523290
中国 广东 东莞
石碣镇西南村石塘贝二街1号3楼
东莞市石碣华旭电子厂
XUEHUA LIU

XUEHUA LIU
DONG GUANG SHI JIE HUA XU ELECTRONICS
NO 1 SHI TANG BEI ST 2
SHI JIE TOWN
DONG GUAN CITY
GUANGDONG 523290 CHINA

Date:	2014/07/01
Subscriber:	100583621
PartySite:	195133
File No:	E468713
Project No:	4786443566
PD No:	14024106
Type:	R
PO Number:	FILE E308726 COPY TO

Subject: **Initial Production Inspection**

PLEASE NOTE: YOU ARE NOT AUTHORIZED TO SHIP ANY PRODUCTS BEARING ANY UL MARKS UNTIL THE INITIAL PRODUCTION INSPECTION HAS BEEN SUCCESSFULLY CONDUCTED BY THE UL FIELD REPRESENTATIVE.

An Initial Production Inspection (IPI) is an inspection that must be conducted prior to the first shipment of products bearing the UL Mark. This is to ensure that products being manufactured are in accordance with UL's requirements including the Follow-Up Service Procedure. After the UL Representative has verified compliance of your product(s), authorization will be granted for shipment of product(s) bearing the appropriate UL Marks as denoted in the Procedure.

Inspections at your plant will be conducted under the supervision of WEIQUN LI, UL INSPECTION CENTER DONGGUAN, CHINA NAT' IMPORT & EXP COM INSP CORP, 6 LI CHENG RD, ZHONGCHANG BLDG, 5TH FL, CHANG PING TOWN, DONGGUAN, GUANGDONG, China, 523565., PHONE: 769-3817017, FAX: 769-3817010, EMAIL: ulic213@ccicgd.com

Marks as needed may be obtained from UL LABEL CENTER GUANGZHOU, ROOM 3402-3407, TIMES PROPERTY CENTER, NO 410 DONGFENG RD MIDDLE, GUANGZHOU, GUANGDONG, China, 510030. PHONE: 208-348-7088, FAX: 208-348-7088, EMAIL: LABELCENTER.GUZ@CN.UL.COM, ATTN: T WEN

Please file revised pages and illustrations in place of material of like identity. New material should be filed in its proper numerical order.

NOTE: Follow-Up Service Procedure revisions DO NOT include Cover Pages, Test Records and Conclusion Pages. Report revisions DO NOT include Authorization Pages, Indices, Section General Pages and Appendixes.

Please review this material and report any inaccuracies to UL's Customer Service Professionals. Contact information for all of UL's global offices can be found at http://www.ul.com/global/eng/pages/corporate/contactus.

If you'd like to receive updated materials FASTER, UL offers electronic access and/or delivery of this material. For more details, contact UL's Customer Service Professionals as shown above., referring to the above Project and/or PD Numbers.

This material is provided on behalf of UL LLC(UL) or any authorized licensee of UL.

SUZ File

UL INSPECTION CENTER 213

Production Date:	UNKNOWN
Contact:	Liu Xue Hua
Phone:	0769-86326518; 13929415838
EMail:	dghuaxu@163.com

ADDENDUM TO TRANSMITTAL LETTER

XUEHUA LIU
DONG GUANG SHI JIE HUA XU ELECTRONICS
NO 1 SHI TANG BEI ST 2
SHI JIE TOWN
DONG GUAN CITY
GUANGDONG 523290 CHINA

Date: 2014/07/01
Subscriber: 100583621
PartySite: 195133
File No: E468713
Project No: 4786443566
PD No: 14O24106
Type: R
PO Number: FILE E308726 COPY TO

Subject: **Initial Production Inspection**

The following material resulting from the investigation under the above numbers is enclosed.

Issue Date	Vol	Sec	Pages	Revised Date
1991/10/09	1	1	Cert of Compliance	
1991/10/09	1	1	Add New Volume	
1992/04/08	1	2	Cert of Compliance	
1992/04/08	1	2	Add New Proc/Report Sect	
1997/01/30	1	3	Cert of Compliance	
1997/01/30	1	3	Add New Proc/Report Sect	
1997/07/24	1	4	Cert of Compliance	
1997/07/24	1	4	Add New Proc/Report Sect	
2002/12/12	1	5	Cert of Compliance	
2002/12/12	1	5	Add New Proc/Report Sect	
2003/12/11	1	6	Cert of Compliance	
2003/12/11	1	6	Add New Proc/Report Sect	
2004/01/05	1	7	Cert of Compliance	
2004/01/05	1	7	Add New Proc/Report Sect	
2004/01/13	1	8	Cert of Compliance	
2004/01/13	1	8	Add New Proc/Report Sect	

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Copy File - E308726 Vol. 1 Sec. 1 through 13 to File - E468713 -Vol. 1 Sec. 1 through 13.
Copy File - E308726 Vol. 4 Sec. 1 and 2 to File - E468713 -Vol. 4 Sec. 1 and 2.
"If there are illegible images in this package, legible images may be found online via MyHome@UL under My UL Reports/CDA."

Follow-Up Service Procedure

DO NOT DISCARD THIS PAGE

It is important to keep UL Procedures and Test Reports up-to-date as new or revised pages are received.
Correct maintenance will decrease the amount of time the UL Representative spends when visiting your facility.

UL LLC offers MyHome @UL, a dedicated website providing secure access to online tools and databases that can help simplify your compliance activities. You can customize your personal MyHome @UL page to include the content needed most, including timely information about certification updates and links to other Web sites you visit regularly. Visit http://my.home.ul.com/ to sign up today!

PAGES (in content order)	FUNCTION	HOW TO UPDATE
Authorization Page	Displays the Product Category, the type of Follow-Up Service (Type R=Reexamination / Type L=Label), the File Number and the Volume Number associated with each Applicant's, Manufacturer's and Listee's company name and address.	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Addendum to Authorization Page*	Lists the additional names and addresses of manufacturing locations, when multiple locations exist	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Listing Mark Data (LMD), Classification Mark Data (CMD) or Recognized Component Mark Data (RCMD) Pages * #	Used only for products covered under Type R Service. Displays the correct LMD, CMD, or RCMD Mark, the Control Number for Listed and Classified categories and additional information regarding minimum size, application, procurement, and any other optional markings, in addition to the UL Mark.	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Multiple Listing (ML) Correlation Sheet*	Correlates product model numbers between those products made by a Manufacturer for the Basic Applicant and those supplied to another company, the Multiple Listee.	Replace, add or delete page(s) with most current "Issued" or "Revised" date.
Index*	Catalogs the contents of the Procedure by some logical means, i.e. Section Number, Report Reference Number, or Issue Date.	Replace present page by matching the UL File Number, Volume Number, Page Number and most current "Revised" date.
Appendices * # **(App.)**	Contains instructions for the Manufacturer and UL Representative concerning specific responsibilities and required periodic tests. May also outline tests to be conducted on samples to be forwarded to UL's facilities.	Replace present page by matching the UL File Number, Volume Number, Appendix letter (eg. App. A), Page Number and most current "Revised" date.
	Standardized Appendix Pages are the same for all manufacturers within a particular product category.	Replace present page by matching the Appendix letter (eg. App. A), Page Number and most current "Revised" date.
Follow-Up Inspection Instructions (FUII) Pages*	Contains information similar to that in the Appendices. FUII Pages are issued as part of the Procedure when a UL Standard is used in conjunction with the Procedure, and are the same for all manufacturers within a particular category.	Replace present pages by matching the Page Number and most current "Issued" or "Revised" date.
Section General * # **(Sec. Gen.)**	Contains description, requirements, identifications and/or specifications that are common to all products covered by the entire volume and supplements the information provided in the Description Section.	Replace present page by matching the UL File Number, Volume Number, Page Number and most current "Revised" date.
Description, or Section (Sec.)*	Contains the specific description of one or more products or systems. This includes written text supplemented by photographs, drawings, etc., as necessary, to define features that affect compliance with the applicable requirements.	Replace present page by matching the UL File Number, Volume Number, Section Number, Page Number and most current "Issued" date.

* The above page(s) may not appear in all UL Follow-Up Service Procedures; UL's Conformity Assessment Services staff determines their inclusion.
\# These pages are combined in the **Generic Inspection Instructions** for International Style Reports, identified, as example by Vol. X1, X2, etc.

PLEASE NOTIFY YOUR LOCAL UL OFFICE OF ANY CHANGES IN CONTACT NAME, COMPANY NAME OR ADDRESS, SO THIS MATERIAL AND IMPORTANT INFORMATION CONTINUES TO BE DELIVERED TO YOUR FACILITY WITHOUT INTERRUPTION.

FOLLOW-UP SERVICE PROCEDURE
(TYPE R)

DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS
(EPBU,EPBU7)

Manufacturer: SEE ADDENDUM FOR MANUFACTURER LOCATIONS

Applicant: (100583-621)
195133 (Party Site)
DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
NO 1 SHI TANG BEI ST 2
SHI JIE TOWN
DONG GUAN CITY
GUANGDONG 523290 CHINA

Listee/Classified Co.: (100583-621)
195133 (Party Site)
SAME AS APPLICANT

This Follow-Up Service Procedure authorizes the above Manufacturer(s) to use the marking specified by UL LLC, or any authorized licensee of UL LLC, including the UL Contracting Party, only on products when constructed, tested and found to be in compliance with the requirements of this Follow-Up Service Procedure and in accordance with the terms of the applicable service agreement with UL Contracting Party and any applicable Service Terms. The UL Contracting Party for Follow-Up Services is listed on addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

UL further defines responsibilities, duties and requirements for both Manufacturers and UL representatives in the document titled, "UL Mark Surveillance Requirements" that can be located at the following web-site: http://www.ul.com/fus and in the document titled "UL and Subscriber Responsibilities" that can be located at the following website: http://www.ul.com/responsibilities. Manufacturers without Internet access may obtain the current version of these documents from their local UL customer service representative or UL field representative. For assistance, or to obtain a paper copy of these documents or the applicable Service Terms, please contact UL's Customer Service at http://www.ul.com/global/eng/pages/corporate/contactus, select a location and enter your request, or call the number listed for that location.

The Applicant, the specified Manufacturer(s) and any Listee/Classified Co. in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable agreement is a Global Services Agreement ("GSA") with an effective date of January 1, 2012 or later and this Follow-Up Service Procedure is issued on or after that effective date, the Applicant, the specified Manufacturer(s) and any Listee/Classified Co. will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of use of the prescribed UL Mark, acceptance of the factory inspection, or payment of the Follow-Up Service fees which will incorporate such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking here: http://www.ul.com/contracts/Terms-After-12-31-2011. In all other events, Follow-Up Services will be governed by and incorporate the terms of your applicable service agreement and this Follow-Up Service Procedure.

It is the responsibility of the Listee/Classified Co. to make sure that only the products meeting the aforementioned requirements bear the authorized Marks of UL LLC, or any authorized licensee of UL LLC.

This Follow-Up Service Procedure contains information for the use of the above Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Manufacturer with the understanding that it will be returned upon request and is not to be copied in whole or in part.

This Follow-Up Service Procedure, and any subsequent revisions, is the property of UL and is not transferable. This Follow-Up Service Procedure contains confidential information for use only by the above named Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Subscribers with the understanding that it is not to be copied, either wholly or in part unless specifically allowed, and that it will be returned to UL, upon request.

Capitalized terms used but not defined herein have the meanings set forth in the GSA and the applicable Service Terms or any other applicable UL service agreement.

UL shall not incur any obligation or liability for any loss, expense or damages, including incidental, consequential or punitive damages arising out of or in connection with the use or reliance upon this Follow-Up Service Procedure to anyone other than the above Manufacturer(s) as provided in the agreement between UL LLC or an authorized licensee of UL LLC, including UL Contracting Party, and the Manufacturer(s).

UL LLC has signed below solely in its capacity as the accredited entity to indicate that this Follow-Up Service Procedure is in compliance with the accreditation requirements.

William R. Carney
Director
North American Certification Program

LOCATION

195133 (Party Site)
(100583-621) DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
NO 1 SHI TANG BEI ST 2
SHI JIE TOWN
DONG GUAN CITY
GUANGDONG 523290 CHINA
Factory ID: None
UL Contracting Party for above site is: UL AG

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

LISTING MARK

The Listing Mark consists of four elements placed in close proximity and shall appear on Listed products only. Minimum size is not specified, as long as the Listing Mark is legible. The following is suggested.

LISTED
(PRODUCT IDENTITY)
XXXX

XXXX = The control number assigned by UL, E468713.

The minimum height of the registered trademark symbol ® shall be 3/64 of an inch. When the overall diameter of the UL Mark is less than 3/8 of an inch, the trademark symbol may be omitted if it is not legible to the naked eye.

The product identity is: "CLASS 2 POWER SUPPLY," "CLASS 2 TRANSFORMER," “CLASS 2 POWER UNIT,” “CLASS 2 BATTERY CHARGER,” or appropriate product identities, as shown in the individual Listing. The word "Transformer" may be abbreviated "XFMR,""XFRMR" or "XFORMER."

The product identity may be omitted if the Mark is directly and permanently applied to the product by stamping, molding, ink-stamping, silk screening or similar process. The product identity may appear elsewhere on the product if the other three elements are part of the nameplate which includes the rating or the catalog or model designation.

Separable Listing Mark (not part of a nameplate and in the form of decals, stickers or labels) will always include the four elements.

The manufacturer may reproduce the Mark or obtain it from a UL authorized supplier. The list of UL authorized label suppliers can be found on UL’s online directory at www.ul.com.

Canadian Listing Mark Data Page (CLMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

LISTING MARK

The Listing Mark consists of four elements placed in close proximity and shall appear on Listed products only. Minimum size is not specified, as long as the Listing Mark is legible. The following is suggested. (If only Canadian coverage is authorized, use only the C-UL Symbol).

UL Symbol to the left and the C-UL Symbol to the right.

Alternatively, the Canadian/US Mark may be used. The UL Symbol with "C" to the left and "US" to the right.

XXXX = The control number assigned by UL, E468713.

The minimum height of the registered trademark symbol ® shall be 3/64 of an inch. When the overall diameter of the UL Mark is less than 3/8 of an inch, the trademark symbol may be omitted if it is not legible to the naked eye.

The product identity is: "CLASS 2 POWER SUPPLY," "CLASS 2 TRANSFORMER," "CLASS 2 POWER UNIT," "CLASS 2 BATTERY CHARGER," or appropriate product identities, as shown in the individual Listing. The word "Transformer" may be abbreviated "XFMR,""XFRMR" or "XFORMER."

The product identity may be omitted if the Mark is directly and permanently applied to the product by stamping, molding, ink-stamping, silk screening or similar process. The product identity may appear elsewhere on the product if the other three elements are part of the nameplate which includes the rating or the catalog or model designation.

Separable Listing Mark (not part of a nameplate and in the form of decals, stickers or labels) will always include the four elements.

The manufacturer may reproduce the Mark or obtain it from a UL authorized supplier. The list of UL authorized label suppliers can be found on UL's online directory at www.ul.com.

INDEX

Product	Model No.	USL	CNL	Sec.	Report Date
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	GP3509200D,	X			
	GP3530005D	X			
	GP357.5100D	X			
	GP3506500A	X			
	GP3509200A	X			
	GP3530005A	X			
	GP3512200D	X			
	GP3512300A	X			
	GP4103750D	X			
	GP4116250A	X			
	GP4116500A	X			
	GP4112500D	X			
	GP4118200D	X			
	GP3503800D	X			
	GP3503260D	X			
	GP3506200D	X			
	GP3505500D	X			
	GP3505500D	X			
Direct Plug-In Transformers	GP3520200A	X		2	1992-04-08
	GP4106001D	X			
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	GP4109300D	X			
	GP4813.5780D	X			
	GP4813.51000D	X			
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	GP48091000D	X			
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	GP48091500D	X			
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Cord Connected Class 2 Power Unit	GPA-66-1577	X		3	1997-01-30
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STANDARDIZED APPENDIX PAGES
Subject 1310

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

STANDARDIZED APPENDIX PAGES

TABLE OF CONTENT

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

APPENDIX A - FIELD REPRESENTATIVE'S RESPONSIBILITIES AND INSTRUCTIONS FOR EXAMINATION OF THE PRODUCT

FIELD REPRESENTATIVE'S RESPONSIBILITIES

The Field Representative’s responsibilities include, but are not limited to:

Examine the construction of production bearing, or intended to bear, the UL Mark or Markings to determine compliance with the description of the product and any other requirements expressed in this Procedure.

Where so specified by Appendix B, select samples to be forwarded to the appropriate UL Testing Laboratory for Follow-Up Tests. The packaging and shipment of samples are the responsibility of the manufacturer.

Where so specified by Appendix D, inspect the test records and facilities of the manufacturer to verify that:

a. The proper number of samples are undergoing the required tests,

b. The required tests are being performed correctly and appropriate records are maintained,

c. The proper information is being recorded and is up-to-date,

d. The instruments being used for the tests have been calibrated at the prescribed interval and are in good working order.

Report to the manufacturer and the UL Responsible Office by means of a Variation Notice (VN) if:

a. Variations in construction are found,

b. The manufacturer's method and/or frequency of test is not as described,

c. The records maintained by the manufacturer are not as described,

d. The manufacturer's inspection program is not being performed as described,

e. The manufacturer’s test equipment is not properly calibrated, calibrations are not conducted at the prescribed frequency, or calibration certificates/records do not contain all required information. (Note: Variation Notices written for these issues are to be handled under Field Representative control.).

f. The calibration of the equipment before any adjustments are made is outside of the required tolerance (equipment manufacturer’s accuracy specification), or the equipment is determined to be non-operational, discovered to be defective, or has other features that could affect the validity of previous measurements/test results. (Note: for these issues, the VN shall be issued under a Temporary Acceptance status for analysis by the Variation Notice Handling Office).

g. Nonconforming test results are witnessed during tests conducted specifically for the Field Representative.

Explain to the manufacturer that a Variation Notice is a means of communication with the manufacturer and forms a record of those items where nonconformance with the Procedure has been encountered.

PROCEDURE IN THE EVENT OF NONCONFORMANCE

When a product does not comply with the Follow-Up Service Procedure require that the manufacturer shall either:

a. Remove any markings referencing UL from the product, or obliterate these markings where the marking is imprinted, die-stamped, molded, etc., or

b. Modify all products to bring them into compliance with the Follow-Up Service Procedure, or

c. Hold shipment pending further instructions from UL.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

It is the manufacturer’s responsibility to forward a copy of the Variation Notice to the Applicant. If the rejection of the product is questioned by the manufacturer and Applicant, the material may be held at the point of inspection, typically at the factory, pending an appeal. The manufacturer has the right to appeal a decision with which they disagree. Appeals of technical decisions and held shipments should be directed to the Variation Notice Handling Office. To resolve issues involving variations in construction, the manufacturer and Applicant may also be offered the option of contacting a Customer Service Professional.

Should UL grant temporary authorization for the continued use of the UL Mark, such temporary authorization shall only be for the time needed to review and/or process the Procedure revisions, or as otherwise specified to cover a particular lot or production run.

When it is decided that UL Marks are to be removed from products, the manufacturer shall demonstrate that all marks referencing UL are removed from the affected material. Those marks referencing UL not destroyed during their removal from the product shall be retrieved from the manufacturer’s control by the Field Representative and either (1) held until the manufacturer demonstrates adequate control of their production to assure the application of the Mark to only those products that comply with requirements, (2) returned to the supporting UL Label Center, or (3) destroyed.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

APPENDIX B - INSTRUCTIONS FOR FIELD REPRESENTATIVE'S SAMPLE SELECTION

RESERVED FOR FUTURE USE

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

APPENDIX C - INSTRUCTIONS FOR FOLLOW-UP TESTS AT UL

RESERVED FOR FUTURE USE

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

APPENDIX D - MANUFACTURER' S RESPONSIBILITIES, CONSTRUCTION CONSIDERATIONS, AND REQUIREMENTS FOR FACTORY TESTS

The Follow-Up Service Procedure covering the product is loaned to the manufacturer and constitutes the basis on which the product is judged for compliance with the applicable requirements.

MANUFACTURER' S RESPONSIBILITIES

The manufacturer's responsibilities include, but are not limited to:
Control of the UL Mark - Restrict the use of markings that reference UL (either directly by use of the name, an abbreviation of it, or the UL symbol, Classification Mark or Recognized Component Mark, or indirectly by means of agreed-upon markings that are understood to indicate acceptance by UL) to those products that are found by the manufacturer's own inspection to comply with the Follow-Up Service Procedure description. Use of such markings is further limited by the agreements that have been executed by the Subscriber and UL. Confine the application of markings referencing UL to the location or locations authorized in these Appendix Pages or the Follow-Up Service Procedure.

Access to Factory - During hours in which the factory is in operation, provide the Field Representative with free access to any portion of the premises where the product or components thereof are being fabricated, processed, finished or stored, and to the test areas when testing is required in this document. The Field Representative shall be permitted to inspect and witness prescribed tests, prior to shipment, any product bearing or intended to bear markings referencing UL. If product disassembly is required, it shall be undertaken by the manufacturer. Tests required, as part of this Procedure, shall be conducted by the manufacturer.

Corrective Action –_Perform a root cause analysis of nonconforming test results reported by UL in order to determine and implement appropriate corrective actions. Upon request, the manufacturer shall submit the findings of their analysis and action plan for review and/or monitoring by UL. For those cases involving questionable test and measuring equipment, the manufacturer shall evaluate and document the effects of the equipment on previous inspections or tests. The manufacturer shall evaluate if the equipment condition could have significantly affected previous inspection or test results and take corrective action as appropriate. The equipment in question shall be removed from service by segregation or prominent labeling and marking.

Production-Line Tests - Conduct the Factory Tests detailed in Appendix D.

Required Records - Maintain records of test performance. Unless indicated otherwise in the Procedure, the information to be recorded should include the model or catalog number, identification of the product, the test conducted, the test date, and the results. The record for a specific lot or group of products may consist only of a statement, without specific details, that the entire lot or group was tested and found acceptable. Generally, a form record sheet should be used to assist in and expedite the record-keeping task. Records are to be retained for at least 6 months and shall be readily available for review by the Field Representative. Note: It is not necessary to keep complete test records when 100% of production is tested, if the manufacturer has an auditable system in place to confirm that production is always subjected to the required tests. Instead, exception reports indicating noncompliance and corrective action should be retained.

Test Equipment and Personnel - Provide, at a convenient location, all required test equipment and facilities and any required personnel for conducting all tests that are to be performed at the factory. These shall be available when needed so that the inspection work can proceed without undue delay.

Test and Measuring Equipment and Standards Calibration – The Manufacturer shall determine daily that test equipment is functioning properly. In addition,

a. Unless specified elsewhere in the Follow-Up Services Procedure, all test and measuring instruments required as part of the Follow-Up Services Procedure or used by Field Representatives in the conduct of inspection activity at the factory shall be calibrated yearly (or whenever it has been subject to abuse such as dropped or struck with an object, or its accuracy is otherwise questionable) for its intended use. Exception 1 -Instruments used as part of processing equipment, i.e. equipment used in the manufacturing of the product, are not generally subject to this calibration requirement unless specifically noted otherwise elsewhere in the Follow-Up Services Procedure. Exception 2 – Measuring equipment such as steel rules, tape measures, protractors, and radius gauges typically only need in-service checks to verify their fitness for use.

b. For in-house calibrations of weights and gauge blocks, the Standard used for the calibrations shall only be used for calibration purposes and be calibrated by a competent body every three years, or whenever the Standard has been subject to some form of abuse that may affect the Standard’s fitness for use.

c. For other Standards (such as Voltmeters), the Standard shall only be used for calibration purposes and be calibrated by a competent body yearly or in accordance with the equipment manufacturer’s specifications, as well as, whenever the Standard has been subject to some form of abuse that may affect the Standard’s fitness for use.

d. All Standards shall be stored per the Standard manufacturer’s recommendations to protect them from damage or deterioration.

d. The calibrated test and measuring equipment, and the Standards used for in-house calibration, should be provided with a label or the like indicating the next calibration due date. The manufacturer must keep records of calibrations. The records are to include information equivalent to that noted in item f.

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(EPBU, EPBU2)

f. When calibration service providers are utilized, who are accredited to ISO 17025 and where the calibration certificates show evidence of this accreditation, it is only necessary for the Field Representative to verify that the instrument is covered by the certificate, is within the calibration period and has been calibrated for the measurements for which it will be used. For calibration service providers who are not accredited to ISO 17025 (including in-house calibrations), the Field Representative shall verify the following information on the certificates provided (or records maintained for in-house calibrations):

  1. Title, e.g. “Calibration Certificate”, “Calibration Report”, etc. (or equivalent)
  2. Name and address of laboratory, and the location where the calibration was carried out, if different from the address of the laboratory.
  3. Unique identification of the certificate (such as serial number), and on each page, an identification in order to ensure each page is part of the calibration certificate with a clear indication of the end of the calibration certificate (such as page numbers and total pages – Page X of Y)
  4. Name and address of customer
  5. Description of the condition of the item calibrated (e.g., received out of calibration, damaged, etc.)
  6. Date(s) of performance of the calibration.
  7. Model number and serial number of the item calibrated or other unambiguous identification of the item calibrated.
  8. The measured value(s) of the calibration with units of measurement(s).
  9. A signature and title, or equivalent identification of the persons authorizing the calibration certificate.
  10. Where relevant, a statement to the effect that the results relate only to the items calibrated.
  11. Evidence that the measurements are traceable to national/international standards.

g. There should not be any alteration to the calibration data/results without laboratory authorization).

h. When the certificate or report contains results of calibrations performed by subcontractors, these results shall be clearly identified.

Samples for Follow-Up Testing at UL - If Appendix B specifies that samples are required to be forwarded to UL for Follow-Up Testing, the manufacturer shall forward the samples selected by the Field Representative, to the specified UL Testing Laboratory, within five working days of the Field Representative’s inspection visit. Packaging and shipment of the samples are the responsibility of the manufacturer.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

SPECIAL REQUIREMENTS

Special requirements that may also apply to some or all of the products covered by this Procedure include the following:

1. Power Supply Cords

Non-Detachable Power Supply Cord -

A non-detachable power supply cord as described in the individual sections of the Procedure must be provided and shipped with the unit in all cases. The power supply cord and any alternatives must be described in each Procedure section or Section General.

Detachable Power Supply Cord -

The detachable power supply cord as described in the individual sections of the Procedure may or may not be shipped with the unit. Use the guidelines in Table 1 in assisting the manufacturer to apply the alternatives under each of the situations described in the notes to Table 1. Table 1 also includes alternative detachable power supply cords that may be shipped with units intended for use outside the USA and/or Canada.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

TABLE 1 - DETACHABLE POWER SUPPLY CORD REQUIREMENTS

The requirements for detachable power supply cords depend on whether the cord is provided.

This table, along with the following notes, details the requirements for each of the possible situations.

Status of Detachable Power Cord	
Provided	Not Provided
Note A or D	(Notes B and C) or (Notes B and E)

NOTE:

A. The power supply cord should be as described in the Procedure section.

B. A marking must be provided adjacent to the appliance coupler or at an equivalent location either to inform the user on proper selection of the power supply cord or to see the instruction manual for this information. This marking may be in the form of a tag, nonpermanent label, or product insert that is provided on or packaged with the product so that the marking is visible at the time of installation.

C. The marking (tag, label, or product insert) or instruction manual must contain complete instructions concerning selection of the proper power supply cord. The reference to the power supply cord must be of a UL Listed detachable power supply cord consisting of the specific configuration of appliance coupler, the cord type, and the electrical rating of the power supply cord as described in the appropriate sections of the Procedure. Refer to Table 2 for equivalent types of cords.

D. The manufacturer is to supply the Field Representative with information that allows the Field Representative to verify that the products are intended to be sold outside of the USA and/or Canada and that the cord is certified or similarly appropriate for use in the destination country.

E. The reference to the power supply cord (see Note B) shall include instructions for selection of the proper power supply cord as in the destination country other than the USA or Canada.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

TABLE 2 - EQUIVALENT CORDS

Basic Cord Type	Other Suitable Types
TS	TST
SP-2	SPE-2, SPT-2
SP-3	SPE-3, SPT-3
SV	SVE, SVO, SVOO, SVT, SVT0, SVTOO
SJ	SJE, SJO, SJOO, SJT, SJTO, SJTOO
S	SE, SO, SOO, ST, STO, STOO

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

REQUIREMENTS FOR FACTORY TESTS

The following Production-Line Tests shall be conducted on products covered by this Procedure. During production, test equipment shall be checked for proper operation at least once daily.

A. Production-Line Dielectric Voltage-Withstand Test

General - Except as may be noted under Exceptions in Sp. App. D, the manufacturer shall subject 100 percent of production of all products to a routine Production-Line Dielectric Voltage-Withstand Test in accordance with the following.

Test Equipment - The equipment shall provide the following features.

1. The test equipment shall have a means of indicating the test potential, an audible or visual indicator of electrical breakdown, and, if for automated or station type operations, either a manual-reset device to restore the equipment after electrical breakdown or an automatic-reject feature for any nonconforming unit (appliance). When an ac test potential is applied, the test equipment shall include a transformer having an essentially sinusoidal output.

2. When the rated output of the test equipment is less than 500 volt-amperes, the equipment shall include a voltmeter in the output circuit to directly indicate the applied test potential.

3. When the rated output of the test equipment is 500 volt-amperes or more, the test potential may be indicated by (1) a voltmeter in the primary circuit or in a tertiary-winding circuit, (2) by a selector switch marked to indicate the test potential, or, (3) in the case of equipment having a single test-potential output, by a marking in a readily visible location to indicate the test potential. If an indicating voltmeter is not used, the test equipment shall include a visual means, such as an indicator lamp, to indicate that the test voltage is present at the test-equipment output.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

Method - Each unit shall withstand without electrical breakdown the application of an ac potential at a frequency within the range of 40-70 Hz between (1) the primary wiring, including connected components, and accessible dead metal parts, and (2) between the primary wiring, including connected components, and output circuits. If indicated on Sp. App. D page 1, the test potential shall also be applied between primary circuits and the inaccessible transformer core.

For the test, either a sufficient number of control devices are to be closed or separate applications of the test potential are to be made so that all parts of the primary circuit are tested.

The unit may be at intended operating temperature, at room temperature, or at any intermediate temperature for the test.

The test duration and potential shall be:

A. 1000 Vac for 60 seconds, or

B. 1200 Vac for one second.

The test potential may be gradually increased to the minimum required value but the full test potential value is to be applied for the specified test duration.

The test shall be conducted when the unit is fully assembled. It is not intended that the unit be rewired, modified, or disassembled for the test.

Exception No. 1: Parts such as snap covers or friction-fit knobs that interfere with performance of the test need not be in place.

Exception No. 2: The test may be performed before final assembly if the test represents that for the completed unit. Any component not included shall not affect the results with respect to determination of possible electric shock from miswiring, defective components, nonconforming spacings, and the like.

Exception No. 3: The test need not be performed using the power supply cord provided with the product. However, if the manufacturer's test method employs a test power supply cord, then the continuity of the test power supply cord conductor connections shall be checked once daily.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

When authorized by the Exceptions in Sp. App. D, solid-state components that might be damaged by a secondary effect (induced voltage surge, excessive heating, and the like) of the test may be short-circuited by means of a temporary electrical jumper, or the test may be conducted without the component electrically connected, providing the wiring and terminal spacings are maintained. Additionally, transient voltage suppression devices other than capacitors connected from primary wiring to dead metal may be disconnected during the test.

Basis for Acceptability: All products shall withstand the applied potential without electrical breakdown.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

B. Production-Line Grounding Continuity Test

General - Except as may be noted on any Exceptions page included with Sp. App. D, the manufacturer shall subject 100 percent of all products intended to be grounded to a grounding continuity test.

Test Equipment - Any suitable continuity indicating device (such as an ohmmeter, a battery and buzzer combination, or the like) may be used to determine compliance with the Grounding Continuity Test requirements. Additionally, commercial ground continuity testers that pass a current through the grounding path may be used to determine compliance with the same requirements.

Method -

Cord-Connected Units: Grounding continuity shall be determined between the grounding conductor of the attachment plug cap, and/or the designated main grounding point and accessible dead-metal parts of the product, using the test equipment indicated above.

Direct Plug-In Units: Grounding continuity shall be determined between the ground pin and accessible dead-metal parts of the product, using the test equipment indicated above.

Basis for Acceptability - Grounding continuity shall be confirmed between the parts specified.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

PRODUCTS WHICH REQUIRE PRODUCTION DIELECTRIC TEST BETWEEN
PRIMARY CIRCUIT PARTS AND INACCESSIBLE TRANSFORMER CORE
(see Method, Page 4)

Product Designation	Procedure Section or Date

Direct Plug-In and Cord-Connected Class 2 Power Units (EPBU, EPBU2)

Test Equipment

Production-Line Dielectric Voltage-Withstand Test - The manufacturer may use the equipment listed below for this test. See Appendix D, Page 3, for acceptance of any alternate test equipment.

Manufacturer	Model/Cat. No.
------	**Verified by Field Representative**

Exceptions

Production-Line Dielectric Voltage-Withstand Test

1. Production-Line Dielectric Voltage-Withstand Test Voltages - For products which have specific testing conditions, the voltage to be used for the Production-Line Dielectric Voltage-Withstand Test on 100% of production is specified below.

Procedure Section or Date	Product Designation	Potential V ac	Test Potential V dc	Time Test Seconds	Applied Between

Comments:

2. Production Exempt From Production-Line Dielectric Voltage-Withstand Test - Based on engineering judgement, this test is not required to be performed on the following products.

Product Name	Product Designation	Procedure Section or Date
N/A	-	-

3. Components Exempt From Production-Line Dielectric Voltage-Withstand Test - The following components may be disconnected from the remainder of the circuitry during the performance of this test.

Product Name	Product Designation	Component Designation	Procedure Section or Date	Fig., Item, Ill.

Direct Plug-In and Cord-Connected Class 2 Power Units
(EPBU, EPBU2)

Exceptions

Production-Line Grounding Continuity Test

Based on engineering judgement, this test is not required to be performed on the following products.

Product Name	Product Designation	Procedure Section or Date

GENERAL

PRODUCT COVERED:

Direct Plug-In and Cord-Connected Class 2 Power Units.

*

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE USE):

Products designated USL have been investigated using requirements contained in the Standard for Class 2 Power Units, UL1310

Products designated CNR have been investigated to Canadian requirements using requirements contained in the Canadian Standard for Power Supplies with Extra-Low-Voltage Class 2 Outputs, CAN/CSA, C22.2 No. 223-M91.

"CN" indicates that the component has been evaluated to Canadian requirements. The Field Representative shall confirm that the component has a Canadian UL Listing or Recognition Mark, a CSA Certification Mark or an equivalent identifier. If the Power Unit does not bear the C-UL or C-UR Mark, the CN reference should be disregarded.

Circuit Designation -

Primary Circuit (PRI) - indicates an internal circuit that is directly connected to the external supply mains or other equivalent source which supplies the electric power.

Secondary Circuit (SEC) - indicates a circuit which has no direct connection to primary power and derives its power from a transformer, converter, or equivalent isolation device situated within the equipment, and does not exceed Class 2 Voltage, Current, and Power Limitations.

MARKINGS:

Application -

1. Markings are molded, die-stamped, paint-stenciled, stamped or etched in metal or indelibly stamped or printed on pressure-sensitive label secured by adhesive.

2. Unless otherwise specified, pressure sensitive labels which contain any of the required markings shall be R/C (PGDQ2) / CN suitable for minimum 80°C and for the surface material or finish to which adhered.

Product Marking - All units shall be marked with the following.

1. Listee's name, Listee File Number, or trademark as specified in Note 1 below.

2. Model designation.

3. Electrical ratings, including input voltage or voltage range, input frequency and, if specified in the individual Reports, input amperes, volt-amperes or wattage rating. Additionally, output voltage in ac or dc and output current in amperes, volt-amperes or watts shall be marked, unless the unit is a battery charger marked for use with a specific battery pack.

4. Output polarity (Note 2).

5. Date code (Note 3).

6. Factory identification if applicable.

7. Product Identification and Use. A unit shall be marked with one of the following terms, as applicable. See individual Reports.

   a) "Class 2 Transformer,"
   b) "Class 2 Power Supply," or
   c) "Class 2 Power Unit."

Note 1: The following marking or trademark may be used to identify the Listee:
Reserve for future use.

Note 2: The polarity of a direct current output shall be plainly marked unless the unit is provided with a polarized output termination.

Note 3: Date Code - Consist of a four digit code. The first two digits represent the year of manufacture. The last two digits represent the month of the year of manufacture.

Example: 0210 = October, 2002.

Cautionary Markings - Shall include the following:

″CAUTION″ and ″Risk of electric shock″ and the following: ″Dry location use only″ or ″Do not expose to liquid, vapor, or rain.″ (Note 4)

See also individual Reports.

A cautionary marking shall be located on a part that cannot be removed without impairing the operation of the unit, or it may be provided on a permanent tag secured to the output or input cord.

The tag shall be of cloth, plastic or other durable material and large enough to accommodate the required marking. The tag may be either a flat tag with a hole large enough for the cord but not so large that it can be easily torn from the cord, or the tag may be an adhesive back, flag-type tag wrapped tightly around the cord. The ends of the tag are to adhere to each other and form the flag.

Markings on a tag are to be printed in contrasting colors on a background other than blue or yellow.

The tag shall be marked "Do Not Remove This Tag" or the equivalent in letters minimum 2.4 mm (3/32 in.) tall.

Note 4: The words "CAUTION", "WARNING", and/or "DANGER" shall be in letters not less than 3.2 mm (1/8 in.) tall, remaining letters not less than 1.6 mm (1/16 in.) tall.

For multiple voltage rated power units intended for use by travelers, an instruction manual or informative sheet must be provided to include the statement of:

″IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS″ and “DANGER – TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CAREFULLY FOLLOW THESE INSTRUCTIONS″ in letters of 1/8 inch (3.18 mm) high or in a readily visible contrasting text.

a) "Be sure voltage selector is in correct voltage position before plugging in." The instructions shall also specify the procedures to follow for changing the voltage selector.

b) "For use in the U.S.A., the voltage selector switch must be placed in the 120 volt position. For use in countries other than the U.S.A., the voltage selector may need to be placed in other than the 120 volt position. Confirm the voltage available at each country location before using the product."

c) "For connection to a supply not in the U.S.A., use an attachment plug adapter of the proper configuration for the power outlet."

*

These instructions are effective after May 3, 2007.

For multiple voltage rated power units intended for use by travelers, the following marking will be provided "See instruction manual for use in countries other than the U.S.A." This marking is effective after May 3, 2007.

A battery charger shall be marked "Backfeed Protection", "BFP", or the equivalent. This marking is effective after May 3, 2007.

Instruction Manual – The operating orientation of a direct plug-in power unit shall be indicated in the instructions as follows:

"This power unit is intended to be correctly orientated in a vertical or floor mount position." or equivalent wording.

Alternate - Same as above except to indicate in the product and/or individual marketing container of the product.

CONSTRUCTION DETAILS:

General - Unless otherwise described in the individual Reports, the following paragraphs apply to all products included in this Procedure.

Blades - Folded over or solid, copper, brass or bronze. Located minimum 5.1 m **for USL units and 8 mm for CNL units** from edge of enclosure. See Sec. Gen., ILL. 1 for dimensions, spacing and relative location of blades.

Abbreviations –

Sec. Gen.	**– Sectional General**
R/C	**- Recognized Component**
USL/USR	**- United States, Listed/Recognized**
CNL/CNR	**- Canadian Standard, Listed/Recognized**

Spacings - Minimum spacings between live parts of opposite polarity and between live and dead-metal parts shall be as specified below:

SPACINGS IN UNITS HAVING OPENINGS IN THE ENCLOSURE		
Potential Involved, Volts, rms	Through-Air mm (inch)	Over-Surface mm (inch)
50 or less	1.6 (1/16)	1.6 (1/16)
51 - 150	3.2 (1/8)	6.4 (1/4)
151 - 250	6.4 (1/4)	9.5 (3/8)

SPACINGS IN UNITS WITHOUT OPENINGS IN THE ENCLOSURE		
Potential Involved, Volts, rms	Through-Air mm (inch)	Over-Surface mm (inch)
50 or less	1.6 (1/16)	1.6 (1/16)
51 - 150	1.6 (1/16)	1.6 (1/16)
151 - 250	4.8 (3/16)	4.8 (3/16)

Segregation - Insulated conductors of different circuits shall be provided with spacings as specified above unless both circuits are insulated for the highest voltage involved. Insulated conductors shall be maintained away from bare live parts of different circuits, sharp edges, and heat producing components by routing or clamping.

Alternate - Segregation may be maintained by use of a barrier. Refer to the individual Reports for details concerning barrier.

Class 2 Secondary Circuit Spacings - Not specified as spacings are based on Dielectric voltage-Withstand Tests.

Printed Wiring Boards - Unless designated as "SEC", all printed wiring boards (PWB), shall be R/C (ZPMV2) with a minimum flammability rating of 94V-2 for units without openings, 94V-1 for units with openings, and have a minimum operating temperature rating of 90°C. Also, the solder time and temperature of any wave soldering machines shall not exceed the values indicated in the Component Recognition Report or Directory. Hand soldered boards shall be examined for charring, burned areas or other damage.

See also the individual Reports for additional requirements or instructions that may supersede these instructions.

Internal Wiring - Unless otherwise specified, internal wiring shall be R/C (AVLV2)/CN, with insulation minimum 0.8 mm thick and rated minimum 300 V, 80°C minimum.

Electrical Connections - Electrical connections may be accomplished by soldering or use of wire connectors.

Wire connectors or terminals, shall be Listed or Recognized (ZMVV2), suitable for the type, size and number of conductors and applied using the tool recommended by the connector manufacturer. Additionally, terminals shall be of the closed loop, or spade type with upturned ends.

Quick connect terminals shall be Listed with integral detent or locking type, suitable for the type, size and number of conductors and applied using the tool recommended by the connector manufacturer.

Solder connections shall be mechanically secured prior to soldering. Printed wiring assemblies may be wave soldered.

Insulation Tubing/Sleeving - Unless otherwise specified, R/C (YDPU2)/CN; (YDRY2)/CN ; (YDTU2)/CN; (UZFT2) or (UZKX2)/CN, rated minimum 90°C, 300 V.

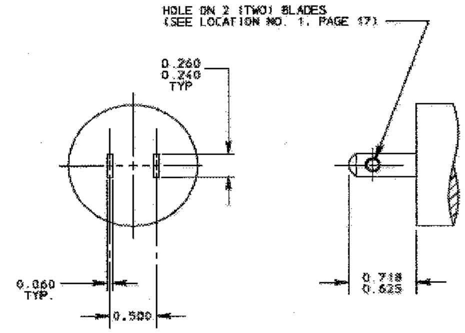
Wire Positioning Devices - Unless otherwise specified, R/C (ZODZ2)/CN, rated minimum 60°C.

Corrosion Protection - Iron and steel parts shall be protected against corrosion by painting, plating, galvanizing or enameling.

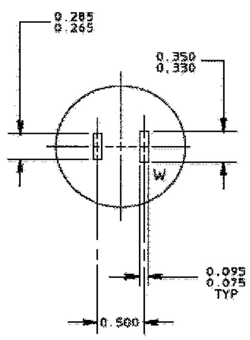
Exception: Laminations and small parts of iron or steel such as washers or screws that are not current carrying parts do not require corrosion protection.

*

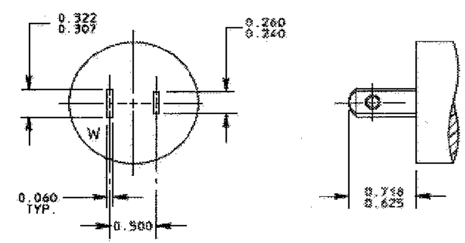
FIGURE 1–15
PLUG AND RECEPTACLE
125 volts, 15 amperes, 2 pole, 2 wire



NON–POLARIZED PLUG



RECEPTACLE



POLARIZED PLUG

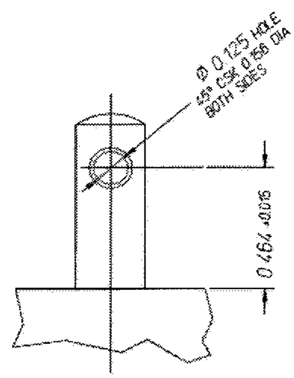
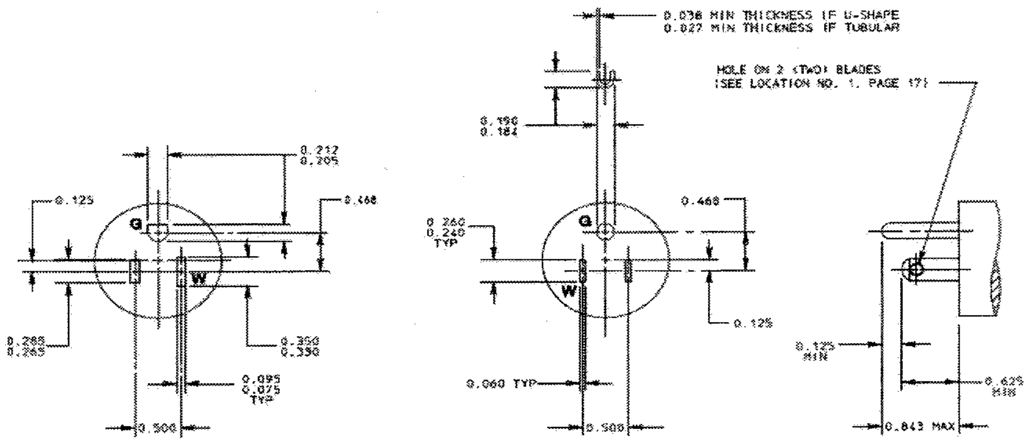


FIGURE 5-15
PLUG AND RECEPTACLE
125 volts, 15 amperes, 2 pole, 3 wire, Grounding type



RECEPTACLE **PLUG**

1. All dimensions are in inches, unless otherwise specified.
2. Decimal dimensions without tolerances shall be subject to a plus or minus 0.005-inch tolerance.
3. Angular dimensions without tolerances shall be subject to a plus or minus 1 degree tolerance.
4. "G" denotes equipment ground.
5. "W" denotes system ground.
6. Leading edges of plug blades shall be free of burrs and sharp edges.
7. All slots and slot tolerances are symmetrically located about centerlines.
8. Female contacts associated with plug blades that are 0.125 minimum longer than other blades are engaged prior to the other female contacts.

D E S C R I P T I O N

PRODUCT COVERED:

USL - Direct plug-in Class 2 transformers, Models GP3506150D, GP3506500D, GP357.5100D, GP3509200D, GP3530005D, GP4103750D, GP4112500D, GP4116250A, GP4116500A, GP4118200D, GP3506500A, GP3509200A, GP3512200D, *GP3512300A, GP3503800D, and GP3506200D, GP3503260D, GP3505500D.

GENERAL CHARACTER:

The devices covered by this Report are direct plug-in transformer units.

The units covered by this Report consists of a transformer and other related electronic circuitry housed in a thermoplastic enclosure. The units are provided with parallel type blades for insertion in a standard parallel blade receptacle. The output cord is provided with a nonstandard polarized connector.

USL - Indicates investigation to the U.S. Standard for Safety of Class 2 Power Units, UL 1310, Fifth Edition.

ELECTRICAL RATINGS:

	Input, W	Hz		Output	
(Model)(Type)	V	W	Hz	V	mA
GP3506150D	120	4	60	6 V dc	150
GP3506500D	120	8	60	6 V dc	500
GP357.5100D	120	1.5	60	7.5 V dc	100
GP3509200D	120	6	60	9 V dc	200
GP3530005D	120	1.5	60	30 V dc	5
GP4103750D	120	8	60	3.0 V dc	750
GP4112500D	120	12	60	12.0 V dc	500
GP4116250A	117/120	8	50/60	16 V ac	250
GP4116500A	120	12	60	16 V ac	500
GP4118200D	120	8	60	18 V dc	200
GP3506500A	120	8	60	6 V ac	500
GP3509200A	120	6	60	9 V ac	200
GP3512200D	120	8	60	12 V dc	200
GP3503800D	120	7	60	3 V dc	800
GP3506200D	120	3	60	6 V dc	200
GP3503260D	120	4	60	3 V dc	260
*GP3505500D	120	7	60	5 V dc	500

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity, between live and dead-metal parts (and between live parts and a metal enclosure) shall be as indicated below:

	Minimum Spacings, in (mm)	
V rms	Through Air and Over Surface	Shortest Distance to Metal Enclosure
150 or less	1/16 (1.6)	1/4 (6.4)
151-250	3/16 (1.8)	1/4 (6.4)

Class 2 Secondary Circuit Spacings - Not specified, spacings are based on Dielectric Withstand Tests.

Marking - Permanently ink-stamped, hot-stamped, silk-screened or provided as label, label employed is covered as a Recognized Component marking and labeling system suitable for application to polyphenylene oxide and having a min operating temperature of 80°C.

Information Marking - Indicates company name, model number, date of other dating period of manufacture, cautionary statements, and electrical ratings including: Input voltage, frequency, and watts; Output voltage and current dc.

Cautionary Markings - The "CAUTION" or "WARNING" in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - The date code consists of a four digit code. The first two digits represent the last two digits of the year of manufacture. The last two digits represent the month of the year of manufacture.

Example: 9006 = June, 1990.

The following markings are provided:

* "Class 2 Transformer"

* “CAUTION: Risk of electric shock”
and
“Dry location use only”
or
“Do not exposure to liquid, vapor or rain”
or the equivalent

Internal Wiring - Unless otherwise specified, all internal wiring is Recognized Component appliance wiring material (AVLV2), insulation 1/32 in (0.8 mm) thick minimum, rated 600 V, 105°C minimum (UL Style 1015), or 1/64 in (0.4 mm) thick cross-linked PVC insulation.

Segregation - Insulated conductors of difference circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge, and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - Recognized Component tubing (YDPU2) and/or sleeving (UZFT2) rated 300 V, 105°C minimum.

Printed Wiring Boards - Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flammability rating of 94HB and an operating temperature rating of at least 105°C.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Enclosure Assembly - All models. Case and cover constructed from Recognized Component plastic material (QMFZ2), Cycolac KJW-R or Lexan 141R manufactured by GE Plastic or Polycarbonate Type S-2000 manufactured by Mitsubishi Gas Chemical Co. Inc. Case and cover secured together by high frequency (sonic) welding (or solvent cement).

Electrical Schematic - Refer to Ill. 1 and 1A.

Blade - Dimensions, spacings, and relative location of blades and grounding pin shall be as detailed in Ill. 2.

Instruction Manual – See Section General, Instruction Manual

Model Differences

Models GP3506500A, and GP3509200A are constructed similar to Models GP3506500D, GP3509200D and GP3530005D except that the models ending in A are not provided with diodes.

Model GP3512200D is similar to Model GP3506500D, except for output rating.

Models GP4103750D and GP4112500D is similar to Model GP3506500D except for output ratings.

Model GP3503800D is similar to Model GP3512200D except for input and output ratings.

Model GP357.5100D is similar to Model GP3506500D except for output ratings.

Model GP4118200D is similar to Model GP4112500D except for output ratings.

Model GP3506150D is similar to Model GP3506500D except for input and output current ratings.

Model GP3506200D is identical to Model GP357.51000 except for output ratings.

Model GP4116250A is similar to Model GP4112500D except for input and output ratings.

Model GP4116500A is similar to Model GP4112500D except for output ratings.

Model GP3503260D is similar to Model GP3506200D except for output ratings.

Model GP3512300A is similar to Model GP3506500A except for output ratings.

Model GP3505500D is similar to Model GP3506500D except for output ratings.

REPRESENTS ALL MODELS FIG. 1 (M91-18731)

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described.

*1. Enclosure Cover - 2.5 mm thick, 60.8 by 44.7 by 24 mm. See Construction Details for material types.

*2. Enclosure Base - 2.5 mm thick, 60 by 44.7 by 12 mm. See Construction Details for material types.

3. Blades - Folded over/solid copper, brass or bronze. Located a minimum 7.9 mm from edge of enclosure. See Ill. 2 for dimensions, spacings and relative locations. Molded into enclosure base.

4. Strain Relief - Integrally molded with the output cord 10 by 9.4 by 2.3 mm. Secured by enclosure base, cover and integral slots.

*5. Output Cord - Two conductor, provided with 0.33 mm thick thermoplastic insulation on each lead. Minimum 1.8 m external length. Terminates in a polarized connector.

REPRESENTS ALL MODELS FIG. 2 (M91-18730)

General - This Fig. shows an internal view of the unit.

1. Printed Wiring Board - Recognized Component (ZPMV2) board rated min 94HB overall 1.7 mm minimum thick dimensions are 31 by 20 mm.

2. Transformer - Constructed as follows:

* Core - For Models GP4103750D, GP4112500D, GP4116250A, GP4116500A and GP4118200D only. Laminated Steel, 41 by 33 by 19 mm.

* Alternate - For Models GP3506150D, GP3506500D, GP357.5100D, GP3509200D, GP3530005D, GP3506500A, GP3509200A, GP3512200D, GP3503800D, GP3506200D, GP3503260D and GPD3505500D only. Laminated Steel, 35 by 30 by 12 mm.

Windings - Enameled copper magnet wire, randomly wound.

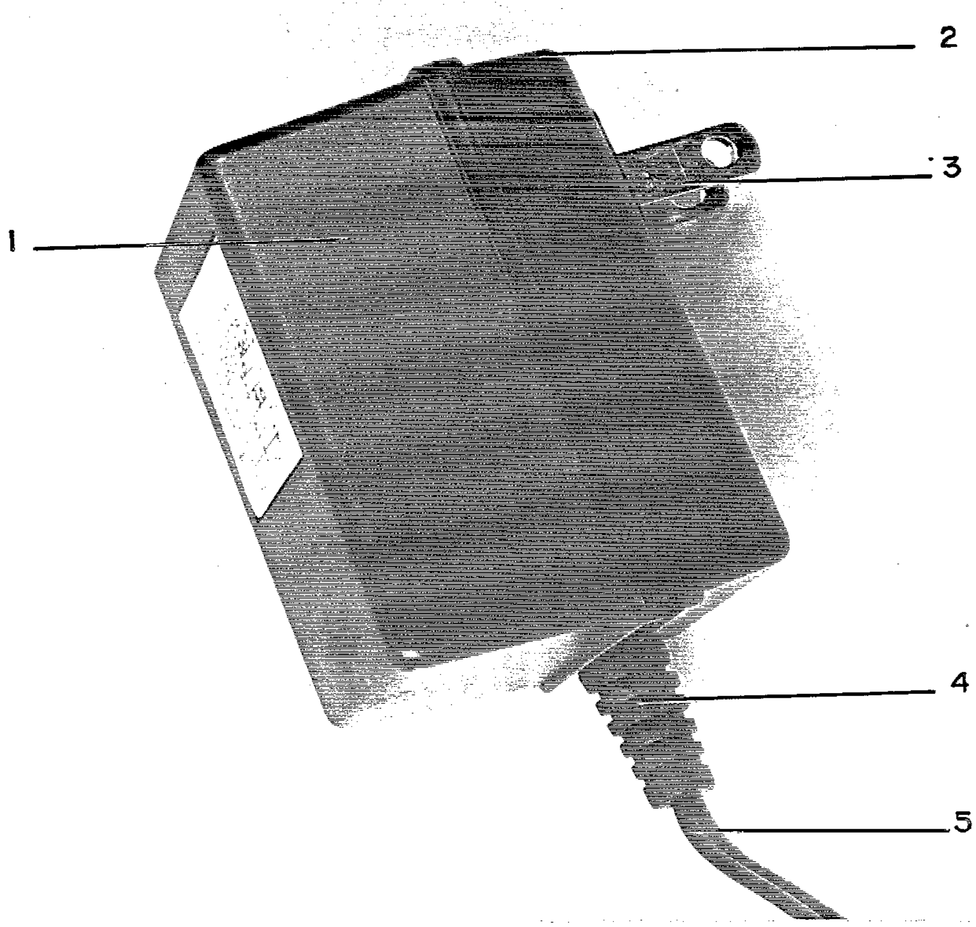
*

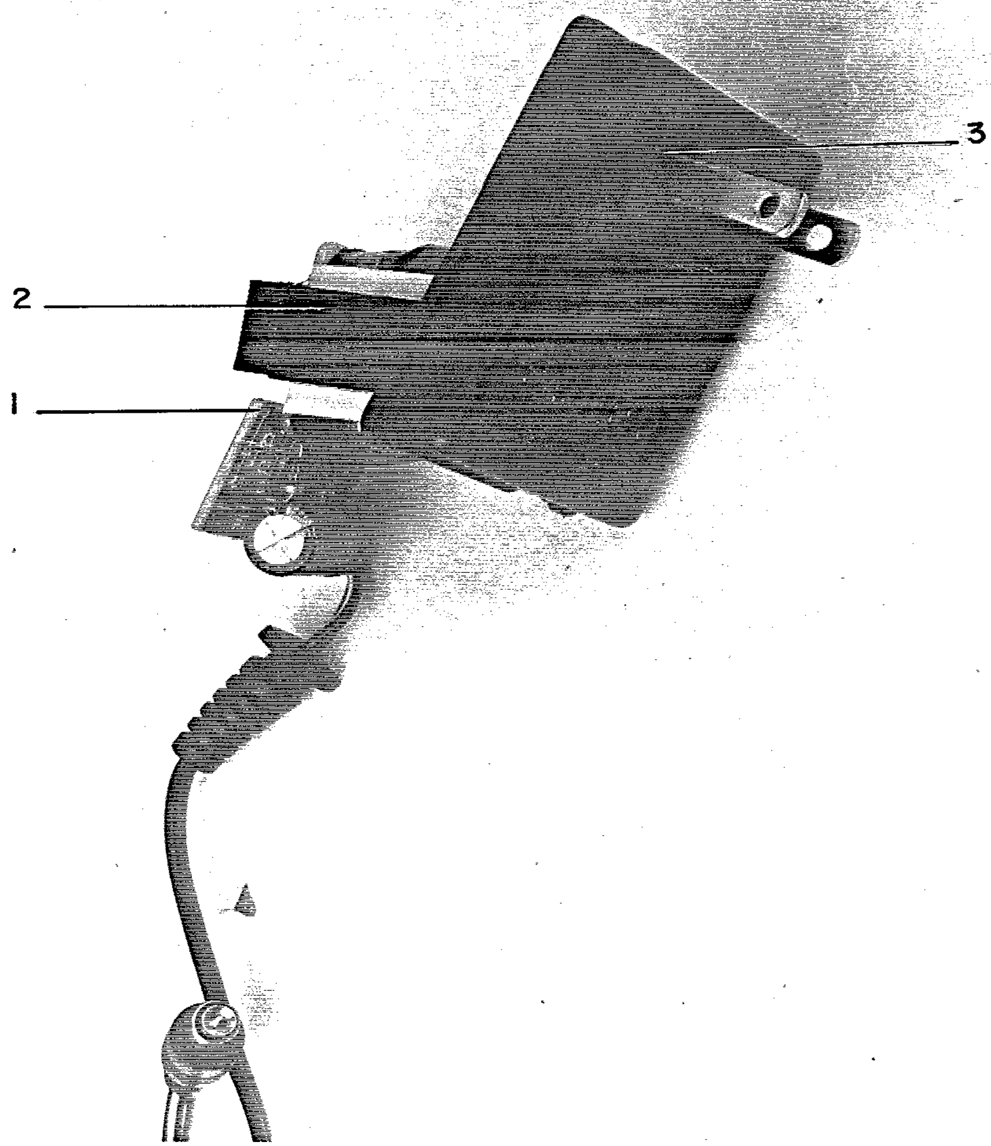
Bobbin - Three flange type. Recognized Component plastic material (QMFZ2), manufactured by EI Dupont, Type Zytel 101; 1.3 mm thick. Provided with 3 layers of polyester tape for crossover lead. Integral barrier between primary and secondary windings consist of bobbin flange 1.3 mm minimum thick.

Outer Wrap - Consists of 3 layers of 0.05 mm thick per layer of polyester tape.

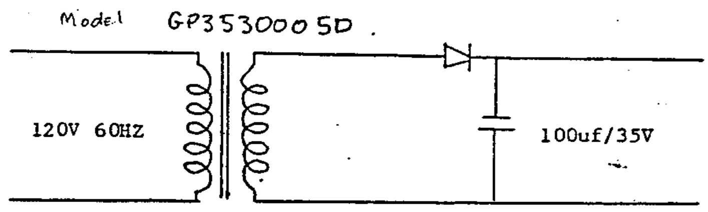
3. Thermostat - (Optional) R/C (XEWR2) - For Models GP4116250A and GP41160500A, not relied upon for testing. Provided with 4 layers polyester tape between winding and body of thermostat.

4. Blade Support - Recognized Component plastics (QMFZ2), rated min 94V-2, manufactured by GE, Type Lexan or Cycolac; 2.5 mm. Molded into enclosure base.

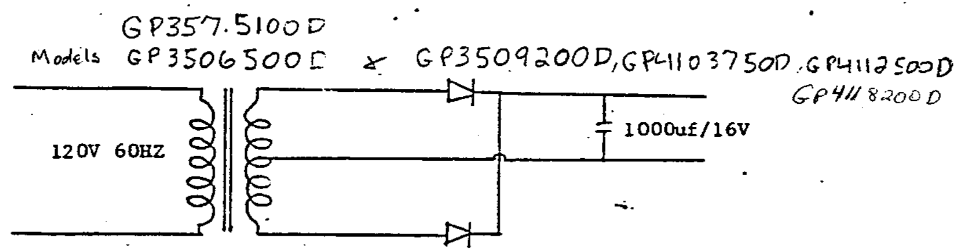

1
2
3
4
5


3
2
1

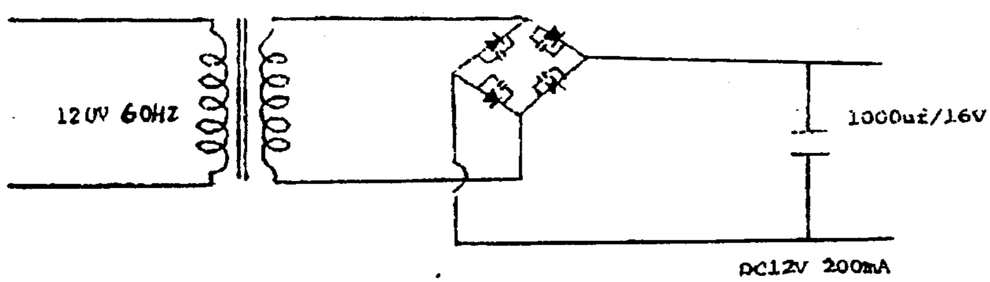
Schematic Diagram



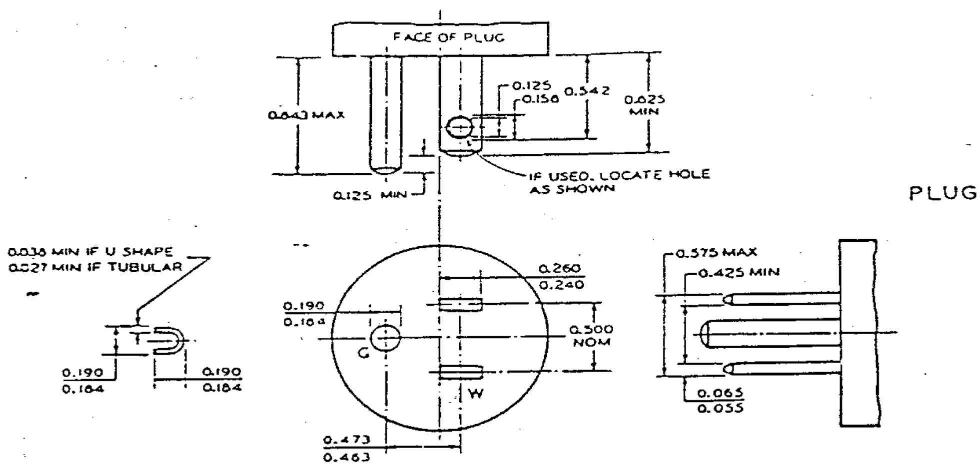
Schematic Diagram



Schematic Diagram : MODEL GP3512200D, GP3503800D, GP3506150D

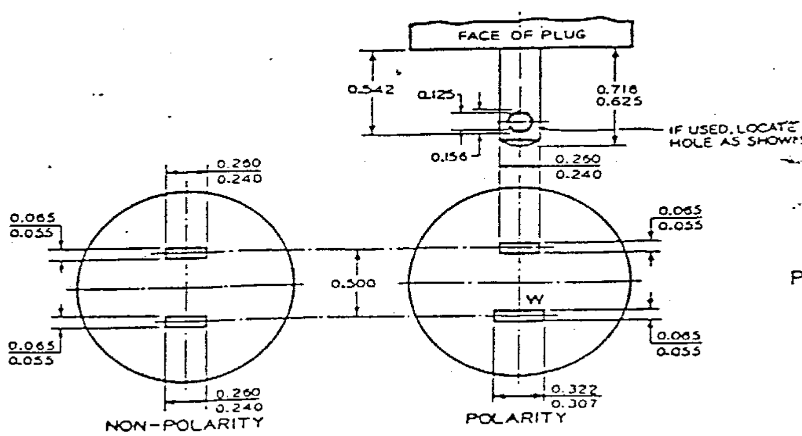


2-POLE, 3-WIRE GROUNDING DEVICES RATED
15 AMPERES, 125 VOLTS



PLUG

2-POLE, 2-WIRE PLUG RATED
15 AMPERES, 125 VOLTS



PLUG

inch	0.065 / 0.055	0.125	0.156	0.260 / 0.240	0.322 / 0.307	0.500	0.542	0.718 / 0.625
mm	1.65 / 1.39	3.2	4.0	6.60 / 6.10	8.18 / 7.80	12.7	13.8	18.2 / 15.9

DESCRIPTION

PRODUCT COVERED:

USL - Direct plug-in Class 2 units, Models GP3520200A, GP4106001D, GP4109500D, GP4124100D, GP4813.5780D, GP4813.51000D, GP48091000D, (P48091000A040G) GP48091500D, GP4810850D, GP48121000D, GP4815800D, GP4106001A, GP4109600A, GP4127200A, GP4109300D, GP4112150A, GP4112300D, GP4112300DG, GP4175500D, GP4114700A and GP48151500A. USL, CNL Direct Plug-in Class 2 units GP48091200D, GP48091200DG, GP4820750A.

GENERAL CHARACTER:

The devices covered by this Report are direct plug-in transformer units.

The units covered by this Report consist of a transformer and other related electronic circuitry housed in a thermoplastic enclosure. The units are provided with parallel type blades for insertion in a standard parallel blade receptacle. The output cord is provided with a nonstandard polarized connector.

USL - Indicates investigation to the U.S. Standard for Safety of Class 2 Power Units, UL 1310, Fifth Edition.

CNL - indicates investigation to CAN/CSA C22.2 No. 233-M91.

ELECTRICAL RATINGS:

	Input, W		Hz	Output	
Model	V	W	Hz	V	mA
GP3520200A	120	8	60	20 V ac	200
GP4106001D	120	14	60	6 V dc	1000
GP4109300D	120	9	60	9 V dc	300
GP4109500D	120	9	60	9 V dc	500
GP4124100D	120	5	60	24 V dc	100
GP4813.5780D	120	22	60	13.5 V dc	780
GP4813.51000D	120	21	60	13.5 V dc	1000
GP48091000D (P48091000A040G)	120	17	60	9 V dc	1000
GP48091500D	120	22	60	9 V dc	1500
GP48091200D, GP48091200DG	120	16	60	8.5 V dc	1200
GP4810850D	120	17	60	10 V dc	850
GP48121000D	120	21	60	12 V dc	1000
GP48151500A	120	30	60	15 V ac	1500
GP4815800D	120	21	60	15 V dc	800
GP4106001A	120	10	60	6 V ac	1000
GP4109600A	120	9	60	9 V ac	600
GP4127200A	120	10	60	27 V ac	200
GP4112150A	120	4	60	12 V ac	150
GP4112300D	120	8	60	12 V dc	300
GP4175500D, GP4112300DG	120	8	60	7.5 V dc	500
GP4114700A	120	15	60	14 V ac	700
GP4820750A	120	22	60	20 V ac	750

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity, between live and dead-metal parts (and between live parts and a metal enclosure) shall be as indicated below:

	Minimum Spacings, in (mm)	
V rms	Through Air and Over Surface	Shortest Distance to Metal Enclosure
150 or less	1/16 (1.6)	1/4 (6.4)
151-250	3/16 (1.8)	1/4 (6.4)

Class 2 Secondary Circuit Spacings - Not specified, spacings are based on Dielectric Withstand Tests.

Marking - Permanently ink-stamped, hot-stamped, silk-screened or provided as label, label employed is covered as a Recognized Component marking and labeling system suitable for application to polyphenylene oxide and having a min operating temperature of 80°C.

Information Marking - Indicates company name, model number, date of other dating period of manufacture, cautionary statements, and electrical ratings including: Input voltage, frequency, and watts; Output voltage and current dc.

Cautionary Markings - The "CAUTION" or "WARNING" in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - The date code consists of a four digit code. The first two digits represent the last two digits of the year of manufacture. The last two digits represent the month of the year of manufacture.

Example: 9006 = June, 1990.

The following markings are provided:

* "Class 2 Transformer"

* “CAUTION: Risk of electric shock”
  and
  “Dry location use only”
  or
  “Do not exposure to liquid, vapor or rain”
  or the equivalent

<u>Internal Wiring</u> - Unless otherwise specified, all internal wiring is Recognized Component appliance wiring material (AVLV2), insulation 1/32 in (0.8 mm) thick minimum, rated 600 V, 105°C minimum (UL Style 1015), or 1/64 in (0.4 mm) thick cross-linked PVC insulation.

<u>Segregation</u> - Insulated conductors of difference circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

<u>Mechanical Electrical Connections</u> - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge, and number of conductors.

<u>Soldered Connections</u> - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

<u>Electrical Tubing and Sleeving</u> - Recognized Component tubing (YDPU2) and/or sleeving (UZFT2) rated 300 V, 105°C minimum.

<u>Printed Wiring Boards</u> - Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flammability rating of 94HB and *an operating temperature rating of at least 105°C except where otherwise indicated.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Enclosure Assembly - All models. Case and cover constructed from Recognized Component plastic material (QMFZ2), Lexan 141R manufactured by GE Plastic or Polycarbonate Type S-2000 manufactured by Mitsubishi Gas Chemical. Case and cover secured together by high frequency (sonic) welding (or solvent cement).

Electrical Schematic - Refer to Ill. 1.

Blade - Dimensions, spacings, and relative location of blades and grounding pin shall be as detailed in Ill. 2.

Instruction Manual – See Section General, Instruction Manual

Model Differences -

Models GP4106001A, GP4109500A, GP4127200A, and GP4114700A, are constructed similar to Models GP4106001D, GP4109500D and GP4124100D except that the models ending in "A" are not provided with diodes or capacitors.

Model GP4109300D is constructed similar to Model GP4109500D except for a lower output current rating.

Model GP4813.5780D is constructed similar to Model GP4109500D except for input and output ratings, core and outer enclosure dimensions.

Model GP4112300D is constructed similar to Model GP4109500D except for input power and output ratings, 3 prong input, and ground pin is connected to the core with a screw, nut and lockwasher by a green/yellow conductor with one closed loop crimp connector and one solder tab riveted to the ground pin.

Model GP4175500D is constructed similar to Model GP4112300D except for output ratings.

Model GP4810850D is constructed similar to Model GP4813.5780D except for input current rating, output ratings and the addition of a thermal cutoff.

Model GP4813.51000D is constructed similar to Model GP4813.5780D except for input and output ratings.

Model GP48091000D is constructed similar to Model GP4810850D except for output ratings.

Model GP48091500D is constructed similar to Model GP4813.51000D except for input and output ratings.

Model GP48121000D is constructed similar to Model GP4813.51000D except for output ratings.

Model GP4815800D is constructed similar to Model GP4813.51000D except for output ratings.

Model GP3520200A is constructed similar to Model GP4114700A except for output ratings.

Model GP48151500A is constructed similar to Model GP4815800D except for output ratings.

Model GP48811500D is constructed similar to Model GP48091200D except for output ratings and output termination. The output of Model GP48091200D does not consist of output cord it terminates into screw block. Refer to Ill. 6.

Model GP48091000D is the basic unit described. Model P48091000A040G is similar to Model GP48091000D except for the output lead and model number.

Model GP4112150A is constructed similar to Model GP4112300D except for input and output ratings.

Model GP4112300DG is similar to Model GP4112300D except for a 3 prong input.

Model GP48091200DG is similar to Model GP48091200D except for 3 prong input.

REPRESENTS ALL MODELS FIG. 1 (M91-21561)

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described.

1. Enclosure Cover - Not shown. 2.5 mm thick, 62.4 by 50 by 20 mm.
For Model GP4813.5780D - 2.5 mm thick, 83.4 by 58 by 20 mm.
Enclosure - For Model GP4114700A overall dimensions: 66.1 by 51.9 by 41 mm stacking height. - 2.8 mm thick. See Ill. 4.
Enclosure - For Model GP3520200A overall dimensions: 61 by 44.9 by 36.9 mm stacking height. - 2.6 mm thick. See Ill. 5.
* Enclosure - For Model GP4820750A overall dimensions 6.24 x 55 x 45 mm.

2. Enclosure Base - 2.5 mm thick, 62.4 by 50 by 20 mm.
For Model GP4813.5780D - 2.5 mm thick, 83.4 by 58 by 29 mm.
* For Model GP4820750A 2.5 x 61 x 54 mm.

3. Blades - Folded over/solid copper, brass or bronze. Located a minimum 10 mm from edge of enclosure. See Ill. 2 for dimensions, spacings and relative locations. Molded into enclosure base.

4. Strain Relief - Integrally molded with the output cord 10 by 9.4 by 2.3 mm. Secured by enclosure base, cover and integral slots.

5. Output Cord - Two conductor, No. 24 AWG min. Provided with 0.33 mm thick thermoplastic insulation on each lead. Min 1.8 m external length. Terminates in a polarized connector.
For Model GP4114700A, the output cord is No. 22 AWG min. Provided with 0.4 mm thick thermoplastic insulation on each lead.

6. Printed Wiring Board - Recognized Component (ZPMV2) board rated min 94V-2 min, 130°C, overall 1.7 mm min thick dimensions are 31 by 20 mm.

7. Transformer - Constructed as follows:
Core - Laminated steel 41 by 33 by 20 mm. Stack height.

For Models GP4813.5780D, GP4813.51000D, GP48091000D and GP4810850D - 48
* by 40.5 x 23 mm stack height. For Model GP4114700A - 41 by 33 by 26 mm stack height. For Model GP4820750A, 48 by 40 by 20 mm.

Windings - Enameled copper magnet wire, randomly wound.

Bobbin - Three flange type. Recognized Component plastic material (QMFZ2), manufactured by E.I. Dupont, Type Zytel 101 or 101F; 1.0 mm thick. Provided with three layers of polyester tape for crossover lead. Integral barrier between primary and secondary windings consist of bobbin flange 1.0 mm min thick.

Thermal Cutoff - Provided only on Models GP4810850D, GP48121000D, GP48091000D, GP4813.5780D and GP4813.51000D, GP4815800D, GP48151500A. Recognized Component (XCMQ2) Part No. S3 rated 130°C, 250 V, 1 A manufactured by Uchihashi ESTEC Co. secured between primary windings.

Alternate - Recognized Component (XCMQ2) Part No. M33 rated 130°C, 250 V, 1 A manufactured by Joint Force Metal Research Co. (E142267).

* For Models GP48091500D, GP4114700A and GP4820750A Recognized Component (XCMQ2) Type S2 rated 115°C, 250 V, 1 A, manufactured by Uchihashi Estec Co.

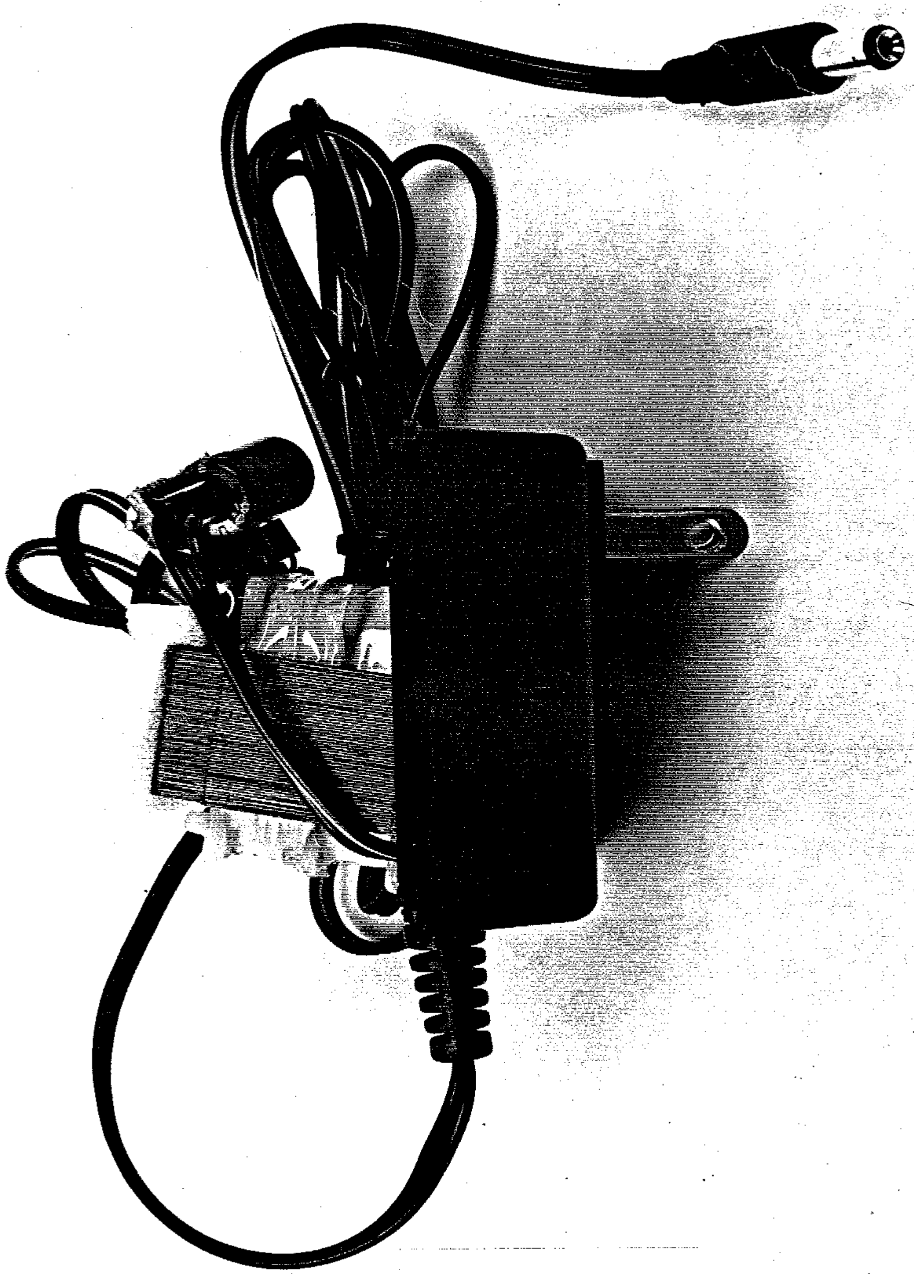
Outer Wrap - Consists of three layers of 0.05 mm thick per layer of polyester tape.

* Primary/Secondary Insulation - Model GP48020750A secondary winding provided with one layer 0.05 polyester tape forming bent up edge min 0.8 mm in addition to bobbin center flange.

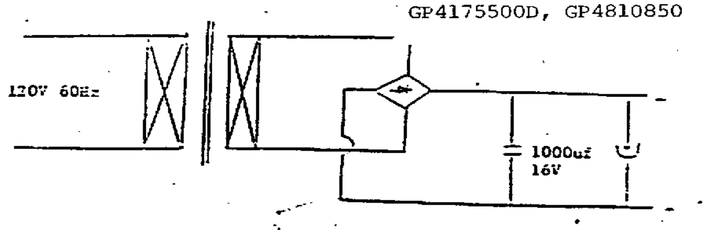
Blade Support - Recognized Component plastics (QMFZ2), rated min 94V-2, manufactured by GE, Type Lexan, 2.5 mm. Molded into enclosure base.

Alternate - Same as above except manufactured by Mitsubishi Gas Chemical, Type S-2000 polycarbonate.

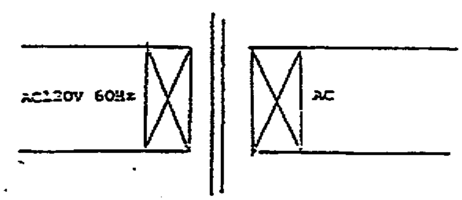
8. Diodes - For Model GP48091500D, Diodes are mounted min 3.5 mm above the printed wiring board.



Schematic Diagram REPRESENTS MODELS GP4106001D, GP4109500D, GP4124100D, GP4109300D, GP4813.5780D, GP4112300D, GP4175500D, GP4810850

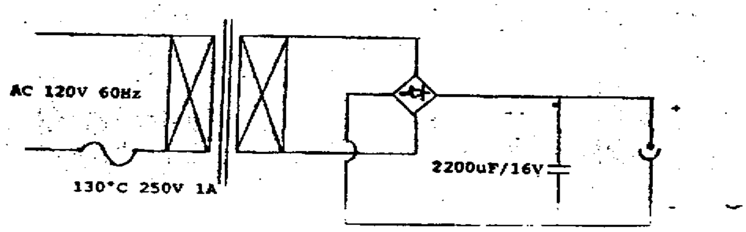


REPRESENTS MODELS GP106001A, GP11096001A, GP4109600A, GP4127200A

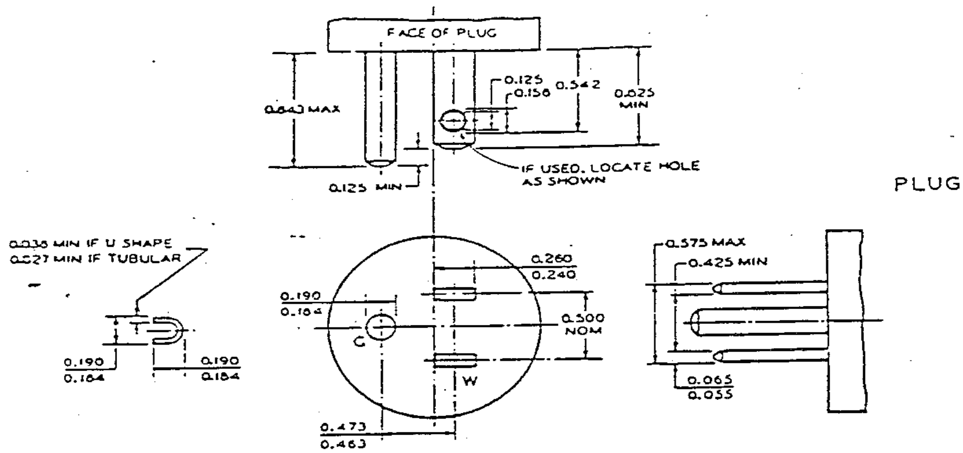


Represents Models

GP4813.51000D & GP48091000D

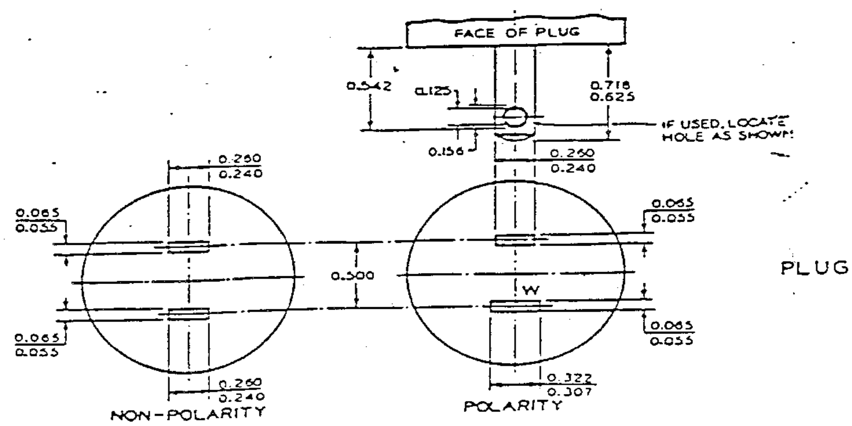


2-POLE, 3-WIRE GROUNDING DEVICES RATED
15 AMPERES, 125 VOLTS



PLUG

2-POLE, 2-WIRE PLUG RATED
15 AMPERES, 125 VOLTS



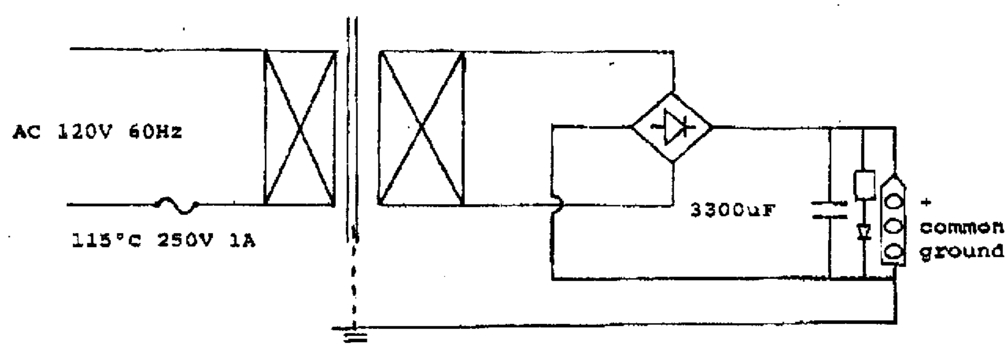
PLUG

inch	0.065 / 0.055	0.125	0.156	0.260 / 0.240	0.322 / 0.307	0.500	0.542	0.718 / 0.625
mm	1.65 / [illegible]	3.2	4.0	6.60 / 6.10	8.18 / 7.80	12.7	13.8	18.2 / 15.9

SCHEMATIC DIAGRAM

GP48091500D

Model: [illegible] Description: AC120V 60Hz/DC9V 1500mA Date: June 22, 95



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GOOD POWER ELECTRONICS LIMITED 能量電子有限公司

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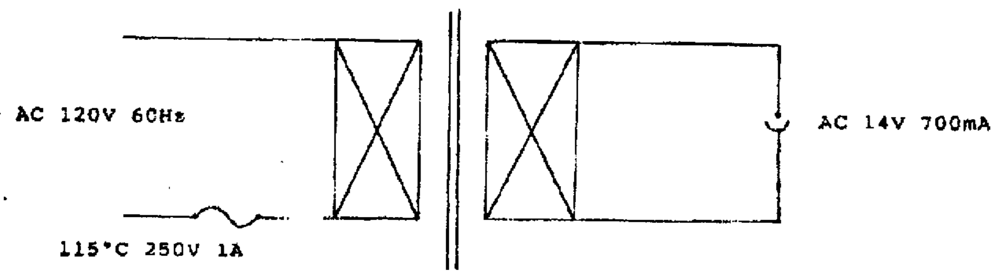
234 Aberdeen Main Road, Aberdeen
Hong Kong

香港香港仔大道234號富嘉工業大廈1406室

Tel : 2518 0300
Fax: 2552 5678

SCHEMATIC DIAGRAM

Model: GP4114700A Description: AC120V 60Hz/AC14V 700mA Date: Aug. 16, 95.



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Tel : 2518 0300
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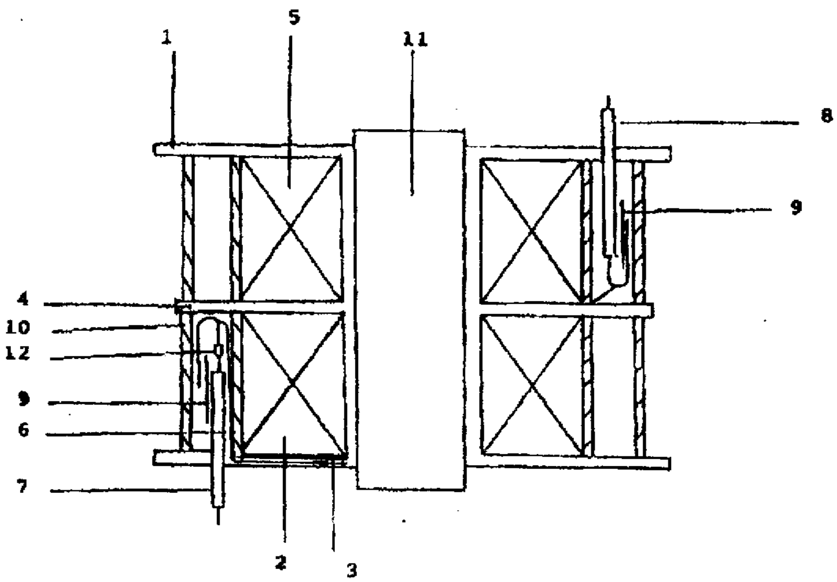

1. Bobbin
2. Primary Winding
3. Cross Over Insulation
4. Insulation Between Primary & Secondary
5. Secondary Winding
6. Wrapping Tape
7. Primary Leads
8. Secondary Leads
9. Leads Strain Relief
10. Outer Wrapping Tape
11. Lamination Core
12. Thermal Fuse

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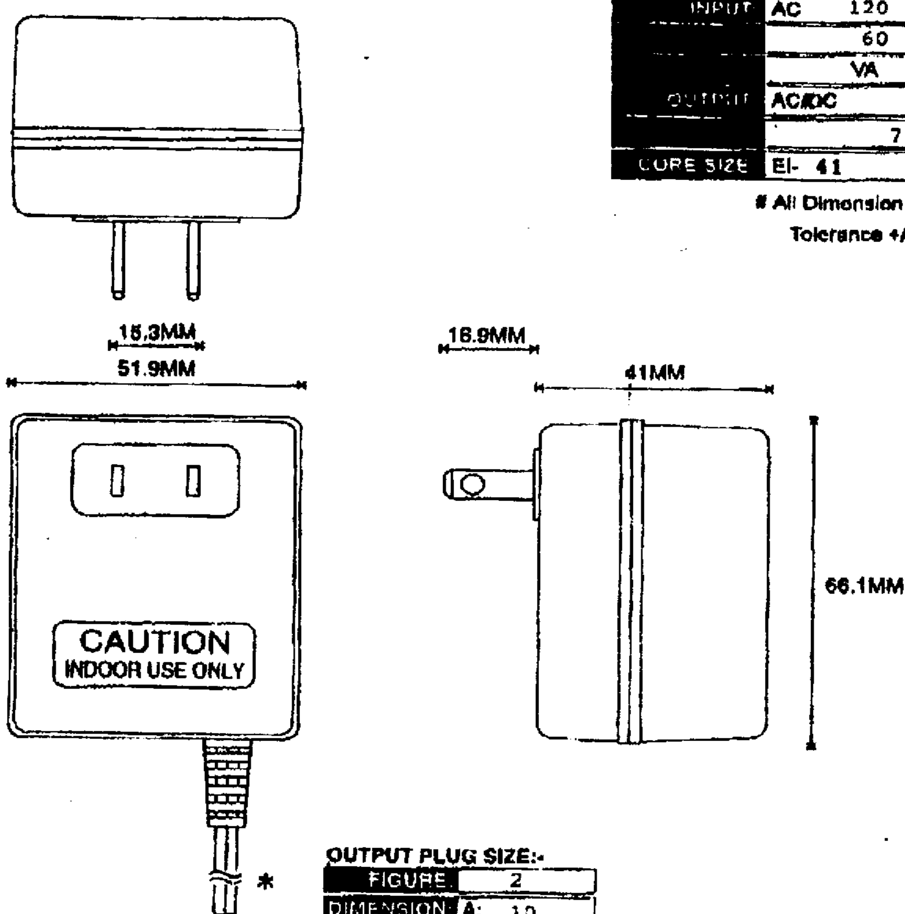
GOOD POWER ELECTRONICS LTD.

MECHANICAL SPECIFICATION	
STANDARD:	
APP MODEL:	
MODEL:	GP4114700A
INPUT	AC 120 V
	60 Hz
	VA 15 W
OUTPUT	AC/DC 14 V
	700 mA
CORE SIZE	EI- 41

\# All Dimension in MM
Tolerance +/- 1mm

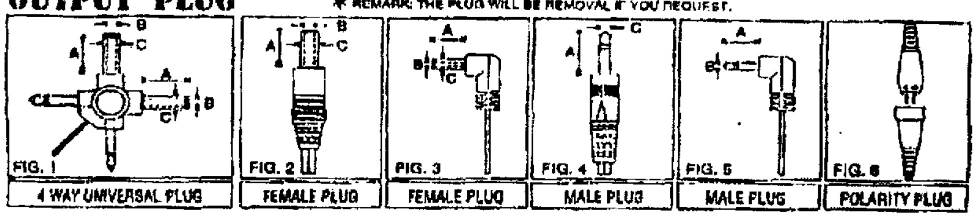


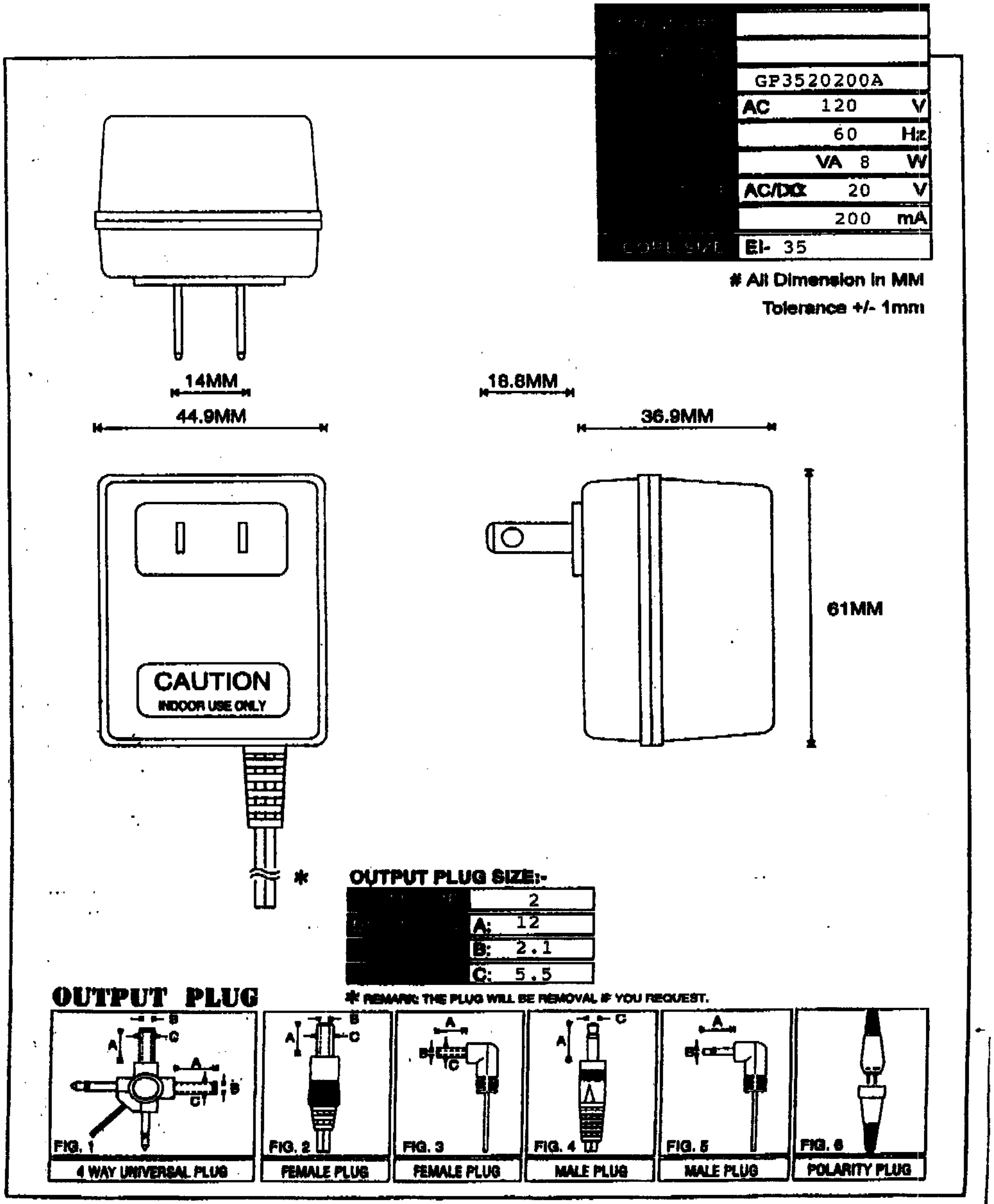
OUTPUT PLUG SIZE:-

FIGURE	2
DIMENSION:	A: 10
	B: 2.1
	C: 5.5

OUTPUT PLUG

* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.




[redacted]
GP3520200A
AC 120 V
60 Hz
VA 8 W
AC/DC 20 V
200 mA
[redacted]
EI- 35
All Dimension in MM
Tolerance +/- 1mm
14MM
44.9MM
18.8MM
36.9MM
61MM
CAUTION
INDOOR USE ONLY
*
OUTPUT PLUG SIZE:-
[redacted] 2
[redacted] A: 12
B: 2.1
C: 5.5
* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.
OUTPUT PLUG
FIG. 1
4 WAY UNIVERSAL PLUG
FIG. 2
FEMALE PLUG
FIG. 3
FEMALE PLUG
FIG. 4
MALE PLUG
FIG. 5
MALE PLUG
FIG. 6
POLARITY PLUG

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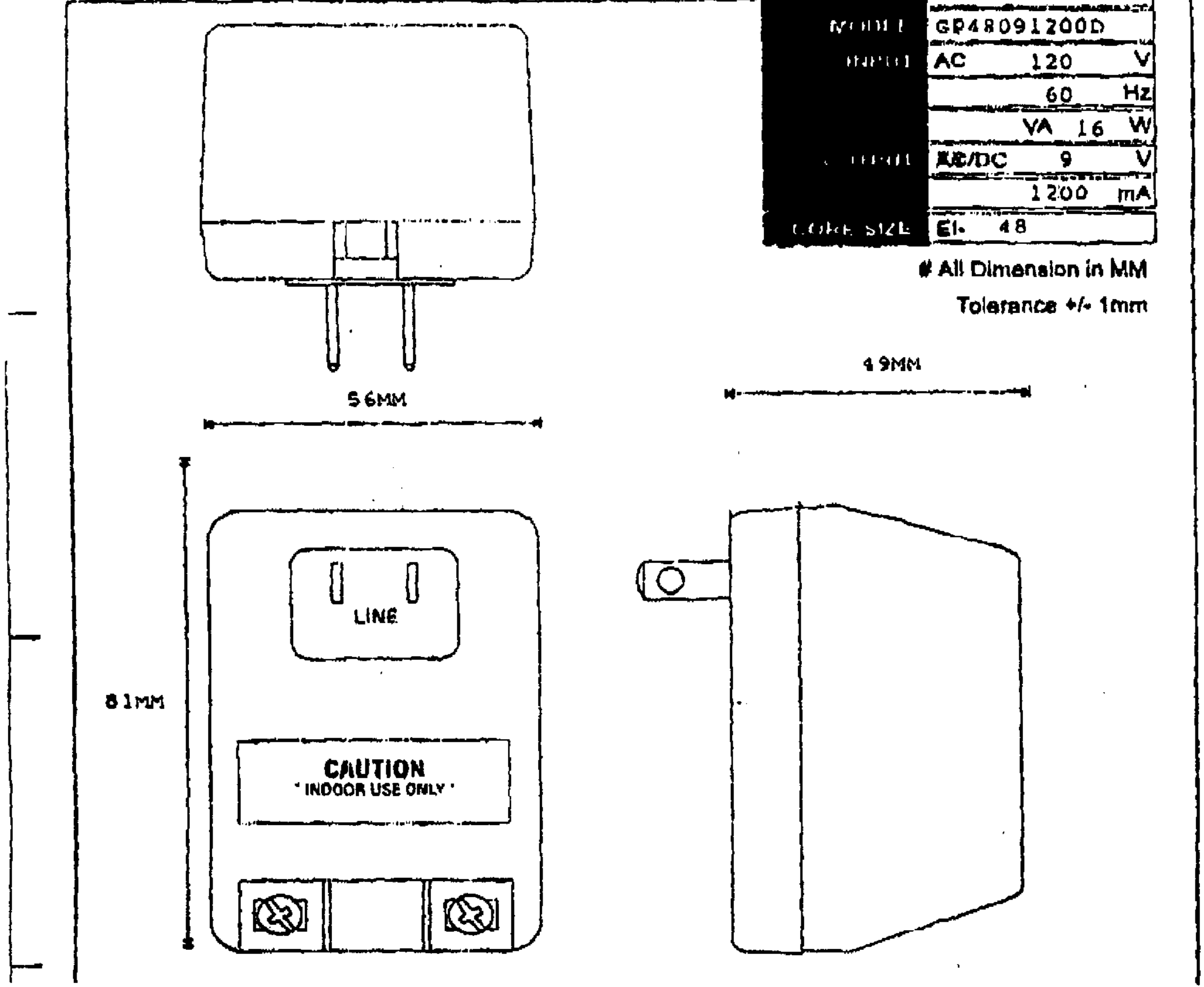
MECHANICAL SPECIFICATION			
STANDARD			
APP MODEL			
MODEL	GP48091200D		
INPUT	AC	120	V
		60	Hz
	VA	16	W
OUTPUT	AC/DC	9	V
		1200	mA
CORE SIZE	EI-	48	

All Dimension in MM
Tolerance +/- 1mm



DESCRIPTION

PRODUCT COVERED:

Power Supply Model GPA-66-1577.

GENERAL CHARACTER:

The product covered by this Report is a wall mounted power supply. It is provided a Listed, CSA Certified supply cord for connection to its nominal rated 60 Hz source of supply, and output connections for connection to the telephone system. The unit is intended to be installed in accordance with the instructions supplied with the units.

USL - Indicates investigation to the U.S. Standard for Safety of Class 2 Power Units, UL 1310, Fifth Edition.

RATINGS:

Electrical -

Model	Input, 60 Hz		Output, dc	
GPA-66-1577	V	W	V	A
	120	33	-12	1
			+5	

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity and between live- and dead-metal parts shall be as indicated below.

Spacings Other Than At Field Wiring Terminals

Potential Involved, V	Through Air	Over Surface
50 or less	1/16(1.6)	1/16(1.6)
51-150	1/8(3.2)	1/4(6.4)

Secondary spacings in isolated limited energy circuits (100 VA maximum available, rated less than 1000 V) and low-voltage limited energy circuits (less than 42.4 V peak open circuit, less than 8 A short circuit) are not specified. Acceptability of spacings in these circuits was determined by Dielectric Withstand Tests.

Spacings to Enclosure

Potential Involved, V	Minimum Spacings Through Air and Over Surface, in (mm)
0-50	1/16(1.6)
51-150	1/4(6.4)

Markings - All markings are either permanently ink stamped, silk-screened, or provided on a Recognized Component Marking and Labeling System (PGDQ2) (preprinted or die-stamped foil type suitable for application' to the surface involved, rated mm 80^0C.)

The following markings are provided:

Manufacturer's name, model number date or other dating period of manufacture, (and) complete electrical ratings. Refer to Ill. 1 for details.

The date of manufacture (date code): four digits, first represent year, second two represent week of year.

Example: 9426

Fuse replacement size consisting of voltage and current ratings marked adjacent to fuse(s). "Intended for Installation in a Protected Environment."

*

* "Class 2 Transformer"

* "CAUTION: Risk of electric shock"
and
"Dry location use only"
or
"Do not exposure to liquid, vapor or rain"
or the equivalent

"WARNING: To reduce the risk of fire or electric shock, do not interconnect output terminations."

Internal Wiring - Unless otherwise specified, all internal wiring is AVLV2 rated VWl, 300 V, 80^{0}C.

Segregation - Insulated conductors of different circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

Enclosure Assembly - Case and cover constructed of R/C plastic material (QMFZ2), designated Lexan 950, manufactured by G.E. Plastics rated 94-5VA, 130^{0}C. Case and cover secured together by screws.

Mechanical Assembly - Unless otherwise stated, all enclosure parts and component mounting assemblies are secured by welding or thread forming screws, or machine bolts provided with nuts and lockwashers. Nonmetallic panels are secured by machine bolts and nuts.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception - Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - Recognized Component tubing (YDPtJ2) and/or sleeving (UZFT2) rated 125 V, 105W minimum.

Bonding for Grounding - All dead-metal parts are bonded to the frame by metal-to-metal contact through welding, the use of machine bolts, nuts and lockwashers or thread forming screws and paint piercing washers providing good metal-to-metal contact.

Printed Wiring Boards - Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flame rating of 94V-0 and an operating temperature rating of at least 130^{0}C.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Tolerances - Unless specified otherwise, all indicated dimensions are nominal.

POWER SUPPLY MODEL GPA-66-1577 FIG. 1 (M96-1186o)

General - Shows external view.

1. Enclosure Top - R/C (QMFZ2), designated Lexan 950, rated 94-SV, 2.3 mm thick, approx 128 by 90 by 43 mm, with four integrally molded bosses for securing enclosure bottom. Provided with ventilation openings on top face 60 by 3.2 mm, and on all edges 14 by 3.2 mm as shown.

2. Enclosure Bottom - Secured to top by four screws. Same material as Item 1, 2.7 mm thick, approx 128 by 90 by 43 mm, with three integrally molded bosses for securing PWB. Provided with ventilation openings on bottom face 58 by 3.2 mm, and on edges 14 by 3.2 mm. Provided with two integrally molded mounting tabs (as shown) which when mounted will raise unit 10 mm from mounting surface.

3. Markings - Include Listee’s name, Model No., electrical ratings. (See Construction Details)

POWER SUPPLY MODEL GPA-66-1577 FIG. 2 (M96-11861)

General - Shows internal view.

1. Transformer - Constructed as follows:

Core - Laminated sheet steel, 66 by 29.5 by 55 mm.

Windings - Enameled copper magnet wire, randomly wound.

Bobbin - Two provided, 2 flange type, R/C material (QMFZ2), manufactured by E.I. Dupont, Type Zytel 101F rated 94V-2, 125^{0}C.

Outerwrap - Consists of 3 layers of 0.05 mm thick per layer of polyester film tape.

2. Input Cord - Listed, CSA Certified, 3 conductor No. 18 AWG, Type SVT rated 105^{0}C, VW-1, standard 3 conductor plug in which the ground conductor terminates on crimped closed loop connector under separate screw lockwasher through transformer core, secured to a nut. Provided with strain relief bushing, as shown in Fig. 2, secured to snug fit between enclosure halves. Cord length 1.8 m minimum.

3. Output Cord - Listed, CSA Certified, rated 105^{0}C, VW-1 terminating in a 5 pin din connector. Provided with a molded on strain bushing, as shown in Fig. 2, secured by snug fit between enclosure halves. Cord length 1.8 m minimum.

4. Secondary Components - Located in a Class 2 circuit.

5. Secondary Fuses (F1, F2) - Listed, rated 125 V, 5 A. Secured to PWB by solder.

6. Printed Wiring Board - R/C (ZPMV2) board rated 94V-0, 130^{0}C.

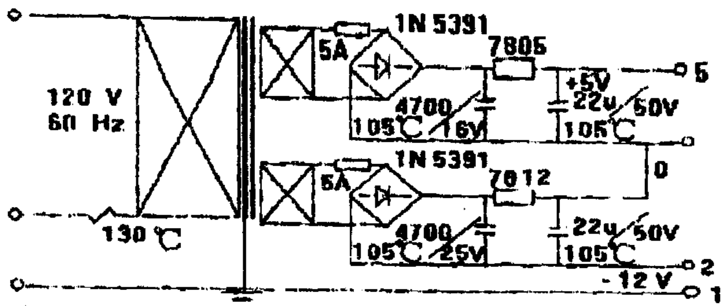
N141178454

N141178455

P.03

SCHEMATIC DIAGRAM

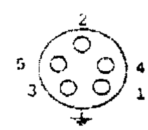
Model: GPA-66-1577 Description: AC120V 60Hz/ +DC5V 1A -DC12V 1A Date: June 7, 96.

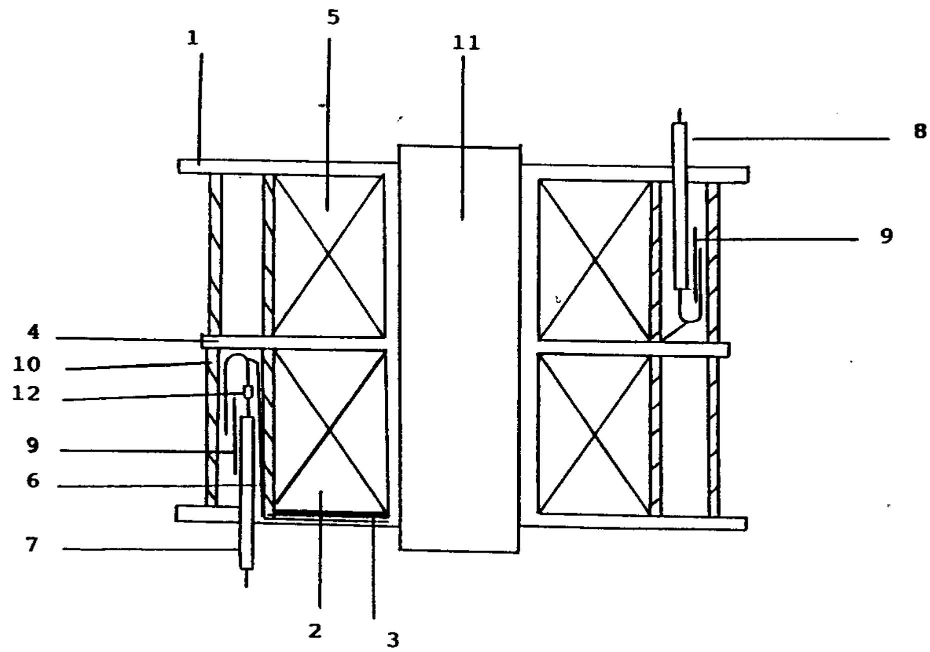


Note :

1. Primary with 3 prong power cable

2. Secondary with 5 pin din plug
   Pin#1 Ground
   Pin#2 -DC 12V 1A
   Pin#3 Common
   Pin#4 N/C
   Pin#5 +DC 5V 1A

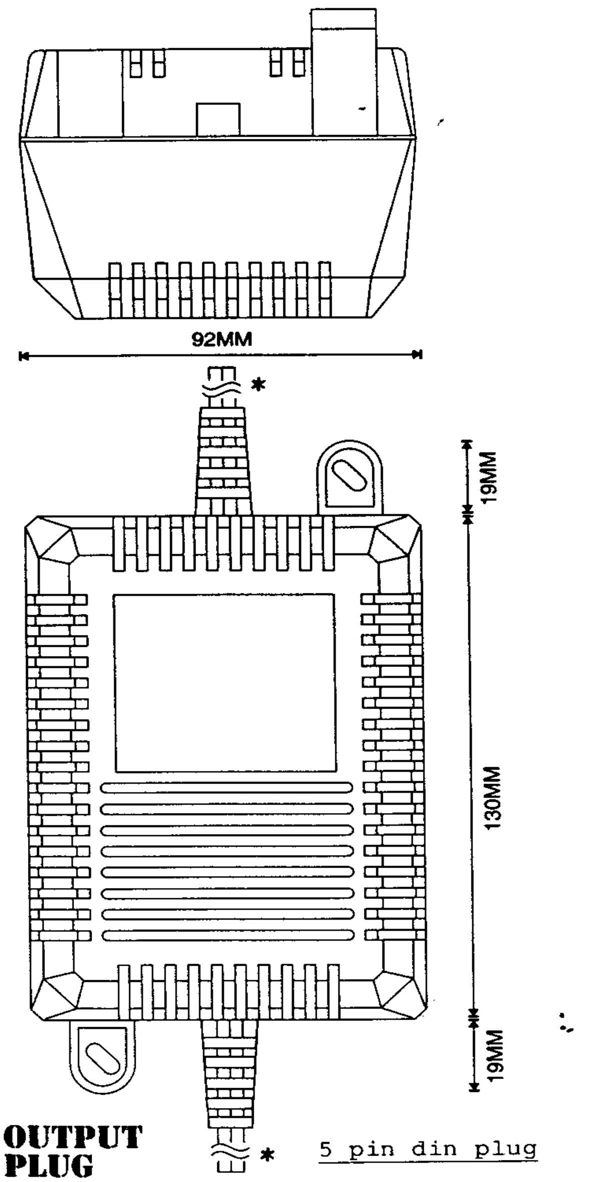




1. Bobbin
2. Primary Winding
3. Cross Over Insulation
4. Insulation Between Primary & Secondary
5. Secondary Winding
6. Wrapping Tape
7. Primary Leads
8. Secondary Leads
9. Leads Strain Relief
10. Outer Wrapping Tape
11. Lamination Core
12. Thermal Fuse

MECHANICAL SPECIFICATION	
STANDARD:	
APP. MODEL:	
MODEL:	GPA-66-1577
INPUT:	AC 120 V
	60 Hz
	VA 33 W
OUTPUT:	DC -12V 1A
	DC +5V 1A
CORE SIZE:	EI- 66

All Dimension in MM
Tolerance +/- 1mm



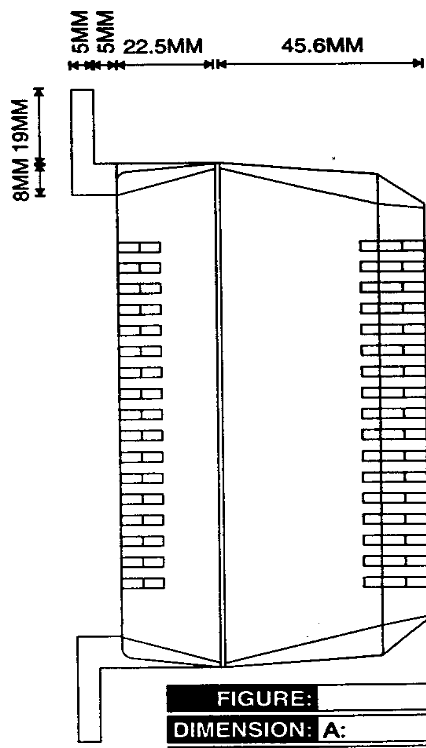


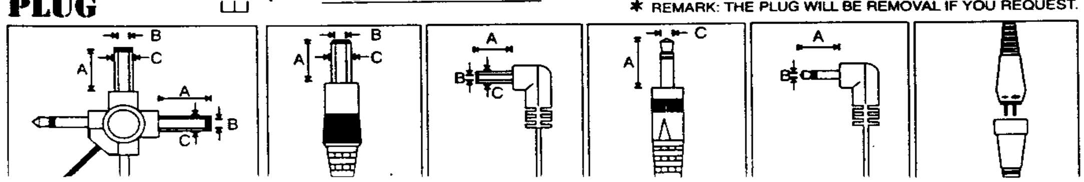
FIGURE:	
DIMENSION:	A:
	B:
	C:

OUTPUT PLUG SIZE:-

* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.

OUTPUT PLUG

5 pin din plug



DESCRIPTION

PRODUCT COVERED:

USL - Class 2 Power Units, Model No. GP57151800D, GP57181000D

GENERAL CHARACTER:

The devices covered by this Report are direct plug-in transformer units.

The units covered by this Report consist of a transformer and other related electronic circuitry housed in a thermoplastic enclosure. The units are provided with parallel type blades for insertion in a standard parallel blade receptacle. The output cord is provided with a nonstandard polarized connector.

USL indicates coverage under UL 1310, Standard for Class 2 Power Units, Fifth Edition.

ELECTRICAL RATINGS:

	Input, W	Hz		Output	
Model	Volt	Watt	Hz	Volt	mA
GP57151800D,	120	35	60	15 V dc	1800
GP57181000D	120	25	60	18 V dc	1000

Model Differences - Model GP57151800D (cord connected) is the basic model covered in this report. Model GP57181000D is similar to GP57151800D (direct plug in) except for input/output ratings, input connection and output cords as noted.

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity, between live and dead-metal parts (and between live parts and a metal enclosure) shall be as indicated below:

Minimum Spacings, in (mm)

Volt rms	Through Air and Over Surface	Shortest Distance to Metal Enclosure
150 or less	1/16 (1.6)	1/4(6.4)
151—250	3/16 (1.8)	1/4(6.4)

Class 2 Secondary Circuit Spacings - Not specified, spacings are based on Dielectric Withstand Tests.

Marking - Permanently ink-stamped, hot-stamped, silk-screened or provided as label, label employed is covered as a Recognized Component marking and labeling system suitable for application to polyphenylene oxide and having a mm operating temperature of 80^0C.

Information Marking - Indicates company name, model number, date of other dating period of manufacture, cautionary statements, and electrical ratings including: Input voltage, frequency, and watts; Output voltage and current dc.

Cautionary Markings - The “CAUTION” or “WARNING” in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - The date code consists of a four digit code. The first two digits represent the last two digits of the year of manufacture. The last two digits represent the month of the year of manufacture.

Example: 9006 = June, 1990.

The following markings are provided:

* “Class 2 Transformer”

* “CAUTION - Risk of electric shock, dry location use only or equivalent.”

* Blades - Four direct plug-in units: Folded over or solid, copper, brass or bronze. Location min 7.9 mm from edge of enclosure. See Sec. Gen. Ill. 1 for dimensions, spacing and relative location of blades.

Internal Wiring - Unless otherwise specified, all internal wiring is Recognized Component appliance wiring material (AVLV2), insulation 1/32 in (0.8 mm) thick minimum, rated 600 V, 105^{0}C minimum (UL Style 1015), or 1/64 in (0.4 mm) thick cross-linked PVC insulation.

Segregation - Insulated conductors of difference circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge, and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - Recognized Component tubing (YDPU2) and/or sleeving (UZFT2) rated 300 V, 105^{0}C minimum.

Printed Wiring Boards — Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flammability rating of 94HB and an operating temperature rating of at least 105^{0}C except where otherwise indicated.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Instruction Manual - For Model GP57151800D only. See Section General, Instruction Manual.

Enclosure Assembly - All models. Case and cover constructed from Recognized Component plastic material (QMFZ2), Lexan 141R manufactured by GE Plastic or Polycarbonate Type S—2000 manufactured by Mitsubishi Gas Chemical. Case and cover secured together by high frequency (sonic) welding (or solvent cement)

Electrical Schematic — Refer to Ill. 1

MODEL GP57151800D FIG. 1 (M96—16984)
*(ALSO REPRESENTS MODEL GP57181000D)

1. Enclosure - Two pieces held together by screws. See construction details for material types. Overall dimensions are 90.1 by 68.1 by 54 mm, 2.43 mm thick.

2. Power Supply Cord - Listed, Type SPT-2, with molded-on attachment plug, rated VW-1, 105^{0}C, mm length 1.8 m. Must be of the polarized plug type.

*3. Blades - (For Model GP57181000D) Not shown. Refer to Construction Details.

MODEL GP57151800D FIG. 2 (M96—16985)
*(ALSO REPRESENTS MODEL GP57181000D)

1. Printed Wiring Board - R/C (ZPMV2) board rated minimum 94HB, 105^{0}C, overall 1.7 mm minimum thick.

2. Transformer - Constructed as follows:

Core - laminated silicon steel. Overall dimensions 57 by 30 by 47.5 mm.

Windings - Enameled copper magnet wire, randomly wound.

Bobbin - 2 flange type provided, with bobbin holder. R/C plastic material (QMFZ2), manufactured by E.I. Dupont, Type Zytel 101.

Primary and secondary bobbin dimensions are 50 by 35 by 18 mm, walls are 1.2 mm and flanges are 1.3 mm thick. Primary and secondary bobbins slide into bobbin holder, and secured by core.

Bobbin holder dimensions are 52 by 27 by 37 mm, center flange thickness is 0.6 mm.

Outerwrap — Consists of 3 layers of 0.05 mm thick per layer of polyester tape.

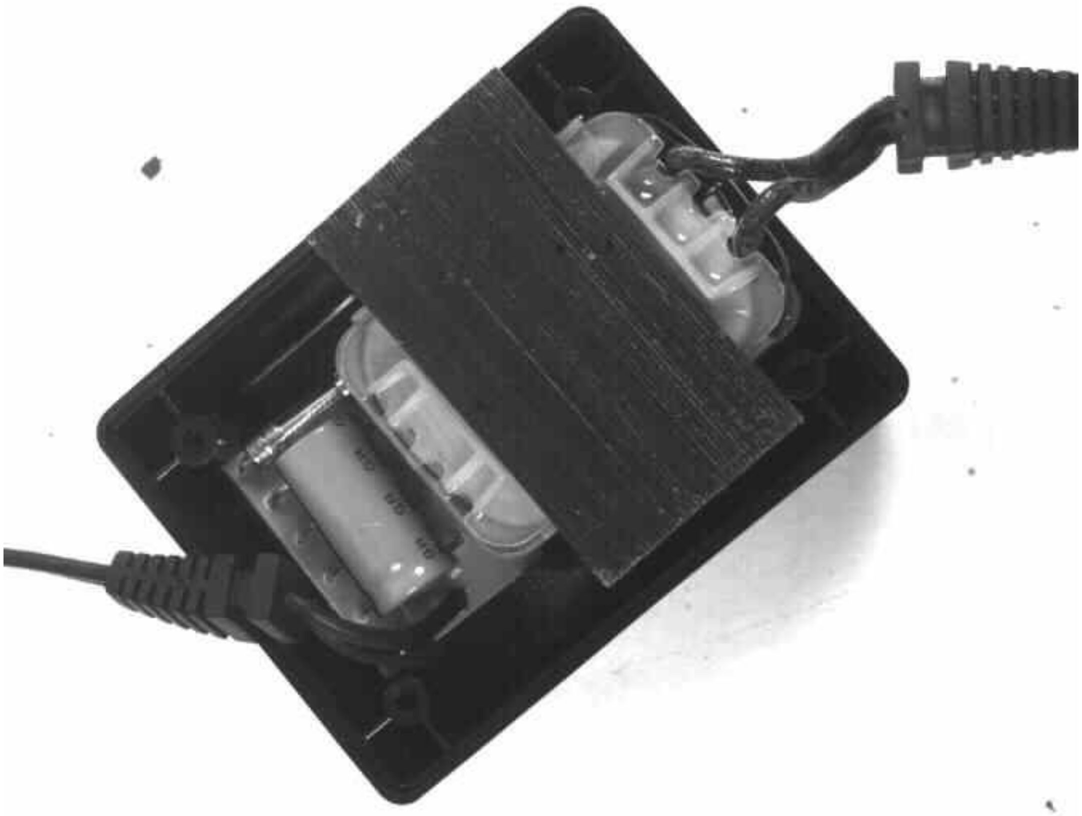
3. Thermal Protector - (Not shown),R/C (XCMQ2) Type No. V125, manufactured by Tamura Kaken Co., Ltd., rated 130^{0}C, 250 V. Located on the primary winding.

4. Current Fuse — Listed, rated 125 V, 5 A, slo—blow. Secured to PWB by soldered pigtails.

5. Diode - Type No. N5822, 2 provided, spaced on minimum distance of 5 mm from surface of P.C. Board.

*6. Grounding - (For Model GP57181000D) Not shown. Ground pin is connected to core with a single 2.5 mm screw and closed loop connector. Secondary output cord is also connected to ground pin mechanically secured and soldered.

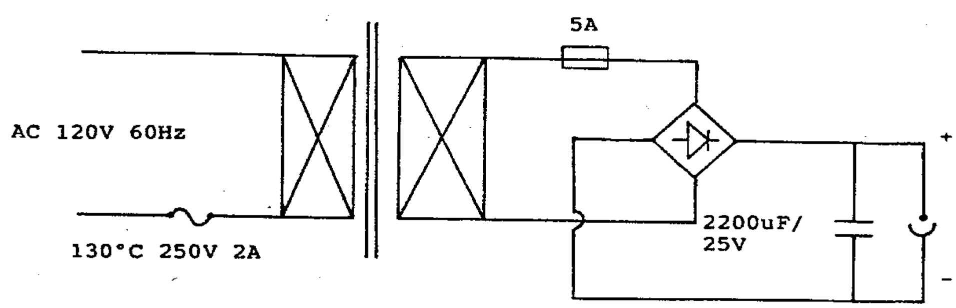
N141177198



N141177199

SCHEMATIC DIAGRAM

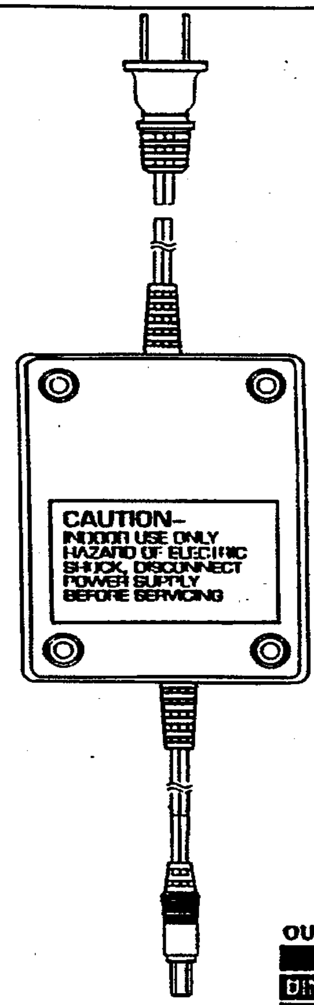
Model: GP57151800D Description: AC120V 60Hz/DC 15V 1800mA Date: Oct. 14, 96.

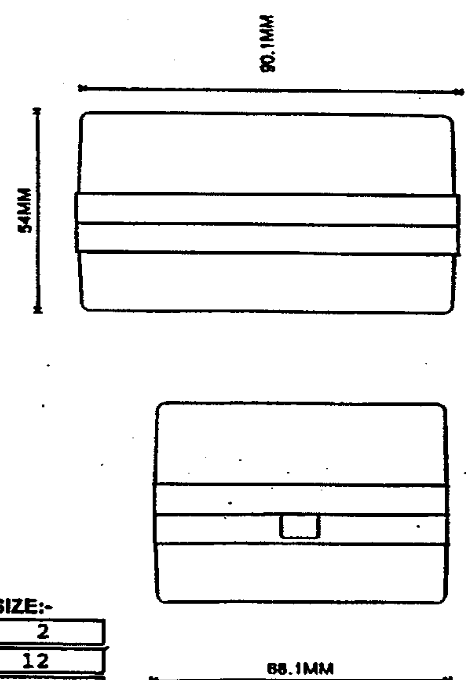


MECHANICAL SPECIFICATION

STANDARD:		
APP. MODEL:		
MODEL:	GP57151800D	
INPUT:	AC 120	V
	60	Hz
	VA 35	W
OUTPUT:	15	V
	1800	mA
CORE SIZE:	EI- 57	

All Dimension in MM
Tolerance +/- 1mm



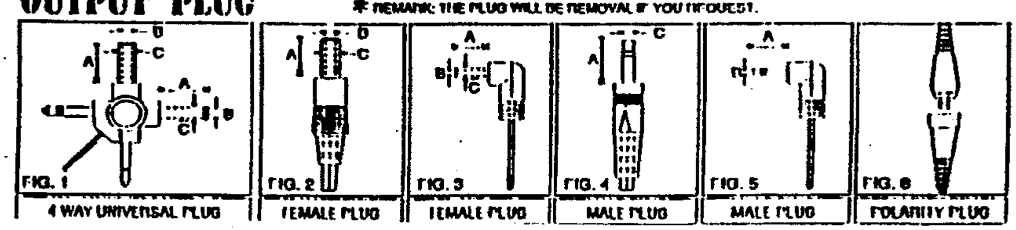


OUTPUT PLUG SIZE:-

FIGURE:		2
DIMENSION:	A:	12
	B:	2.1
	C:	5.5

OUTPUT PLUG

* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.



N141177200

DESCRIPTION

PRODUCT COVERED:

USL – Class 2 power supply, Model GPU411200500CD00.

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

The transformer covered by this report consists of inherently limited cord connected Class 2 transformer.

The unit consists of a transformer and other related Class 2 electronic circuitry housed in a thermoplastic enclosure. The transformer secondary winding is connected to external load via an output cord and a non-standard polarized connector. Power supply cord with non-polarized parallel type blades is provided for insertion in a standard 15 A, 125 V receptacle.

The unit does not include grounding connection, and has no user accessible metal parts which are likely to become energized. The unit is intended for dry location use only.

USL indicates investigation to the Standard for Class 2 Power Units, UL 1310, Fifth Edition.

ELECTRICAL RATINGS:

	Input			Output	
Model	Vac	Hz	Watt	Vdc	mA
GPU411200500CD00	120	60	13	12	500

CONSTRUCTION DETAILS:

Section General - The following construction items are described in Section General.

Abbreviations	Class 2 Secondary Circuit Spacings
Markings	Printed Wiring Boards
Spacings	Electrical Connections
Segregation	Corrosion Protection

Illustrations - The following illustrations are included in this report.

Description	ILL. Number
Electrical Schematic (Not for Field Representative's Use)	1
Transformer Primary Insulation System	2
Insulation between Primary Winding and Core and between Primary Winding to Secondary Winding	3

General - The general design, shape, and arrangement shall be as illustrated in the following figures, except where variations are specifically described.

CLASS 2 TRANSFORMER, MODEL GPU411200500CD00 - FIG. 1

General – Fig. 1 shows the overall view of Model GPU411200500CD00.

1. Enclosure Base – R/C QMFZ2, GE Plastics Americas. (E121562), Type 241R, rated V-2. Overall 74.7 by 50 by 19.8 mm high, 2.4 mm thick. Provided with a 10 by 9.5 mm cutout for Power Supply Cord exit and a 7 by 6.4 mm cutout for Output Cord exit. Secured to Enclosure Cover by ultrasonic welding.

2. Enclosure Cover - Same material as Enclosure Base. Overall 74.7 by 50 by 22.9 mm high, 2.3 mm thick.

3. Power Supply Cord - Listed, Type SPT-2, No. 18 AWG X 2C, rated minimum 150 V, 60°C. Minimum 0.91 m external length when measured from cord exit to fact of attachment parallel plug. One end terminated in an attachment plug with non-polarized blades, and the another end is mechanically connected to Primary Winding prior to soldering.

4. Power Supply Cord Strain Relief Bushing – PVC, molded with Power Supply Cord, overall 37.2 mm long with a 12.6 by 13.2 by 3.1 mm stopper. Provided with a 9.3 by 7.6 by 3 mm neck fitted into a "U" shaped slot in Enclosure Base.

5. Output Cord – PVC, two-conductor, No. 24 AWG. Provided with minimum 0.33 mm thick thermoplastic insulation on each lead. Minimum 1.8 m combined external length for Power Supply Cord and Output Cord. One end mechanically connected to PWB prior to soldering and the other end terminates in a non-standard polarized connector. Portion between Output Cord Strain Relief Bushing and PWB are covered by a heat-shrinkable tubing, R/C YDPU2, rated minimum 150 V and minimum 80°C.

6. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, overall 29.8 mm long with a 12 by 8.8 by 2.6 mm stopper. Provided with a 6.6 by 4 by 3.2 mm neck fitted into a "U" shaped slot in Enclosure Base.

CLASS 2 TRANSFORMER, MODEL GPU411200500CD00 - FIG. 2

General – Fig. 2 shows the internal view of Model GPU411200500CD00.

1. Transformer – Fitted to Enclosure Base, Fig. 1, Item 1, by integral ribs and future secured between Enclosure Base and Enclosure Cover. See ILL. 2 for primary insulation system. Constructed as follows:

A. Core - Laminated steel, 41 by 33 by 19 mm.

B. Primary Winding - Enameled copper wire, 0.15 mm diameter, 1300 turns. Both end connected to Power Supply Cord.

C. Secondary Winding - Enameled copper wire, 0.45 mm diameter, 145 turns. Terminated to PWB.

D. Bobbin – Three flange type. R/C QMFZ2, EI Dupont De Nemours & Co Inc (E41938), Type 101, rated V-2.

E. Thermal Cutoff – R/C XCMQ2, Uchihashi Estec Co Ltd. (E50082), Type G33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

Alternate - Same as above except for R/C XCMQ2, Joint Force Metal Research & Co. (E142267), Type M33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

F. Primary Outer Wrap - Two layers of polyester tape, each measures 0.05 mm thick, and one layer of fiber board, measures 0.4 mm thick.

G. Primary to Secondary Insulation - One layer of Bobbin, 1.3 mm thick. In addition, two layers of polyester bent up tape, each measures 0.05 mm thick, is provided on all four sides of Bobbin in order to provide the minimum 1.6 mm over-surface spacing between Primary Winding and Secondary Winding. See ILL. 3 for details.

H. Primary Winding to Core Insulation (Top) – One layer of Bobbin, measures 0.95 mm thick.

I. Primary Winding to Core Insulation (Center) - One layer of Bobbin, measures 1.1 mm thick.

J. Primary Winding to Core Insulation (Sides) – Seven layers of polyester tape, each measures 0.05 mm thick. In addition, one layer of C-shaped polyester window tape, measures 0.05 mm thick, is provided on each longer side of Bobbin in order to provide minimum 1.6 mm over-surface spacing between Primary Winding and Core. See ILL. 3 for details.

K. Primary Lead connection to Adjacent Winding Insulation - Five layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

L. Thermal Cutoff Splice Connection to Adjacent Winding Insulation - Six layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

M. Thermal Cutoff Body to Primary Winding Insulation – Three layers of polyester tape, each measure 0.05 mm thick.

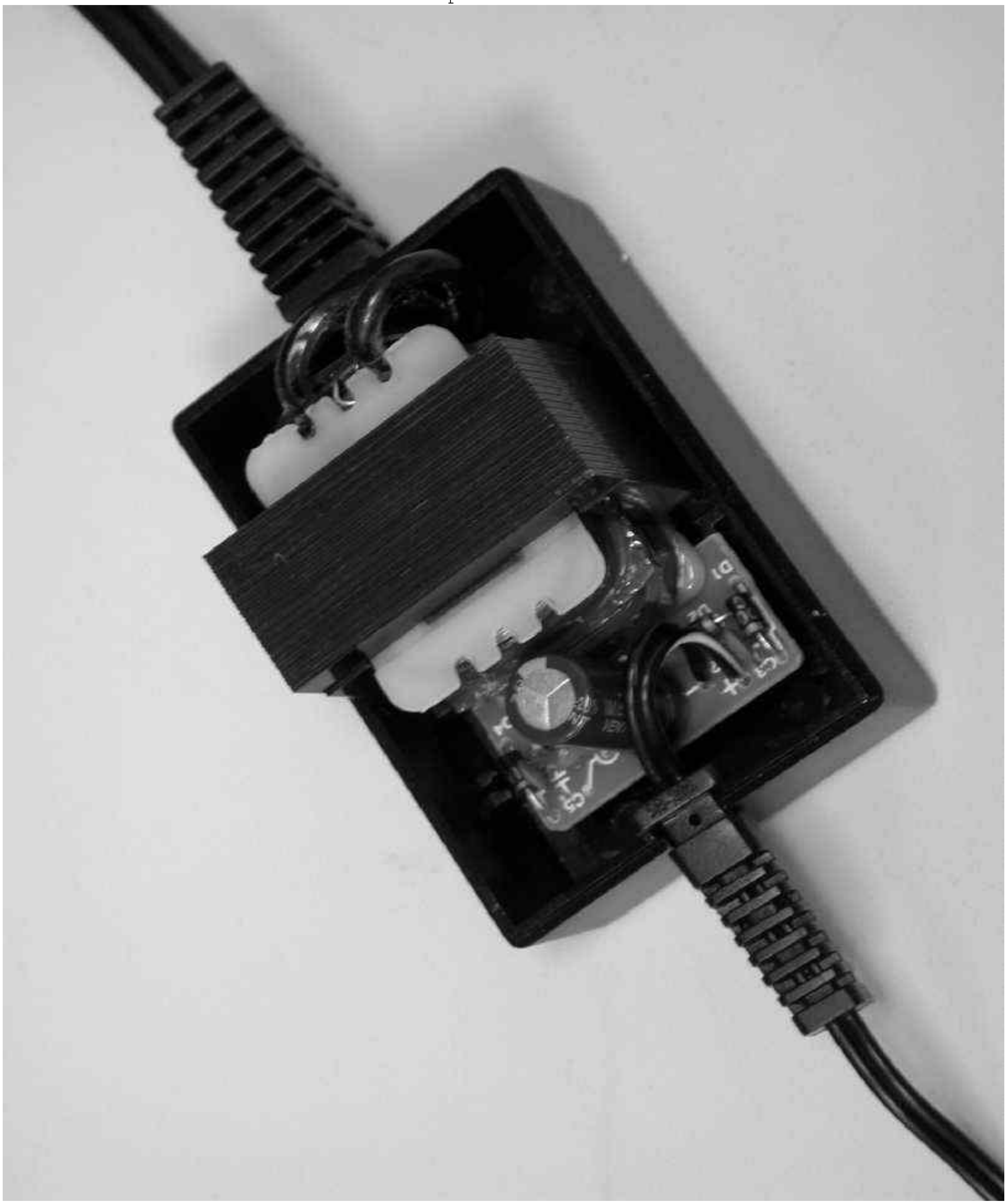
N. Crossover Insulation – Three layers of polyester tape, each measure 0.05 mm thick.

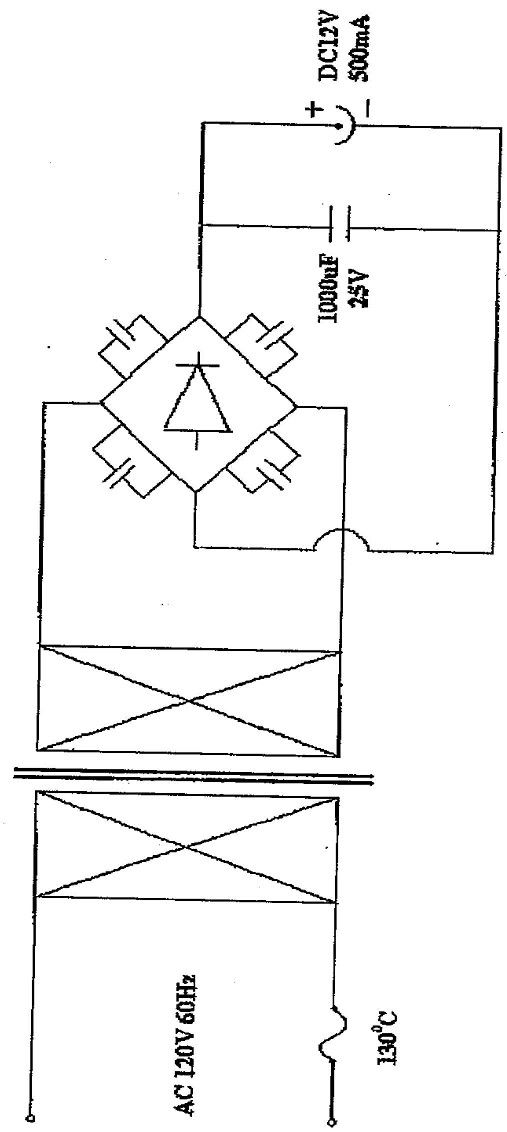
2. Printed Wiring Board (PWB) – R/C ZPMV2, rated minimum HB, 105°C. 35 by 18 mm.

3. Diodes – Four provided, Type 1N4001. Mechanically secured before soldering onto PWB.

4. Electrolytic Capacitor – Rated minimum 85°C. Mechanically secured before soldered onto PWB.

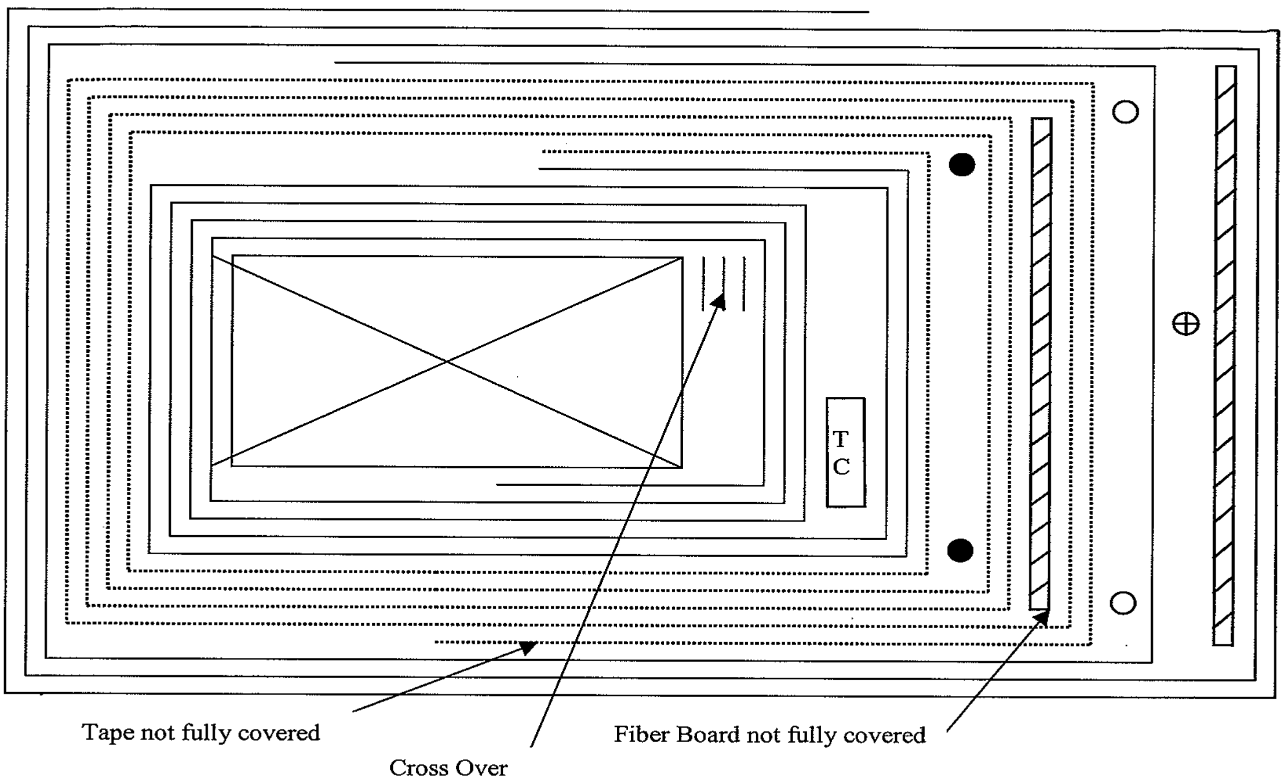

Good Power Electronics Ltd.
MODEL :
INPUT :
OUTPUT : AC/DC




+
DC12V
500mA
−
1000uF
25V
AC 120V 60Hz
130°C

Transformer Insulation System Construction

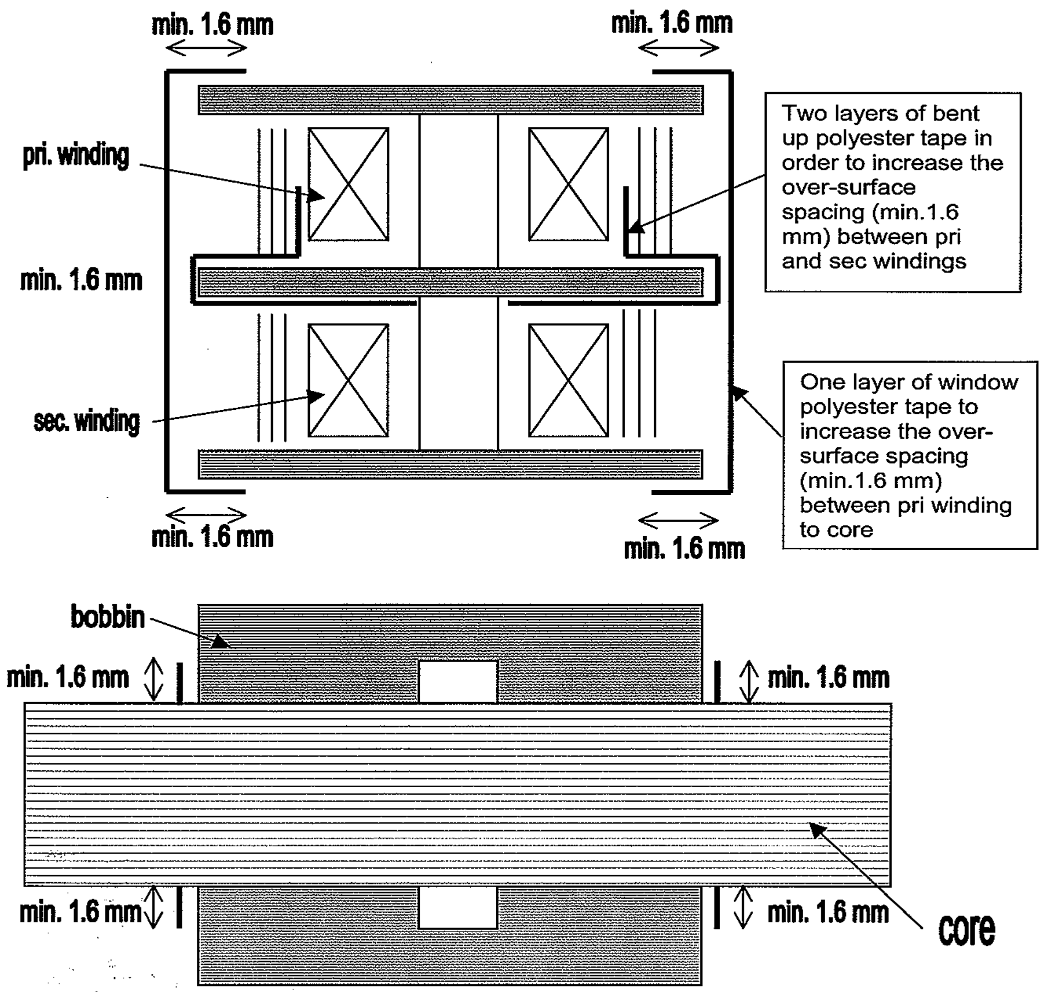
Model No.: GPU411200500CD00 **Primary Winding Insulation System**



Legen	**Symbol**
Polyester Tape (P) – 0.05 mm thick	
Fiber Board (F) – 0.4 mm thick	
Splice Connection	○
Lead Wire	●
Thermal Cutoff Splice Connection	⊕
Thermal Cutoff	TC
Winding and Bobbin	

Core Size: 41 by 33 by 19.6 mm

Primary to Secondary Windings and Primary Winding to Core Insulations



PRODUCT COVERED:

USL, CNL– Class 2 power supply, EI-57 AC/DC. Direct plug in or table top. (refer to nomenclature)

GENERAL:

The transformers covered by this report consists of inherently and non- inherently limited Class 2 transformer.

The unit consists of a transformer and other related Class 2 electronic circuitry housed in a thermoplastic enclosure. The transformer secondary winding is connected to external load via an output cord and a non-standard polarized connector.

The unit does not include grounding connection, (Optional) and has no user accessible metal parts which are likely to become energized. These units are intended for dry location use only.

USL Indicates investigation to the Standard for Class 2 Power Units, UL 1310, Fifth Edition.

CNL Indicates investigation to C22.2, No. 223, the Canadian Standard For Power Supplies with Extra Low-Voltage Class 2 Outputs.

ELECTRICAL RATINGS: Input 120V AC 60 Hz 50W MAX.

Output: Nomenclature: GPU XX XXX XXXX X X X X

1. Size of adaptor (EI57)

2. Output Voltage- First 2 digits will be the whole value of the voltage and the last digit is the value of the decimal. 12 (12 V) 125 (125 V) 060 (6 V) (6V – 24 V).

3. Output Current. (500 mA – 3000 mA)

4. Type of plug in W (wall plug), C (desktop, G (ground pin)

5. DC/AC- D-(DC Output), A- (AC Output)

6. Special function of adaptor- O (adaptor) X (special)

7. Unregulated/Regulated- O (unregulated) R (Regulated) S (Switching)

CONSTRUCTION DETAILS:

Section General - The following construction items are described in the Section General.

Markings	Printed Wiring Boards
General	Internal Wiring
Blades	Electrical Connections
Spacings	Corrosion Protection
Segregation	Instruction Manual

Instruction Manual – For direct plug-in units only. See Section General, Instruction Manual.

CLASS 2 POWER UNIT, EI57 SERIES - FIG. 1 (M030041518)

General – Fig. 1 shows the internal view of power supply.

1. Enclosure Base & cover–QMFZ2, GE Plastics. Lexan,241R rated V-0. Overall 99.0 by 67.0 by 54.0 mm, 2.43 mm thick. Secured to Enclosure Cover by ultrasonic welding.

2. Power Supply Cord For Desktop units only- Listed, Type SPT-2, No. 18 AWG, rated 105°C. Minimum 1.8 m. One end terminated in an attachment plug with non-polarized blades, and the another end is mechanically connected to Primary Winding prior to soldering.

3. Output Cord – PVC, two-conductor, No. 24 AWG. Provided with minimum 0.4 mm thick thermoplastic insulation on each lead. Length minimum 1.8 m terminates in a non-standard polarized connector.

4. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, neck fitted into a "U" shaped slot in Enclosure Base.

CLASS 2 POWER UNITS-Represents all models.

1. Transformer – Fitted to Enclosure Base, by integral ribs and secured between Enclosure Base and Enclosure Cover. Constructed as follows:

   A. Core - Silicon steel, 57 by 30 by 24 mm.

   B. Primary Winding - Enameled copper wire.

   C. Secondary Winding - Enameled copper wire.

   D. Bobbin – Three flange type. QMFZ2, EI Dupont De Nemours & Co Inc, Type 101.1 mm thick rated V-2.

   E. Thermal Cutoff –XCMQ2, Uchihashi Estec Co Ltd. Type G33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

      Alternate - XCMQ2 Same as above manufactured by Joint Force Metal Research & Co. Type M33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

   F. Primary Outer Wrap – Three layers of polyester tape, each measures 0.05 mm thick, and one layer of fiber board, measures 0.4 mm thick.

   G. Primary to Secondary Insulation - Bobbin, 1.1 mm thick.

   H. Lead Strain Relief - Two layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

   I. Thermal Cutoff Splice Connection to Adjacent Winding Insulation - six layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

   J. Crossover Insulation – Three layers of polyester tape, each measures 0.05 mm thick.

2. Printed Wiring Board (PWB) for DC units. ZPMV2, rated V0, 105°C.

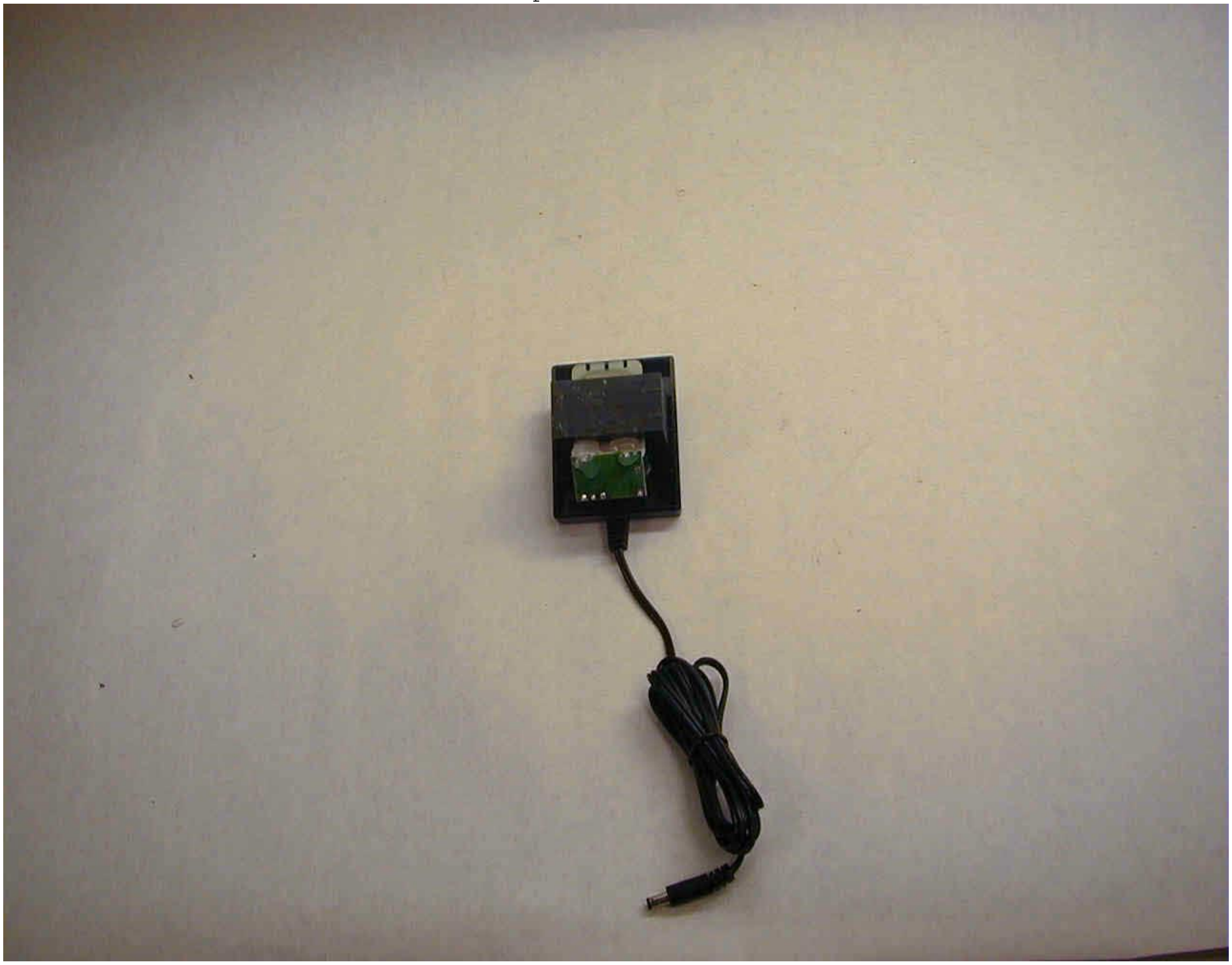
3. Diodes – for DC units. Four provided, Type 1N4001. Mechanically secured before soldering onto PWB.

4. Electrolytic Capacitor – for DC units. Rated min. 25 Vdc except 24 Vdc model rated min 35 Vdc. Mechanically secured before soldered onto PWB.

5. Fuse Listed rated 5 A, 250 V. For all units rated greater than 1000 ma.

6. PTC- Model GPU571201400D00 only – R/C (XGPU2), manufactured by Sea and Land Integrated Corp., type R30-250,.

   Alternate – same as above Type R30-185.



N141177679

DESCRIPTION

PRODUCT COVERED:

USL, CNL Class 2 Power Supplies, EI48 x 30 Series, see Table 1 for Model Numbers.

GENERAL CHARACTERISTICS:

The units covered by this report consists of a transformer, and other related electronic circuitry, housed in a thermoplastic enclosure. The units are intended for connection to a 15 A branch circuit, with a potential of 120 V to ground.

USL - Indicated investigation to the Standard for Direct Plug-In and Cord Connected Class 2 Power Units, UL 1310, Fifth Edition.

CNL - Indicated investigation to Canadian Standard C22.2 No. 223-M91.

ELECTRICAL RATINGS:

All products are rated 120 V, 60 Hz. The maximum rated input power is 25 W.

Models:

	Model Number	Input	Input VA	Output Voltage DC	Output Current mA	Output VA	Diodes	Capacitor Min V rating
*	GPU480302600WD01	120 V 60 HZ	15	3.0	2600	7.8	IN5401 (2)	10
*	GPU480332500WD01	120 V 60 HZ	15	3.3	2500	8.25	IN5401 (2)	10
*	GPU480452000WD01	120 V 60 HZ	16	4.5	2000	9.0	IN5401 (2)	10
*	GPU480502000WD01	120 V 60 HZ	17	5.0	2000	10.0	IN5401 (2)	10
*	GPU480651500WD01	120 V 60 HZ	18	6.5	1500	9.75	IN5401 (2)	10
*	GPU480601800WD01	120 V 60 HZ	18	6.0	1800	10.8	IN5401 (2)	16
*	GPU480721500WD01	120 V 60 HZ	18	7.2	1500	10.8	IN5401 (2)	16
*	GPU480751400WD01	120 V 60 HZ	18	7.5	1400	10.5	IN5401 (2)	16
*	GPU480751500WD01	120 V 60 HZ	18	7.5	1500	11.25	IN5401 (2)	16
	GPU480901300WD01	120 V 60 HZ	19	9.0	1300	11.7	IN5401 (2)	16
*	GPU480901500WD01	120 V 60 HZ	21	9.0	1500	13.5	IN5401 (2)	16
	GPU481201200WD01	120 V 60 HZ	22	12.0	1200	14.4	IN5401 (2)	25
*	GPU481201350WD01	120 V 60 HZ	24	12.0	1350	16.2	IN5401 (2)	25
	GPU481351200WD01	120 V 60 HZ	23	13.5	1200	16.2	IN5401 (2)	25
	GPU481601000WD01	120 V 60 HZ	23	16.0	1000	16.0	IN5391 (4)	25
	GPU481800800WD01	120 V 60 HZ	22	18.0	800	14.4	IN5391 (4)	35
	GPU481800900WD01	120 V 60 HZ	23	18.0	900	16.2	IN5391 (4)	35
	GPU482000800WD01	120 V 60 HZ	23	20.0	800	16.0	IN5391 (4)	35
	GPU482100700WD01	120 V 60 HZ	22	21.0	700	14.7	IN5391 (4)	35
	GPU482200650WD01	120 V 60 HZ	22	22.0	650	14.3	IN5391 (4)	35
	GPU482200700WD01	120 V 60 HZ	23	22.0	700	15.4	IN5391 (4)	35
	GPU482400650WD01	120 V 60 HZ	25	24.0	650	15.6	IN5391 (4)	35

* indicates secondary fuse required (see Fig. 1)

CONSTRUCTION DETAILS:

Marking - Permanently ink-stamped, hot stamped, silk screened or provided as label; label employed is Recognized Component marking and labeling system (PGDQ2), suitable for application to for the surface applied.

Information Marking - Indicates company name, model number, date or other dating period of manufacture, cautionary statements, and electrical ratings, including: Input voltage, frequency and current; output voltage and current, dc. Also, one of the following: "Class 2 Transformer", "Class 2 Power Supply" or "Class 2 Power Unit".

Cautionary Markings - The word "CAUTION" or "WARNING" in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - Four digit code hot stamped into bottom of enclosure.

Example: 9338 - First 2 digits = year, last 2 digits - week of year.

The following markings are provided:

All products covered by this report shall be marked with the word "CAUTION" and "RISK OF ELECTRIC SHOCK" and the following or the equivalent: "DRY LOCATION USE ONLY" or "DO NOT EXPOSE TO LIQUID, VAPOR, OR RAIN."

Internal Wiring - Unless otherwise specified, all internal wiring is R/C (AVLV2), rated 125 V, 85°C min.

Segregation - Insulated conductors of different circuits are provided with spacings as specified in this report, unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges and heat producing components.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - R/C tubing (YDPU2) and/or sleeving (UZFT2), rated 125 V, 85°C.

Printed Wiring Boards - Unless otherwise specified, all boards are R/C (ZPMV2), suitable for the solder time and temp used by the manufacturer, and having a min flammability rating of 94V-2 and an operating temp rating of at least 105°C.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Enclosure Assembly - All models. Case and cover constructed from R/C plastic material (QMFZ2), manufactured by GE Plastics, designated Polycarbonate, Type 6485+(f1), rated 94V-0, 130°C. Case and cover secured together by sonic welding and two screws.

Blades and Grounding Pin - Dimensions, spacings, and relative location of blades shall be as detailed in Section General Ill. 1.

Instruction Manual – See Section General, Instruction Manual

FIG. 1

General - Represents all other models covered in this Report.

1. Enclosure Base - Recognized Component - Plastics (QMFZ2), See Construction Details. 83.5 x 58 x 18 mm. Min 2.0 mm thick.

2. Enclosure Cover - Same material as Enclosure Base. 83.5 x 58 x 32 mm. Min 2.0 thick. Sonically welded to base.

3. Input Blade - Cooper alloy. Located min 7.9 mm from edge of Enclosure Base. See Section General Ill. 1 for details on location of blades.

4. Transformer - Secured by integral ribs of Enclosure Base and fitted between the Enclosure Cover and Base. Constructed as follows:

   A. Core - Laminated sheet steel, 48 by 40 by 30 mm.

   B. Primary Winding - Enameled copper magnet wire.

   C. Secondary Winding - Enameled copper magnet wire.

   D. Bobbin - Three flange type. Recognized Component - Plastics (QMFZ2), E.I. Dupont de Nemours & Co., designated Zytel, Type 101, min 1.1 mm thick, rated 94V-2, 130°C.

   E. Primary Crossover Leads Insulation - three layers polyester tape 0.05 mm thick.

   F. Primary to Secondary Insulation - One layer of bobbin flange, min 1.1 mm thick.

   G. Primary Outerwrap - 2 layers of polyester tape, each 0.05 mm thick.

5. Thermal Cutoff - R/C (XCMQ2) Uchihashi Estec Co., Ltd. Japan, Type G33, rated 1 A, 130°C. Insulated from winding by 3 layers 0.05 polyester tape.

   Alternate - R/C (XCMQ2) Joint Metal Research Type M33, rated as above.

6. Output Cord - 2 conductor, min No. 22 AWG (Models rated 2000 mA and above have 20 AWG cord). Provided with min 0.33 mm thick thermoplastic insulation on each lead. Min 1.8 m external length. Terminates in a polarized plug.

7. Strain Relief Bushing - Molded with the output cord, 23 mm long with a 8.0 by 8.0 by 2 mm stopper.

8. Rectifier – see Table 1.

9. Electrolytic Capacitor – see Table 1 for voltage rating, min 85°C

10. PCB - See construction details.

11. Fuse - Listed 5 A, 250 V provided in secondary circuit of all models rated 1350 mA or greater (see Table 1 for model numbers).


Good Power Electronics Ltd
AC-DC ADAPTOR
MODEL
INPUT 120 V 60 Hz W
OUTPUT AC/DC V
mA

N141177174

PRODUCT COVERED:

USL, CNL– Class 2 power supply, EI-28 AC/DC. Direct plug in. (refer to nomenclature)

GENERAL):

The transformer covered by this report consists of inherently limited Class 2 transformer.

The unit consists of a transformer and other related Class 2 electronic circuitry housed in a thermoplastic enclosure. The transformer secondary winding is connected to external load via an output cord and a non-standard polarized connector.

The unit does not include grounding connection, (Optional) and has no user accessible metal parts, which are likely to become energized. These units are intended for dry location use only.

USL Indicates investigation to the Standard for Class 2 Power Units, UL 1310, Fifth Edition, **with revisions including and through July 20, 2009.**

CNL Indicates investigation to C22.2, No. 223, the Canadian Standard For Power Supplies with Extra Low-Voltage Class 2 Outputs, **with revisions including and through September, 2009.**

*ELECTRICAL RATINGS:

For Model GPU280450100WD00 only, Input 120 Vac, 60 Hz, 5 W.

Input 120 Vac, 60 Hz, 7 W max.

Output: Nomenclature: GPU XX XXX XXXX X X X X

1. where XX = Size of adaptor (EI28)

2. where XXX = Output Voltage- First 2 digits will be the whole value of the voltage and the last digit is the value of the decimal. 12 (12V) 125 (12.5V) 060 (6V)- Voltage range -3.0-24.0

3. where XXXX= Output Current. Current range. 5ma-500ma

4. where X = Type of plug in,W (wall plug),C (desktop), G (ground pin)

5. where X = DC/AC- D-(DC Output), A- (AC Output)

6. where X = Special function of adaptor- O (adaptor) X (special)

7. where X = Unregulated/Regulated- O (unregulated) R (Regulated)

CONSTRUCTION DETAILS:

Section General - The following construction items are described in the Section General.

Markings	Printed Wiring Boards
General	Internal Wiring
Blades	Electrical Connections
Spacings	Corrosion Protection
Segregation	Instruction Manual

Instruction Manual – For direct plug-in units only. See Section General, Instruction Manual.

CLASS 2 POWER UNIT, EI28 SERIES - FIG. 1

General – Fig. 1 shows the overall and inside view of power supply.

1. Enclosure Base & cover–QMFZ2, GE Plastics. Lexan, 241R rated V-0. Overall 60.0 by 35.0 by 34.0 mm, 2.43 mm thick. Secured to Enclosure Cover by ultrasonic welding.

2. Output Cord – PVC, two-conductor, No. 24 AWG. Provided with minimum 0.4 mm thick thermoplastic insulation on each lead. Length Minimum 1.8 m terminates in a non-standard polarized connector.

3. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, neck fitted into a "U" shaped slot in Enclosure Base.

CLASS 2 POWER UNITS- EI28 Series -Represents all models.

1. Transformer – Fitted to Enclosure Base, by integral ribs and secured between Enclosure Base and Enclosure Cover. Constructed as follows:

   A. Core - Silicon steel, 28 by 15 by 25 mm.

   B. Primary Winding - Enameled copper wire.

   C. Secondary Winding - Enameled copper wire.

   D. Bobbin – Three-flange type. QMFZ2, EI Dupont De Nemours & Co Inc, Type 101,1 mm thick rated V-2.

* E. OMITTED

   F. Primary Outer Wrap – Three layers of polyester tape, each measures 0.05 mm thick, and one layer of fiberboard, measures 0.4 mm thick.

   G. Primary to Secondary Insulation - Bobbin, 1.1 mm thick.

   H. Lead Strain Relief - Two layers of polyester tape, each measures 0.05 mm thick and one layer of fiberboard measures 0.4 mm thick.

* I. OMITTED

   J. Crossover Insulation – Three layers of polyester tape, each Measure 0.05 mm thick.

2. Printed Wiring Board (PWB) for DC units. –ZPMV2 rated V0, 105°C.

3. Diodes –for DC units. Four provided, Type 1N4001. Mechanically secured before soldering onto PWB.

4. Electrolytic Capacitor – for DC units. Rated min. voltage 1.414 times specified output voltage (Vdc). Mechanically secured before soldered onto PWB.

CLASS 2 POWER UNITS, MODEL GPU280450100WD00 - FIG. 2

1. Enclosure Base & Cover – R/C QMFZ2, SABIC INNOVATIVE PLASTICS CHINA CO LTD (E161723). Type 950, any color (opaque only), rated V-0, 120°C. Overall 60.0 by 35.0 by 34.0 mm, 2.43 mm thick. Secured together by ultrasonic welding.

2. Output Cord – Two-conductors, No. 24 AWG, rated VW-1, 80°C, 300 V. Provided with minimum 0.4 mm thick thermoplastic insulation on each lead. Length minimum 1.8 m terminates in a non-standard polarized connector.

3. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, Outer portion measures 6.35 mm diameter tapering to 8.8 mm diameter, inside portion measures 7.15 by 9.35 by 3.6 mm thick; center part overall measures 6.2 by 4.2 by 2.8 mm. Neck fitted into a "U" shaped slot in Enclosure Base.

4. Blades – Non-polarized, non-grounding type, plated copper alloy, two provided. Each blade located minimum 8 mm from side of platform edge. See Section General for dimensions, spacing and location of blades. The shortest distance from any blade to core is larger than 1.6 mm.

CLASS 2 POWER UNITS, MODEL GPU280450100WD00 - FIG. 3

1. Printed Wiring Board (PWB) for DC units. – R/C ZPMV2, rated V-0, 105°C.

2. Diodes – Four provided, Type 1N4001.

3. Capacitor – Electrolytic with integral pressure relief, rated 16 V, 470 uF, 105 °C.

4. Primary Leads – R/C (AVLV2/8), two provided, Style 1015, Min. 20 AWG, rated 300 V ac, 105°C.

5. Transformer – Constructed as follows:

    A. Core - Silicon steel, overall dimension 28 by 12 by 25 mm.

    B. Primary Winding - Polyurethane enameled copper wire, 0.06 mm diameter, 4000 turns.

    C. Secondary Winding - Polyurethane enameled copper wire, 0.31 mm diameter, 197 turns.

    D. Bobbin – Three-flange type. R/C QMFZ2, EI Dupont De Nemours & Co Inc (E41938), Type 101, min. 0.71 mm thick, rated V-2, 130°C.

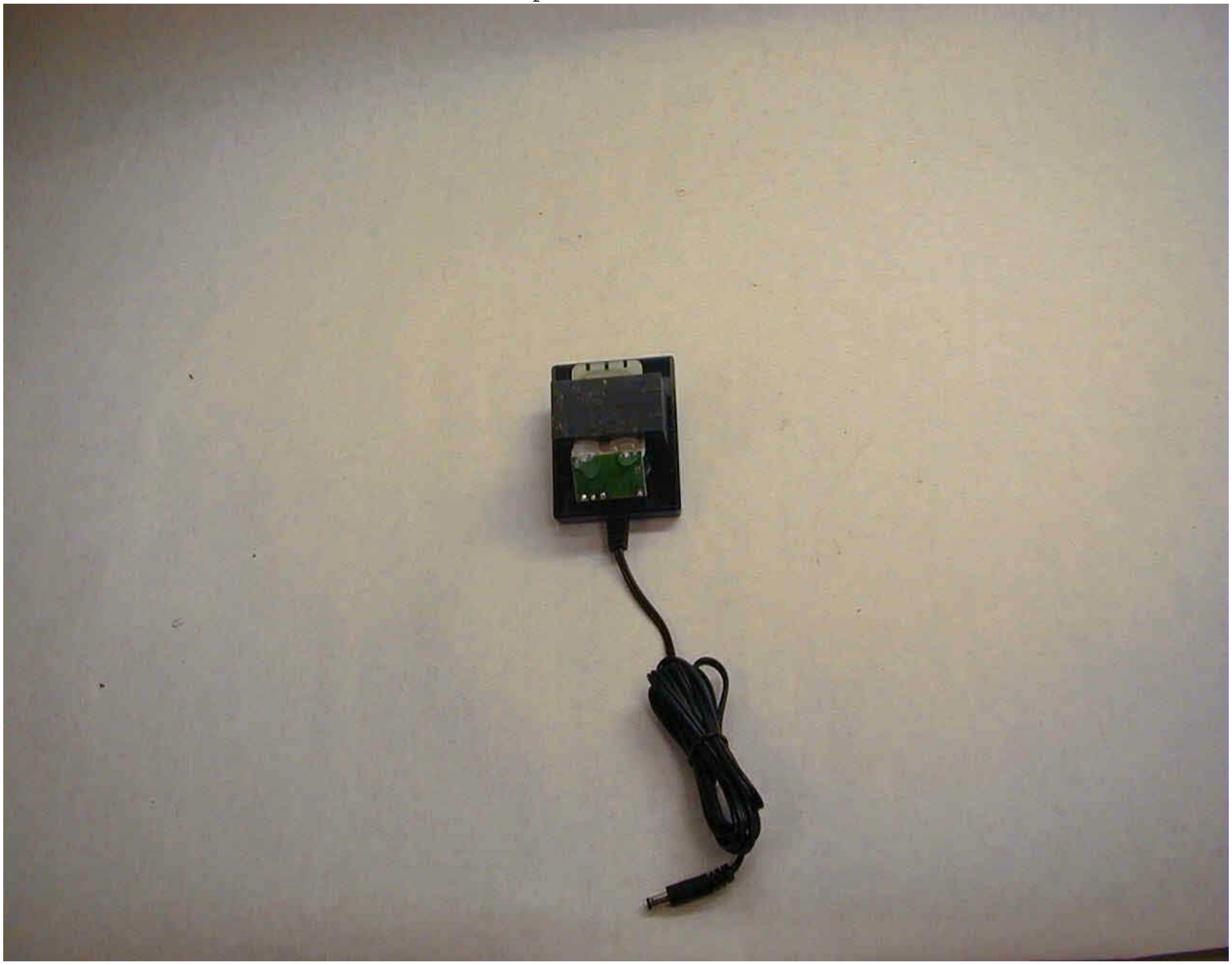
    E. Insulation Tape – R/C (OANZ2), Polyester Tape, rated 130°C.

    F. Crossover Insulation – Two layers of polyester tape, each Measure 0.05 mm thick.

Transformer Insulation as follows:

Description	Insulation Material	Total Thickness, mm	Layers Min
Primary Winding/ Secondary Winding	Bobbin	0.80	-
	Tape	Min. 0.10	2
Primary Outer-wrap	Tape	Min. 0.10	2
Primary Winding to Core Insulation (Bottom)	Bobbin	0.95	-
	Tape	Min. 0.10	2
Primary Winding to Core Insulation (Sides)	Tape (@)	Min. 0.10	2
Primary Winding to Core Insulation (Center)	Bobbin	0.85	-
Primary Crossover Lead to Primary Winding	Tape	Min. 0.10	2
Secondary Outer-wrap	Tape	MIN. 0.10	2
Secondary Winding to Core Insulation (Side)	Tape (@)	Min. 0.10	2
Secondary Winding to Core Insulation (Center)	Bobbin	0.85	-
Secondary Winding to Core Insulation (Top)	Bobbin	0.95	-
	Tape (@)	MIN. 0.10	2

Tape (@): The bent-up of tape is at least 1.6 mm for spacing between secondary winding and core, between primary winding and core. See ILL. 1A.



N141177154


RS AC/DC ADAPTOR
DONGGUAN GAOYI ELECTRONIC CO., LTD
CLASS 2 POWER SUPPLY
MODEL: GPU280450100WD00
INPUT: 120V ~ 60Hz 5W
OUTPUT: 4.5V ⎓ 100mA
OUTPUT POWER: 0.45W MAX
LISTED
E308726
49Y9
c
MADE IN CHINA

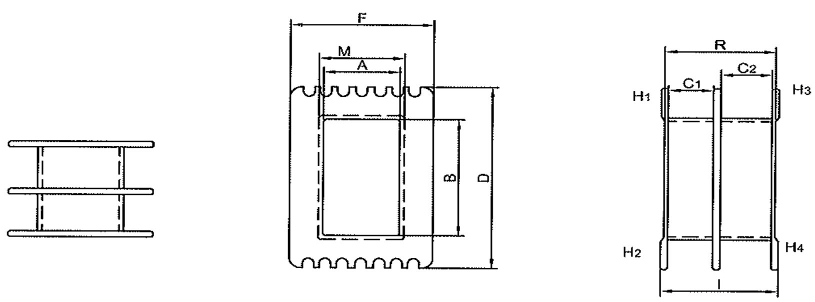
N141177155

N141177156

TY-28

双格式（王字）胶芯尺寸图

EI DUPONT DE NEMOURS & CO INC(E41938)
POLYAMIDE 66
TYPE 101 RATED V-2

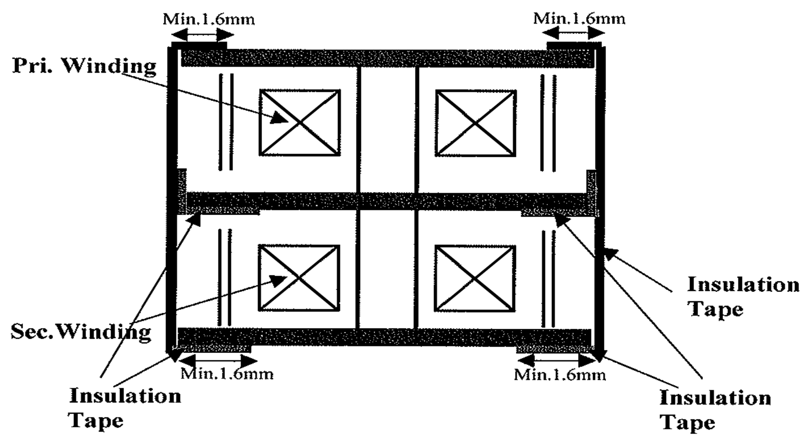


UNIT:mm

A	B	C_1	C_2	D	F	M	R	T	H_1	H_2	H_3	H_4
8.7	12.0	6.5	7.5	25.5	18.8	10.2	17.2	17.4	3	3	3	3

MODEL NAMA	EI-28*12王字	SCALE	UNIT	TOLERANCE
MATERIAL	Nylon 66		mm	mm
TY 高益电子有限公司 TEL: 0769-86386989 FAX: 0769-86386339		UL REC	REV	MAPPER
		PN		

Transformer Insulation Construction Drawing



Note:
Over surface between primary/secondary and core is min. 1.6mm.
Over surface between primary and secondary is min. 1.6mm.

CERTIFICATE OF COMPLIANCE

Certificate Number	20140627- E468713
Report Reference	E468713-19911009
Issue Date	2014-June-27

Issued to:	DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY NO 1 SHI TANG BEI ST 2 SHI JIE TOWN DONG GUAN CITY GUANGDONG 523290 CHINA
This is to certify that representative samples of	DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS See Addendum page Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	Standard for Direct Plug-In Transformer Units, UL 1310
Additional Information:	See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle: UL with the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

CERTIFICATE OF COMPLIANCE

Certificate Number 20140627- E468713
Report Reference E468713-19911009
Issue Date 2014-June-27

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Models/Product

USL - Direct plug-in Class 2 transformers, Models GP3506150D, GP3506500D, GP357.5100D, GP3509200D, GP3530005D, GP4103750D, GP4112500D, GP4116250A, GP4116500A, GP4118200D, GP3506500A, GP3509200A, GP3512200D, GP3512300A, GP3503800D, and GP3506200D, GP3503260D, GP3505500D.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

October 9, 1991

REPORT

O

DIRECT PLUG-IN TRANSFORMER UNITS

DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
GUANGDONG 523290 CHINA

D E S C R I P T I O N

PRODUCT COVERED:

USL - Direct plug-in Class 2 transformers, Models GP3506150D, GP3506500D, GP357.5100D, GP3509200D, GP3530005D, GP4103750D, GP4112500D, GP4116250A, GP4116500A, GP4118200D, GP3506500A, GP3509200A, GP3512200D, *GP3512300A, GP3503800D, and GP3506200D, GP3503260D, GP3505500D.

GENERAL CHARACTER:

The devices covered by this Report are direct plug-in transformer units.

The units covered by this Report consists of a transformer and other related electronic circuitry housed in a thermoplastic enclosure. The units are provided with parallel type blades for insertion in a standard parallel blade receptacle. The output cord is provided with a nonstandard polarized connector.

USL - Indicates investigation to the U.S. Standard for Safety of Class 2 Power Units, UL 1310, Fifth Edition.

ELECTRICAL RATINGS:

	Input, W		Hz	Output	
(Model)(Type)	V	W	Hz	V	mA
GP3506150D	120	4	60	6 V dc	150
GP3506500D	120	8	60	6 V dc	500
GP357.5100D	120	1.5	60	7.5 V dc	100
GP3509200D	120	6	60	9 V dc	200
GP3530005D	120	1.5	60	30 V dc	5
GP4103750D	120	8	60	3.0 V dc	750
GP4112500D	120	12	60	12.0 V dc	500
GP4116250A	117/120	8	50/60	16 V ac	250
GP4116500A	120	12	60	16 V ac	500
GP4118200D	120	8	60	18 V dc	200
GP3506500A	120	8	60	6 V ac	500
GP3509200A	120	6	60	9 V ac	200
GP3512200D	120	8	60	12 V dc	200
GP3503800D	120	7	60	3 V dc	800
GP3506200D	120	3	60	6 V dc	200
GP3503260D	120	4	60	3 V dc	260
*GP3505500D	120	7	60	5 V dc	500

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity, between live and dead-metal parts (and between live parts and a metal enclosure) shall be as indicated below:

	Minimum Spacings, in (mm)	
V rms	Through Air and Over Surface	Shortest Distance to Metal Enclosure
150 or less	1/16 (1.6)	1/4 (6.4)
151-250	3/16 (1.8)	1/4 (6.4)

Class 2 Secondary Circuit Spacings - Not specified, spacings are based on Dielectric Withstand Tests.

Marking - Permanently ink-stamped, hot-stamped, silk-screened or provided as label, label employed is covered as a Recognized Component marking and labeling system suitable for application to polyphenylene oxide and having a min operating temperature of 80°C.

Information Marking - Indicates company name, model number, date of other dating period of manufacture, cautionary statements, and electrical ratings including: Input voltage, frequency, and watts; Output voltage and current dc.

Cautionary Markings - The "CAUTION" or "WARNING" in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - The date code consists of a four digit code. The first two digits represent the last two digits of the year of manufacture. The last two digits represent the month of the year of manufacture.

Example: 9006 = June, 1990.

The following markings are provided:

* "Class 2 Transformer"

* “CAUTION: Risk of electric shock”
  and
  “Dry location use only”
  or
  “Do not exposure to liquid, vapor or rain”
  or the equivalent

Internal Wiring - Unless otherwise specified, all internal wiring is Recognized Component appliance wiring material (AVLV2), insulation 1/32 in (0.8 mm) thick minimum, rated 600 V, 105°C minimum (UL Style 1015), or 1/64 in (0.4 mm) thick cross-linked PVC insulation.

Segregation - Insulated conductors of difference circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge, and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - Recognized Component tubing (YDPU2) and/or sleeving (UZFT2) rated 300 V, 105°C minimum.

Printed Wiring Boards - Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flammability rating of 94HB and an operating temperature rating of at least 105°C.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Enclosure Assembly - All models. Case and cover constructed from Recognized Component plastic material (QMFZ2), Cycolac KJW-R or Lexan 141R manufactured by GE Plastic or Polycarbonate Type S-2000 manufactured by Mitsubishi Gas Chemical Co. Inc. Case and cover secured together by high frequency (sonic) welding (or solvent cement).

Electrical Schematic - Refer to Ill. 1 and 1A.

Blade - Dimensions, spacings, and relative location of blades and grounding pin shall be as detailed in Ill. 2.

Instruction Manual – See Section General, Instruction Manual

Model Differences

Models GP3506500A, and GP3509200A are constructed similar to Models GP3506500D, GP3509200D and GP3530005D except that the models ending in A are not provided with diodes.

Model GP3512200D is similar to Model GP3506500D, except for output rating.

Models GP4103750D and GP4112500D is similar to Model GP3506500D except for output ratings.

Model GP3503800D is similar to Model GP3512200D except for input and output ratings.

Model GP357.5100D is similar to Model GP3506500D except for output ratings.

Model GP4118200D is similar to Model GP4112500D except for output ratings.

Model GP3506150D is similar to Model GP3506500D except for input and output current ratings.

Model GP3506200D is identical to Model GP357.51000 except for output ratings.

Model GP4116250A is similar to Model GP4112500D except for input and output ratings.

Model GP4116500A is similar to Model GP4112500D except for output ratings.

Model GP3503260D is similar to Model GP3506200D except for output ratings.

Model GP3512300A is similar to Model GP3506500A except for output ratings.

Model GP3505500D is similar to Model GP3506500D except for output ratings.

REPRESENTS ALL MODELS FIG. 1 (M91-18731)

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described.

*1. Enclosure Cover - 2.5 mm thick, 60.8 by 44.7 by 24 mm. See Construction Details for material types.

*2. Enclosure Base - 2.5 mm thick, 60 by 44.7 by 12 mm. See Construction Details for material types.

3. Blades - Folded over/solid copper, brass or bronze. Located a minimum 7.9 mm from edge of enclosure. See Ill. 2 for dimensions, spacings and relative locations. Molded into enclosure base.

4. Strain Relief - Integrally molded with the output cord 10 by 9.4 by 2.3 mm. Secured by enclosure base, cover and integral slots.

*5. Output Cord - Two conductor, provided with 0.33 mm thick thermoplastic insulation on each lead. Minimum 1.8 m external length. Terminates in a polarized connector.

REPRESENTS ALL MODELS FIG. 2 (M91-18730)

General - This Fig. shows an internal view of the unit.

1. Printed Wiring Board - Recognized Component (ZPMV2) board rated min 94HB overall 1.7 mm minimum thick dimensions are 31 by 20 mm.

2. Transformer - Constructed as follows:

* Core - For Models GP4103750D, GP4112500D, GP4116250A, GP4116500A and GP4118200D only. Laminated Steel, 41 by 33 by 19 mm.

* Alternate - For Models GP3506150D, GP3506500D, GP357.5100D, GP3509200D, GP3530005D, GP3506500A, GP3509200A, GP3512200D, GP3503800D, GP3506200D, GP3503260D and GPD3505500D only. Laminated Steel, 35 by 30 by 12 mm.

Windings - Enameled copper magnet wire, randomly wound.

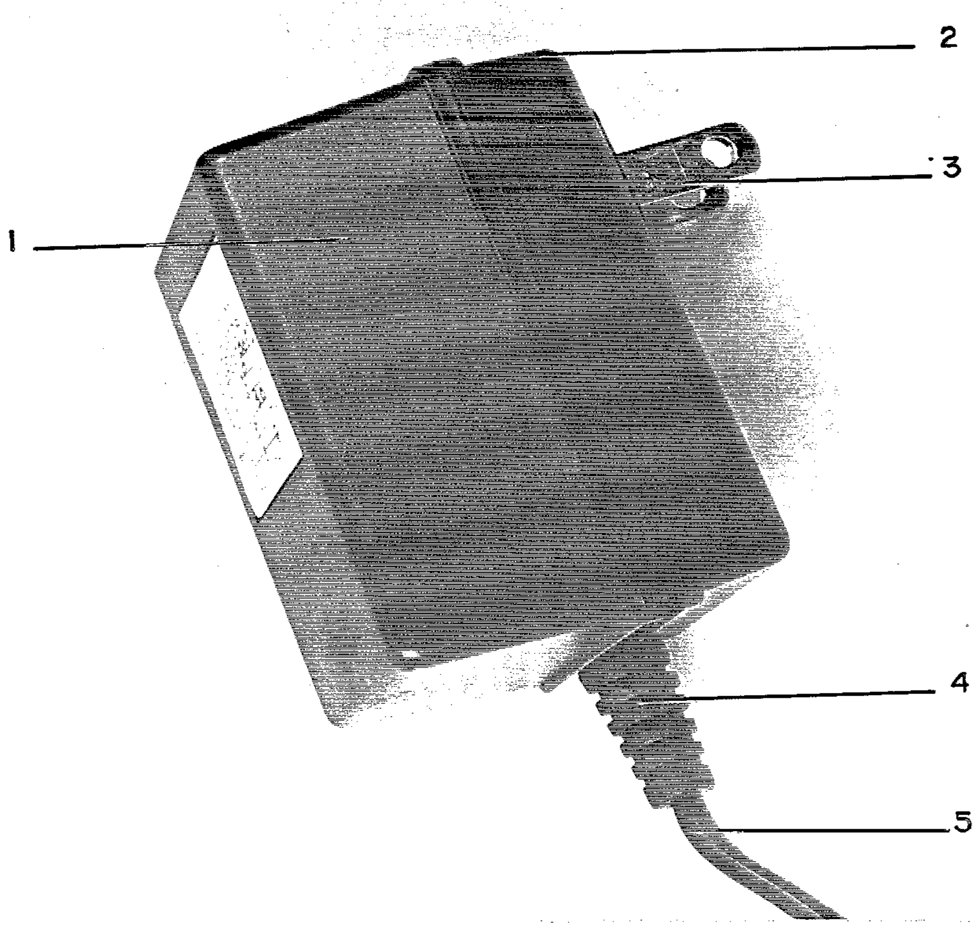
*

Bobbin - Three flange type. Recognized Component plastic material (QMFZ2), manufactured by EI Dupont, Type Zytel 101; 1.3 mm thick. Provided with 3 layers of polyester tape for crossover lead. Integral barrier between primary and secondary windings consist of bobbin flange 1.3 mm minimum thick.

Outer Wrap - Consists of 3 layers of 0.05 mm thick per layer of polyester tape.

3. Thermostat - (Optional) R/C (XEWR2) - For Models GP4116250A and GP41160500A, not relied upon for testing. Provided with 4 layers polyester tape between winding and body of thermostat.

4. Blade Support - Recognized Component plastics (QMFZ2), rated min 94V-2, manufactured by GE, Type Lexan or Cycolac; 2.5 mm. Molded into enclosure base.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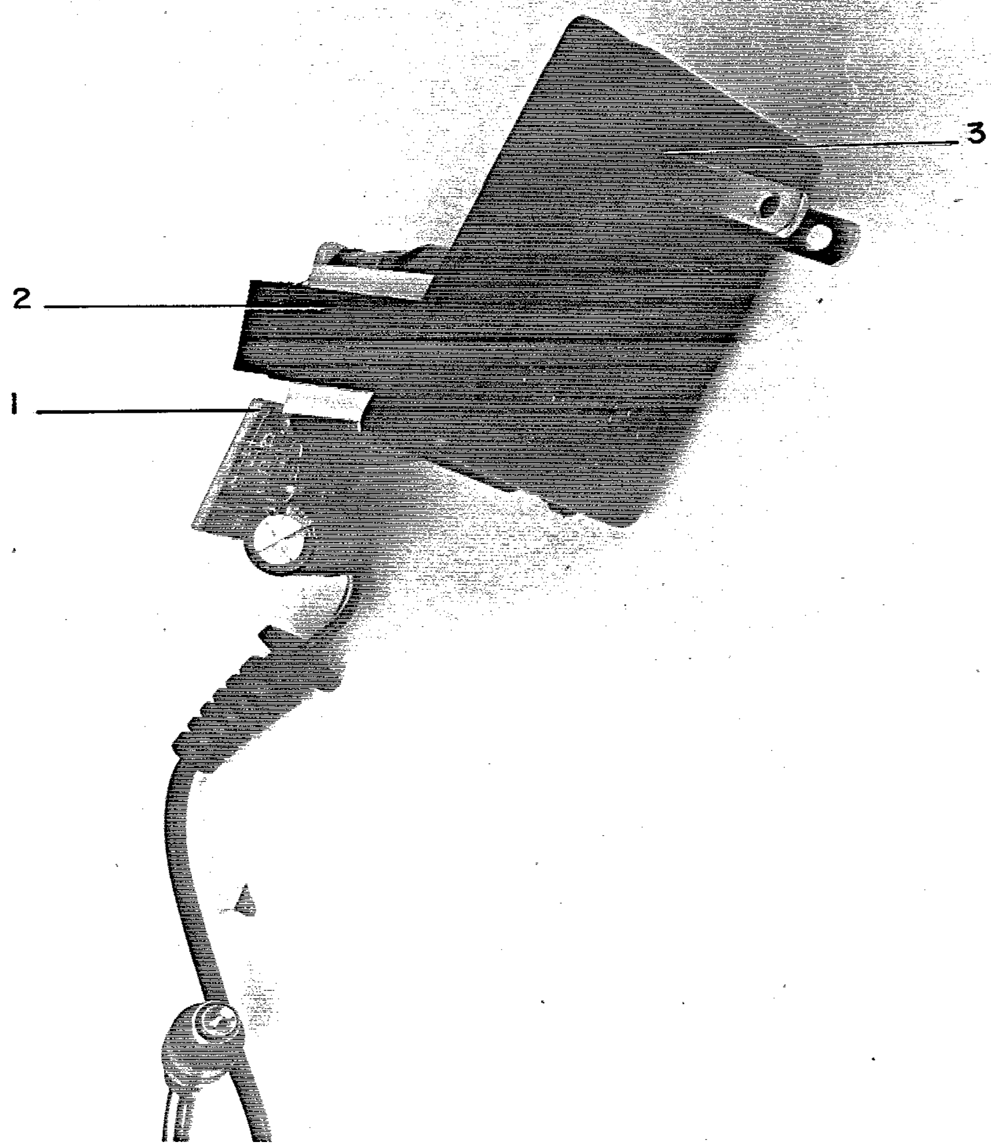
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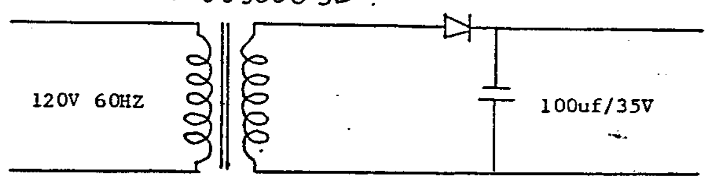
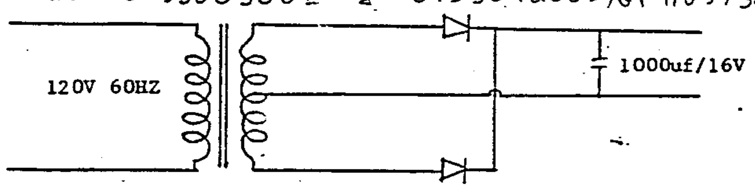
Schematic Diagram

Model GP35300005D.

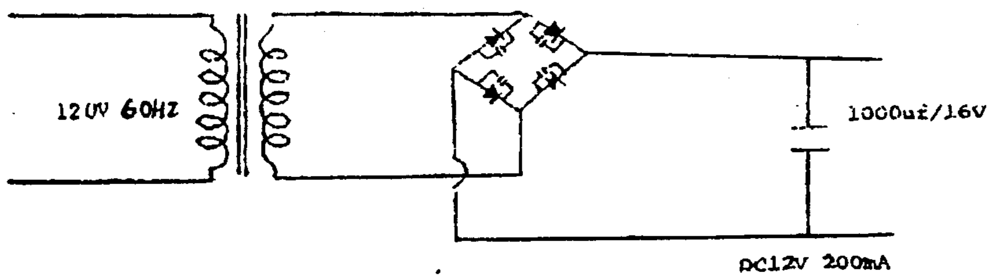


Schematic Diagram

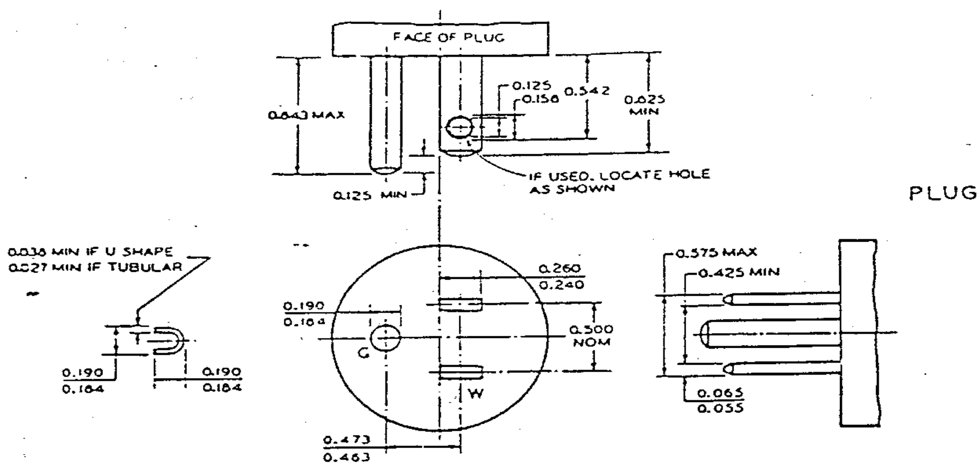
GP357.5100D
Models GP3506500D & GP3509200D, GP41037500D, GP4112500D
GP4118200D



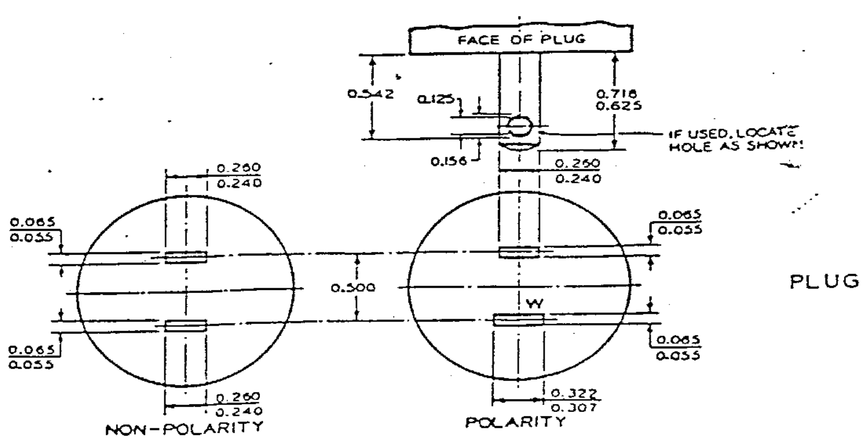
Schematic Diagram : MODEL GP3512200D, GP3503800D, GP3506150D



2-POLE, 3-WIRE GROUNDING DEVICES RATED
15 AMPERES, 125 VOLTS



2-POLE, 2-WIRE PLUG RATED
15 AMPERES, 125 VOLTS



inch	0.065 / 0.055	0.125	0.156	0.260 / 0.240	0.322 / 0.307	0.500	0.542	0.718 / 0.625
mm	1.65 / 1.39	3.2	4.0	6.60 / 6.10	8.18 / 7.80	12.7	13.8	18.2 / 15.9

TEST RECORD NO. 1

SAMPLES:

Samples of the Model GP3530005D, GP3506500D and GP3509200D direct plug-in transformer units were submitted by the manufacturer. They were constructed as described in the preceding section of this Report and subjected to the following tests.

General - For all tests in which the units were energized from a source of supply the units were operated from a 15 A duplex receptacle with a nonmetallic faceplate. The receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 in^3. The outlet box was mounted in a 3-1/2 in thick wall section with gypsum wall board surfaces and loosely filled with fiberglass insulation.

LEAKAGE CURRENT TEST:

METHOD I

One sample of each model tabulated below was connected to a sinusoidal source of supply as indicated. Tests were conducted with the unit under normal load conditions through the test circuit described in Figure 24.1 of the Standard for Direct Plug-In Transformer Units, UL 1310 dated May 8, 1981. The leakage current was measured between exposed conductive surfaces (+), including output terminals, and the grounded pole of the supply circuit. The measurements were made from these surfaces or locations individually as well as collectively where simultaneously accessible, and from one surface to another where simultaneously accessible, except not from one output terminal to another.

For the purpose of this test, the conductive surfaces consisted of metal foil with an area of 10 by 20 cm (3.94 by 7.8 in), or the same size of the surface if the surface is less than 10 by 20 cm, wrapped around the enclosure.

METHOD II

The foregoing test was repeated after the sample had been conditioned at 88 ± 2 percent relative humidity at a temperature of 32.0 ± 2°C (89.6 ± 3.6°F) for 48 h.

A - Position 1 of Switch S2.
B - Position 2 of Switch S2.
1 - Measured between grounded supply conductor and conductive surface.
2 - Maximum measured between grounded supply conductor and output leads (terminals).
3 - Maximum measured between grounded supply conductor and output leads (terminals) conductively connected to conductive surface.
4 - Maximum measured between output leads (terminals) and conductive surface.

RESULTS

Model No. GP3530005D Supply Volts 120 V, 60 Hz

		Measured Leakage Current in Microamps							
		A				B			
Condition	Switch S1	1	2	3	4	1	2	3	4
As-Received									
Open		1.03	1.67	1.87	0.27	1.03	1.67	1.87	0.27
Closed	0-5 s	0.38	0.75	0.88	0.24	0.48	1.12	1.26	0.21
	5 s-10 min	0.37	0.72	0.89	0.22	0.46	1.09	1.31	0.21
	10 min-thermal equilibrium	0.38	0.74	0.90	0.21	0.47	1.15	1.35	0.21
Humidity Conditioned									
Open		0.87	1.25	1.53	0.64	1.11	1.71	2.13	0.63
Closed	0-5 s	0.41	0.83	0.88	0.47	0.48	1.12	1.32	0.35
	5 s-10 min	0.43	0.82	0.90	0.46	0.50	1.09	1.29	0.35
	10 min-thermal equilibrium	0.42	0.84	0.90	0.47	0.51	1.09	1.28	0.37

Model No. GP3506500D Supply Volts 120 V, 60 Hz

		Measured Leakage Current in Microamps							
		A				B			
Condition	Switch S1	1	2	3	4	1	2	3	4
As-Received									
Open		0.88	2.77	3.03	0.18	0.89	2.77	3.03	0.18
Closed	0-5 s	0.53	1.53	1.65	0.07	0.59	1.42	1.54	0.19
	5 s-10 min	0.45	1.69	1.79	0.20	0.53	1.51	1.73	0.07
	10 min-thermal equilibrium	0.49	2.10	2.23	0.26	0.58	1.93	2.15	0.12
Humidity Conditioned									
Open		1.27	2.66	3.08	0.53	1.27	2.69	3.07	0.53
Closed	0-5 s	0.71	1.29	1.50	0.29	0.76	1.35	1.61	0.27
	5 s-10 min	0.71	1.33	1.54	0.29	0.79	1.39	1.65	0.27
	10 min-thermal equilibrium	0.73	1.36	1.53	0.29	0.80	1.41	1.65	0.26

DIELECTRIC WITHSTAND TEST:

METHOD

Immediately following the preceding Leakage Current Test, a 60 Hz alternating potential was applied for 1 min in each test:

A. 1240 V between primary current-carrying parts and dead-metal parts (+),

B. 1240 V between primary and secondary current-carrying parts,

C. 500 V between secondary current-carrying parts and dead-metal parts (+), and

(+) - Enclosure wrapped in foil.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

OPEN-CIRCUIT SECONDARY VOLTAGE TEST:

METHOD

Two samples of each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply as indicated below. The open-circuit output voltage between any two output terminations was measured and recorded below.

RESULTS

Model	Sample No.	Input Rated V, Hz	Input Measured V, Hz	Output Terminations Measured	Output Rated Open Circuit, V dc	Output Measured Open Circuit, V (dc)
GP3530005D	1	120, 60	120, 60	Output	30	32.74
	2	120, 60	120, 60	Output	30	32.80
GP3506500D	1	120, 60	120, 60	Output	5.9	10.80
	2	120, 60	120, 60	Output	5.9	10.85
GP3509200D	1	120, 60	120, 60	Output	9	13.44
	2	120, 60	120, 60	Output	9	13.47

The measured output voltage did not exceed 42.4 V peak for nonsinusoidal alternating current or continuous direct current.

INPUT TEST:

METHOD A

Two samples of each model tabulated below were connected to a 120 V, 60 Hz sinusoidal source of supply as indicated. The output of each was connected to a load consisting of a variable resistor in parallel with a 10,000 uF capacitor for units having a direct-current output. The load was adjusted, including short circuit of any combination of output terminals, to cause maximum input to the unit. The supply circuit was de-energized and the unit allowed to cool to room temperature. The supply circuit was then energized a second time and the input power measured within 15 s after application of voltage to the primary winding.

METHOD B

Two samples of each model tabulated below were connected to a source of supply as indicated above. The output of each was connected to a load as described above and was adjusted to result in rated output current or power. The input power and current was measured within 15 s after application of voltage to the primary winding.

RESULTS (METHOD A)

	Input					Output dc		
Model	Sample	Rated V, Hz	Measured V, Hz	Rated W	Maximum Measured W	(mA)	(V)	(W)
GP3530005D	1	120, 60	60, 120	1.5	13.5	563	150	0.03
	2	120, 60	120, 60	1.5	14.9	593	176	0.05
GP3506500D	1	120, 60	120, 60	8	15.3	1913	693	0.72
	2	120, 60	120, 60	8	15.2	1895	629	0.75
GP3509200D	1	120, 60	120, 60	6	14.2	145	454	0.39
	2	120, 60	120, 60	6	13.9	1436	450	0.39

RESULTS (METHOD B)

		Input, ac					Output, (dc)				
		Rated		Measured			Rated		Measured		
Model	Sample No.	V, Hz	(W)	V, Hz	W	(mA)	V	(mA)	V	mA	(W)
GP3530005D	1	120, 60	1.5	120, 60	0.69	37.7	30	5	30.59	5.0	0.147
	2	120, 60	1.5	120, 60	0.67	35.1	30	5	30.63	5.0	0.149
GP3506500D	1	120, 60	8	120, 60	5.47	53.6	6	500	6.12	500	2.99
	2	120, 60	8	120, 60	5.48	53.9	6	500	6.11	500	2.98
GP3509200D	1	120, 60	6	120, 60	3.00	40.0	9	200	9.42	200	1.88
	2	120, 60	6	120, 60	2.92	36.8	9	200	9.40	200	1.87

The measured input power did not exceed 660 W for Method A. The measured input power or current was within 110 percent of the rated input power or current rating for Method B.

OUTPUT CURRENT AND POWER TEST (INHERENTLY LIMITED):

METHOD

Two samples of each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply as indicated below. A variable resistive load adjusted to obtain the maximum obtainable current after 1 min was (alternately) connected to the output. The current obtained was recorded.

After the samples had cooled to room temperature they were again connected to a 120 V, 60 Hz source of supply as indicated below. A variable resistive load adjusted to obtain the maximum obtainable power after 1 min was connected to the output. The power obtained was recorded.

RESULTS

		Input		Output		
Model	Sample No.	Rated V, Hz	Measured V, Hz	Rated V dc	Maximum Measured Current, A	Maximum Measured Power, W
GP3530005D	1	120, 60	120, 60	30	0.515	2.16
	2	120, 60	120, 60	30	0.513	2.17
GP3506500D	1	120, 60	120, 60	5.9	1.76	3.52
	2	120, 60	120, 60	5.9	1.77	3.50
GP3509200D	1	120, 60	120, 60	9	1.29	3.10
	2	120, 60	120, 60	9	1.28	3.13

The maximum output current after 1 min was less than 8 A. The maximum output power after 1 min was less than 100 W.

FULL-LOAD OUTPUT CURRENT:

METHOD

Two samples of each model tabulated below were subjected to this test. The samples were connected to 60 Hz source of supply as indicated below. The outputs of each were connected to a load consisting of a variable resistor in parallel with a 10,000 uF capacitor for units having a direct-current output adjusted to result in the rated output current or power. After 15 min of operation, the load was readjusted, if necessary, to return the current to its rated value. With no further adjustment the test was continued for 1 h. At the end of 1 h the output current or power was measured and recorded.

For units rated with output ratings in volt-amperes or watts, the output current was determined by dividing the rated output voltage into the rated volt-amperes or watts.

RESULTS

Model	Sample	Protector Type	Rated Input V, Hz A	Measured Input V, Hz A	Rated Output V dc	Rated Output (VA) (Current, A)	Test Current, A	Measured Output Current, A	Did Overcurrent or Overtemperature Device Open?
GP3530005D	1	--	120,60	120,60	30	0.005	0.005	0.005	No
	2	--	120,60	120,60	30	0.005	0.005	0.005	No
GP3506500D	1	--	120,60	120,60	5.9	0.500	0.500	0.498	No
	2	--	120,60	120,60	5.9	0.500	0.501	0.496	No
GP3509200D	1	--	120,60	120,60	9	0.200	0.202	0.198	No
	2	--	120,60	120,60	9	0.200	0.204	0.199	No

The measured output current after 1 h was within 90 percent of the original rated setting and overtemperature or overcurrent protective devices did not function during this test.

TRANSFORMER CLASS 2 CHARACTERISTICS TEST:

METHOD

Two samples of transformers for each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply as indicated below. Using suitable meters, the open circuit voltage and maximum obtainable current after 1 min, was measured at the transformer output.

RESULTS

			Output							
		Measured								
		Input						Short Circuit Current, A		
Model	Sample No.	Rated V, Hz	Measured V, Hz	Winding Tested	Open Circuit, V S1-C	S2-C	S1-S2	S1-C	S2-C	S1-S2
GP3530005D	1	120, 60	120, 60	Sec	23.30	--	--	0.687	--	--
	2	120, 60	120, 60	Sec	23.35	--	--	0.688	--	--
GP3506500D	1	120, 60	120, 60	Sec	15.95	--	--	1.41	--	--
	2	120, 60	120, 60	Sec	15.98	--	--	1.40	--	--
GP3509200D	1	120, 60	120, 60	Sec	19.50	--	--	1.03	--	--
	2	120, 60	120, 60	Sec	19.49	--	--	1.02	--	--

The open circuit voltage was less than 30 V and the maximum obtainable current was less than 8 A after 1 min.

NORMAL TEMPERATURE TEST:

METHOD

One sample of each model tabulated below were connected to a 120 V, 60 Hz source of supply. The output was connected to a load consisting of a variable resistor in parallel with a 10,000 uF capacitor for units having a direct-current output adjusted to result in the rated output current or power.

Each sample was operated continuously under these conditions until temperature on the units became constant.

Temperatures were measured by means of thermocouples secured by solder, tape, or water glass.

Transformer primary temperatures were measured by the change-of-resistance method.

RESULTS

Location of Thermocouples		Maximum Temperature, °C Test Model GP3530005D	Model GP3506500D	Model GP3506500D
Transformer primary winding	+	36.99°	+71.45°	+43.70°
		33.1	69.9	44.4
Transformer secondary winding				
	2	35.3	68.6	44.8
	3	30.7	73.4	45.4
Diode body				
Enclosure inside surface				
Above winding	4	27.0	44.2	32.7
Enclosure outside surface,				
bottom	5	2.92	42.1	32.3
Internal wiring	6	27.3	40.9	31.5
Ambient		21.3	21.3	21.3
Test duration,		7 h	7 h	7 h

Temperature by Change of Resistance Method

Test	Component	t1	R1	t2	R2	T	Temp.
1	GP3530005D	21.2	269.7	21.7	287.9	15.79	36.99
2	GP3506500D	21.2	271.5	21.7	329.8	50.25	71.45
3	GP3509200D	21.2	270.1	21.7	296.2	22.50	43.70

$$T = \frac{R2 - R1}{R1}(234.5 + t1) - (t2 - t1)$$: Where

"T" is the temperature rise
"R1" is the cold resistance at the beginning of the test
"R2" is the hot resistance at the end of the test
"t1" is the room ambient at the beginning of the test
"t2" is the room ambient at the end of the test

DIELECTRIC WITHSTAND TEST:

METHOD

Immediately following the preceding Normal Temperature Test, a 60 Hz alternating potential was applied for 1 min in each test:

A. 1240 V between primary current-carrying parts and dead-metal parts (transformer core),

B. 1240 V between primary and secondary current-carrying parts,

C. 500 V between secondary current-carrying parts and dead-metal parts (transformer core), and

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

INDUCED POTENTIAL TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. While in a heated condition from operation as described in the normal temperature test, an alternating potential of twice the rated voltage of the primary winding was applied to the primary winding of each transformer for 7200 c at 120 Hz or for 60 s if the frequency is less than 120 Hz. The test voltage was started at one-quarter or less of the full value and increased to full value in not more than 15 s. After being held for the time specified, the voltage was reduced within 5 s to one-quarter or less of the maximum value and the circuit was opened.

RESULTS

Model	Sample	Rated Input, V	Voltage Applied	Frequency, Hz
GP3530005D	1	120	240	120
	2	120	240	120
	3	120	240	120

The spacings and insulation withstood the application of the specified potential without breakdown.

<u>OUTPUT LOADING TEST</u>:

METHOD A

Three samples were connected to a 120 V, 60 Hz source of supply and draped with a double layer of cheesecloth.

The output of each unit was short circuited and the remaining if any were connected to loads consisting of a variable resistor in parallel with a 10,000 uF capacitor for units having a direct-current output adjusted to result in the rated output current or power. The grounding means was connected through a 3 A nontime delay fuse.

During this test, the outer surface temperature of the enclosure was measured and the time for the winding to permanently open was recorded. After the test, the samples were subjected to the following dielectric strength withstand test.

This test was repeated for each output.

METHOD B

Since short circuiting the output resulted in opening of the transformer winding, Method A was repeated with the output loaded as specified under conditions of Test A through H, in that order. If a condition resulted in 7 h of continuous operations, no further tests were conducted. The load for Conditions A through H was a variable resistor adjusted to the required value as quickly as possible and readjusted, if necessary, 1 min after application of voltage to the primary winding. After each condition of loading, the samples were subjected to the following dielectric strength test.

This test was repeated for each output.

CONDITIONS OF TEST

<u>Condition A</u> - Loading the output to a current equal to the rated current plus 75 percent of the difference between the short-circuit output current and rated current.

<u>Condition B</u> - Loading the output to a current equal to the rated current plus 50 percent of the difference between the short-circuit output current and rated current.

<u>Condition C</u> - Loading the output to a current equal to the rated current plus 25 percent of the difference between the short-circuit output current and rated current.

Condition D - Loading the output to a current equal to the rated current plus 20 percent of the difference between the short-circuit output current and rated current.

Condition E - Loading the output to a current equal to the rated current plus 15 percent of the difference between the short-circuit output current and rated current.

Condition F - Loading the output to a current equal to the rated current plus 10 percent of the difference between the short-circuit output current and rated current.

Condition G - Loading the output to a current equal to the rated current plus 5 percent of the difference between the short-circuit output current and rated current.

Condition H - Loading the output to rated current.

RESULTS A

Model	Sample	Ambient, °C	Maximum Outer Enclosure Temperature, °C	Time to Burnout min:s
GP3530005D	1	24.2	90.1	12:17
	2	24.2	90.7	12:41
GP3506500D	1	24.2	98.2	19:11
	2	24.2	95.0	19:33
GP3509200D	1	24.2	101.1	23:27
	2	24.2	94.1	22:11

RESULTS B

Model GP3530005D (30 V)

Sample No.	Condition	Test Current In Amps	M:S Time to Burnout	Remarks
1	A	0.387	15:57	NB
2	A	0.387	15:22	NB
3	A	--		
4	B	0.260	7 h	NB
5	B	0.260	7 h	NB
6	B	--		
7	C	0.133	7 h	NB
8	C	0.133	7 h	NB

RESULTS B

Model GP3506500D (6 V)

Sample No.	Condition	Test Current In Amps	M:S Time to Burnout	Remarks
1	A	1.45	38:51	NB
2	A	1.45	39.27	NB
3	A	--		
4	B	1.14	7 h	NB
5	B	1.14	7 h	NB
6	B	--		

RESULTS B

Model GP3509200D (9 V)

Sample No.	Condition	Test Current In Amps	M:S Time to Burnout	Remarks
1	A	1.02	3:47:29	NB
2	A	1.02	1:56:17	NB
3	A	--		
4	B	0.745	7 h	NB
5	B	0.745	7 h	NB
6	B	--		

Sample No.	(30 V) Condition	Test Current In Amps	Remarks
20	G		
21	G		
22	H		
23	H		
24	H		

During the test as described in Method A the exterior surface temperature did not exceed 65°C rise, the transformer winding burned out. During Methods A and B, there was no emission of flame or molten metal, charring of the cheesecloth, openings in the enclosure that exposed live parts operating at more than 42.4 V peak, or loss of structural integrity to an extent the unit could not be removed from the receptacle immediately after the test without deformation or a risk of electric shock.

Sample No.	(6 V) Condition	Test Current In Amps	Remarks
20	G		
21	G		
22	H		
23	H		
24	H		

During the test as described in Method A the exterior surface temperature did not exceed 65°C rise, the transformer winding burned out. During Methods A and B, there was no emission of flame or molten metal, charring of the cheesecloth, openings in the enclosure that exposed live parts operating at more than 42.4 V peak, or loss of structural integrity to an extent the unit could not be removed from the receptacle immediately after the test without deformation or a risk of electric shock.

Sample No.	(9 V) Condition	Test Current In Amps	Remarks
20	G		
21	G		
22	H		
23	H		
24	H		

During the test as described in Method A the exterior surface temperature did not exceed 65°C rise, the transformer winding burned. During Methods A and B, there was no emission of flame or molten metal, charring of the cheesecloth, openings in the enclosure that exposed live parts operating at more than 42.4 V peak, or loss of structural integrity to an extent the unit could not be removed from the receptacle immediately after the test without deformation or a risk of electric shock.

DIELECTRIC STRENGTH TEST:

METHOD

Immediately following the preceding Output Loading Test, each sample was subjected to this test. A 60 Hz sinusoidal potential was applied for 1 min as follows.

Test A - 1240 V between primary and secondary and

Test B - 1240 V between primary and exposed dead-metal parts (enclosure wrapped in foil).

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

TRANSFORMER BURNOUT TEST:

METHOD

Two samples of each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply.

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred. During this test each sample was draped with a double layer of cheesecloth.

For a transformer with more than one secondary winding, or a tapped secondary winding, each winding or tapped section was tested separately with the other windings loaded or unloaded to cause the most unfavorable result.

RESULTS

			Time to Burn Out, min:s		
	Normal	3X Normal	Winding	Sample	
Model	Input, A	Input A	Tested	1	2
GP3530005D	0.0377 0.0377	0.113		32:37	28:54
GP3506500D	0.0539 0.0539	0.162		15:22	16:51
GP3509200D	0.040 0.040	0.120		34:17	35:29

The transformer winding burned out. There was no emission of flame or molten metal, charring of the cheesecloth, openings of the enclosure that would result in exposure of live parts operating at more than 42.4 V peak, or loss of structural integrity to an extent the unit could not be removed from the receptacle immediately after the test without deformation or a risk of electric shock.

DIELECTRIC STRENGTH TEST:

METHOD

Immediately following the preceding Transformer Burnout Test each sample was subjected to this test. A 60 Hz sinusoidal potential was applied for 1 min as follows.

A. 1240 V between primary and exposed dead-metal parts (foil wrapped around enclosure).

B. 1240 V between primary and secondary windings.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

STRAIN RELIEF TEST:

METHOD

Three samples of each model tabulated below were subjected to this test in the "as-received" condition and after being conditioned in an oven maintained at a temperature of 70°C or hottest temperature + 10°C for 7 h. The output cord of each sample was subjected to a 20 lb pull for 1 min. The internal connections to the cords were left intact during the test.

RESULTS

Model	Sample	Before Oven/After Oven
GP3506500D	1	No Displacement/No Displacement
GP3506500D	2	No Displacement/No Displacement
GP3506500D	3	No Displacement/No Displacement

There was no displacement or breakage of the cord or deformation of its anchoring surface.

BLADE SECURENESS TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. Each unit was supported on a horizontal steel plate with the blades projecting downward through a hole having a diameter sufficient only to permit the blades to pass through it. A 20 lb weight was supported by each blade in succession and then by the two blades tested together. Each test was 2 min in length.

RESULTS

Model	Sample	Remarks		
		Blade 1	Blade 2	Blade 1 and 2
GP3506500D	C3	OK	OK	OK
	C4	OK	OK	OK
	C5	OK	OK	OK

The blades did not loosen or pull out.

SECURITY OF INPUT CONTACTS TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. Each unit was rigidly supported in the blades up position. Each blade in succession were subjected to a force of 30 lb applied gradually along the axis of the blade in a direction towards the face of the unit. The same samples were retested subjecting both blades to a single applied force of 40 lb. Each test was 1 min in length.

RESULTS

Model	Sample	Remarks			
		Blade 1	Blade 2	Ground Pin	Both Blades
GP3506500D	C3	OK	OK	--	OK
	C4	OK	OK	--	OK
	C5	OK	OK	--	OK

The blades did not loosen to a degree that would introduce a risk of a fire or an electric shock.

IMPACT TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. Each sample was dropped four times in succession from a height of 3 ft onto a concrete floor at least 2-1/2 in thick covered with a 1/8 in. thick vinyl tile. On each successive drop the enclosure struck the surface in a different orientation.

RESULTS

Model	Sample	Drop No.	Area Tested
GP3506500D	1	1	(A) Top
		2	(B) Side
		3	(C) Top Corner
		4	(D) Bottom Corner

There was no shattering, cracking, or other damage to the enclosure that would expose internal wiring or live parts.

ROD PRESSURE TEST:

METHOD

A sample of each model tabulated below was subjected to this test. Each sample was energized from a 120 V, 60 Hz source of supply. (The enclosure was wrapped with a layer of metal foil.) A force increasing from 0-20 lb over a period of 5 s was applied through the axis of the rod perpendicular to the surface of the enclosure as indicated below. The rod was 1/2 in diameter, had a flat face, with edges rounded to a radius of 1/32 in. The test was continued for 1 min.

During this test peak voltage and leakage current was monitored between earth ground and all parts of the enclosure (the outer foil wrap).

RESULTS

Rod Application Points -

	Enclosure To Earth Ground Measurements			
	Rms		Leakage Current, Rms	
	S1 Closed		S1 Closed	
	S2 Position		S2 Position	
	MV		Microamps	
Model	1	2	1	2
GP3506500D	0.98	1.07	0.65	0.71 mA

No openings developed in the enclosure that exposed live circuit parts greater than 42.4 V peak to contact, to any other part, or to ground. Leakage current between enclosure (metal foil) and earth ground was not above 7.07 mA peak, the voltage between the enclosure (metal foil) and earth ground did not exceed 42.4 V peak.

DIELECTRIC WITHSTAND TEST:

METHOD

Immediately following the preceding Impact and Rod Pressure Tests, each unit was subjected to this test. A 60 Hz sinusoidal potential was applied as follows for 1 min.

Test A - 1240 V between primary and secondary.

Test B - 1240 V between primary and dead-metal.

Test C - 500 V between secondary and dead-metal.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

CRUSH RESISTANCE TEST:

METHOD

A sample of each model tabulated below was placed between two maple blocks each not less than 1/2 in thick and one having slots for the plug blades. A crushing force of 75 lb was applied gradually in a direction normal to the mounting surface for a period of 1 min.

RESULTS

There was no splitting, cracking or shattering of the enclosure that would expose internal wiring or live-parts.

MOLD STRESS EVALUATION:

METHOD

Three samples of each model tabulated below were placed in a 70°C the hottest temperature measured +10°C oven for a period of 7 h. Upon removal they were examined for evidence of softening, cracking, warping or distortion. They were also examined for exposed uninsulated live-metal parts. After cooling to room temperature, the Strain Relief Test was repeated (see Strain Relief Test).

RESULTS

There was no evidence of softening, cracking, warping, or any other distortion that would expose live parts or increase the fire or shock hazard of the device. There was no breakage of the cord or deformation of its anchoring surface after the repeated Strain Relief Test.

WEIGHT AND MOMENT COMPUTATION:

METHOD

A sample model was weighed (+) and the distance to the center of gravity was measured using suitable instruments. Also the distance between the center of the blades and the center of gravity was measured. For this test direct mounted accessories were in place. The moments were then calculated by taking the products of the above measurements.

(+) = The output cord was not included in the weight measurement.

W = Weight of the device in ounces (grams).

S = The lessor of S_1 and S_2.

S_1 = Distance from the center of the blades to the left side of the enclosure in inches (millimeters).

S_2 = Distance from the center of the blades to the right side of the enclosure in inches (millimeters).

X = The greater of X_1 and X_2.

X_1 = Distance from the horizontal axis passing through the center of the blades to the center of gravity in inches (millimeters).

X_2 = Distance from the vertical axis passing through the center of the blades to the center of gravity in inches (millimeters).

Y = Distance from the face (blade side) to the center of gravity in inches (millimeters).

Z = The lessor of Z_1 and Z_2.

Z_1 = Distance from the center of the blades to the top of the enclosure in inches (millimeters) including mounting tab.

Z_2 = Distance from the center of the blades to the bottom of the enclosure in inches (millimeters).

RESULTS

Model	W oz	S in	X in	Y in	Z in	WY/Z oz	WY/S oz	WX oz in
GP3506500D	4.80	1.391	0.700	0.673	0.500	6.461	2.322	3.36

W - Did not exceed 28 oz (794 g).
WY/Z - Did not exceed 48 oz (1361 g).
WY/S - Did not exceed 48 oz (1361 g)
WX - Did not exceed 80 oz in 56000 gmm or 0.56 gm

B.B.

T E S T R E C O R D N O. 2

SAMPLES:

No tests were performed on Model GP3512200D, because of similarity in construction to previously Listed models. Reference File E140329 report dated 10-9-91 Test Record No. 1.

B.B.

T E S T R E C O R D N O. 3

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP41160500A.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current (and power) to the sample were measured 15 s after application of voltage to the primary.

RESULTS

Model	Measured Input V	mA	W	Marked Rated Input (W)
GP4116500A	120	112	11.14	12

The marked rated input power is at least 90% of the measured input.

TRANSFORMER CHARACTERISTICS TEST:

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output Measured	V, rms	Current (A)	Power, W
GP4116500A	Secondary	18.3	3.2	15

RESULTS A and B cont'd

For inherently limited secondaries:

The maximum secondary current and power did not exceed 8 A and 100 W, respectively.

NORMAL TEMPERATURE TEST:

METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions.

RESULTS

Model GP4116500A.

Thermocouple Locations	Max Temperatures, °C Horizontal	Vertical
Transformer Primary Winding Top	75	73
Transformer Secondary Winding, Top	74	75
Transformer Core	74	73
Enclosure Outside Surface, Near Transformer	44	41
Ambient	23.9	24.7
Test Duration, h:min	3-1/2 h	3-1/2 h

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHOD

One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

500 V ac between secondary circuits and exposed conductive parts with common connections disconnected.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

W.C.

TEST RECORD NO. 4

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP3503260D

GENERAL:

Unless otherwise specified in the individual test Methods and Results, the units were operated as follows:

Supply Circuit - The units were connected to a A branch circuit supply adjusted to provide 120 V, 60 Hz.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input		Marked Rated Input
Model	V	mA	W	(W)
GP3503260D	120	26 mA	2.12	4

The marked rated input current and power is at least 90% of the measured input.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each unit was placed on a tissue covered soft wood surface and draped with a double layer of cheesecloth.

If the results indicated that the secondary under test met not inherently limited Class 2 specifications, the unit was subjected to the following Dielectric Voltage Withstand Test.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	V, rms	Current (A) (mA)	Power, W
GP3503260D	7.89 V	1.32 A	2.96

RESULTS A and B (Cont'd)

For inherently limited secondaries:

The maximum secondary current and power did not exceed 8 A and 100 W, respectively.

For not inherently limited secondaries:

There was no charring, glowing, or flaming of the cheesecloth.

NORMAL TEMPERATURE TEST:

METHOD

Each unit was tested in the indicated positions.

RESULTS
Model GP3503260D Thermocouple Locations Horizontal
Vertical Transformer Primary Winding Outerwrap 45.6
46.0Transformer Secondary Winding Outerwrap, 49.4
49.1Transformer Core, Top 49.4 49.8Enclosure Inside
Surface Near Enclosure Outside Surface, Bottom
32.9 32.9Internal Wiring Near
Printed Wiring Board Near
Ambient 24.1 24.1Test Duration,
h:min 4 Hrs 3 Hrs
DIELECTRIC VOLTAGE WITHSTAND TEST:
METHOD One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.
1240 V ac between primary circuits and exposed conductive surfaces.
1240 V ac between primary and secondary circuits.RESULTS The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.TRANSFORMER BURNOUT TEST (LINEAR DESIGNS)- ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, mA	Observations
GP3503260D	23	Ran 7 Hours - No Hazard

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces (+).

1240 V ac between primary and secondary circuits (+).

(+) - The AC potential resulted in excessive leakage through capacitors. Therefore, the capacitors were removed from the circuit for the AC potential. With the capacitors connected in the circuit, the unit was subjected to a DC potential of 1.414 times the AC rms potential.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

Test Record Summary:

The results of this investigation indicate that the sample(s) evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

S. KARIM
Senior Engineering Assistant

B. CHABZA
Project Engineer

Reviewed by:

D. ALMA
Senior Project Engineer

TEST RECORD NO. 5

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP4116250A

The samples employed the revised input ratings.

Due to similarity with other Listed products, only the following tests were considered necessary.

GENERAL:

Unless otherwise specified in the individual test Methods and Results, the units were operated as follows:

Direct Plug-In Units - For all tests in which the units were energized from a source of supply the units were operated from a 15 A duplex receptacle with a nonmetallic faceplate. The receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 in.^{3} The outlet box was mounted in a 3-1/2 in. thick wall section with gypsum wall board surfaces and loosely filled with fiberglass insulation.

Supply Circuit - The units were connected to a 15 A branch circuit supply adjusted to provide 117 V, 50/60 Hz.

Test	Supply Circuit, Volts/Hz/Amperes (15 or 20 A)
Maximum Input	
Full-Load Output Current	
Normal Temperature	

Normal Load -

Each AC output was resistively loaded to its rated output current (+).

16 V Output - 250 mA

MAXIMUM INPUT TEST:

METHOD

Each AC output was connected to a variable resistor.

Each load was adjusted, including short circuit, to result in maximum primary input current to the sample. Without further load adjustment, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input	
Model	V	mA	W
GP4116250A	120 V, 50 Hz	343	39.9

The maximum input power did not exceed 660 watts.

FULL-LOAD OUTPUT CURRENT TEST:METHOD

Each output was loaded to result in normal load. At 15 min of operation each load was readjusted, if necessary, to result in normal load. Without further load adjustment the test was continued for one h. At one h the output load was measured.

RESULTS

Model	Output Current Rating, (mA) (A)	Output Current Rating, at 1 h,(mA) (A)
GP4116250A @120 V/50 Hz	250	250

The output current at one h was at least 90% of the rated value.

NORMAL TEMPERATURE TEST:
METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions. (120 V, 50 Hz).RESULTS
Model GP4116250A

Thermocouple Locations	Maximum Temperatures, °C Horizontal	Vertical
Transformer Primary Winding Outerwrap	52.7	53.8
Transformer Secondary Winding, Outerwrap	49.7	49.3
Transformer Core, Top	54.3	54.3
Enclosure Outside Surface, Top	30.9	32.3
Ambient	21.7	22.2
Test Duration, h:min	4:30:00	1:40:00

DIELECTRIC VOLTAGE WITHSTAND TEST:
METHOD One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.RESULTS The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by: Reviewed by:

D. Wagner David V. Alma

D. WAGNER
Senior Engineering Assistant

D. V. ALMA
Engineering Team Leader

TEST RECORD NO. 6

SAMPLES:

Samples of Model GP3512300A were found to be constructed as described in the previous Report and were subjected to the test program noted below.

No tests were considered necessary due to similarity to Model GP3506500A, refer to Test Record No. 1.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Shahnaz Karim

SHAHNAZ KARIM
Associate Project Engineer

Reviewed by:

David V. Alma

DAVID V. ALMA
Engineering Team Leader

C O N C L U S I O N

Samples of the products covered by this Report have been found to comply with the requirements covering the class and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:	Reviewed by:
R. HENRY	B. BARZIDEH
Associate Project Engineer	Engineering Team Leader
Electrical Department	Electrical Department

CERTIFICATE OF COMPLIANCE

Certificate Number	20140626-E468713
Report Reference	E468713-19920408
Issue Date	2014-JUNE-26

Issued to: DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY

NO 1 SHI TANG BEI ST 2,
SHI JIE TOWN, DONG GUAN CITY,
GUANGDONG 523290 CHINA.

This is to certify that representative samples of DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

"See Addendum Page"

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1310, UL Standard for Safety for Class 2 Power Units. CAN/CSA C22.2 No. 223 M91, Standard for Power Supplies with Extra-Low-Voltage Class 2 Outputs.

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.
The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers: c UL us the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

CERTIFICATE OF COMPLIANCE

Certificate Number 20140626-E468713
Report Reference E468713-19920408
Issue Date 2014-JUNE-26

USL - Direct plug-in Class 2 units, Models GP3520200A, GP4106001D, GP4109500D, GP4124100D, GP4813.5780D, GP4813.51000D, GP48091000D, (P48091000A040G) GP48091500D, GP4810850D, GP48121000D, GP4815800D, GP4106001A, GP4109600A, GP4127200A, GP4109300D, GP4112150A, GP4112300D, GP4112300DG, GP4175500D, GP4114700A and GP48151500A. USL, CNL Direct Plug-in Class 2 units GP48091200D, GP48091200DG, GP4820750A.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

April 8, 1992

REPORT

on

DIRECT PLUG-IN TRANSFORMER UNITS

DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
GUANGDONG 523290 CHINA

DESCRIPTION

PRODUCT COVERED:

USL - Direct plug-in Class 2 units, Models GP3520200A, GP4106001D, GP4109500D, GP4124100D, GP4813.5780D, GP4813.51000D, GP48091000D, (P48091000A040G) GP48091500D, GP4810850D, GP48121000D, GP4815800D, GP4106001A, GP4109600A, GP4127200A, GP4109300D, GP4112150A, GP4112300D, GP4112300DG, GP4175500D, GP4114700A and GP48151500A. USL, CNL Direct Plug-in Class 2 units GP48091200D, GP48091200DG, GP4820750A.

GENERAL CHARACTER:

The devices covered by this Report are direct plug-in transformer units.

The units covered by this Report consist of a transformer and other related electronic circuitry housed in a thermoplastic enclosure. The units are provided with parallel type blades for insertion in a standard parallel blade receptacle. The output cord is provided with a nonstandard polarized connector.

USL - Indicates investigation to the U.S. Standard for Safety of Class 2 Power Units, UL 1310, Fifth Edition.

CNL - indicates investigation to CAN/CSA C22.2 No. 233-M91.

ELECTRICAL RATINGS:

	Input, W		Hz	Output	
Model	V	W	Hz	V	mA
GP3520200A	120	8	60	20 V ac	200
GP4106001D	120	14	60	6 V dc	1000
GP4109300D	120	9	60	9 V dc	300
GP4109500D	120	9	60	9 V dc	500
GP4124100D	120	5	60	24 V dc	100
GP4813.5780D	120	22	60	13.5 V dc	780
GP4813.51000D	120	21	60	13.5 V dc	1000
GP48091000D (P48091000A040G)	120	17	60	9 V dc	1000
GP48091500D	120	22	60	9 V dc	1500
GP48091200D, GP48091200DG	120	16	60	8.5 V dc	1200
GP4810850D	120	17	60	10 V dc	850
GP48121000D	120	21	60	12 V dc	1000
GP48151500A	120	30	60	15 V ac	1500
GP4815800D	120	21	60	15 V dc	800
GP4106001A	120	10	60	6 V ac	1000
GP4109600A	120	9	60	9 V ac	600
GP4127200A	120	10	60	27 V ac	200
GP4112150A	120	4	60	12 V ac	150
GP4112300D	120	8	60	12 V dc	300
GP4175500D, GP4112300DG	120	8	60	7.5 V dc	500
GP4114700A	120	15	60	14 V ac	700
GP4820750A	120	22	60	20 V ac	750

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity, between live and dead-metal parts (and between live parts and a metal enclosure) shall be as indicated below:

	Minimum Spacings, in (mm)	
V rms	Through Air and Over Surface	Shortest Distance to Metal Enclosure
150 or less	1/16 (1.6)	1/4 (6.4)
151-250	3/16 (1.8)	1/4 (6.4)

Class 2 Secondary Circuit Spacings - Not specified, spacings are based on Dielectric Withstand Tests.

Marking - Permanently ink-stamped, hot-stamped, silk-screened or provided as label, label employed is covered as a Recognized Component marking and labeling system suitable for application to polyphenylene oxide and having a min operating temperature of 80°C.

Information Marking - Indicates company name, model number, date of other dating period of manufacture, cautionary statements, and electrical ratings including: Input voltage, frequency, and watts; Output voltage and current dc.

Cautionary Markings - The "CAUTION" or "WARNING" in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - The date code consists of a four digit code. The first two digits represent the last two digits of the year of manufacture. The last two digits represent the month of the year of manufacture.

Example: 9006 = June, 1990.

The following markings are provided:

* "Class 2 Transformer"

* “CAUTION: Risk of electric shock”
and
“Dry location use only”
or
“Do not exposure to liquid, vapor or rain”
or the equivalent

Internal Wiring - Unless otherwise specified, all internal wiring is Recognized Component appliance wiring material (AVLV2), insulation 1/32 in (0.8 mm) thick minimum, rated 600 V, 105°C minimum (UL Style 1015), or 1/64 in (0.4 mm) thick cross-linked PVC insulation.

Segregation - Insulated conductors of difference circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge, and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - Recognized Component tubing (YDPU2) and/or sleeving (UZFT2) rated 300 V, 105°C minimum.

Printed Wiring Boards - Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flammability rating of 94HB and *an operating temperature rating of at least 105°C except where otherwise indicated.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Enclosure Assembly - All models. Case and cover constructed from Recognized Component plastic material (QMFZ2), Lexan 141R manufactured by GE Plastic or Polycarbonate Type S-2000 manufactured by Mitsubishi Gas Chemical. Case and cover secured together by high frequency (sonic) welding (or solvent cement).

Electrical Schematic - Refer to Ill. 1.

Blade - Dimensions, spacings, and relative location of blades and grounding pin shall be as detailed in Ill. 2.

Instruction Manual – See Section General, Instruction Manual

Model Differences -

Models GP4106001A, GP4109500A, GP4127200A, and GP4114700A, are constructed similar to Models GP4106001D, GP4109500D and GP4124100D except that the models ending in "A" are not provided with diodes or capacitors.

Model GP4109300D is constructed similar to Model GP4109500D except for a lower output current rating.

Model GP4813.5780D is constructed similar to Model GP4109500D except for input and output ratings, core and outer enclosure dimensions.

Model GP4112300D is constructed similar to Model GP4109500D except for input power and output ratings, 3 prong input, and ground pin is connected to the core with a screw, nut and lockwasher by a green/yellow conductor with one closed loop crimp connector and one solder tab riveted to the ground pin.

Model GP4175500D is constructed similar to Model GP4112300D except for output ratings.

Model GP4810850D is constructed similar to Model GP4813.5780D except for input current rating, output ratings and the addition of a thermal cutoff.

Model GP4813.51000D is constructed similar to Model GP4813.5780D except for input and output ratings.

Model GP48091000D is constructed similar to Model GP4810850D except for output ratings.

Model GP48091500D is constructed similar to Model GP4813.51000D except for input and output ratings.

Model GP48121000D is constructed similar to Model GP4813.51000D except for output ratings.

Model GP4815800D is constructed similar to Model GP4813.51000D except for output ratings.

Model GP3520200A is constructed similar to Model GP4114700A except for output ratings.

Model GP48151500A is constructed similar to Model GP4815800D except for output ratings.

Model GP48811500D is constructed similar to Model GP48091200D except for output ratings and output termination. The output of Model GP48091200D does not consist of output cord it terminates into screw block. Refer to Ill. 6.

Model GP48091000D is the basic unit described. Model P48091000A040G is similar to Model GP48091000D except for the output lead and model number.

Model GP4112150A is constructed similar to Model GP4112300D except for input and output ratings.

Model GP4112300DG is similar to Model GP4112300D except for a 3 prong input.

Model GP48091200DG is similar to Model GP48091200D except for 3 prong input.

REPRESENTS ALL MODELS FIG. 1 (M91-21561)

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described.

1. Enclosure Cover - Not shown. 2.5 mm thick, 62.4 by 50 by 20 mm.
   For Model GP4813.5780D - 2.5 mm thick, 83.4 by 58 by 20 mm.
   Enclosure - For Model GP4114700A overall dimensions: 66.1 by 51.9 by 41 mm stacking height. - 2.8 mm thick. See Ill. 4.
   Enclosure - For Model GP3520200A overall dimensions: 61 by 44.9 by 36.9 mm stacking height. - 2.6 mm thick. See Ill. 5.
   * Enclosure - For Model GP4820750A overall dimensions 6.24 x 55 x 45 mm.

2. Enclosure Base - 2.5 mm thick, 62.4 by 50 by 20 mm.
   For Model GP4813.5780D - 2.5 mm thick, 83.4 by 58 by 29 mm.
   * For Model GP4820750A 2.5 x 61 x 54 mm.

3. Blades - Folded over/solid copper, brass or bronze. Located a minimum 10 mm from edge of enclosure. See Ill. 2 for dimensions, spacings and relative locations. Molded into enclosure base.

4. Strain Relief - Integrally molded with the output cord 10 by 9.4 by 2.3 mm. Secured by enclosure base, cover and integral slots.

5. Output Cord - Two conductor, No. 24 AWG min. Provided with 0.33 mm thick thermoplastic insulation on each lead. Min 1.8 m external length. Terminates in a polarized connector.
   For Model GP4114700A, the output cord is No. 22 AWG min. Provided with 0.4 mm thick thermoplastic insulation on each lead.

6. Printed Wiring Board - Recognized Component (ZPMV2) board rated min 94V-2 min, 130°C, overall 1.7 mm min thick dimensions are 31 by 20 mm.

7. Transformer - Constructed as follows:
   Core - Laminated steel 41 by 33 by 20 mm. Stack height.

   * For Models GP4813.5780D, GP4813.51000D, GP48091000D and GP4810850D - 48 by 40.5 x 23 mm stack height. For Model GP4114700A - 41 by 33 by 26 mm stack height. For Model GP4820750A, 48 by 40 by 20 mm.

   Windings - Enameled copper magnet wire, randomly wound.

   Bobbin - Three flange type. Recognized Component plastic material (QMFZ2), manufactured by E.I. Dupont, Type Zytel 101 or 101F; 1.0 mm thick. Provided with three layers of polyester tape for crossover lead. Integral barrier between primary and secondary windings consist of bobbin flange 1.0 mm min thick.

   Thermal Cutoff - Provided only on Models GP4810850D, GP48121000D, GP48091000D, GP4813.5780D and GP4813.51000D, GP4815800D, GP48151500A. Recognized Component (XCMQ2) Part No. S3 rated 130°C, 250 V, 1 A manufactured by Uchihashi ESTEC Co. secured between primary windings.

Alternate - Recognized Component (XCMQ2) Part No. M33 rated 130°C, 250 V, 1 A manufactured by Joint Force Metal Research Co. (E142267).

* For Models GP48091500D, GP4114700A and GP4820750A Recognized Component (XCMQ2) Type S2 rated 115°C, 250 V, 1 A, manufactured by Uchihashi Estec Co.

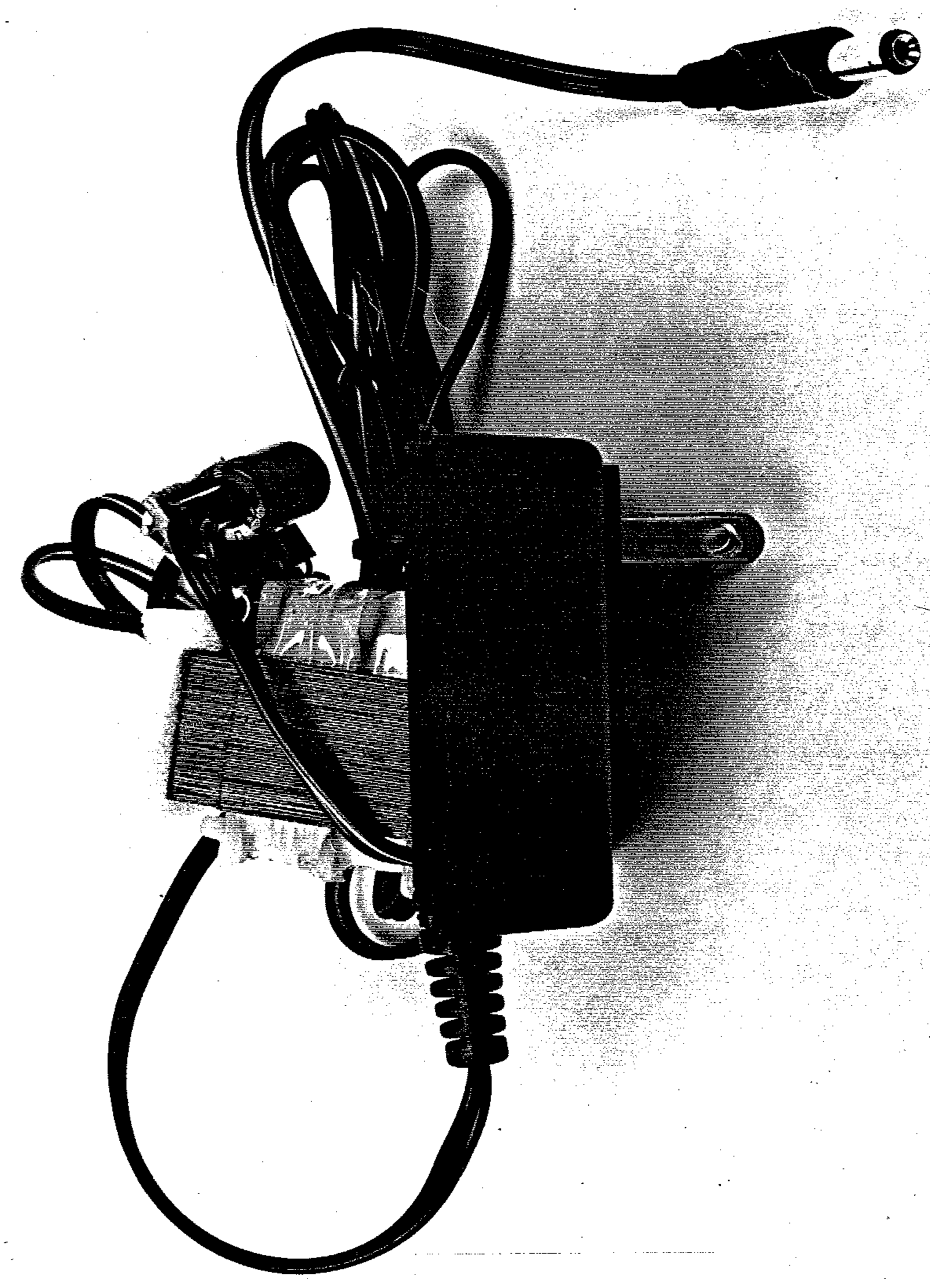
Outer Wrap - Consists of three layers of 0.05 mm thick per layer of polyester tape.

* Primary/Secondary Insulation - Model GP48020750A secondary winding provided with one layer 0.05 polyester tape forming bent up edge min 0.8 mm in addition to bobbin center flange.

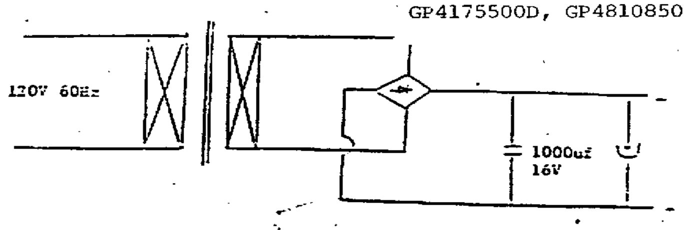
Blade Support - Recognized Component plastics (QMFZ2), rated min 94V-2, manufactured by GE, Type Lexan, 2.5 mm. Molded into enclosure base.

Alternate - Same as above except manufactured by Mitsubishi Gas Chemical, Type S-2000 polycarbonate.

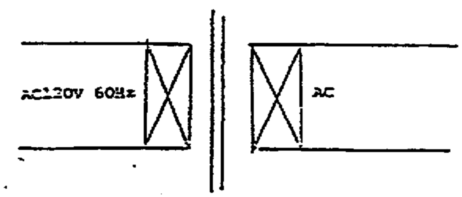
8. Diodes - For Model GP48091500D, Diodes are mounted min 3.5 mm above the printed wiring board.



Schematic Diagram REPRESENTS MODELS GP4106001D, GP4109500D, GP4124100D, GP4109300D, GP4813.5780D, GP4112300D, GP4175500D, GP4810850

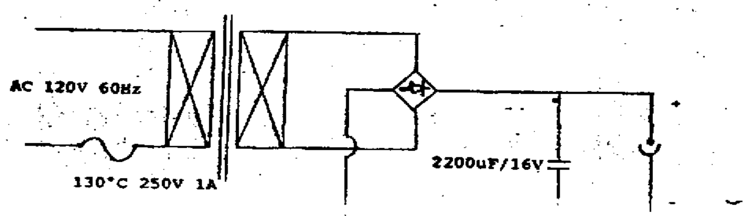


REPRESENTS MODELS GP106001A, GP11096001A, GP4109600A, GP4127200A

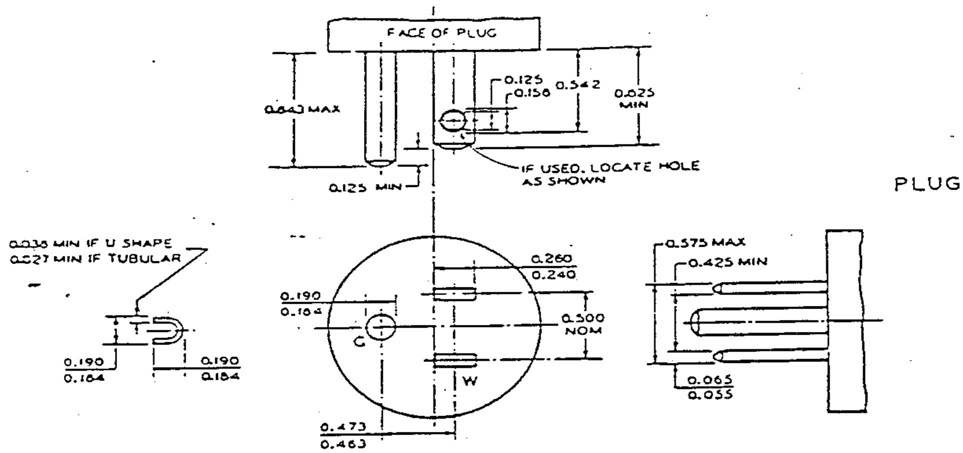


Represents Models

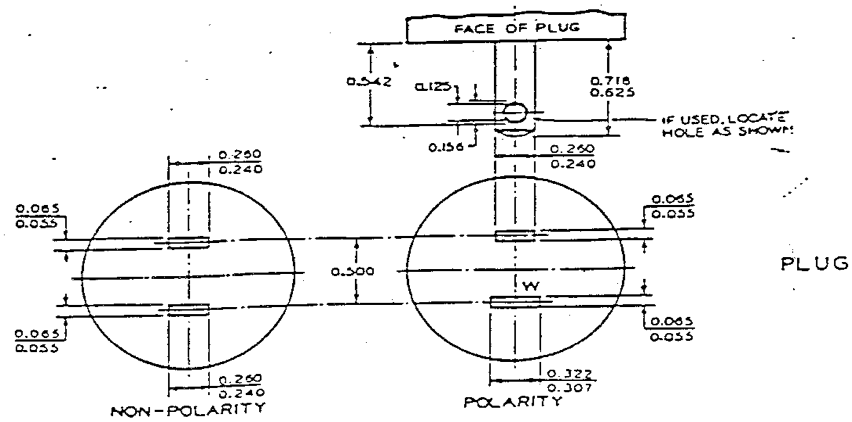
GP4813.51000D & GP48091000D



2-POLE, 3-WIRE GROUNDING DEVICES RATED
15 AMPERES, 125 VOLTS



2-POLE, 2-WIRE PLUG RATED
15 AMPERES, 125 VOLTS

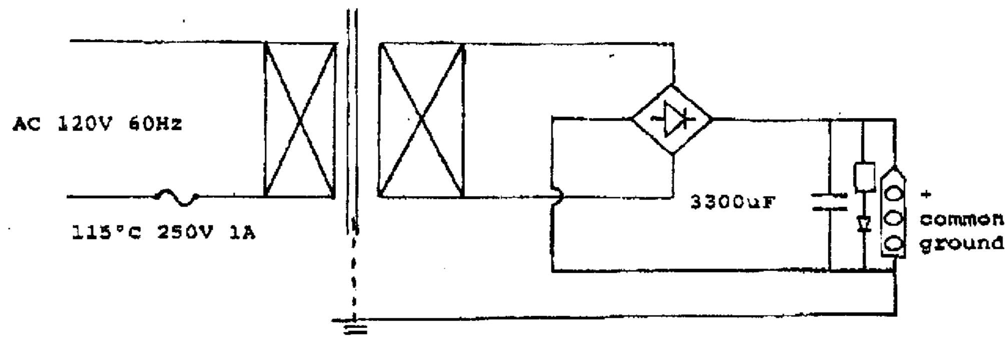


	0.065			0.260	0.322			0.718
inch	0.055	0.125	0.156	0.240	0.307	0.500	0.542	0.625
mm	1.65	3.2	4.0	6.60	8.10	12.7	13.8	18.2
	[illegible]			6.10	7.80			15.9

SCHEMATIC DIAGRAM

GP48091500D

Model: [illegible] Description: AC120V 60Hz/DC9V 1500mA Date: June 22, 95



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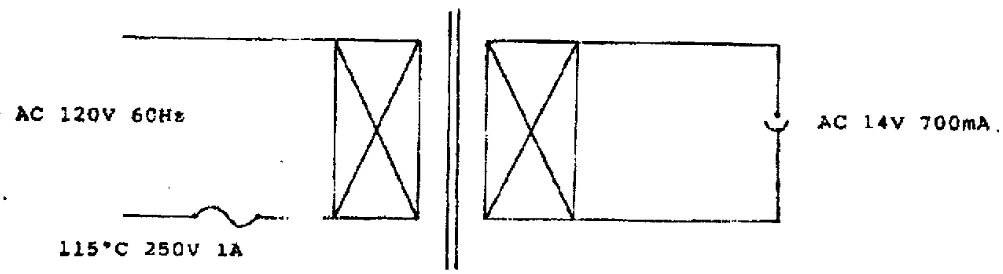
Tel : 2518 0300
Fax: 2552 5678

SCHEMATIC DIAGRAM

Model: GP4114700A Description: AC120V 60Hz/AC14V 700mA Date: Aug. 16, 95.



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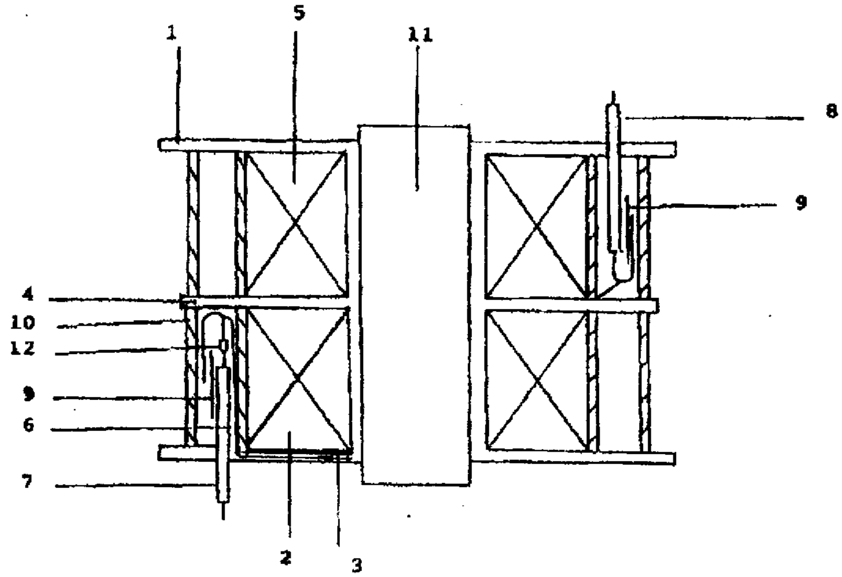

1. Bobbin
2. Primary Winding
3. Cross Over Insulation
4. Insulation Between Primary & Secondary
5. Secondary Winding
6. Wrapping Tape
7. Primary Leads
8. Secondary Leads
9. Leads Strain Relief
10. Outer Wrapping Tape
11. Lamination Core
12. Thermal Fuse

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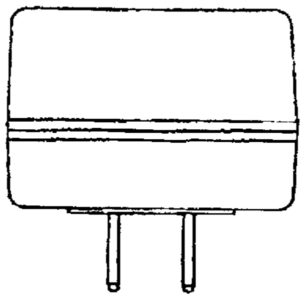
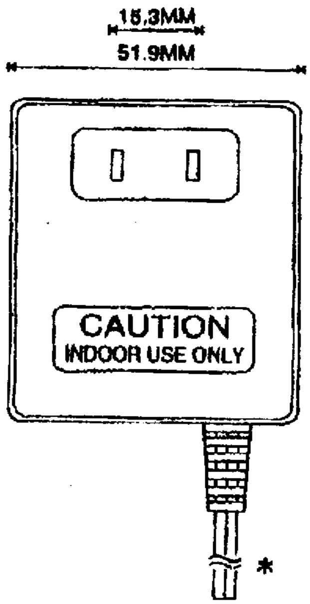
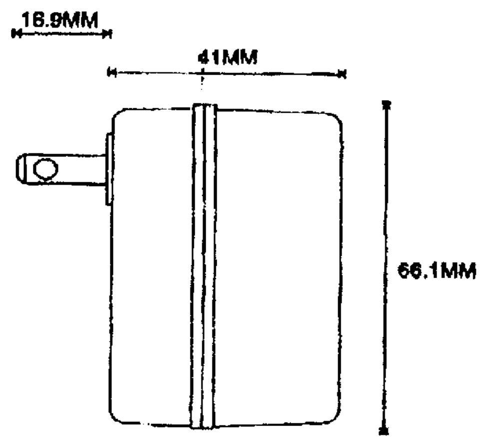
GOOD POWER ELECTRONICS LTD.

MECHANICAL SPECIFICATION	
STANDARD:	
APP MODEL:	
MODEL:	GP4114700A
INPUT	AC 120 V
	60 Hz
	VA 15 W
OUTPUT	AC/DC 14 V
	700 mA
CORE SIZE	EI- 41

All Dimension in MM
Tolerance +/- 1mm





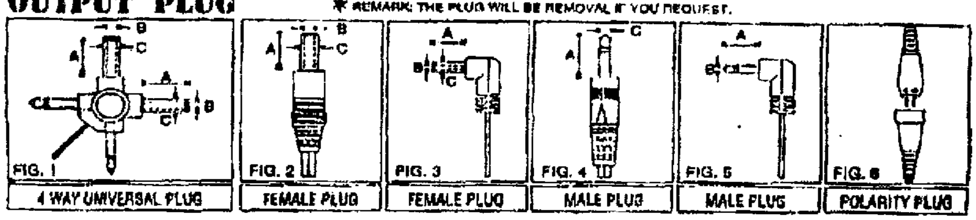


OUTPUT PLUG SIZE:-

FIGURE	2
DIMENSION:	A: 10
	B: 2.1
	C: 5.5

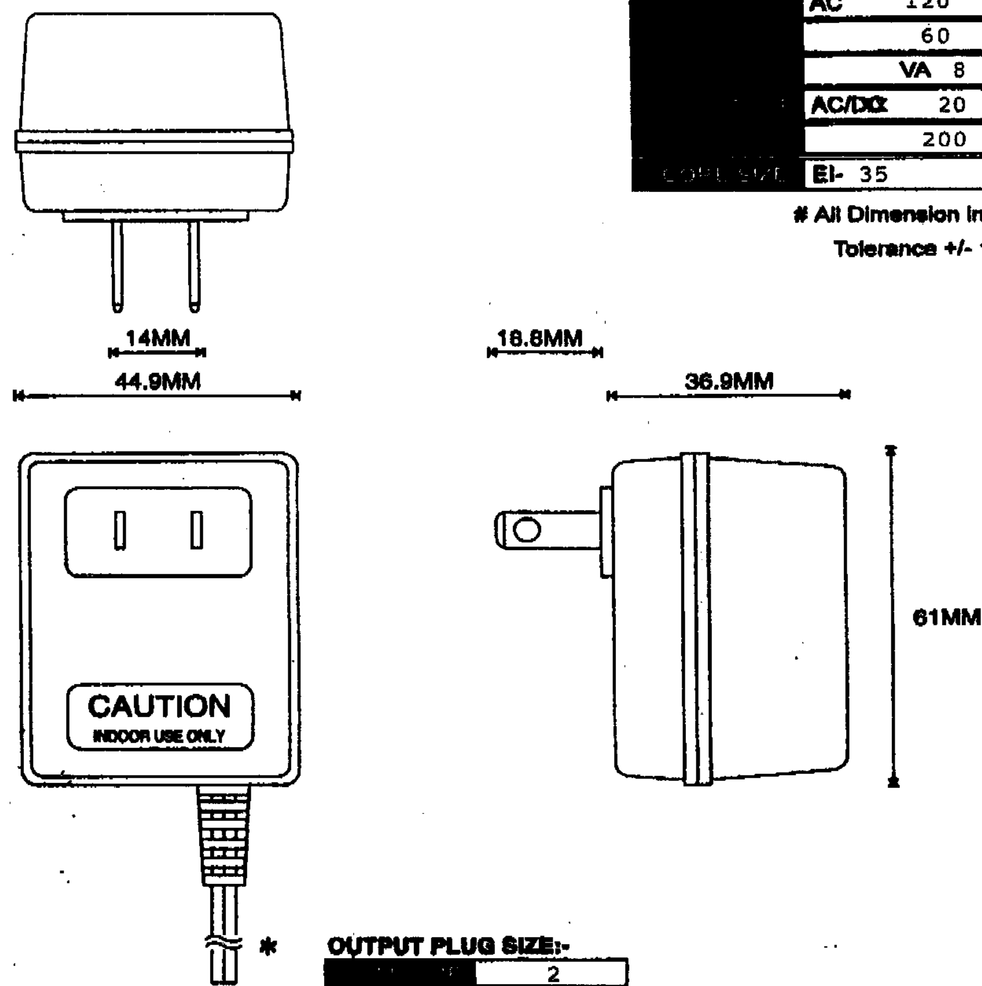
OUTPUT PLUG

* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.



[redacted]	
	GP3520200A
	AC 120 V
	60 Hz
	VA 8 W
	AC/DC 20 V
	200 mA
	EI- 35

All Dimension in MM
Tolerance +/- 1mm

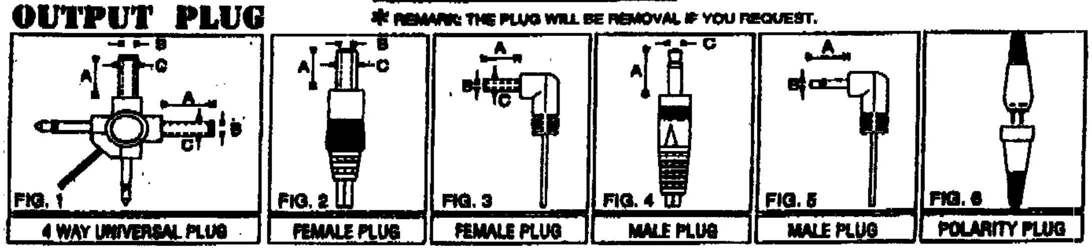


OUTPUT PLUG SIZE:-

[redacted]	2
	A: 12
	B: 2.1
	C: 5.5

* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.

OUTPUT PLUG



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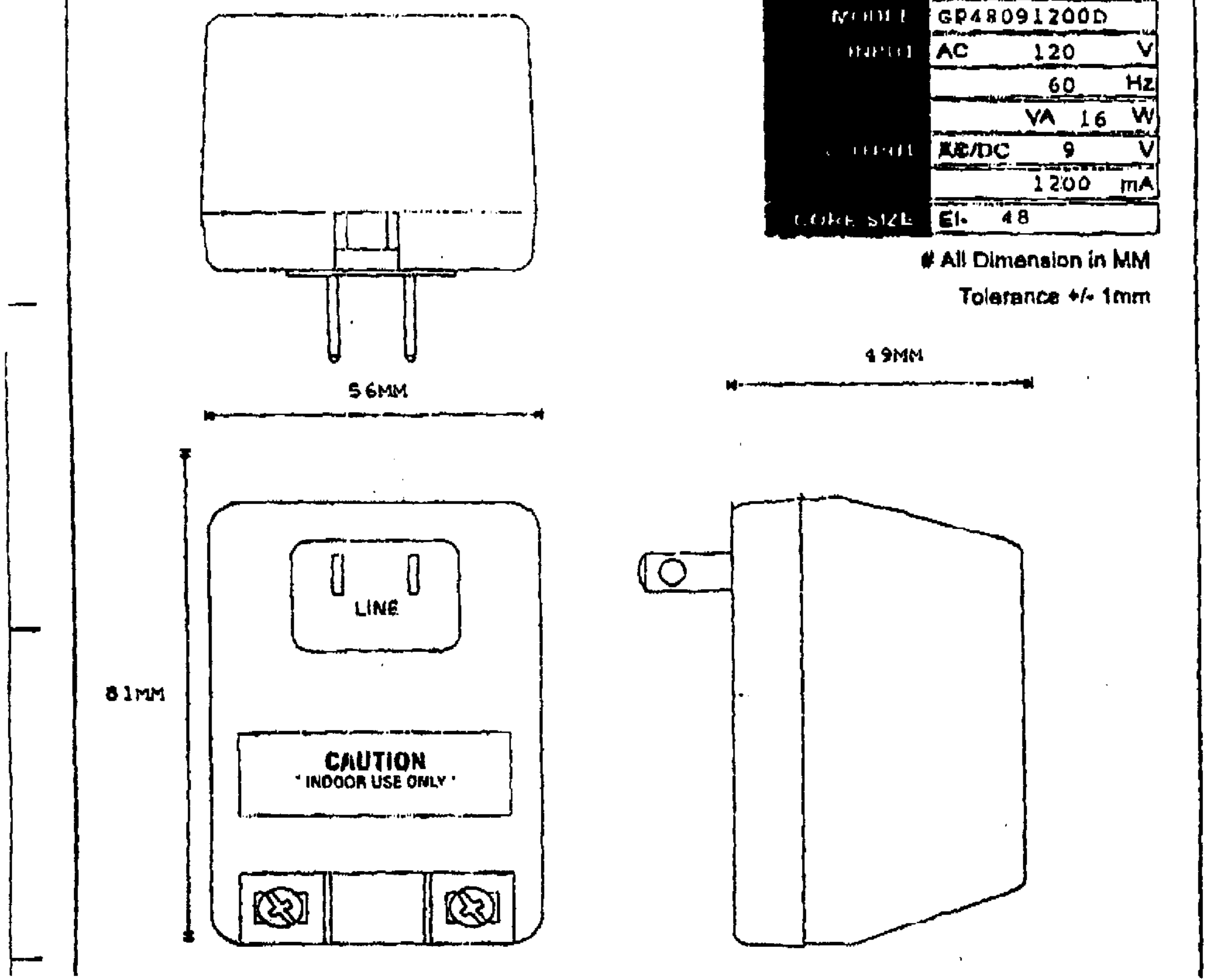
MECHANICAL SPECIFICATION			
STANDARD			
APP MODEL			
MODEL	GP48091200D		
INPUT	AC	120	V
		60	Hz
	VA	16	W
OUTPUT	AC/DC	9	V
		1200	mA
CORE SIZE	EI-	48	

All Dimension in MM
Tolerance +/- 1mm



T E S T R E C O R D N O. 1

SAMPLES:

Samples of the Models GPA4106001D and GPA4124100D direct plug-in transformer units were submitted by the manufacturer. They were constructed as described in the preceding section of this report and subjected to the following tests.

General - For all tests in which the units were energized from a source of supply the units were operated from a 15 A duplex receptacle with a nonmetallic faceplate. The receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 in^3. The outlet box was mounted in a 3-1/2 in thick wall section with gypsum wall board surfaces and loosely filled with fiberglass insulation.

LEAKAGE CURRENT TEST:

METHOD I

One sample of each model tabulated below was connected to a sinusoidal source of supply as indicated. Tests were conducted with the unit under normal load conditions through the test circuit described in Figure 24.1 of the Standard for Direct Plug-In Transformer Units, UL 1310 dated April 5, 1990. The leakage current was measured between exposed conductive surfaces (+), including output terminals, and the grounded pole of the supply circuit. The measurements were made from these surfaces or locations individually as well as collectively where simultaneously accessible, and from one surface to another where simultaneously accessible, except not from one output terminal to another.

For the purpose of this test, the conductive surfaces consisted of metal foil with an area of 10 by 20 cm (3.94 by 7.8 in), or the same size of the surface if the surface is less than 10 by 20 cm, wrapped around the enclosure.

METHOD II

The foregoing test was repeated after the sample had been conditioned at 88 ± 2 percent relative humidity at a temperature of 32.0 ± 2°C (89.6 ± 3.6°F) for 48 h.

A - Position 1 of Switch S2.
B - Position 2 of Switch S2.
1 - Measured between grounded supply conductor and conductive surface.
2 - Maximum measured between grounded supply conductor and output leads (terminals).
3 - Maximum measured between grounded supply conductor and output leads (terminals) conductively connected to conductive surface.
4 - Maximum measured between output leads (terminals) and conductive surface.

RESULTS

Model No. GPA4106001D Supply Volts 120 V, 60 Hz

		Measured Leakage Current in Microamperes							
		A				B			
Condition	Switch S1	1	2	3	4	1	2	3	4
As-Received									
Open									
Closed	0-5 s	1.08	1.65	1.87	0.28	0.70	1.09	1.19	0.17
	5 s-10 min	0.53	0.91	1.03	0.18	0.61	0.95	1.09	0.13
	10 min-thermal	0.56	1.06	1.14	0.26	0.69	1.13	1.23	0.19
	equilibrium	0.63	1.43	1.54	0.51	0.79	1.51	1.69	0.43
Humidity Conditioned									
Open									
Closed	0-5 s	1.12	2.03	2.41	0.31	1.13	2.04	2.42	0.32
	5 s-10 min	0.52	1.01	1.15	0.20	0.65	1.09	1.29	0.18
	10 min-thermal	0.57	1.32	1.49	0.33	0.71	1.43	1.65	0.28
	equilibrium	0.61	1.65	1.83	0.45	0.75	1.74	1.99	0.39

Model No. GPA4124100D Supply Volts 120 V, 60 Hz

		Measured Leakage Current in Microamperes							
		A				B			
Condition	Switch S1	1	2	3	4	1	2	3	4
As-Received									
Open									
Closed	0-5 s	0.82	1.54	1.83	0.13	1.82	1.53	1.81	0.13
	5 s-10 min	0.35	0.78	0.87	0.07	0.44	0.89	1.02	0.08
	10 min-thermal	0.35	0.79	0.88	0.07	0.45	0.93	1.07	0.10
	equilibrium	0.35	0.82	0.90	0.11	0.46	0.99	1.13	0.14
Humidity Conditioned									
Open									
Closed	0-5 s	1.06	1.97	2.40	0.28	1.05	1.99	2.39	0.29
	5 s-10 min	0.46	0.85	1.01	0.13	0.59	1.07	1.30	0.16
	10 min-thermal	0.47	0.87	1.01	0.13	0.60	1.09	1.31	0.19
	equilibrium	0.45	0.88	1.02	0.14	0.59	1.11	1.33	0.18

DIELECTRIC WITHSTAND TEST:

METHOD

Immediately following the preceding Leakage Current Test, a 60 Hz alternating potential was applied for 1 min in each test:

A. 1240 V between primary current-carrying parts and dead-metal parts (+),

B. 1240 V between primary and secondary current-carrying parts,

C. 500 V between secondary current-carrying parts and dead-metal parts (+).

(+) - Enclosure wrapped in foil.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

OPEN-CIRCUIT SECONDARY VOLTAGE TEST:

METHOD

Two samples of each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply as indicated below. The open-circuit output voltage between any two output terminations was measured and recorded below.

RESULTS

Model	Sample No.	Input Rated V	Input Rated Hz	Input Measured V	Input Measured Hz	Output Rated Open Circuit, V dc	Output Measured Open Circuit, V (dc)
GPA4106001D	1	120	60	120	60	6	10.62
	2	120	60	120	60	6	10.70
	3	120	60	120	60	6	10.85
GPA4124100D	1	120	60	120	60	24	28.10
	2	120	60	120	60	24	28.04
	3	120	60	120	60	24	28.16

The measured output voltage did not exceed 30 V rms for a sinusoidal wave.

INPUT TEST:

METHOD A

Two samples of each model tabulated below were connected to a 120 V, 60 Hz sinusoidal source of supply as indicated. The output of each was connected to a load consisting of a variable resistor in parallel with a 10,000 uF capacitor for units having a direct-current output. The load was adjusted, including short circuit of any combination of output terminals, to cause maximum input to the unit. The supply circuit was de-energized and the unit allowed to cool to room temperature. The supply circuit was then energized a second time and the input power measured within 15 s after application of voltage to the primary winding.

METHOD B

Three samples of each model tabulated below were connected to a source of supply as indicated above. The output of each was connected to a load as described above and was adjusted to result in rated output current or power. The input power and current was measured within 15 s after application of voltage to the primary winding.

RESULTS (METHOD A)

Model	Sample	Input Rated V,	Input Rated Hz	Input Measured V,	Input Measured Hz	Input Rated W	Maximum Measured (mA)	Maximum Measured (W)	Output dc (A)	Output dc (V)	Output dc (W)
GPA4106001D	1	120	60	120	60	14	211	23.9	2.30	3.64	8.4
	2	120	60	120	60	14	223	25.4	2.45	3.61	8.8
	3	120	60	120	60	14	216	24.8	2.36	3.79	8.1
GPA4124100D	1	120	60	120	60	5	445	54.0	2.19	1.95	4.4
	2	120	60	120	60	5	456	54.9	2.26	1.54	3.5
	3	120	60	120	60	5	460	55.1	2.17	1.67	3.6

RESULTS (METHOD B)

Model	Sample No.	Input, ac Rated V,	Rated Hz	Rated W	Measured V,	Measured Hz	Measured W	Measured mA	Output, (dc) Rated V	Rated mA	Measured V	Measured mA	Measured W
GPA4106001D	1	120	60	14	120	60	11.21	108.0	6	1000	6.30	1005	6.29
	2	120	60	14	120	60	11.85	113.5	6	1000	6.30	1075	6.75
	3	120	60	14	120	60	11.74	112.3	6	1000	6.23	1045	6.49
GPA4124100D	1	120	60	5	120	60	3.28	50.2	24	100	24.19	100	2.42
	2	120	60	5	120	60	3.39	56.7	24	100	24.19	100	2.42
	3	120	60	5	120	60	3.23	45.0	24	100	24.22	100	2.43

The measured input power did not exceed 660 W for Method A. The measured input power or current was within 110 percent of the rated input power or current rating for Method B.

OUTPUT CURRENT AND POWER TEST (INHERENTLY LIMITED):

METHOD

Two samples of each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply as indicated below. A variable resistive load adjusted to obtain the maximum obtainable current after 1 min was connected to the output. The current obtained was recorded.

After the samples had cooled to room temperature they were again connected to a 120 V, 60 Hz source of supply as indicated below. A variable resistive load adjusted to obtain the maximum obtainable power after 1 min was connected to the output. The power obtained was recorded.

RESULTS

		Input				Output		
Model	Sample No.	Rated V	Rated Hz	Measured V	Measured Hz	Rated V dc	Maximum Measured Current, A	Maximum Measured Power, W
GPA4106001D	1	120	60	120	60	6	4.06	8.5
	2	120	60	120	60	6	4.15	9.0
	3	120	60	120	60	6	3.91	8.5
GPA4124100D	1	120	60	120	60	24	2.15	9.8
	2	120	60	120	60	24	2.14	10.0
	3	120	60	120	60	24	2.13	10.3

The maximum output current after 1 min was less than 8 A. The maximum output power after 1 min was less than 100 W.

FULL-LOAD OUTPUT CURRENT TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. The samples were connected to 60 Hz source of supply as indicated below. The output was connected to a load consisting of a variable resistor in parallel with a 10,000 uF capacitor for units having a direct-current output adjusted to result in the rated output current or power. After 15 min of operation, the load was readjusted, if necessary, to return the current to its rated value. With no further adjustment the test was continued for 1 h. At the end of 1 h the output current or power was measured and recorded.

For units rated with output ratings in volt-amperes or watts, the output current was determined by dividing the rated output voltage into the rated volt-amperes or watts.

RESULTS

Model	Sample	Protector Type	Rated Input V, Hz	Measured Input V, Hz	Rated Output V	Rated Output (Current, A)	Test Current, A	Measured Output Current, A	Did Overcurrent or Overtemperature Device Open?
GPA4106001D	1	-	120 60	120 60	6	1000	1.02	.998	-
	2	-	120 60	120 60	6	1000	1.01	.996	-
	3	-	120 60	120 60	6	1000	.998	.994	-
GPA4124100D	1	-	120 60	120 60	24	100	.101	.100	-
	2	-	120 60	120 60	24	100	.100	.997	-
	3	-	120 60	120 60	24	100	.996	.995	-

The measured output current after 1 h was within 90 percent of the original rated setting and overtemperature or overcurrent protective devices did not function during this test.

TRANSFORMER CLASS 2 CHARACTERISTICS TEST:

METHOD

Two samples of transformers for each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply as indicated below. Using suitable meters, the open circuit voltage and maximum obtainable current after 1 min, was measured at the transformer output.

RESULTS

Model	Sample No.	Input Rated V, Hz	Input Measured V, Hz	Output Measured Open Circuit, V S1-S2	Output Measured Short Circuit Current, A S1-S2
GPA4106001D	1	120 60	120 60	8.33	5.04
	2	120 60	120 60	8.32	5.03
	3	120 60	120 60	8.33	5.00
GPA4124100D	1	120 60	120 60	20.55	2.34
	2	120 60	120 60	20.51	2.34
	3	120 60	120 60	20.53	2.32

The open circuit voltage was less than 30 V and the maximum obtainable current was less than 8 A after 1 min.

NORMAL TEMPERATURE TEST:

METHOD

Three samples of each model tabulated below were connected to a 120 V, 60 Hz source of supply. The output was connected to a load consisting of a variable resistor in parallel with a 10,000 uF capacitor for units having a direct-current output adjusted to result in the rated output current or power.

Each sample was operated continuously under these conditions until temperature on the units became constant.

Temperatures were measured by means of thermocouples secured by solder, tape, or water glass.

Transformer primary temperatures were measured by the change-of-resistance method.

RESULTS

Maximum Temperature, °C

Test

	Model GPA4106001D						Model GPA4124100D					
	Horizontal			Vertical			Horizontal			Vertical		
	Sample No.											
Location of Thermocouples	1	2	3	1	2	3	1	2	3	1	2	3
Transformer primary winding	81.9	83.1	80.7	76.9	78.1	75.2	37.8	36.2	36.5	36.8	35.1	34.9
Transformer secondary winding	86.4	84.4	77.9	82.0	79.6	72.6	37.0	35.1	36.9	35.8	33.8	36.6
On printed wiring under diode	112.9	113.5	112.2	112.9	116.8	114.9	37.8	37.3	35.6	37.4	36.9	34.3
Enclosure outside surface top	47.6	44.3	45.8	58.1	52.7	53.3	26.2	26.4	26.3	27.3	26.4	27.0
Ambient	22.3	22.3	22.3	23.6	23.6	23.6	22.9	22.9	22.9	22.9	22.9	22.9
Primary change of resistance	+89.24	91.02	84.28	84.90	85.64	80.23	38.5	36.56	36.93	37.54	36.25	35.77

			Temperature by Change of Resistance Method				
Test	Component	Circuit Designation	t1	R1	t2	R2	T
1	Horizontal	GPA41060010	22.7	110.30	23.6	139.22	66.54
2			22.7	110.80	23.6	140.62	68.32
3			22.7	110.84	22.6	137.98	62.08
1	Vertical		22.7	110.30	23.6	137.36	62.20
2			22.7	110.80	23.6	138.30	62.94
3			22.7	110.84	23.6	136.02	57.53
1	Horizontal		21.9	110.03	22.9	117.56	16,55
2			21.9	109.73	22.9	116.43	14.66
3			21.9	110.19	22.9	117.08	15.03
1	Vertical		21.9	110.03	22.9	117.18	15.64
2			21.9	109.73	22.9	116.13	14.35
3			21.9	110.19	22.9	116.58	13.87

$$T = \frac{R2 - R1}{R1} (234.5 + t1) - (t2 - t1)$$: Where

"T" is the temperature rise
"R1" is the cold resistance at the beginning of the test
"R2" is the hot resistance at the end of the test
"t1" is the room ambient at the beginning of the test
"t2" is the room ambient at the end of the test

DIELECTRIC WITHSTAND TEST:

METHOD

Immediately following the preceding Normal Temperature Test, a 60 Hz alternating potential was applied for 1 min in each test:

A. 1240 V between primary current-carrying parts and dead-metal parts (transformer core),

B. 1240 V between primary and secondary current-carrying parts,

C. 500 V between secondary current-carrying parts and dead-metal parts (transformer core).

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

INDUCED POTENTIAL TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. While in a heated condition from operation as described in the normal temperature test, an alternating potential of twice the rated voltage of the primary winding was applied to the primary winding of each transformer for 7200 c at 120 Hz or for 60 s if the frequency is less than 120 Hz. The test voltage was started at one-quarter or less of the full value and increased to full value in not more than 15 s. After being held for the time specified, the voltage was reduced within 5 s to one-quarter or less of the maximum value and the circuit was opened.

RESULTS

Model	Sample	Rated Input, V	Voltage Applied	Frequency, Hz
GPA4124100D	1	120	240	120

The spacings and insulation withstood the application of the specified potential without breakdown.

OUTPUT LOADING TEST:

METHOD A

Three samples were connected to a 120 V, 60 Hz source of supply and draped with a double layer of cheesecloth.

The output of each unit was short circuited. The grounding means was connected through a 3 A nontime delay fuse.

If this test results in 7 h of continuous operation, no further tests were conducted.

During this test, the outer surface temperature of the enclosure was measured and the time for the winding to permanently open or temperatures to stabilize was recorded. After the test, the samples were subjected to the following dielectric strength withstand test.

Since short circuiting the output resulted in opening of the transformer winding, Method A was repeated with the output loaded as specified under conditions of Test A through H, in that order. If a condition resulted in 7 h of continuous operations, no further tests were conducted. The load for Conditions A through H was a variable resistor adjusted to the required value as quickly as possible and readjusted, if necessary, 1 min after application of voltage to the primary winding. After each condition of loading, the samples were subjected to the following Dielectric Strength Test.

This test was repeated for each output.

CONDITIONS OF TEST

Condition A - Loading the output to a current equal to the rated current plus 75 percent of the difference between the short-circuit output current and rated current.

Condition B - Loading the output to a current equal to the rated current plus 50 percent of the difference between the short-circuit output current and rated current.

Condition C - Loading the output to a current equal to the rated current plus 25 percent of the difference between the short-circuit output current and rated current.

Condition D - Loading the output to a current equal to the rated current plus 20 percent of the difference between the short-circuit output current and rated current.

Condition E - Loading the output to a current equal to the rated current plus 15 percent of the difference between the short-circuit output current and rated current.

Condition F - Loading the output to a current equal to the rated current plus 10 percent of the difference between the short-circuit output current and rated current.

Condition G - Loading the output to a current equal to the rated current plus 5 percent of the difference between the short-circuit output current and rated current.

Condition H - Loading the output to rated current.

RESULTS A

Model	Sam-ple	Ambient, °C	Maximum Outer Enclosure Temperature, °C	Time to Burnout min:s	Comments
GPA4106001D	1	23.6	82.1	3:57	NB TP + CC OK
	2	23.6	77.9	3:52	NB TP + CC OK
	3	23.6	90.4	3:38	NB TP + CC OK

NB - No dielectric breakdown.

RESULTS B

Sample No.	Condition	Test Current In Amperes	Remarks
1	A	3.7	10:17 NB
2			10:56 NB
3			11:28 NB
4	B	2.8	29:41 NB
5			37:54 NB
6			31:18 NB
7	C	1.90	3:47:55 NB
8			4:13:19 NB
9			4:06:12 NB
10	D	1.72	7 h NB
11			7 h NB
12			7 h NB

During the test as described in Method A the exterior surface temperature did not exceed 105°C, the temperatures stabilized. During Methods A and B, there was openings in the enclosure that exposed live parts operating at more than 42.4 V peak, and loss of structural integrity to an extent the unit could not be removed from the receptacle immediately after the test without deformation or a risk of electric shock.

TRANSFORMER BURNOUT TEST:

METHOD

Two samples of each model tabulated below were subjected to this test. The samples were connected to a 120 V, 60 Hz source of supply.

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred. During this test each sample was draped with a double layer of cheesecloth.

For a transformer with more than one secondary winding, or a tapped secondary winding, each winding or tapped section was tested separately with the other windings loaded or unloaded to cause the most unfavorable result.

RESULTS

Model	Normal Input, A	Time to Burn Out, min:s Sample 1	2	3
GPA41006001D	.1135	9:47	9:11	8:54

The transformer winding burned out. There was no emission of flame or molten metal, charring of the cheesecloth, openings of the enclosure that would result in exposure of live parts operating at more than 42.4 V peak, or loss of structural integrity to an extent the unit could not be removed from the receptacle immediately after the test without deformation or a risk of electric shock.

DIELECTRIC STRENGTH TEST:

METHOD

Immediately following the preceding Transformer Burnout Test each sample was subjected to this test. A 60 Hz sinusoidal potential was applied for 1 min as follows.

A. 1240 V between primary and exposed dead-metal parts (foil wrapped around enclosure).

B. 1240 V between primary and secondary windings.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 min without breakdown.

STRAIN RELIEF TEST:

METHOD

Three samples of each model tabulated below were subjected to this test in the "as-received" condition and after being conditioned in an oven maintained at a temperature of 70°C for 7 h. The output cord of each sample was subjected to a 20 lb pull for 1 min. The internal connections to the cords were left intact during the test.

RESULTS

Model	Sample	As-Received	7 h Oven
GPA4106001D	1	Fail	OK
	2	Fail	OK
	3	OK	OK

There was no displacement or breakage of the cord or deformation of its anchoring surface.

BLADE SECURENESS TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. Each unit was supported on a horizontal steel plate with the blades projecting downward through a hole having a diameter sufficient only to permit the blades to pass through it. A 20 lb weight was supported by each blade in succession and then by the two blades tested together. Each test was 2 min in length.

RESULTS

		Remarks		
Model	Sample	Blade 1	Blade 2	Blade 1 and 2
GPA4106001D	1	OK	OK	OK
	2	OK	OK	OK
	3	OK	OK	OK

The blades did not loosen or pull out.

IMPACT TEST:

METHOD

Three samples of each model tabulated below were subjected to this test. Each sample was dropped four times in succession from a height of 3 ft onto a concrete floor at least 2-1/2 in thick covered with a 1/8 in. thick vinyl tile. On each successive drop the enclosure struck the surface in a different orientation.

RESULTS

There was no shattering, cracking, or other damage to the enclosure that would expose internal wiring or live parts.

CRUSH RESISTANCE TEST:

METHOD

A sample of each model tabulated below was placed between two maple blocks each not less than 1/2 in thick and one having slots for the plug blades. A crushing force of 75 lb was applied gradually in a direction normal to the mounting surface for a period of 1 min.

RESULTS

There was no splitting, cracking or shattering of the enclosure that would expose internal wiring or live-parts.

MOLD STRESS EVALUATION:

METHOD

Three samples of each model tabulated below were placed in a 70°C oven for a period of 7 h. Upon removal they were examined for evidence of softening, cracking, warping or distortion. They were also examined for exposed uninsulated live-metal parts. After cooling to room temperature, the Strain Relief Test was repeated (see Strain Relief Test).

RESULTS

There was no evidence of softening, cracking, warping, or any other distortion that would expose live parts or increase the fire or shock hazard of the device. There was no breakage of the cord or deformation of its anchoring surface after the repeated Strain Relief Test.

WEIGHT AND MOMENT COMPUTATION:

METHOD

A sample model was weighed (+) and the distance to the center of gravity was measured using suitable instruments. Also the distance between the center of the blades and the center of gravity was measured. For this test direct mounted accessories were in place. The moments were then calculated by taking the products of the above measurements.

(+) = The output cord was not included in the weight measurement.

W = Weight of the device in ounces (grams).

S = The lessor of S_1 and S_2.

S_1 = Distance from the center of the blades to the left side of the enclosure in inches (millimeters).

S_2 = Distance from the center of the blades to the right side of the enclosure in inches (millimeters).

X = The greater of X_1 and X_2.

X_1 = Distance from the horizontal axis passing through the center of the blades to the center of gravity in inches (millimeters).
X_2 = Distance from the vertical axis passing through the center of the blades to the center of gravity in inches (millimeters).

Y = Distance from the face (blade side) to the center of gravity in inches (millimeters).

Z = The lessor of Z_1 and Z_2.

Z_1 = Distance from the center of the blades to the top of the enclosure in inches (millimeters) including mounting tab.

Z_2 = Distance from the center of the blades to the bottom of the enclosure in inches (millimeters).

RESULTS

Model	W oz	S in	X in	Y in	Z in	WY/Z oz	WY/S oz	WX oz in
GPA4106001D	8.80	1.02	.470	.708	0.50	12.46	6.11	4.14

W - Did not exceed 28 oz (794 g).
WY/Z - Did not exceed 48 oz (1361 g).
WY/S - Did not exceed 48 oz (1361 g)
WX - Did not exceed 80 oz in 56000 gmm or 0.56 gm

TEST RECORD NO. 2

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Direct Plug-In Transformer Model GPA4813.5780D. Only limited tests were considered necessary because of similarity to Model GPA4109500D covered in this report dated 4-8-92, Test Record No. 1.

GENERAL:

Unless otherwise specified in the individual test Method and Results, the units were operated as follows:

Direct Plug-In Units - For all tests in which the units were energized from a source of supply the units were operated from a 15A duplex receptacle with a nonmetallic faceplate. The receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 in^3. The outlet box was mounted in a 3-1/2 in. thick wall section with gypsum wall board surfaces and loosely filled with fiberglass insulation.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

	Measured Input			Marked Rated Input
Model	V	mA	W	(W)
GPA4813.5780D	120	185	15.7	22

The marked rated input power is at least 90% of the measured input.

ABNORMAL TESTS:

GENERAL

The following apply to each test identified as an Abnormal Test.

During these tests each direct plug-in unit was draped with a double layer of cheesecloth.

One minute following each test the Dielectric Voltage Withstand Test was conducted in accordance with the procedure described after the applicable test.

TRANSFORMER BURNOUT TEST (LINEAR DESIGNS)- ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, mA/W	3X Input A & W mA/W	Observations	Time To Open For Thermal Protector m:s
GPA4813.5780D	185/15.7	556/63.7	No Flame or Charring on Cheesecloth or Tissue Paper	7:17

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces (+).

1240 V between primary and secondary circuits (+).

(+) - The ac potential resulted in excessive leakage through capacitors. Therefore, the capacitors were removed from the circuit for the ac potential. With the capacitors connected in the circuit, the unit was subjected to a dc potential of 1.414 times the ac rms potential.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the thermal protector was shorted.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was deenergized and the sample was allowed to cool to room temperature. The supply circuit was then reenergized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

RESULTS

Model	V, rms	Current (A)
GPA4813.5780D	13.74	6.3

RESULTS A AND B cont'd.

For inherently limited secondaries:

The maximum secondary current and power did not exceed 8 A and 100 W, respectively.

There was no charring, glowing, or flaming of the cheesecloth.

TEST RECORD NO. 3

SAMPLES:

No tests were performed on Model GPA4112300D because of similarity in construction to units covered in this report.

TEST RECORD NO. 4

No tests were performed on Model GPA4810850D because of similarity in construction to Model GPA4813.5780D. Refer to Report dated 4-8-92, File E140329. Test Record No. 2.

TEST RECORD NO. 5

SAMPLES:

Representative production samples of Model GPA4813.51000D described in the preceding section of this Report, were submitted by the manufacturer and subjected to a test program as outlined below.

Only limited tests were performed on Model GPA4813.51000D because of similarity in construction. Refer to Report dated April 8, 1992, File E140329
(Test Record No. 1).

Unless otherwise noted, tests were conducted in the order specified. The following Standard was used: UL 1310 Fourth Edition.

The unit was configured as follows:

	V	W	Hz
Input -	120	21	60

ABNORMAL TESTS:

GENERAL

The following apply to each test identified as an Abnormal Test.

During these tests each direct plug-in unit was draped with a double layer of cheesecloth.

The grounding means was connected to ground through a 3 A nontime delay fuse.

OUTPUT LOADING TEST - ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD A

The output under test was short circuited and the sample was operated for 7 h or until the output current was interrupted by opening of a single operation thermal cutoff.

During this test the outer surface temperatures of the direct plug-in enclosure were measured.

METHOD B

The output under test was resistively loaded to result in max output current. The sample was operated for 7 h or until the output current was interrupted by opening of a single operation thermal cutoff.

If the output under test operated continuously for 7 h at the max output current without operation of overcurrent or thermal protection, no further tests were conducted on that output.

During this test the outer surface temperatures of the direct plug-in enclosure were measured.

METHOD C 2

Since the load condition of Method B resulted in opening of a thermal cutoff, the thermal cutoff was shunted and Method B was repeated with the output under test gradually loaded to result in a winding temperature of 5°C above the rated trip temperature of the protector as determined by a thermocouple attached to the winding adjacent to the protector. The unit was operated for 7 h.

RESULTS A

Model	Shorted	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/Observations
GPA4813.51000D	X	23.0	51.7	2 min 34 s	8.9 A initial Thermal fuse opens

RESULTS B

Model	Output Overloaded	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/Observations
GPA4813.51000D	S.C.	23.0	51.7	2 min 34 s	8.9 A initial Thermal fuse opens

RESULTS C 2

Model	Output Overloaded	Cutout Temperature Rating of Protective Device, °C	Test Temperature Measured on Winding °C	Comments/Observations
GPA4813.51000D	1.55 A	130°C + 5 = 135°C	135.7	Ran for 7 h

There was no indication of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT LOADING TEST:

METHOD

One min following each of the preceding Output Loading Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces (+).

1240 V ac between primary and secondary circuits (+).

(+) - The ac potential resulted in excessive leakage through capacitors. Therefore, the capacitors were removed from the circuit for the ac potential. With the capacitors connected in the circuit, the unit was subjected to a dc potential of 1.414 times the ac rms potential.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TRANSFORMER BURNOUT TEST (LINEAR DESIGNS)- ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, A	Max Input Current Not Exceeding 3 Times Normal Input Current	Observations
GPA4813.51000D	.19	Max = .479 A under S.C.	Ran for 11 min - Transformer thermal fuse opens

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces (+).

1240 V ac between primary and secondary circuits (+).

(+) - The ac potential resulted in excessive leakage through capacitors. Therefore, the capacitors were removed from the circuit for the ac potential. With the capacitors connected in the circuit, the unit was subjected to a dc potential of 1.414 times the ac rms potential.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

T E S T R E C O R D N O. 6

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP48091500D

Due to similarity with other Listed products, only the following tests were considered necessary.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current (and power) to the sample was measured 15 s after application of voltage to the primary.

RESULTS

	Measured Input			Marked Rated Input
Model	V	mA	W	W
GP48091500D	120	220	21.1	22

The marked rated input power is at least 90% of the measured input.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the thermal protector was shorted.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output	V, rms	Current A	Power, W
_		_		_
			3.9	
GP48091500D		12.94		21.4

NORMAL TEMPERATURE TEST:

METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions.

RESULTS

Model GP48091500D

Maximum Temperatures, °C

Thermocouple Locations	Horizontal	Vertical
Transformer Primary Winding, Top	69	68
Transformer Secondary Winding, Top	80	79
Transformer Core, Top	68	69
Enclosure Inside Surface Near Transformer	61	62
Enclosure Outside Surface Near Transformer	57	57
Printed Wiring Board Near Diode	118	119
Ambient	24	24
Test Duration, h:min	4 h	4 h

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHOD

One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

T E S T R E C O R D N O. 7

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP4114700A

Only following tests were considered necessary due to similarities to previously tested models.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current (and power) to the sample was measured
15 s after application of voltage to the primary.

RESULTS

	Measured Input			Marked Rated Input
Model	V	A	W	(W)
GP4114700A	120	.113	12.5	15

The marked rated input power is at least 90% of the measured input.

TRANSFORMER CHARACTERISTICS TEST:

The following test is intended for a linear type unit which (a) may employ a fuse or thermal protector, and (b) does not employ a limiting impedance or electronic limiting component or circuit.

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the thermal protector was shorted.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	V, rms	Current (A)	Power, W
GP4114700A	16.483	4.1	17.9

NORMAL TEMPERATURE TEST:

METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions.

RESULTS

Model GP4114700A

Thermocouple Locations	Maximum Temperatures, °C Horizontal	Vertical
Transformer Primary Winding Outerwrap	59.6	60.3
Transformer Secondary Winding, Outerwrap	61.4	63.2
Transformer Core, Top	72.3	69.3
Enclosure Inside Surface Near Transformer Core	56.7	52.4
Enclosure Outside Surface, Top	46.3	45.7
Ambient	24.1	24.3
Test Duration, h	4	4

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHOD

One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

500 V ac between secondary circuits and exposed conductive parts with common connections disconnected (+).

(+) - The ac potential resulted in excessive leakage through capacitors. Therefore, the capacitors were removed from the circuit for the ac potential. With the capacitors connected in the circuit, the unit was subjected to a dc potential of 1.414 times the ac rms potential.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TEST RECORD NO. 8

SAMPLES:

Representative production samples of Cat. No. GP48121000D described in the preceding section of this Report, were submitted by the manufacturer and subjected to a test program as outlined below.

Only limited tests were performed on Cat. No. GP48121000D because of similarity in construction.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current (and power) to the sample was measured 15 s after application of voltage to the primary.

RESULTS

	Measured Input			Marked Rated Input
Model	V	mA	W	W
GP48121000D	120	203	18.6	21

The marked rated input power is at least 90% of the measured input.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B

During these tests each unit was placed on a tissue covered softwood surface and draped with a double layer of cheesecloth.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

RESULTS

Model	V, rms	Current A	Power, W
GP48121000D	12.5	5.2	34.7

NORMAL TEMPERATURE TEST:

METHOD

Each unit was tested in the indicated positions.

RESULTS

Model GP48121000D

Thermocouple Locations	Max Temperatures, °C Horizontal
Transformer primary winding, top	79
Transformer secondary winding, top	89
Transformer core, top	77
Printed wiring board near diode	114
Ambient	23.7
Test Duration, h:min	4 h

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHOD

One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

500 V ac between secondary circuits and exposed conductive parts (with common connections disconnected.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TEST RECORD NO. 9

SAMPLES:

Representative production samples of Model GP4815800D described in the preceding section of this report, were submitted by the manufacturer and subjected to a test program as outlined below. Only limited tests were performed on Model GP4815800D because of similarity in construction.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input		Marked Rated Input
Model	V	mA	W	(W)
GP4815800D	120	177	17.6	21

The marked rated input power is at least 90% of the measured input.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output Measured	V, rms	Current (A)	Power, W
GP4815800D	Secondary	16.14	4.7	33.1

NORMAL TEMPERATURE TEST:
METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions.

RESULTS
Model GP4815800D

Thermocouple Locations Horizontal Vertical
Transformer Primary Winding Outerwrap 76 73
Transformer Secondary Winding, Outerwrap 84 83 Transformer
Core, Side 81 80 Enclosure Inside
Surface Near X FormR 53 53 Enclosure Outside
Surface, Top 48 48 Printed Wiring
Board Near D1 110 110
Ambient

DIELECTRIC VOLTAGE WITHSTAND TEST:METHOD One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min. 1240 V ac between primary circuits and exposed conductive surfaces (+). 1240 V ac between primary and secondary circuits (+).RESULTS The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

Test Record No. 9 Summary

The results of the investigation covered by Test Record No. 9 indicate that the sample of GP4815800D comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record No. 9 by:	Reviewed by:
W. CHABZA	B. LEMM
Associate Project Engineer	Engineering Team Leader

TEST RECORD NO. 10

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP3520200A.

Due to similarity with other Listed products, only the following tests were considered necessary.

GENERAL:

Direct Plug-In Units - For all tests in which the units were energized from a source of supply the units were operated from a 15 A duplex receptacle with a non-metallic faceplate. The receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 in^3. The outlet box was mounted in a 3-1/2 in thick wall section with gypsum wall board surfaces and loosely filled with fiberglass insulation.

Supply Circuit - The units were connected to a 15 A branch circuit supply adjusted to provide 120 V, 60 Hz.

Normal Load -

Each ac output was resistively loaded to its rated output current.

20 V Output - 200 mA

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current (and power) to the sample was measured 15 s after application of voltage to the primary.

RESULTS

	Measured Input			Marked Rated Input
Model	V	mA	W	(W)
GP3520200A	120	61	6.9	8

The marked rated input power is at least 90% of the measured input.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the thermal protector was shorted.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output Measured	V, rms	Current (A)	Power, W
GP3520200A	20 V	26.75	.81	5.4

FULL-LOAD OUTPUT CURRENT TEST:

METHOD

Each output was loaded to result in normal load. At 15 min of operation each load was readjusted, if necessary, to result in normal load. Without further load adjustment the test was continued for one h. At one h the output load was measured.

RESULTS

Model	Output Current Rating, (mA)	Output Current Rating at 1 h, (mA)
GP3520200A	200	190 mA

The output current at one h was at least 90% of the rated value.

NORMAL TEMPERATURE TEST:

METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions.

RESULTS

Model GP3520200A

Thermocouple Locations	Maximum Temperatures, °C Horizontal	Maximum Temperatures, °C Vertical
Transformer Primary Winding (Top)	71.6	68.0
Transformer Secondary Winding, (Top)	67.9	67.1
Transformer Core, (Top)	69.8	67.5
Enclosure Inside Surface Near Transformer	58.9	56.4
Enclosure Outside Surface, Near Transformer	42.4	39.7
Ambient	22.2	22.2
Test Duration, h:min	4 hr	4 hr

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHOD

One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

ABNORMAL TESTS:

GENERAL

The following apply to each test identified as an abnormal test.

During these tests each direct plug-in unit was draped with a double layer of cheesecloth. The grounding means was connected to ground through a 3 A nontime-delay fuse. One minute following each test the Dielectric Voltage Withstand Test was conducted in accordance with the procedure described after the applicable test.

OUTPUT LOADING TEST - ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD A

The output under test was short circuited and the sample was operated for 7 h or until the output current was interrupted by opening of a winding.

METHOD B

The output under test was resistively loaded to result in maximum output current as determined under the Maximum Output Current and Power Test. The sample was operated for 7 h or until the output current was interrupted by opening of a winding.

If the output under test operated continuously for 7 h at the maximum output current without operation of overcurrent or thermal protection, no further tests were conducted on that output.

METHOD C 1

Since the load condition of Method B resulted in opening of a winding, Method B was repeated with the output under test loaded as specified under Conditions of Test A through H, in that order. If a condition resulted in 7 h of continuous operation, no further tests were conducted. The load for Conditions A through H was readjusted, if necessary, one min after application of voltage to the primary.

Conditions of Test:

Condition A - Loading the output to a current equal to the normal current plus 75% of the difference between the Method B output current and normal current.

Condition B - Loading the output to a current equal to the normal current plus 50% of the difference between the Method B output current and normal current.

Condition C - Loading the output to a current equal to the normal current plus 25% of the difference between the Method B output current and normal current.

Condition D - Loading the output to a current equal to the normal current plus 20% of the difference between the Method B output current and normal current.

Condition E - Loading the output to a current equal to the normal current plus 15% of the difference between the Method B output current and normal current.

Condition F - Loading the output to a current equal to the normal current plus 10% of the difference between the Method B output current and normal current.

Condition G - Loading the output to a current equal to the normal current plus 5% of the difference between the Method B output current and normal current.
Condition H - Loading the output to normal current.

RESULTS A

Model	Shorted	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/Observations
GP3520200A	20 V ac	22.3	108.7	20 min	Primary Winding Opened

RESULTS B

Model	Output Overloaded	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/Observations
GP3520200A	20 V ac	22.3	108.7	20 min	Primary Winding Opened

RESULTS C 1
Model GP3520200A

Test Condition	Output Current, A	Test Duration	Comments/Observations
A	0.65	20 min	Primary opened, enclosure temp 109°C
B	0.51	1 hr 45 min	Primary opened, enclosure temp 130°C
C	0.35	7 hrs	Outer enclosure 67°C, N.B.

There was no indication of emission of flame or molten metal. There was no development of openings exposing live parts posing a risk of electric shock. The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock. The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT LOADING TEST:

METHOD

One min following each of the preceding Output Loading Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TRANSFORMER BURNOUT TEST (LINEAR DESIGNS) - ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, mA	Winding Tested	Observations
GP3520200A	61	Output	Primary windings opened in less than 20 minutes, no risk of fire.

There was no indication of emission of flame or molten metal. The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock. The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TEST RECORD NO. 10 SUMMARY

The results of the investigation covered by Test Record No. 10 indicate that the samples of Model GP3520200A comply with the applicable requirements, and therefore, such products are judged eligible to bear the UL Mark as described on the Conclusion Page of this report.

TEST RECORD NO. 10 BY: REVIEWED BY:

W. CHABZA
Project Engineer

D. ALMA
Senior Project Engineer

TEST RECORD NO. 11

Only limited tests were performed on Model No. GP48151500A because of similarity in construction to Model GP4815800D.

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP48151500A

Due to similarity with other listed products, only the following tests were considered necessary.

GENERAL:

Unless otherwise specified in the individual test Methods and Results, the units were operated as follows:

Supply Circuit - The units were connected to a 20 amp branch circuit supply adjusted to provide 120 V, 60 Hz.

Normal Load -

Each AC output was resistively loaded to its rated output current (+).

15 V Output - 1500 ma

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input		Marked Rated Input
Model	V	mA	W	(W)
GP48151500A	120	237	27.5	30

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the thermal protector was shorted.

The remaining secondaries were open circuited. The test was repeated for each secondary.

If the results indicated that the secondary under test met not inherently limited Class 2 specifications, the unit was subjected to the following Dielectric Voltage Withstand Test.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output Measured	V, rms	Current (A) (mA)	Power, W
GP48151500A	Sec.	17.50	6.91	44.6

RESULTS A and B (Cont'd)

For inherently limited secondaries:

The maximum secondary current and power did not exceed 8 A and 100 W, respectively.

NORMAL TEMPERATURE TEST:

METHOD

Each unit was tested in the indicated positions.

RESULTS

Model GP48151500A Maximum

Temperatures, °C Thermocouple Locations

Vertical Transformer Primary Winding, Outerwrap 1. 65.2 Transformer Secondary Winding, Outerwrap 2. 71.3

Transformer Core, Top 3. 66.1

Enclosure Inside Surface Near Transformer Core top 4. 59.7

Enclosure Outside Surface, Bottom 5. 45.1

Internal Wiring Near Secondary leads 6. 44.3

Ambient 7. 23.1

Test Duration, h:min 3:30

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHODOne min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min. 1240 V ac between primary ci connections disconnected)(+).

RESULTS The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TRANSFORMER BURNOUT TEST (LINEAR DESIGNS)- ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, A mA	Load Location	Observations
GP48151500A	237	Sec.	Thermal Protector Opened In 8:45 T.

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:	Reviewed by:
S. KARIM Senior Engineering Assistant	A. NELSON Staff Engineer
D. ALMA Senior Project Engineer	

TEST RECORD NO. 12

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP48091200D

Due to similarity with Model GP48091500D, only the following tests were considered necessary.

GENERAL:

Direct Plug-In Units - For all tests in which the units were energized from a source of supply the units were operated from a 15 A duplex receptacle with a nonmetallic faceplate.

Supply Circuit - The units were connected to a A branch circuit supply adjusted to provide 120 V, 60 Hz.

Normal Load -

Each DC output was loaded with a 10,000 uF capacitor in parallel with a variable resistor adjusted to result in the rated output current.

8.5 V SK Output - 1200 ma

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input		Marked Rated Input
Model	V	mA	W	(W)
GP48091200D	120	177	15.6	16

The marked rated input power is at least 90% of the measured input.

NORMAL TEMPERATURE TEST:METHODEach unit was tested in the indicated positions.Each output was connected to the normal load. At 15 min of operation each load was readjusted to result in normal load. Without further load adjustment each unit was operated until temperatures stabilized. Temperatures were measured by means of thermocouples secured by solder, tape, or waterglass.
RESULTS
Model GP48091200D Thermocouple Locations Horizontal
Transformer Primary Winding Outerwrap 84.2
Transformer Secondary Winding, Outerwrap 86.8 Transformer Core,
Top 72.3 Enclosure Outside Surface,
Top 58.8 Printed Wiring Board
Near diode 106
Ambient 24.2 Test Duration, h:min
4 hrsDIELECTRIC VOLTAGE WITHSTAND TEST:
METHOD One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.
1240 V ac between primary circuits and exposed conductive surfaces.
1240 V ac between primary and secondary circuits. 500 V ac between secondary circuits and exposed conductive parts.
RESULTS The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

ABNORMAL TESTS:GENERALThe following apply to each test identified as an abnormal test.

During these tests each direct plug-in unit was draped with a double layer of cheesecloth.

OUTPUT LOADING TEST - ABNORMAL:Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details. A Class A, 15A GFCI was used for this test.

METHOD A The output under test was short circuited and the sample was operated for 7 h or until the output current was interrupted by opening of a single operation thermal cut-off.

During this test the outer surface temperatures of the direct plug-in enclosure were measured.

METHOD B The output under test was resistively loaded to result in maximum output current as determined under the Maximum Output Current and Power Test. The sample was operated for 7 h or until the output current was interrupted by opening of a single operation thermal cut-off.

If the output under test operated continuously for 7 h at the maximum output current without operation of overcurrent or thermal protection, no further tests were conducted on that output.

During this test the outer surface temperatures of the direct plug-in enclosure were measured.

METHOD C2

Since the load condition of Method B resulted in opening of a thermal cutoff, the thermal cutoff was shunted and Method B was repeated with the output under test gradually loaded to result in a winding temperature of 5°C above the rated trip temperature of the protector as determined by a thermocouple attached to the winding adjacent to the protector. The unit was operated for 7 h.

RESULTS A

Model	Shorted	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/Observations
GP48091200D	Secondary	24.6	28.6	45 Sec.	Thermal Cutoff opened

RESULTS B

Model	Output Overloaded	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/ Observations
GP48091200D	Secondary	24.6	29.8	58 Sec	Thermal Cutoff opened

RESULTS C2

Model	Output Overloaded	Cutout Temperature Rating of Protective Device, °C	Test Temperature Measured on Winding °C	Comments/ Observations
GP48091200D	Secondary	130	135	Operated 7 hours/No damage

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT LOADING TEST:

METHOD

One min following each of the preceding Output Loading Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:	Reviewed by:
S. KARIM	D. ALMA
Associate Project Engineer	Senior Project Engineer

TEST RECORD NO. 13

SAMPLES:

No testing was considered necessary on Model P48091000A040G because it is similar to previously tested Models.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by: Reviewed by:

J. ZAKSHEVUSKY
Technical Correspondent

D. ALMA
Engineering Team Leader

S. KARIM
Associate Project Engineer

TEST RECORD NO. 14

SAMPLES:

No testing was considered necessary on Model GP4112150A because it is similar to previously tested Model GP4112300D; refer to Test Record No. 1 and 3.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

J. Zakshevsky

J. ZAKSHEVSKY
Technical Correspondent

Shahnaz Karim

S. KARIM
Associate Project Engineer

Reviewed by:

David V. Alma

D. ALMA
Engineering Team Leader

TEST RECORD NO. 15

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Model GP4112300D

The samples employed the revised input blades and grounding means.

Due to similarity with other Listed products, only the following tests were considered necessary.

GENERAL:

Direct Plug-In Units - For all tests in which the units were energized from a source of supply the units were operated from a 15 A duplex receptacle with a nonmetallic faceplate. The receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 in.^{3} The outlet box was mounted in a 3-1/2 in. thick wall section with gypsum wall board surfaces and loosely filled with fiberglass insulation.

Supply Circuit - The units were connected to a 15 A branch circuit supply adjusted to provide 120 V, 60 Hz.

Normal Load -

Each DC output was loaded with a 10,000 uF capacitor in parallel with a variable resistor adjusted to result in the rated output current (+).

12 V Output - 300 mA

DIELECTRIC VOLTAGE WITHSTAND TEST:
METHOD The following potentials were gradually applied and maintained for one min.1240 V ac between primary circuits and exposed conductive surfaces (ground pin)
1240 V ac between primary and secondary circuits
RESULTSThe spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

BLADE SECURENESS TEST: (Direct Plug-In Unit)

METHOD

Each unit was supported on a horizontal steel plate with the blades and grounding, projecting downward through a hole having a diameter sufficient only to permit the blades to pass through. A 20 lb weight was supported by each blade and grounding pin in succession, and then by the two blades tested together. Each test was two min in length.

RESULTS

Model	Observations
GP4112300D	No displacement

The blades and grounding pin did not loosen or pull out.

INPUT CONTACT SECURITY TEST: (Direct Plug-In Unit)

METHOD

Each sample was rigidly supported in the blades up position. Each blade and the grounding pin in succession was subjected to a force of 30 lb applied gradually in a direction towards the face of the sample. The same sample was retested subjecting both blades and the grounding pin to a single applied force of 40 lb. Each test was one min in length.

RESULTS

Model	Observations
GP4112300D	No displacement

The blades and grounding pin did not loosen to a degree that would introduce a risk of fire or electric shock.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by: Reviewed by:

Bahram Barzideh David V. Alma

BAHRAM BARZIDEH
Engineering Group Leader

DAVID ALMA
Engineering Team Leader

TEST RECORD NO. 16

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GP4820750A.

GENERAL:

Unless otherwise specified in the individual test Methods and Results, the units were operated as follows:

Direct Plug-In Units - For all tests in which the units were energized from a source of supply the units were operated from a 15 A duplex receptacle with a nonmetallic faceplate. The receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 in.^{3} The outlet box was mounted in a 3-1/2 in. thick wall section with gypsum wall board surfaces and loosely filled with fiberglass insulation.

Supply Circuit - The units were connected to a 15 A branch circuit supply adjusted to provide 120 V, 60 Hz.

Normal Load -

Each AC output was resistively loaded to its rated output current (+).

20 V Output - 750 mA

For tests which reference exposed conductive surfaces or accessible dead metal, the conductive surfaces consisted of metal foil with an area of 10 by 20 cm (3.94 by 7.8 in.), or the same size of the surface if the surface was less than 10 by 20 cm, wrapped around the enclosure.

LEAKAGE CURRENT TEST:

METHOD A

An as received sample was connected in accordance with the circuit described in Fig. 24.1 of the Standard for Class 2 Power Units, UL 1310, Third Edition. Under normal load conditions the leakage current was measured:

(a) between exposed conductive surfaces and the grounded pole of the supply circuit.

(b) between output circuits and the grounded pole of the supply circuit.

(d) with output circuits conductively connected to exposed conductive surfaces.

METHOD B

Method A was repeated after the sample had been conditioned at 88 ± 2 percent relative humidity at a temperature of 32 ± 2°C (89.6 ± 3.6°F) for 48 h.

RESULTS A and B

Model	GP4820750A	Measured Leakage Current, mA							
		Switch 2, Position 1				Switch 2, Position 2			
Condition	Switch S1	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
As received	Open	1.56	3.07		3.42	1.56	3.07		3.42
	Closed								
	0 - 5 s	0.78	0.97		1.20	0.84	2.42		2.56
	5 s - 10 min	0.78	1.04		1.27	0.83	2.47		2.59
	10 min-thermal stability	0.83	1.23		1.47	0.84	2.64		2.78
Humidity Conditioned	Open	1.84	3.34		3.73	1.79	3.36		3.73
	Closed								
	0 - 5 s	0.87	1.16		1.39	0.90	2.32		2.47
	5 s - 10 min	0.92	1.19		1.43	0.91	2.35		2.50
	10 min-thermal stability	0.91	1.26		1.49	0.89	2.41		2.54

Model		Calculated Leakage Current, uA							
		Switch 2, Position 1				Switch 2, Position 2			
Condition	Switch S1	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
As received	Open	1.04	2.05		2.28	1.04	2.05		2.28
	Closed								
	0 - 5 s	0.52	0.65		0.80	0.56	1.61		1.71
	5 s - 10 min	0.52	0.69		0.85	0.55	1.65		1.73
	10 min-thermal stability	0.55	0.82		0.98	0.56	1.76		1.85
Humidity Conditioned	Open	1.23	2.23		2.49	1.19	2.24		2.49
	Closed								
	0 - 5 s	0.58	0.77		0.93	0.60	1.55		1.65
	5 s - 10 min	0.61	0.79		0.95	0.61	1.57		1.67
	10 min-thermal stability	0.61	0.84		0.99	0.59	1.61		1.69

RESULTS (Cont'd)

The maximum measured leakage current did not exceed the allowable 0.5 mA rms for a portable unit.

The maximum measured leakage current after humidity conditioning did not exceed the allowable 0.5 mA rms for a portable unit.

RESULTS (Cont'd)

The maximum measured leakage current did not exceed the allowable 0.5 mA rms for a portable unit.

The maximum measured as received leakage current did not exceed the allowable 0.5 mA rms for a portable unit.

DIELECTRIC VOLTAGE WITHSTAND TEST FOLLOWING LEAKAGE CURRENT TEST:

METHOD

One min following the preceding Leakage Current Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

500 V ac between secondary circuits and exposed conductive parts.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input		Marked Rated Input
Model	V	mA	W	(W)
GP4820750A	120	159	17.5	22

The marked rated input power is at least 90% of the measured input.

MAXIMUM INPUT TEST:

METHOD

Each AC output was connected to a variable resistor.

Each load was adjusted, including short circuit, to result in maximum primary input current to the sample. Without further load adjustment, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input	
Model	V	mA	W
GP4820750A	120	1018	122

The maximum input power did not exceed 660 watts.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the thermal protector was shorted.

If the results indicated that the secondary under test met not inherently limited Class 2 specifications, the unit was subjected to the following Dielectric Voltage Withstand Test.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output Measured	V, rms	Current (A)	Power, W
GP4820750A	51	22.98	4.24	4

For inherently limited secondaries:

The maximum secondary current and power did not exceed 8 A and 100 W, respectively.

For not inherently limited secondaries:

There was no charring, glowing, or flaming of the cheesecloth.

FULL-LOAD OUTPUT CURRENT TEST:

METHOD

Each output was loaded to result in normal load. At 15 min of operation each load was readjusted, if necessary, to result in normal load. Without further load adjustment the test was continued for one h. At one h the output load was measured.

RESULTS

Model	Output Current Rating, (mA)	Output Current Rating, at 1 h,(mA)
GP4820750A	750	749

The output current at one h was at least 90% of the rated value. The overtemperature protection device did not operate.NORMAL TEMPERATURE TEST:

METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions. Each output was connected to the normal load. At 15 min of operation each load was readjusted to result in normal load. Without further load adjustment each unit was operated until temperatures stabilized. Temperatures were measured by means of thermocouples secured by solder, tape, or waterglass.

RESULTS

Model GP4820750A Thermocouple Locations Maximum Temperatures, °

Thermocouple Locations	Horizontal	Vertical
Transformer Primary Winding Outerwrap	52.6	53.7
Transformer Secondary Winding, Outerwrap	58.1	58.9
Transformer Core, Top	54.6	55.0
Enclosure Inside Surface Near Transformer	41.7	42.1
Enclosure Outside Surface, Top	35.9	38.0
Ambient	23.2	23.4
Test Duration, h:min	03:35:00 hrs:min:sec	04:30:00

DIELECTRIC VOLTAGE WITHSTAND TEST:
METHOD One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.
1240 V ac between primary circuits and exposed conductive surfaces.
1240 V ac between primary and secondary circuits. 500 V ac between secondary circuits and exposed conductive parts.
RESULTS The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.INDUCED POTENTIAL TEST:
METHOD While in a heated condition representative of transformer temperatures attained in the preceding Normal Temperature Test the unit was subjected to an alternating potential of twice the rated primary winding voltage applied across the primary winding for 7200 cycles if the frequency was 120 Hz or more, 60 s if the frequency was less than 120 Hz. The test voltage was started at one-quarter or less of the full value and increased to full value in not more than 15 s. After being held for the time specified, the voltage was reduced within 5 s to one-quarter or less of the maximum value and the circuit was opened.
RESULTS

Model	Voltage Applied	Frequency, Hz	Observations
GP4820750A	240	120	No Damage, NB

There was no indication of breakdown.ABNORMAL TESTS:GENERAL The following apply to each test identified as an abnormal test. During these tests each direct plug-in unit was draped with a double layer of cheesecloth. A Class “A” GFCI was utilized.

One minute following each test the Dielectric Voltage Withstand Test was conducted in accordance with the procedure described after the applicable test.

OUTPUT LOADING TEST - ABNORMAL:Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD A The output under test was short circuited and the sample was operated for 7 h until the output current was interrupted by opening of a single operation thermal cut-off.

During this test the outer surface temperatures of the direct plug-in enclosure were measured.

METHOD B The output under test was resistively loaded to result in maximum output current as determined under the Maximum Output Current and Power Test. The sample was operated for 7 h or until the output current was interrupted by opening of a single operation thermal cut-off.

If the output under test operated continuously for 7 h at the maximum output current without operation of overcurrent or thermal protection, no further tests were conducted on that output.

During this test the outer surface temperatures of the direct plug-in enclosure were measured.

METHOD C2

Since the load condition of Method B resulted in opening of a thermal cutoff, the thermal cutoff was shunted and Method B was repeated with the output under test gradually loaded to result in a winding temperature of 5°C above the rated trip temperature of the protector as determined by a thermocouple attached to the winding adjacent to the protector. The unit was operated for 7 h.

RESULTS A

Model	Shorted	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/Observations
GP4820750P	51	22.2	26	1 min	NB, thermal cutoff opened

RESULTS B

Model	Output Overloaded	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/ Observations
GP4820750A	51	22.4	35.6	2 min	NB, thermal cutoff opened

RESULTS C2

Model	Output Overloaded	Cutout Temperature Rating of Protective Device, °C	Test Temperature Measured on Winding °C	Comments/ Observations
GP4820750A	51	115	119.6	Ran for 7 h, NB

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT LOADING TEST:

METHOD

One min following each of the preceding Output Loading Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TRANSFORMER BURNOUT TEST (LINEAR DESIGNS)- ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, mA	Load Location	Observations
GP4820750A	159	51	Thermal cutoff opened in 8 min, 40 s, NB

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

STRAIN RELIEF TEST:

METHOD

With internal connections intact, the output cable was subjected to a 20 lb pull for one min at the angle indicated under Results.

RESULTS

Output Cable Strain Relief

Model	Angle of Pull	Observations
GP4820750A	90 degree	No damage
	180 degree	No damage

BLADE SECURENESS TEST: (Direct Plug-In Unit)

METHOD

Each unit was supported on a horizontal steel plate with the blades projecting downward through a hole having a diameter sufficient only to permit the blades to pass through. A 20 lb weight was supported by each blade in succession, and then by the two blades tested together. Each test was two min in length.

RESULTS

Model	Observations
GP4820750A	No damage

The blades did not loosen or pull out.

INPUT CONTACT SECURITY TEST: (Direct Plug-In Unit)

METHOD

Each sample was rigidly supported in the blades up position. Each blade in succession was subjected to a force of 30 lb applied gradually in a direction towards the face of the sample. The same sample was retested subjecting both blades to a single applied force of 40 lb. Each test was one min in length.

RESULTS

Model	Observations
GP4820750A	No damage

The blades did not loosen to a degree that would introduce a risk of fire or electric shock.

IMPACT TEST: (Direct Plug-In Unit)

METHOD

Three samples were dropped three times in succession from a height of 3 ft onto a surface as described in UL 1310 Par. 44.2.2. On each successive drop the enclosure struck the surface in a different orientation.

RESULTS

Model	Sample No.	Drop No.	Area Tested	Observations
GP4820750A	M1	1	Side	No damage
GP4820750A	--	2	Top	No damage
GP4820750A	--	3	Corner	No damage
GP4820750A	M2	1	Side	No damage
GP4820750A	--	2	Top	No damage
GP4820750A	--	3	Corner	No damage
GP4820750A	M3	1	Side	No damage
GP4820750A	--	2	Top	No damage
GP4820750A	--	3	Corner	No damage

There was no shattering, cracking, or other damage to the enclosure that would expose internal wiring or live parts.

ROD PRESSURE TEST: (Direct Plug-In Unit)

METHOD

Each sample was connected to the source of supply. A force increasing from 0 to 20 lb over a period of 5 s was applied through the axis of the rod perpendicular to the surface of the enclosure as indicated below. The rod was 1/2 in. diameter, had a flat face, with edges rounded to a radius of 1/32 in. Each test was continued for 1 min.

During each test the peak voltage and leakage current were monitored between earth ground and accessible dead metal parts of the enclosure.

RESULTS

		Enclosure to Earth Ground Measurements							
		Voltage, mV				Leakage Current, μA			
		S1 Open S2 Position		S1 Closed S2 Position		S1 Open S2 Position		S1 Open S2 Position	
Model	Surface	1	2	1	2	1	2	1	2
GP4820750A	Face	2.19	2.10	1.20	1.28	1.46	1.4	.80	.97

Openings did not develop in the enclosure that exposed live circuit parts.

RESULTS (Cont'd)

The voltage between accessible dead metal and earth ground did not exceed 42.4 Vp.

The leakage current between accessible dead metal and earth ground did not exceed 7.07 mA peak.

DIELECTRIC VOLTAGE WITHSTAND TEST (AFTER ROD PRESSURE TEST):

METHOD

One min following the preceding Rod Pressure Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces (+).

1240 V ac between primary and secondary circuits (+).

500 V ac between secondary circuits and exposed conductive parts.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

RESISTANCE TO CRUSHING TEST: (Direct Plug-In Unit)

METHOD

Each sample was placed between two maple blocks. Each block was not less than 1/2 in. thick, and one block had slots for the plug blades. A crushing force of 75 lb was applied gradually in a direction normal to the mounting surface for a period of 1 min.

RESULTS

Model	Observations
GP4820750A	No damage

There was no shattering, cracking, or other damage to the enclosure that would expose internal wiring or live parts.

MOLD STRESS RELIEF DISTORTION TEST:

METHOD

A sample of each model indicated below was placed in a 70°C oven for a period of 7 h. Upon removal each was examined for evidence of softening, cracking, warping or distortion. Each was also examined for exposed uninsulated live parts. After cooling to room temperature, The Strain Relief Test was repeated.

RESULTS

Model	Observations
GP4820750A	No damage

There was no softening, cracking, warping or other damage to the enclosure that would expose internal wiring or live parts.

STRAIN RELIEF TEST AFTER MOLD STRESS RELIEF DISTORTION TEST:

METHOD

With internal connections intact, the output cable was subjected to a 20 lb pull for one min at the angle indicated under Results.

RESULTS

Output Cable Strain Relief

Model	Angle of Pull	Observations
GP4820750A	90 degrees	No damage
	180 degrees	No damage

WEIGHT AND MOMENT DETERMINATION: (Direct Plug-In Unit)

METHOD

The output cord was not included in the weight measurement.

Each sample was weighed and the distance to the center of gravity was measured using suitable instruments. The distance between the center of the blades and the center of gravity was measured. The moments were then calculated by taking the products of the above measurements.

W = Weight of the device.

S = The lesser of S_1 and S_2.

S_1 = Distance from the center of the blades to the left side of the enclosure.

S_2 = Distance from the center of the blades to the right side of the enclosure.

X = The greater of X_1 and X_2.

X_1 = Distance from the horizontal axis passing through the center of the blades to the center of gravity.

X_2 = Distance from the vertical axis passing through the center of the blades to the center of gravity.

Y = Distance from the face (blade side) to the center of gravity.

Z = The lesser of Z_1 and Z_2.

Z_1 = Distance from the center of the blades to the top of the enclosure.

Z_2 = Distance from the center of the blades to the bottom of the enclosure.

RESULTS

Values are in oz or inches.

Model	W	W	X	Y	Z	WY/Z	WY/S	WX
GP4820750A	0.75 lbs							11.1 N mm

Note: WX is equal to 11.1 Newton mm

W did not exceed 794 grams, WY/Z did not exceed 1361 grams, WY/S did not exceed 1361 grams, and WX did not exceed 0.56 Nm (57606 g-mm).

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

DAVID H. WAGNER
Senior Engineering Assistant

Reviewed by:

David V. Alma

DAVID V. ALMA
Engineering Team Leader

Shahnaz Karim

SHAHNAZ KARIM
Associate Project Engineer

TEST RECORD NO. 17

SAMPLES:

Samples of Models GP4112300DG and GP48091200DG were found to be constructed as described in the previous Report and were subjected to the test program noted below.

No tests were considered necessary due to similarity to models GP4112300D and GP48091200D respectively, refer to Test Record No. 1.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Shahnaz Karim

SHAHNAZ KARIM
Associate Project Engineer

Reviewed by:

David V. Alma

DAVID V. ALMA
Engineering Team Leader

CERTIFICATE OF COMPLIANCE

Certificate Number 20140630-E468713
Report Reference E468713-19970130
Issue Date 2014-JUNE-30

Issued to: DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY

NO 1 SHI TANG BEI ST 2,
SHI JIE TOWN, DONG GUAN CITY,
GUANGDONG 523290 CHINA.

This is to certify that representative samples of DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

Power Supply Model GPA-66-1577.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1310, UL Standard for Safety for Class 2 Power Units.

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle: UL with the word “LISTED”; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

January 30, 1997

REPORT

on

DIRECT PLUG-IN TRANSFORMER UNITS

DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
GUANGDONG 523290 CHINA

DESCRIPTION

PRODUCT COVERED:

Power Supply Model GPA-66-1577.

GENERAL CHARACTER:

The product covered by this Report is a wall mounted power supply. It is provided a Listed, CSA Certified supply cord for connection to its nominal rated 60 Hz source of supply, and output connections for connection to the telephone system. The unit is intended to be installed in accordance with the instructions supplied with the units.

USL - Indicates investigation to the U.S. Standard for Safety of Class 2 Power Units, UL 1310, Fifth Edition.

RATINGS:

Electrical -

Model	Input, 60 Hz		Output, dc	
GPA-66-1577	V	W	V	A
	120	33	-12	1
			+5	

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity and between live- and dead-metal parts shall be as indicated below.

Spacings Other Than At Field Wiring Terminals

Potential Involved, V	Through Air	Over Surface
50 or less	1/16(1.6)	1/16(1.6)
51-150	1/8(3.2)	1/4(6.4)

Secondary spacings in isolated limited energy circuits (100 VA maximum available, rated less than 1000 V) and low-voltage limited energy circuits (less than 42.4 V peak open circuit, less than 8 A short circuit) are not specified. Acceptability of spacings in these circuits was determined by Dielectric Withstand Tests.

Spacings to Enclosure

Potential Involved, V	Minimum Spacings Through Air and Over Surface, in (mm)
0-50	1/16(1.6)
51-150	1/4(6.4)

Markings - All markings are either permanently ink stamped, silk-screened, or provided on a Recognized Component Marking and Labeling System (PGDQ2) (preprinted or die-stamped foil type suitable for application’ to the surface involved, rated mm 80^{0}C.)

The following markings are provided:

Manufacturer’s name, model number date or other dating period of manufacture, (and) complete electrical ratings. Refer to Ill. 1 for details.

The date of manufacture (date code): four digits, first represent year, second two represent week of year.

Example: 9426

Fuse replacement size consisting of voltage and current ratings marked adjacent to fuse(s). “Intended for Installation in a Protected Environment.”

*

* “Class 2 Transformer”

* “CAUTION: Risk of electric shock”
and
“Dry location use only”
or
“Do not exposure to liquid, vapor or rain”
or the equivalent

“WARNING: To reduce the risk of fire or electric shock, do not interconnect output terminations.”

Internal Wiring - Unless otherwise specified, all internal wiring is AVLV2 rated VWl, 300 V, 80^{0}C.

Segregation - Insulated conductors of different circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

Enclosure Assembly - Case and cover constructed of R/C plastic material (QMFZ2), designated Lexan 950, manufactured by G.E. Plastics rated 94-5VA, 130^{0}C. Case and cover secured together by screws.

Mechanical Assembly - Unless otherwise stated, all enclosure parts and component mounting assemblies are secured by welding or thread forming screws, or machine bolts provided with nuts and lockwashers. Nonmetallic panels are secured by machine bolts and nuts.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception - Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - Recognized Component tubing (YDPtJ2) and/or sleeving (UZFT2) rated 125 V, 105W minimum.

Bonding for Grounding - All dead-metal parts are bonded to the frame by metal-to-metal contact through welding, the use of machine bolts, nuts and lockwashers or thread forming screws and paint piercing washers providing good metal-to-metal contact.

Printed Wiring Boards - Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flame rating of 94V-0 and an operating temperature rating of at least 130^{0}C.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Tolerances - Unless specified otherwise, all indicated dimensions are nominal.

POWER SUPPLY MODEL GPA-66-1577 FIG. 1 (M96-1186o)

General - Shows external view.

1. Enclosure Top - R/C (QMFZ2), designated Lexan 950, rated 94-SV, 2.3 mm thick, approx 128 by 90 by 43 mm, with four integrally molded bosses for securing enclosure bottom. Provided with ventilation openings on top face 60 by 3.2 mm, and on all edges 14 by 3.2 mm as shown.

2. Enclosure Bottom - Secured to top by four screws. Same material as Item 1, 2.7 mm thick, approx 128 by 90 by 43 mm, with three integrally molded bosses for securing PWB. Provided with ventilation openings on bottom face 58 by 3.2 mm, and on edges 14 by 3.2 mm. Provided with two integrally molded mounting tabs (as shown) which when mounted will raise unit 10 mm from mounting surface.

3. Markings - Include Listee’s name, Model No., electrical ratings. (See Construction Details)

POWER SUPPLY MODEL GPA-66-1577 FIG. 2 (M96-11861)

General - Shows internal view.

1. Transformer - Constructed as follows:

Core - Laminated sheet steel, 66 by 29.5 by 55 mm.

Windings - Enameled copper magnet wire, randomly wound.

Bobbin - Two provided, 2 flange type, R/C material (QMFZ2), manufactured by E.I. Dupont, Type Zytel 101F rated 94V-2, 125^{0}C.

Outerwrap - Consists of 3 layers of 0.05 mm thick per layer of polyester film tape.

2. Input Cord - Listed, CSA Certified, 3 conductor No. 18 AWG, Type SVT rated 105^{0}C, VW-1, standard 3 conductor plug in which the ground conductor terminates on crimped closed loop connector under separate screw lockwasher through transformer core, secured to a nut. Provided with strain relief bushing, as shown in Fig. 2, secured to snug fit between enclosure halves. Cord length 1.8 m minimum.

3. Output Cord - Listed, CSA Certified, rated 105^{0}C, VW-1 terminating in a 5 pin din connector. Provided with a molded on strain bushing, as shown in Fig. 2, secured by snug fit between enclosure halves. Cord length 1.8 m minimum.

4. Secondary Components - Located in a Class 2 circuit.

5. Secondary Fuses (F1, F2) - Listed, rated 125 V, 5 A. Secured to PWB by solder.

6. Printed Wiring Board - R/C (ZPMV2) board rated 94V-0, 130^{0}C.

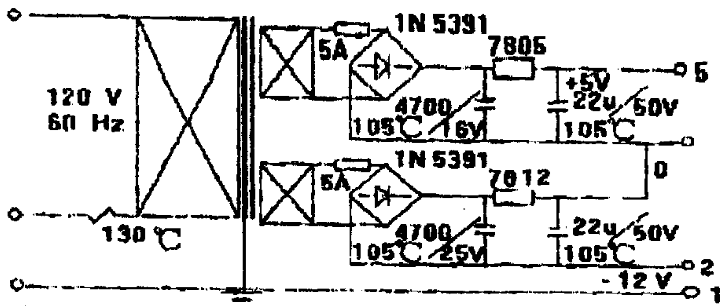
N141178454

N141178455

P.03

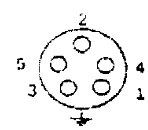
SCHEMATIC DIAGRAM

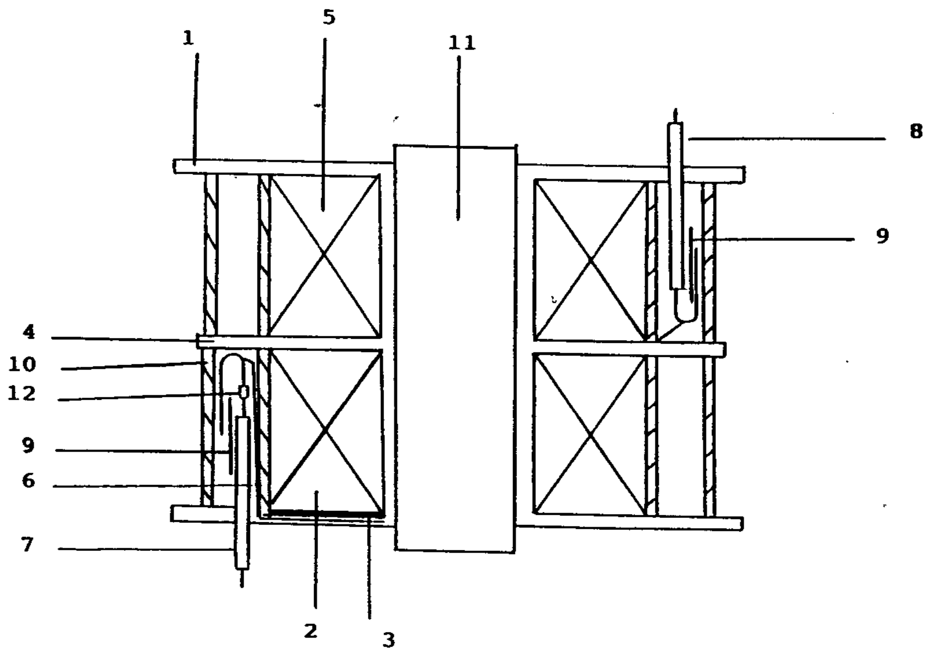
Model: GPA-66-1577 Description: AC120V 60Hz/ +DC5V 1A -DC12V 1A Date: June 7, 96.



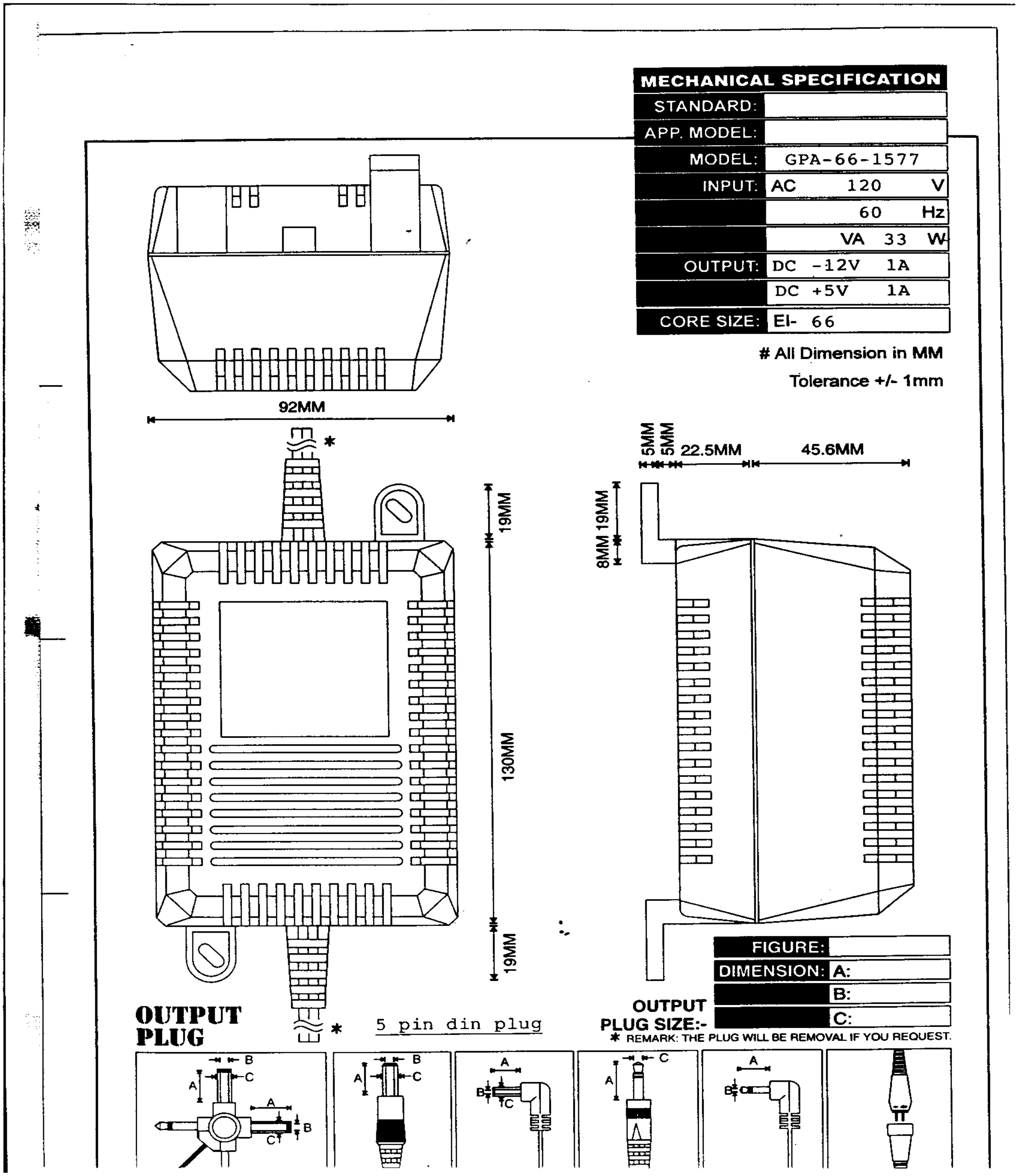
Note :

1. Primary with 3 prong power cable
2. Secondary with 5 pin din plug
   Pin#1 Ground
   Pin#2 -DC 12V 1A
   Pin#3 Common
   Pin#4 N/C
   Pin#5 +DC 5V 1A





1. Bobbin
2. Primary Winding
3. Cross Over Insulation
4. Insulation Between Primary & Secondary
5. Secondary Winding
6. Wrapping Tape
7. Primary Leads
8. Secondary Leads
9. Leads Strain Relief
10. Outer Wrapping Tape
11. Lamination Core
12. Thermal Fuse


MECHANICAL SPECIFICATION
STANDARD:
APP. MODEL:
MODEL: GPA-66-1577
INPUT: AC 120 V
60 Hz
VA 33 W
OUTPUT: DC -12V 1A
DC +5V 1A
CORE SIZE: EI- 66
All Dimension in MM
Tolerance +/- 1mm
92MM
5MM
5MM
22.5MM
45.6MM
19MM
130MM
19MM
8MM
19MM
FIGURE:
DIMENSION: A:
B:
C:
OUTPUT PLUG
5 pin din plug
OUTPUT PLUG SIZE:-
* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.

T E S T R E C O R D N O. 1

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the construction described in the preceding section of this Report and the following tests were conducted. Test results relate only to the items tested.

Power Supply Model GPA-66-1577

Supply Circuit - The units were connected to a 20 A branch circuit supply adjusted to provide 120 V, 60 Hz.

Normal Load -

Each DC output was loaded with a 10,000 uF capacitor in parallel with a variable resistor adjusted to result in the rated output current (+).

-12 V Output - 1 A
+5 V Output - 1 A

For tests which reference exposed conductive surfaces or accessible dead metal, the conductive surfaces consisted of metal foil with an area of 10 by 20 cm (3.94 by 7.8 in.), or the same size of the surface if the surface was less than 10 by 20 cm, wrapped around the enclosure.

LEAKAGE CURRENT TEST:

METHOD A

An as received sample was connected in accordance with the circuit described in Fig. 24.1 of the Standard for Class 2 Power Units, UL 1310, Third Edition. Under normal load conditions the leakage current was measured:

(a) between exposed conductive surfaces and the grounded pole of the supply circuit.

(b) between output circuits and the grounded pole of the supply circuit.

(c) with output circuits conductively connected to exposed conductive surfaces, between output circuits/exposed conductive surfaces and the grounded pole of the supply circuit.

METHOD B

Method A was repeated after the sample had been conditioned at 88 ± 2 percent relative humidity at a temperature of 32 ± 2°C (89.6 ± 3.6°F) for 48 h.

RESULTS A and B

Model GPA-66-1577		Measured Leakage, MV					
		Switch 2, Position 1			Switch 2, Position 2		
Condition	Switch S1	(a)	(b)	(c)	(a)	(b)	(c)
As received	Open	11.20	10.46	11.21	11.22	10.46	11.22
	Closed						
	0 - 5 s	1.79	5.51	5.92	1.60	4.99	5.39
	5 s - 10 min	1.70	5.64	6.04	1.59	5.12	5.51
	10 min-thermal stability	1.73	5.87	6.27	1.64	5.35	5.77
Humidity	Open	3.06	11.66	12.54	3.07	11.67	12.50
Conditioned	Closed						
	0 - 5 s	1.65	6.20	6.63	1.53	5.62	6.02
	5 s - 10 min	1.89	6.56	6.96	1.54	5.88	6.33
	10 min-thermal stability	1.71	6.77	7.15	1.57	6.04	6.43

Model GPA-66-1577		Measured Leakage, µA					
		Switch 2, Position 1			Switch 2, Position 2		
Condition	Switch S1	(a)	(b)	(d)	(a)	(b)	(c)
As received	Open	7.47	6.97	7.49	7.48	6.97	7.48
	Closed						
	0 - 5 s	1.19	3.67	3.95	10.67	3.33	3.59
	5 s - 10 min	1.13	3.76	4.03	1.06	3.41	3.67
	10 min-thermal stability	1.15	3.91	4.18	1.09	3.57	3.85
Humidity	Open	2.04	7.77	8.36	2.05	7.78	4.99
Conditioned	Closed						
	0 - 5 s	1.10	4.13	4.42	1.02	3.75	2.39
	5 s - 10 min	1.13	2.51	4.64	1.03	3.92	2.45
	10 min-thermal stability	1.14	4.51	4.77	1.05	4.03	2.57

RESULTS (Cont'd)

The maximum measured leakage current did not exceed the allowable 0.5 mA rms for a portable unit.

The maximum measured leakage current after humidity conditioning did not exceed the allowable 0.5 mA rms for a portable unit.

DIELECTRIC VOLTAGE WITHSTAND TEST FOLLOWING LEAKAGE CURRENT TEST:

METHOD

One min following the preceding Leakage Current Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

MAXIMUM OUTPUT VOLTAGE TEST:

METHOD A

The maximum peak and rms output voltage under any load condition, including open-circuit, between any two output terminations were measured and recorded below.

METHOD B

Method A was repeated except the outputs were interconnected to result in the maximum peak output voltage.

RESULTS A and B

		Maximum Voltage Measured
Model	Output Terminations Measured	DC
GPA-66-1577	-12	-12.259
	+5	5.033
	Both in series	-17.292

The output voltage did not exceed 60 V for continuous dc.

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER MAXIMUM OUTPUT VOLTAGE TEST (FAULT CONDITIONS):

METHOD

One min following the preceding Maximum Output Voltage Test under component fault conditions, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

500 V ac between secondary circuits and exposed conductive parts (with common connections disconnected).

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current (and power) to the sample were measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input		Marked Rated Input
Model	V	mA	W	(W)
GPA-66-1577	120	361	35.2	33

The marked rated input power is at least 90% of the measured input.

MAXIMUM INPUT TEST:

METHOD

Each DC output was connected to a 10,000 uF capacitor in parallel with a variable resistor.

Each load was adjusted, including short circuit, to result in maximum primary input current to the sample. Without further load adjustment, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input	
Model	V	mA	W
GPA-66-1577	120	454	43.3

The maximum input power did not exceed 660 watts.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each unit was placed on a tissue covered soft wood surface and draped with a double layer of cheesecloth. The secondary fuse was shorted.

The remaining secondaries were resistively loaded to result in minimum load. The test was repeated for each secondary.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output Measured	V, rms	Current (A)	Power, W
GPA-66-1577	+5 TD (W-W)	6.72	16.72	47.7
	-12 TD (Y-Y)	13.23	16.75	79.9

RESULTS

For not inherently limited secondaries:

The maximum secondary current and power did not exceed $1000/V_{max}$ A and 350 W, respectively, for outputs with a maximum voltage of 20 V.

There was no charring, glowing, or flaming of the cheesecloth.

OUTPUT CURRENT AND POWER TEST:

METHODS A and B

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the fuse was shorted.

During these tests each unit was placed on a tissue covered soft wood surface and draped with a double layer of cheesecloth. The fuse was shorted.

METHOD A

The output under test was resistively loaded, including short circuit, to result in maximum output current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the output current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD B

The output under test was resistively loaded to result in maximum output power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the output power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS A and B

Model	Output Measured	Current, (A)	Power, W
@GPA-66-1577	-12	1.75	18.5
	+5	1.72	7.2

@ - Testing conducted w/regulators in TD circuit.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT CURRENT AND POWER TEST (NOT INHERENTLY LIMITED UNITS):

METHOD

One min following the preceding Output Current and Power Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

CALIBRATION OF OVERCURRENT PROTECTION DEVICES TEST (NOT INHERENTLY LIMITED UNITS):

METHODS A and B

During these tests each unit was placed on a tissue covered soft wood surface and draped with a double layer of cheesecloth. The grounding means was connected to ground through a 3 A nontime-delay fuse.

METHOD A

The output under test was resistively loaded to deliver the current indicated under RESULTS A below. The load was continuously adjusted for two min or until the protection device operated, whichever occurred first, to maintain the current value during the test.

METHOD B

The output under test was resistively loaded to deliver the current indicated under RESULTS B below. After 15 min the load was adjusted to result in the original value. Without further load adjustment the unit was continuously operated for 60 min or until the protection device operated, whichever occurred first.

RESULTS A

Model	Output Tested	Output Currents, A	Time for Protective Device to Operate, min:s
GPA-66-1577	Yel -12 V	10	7 s
	Wh 5 V	10	5 s

RESULTS B

Model	Output Tested	Output Currents, A	Time for Protective Device to Operate, min:s
GPA-66-1577	Yel -12 V	6.75	15:33
	Wh 5 V	6.75	15:40

The protection device operated within the time specified in UL 1310 Table 29.1. During Method B the protection device operated within 60 min.During Method A the p risk of electric shock.The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.The 3 A ground fuse remained

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER CALIBRATION OFOVERCURRENT PROTECTION DEVICES TEST:

METHOD

One minute following the preceding Calibration of Overcurrent Protection Devices Test, the following potentials were gradually applied and maintained for one min. 1240 V ac between primary circuits and exposed conductive surfaces. 1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.FULL-LOAD OUTPUT CURRENT TEST:

METHOD

Each output was loaded to result in normal load. At 15 min of operation each load was readjusted, if necessary, to result in normal load. Without further load adjustment the test was continued for one h. At one h the output load was measured.

RESULTS

Model	Output Current Rating, (mA) (A)	Output Current Rating, at 1 h,(mA)
GPA-66-1577	-12 V @ 1000	997
	+5 V @ 1000	994

The output current at one h was at least 90% of the rated value.

NORMAL TEMPERATURE TEST:

METHOD

Each unit was tested in the indicated positions.

RESULTS

Model GPA-66-1577 Maximum Temperatures, °C

Thermocouple Locations	Horizontal
Transformer Primary Winding Outerwrap	76
Transformer Secondary Winding, Outerwrap	85
Transformer Core, Top	81
Enclosure Inside Surface Near Transformer	70
Enclosure Outside Surface, Near Transformer	60
Printed Wiring Board Near D1	113
Heat sink at screw LM7812	83
Ambient	24
Test Duration, h	4

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHOD

One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min. 1240 V ac between primary circuits and exposed conductive surfaces. 1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

INDUCED POTENTIAL TEST:

METHOD

While in a heated condition representative of transformer temperatures attained in the preceding Normal Temperature Test the unit was subjected to an alternating potential of twice the rated primary winding voltage applied across the primary winding for 7200 cycles if the frequency was 120 Hz or more, 60 s if the frequency was less than 120 Hz. The test voltage was started at one-quarter or less of the full value and increased to full value in not more than 15 s. After being held for the time specified, the voltage was reduced within 5 s to one-quarter or less of the maximum value and the circuit was opened.

RESULTS

Model	Voltage Applied	Frequency, Hz	Observations
GPA-66-1577	240	120	No damage

There was no indication of breakdown.

ABNORMAL TESTS:

GENERAL

The following apply to each test identified as an abnormal test.During these tests value. The test was repeated for each output.One minute following each test the Dielectri

OUTPUT LOADING TEST - ABNORMAL: Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD A The output under test was short circuited and the sample was operated for 7 h.

If the output under test operated continuously for 7 h at the maximum output current without operation of overcurrent or thermal protection, no further tests were conducted on that output.

RESULTS A

Model	Shorted	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/Observations
GPA-66-1577	+5	23.1	34.2	7 h	No damage, regulator operated in fold back
	-12	23.1	36.2	7 h	No damage, regulator operated in fold back

RESULTS (cont'd)

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT LOADING TEST:

METHOD

One min following each of the preceding Output Loading Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TRANSFORMER BURNOUT TEST (LINEAR DESIGNS)- ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, mA	Load Location	Observations
GPA-66-1577	361	Wht - Wht	Thermal protector opened in 9 min 22 sec.
GPA-66-1577	361	Yel - Yel	Thermal protector opened in 41 min.

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

STRAIN RELIEF TEST:

METHOD

With internal connections disconnected, the supply cord was subjected to a 35 lb pull for one min at the angle indicated under Results.

With internal connections intact, the output cable was subjected to a 20 lb pull for one min at the angle indicated under Results.

RESULTS

Supply Cord Strain Relief

Model	Angle of Pull	Observations
GPA-66-1577	<90 and <180	No damage

Output Cable Strain Relief

Model	Angle of Pull	Observations
GPA-66-1577	<90 and <180	No damage

IMPACT TEST: (Cord Connected Unit)

METHOD

Each sample was subjected to an impact of 5 ft-lb using a 2 in diameter steel ball weighing 1.18 lb dropped through a distance of 51 in. Following the impacts each sample was examined for exposure of live parts.

Following the impacts each sample was subjected to a 1240 V dielectric test between primary circuits and accessible dead metal parts.

RESULTS

Model	Area Tested	Observations
GPA-66-1577	Top	OK NB
	Side	OK NB
	Bottom	OK NB

There was no shattering, cracking, or other damage to the enclosure that would expose internal wiring or live parts.

MOLD STRESS RELIEF DISTORTION TEST:

METHOD

A sample of each model indicated below was placed in a 70°C oven for a period of 7 h. Upon removal each was examined for evidence of softening, cracking, warping or distortion. Each was also examined for exposed uninsulated live parts. After cooling to room temperature, The Strain Relief Test was repeated.

RESULTS

Model	Observations
GPA-66-1577	OK

There was no softening, cracking, warping or other damage to the enclosure that would expose internal wiring or live parts.

STRAIN RELIEF TEST AFTER MOLD STRESS RELIEF DISTORTION TEST:

METHOD

With internal connections disconnected, the supply cord was subjected to a 35 lb pull for one min at the angle indicated under Results.

With internal connections intact, the output cable was subjected to a 20 lb pull for one min at the angle indicated under Results.

RESULTS

Model	Angle of Pull	Observations
GPA-66-1577	<90 and <180	OK

Model	Angle of Pull	Observations
GPA-66-1577	<90 and <180	OK

CERTIFICATE OF COMPLIANCE

Certificate Number	20140627-E468713
Report Reference	E468713-19970724
Issue Date	2014-JUNE-27

Issued to: DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY

NO 1 SHI TANG BEI ST 2,
SHI JIE TOWN, DONG GUAN CITY,
GUANGDONG 523290 CHINA.

This is to certify that representative samples of DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

Class 2 Power Units, Model No. GP57151800D, GP57181000D

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1310, UL Standard for Safety for Class 2 Power Units.
CAN/CSA C22.2 No. 223 M91, Standard for Power Supplies with Extra-Low-Voltage Class 2 Outputs.

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.
The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with “C” and “US” identifiers: c UL us the word “LISTED”; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

July 24, 1997

REPORT

On

DIRECT PLUG-IN TRANSFORMER UNITS

DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
GUANGDONG 523290 CHINA

DESCRIPTION

PRODUCT COVERED:

USL - Class 2 Power Units, Model No. GP57151800D, GP57181000D

GENERAL CHARACTER:

The devices covered by this Report are direct plug-in transformer units.

The units covered by this Report consist of a transformer and other related electronic circuitry housed in a thermoplastic enclosure. The units are provided with parallel type blades for insertion in a standard parallel blade receptacle. The output cord is provided with a nonstandard polarized connector.

USL indicates coverage under UL 1310, Standard for Class 2 Power Units, Fifth Edition.

ELECTRICAL RATINGS:

	Input, W	Hz		Output	
Model	Volt	Watt	Hz	Volt	mA
GP57151800D,	120	35	60	15 V dc	1800
GP57181000D	120	25	60	18 V dc	1000

Model Differences - Model GP57151800D (cord connected) is the basic model covered in this report. Model GP57181000D is similar to GP57151800D (direct plug in) except for input/output ratings, input connection and output cords as noted.

CONSTRUCTION DETAILS:

Spacings - Minimum spacings between live parts of opposite polarity, between live and dead-metal parts (and between live parts and a metal enclosure) shall be as indicated below:

Minimum Spacings, in (mm)

Volt rms	Through Air and Over Surface	Shortest Distance to Metal Enclosure
150 or less	1/16 (1.6)	1/4(6.4)
151—250	3/16 (1.8)	1/4(6.4)

Class 2 Secondary Circuit Spacings - Not specified, spacings are based on Dielectric Withstand Tests.

Marking - Permanently ink-stamped, hot-stamped, silk-screened or provided as label, label employed is covered as a Recognized Component marking and labeling system suitable for application to polyphenylene oxide and having a mm operating temperature of 80^0C.

Information Marking - Indicates company name, model number, date of other dating period of manufacture, cautionary statements, and electrical ratings including: Input voltage, frequency, and watts; Output voltage and current dc.

Cautionary Markings - The “CAUTION” or “WARNING” in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - The date code consists of a four digit code. The first two digits represent the last two digits of the year of manufacture. The last two digits represent the month of the year of manufacture.

Example: 9006 = June, 1990.

The following markings are provided:

* “Class 2 Transformer”

* “CAUTION - Risk of electric shock, dry location use only or equivalent.”

* Blades - Four direct plug-in units: Folded over or solid, copper, brass or bronze. Location min 7.9 mm from edge of enclosure. See Sec. Gen. Ill. 1 for dimensions, spacing and relative location of blades.

<u>Internal Wiring</u> - Unless otherwise specified, all internal wiring is Recognized Component appliance wiring material (AVLV2), insulation 1/32 in (0.8 mm) thick minimum, rated 600 V, 105^{0}C minimum (UL Style 1015), or 1/64 in (0.4 mm) thick cross-linked PVC insulation.

<u>Segregation</u> - Insulated conductors of difference circuits are provided with spacings as specified in this Report unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges, and heat producing components.

<u>Mechanical Electrical Connections</u> - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge, and number of conductors.

<u>Soldered Connections</u> - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

<u>Electrical Tubing and Sleeving</u> - Recognized Component tubing (YDPU2) and/or sleeving (UZFT2) rated 300 V, 105^{0}C minimum.

<u>Printed Wiring Boards</u> — Unless otherwise specified, all boards are Recognized Components (ZPMV2), suitable for the solder time and temperature used by the manufacturer, and having a minimum flammability rating of 94HB and an operating temperature rating of at least 105^{0}C except where otherwise indicated.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Instruction Manual - For Model GP57151800D only. See Section General, Instruction Manual.

Enclosure Assembly - All models. Case and cover constructed from Recognized Component plastic material (QMFZ2), Lexan 141R manufactured by GE Plastic or Polycarbonate Type S—2000 manufactured by Mitsubishi Gas Chemical. Case and cover secured together by high frequency (sonic) welding (or solvent cement)

Electrical Schematic — Refer to Ill. 1

MODEL GP57151800D FIG. 1 (M96—16984)
*(ALSO REPRESENTS MODEL GP57181000D)

1. Enclosure - Two pieces held together by screws. See construction details for material types. Overall dimensions are 90.1 by 68.1 by 54 mm, 2.43 mm thick.

2. Power Supply Cord - Listed, Type SPT-2, with molded-on attachment plug, rated VW-1, 105^{0}C, mm length 1.8 m. Must be of the polarized plug type.

*3. Blades - (For Model GP57181000D) Not shown. Refer to Construction Details.

MODEL GP57151800D FIG. 2 (M96—16985)
*(ALSO REPRESENTS MODEL GP57181000D)

1. Printed Wiring Board - R/C (ZPMV2) board rated minimum 94HB, 105^{0}C, overall 1.7 mm minimum thick.

2. Transformer - Constructed as follows:

Core - laminated silicon steel. Overall dimensions 57 by 30 by 47.5 mm.

Windings - Enameled copper magnet wire, randomly wound.

Bobbin - 2 flange type provided, with bobbin holder. R/C plastic material (QMFZ2), manufactured by E.I. Dupont, Type Zytel 101.

Primary and secondary bobbin dimensions are 50 by 35 by 18 mm, walls are 1.2 mm and flanges are 1.3 mm thick. Primary and secondary bobbins slide into bobbin holder, and secured by core.

Bobbin holder dimensions are 52 by 27 by 37 mm, center flange thickness is 0.6 mm.

Outerwrap — Consists of 3 layers of 0.05 mm thick per layer of polyester tape.

3. Thermal Protector - (Not shown),R/C (XCMQ2) Type No. V125, manufactured by Tamura Kaken Co., Ltd., rated 130^{0}C, 250 V. Located on the primary winding.

4. Current Fuse — Listed, rated 125 V, 5 A, slo—blow. Secured to PWB by soldered pigtails.

5. Diode - Type No. N5822, 2 provided, spaced on minimum distance of 5 mm from surface of P.C. Board.

*6. Grounding - (For Model GP57181000D) Not shown. Ground pin is connected to core with a single 2.5 mm screw and closed loop connector. Secondary output cord is also connected to ground pin mechanically secured and soldered.

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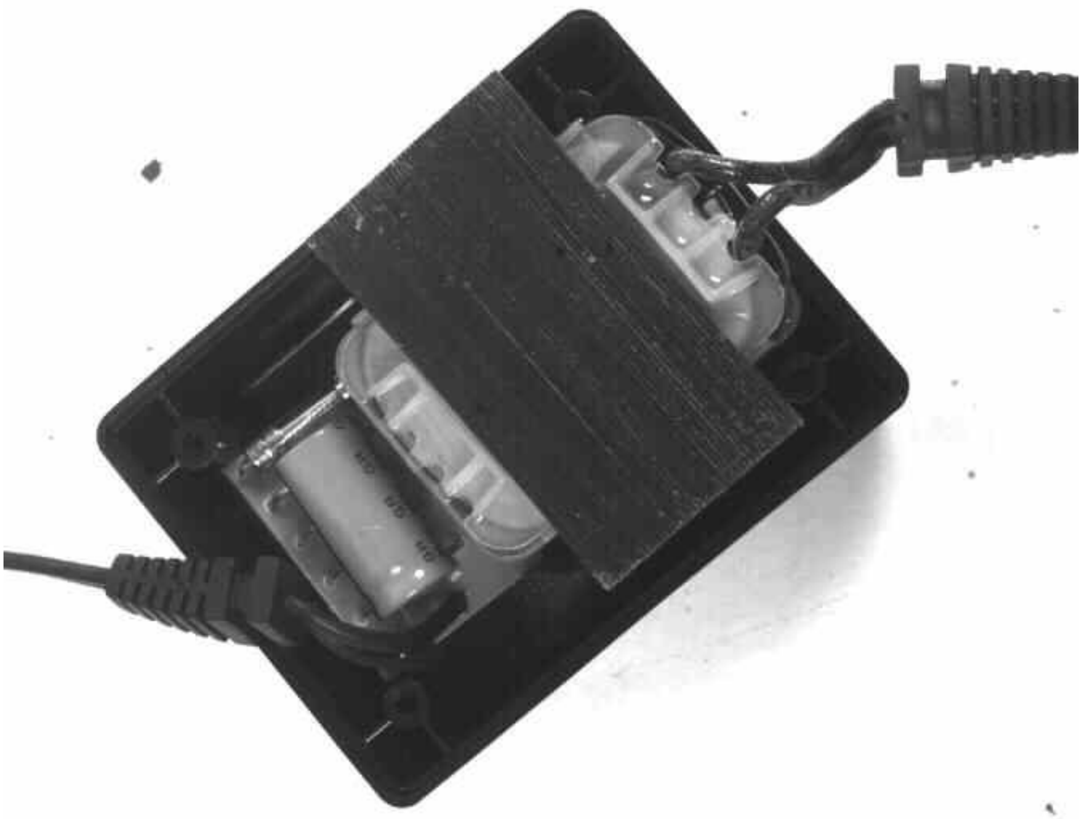

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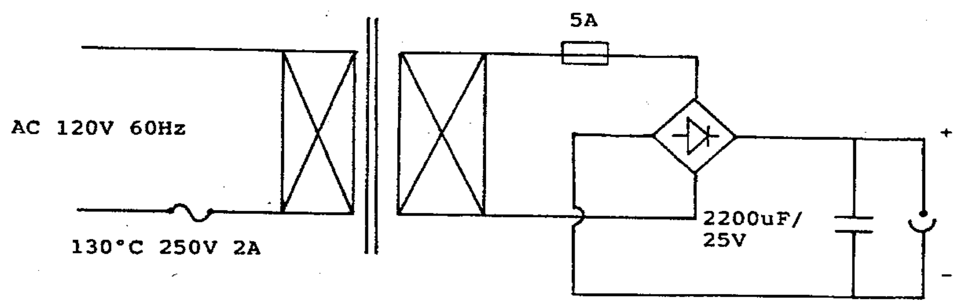
SCHEMATIC DIAGRAM

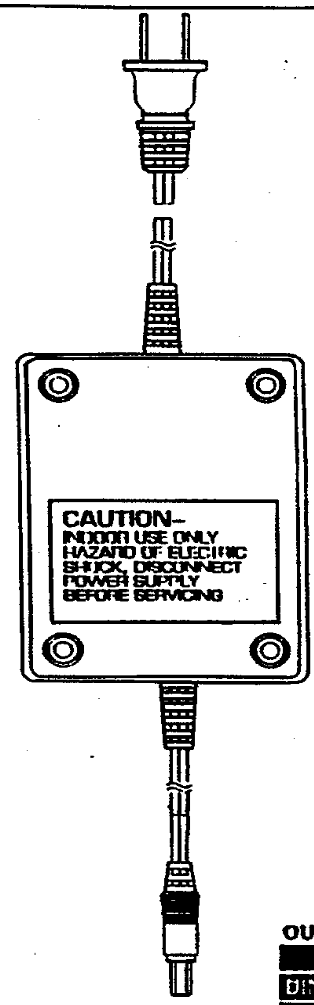
Model: GP57151800D **Description:** AC120V 60Hz/DC 15V 1800mA **Date:** Oct. 14, 96.

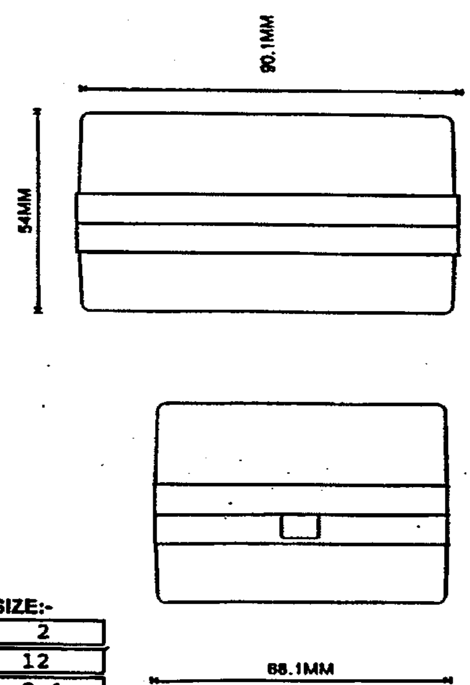


MECHANICAL SPECIFICATION	
STANDARD:	
APP. MODEL:	
MODEL:	GP57151800D
INPUT:	AC 120 V
	60 Hz
	VA 35 W
OUTPUT:	15 V
	1800 mA
CORE SIZE:	EI- 57

All Dimension in MM

Tolerance +/- 1mm



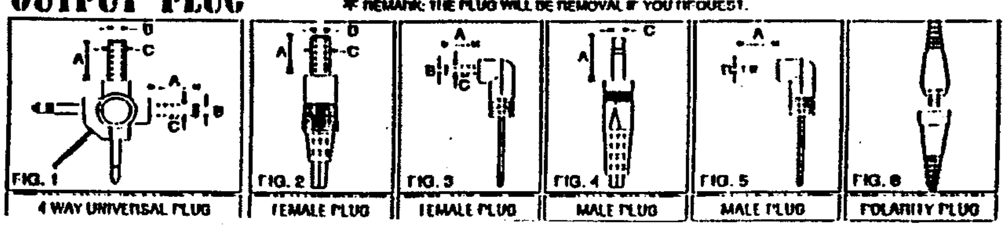


OUTPUT PLUG SIZE:-

FIGURE:		2
DIMENSION:	A:	12
	B:	2.1
	C:	5.5

OUTPUT PLUG

* REMARK: THE PLUG WILL BE REMOVAL IF YOU REQUEST.



T E S T R E C O R D N O. 1

SAMPLES:

Samples as indicated below were submitted by the manufacturer. Each was representative of the constructed described in the preceding section of this Report and the following tests were conducted. Test results relate only to items tested.

Power Supply Model GP57151800D

Due to similarity with other Listed products, only he following tests were considered necessary.

General - Unless otherwise specified in the individual test methods and results, the units were operated as follows:

Supply Circuit - The units were connected to a 15 A branch circuit supply adjusted to provide 120 V, 60 Hz.

Normal Load - Each dc output was loaded with a 10,000 uF capacitor in parallel with a variable resistor adjusted to result in the rated output current, 15 V output - 1.8 A

For tests which reference exposed conductive surfaces or accessible dead metal, the conductive surfaces consisted of metal foil with an area of 10 by 20 cm (3.94 by 7.8 in), or the same size of the surface if the surface was less than 10 by 20 cm, wrapped around the enclosure.

LEAKAGE CURRENT TEST:

METHOD A

An as received sample was connected in accordance with the circuit described in Fig. 24.1 of the Standard for Class 2 Power Units, UL 1310, Third Edition. Under normal load conditions the leakage current was measured:

(a) between exposed conductive surfaces and the grounded pole of the supply circuit.

(b) between output circuits and the grounded pole of the supply circuit.

(c) between output circuits and exposed conductive surfaces.

(d) with output circuits conductively connected to exposed conductive surfaces, between output circuits/exposed conductive surfaces and the grounded pole of the supply circuit.

METHOD B

Method A was repeated after the sample had been conditioned at 88 ± 2 percent relative humidity at a temperature of 32 ± 2°C (89.6 ± 3.6°F) for 48 h.

RESULTS A and B

Model GP57151800D		Measured Leakage Current, uA							
		Switch 2, Position 1				Switch 2, Position 2			
Condition	Switch S1	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
As received	Open	3.5	2.9	-	3.6	3.5	2.93	-	3.6
	5 s - 10 min	1.85	1.53	-	1.8	2.1	1.6	-	2.1
	10 min-thermal stability	1.34	3.2	-	3.5	2.7	3.3	-	3.7
Humidity	Open	1.6	2.5	-	3.2	1.8	2.5	-	3.2
Conditioned	5 s - 10 min	1.3	1.6	-	1.8	2.2	1.7	-	2.3
	10 min-thermal stability	1.7	2.7	-	3.0	1.7	3.5	-	3.9

RESULTS

The maximum measured leakage current did not exceed the allowable 0.5 mA rms for a portable unit.

DIELECTRIC VOLTAGE WITHSTAND TEST FOLLOWING LEAKAGE CURRENT TEST:

METHOD

One min following the preceding Leakage Current Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

MAXIMUM OUTPUT VOLTAGE TEST:

METHOD A

The maximum peak and rms output voltage under any load condition, including open-circuit, between any two output terminations were measured and recorded below.

RESULTS A

		Maximum Voltage Measured	
Model	Output Terminations Measured	Peak	rms
GP57151800D	Output	-	19.6 V

The output voltage did not exceed 42.4 V peak for sinusoidal or nonsinusoidal ac.

NORMAL INPUT TEST:

METHOD

Each load was adjusted to result in normal load conditions. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input		Marked Rated Input
Model	Volt	mA	Watt	(W)
GP57151800D	120	396	36.6	35

The marked rated input power is at least 90% of the measured input.

MAXIMUM INPUT TEST:

METHOD

Each DC output was connected to a 10,000 uF capacitor in parallel with a variable resistor.

Each load was adjusted, including short circuit, to result in maximum primary input current to the sample. Without further load adjustment, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the primary input current to the sample was measured 15 s after application of voltage to the primary.

RESULTS

		Measured Input	
Model	Volt	Ampere	Watt
GP57151800D	120	2.02	222

The maximum input power did not exceed 660 watts.

TRANSFORMER CHARACTERISTICS TEST:

METHODS A, B and C

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the thermal protector was shorted.

METHOD A

With all secondary circuits disconnected, the secondary under test was open circuited and the voltage was measured.

METHOD B

With all secondary circuits disconnected, the secondary under test was resistively loaded, including short circuit, to result in maximum secondary current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD C

With all secondary circuits disconnected, the secondary under test was resistively loaded to result in maximum secondary power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the secondary power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS

Model	Output Measured	V, rms	Current (A) (mA)	Power, W
GP57151800D	Secondary	15.12	14.0	44

For not inherently limited secondaries:

The maximum secondary current and power did not exceed 1000/V_{max} A and 250 W, respectively, for outputs with a maximum voltage of 20 V.

There was no charring, glowing, or flaming of the cheesecloth.

OUTPUT CURRENT AND POWER TEST:

METHODS A and B

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the fuse was shorted.

METHOD A

The output under test was resistively loaded, including short circuit, to result in maximum output current. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the output current was monitored for 60 s after application of voltage to the primary. The current at 60 s was recorded.

METHOD B

The output under test was resistively loaded to result in maximum output power as determined by a watt meter. Without further adjustment of the load, the supply circuit was de-energized and the sample was allowed to cool to room temperature. The supply circuit was then re-energized and the output power was monitored for 60 s after application of voltage to the primary. The power at 60 s was recorded.

RESULTS A and B

Model	Output Measured	Current, (A) (mA)	Power, W
GP57151800D	Secondary	5	56

For not inherently limited outputs:

The maximum output current and power did not exceed 1000/V_{max} A and 350 W, respectively, for outputs with a maximum voltage of 20 V.

There was no charring, glowing, or flaming of the cheesecloth.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT CURRENT AND POWER TEST (NOT INHERENTLY LIMITED UNITS):

METHOD

One min following the preceding Output Current and Power Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

500 V ac between secondary circuits and exposed conductive parts.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

CALIBRATION OF OVERCURRENT PROTECTION DEVICES TEST (NOT INHERENTLY LIMITED UNITS):

METHODS A and B

During these tests each direct plug-in unit was draped with a double layer of cheesecloth and the grounding means was connected to ground through a 3 A nontime-delay fuse.

METHOD A

The output under test was resistively loaded to deliver the current indicated under RESULTS A below. The load was continuously adjusted for two min or until the protection device operated, whichever occurred first, to maintain the current value during the test.

METHOD B

The output under test was resistively loaded to deliver the current indicated under RESULTS B below. After 15 min the load was adjusted to result in the original value. Without further load adjustment the unit was continuously operated for 60 min or until the protection device operated, whichever occurred first.

RESULTS A

Model	Output Tested	Output Currents, A	Time for Protective Device to Operate, min:s
GP57151800D	-	10	Less than 5 s

RESULTS B

Model	Output Tested	Output Currents, A	Time for Protective Device to Operate, min:s
GP57151800D	-	6.25	8 s

The protection device operated within the time specified in UL 1310 Table 29.1. During Method B the protection device operated within 60 min.

During Method A the protection device operated within 2 min. There was no indication of emission of flame or molten metal. There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock. The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER CALIBRATION OFOVERCURRENT PROTECTION DEVICES TEST:

METHOD

One minute following the preceding Calibration of Overcurrent Protection Devices Test, the following potentials were gradually applied and maintained for one min. 1240 V ac between primary circuits and exposed conductive surfaces. 1240 V ac between primary and secondary circuits.RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.FULL-LOAD OUTPUT CURRENT TEST:

METHOD

Each output was loaded to result in normal load. At 15 min of operation each load was readjusted, if necessary, to result in normal load. Without further load adjustment the test was continued for one h. At one h the output load was measured.

RESULTS

Model	Output Current Rating, Ampere	Output Current Rating, at 1 h, (A)
GP57151800D	1.8	1.6

The output current at one h was at least 90% of the rated value.

NORMAL TEMPERATURE TEST:

METHOD

Each direct plug-in unit was tested in both the horizontal and vertical positions.

RESULTS

Model GP57151800D

Thermocouple Locations	Maximum Temperatures, °C Horizontal
Transformer Primary Winding, Top	81
Transformer Secondary Winding, Top	73
Transformer Core, Top	78
Enclosure Inside Surface Near Transformer	75
Enclosure Outside Surface, Near Transformer	57
Printed Wiring Board Near Diode	71
Ambient	24
Test Duration, h:min	5 h

DIELECTRIC VOLTAGE WITHSTAND TEST:

METHOD

One min following the preceding Normal Temperature Test, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

500 V ac between secondary circuits and exposed conductive parts.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

INDUCED POTENTIAL TEST: METHOD While in a heated condition representative of transformer temperatures attained in the preceding Normal Temperature Test the unit was subjected to an alternating potential of twice the rated primary winding voltage applied across the primary winding for 7200 cycles if the frequency was 120 Hz or more, 60 s if the frequency was less than 120 Hz.The test voltage at one-quarter or less of the full value and increased to full value in not more than 15 s. After being held for the time specified, the voltage was reduced within 5 s to one-quarter or less of the maximum value and the circuit was opened.

Model	Voltage Applied	Frequency, Hz	Observations
GP57151800D	240	120	No damage

There was no indication of breakdown.ABNORMAL TESTS: cheesecloth.The grounding means was connected to ground through a 3 A nontime-delay fuse.One minute following each test the Dielectric Voltage Withstand Test was conducted in accordance with the procedure described after the applicable test.

OUTPUT LOADING TEST - ABNORMAL:Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details. METHOD A

The output under test was short circuited and the sample was operated for 7 h or until the output current was interrupted by opening of a single operation thermal cut-off, or opening of a fuse.

METHOD B The output under test was resistively loaded to result in maximum output current as determined under the Maximum Output Current and Power Test. The sample was operated for or until the output current was interrupted by opening of a single operation thermal cut-off, or opening of a fuse.

The output under test was short circuited and the sample was operated for 7 h or until the output current was interrupted by opening of a single operation thermal cut-off, or opening of a fuse.

During this test the outer surface temperatures of the direct plug-in enclosure were measured.

METHOD C2

Since the load condition of Method B resulted in opening of a fuse, rated 5 A, the output under test was loaded to result in the fuse current noted under Results. For the condition which resulted in continuous operation, the test was continued for 7 h.

METHOD C3

Since the load condition of Method C2 resulted in opening of a thermal cutoff, the thermal cutoff was shunted and Method B was repeated with the output under test gradually loaded to result in a winding temperature of 5°C above the rated trip temperature of the protector as determined by a thermocouple attached to the winding adjacent to the protector. The unit was operated for 7 h.

RESULTS A

Model	Shorted	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/ Observations
GP57151800D	Secondary	23	23	1 s	5 A Fuse opened

RESULTS B

Model	Output Overloaded	Ambient °C	Maximum Outer Enclosure Temperature of Direct Plug-in, °C	Test Duration	Comments/ Observations
GP57151800D	Secondary	23	23	1 s	5 A Fuse opened

RESULTS C2

Model	Output Tested	Fuse Rating	Fuse Test Current	Test Duration	Comments/ Observation
GP57151800D		5 A	4.73	2-1/2 h	Thermal Devices opened

RESULTS C3

Model	Output Overloaded	Cutout Temperature Rating of Protective Device, °C	Test Temperature Measured on Winding °C	Comments/ Observations
GP57151800D	Output	130	135	Operated 7 h

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER OUTPUT LOADING TEST:

METHOD

One min following each of the preceding Output Loading Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

TRANSFORMER BURNOUT TEST (LINEAR DESIGNS)- ABNORMAL:

Refer to the ABNORMAL TESTS, GENERAL section preceding this test for additional details.

METHOD

A resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. Each sample was operated continuously for 7 h or until ultimate conditions occurred.

RESULTS

Model	Normal Input Current, A mA	Load Location	Observations
GP57151800D	.396	Secondary	Opened in 20 min, no damage

There was no indication of emission of flame or molten metal.

There was no development of openings exposing live parts posing a risk of electric shock.

The structural integrity of the direct plug-in enclosure was such that the unit could be removed from the receptacle without deformation of the enclosure posing a risk of electric shock.

The 3 A ground fuse remained intact.

DIELECTRIC VOLTAGE WITHSTAND TEST AFTER TRANSFORMER BURNOUT TEST:

METHOD

One min following each of the preceding Transformer Burnout Tests, the following potentials were gradually applied and maintained for one min.

1240 V ac between primary circuits and exposed conductive surfaces.

1240 V ac between primary and secondary circuits.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one min without indication of breakdown.

STRAIN RELIEF TEST:

METHOD

With internal connections disconnected, the supply cord was subjected to a 35 lb pull for one min at the angle indicated under Results.

With internal conFile
E468713 Page T- of Issued: 1997-07-14

RESULTS

Supply Cord Strain Relief

Model	Angle of Pull	Observations
GP57151800D	90°	No displacement

Output Cable Strain Relief

Model	Angle of Pull	Observations
GP57151800D	90°	No displacement

IMPACT TEST: (Cord Connected Unit)

METHOD

Each sample was subjected to an impact of 5 ft-lb using a 2 in. diameter steel ball weighing 1.18 lb dropped through a distance of 51 in. Following the impacts each sample was examined for exposure of live parts.

Following the impacts each sample was subjected to a 1240 V dielectric test between primary circuits and accessible dead metal parts.

RESULTS

Model	Area Tested	Observations
GP57151800D	Top Side	No Damage

There was no shattering, cracking, or other damage to the enclosure that would expose internal wiring or live parts.

MOLD STRESS RELIEF DISTORTION TEST:

METHOD

A sample of each model indicated below was placed in a 70°C oven for a period of 7 h. Upon removal each was examined for evidence of softening, cracking, warping or distortion. Each was also examined for exposed uninsulated live parts. After cooling to room temperature, The Strain Relief Test was repeated.

RESULTS

Model	Observations
GP57151800D	No displacement

There was no softening, cracking, warping or other damage to the enclosure that would expose internal wiring or live parts.

STRAIN RELIEF TEST AFTER MOLD STRESS RELIEF DISTORTION TEST:

METHOD

With internal connections disconnected, the supply cord was subjected to a 35 lb pull for one min at the angle indicated under Results.

With internal connections intact, the output cable was subjected to a 20 lb pull for one min at the angle indicated under Results.

RESULTS

Supply Cord Strain Relief

Model	Angle of Pull	Observations
GP57151800D	90°	No displacement

Output Cable Strain Relief

Model	Angle of Pull	Observations
GP57151800D	90°	No displacement

R E P L A C E M E N T P A G E

The above Test Record has been deleted from this Report.

CERTIFICATE OF COMPLIANCE

Certificate Number	20140626-E468713
Report Reference	E468713-20021212
Issue Date	2014-JUNE-26

Issued to: DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY

NO 1 SHI TANG BEI ST 2 SHI JIE TOWN DONG GUAN CITY GUANGDONG 523290 CHINA

This is to certify that representative samples of DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

Model GPU411200500CD00

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: Class 2 Power Units, UL 1310

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark should be considered as being covered by UL's Listing and Follow-Up Service.

The UL Listing Mark generally includes the following elements: the symbol UL in a circle: with the word “LISTED”; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

December 12, 2002

REPORT

On

DIRECT PLUG-IN AND CORD CONNECTED CLASS 2 POWER UNITS

Dong guang shi jie hua xu electronics factory
Guangdong 523290 china

DESCRIPTION

PRODUCT COVERED:

USL – Class 2 power supply, Model GPU411200500CD00.

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

The transformer covered by this report consists of inherently limited cord connected Class 2 transformer.

The unit consists of a transformer and other related Class 2 electronic circuitry housed in a thermoplastic enclosure. The transformer secondary winding is connected to external load via an output cord and a non-standard polarized connector. Power supply cord with non-polarized parallel type blades is provided for insertion in a standard 15 A, 125 V receptacle.

The unit does not include grounding connection, and has no user accessible metal parts which are likely to become energized. The unit is intended for dry location use only.

USL indicates investigation to the Standard for Class 2 Power Units, UL 1310, Fifth Edition.

ELECTRICAL RATINGS:

	Input			Output	
Model	Vac	Hz	Watt	Vdc	mA
GPU411200500CD00	120	60	13	12	500

CONSTRUCTION DETAILS:

Section General - The following construction items are described in Section General.

Abbreviations	Class 2 Secondary Circuit Spacings
Markings	Printed Wiring Boards
Spacings	Electrical Connections
Segregation	Corrosion Protection

Illustrations - The following illustrations are included in this report.

Description	ILL. Number
Electrical Schematic (Not for Field Representative's Use)	1
Transformer Primary Insulation System	2
Insulation between Primary Winding and Core and between Primary Winding to Secondary Winding	3

General - The general design, shape, and arrangement shall be as illustrated in the following figures, except where variations are specifically described.

CLASS 2 TRANSFORMER, MODEL GPU411200500CD00 - FIG. 1

General – Fig. 1 shows the overall view of Model GPU411200500CD00.

1. Enclosure Base – R/C QMFZ2, GE Plastics Americas. (E121562), Type 241R, rated V-2. Overall 74.7 by 50 by 19.8 mm high, 2.4 mm thick. Provided with a 10 by 9.5 mm cutout for Power Supply Cord exit and a 7 by 6.4 mm cutout for Output Cord exit. Secured to Enclosure Cover by ultrasonic welding.

2. Enclosure Cover - Same material as Enclosure Base. Overall 74.7 by 50 by 22.9 mm high, 2.3 mm thick.

3. Power Supply Cord - Listed, Type SPT-2, No. 18 AWG X 2C, rated minimum 150 V, 60°C. Minimum 0.91 m external length when measured from cord exit to fact of attachment parallel plug. One end terminated in an attachment plug with non-polarized blades, and the another end is mechanically connected to Primary Winding prior to soldering.

4. Power Supply Cord Strain Relief Bushing – PVC, molded with Power Supply Cord, overall 37.2 mm long with a 12.6 by 13.2 by 3.1 mm stopper. Provided with a 9.3 by 7.6 by 3 mm neck fitted into a "U" shaped slot in Enclosure Base.

5. Output Cord – PVC, two-conductor, No. 24 AWG. Provided with minimum 0.33 mm thick thermoplastic insulation on each lead. Minimum 1.8 m combined external length for Power Supply Cord and Output Cord. One end mechanically connected to PWB prior to soldering and the other end terminates in a non-standard polarized connector. Portion between Output Cord Strain Relief Bushing and PWB are covered by a heat-shrinkable tubing, R/C YDPU2, rated minimum 150 V and minimum 80°C.

6. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, overall 29.8 mm long with a 12 by 8.8 by 2.6 mm stopper. Provided with a 6.6 by 4 by 3.2 mm neck fitted into a "U" shaped slot in Enclosure Base.

CLASS 2 TRANSFORMER, MODEL GPU411200500CD00 - FIG. 2

General – Fig. 2 shows the internal view of Model GPU411200500CD00.

1. Transformer – Fitted to Enclosure Base, Fig. 1, Item 1, by integral ribs and future secured between Enclosure Base and Enclosure Cover. See ILL. 2 for primary insulation system. Constructed as follows:

A. Core - Laminated steel, 41 by 33 by 19 mm.

B. Primary Winding - Enameled copper wire, 0.15 mm diameter, 1300 turns. Both end connected to Power Supply Cord.

C. Secondary Winding - Enameled copper wire, 0.45 mm diameter, 145 turns. Terminated to PWB.

D. Bobbin – Three flange type. R/C QMFZ2, EI Dupont De Nemours & Co Inc (E41938), Type 101, rated V-2.

E. Thermal Cutoff – R/C XCMQ2, Uchihashi Estec Co Ltd. (E50082), Type G33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

Alternate - Same as above except for R/C XCMQ2, Joint Force Metal Research & Co. (E142267), Type M33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

F. Primary Outer Wrap - Two layers of polyester tape, each measures 0.05 mm thick, and one layer of fiber board, measures 0.4 mm thick.

G. Primary to Secondary Insulation - One layer of Bobbin, 1.3 mm thick. In addition, two layers of polyester bent up tape, each measures 0.05 mm thick, is provided on all four sides of Bobbin in order to provide the minimum 1.6 mm over-surface spacing between Primary Winding and Secondary Winding. See ILL. 3 for details.

H. Primary Winding to Core Insulation (Top) – One layer of Bobbin, measures 0.95 mm thick.

I. Primary Winding to Core Insulation (Center) - One layer of Bobbin, measures 1.1 mm thick.

J. Primary Winding to Core Insulation (Sides) – Seven layers of polyester tape, each measures 0.05 mm thick. In addition, one layer of C-shaped polyester window tape, measures 0.05 mm thick, is provided on each longer side of Bobbin in order to provide minimum 1.6 mm over-surface spacing between Primary Winding and Core. See ILL. 3 for details.

K. Primary Lead connection to Adjacent Winding Insulation - Five layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

L. Thermal Cutoff Splice Connection to Adjacent Winding Insulation - Six layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

M. Thermal Cutoff Body to Primary Winding Insulation – Three layers of polyester tape, each measure 0.05 mm thick.

N. Crossover Insulation – Three layers of polyester tape, each measure 0.05 mm thick.

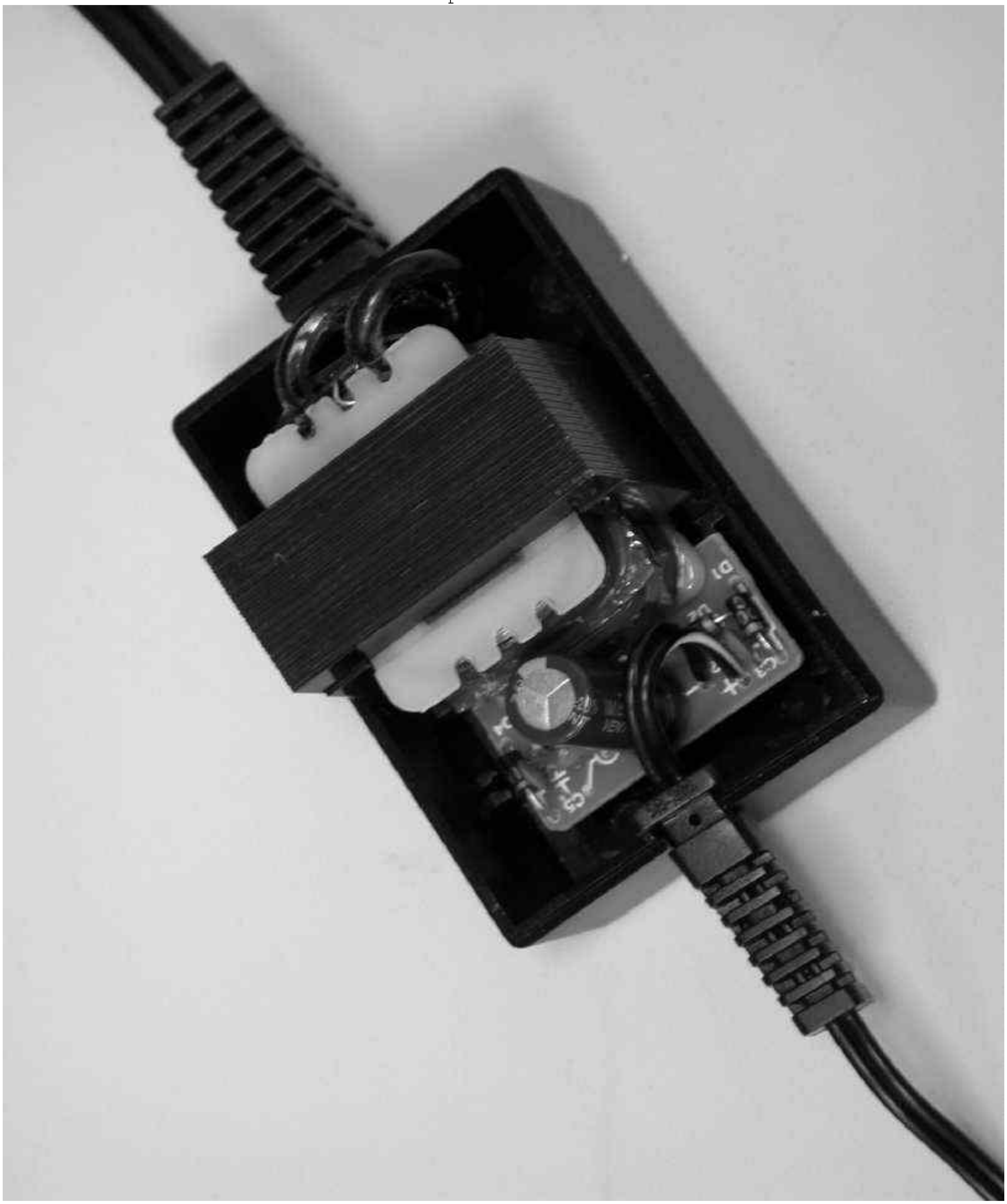
2. Printed Wiring Board (PWB) – R/C ZPMV2, rated minimum HB, 105°C. 35 by 18 mm.

3. Diodes – Four provided, Type 1N4001. Mechanically secured before soldering onto PWB.

4. Electrolytic Capacitor – Rated minimum 85°C. Mechanically secured before soldered onto PWB.


Good Power Electronics Ltd.
MODEL :
INPUT : 120V 60 Hz W
OUTPUT : AC/DC 12 V
mA

N141176805



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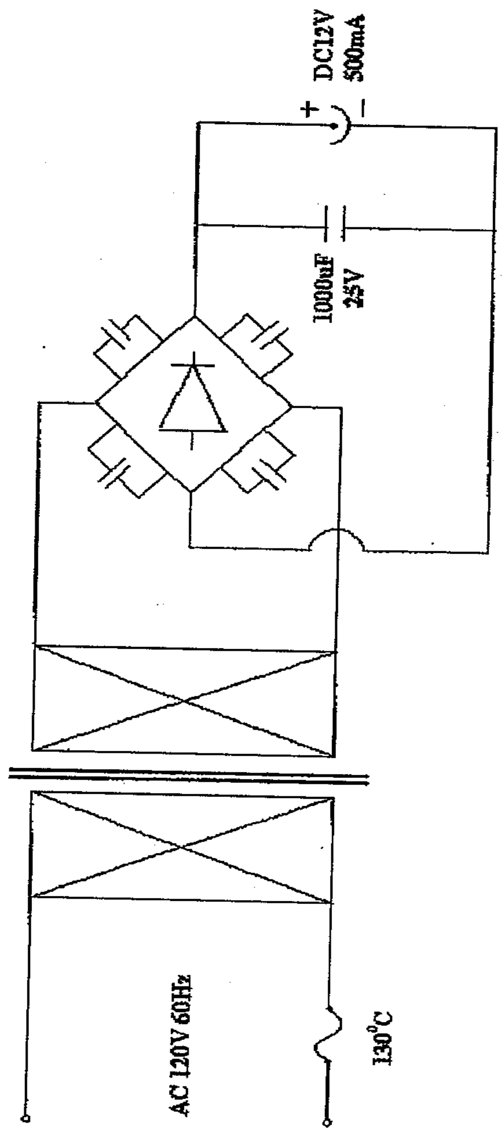
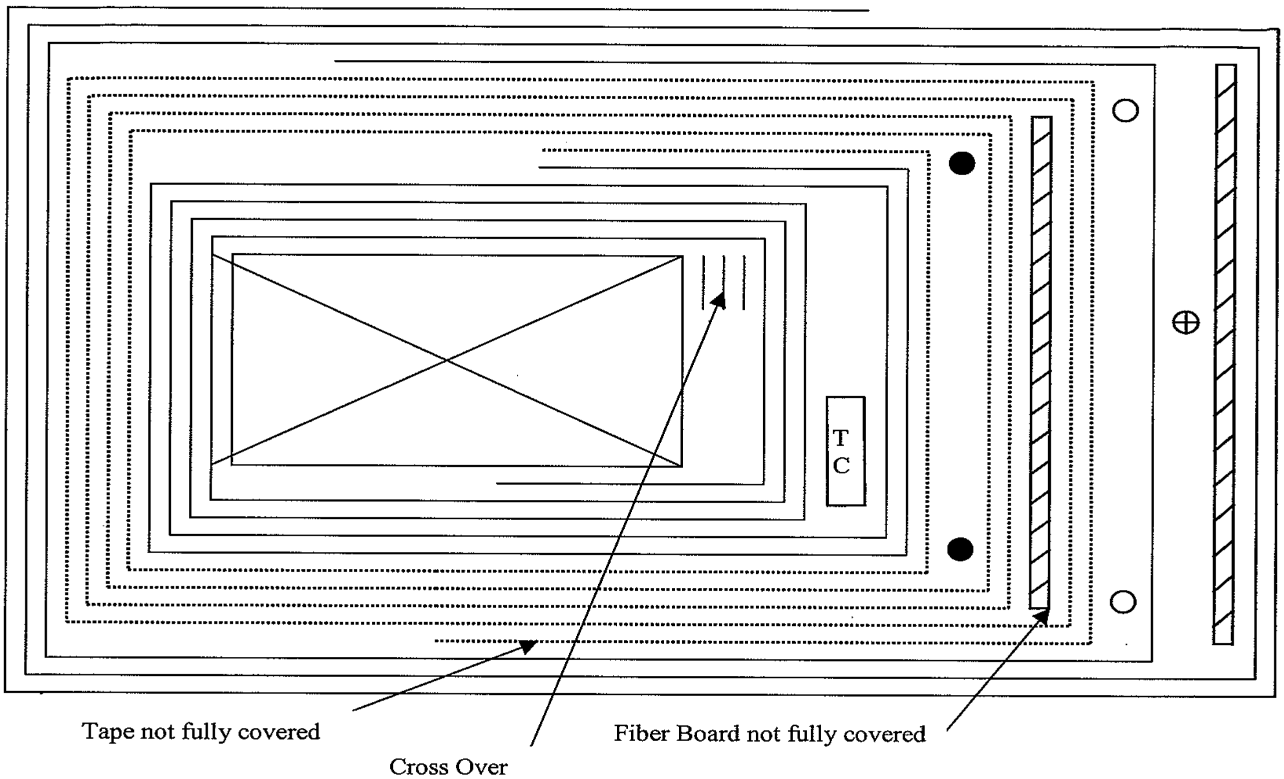

DC12V
500mA
+
-
1000uF
25V
AC 120V 60Hz
130°C

Transformer Insulation System Construction

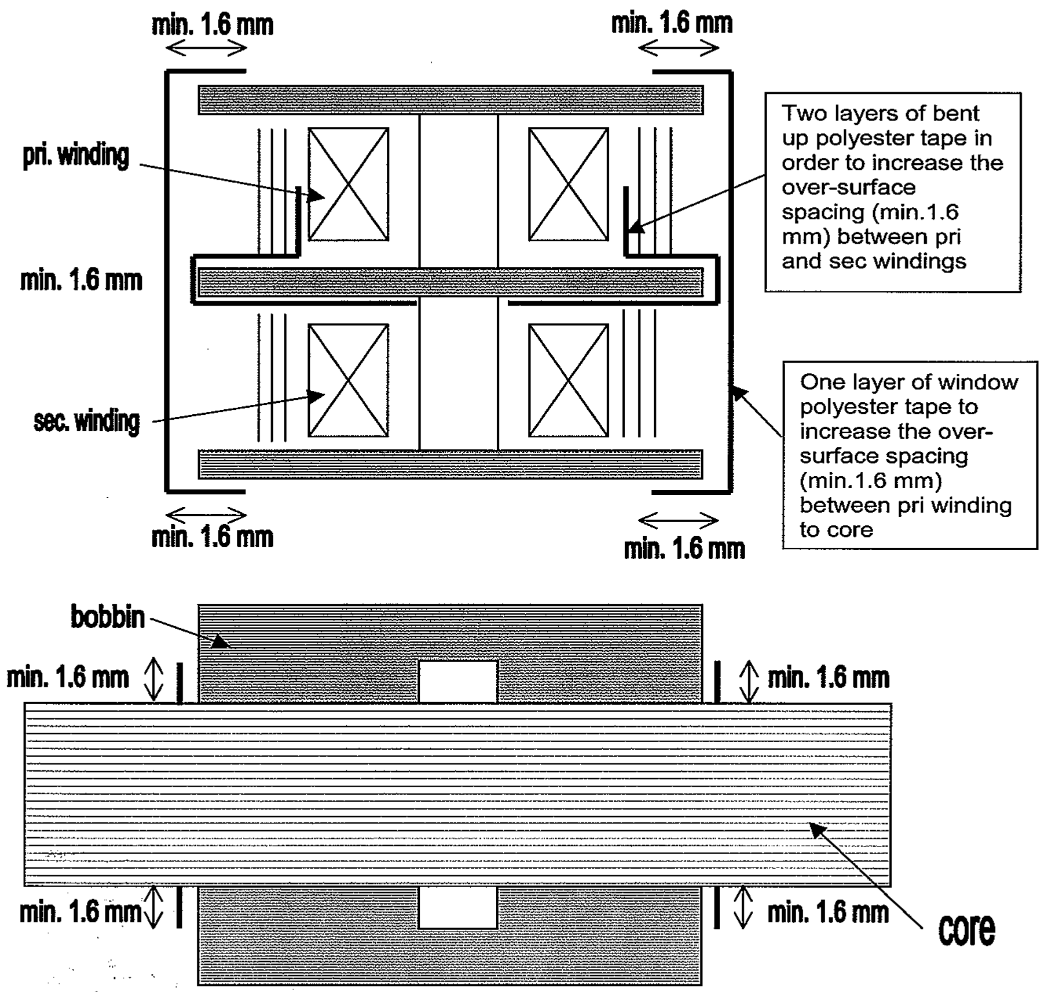
Model No.: GPU411200500CD00 **Primary Winding Insulation System**



Legen	**Symbol**
Polyester Tape (P) – 0.05 mm thick	———
Fiber Board (F) – 0.4 mm thick	▨
Splice Connection	○
Lead Wire	●
Thermal Cutoff Splice Connection	⊕
Thermal Cutoff	TC
Winding and Bobbin	⊠

Core Size: 41 by 33 by 19.6 mm

Primary to Secondary Windings
and
Primary Winding to Core Insulations



TEST RECORD NO. 1

GENERAL:

The test results reported relate only to the items tested.

SAMPLES:

Samples of cord connected Class 2 transformer, Model GPU411200500CD00, were submitted by the applicant and subjected to a test program as outlined below.

The testing was performed in accordance with the Standard for Class 2 Power Units, UL 1310, 4th edition, with revision pages dated October 22, 2001.

Only limited tests were deemed necessary due to similarity to previously tested construction of Class 2 transformer under File E140329, Vol. 1, Sec. 1. See File E140329, Report issued 1991-10-09, Test Record Nos. 1-6.

TEST GENERAL:

Unless specified otherwise, all tests were conducted with a 120 Vac, 60 Hz supply source. The loading for use in the Normal Temperature Test was variable resistor connected in parallel with a 10,000 microfarad capacitor.

For all tests in which the units were energized from a source of supply:

- the receptacle was mounted on a nonmetallic outlet box having a volume of not more than 12 $in.^3$,
- the unit was operated from a 15 A duplex receptacle with a nonmetallic faceplate,
- the outlet box was mounted in a 3-1/2 in. thick wall section with plywood or gypsum wall board surfaces and loosely filled with fiberglass insulation.
- the branch circuit protection was rated 15 A,
- the tests marked with an asterisk (#) were conducted in an ambient air temperature range of 21-30°C, except for the Normal Temperature Test which might be conducted in an ambient air temperature range of 10-40°C when no overtemperature protectors were provided.

Electrical Ratings - The units are rated as follows:

	Input			Output (dc)	
Model	Volt.	Hertz	Watt	Volt.	Milli-ampere
GPU411200500CD00	120	60	13	12	500

LEAKAGE CURRENT TEST:

METHOD I

One sample was connected to a 120 V, 60 Hz sinusoidal source of supply. The output was connected with a resistive load which was adjusted to draw the rated output in watts or volt-amperes at the rated voltage. Tests were conducted with the unit under normal load conditions through the test circuit described in Figure 24.1 of the Standard for Class 2 Power Units, UL 1310. The leakage current was measured between exposed conductive surfaces (+), including output terminals, and the grounded pole of the supply circuit. The measurements were made from these surfaces or locations individually as well as collectively where simultaneously accessible, and from one surface to another where simultaneously accessible, except not from one output terminal to another.

(+) - For the purpose of this test, the conductive surfaces consisted of metal foil with an area of 10 by 20 cm (3.94 by 7.88 in.), or the same size as the surface of the enclosure if the surface was less than 10 by 20 cm, wrapped around the enclosure.

One minute after the test, the sample was subjected to the following Dielectric Voltage Withstand Test.

METHOD II

The foregoing test was repeated after the sample had been conditioned at 88 ± 2 percent relative humidity at a temperature of 32.0 ± 2°C (89.6 ± 3.6°F) for 48 hours.

One minute after the test, the sample was subjected to the Dielectric Voltage Withstand Test.

RESULTS I & II

The maximum measured leakage current was less than 0.5 mA.

DIELECTRIC VOLTAGE WITHSTAND TEST (AFTER LEAKAGE CURRENT TEST):

METHOD

One minute following the preceding Leakage Current Test, the following 60 Hz potentials were applied for 1 minute:

A. 1240 V between primary current-carrying parts and exposed dead-metal parts (+),

B. 1240 V between primary and secondary current-carrying parts,

C. 500 V between secondary current-carrying parts and dead-metal parts (+).

(+) - Enclosure wrapped in foil

RESULTS

The spacings and insulation withstood the application of the specified potentials for one minute without breakdown.

MAXIMUM OUTPUT VOLTAGE TEST:

METHOD

One sample was connected to a 120 V, 60 Hz source of supply. The maximum output voltage under any load condition including no load was measured and recorded below.

RESULTS

Model	Maximum Measured Voltage, Vdc
GPU411200500CD00	17.50

The measured output voltage did not exceed 60 V dc.

OUTPUT CURRENT AND POWER TEST #

METHOD

A sample was connected to a 120 V, 60 Hz source of supply and was drapped with a double layer of cheesecloth. A variable resistive load was connected to the output and adjusted to obtain the maximum output current. With no further adjustment of the load, the sample was de-energized and cooled to room temperature. The sample was then energized and the maximum current was measured at 5 seconds and 60 seconds.

The above procedures were repeated to measure the maximum output power at 5 seconds and 60 seconds.

RESULTS

Model	Output				
	Maximum Current, A		Maximum Power, VA		Vmax, Vdc
	at 5 s	at 60 s	at 5 s	At 60 s	
GPU411200500CD00	3.07	2.61	9.90	9.33	17.50

The maximum output current and the maximum output power at 60 seconds were less than 8 A and 100 VA respectively.

There was no emission of flame or molten metal from the enclosure. There was no charring, glowing, or flaming of the cheesecloth. No openings developed in the enclosure that exposed live parts having a potential higher than 42.4 V peak. The branch circuit protection did not open.

NORMAL TEMPERATURE TEST: #

METHOD

A sample was connected to a 120 V, 60 Hz supply. The output was connected to a load adjusted to result in the rated output current. After 15 minutes of operation, the resistor was readjusted to return the output current to the original value. The sample was operated continuously under this condition until temperatures on the unit became constant.

Temperatures were measured by means of thermocouples secured by solder, tape, or water glass. Transformer primary temperatures were measured by the change--of-resistance method.

Test was conducted in counter top position.

NORMAL TEMPERATURE TEST: # (CONT'D)

RESULTS

Model: GPU411200500CD00

Location of Thermocouples	Maximum Temperature °C Mounting Position Counter Top
Room Ambient	22
Transformer primary winding (+)	81
Transformer secondary winding, Input Side	71
Transformer secondary winding, Output Side	79
Core	73
Enclosure inside, front, under core	53
Enclosure inside, side near core	50
Enclosure inside, above core	54
Enclosure outside, top, above core	53
Enclosure outside, side	43
Enclosure outside, rear	54
Power supply cord at transformer entry	47
Output cord at PWB exit	58
PWB, under diode	74
Diode	70
Capacitor	70
Test duration, hours	5

(+) - Measured by change-of-resistance method.

The temperature rises for all the components indicated above did not exceed the maximum allowable values.

DIELECTRIC VOLTAGE WITHSTAND TEST (AFTER NORMAL TEMPERATURE TEST):

METHOD

One minute following the preceding Normal Temperature Test, the following 60 Hz potentials were applied for one minute:

A. 1240 V between primary current-carrying parts and exposed dead-metal parts (+),

B. 1240 V between primary and secondary current-carrying parts,

C. 500 V between secondary current-carrying parts and dead-metal parts (+).

(+) - Enclosure wrapped in foil.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 minute without indication of breakdown.

OUTPUT LOADING / OUTPUT SHORT CIRCUIT TEST: #

GENERAL

Each sample was connected to a 120 V, 60 Hz supply and the output was loaded as described in each individual method.

Unless otherwise specified in each individual test method, each sample was subjected to the following Dielectric Voltage Withstand Test one minute after each test method.

METHOD A

The output (under test) was short circuited. The test was continued until the output current was interrupted by opening of a winding, or opening of the thermal cutoff. The time for the interruption to occur was recorded.

If this test resulted in 7 hours of continuous operation without the operation of any protective device, no further tests were conducted.

OUTPUT LOADING TEST / OUTPUT SHORT CIRCUIT TEST: # (CONT'D)

RESULTS A

Model	Burnout Time	Observations
GPU411200500CD00	7 mins.	Thermal cut-off operated; no visible defects on enclosure.

There was no emission of flame or molten material. No openings developed in the enclosure that exposed live parts having a potential higher than 42.4 V peak. The branch circuit protection did not open.

METHOD B

Since short circuiting the output resulted in the opening of the thermal cutoff, the thermal cutoff was shunted and a thermocouple was attached to its body. The sample was draped with a double layer of bleached cheesecloth and connected to a 120 V, 60 Hz supply.

The output current was gradually increased until a temperature equal to the rated trip temperature of the thermal cutoff plus 5°C was reached. Without further adjustment of the load, the sample was operated for the remainder of the 7 hours period.

RESULTS B

Model	Rated Cutoff Temp. of Protective Device, °C	Test Temp., °C	Ambient, °C	Observations
GPU411200500CD00	130	135	22	No visible defects on enclosure.

There was no emission of flame or molten material. There was no charring of the cheesecloth. No openings developed in the enclosure that exposed live parts having a potential higher than 42.4 V peak. The branch circuit protection did not open.

DIELECTRIC VOLTAGE WITHSTAND TEST (AFTER OUTPUT LOADING TEST / OUTPUT SHORT CIRCUIT TEST): # (CONT'D)

METHOD

One minute following the preceding Output Loading Test / Output Short Circuit Test, the following 60 Hz potentials were applied for one minute:

A. 1240 V between primary current-carrying parts and exposed dead-metal parts (+),

B. 1240 V between primary and secondary current-carrying parts.

(+) - Enclosure wrapped in foil.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 minute without indication of breakdown.

TRANSFORMER BURNOUT TEST: #

METHOD

A sample was connected to a 120 V, 60 Hz supply. It was first operated as described in the Normal Temperature Test. It was then draped with a double layer of bleached cheesecloth, and a resistive load adjusted to obtain maximum output current but not resulting in more than three times the normal input current was connected directly across the secondary winding. The sample was operated continuously for 7 hours or until ultimate conditions occurred.

1 minute after the test, the sample was subjected to the following Dielectric Voltage Withstand Test.

TRANSFORMER BURNOUT TEST: # (CONT'D)

RESULTS

Model	Normal Input Current, mA	Test Input Current, mA	Component Burnt Out	Burnout Time	Observations
GPU411200500CD00	97.46	292.38	Thermal cutoff	10 mins.	No visible defects on enclosure.

There was no emission of flame or molten material. There was no charring of the cheesecloth. No openings developed in the enclosure that would result in exposure of live parts operating at more than 42.4 V peak. The branch circuit protection did not open.

DIELECTRIC VOLTAGE WITHSTAND TEST (AFTER TRANSFORMER BURNOUT TEST):

METHOD

One minute following the preceding Transformer Burnout Test, a 1240 V, 60 Hz alternating potential was applied between primary and secondary current-carrying parts for one minute.

RESULTS

The spacings and insulation withstood the application of the specified potentials for one minute without indication of breakdown.

STRAIN RELIEF TEST:

METHOD A

A sample was subjected to this test in the "as-received" condition. With internal connections intact, the output cord was subjected to a 20 lb pull for one minute at the most severe angle.

RESULTS A

There was no displacement of the output cord that would result in a reduction of spacings to primary or dead metal parts, or damage to the transformer or the enclosure, or interruption of the output wiring.

STRAIN RELIEF TEST: (CONT'D)

METHOD B

A sample was subjected to this test in the "as-received" condition. With internal connections disconnected, the power supply cord was subjected to a 35 lb pull for 1 minute at any angle that the strain relief permitted.

RESULTS B

There was no displacement or breakage of the power supply cord or deformation of its anchoring surface.

PUSH BACK STRAIN RELIEF TEST:

METHOD

A sample was subjected to this test. The power supply cord was held 1 inch (25.4 mm) for the point where the cord emerged from the product and was pushed back into the product. (For a removable bushing which was an integral part of the cord, the test was carried out by holding the bushing.) The cord was pushed back into the product in 1-inch (25.4 mm) increments until the cord buckled or the force to push the cord into the product exceed 6 pd-force (26.7N). The power supply cord or lead within the product was manipulated to determine compliance.

RESULTS

There was no mechanical damage or exposure of the power supply cord to a temperature higher than that for which it rated, no reduction of spacings below the minimum required values, and no damage to internal connections or components.

BALL IMPACT TEST:

METHOD

Three samples were subjected to a single impact of 5 ft-lb on any surface that exposed to a blow during intend use. The impact was produced by dropping a steel sphere 2 inches in diameter and weighing approximately 1.18 pounds from a height of 51 inches. The steel sphere was allowed to strike the surface in a location different from those in the other two impacts. For surfaces other than the top of an enclosure, the sphere was suspended by a cord and allowed to swing as a pendulum dropping through a vertical distance of 51 inches.

RESULTS

There was no shattering, cracking, or other damage to the enclosure that would expose internal wiring or live parts.

DIELECTRIC VOLTAGE WITHSTAND TEST (AFTER BALL IMPACT TEST):

METHOD

Immediately following the preceding Ball Impact Test, a 60 Hz alternating potential was applied for 1 minute in each test:

A. 1240 V between primary current-carrying parts and dead-metal parts (+),

B. 1240 V between primary and secondary current-carrying parts,

C. 500 V between secondary current-carrying parts and dead-metal parts (+).

(+) - Enclosure wrapped in metal foil.

RESULTS

The spacings and insulation withstood the application of the specified potentials for 1 minute without breakdown.

MOLD STRESS RELIEF DISTORTION TEST:

METHOD

A sample was placed in a 70°C oven for a period of 7 hours. Upon removal it was examined for evidence of softening, cracking, warping or distortion. It was also examined for exposed uninsulated live-metal parts.

RESULTS

There was no evidence of softening, cracking, warping, or any other distortion that would expose live parts or increase the fire or shock hazard of the device.

STRAIN RELIEF TEST (AFTER MOLD STRESS RELIEF DISTORTION):

METHOD

Following the Mold Stress Relief Distortion Test and after the sample had cooled to room temperature, the sample was subjected to the same Strain Relief Test which was conducted in the “as received” condition.

RESULTS

There was no displacement of the output cord that would result in a reduction of spacings to primary or dead metal parts, or damage to the transformer or the enclosure, or interruption of the output wiring.

There was no displacement or breakage of the power supply cord or deformation of its anchoring surface.

TEST ON INSULATING MATERIALS:

METHOD

Samples of the insulating materials noted under RESULTS were placed between two opposing electrodes. The electrodes were cylindrical brass rods 6.4 mm in diameter, with edges rounded to a 0.8 mm radius. The upper moveable electrode weighed between 48 and 52 grams. The ac test potential indicated under Results was applied across the electrodes for 1 second.

RESULTS

Model No. GPU411200500CD00

Insulating material	No. of layers	Test potential, Vac
Polyester Tape	1	2500
Polyester Tape	5	5000

There was no indication of dielectric breakdown.

CONCLUSION

Samples of the product covered by this Report have been found to comply with the requirements covering the category and the product is judged to be eligible for Listing and Follow-up Service. The manufacturer is authorized to use the UL Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the UL Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:
JIMMY LAM
Engineer
Conformity Assessment Services
UL International Ltd.

Reviewed by:
KENNY POON
Project Engineer
Conformity Assessment Services
UL International Ltd.

Pursuant to the Corporate Services Agreement between UL International Limited and Underwriters Laboratories Inc.("UL"), UL hereby accepts and issues this report.

CERTIFICATE OF COMPLIANCE

Certificate Number	20140627-E468713
Report Reference	E468713-20031211
Issue Date	2014-JUNE-27

Issued to: DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
NO 1 SHI TANG BEI ST 2, SHI JIE TOWN,
DONG GUAN CITY, GUANGDONG 523290 CHINA.

This is to certify that representative samples of DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS
USL, CNL– Class 2 power supply, EI-57 Series

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1310, Standard for Class 2 Power Units.
CSA C22.2 No. 223-M91 , Standard For Power Supplies with Extra Low-Voltage Class 2 Outputs.

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.
The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers: c UL us the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

December 11, 2003

REPORT

On

DIRECT PLUG-IN AND CORD CONNECTED CLASS 2 POWER UNITS

DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
GUANGDONG 523290 CHINA

PRODUCT COVERED:

USL, CNL– Class 2 power supply, EI-57 AC/DC. Direct plug in or table top. (refer to nomenclature)

GENERAL:

The transformers covered by this report consists of inherently and non- inherently limited Class 2 transformer.

The unit consists of a transformer and other related Class 2 electronic circuitry housed in a thermoplastic enclosure. The transformer secondary winding is connected to external load via an output cord and a non-standard polarized connector.

The unit does not include grounding connection, (Optional) and has no user accessible metal parts which are likely to become energized. These units are intended for dry location use only.

USL Indicates investigation to the Standard for Class 2 Power Units, UL 1310, Fifth Edition.

CNL Indicates investigation to C22.2, No. 223, the Canadian Standard For Power Supplies with Extra Low-Voltage Class 2 Outputs.

ELECTRICAL RATINGS: Input 120V AC 60 Hz 50W MAX.

Output: Nomenclature: GPU XX XXX XXXX X X X X

1. Size of adaptor (EI57)

2. Output Voltage- First 2 digits will be the whole value of the voltage and the last digit is the value of the decimal. 12 (12 V) 125 (125 V) 060 (6 V) (6V – 24 V).

3. Output Current. (500 mA – 3000 mA)

4. Type of plug in W (wall plug), C (desktop, G (ground pin)

5. DC/AC- D-(DC Output), A- (AC Output)

6. Special function of adaptor- O (adaptor) X (special)

7. Unregulated/Regulated- O (unregulated) R (Regulated) S (Switching)

CONSTRUCTION DETAILS:

Section General - The following construction items are described in the Section General.

Markings	Printed Wiring Boards
General	Internal Wiring
Blades	Electrical Connections
Spacings	Corrosion Protection
Segregation	Instruction Manual

Instruction Manual – For direct plug-in units only. See Section General, Instruction Manual.

CLASS 2 POWER UNIT, EI57 SERIES - FIG. 1 (M030041518)

General – Fig. 1 shows the internal view of power supply.

1. Enclosure Base & cover–QMFZ2, GE Plastics. Lexan,241R rated V-0. Overall 99.0 by 67.0 by 54.0 mm, 2.43 mm thick. Secured to Enclosure Cover by ultrasonic welding.

2. Power Supply Cord For Desktop units only- Listed, Type SPT-2, No. 18 AWG, rated 105°C. Minimum 1.8 m. One end terminated in an attachment plug with non-polarized blades, and the another end is mechanically connected to Primary Winding prior to soldering.

3. Output Cord – PVC, two-conductor, No. 24 AWG. Provided with minimum 0.4 mm thick thermoplastic insulation on each lead. Length minimum 1.8 m terminates in a non-standard polarized connector.

4. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, neck fitted into a "U" shaped slot in Enclosure Base.

CLASS 2 POWER UNITS-Represents all models.

1. Transformer – Fitted to Enclosure Base, by integral ribs and secured between Enclosure Base and Enclosure Cover. Constructed as follows:

   A. Core - Silicon steel, 57 by 30 by 24 mm.

   B. Primary Winding - Enameled copper wire.

   C. Secondary Winding - Enameled copper wire.

   D. Bobbin – Three flange type. QMFZ2, EI Dupont De Nemours & Co Inc, Type 101.1 mm thick rated V-2.

   E. Thermal Cutoff –XCMQ2, Uchihashi Estec Co Ltd. Type G33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

      Alternate - XCMQ2 Same as above manufactured by Joint Force Metal Research & Co. Type M33, rated 130°C, 250 V ac, 1 A. Connected in the primary circuit.

   F. Primary Outer Wrap – Three layers of polyester tape, each measures 0.05 mm thick, and one layer of fiber board, measures 0.4 mm thick.

   G. Primary to Secondary Insulation - Bobbin, 1.1 mm thick.

   H. Lead Strain Relief - Two layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

   I. Thermal Cutoff Splice Connection to Adjacent Winding Insulation - six layers of polyester tape, each measures 0.05 mm thick and one layer of fiber board, measures 0.4 mm thick.

   J. Crossover Insulation – Three layers of polyester tape, each measures 0.05 mm thick.

2. Printed Wiring Board (PWB) for DC units. ZPMV2, rated V0, 105°C.

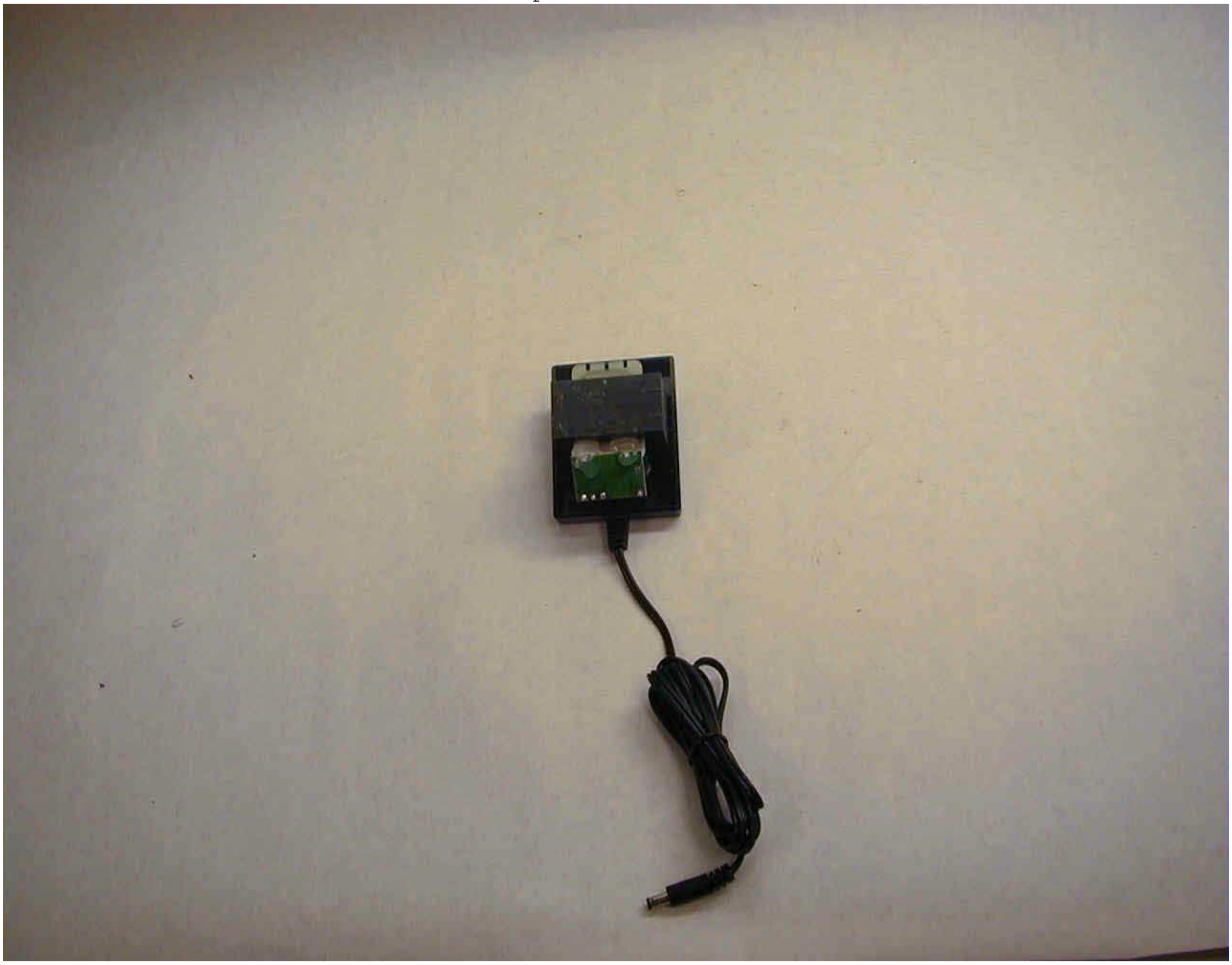
3. Diodes – for DC units. Four provided, Type 1N4001. Mechanically secured before soldering onto PWB.

4. Electrolytic Capacitor – for DC units. Rated min. 25 Vdc except 24 Vdc model rated min 35 Vdc. Mechanically secured before soldered onto PWB.

5. Fuse Listed rated 5 A, 250 V. For all units rated greater than 1000 ma.

6. PTC- Model GPU571201400D00 only – R/C (XGPU2), manufactured by Sea and Land Integrated Corp., type R30-250,.

   Alternate – same as above Type R30-185.



N141177679

TEST RECORD NO. 1

SAMPLES:

Samples of Model EI57 which was found to be constructed as described in the previous Report, were subjected to the test program noted below. Test results relate to the items tested.

The complete Test Package can be found in the Test Reference.

The following tests were performed:

- Input
- Temperature Test
- Electric Strength
- Abnormals
- Transformer Characteristics
- Output Current and Power
- Mechanicals
- Induced Potential
- Leakage
- Max. Output Voltage
- Max. Input
- Full Load Output
- Cal. Overcurrent Protection

Refer to Test Record No. 1 supplement for data sheets with complete testing details.

TEST RECORD NO. 2

SAMPLES:

Class 2 Power Supply Model GPU571201400D00

GENERAL:

Test results relate only to items tested.

SUMMARY:

TRANSFORMER CHARACTERISTICS TEST
OUTPUT CURRENT AND POWER TEST
DIELECTRIC VOLTAGE-WITHSTAND TEST

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements, and therefore, such products are judged eligible to bear UL’s Mark as described on the Conclusion Page of this Report.

Test Record by:	Reviewed by:
BRIAN SPERA	DAVID WAGNER
Project Handler I	Sr. Engineering Associate

CONCLUSION

Samples of the products covered by this Report have been found to comply with the requirements covering the class and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:	Reviewed by:
DAVID WAGNER	A. TROMBETTA
Senior Engineering Associate	Lead Engineering Associate

CERTIFICATE OF COMPLIANCE

Certificate Number 20140627-E468713
Report Reference E468713-20040105
Issue Date 2014-JUNE-27

Issued to: **DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY**
NO 1 SHI TANG BEI ST 2
SHI JIE TOWN, DONG GUAN CITY
GUANGDONG 523290 CHINA

This is to certify that representative samples of **DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS**

Class 2 Power Supplies, EI48 x 30 Series:- GPU480302600WD01, GPU480332500WD01, GPU480452000WD01, GPU480502000WD01, GPU480651500WD01, GPU480651500WD01, GPU480721500WD01, GPU480751400WD01, GPU480751500WD01, GPU480901300WD01, GPU480901500WD01, GPU480901500WD01, GPU481201350WD01, GPU481351200WD01, GPU481601000WD01, GPU481800800WD01, GPU481800900WD01, GPU482000800WD01, GPU482100700WD01, GPU482200650WD01, GPU482200700WD01, GPU482200700WD01

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1310 and CAN/CSA C22.2 No. 223 - Standard for Class 2 Power Supplies

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.
The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with “C” and “US” identifiers: c UL us the word “LISTED”; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

January 5, 2004

REPORT

On

DIRECT PLUG-IN AND CORD CONNECTED CLASS 2 POWER UNITS

DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
GUANGDONG 523290 CHINA

DESCRIPTION

PRODUCT COVERED:

USL, CNL Class 2 Power Supplies, EI48 x 30 Series, see Table 1 for Model Numbers.

GENERAL CHARACTERISTICS:

The units covered by this report consists of a transformer, and other related electronic circuitry, housed in a thermoplastic enclosure. The units are intended for connection to a 15 A branch circuit, with a potential of 120 V to ground.

USL - Indicated investigation to the Standard for Direct Plug-In and Cord Connected Class 2 Power Units, UL 1310, Fifth Edition.

CNL - Indicated investigation to Canadian Standard C22.2 No. 223-M91.

ELECTRICAL RATINGS:

All products are rated 120 V, 60 Hz. The maximum rated input power is 25 W.

Models:

	Model Number	Input	Input VA	Output Voltage DC	Output Current mA	Output VA	Diodes	Capacitor Min V rating
*	GPU480302600WD01	120 V 60 HZ	15	3.0	2600	7.8	IN5401 (2)	10
*	GPU480332500WD01	120 V 60 HZ	15	3.3	2500	8.25	IN5401 (2)	10
*	GPU480452000WD01	120 V 60 HZ	16	4.5	2000	9.0	IN5401 (2)	10
*	GPU480502000WD01	120 V 60 HZ	17	5.0	2000	10.0	IN5401 (2)	10
*	GPU480651500WD01	120 V 60 HZ	18	6.5	1500	9.75	IN5401 (2)	10
*	GPU480601800WD01	120 V 60 HZ	18	6.0	1800	10.8	IN5401 (2)	16
*	GPU480721500WD01	120 V 60 HZ	18	7.2	1500	10.8	IN5401 (2)	16
*	GPU480751400WD01	120 V 60 HZ	18	7.5	1400	10.5	IN5401 (2)	16
*	GPU480751500WD01	120 V 60 HZ	18	7.5	1500	11.25	IN5401 (2)	16
	GPU480901300WD01	120 V 60 HZ	19	9.0	1300	11.7	IN5401 (2)	16
*	GPU480901500WD01	120 V 60 HZ	21	9.0	1500	13.5	IN5401 (2)	16
	GPU481201200WD01	120 V 60 HZ	22	12.0	1200	14.4	IN5401 (2)	25
*	GPU481201350WD01	120 V 60 HZ	24	12.0	1350	16.2	IN5401 (2)	25
	GPU481351200WD01	120 V 60 HZ	23	13.5	1200	16.2	IN5401 (2)	25
	GPU481601000WD01	120 V 60 HZ	23	16.0	1000	16.0	IN5391 (4)	25
	GPU481800800WD01	120 V 60 HZ	22	18.0	800	14.4	IN5391 (4)	35
	GPU481800900WD01	120 V 60 HZ	23	18.0	900	16.2	IN5391 (4)	35
	GPU482000800WD01	120 V 60 HZ	23	20.0	800	16.0	IN5391 (4)	35
	GPU482100700WD01	120 V 60 HZ	22	21.0	700	14.7	IN5391 (4)	35
	GPU482200650WD01	120 V 60 HZ	22	22.0	650	14.3	IN5391 (4)	35
	GPU482200700WD01	120 V 60 HZ	23	22.0	700	15.4	IN5391 (4)	35
	GPU482400650WD01	120 V 60 HZ	25	24.0	650	15.6	IN5391 (4)	35

* indicates secondary fuse required (see Fig. 1)

CONSTRUCTION DETAILS:

Marking - Permanently ink-stamped, hot stamped, silk screened or provided as label; label employed is Recognized Component marking and labeling system (PGDQ2), suitable for application to for the surface applied.

Information Marking - Indicates company name, model number, date or other dating period of manufacture, cautionary statements, and electrical ratings, including: Input voltage, frequency and current; output voltage and current, dc. Also, one of the following: "Class 2 Transformer", "Class 2 Power Supply" or "Class 2 Power Unit".

Cautionary Markings - The word "CAUTION" or "WARNING" in letters 1/8 in high and remaining letters of statement in letters not less than 1/16 in high.

Date of Manufacture Marking - Four digit code hot stamped into bottom of enclosure.

Example: 9338 - First 2 digits = year, last 2 digits - week of year.

The following markings are provided:

All products covered by this report shall be marked with the word "CAUTION" and "RISK OF ELECTRIC SHOCK" and the following or the equivalent: "DRY LOCATION USE ONLY" or "DO NOT EXPOSE TO LIQUID, VAPOR, OR RAIN."

Internal Wiring - Unless otherwise specified, all internal wiring is R/C (AVLV2), rated 125 V, 85°C min.

Segregation - Insulated conductors of different circuits are provided with spacings as specified in this report, unless both circuits are insulated for the highest voltage involved. Insulated conductors are positively maintained away from bare live parts of different circuits, sharp edges and heat producing components.

Mechanical Electrical Connections - For electrical connection, internal wiring and leads of transformers and components are provided with crimp-on terminals (i.e., closed loop, spade type with upturned ends, quick connect with integral detent or locking type) or are mechanically secured and soldered.

Wiring connections may also be accomplished by Listed wire connectors suitable for the temperature, wire gauge and number of conductors.

Soldered Connections - All soldered connections are mechanically secured before soldering. When hand soldered, leads on printed circuit boards are bent over prior to soldering.

Exception: Printed circuit board assemblies that are wave soldered.

Electrical Tubing and Sleeving - R/C tubing (YDPU2) and/or sleeving (UZFT2), rated 125 V, 85°C.

Printed Wiring Boards - Unless otherwise specified, all boards are R/C (ZPMV2), suitable for the solder time and temp used by the manufacturer, and having a min flammability rating of 94V-2 and an operating temp rating of at least 105°C.

Corrosion Protection - Parts are of corrosion resistant material or plated or painted as corrosion protection.

Enclosure Assembly - All models. Case and cover constructed from R/C plastic material (QMFZ2), manufactured by GE Plastics, designated Polycarbonate, Type 6485+(f1), rated 94V-0, 130°C. Case and cover secured together by sonic welding and two screws.

Blades and Grounding Pin - Dimensions, spacings, and relative location of blades shall be as detailed in Section General Ill. 1.

Instruction Manual – See Section General, Instruction Manual

FIG. 1

General - Represents all other models covered in this Report.

1. Enclosure Base - Recognized Component - Plastics (QMFZ2), See Construction Details. 83.5 x 58 x 18 mm. Min 2.0 mm thick.

2. Enclosure Cover - Same material as Enclosure Base. 83.5 x 58 x 32 mm. Min 2.0 thick. Sonically welded to base.

3. Input Blade - Cooper alloy. Located min 7.9 mm from edge of Enclosure Base. See Section General Ill. 1 for details on location of blades.

4. Transformer - Secured by integral ribs of Enclosure Base and fitted between the Enclosure Cover and Base. Constructed as follows:

   A. Core - Laminated sheet steel, 48 by 40 by 30 mm.

   B. Primary Winding - Enameled copper magnet wire.

   C. Secondary Winding - Enameled copper magnet wire.

   D. Bobbin - Three flange type. Recognized Component - Plastics (QMFZ2), E.I. Dupont de Nemours & Co., designated Zytel, Type 101, min 1.1 mm thick, rated 94V-2, 130°C.

   E. Primary Crossover Leads Insulation - three layers polyester tape 0.05 mm thick.

   F. Primary to Secondary Insulation - One layer of bobbin flange, min 1.1 mm thick.

   G. Primary Outerwrap - 2 layers of polyester tape, each 0.05 mm thick.

5. Thermal Cutoff - R/C (XCMQ2) Uchihashi Estec Co., Ltd. Japan, Type G33, rated 1 A, 130°C. Insulated from winding by 3 layers 0.05 polyester tape.

   Alternate - R/C (XCMQ2) Joint Metal Research Type M33, rated as above.

6. Output Cord - 2 conductor, min No. 22 AWG (Models rated 2000 mA and above have 20 AWG cord). Provided with min 0.33 mm thick thermoplastic insulation on each lead. Min 1.8 m external length. Terminates in a polarized plug.

7. Strain Relief Bushing - Molded with the output cord, 23 mm long with a 8.0 by 8.0 by 2 mm stopper.

8. Rectifier – see Table 1.

9. Electrolytic Capacitor – see Table 1 for voltage rating, min 85°C

10. PCB - See construction details.

11. Fuse - Listed 5 A, 250 V provided in secondary circuit of all models rated 1350 mA or greater (see Table 1 for model numbers).

N141177174

T E S T R E C O R D N O. 1

SAMPLES:

Samples of EI-48x30 Series were submitted by the manufacturer and subjected to the following test program in accordance with UL 1310 the Standard for Class 2 Power Supplies and CAN/CSA C22.2 No. 223.

The following tests were conducted on the series with acceptable results.

Leakage
Max Output
Normal Input
Max. Input
Transformer Characteristics
Output Current and Power
Full Load
Temperature Test
Dielectrics
Abnormals
Strain Relief
Blade Secureness
Security of Contacts
Impact
Rod Pressure
Resistance to Crushing
Mold Stress
Weight & Moment

GENERAL:

Test Results relate only to the items tested.

C O N C L U S I O N

Samples of the products covered by this Report have been found to comply with the requirements covering the class and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Mark are considered as Listed by Underwriters Laboratories Inc.

Report by:	Reviewed by:
DAVID WAGNER	Anthony Trombetta
Senior Engineering Associate	Lead Engineering Associate

CERTIFICATE OF COMPLIANCE

Certificate Number	20140627-E468713
Report Reference	E468713-20040113
Issue Date	2014-JUNE-27

Issued to: DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY

NO 1 SHI TANG BEI ST 2
SHI JIE TOWN, DONG GUAN CITY
GUANGDONG 523290 CHINA

This is to certify that representative samples of DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

Class 2 Power Units - EI-28 Series, GPU280450100WD00.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1310 - Standard for Class 2 Power Units
CAN/CSA C22.2 No. 223 - Canadian Standard for Power Supplies with Extra-low Voltage Class 2 Outputs

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.
The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and "US" identifiers: cULus the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.

William R. Carney

William R. Carney, Director, North American Certification Programs

UL LLC

File E468713
Project 4786443566

January 13, 2004

REPORT

On

DIRECT-PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

DONG GUANG SHI JIE HUA XU ELECTRONICS FACTORY
GUANGDONG 523290 CHINA

PRODUCT COVERED:

USL, CNL– Class 2 power supply, EI-28 AC/DC. Direct plug in. (refer to nomenclature)

GENERAL):

The transformer covered by this report consists of inherently limited Class 2 transformer.

The unit consists of a transformer and other related Class 2 electronic circuitry housed in a thermoplastic enclosure. The transformer secondary winding is connected to external load via an output cord and a non-standard polarized connector.

The unit does not include grounding connection, (Optional) and has no user accessible metal parts, which are likely to become energized. These units are intended for dry location use only.

USL Indicates investigation to the Standard for Class 2 Power Units, UL 1310, Fifth Edition, **with revisions including and through July 20, 2009.**

CNL Indicates investigation to C22.2, No. 223, the Canadian Standard For Power Supplies with Extra Low-Voltage Class 2 Outputs, **with revisions including and through September, 2009.**

*ELECTRICAL RATINGS:

For Model GPU280450100WD00 only, Input 120 Vac, 60 Hz, 5 W.

Input 120 Vac, 60 Hz, 7 W max.

Output: Nomenclature: GPU XX XXX XXXX X X X X

1. where XX = Size of adaptor (EI28)

2. where XXX = Output Voltage- First 2 digits will be the whole value of the voltage and the last digit is the value of the decimal. 12 (12V) 125 (12.5V) 060 (6V)- Voltage range -3.0-24.0

3. where XXXX= Output Current. Current range. 5ma-500ma

4. where X = Type of plug in,W (wall plug),C (desktop), G (ground pin)

5. where X = DC/AC- D-(DC Output), A- (AC Output)

6. where X = Special function of adaptor- O (adaptor) X (special)

7. where X = Unregulated/Regulated- O (unregulated) R (Regulated)

CONSTRUCTION DETAILS:

Section General - The following construction items are described in the Section General.

Markings	Printed Wiring Boards
General	Internal Wiring
Blades	Electrical Connections
Spacings	Corrosion Protection
Segregation	Instruction Manual

Instruction Manual – For direct plug-in units only. See Section General, Instruction Manual.

CLASS 2 POWER UNIT, EI28 SERIES - FIG. 1

General – Fig. 1 shows the overall and inside view of power supply.

1. Enclosure Base & cover–QMFZ2, GE Plastics. Lexan, 241R rated V-0. Overall 60.0 by 35.0 by 34.0 mm, 2.43 mm thick. Secured to Enclosure Cover by ultrasonic welding.

2. Output Cord – PVC, two-conductor, No. 24 AWG. Provided with minimum 0.4 mm thick thermoplastic insulation on each lead. Length Minimum 1.8 m terminates in a non-standard polarized connector.

3. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, neck fitted into a "U" shaped slot in Enclosure Base.

CLASS 2 POWER UNITS- EI28 Series -Represents all models.

1. Transformer – Fitted to Enclosure Base, by integral ribs and secured between Enclosure Base and Enclosure Cover. Constructed as follows:

   A. Core - Silicon steel, 28 by 15 by 25 mm.

   B. Primary Winding - Enameled copper wire.

   C. Secondary Winding - Enameled copper wire.

   D. Bobbin – Three-flange type. QMFZ2, EI Dupont De Nemours & Co Inc, Type 101,1 mm thick rated V-2.

* E. OMITTED

   F. Primary Outer Wrap – Three layers of polyester tape, each measures 0.05 mm thick, and one layer of fiberboard, measures 0.4 mm thick.

   G. Primary to Secondary Insulation - Bobbin, 1.1 mm thick.

   H. Lead Strain Relief - Two layers of polyester tape, each measures 0.05 mm thick and one layer of fiberboard measures 0.4 mm thick.

* I. OMITTED

   J. Crossover Insulation – Three layers of polyester tape, each Measure 0.05 mm thick.

2. Printed Wiring Board (PWB) for DC units. –ZPMV2 rated V0, 105°C.

3. Diodes –for DC units. Four provided, Type 1N4001. Mechanically secured before soldering onto PWB.

4. Electrolytic Capacitor – for DC units. Rated min. voltage 1.414 times specified output voltage (Vdc). Mechanically secured before soldered onto PWB.

CLASS 2 POWER UNITS, MODEL GPU280450100WD00 - FIG. 2

1. Enclosure Base & Cover – R/C QMFZ2, SABIC INNOVATIVE PLASTICS CHINA CO LTD (E161723). Type 950, any color (opaque only), rated V-0, 120°C. Overall 60.0 by 35.0 by 34.0 mm, 2.43 mm thick. Secured together by ultrasonic welding.

2. Output Cord – Two-conductors, No. 24 AWG, rated VW-1, 80°C, 300 V. Provided with minimum 0.4 mm thick thermoplastic insulation on each lead. Length minimum 1.8 m terminates in a non-standard polarized connector.

3. Output Cord Strain Relief Bushing – PVC, molded with Output Cord, Outer portion measures 6.35 mm diameter tapering to 8.8 mm diameter, inside portion measures 7.15 by 9.35 by 3.6 mm thick; center part overall measures 6.2 by 4.2 by 2.8 mm. Neck fitted into a "U" shaped slot in Enclosure Base.

4. Blades – Non-polarized, non-grounding type, plated copper alloy, two provided. Each blade located minimum 8 mm from side of platform edge. See Section General for dimensions, spacing and location of blades. The shortest distance from any blade to core is larger than 1.6 mm.

CLASS 2 POWER UNITS, MODEL GPU280450100WD00 - FIG. 3

1. Printed Wiring Board (PWB) for DC units. – R/C ZPMV2, rated V-0, 105°C.

2. Diodes – Four provided, Type 1N4001.

3. Capacitor – Electrolytic with integral pressure relief, rated 16 V, 470 uF, 105 °C.

4. Primary Leads – R/C (AVLV2/8), two provided, Style 1015, Min. 20 AWG, rated 300 V ac, 105°C.

5. Transformer – Constructed as follows:

   A. Core - Silicon steel, overall dimension 28 by 12 by 25 mm.

   B. Primary Winding - Polyurethane enameled copper wire, 0.06 mm diameter, 4000 turns.

   C. Secondary Winding - Polyurethane enameled copper wire, 0.31 mm diameter, 197 turns.

   D. Bobbin – Three-flange type. R/C QMFZ2, EI Dupont De Nemours & Co Inc (E41938), Type 101, min. 0.71 mm thick, rated V-2, 130°C.

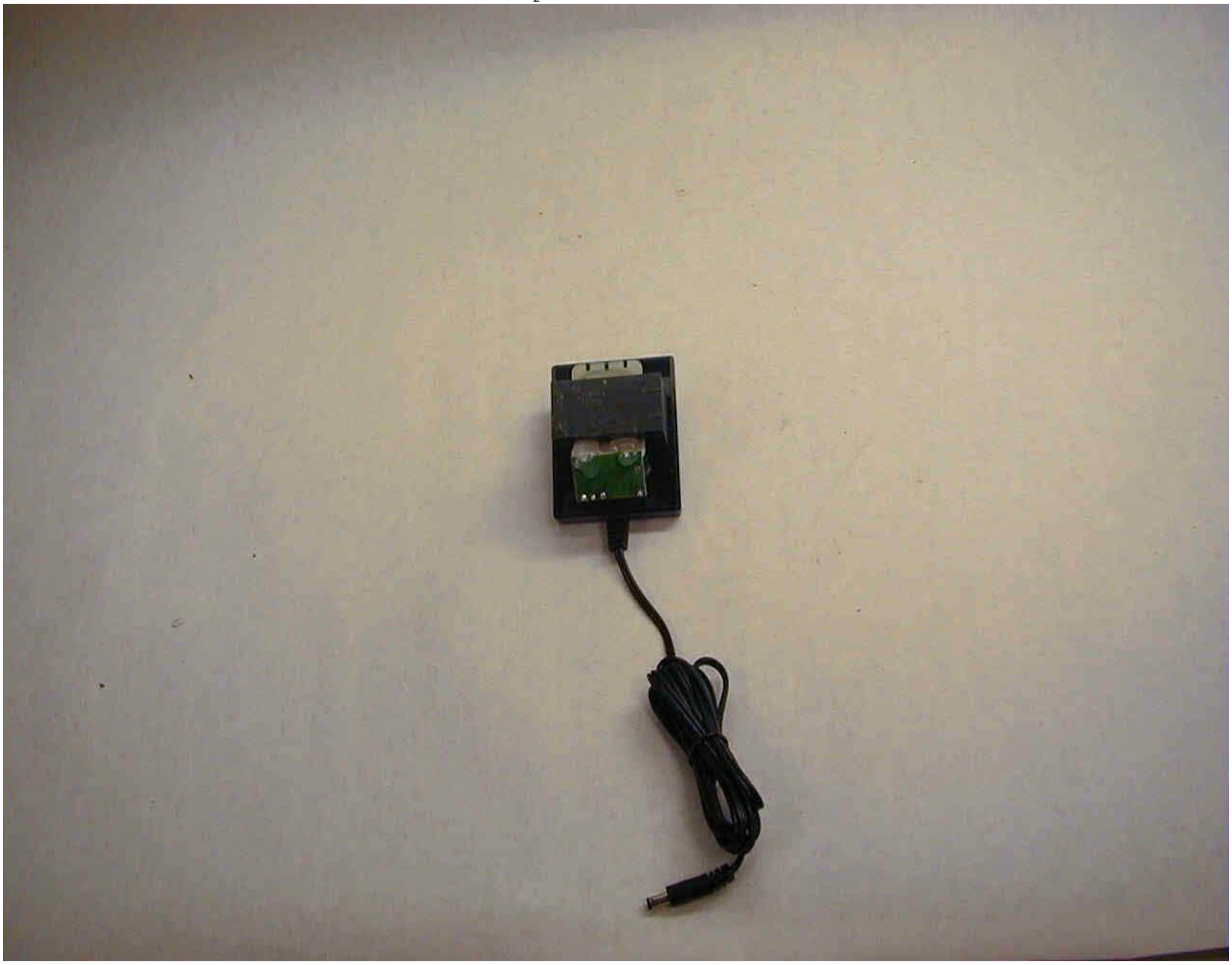
   E. Insulation Tape – R/C (OANZ2), Polyester Tape, rated 130°C.

   F. Crossover Insulation – Two layers of polyester tape, each Measure 0.05 mm thick.

Transformer Insulation as follows:

Description		Insulation Material		Total Thickness, mm		Layers Min
Primary Winding/ Secondary Winding		Bobbin		0.80		-
		Tape		Min. 0.10		2
Primary Outer-wrap		Tape		Min. 0.10		2
Primary Winding to Core Insulation (Bottom)		Bobbin		0.95		-
		Tape		Min. 0.10		2
Primary Winding to Core Insulation (Sides)		Tape (@)		Min. 0.10		2
Primary Winding to Core Insulation (Center)		Bobbin		0.85		-
Primary Crossover Lead to Primary Winding		Tape		Min. 0.10		2
Secondary Outer-wrap		Tape		MIN. 0.10		2
Secondary Winding to Core Insulation (Side)		Tape (@)		Min. 0.10		2
Secondary Winding to Core Insulation (Center)		Bobbin		0.85		-
Secondary Winding to Core Insulation (Top)		Bobbin		0.95		-
		Tape (@)		MIN. 0.10		2

Tape (@): The bent-up of tape is at least 1.6 mm for spacing between secondary winding and core, between primary winding and core. See ILL. 1A.



N141177154


RS AC/DC ADAPTOR
DONGGUAN GAOYI ELECTRONIC CO., LTD
CLASS 2 POWER SUPPLY
MODEL: GPU280450100WD00
INPUT: 120V ~ 60Hz 5W
OUTPUT: 4.5V ⎓ 100mA
OUTPUT POWER: 0.45W MAX
LISTED
E308726
49Y9
c UL
MADE IN CHINA

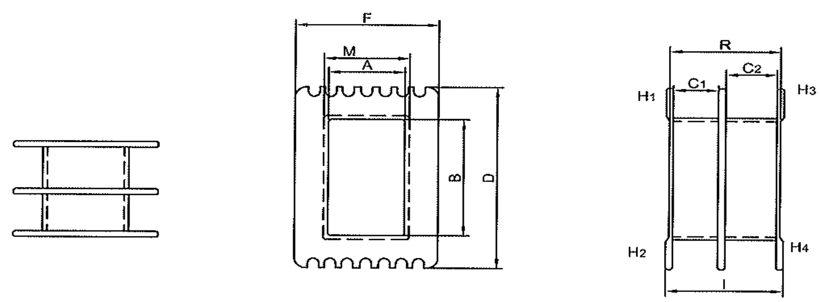
N141177155

N141177156

TY-28

双格式（王字）胶芯尺寸图

EI DUPONT DE NEMOURS & CO INC(E41938)
POLYAMIDE 66
TYPE 101 RATED V-2

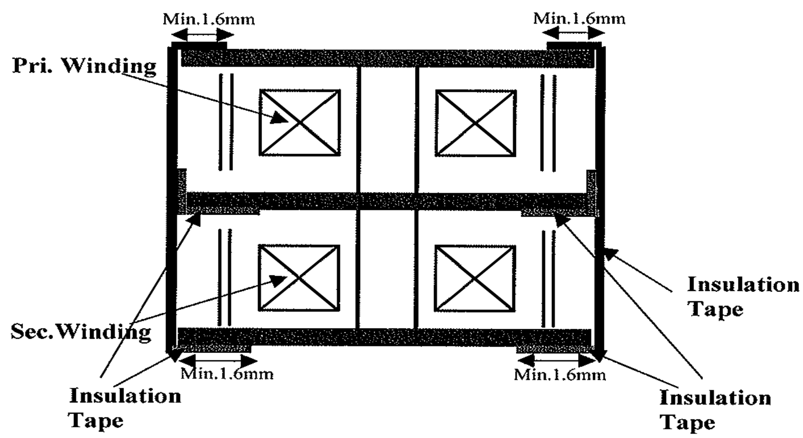


UNIT:mm

A	B	C_1	C_2	D	F	M	R	T	H_1	H_2	H_3	H_4
8.7	12.0	6.5	7.5	25.5	18.8	10.2	17.2	17.4	3	3	3	3

MODEL NAMA	EI-28*12王字	SCALE	UNIT	TOLERANCE
MATERIAL	Nylon 66		mm	mm
TY	高益电子有限公司 TEL：0769-86386989 FAX：0769-86386339	UL REC	REV	MAPPER
		PN		

Transformer Insulation Construction Drawing



Note:
Over surface between primary/secondary and core is min. 1.6mm.
Over surface between primary and secondary is min. 1.6mm.

TEST RECORD NO. 1

SAMPLES:

Samples of Model EI-28 which was found to be constructed as described in the previous Report were subjected to the test program noted below. Test results relate to the items tested.

Complete Test Package in Test Reference.

Tests Performed:

1. Input
2. Temperature Test
3. Electric Strength
4. Abnormals
5. Transformer Characteristics.
6. Output Current& Power.
7. Mechanicals
8. Induced Potential.
9. Leakage.
10. Max Output Voltage.
11. Max. Input.
12. Full Load Output.

TEST RECORD NO. 2

GENERAL:

No testing was deemed necessary for the change of the rating for the electrolytic capacitors for the EI-35 series because of previously tested construction covered in this Report.

Due to similarity with other Listed products, no testing was considered necessary.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:	Reviewed by:
Dennis Grzic	David H. Wagner
Engineer	Engineering Assoc Sr

TEST RECORD NO. 3

SAMPLES:

Samples of the EI28 power supplies were submitted for test verifying Class 2 performance without a thermal cutoff.

The Models used for test purposes were considered representative of the entire series.

GENERAL:

Test results relate only to the items tested.

Due to similarity of these devices those previously Listed for this manufacturer, only the following tests were considered necessary.

The following tests were conducted.

Test
Output Loading Test - Abnormal
Dielectric Voltage Withstand after Output Loading

The test methods and results of the above tests have been reviewed and found in accordance with the requirements in UL 1310.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by: Reviewed by:

M. MARTIN D. WAGNER

Engineering Project Handler Senior Engineering Associate

TEST RECORD NO. 4

GENERAL:

The test results relate only to the items tested.

SAMPLES:

Samples of direct plug-in Class 2 Power Supply, Model GPU280450100WD00 were submitted by the applicant and subjected to the following tests with the requirements in the Standard for Class 2 Power Units, UL 1310, Fifth Edition, dated May 3, 2005, Last Revised date July 20, 2009, and the Canadian Standard for Power Supplies with Extra Low Voltage Class 2 Outputs, CAN/CSA C22.2 No. 223-M91, Second Edition, Last Revised date September, 2009.

The following tests were conducted in accordance with UL 1310 and Canadian Standard, CAN/CSA C22.2 No. 223-M91 with acceptable results. Clause and paragraph reference conventions consist of UL 1310 reference followed by (C22.2 No. 223) reference.

Leakage Current Test:	26(6.5)
Dielectric Voltage Withstand Test Following Leakage Current Test:	27
Leakage Current Test After Humidity Exposure:	27
Dielectric Voltage Withstand Test Following Leakage Current Test:	27
Maximum Output Voltage Test:	28
(Open-Circuit Secondary Voltage, CSA C22.2 No.223)	(6.2.1)
Normal Input Test:	50.2
(Rated Input, CSA C22.2 No.223)	(6.2.2)
Maximum Input Test:	29
(Rated Input, CSA C22.2 No.223)	(6.2.2)
Transformer Characteristics Test:	30
(Maximum Output Current And Power, CSA C22.2 No.223)	(6.2.4)
Output Current And Power Test:	30
(Maximum Output Current And Power, CSA C22.2 No.223)	(6.2.4)

Dielectric Voltage Withstand Test After Output Current And Power Test [CSA C22.2 No. 223 Units]:	34
(Dielectric Strength, CSA C22.2 No.223)	(6.4)
Full-Load Output Current Test:	32
Normal Temperature Test - General:	33
(Temperature (Normal), CSA C22.2 No. 223)	(6.3)
Dielectric Voltage Withstand Test:	34
(Dielectric Strength, CSA C22.2 No. 223)	(6.4)
Induced Potential Test:	34.2(6.4.3.2)
Abnormal Tests:	39(6.7)
Output Loading Test - Abnormal:	39.2
(Secondary Circuit Protection, CSA C22.2 No. 223)	(6.6)
Dielectric Voltage Withstand Test After Output Loading Test:	34
(Dielectric Strength, CSA C22.2 No. 223)	(6.4)
Transformer Burnout Test (Linear Designs) - Abnormal:	39.3
Dielectric Voltage Withstand Test After Transformer Burnout Test:	34
Transformer Insulating Materials Test:	40
(Insulating Material, CSA C22.2 No. 223)	(6.13)
Strain Relief Test:	41
(Strain Relief And Blade Retention, CSA C22.2 No. 223)	(6.10)
Blade Secureness Test: (Direct Plug-In Unit)	43
(Strain Relief And Blade Retention, CSA C22.2 No. 223)	(6.10)
Input Contact Security Test: (Direct Plug-In Unit)	44
(Strain Relief And Blade Retention, CSA C22.2 No. 223)	(6.10)
Impact Test: (Direct Plug-In Unit)	46.2
(Drop And Impact Test, CSA C22.2 No. 223)	(6.9)
Dielectric Voltage Withstand Test After Impact Test:	34
(Dielectric Strength, CSA C22.2 No. 223)	(6.4)
Rod Pressure Test: (Direct Plug-In Unit)	46.4
Dielectric Voltage Withstand Test (After Rod Pressure Test):	34
Resistance To Crushing Test: (Direct Plug-In Unit)	46.5

Mold Stress Relief Distortion Test:	Table 25.1
Strain Relief Test After Mold Stress Relief Distortion Test:	Table 25.1
Weight And Moment Determination: (Direct Plug-In Unit)	7.11
(Construction - General, CSA C22.2 No. 223)	(4.1.4)

Test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the Standard mentioned above.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the product evaluated comply with the applicable requirements in the Standard for Class 2 Power Units, UL 1310, 5th Edition, dated May 3, 2005, Last Revised date July 20, 2009, and Canadian Standard for Power Supplies with Extra-low Voltage Class 2 Outputs, CAN/CSA C22.2 No. 223, 2nd Edition, dated June 1991, Last Revised date September, 2009 and, therefore, such product is judged eligible to bear UL’s Mark as described on the Conclusion Page of this Report.

Test Record by:
ROBIN YANG
Engineer

Reviewed by:
ARES CHEN (T)
Associate Project Engineer

SCOTT LAN
Project Engineer

C O N C L U S I O N

Samples of the products covered by this Report have been found to comply with the requirements covering the category and the products are found to comply with UL's applicable requirements. The description and test result in this Report are only applicable to the sample(s) investigated by UL and does not signify the product(s) described as being covered under UL's Follow-Up Service Program. When covered under UL's Follow-Up Service Program, the manufacturer is authorized to use the UL Listing Mark on such products which comply with UL's Follow-Up Service Procedure and any other application requirements of Underwriters Laboratories Inc. The Listing Mark of Underwriters Laboratories Inc. on the product, or the UL symbol on the product and the Listing Mark on the smallest unit container in which the product is packaged, is the only method to identify products investigated by UL to published requirements and manufactured under UL's Listing and Follow-Up Service.

This Report is intended solely for the use of UL and the Applicant for establishment of UL certification coverage of the product under UL's Follow-Up Service. Any use of the Report other than to indicate that the sample(s) of the product covered by the Report has been found to comply with UL's applicable requirements is not authorized and renders the Report null and void. UL shall not incur any obligation or liability for any loss, expense, or punitive damages, arising out of or in connection with the use or reliance upon the contents of this Report to anyone other than the Applicant as provided in the agreement between UL and Applicant. Any use or reference to UL's name or certification mark(s) by anyone other than the Applicant in accordance with the agreement is prohibited without the express written approval of UL. Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

Report by:	Reviewed by:
David Wagner	A. TROMBETTA
Senior Engineering Associate	Lead Engineering Associate