Thank you for giving UL the opportunity to partner with you.

Inspections at your plant will be conducted by the Inspection Center in your vicinity. More information on Follow-up Service Inspections can be found at https://www.ul.com/resources/follow-up-services-additional-resources.

**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.**

Marks as needed may be obtained from UL Label Centers. To find a Label Center in your vicinity, visit https://marks.ul.com/about/ul-listing-and-classification-marks/labels/label-centers.

Please note, Follow-Up Procedure Revisions or Report Revisions do not include Authorization Pages, Indices, Section General, and/or Appendices unless revisions were required or requested.

Should you have any questions, after reviewing the material, or need to report any inaccuracies, please reach out to your UL representative or find UL contact details for your local Customer Service Department at https://www.ul.com/about/locations.

Please find attached the related material

For your convenience, the below describes the related updates:

For revised/new documentation, please reference 2022-02-09 in the page headings, New Volume(s), 1, Legible images may be viewed online, Certificate of Compliance format now separates US and Canada certified Products by specified scheme and category.

| |
|---|
| E525112-Vol1-AuthorizationPage |
| E525112-vol1-ListingMarkData |
| E525112-vol1-Index |
| E525112-vol1-Appendix |
| E525112-vol1-AppendixStandardized |
| E525112-vol1-SectionGeneral |

| |
|---|
| Illustration-1-Total |
| E525112-20220209-Description |
| Figure-3-Total |
| Illustration-7-Total |

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: | 2333335 (Party Site)<br>Changzhou Positive Energy Electrical Equipment Co., Ltd.<br>Room 402, Building 1, No.12-2.Meihua Road<br>Changzhou Jiangsu 213012 CN |
| Listee/Classified Company: | 2333335 (Party Site)<br>SAME AS APPLICANT |

**Use of the Mark**

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. The UL Contracting Party for Follow-Up Services is listed in the addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

It is the responsibility of the Applicant, Manufacturer(s), and Listee/Classified Company 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.

**Additional Responsibilities**

Additional responsibilities, duties and requirements for the Applicant and Manufacturers are defined under Additional Resources at the following web-site: http://www.ul.com/fus. 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 Follow-Up Service Terms referenced below, please contact UL's Customer Service at http://www.ul.com/aboutul/locations/, select a location and enter your request, or call the number listed for that location.

**Acceptance of Follow-Up Services**

The Applicant and the specified Manufacturer(s) and any Listee/Classified Company in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable service agreement is a Global Services Agreement ("GSA"), the Applicant, the specified Manufacturer(s), and any Listee/Classified Company will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of a) use of the prescribed UL Mark, b) acceptance of the factory inspection, or c) payment of the Follow-Up Service fees. The Service Agreement incorporates such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking the following link: http://services.ul.com/fus-service-terms. 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.

**Use and Ownership of the Follow-Up Service Procedure**

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 Applicant, the specified 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.

**Definition of Terms**

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.

**No Third Party Liability**

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).

**Certification Body**

UL LLC has signed below solely in its capacity as the certification body to indicate that this Follow-Up Service Procedure fulfills the requirements for certification documentation issued by the certification body.

Bruce A. Mahrenholz
Director
Conformity Assessment Programs (CPO)
UL LLC

LOCATION

2333335 (Party Site)
Changzhou Positive Energy Electrical Equipment Co., Ltd.
Room 402, Building 1, No.12-2.Meihua Road
Changzhou Jiangsu 213012 CN
Factory ID: None
UL Contracting Party for above site is: UL GmbH

Listing Mark Data Page (LMDP)

(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.


XXXX = The control number assigned by UL, E525112

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.

THIS FORM PAGE IS TO BE REVISED BY THE NORTHBROOK LABEL DEPARTMENT ONLY

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, E525112

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.

THIS FORM PAGE IS TO BE REVISED BY THE NORTHBROOK LABEL DEPARTMENT ONLY

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.

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

PRODUCTS WHICH REQUIRES PRODUCTION DIELECTRIC TEST BETWEEN PRIMARY CIRCUIT PARTS AND INACCESSIBLE TRANSFORMER CORE
(see Method, Appendix D Page 8)

| Product Designation | Procedure Section or Date |
|---|---|

Reserved for future use

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

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 | Test Potential V ac | Test Potential V dc | Time Seconds | Applied Between |
|---|---|---|---|---|---|
| Reserved for future use | | | | | |

Comments:

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

| Product Name | Product Designation | Procedure Section or Date |
|---|---|---|
| Reserved for future use | | |

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. |
|---|---|---|---|
| Reserved for future use | | | |

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

Exceptions

Production-Line Grounding Continuity Test

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

| Product Name | Product Designation | Procedure Section or Date |
|---|---|---|
| All models covered in this procedure | | |

ISSUED: 11-13-2007
REVISED: 01-01-2012

# 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.

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.

PRODUCT COVERED:

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

FACTORY LOCATION AND IDENTIFICATION:

When more than one manufacturing location is indicated on the Authorization Page Addendum for the Procedure Volume. The factory identification and associated manufacturing location are indicated on the Authorization Page Addendum.

TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE USE):

Products designated USL have been investigated using requirements contained in the Standard for Class 2 Power Units, UL 1310, 7th Edition.

Products designated CNL have been investigated to Canadian requirements using requirements contained in CAN/CSA C22.2 No. 223, 3rd Edition.

"CSA Certified" 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 "CSA Certified" 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 (PGDQ2/8) 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 or 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 Battery Charger,"
   b) "Class 2 Transformer,"
   c) "Class 2 Power Supply," or
   d) "Class 2 Power Unit."

Note 1: The following marking or trademark may be used to identify the Listee: (None)

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 four digits.

The date code consists of the following: MMYY
MM = Month, YY = Years, example: ”1118” means November, 2018;

8. 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."

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.

CONSTRUCTION DETAILS:

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

Abbreviations –

| | |
|---|---|
| Sec. Gen. | - Sectional General |
| R/C | - Recognized Component |
| USL | - United States, Listed |
| CNL | - Canadian Standard, Listed |

Blades - Folded over or solid, copper, brass or bronze. Located minimum 5.1 mm for UL and CUL requirement from edge of enclosure. See Sec. Gen., ILL. 1 for dimensions, spacing and relative location of blades.

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 & SPACINGS IN UNITS FOR OUTDOOR USE

| 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) |
| 251 - 600 | 9.5 (8/3) | 12.7 (1/2) |

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) |
| 251 - 600 | 6.4 (1/4) | 6.4 (1/4) |

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 V-2 for units without openings, V-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 (AVLV2/8), rated minimum 300 V, minimum 80°C.

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 - R/C (YDPU2/8); R/C (YDTU2/8); R/C (UZFT2), or R/C (UZKX2/8), rated minimum 90°C, 300 V.

Wire Positioning Devices - Unless otherwise specified, R/C ZODZ2, 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.

Instruction Manual – The following instructions shall be provided in the instruction manual.

1. 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 – The instructions may be marked on the units.

Note: The instruction is not required for a direct plug-in power unit weighing 1 pound (454 g) or less.

2. The instructions for a power unit intended for use by travelers shall include (a) – (c) or the equivalent, as appropriate. The items shall be precede by "IMPORTANT SAFETY INSTRUCTIONS – SAVE THESE INSTRUCTIONS" and "DANGER – TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK. CAREFULLYFOLLOW 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."

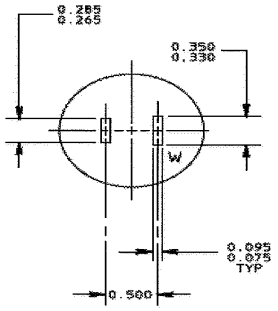
(b) "For use in the U.S.A., the voltage selector switch must be placed in the 120 volt position. For use in countries other than the U.S.A., the voltage selector may need to be placed in other than the 120 volt position. Confirm the voltage available at each country location before using the product."

(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, if needed." or "If the shape of the plug does not fit the power outlet, use an attachment plug adaptor of the proper configuration for the power outlet."

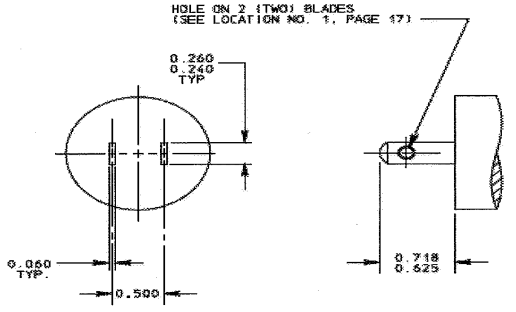
Note: Items (a) and (b) are only for unit employed voltage selector.

Illustration-1 Page-1

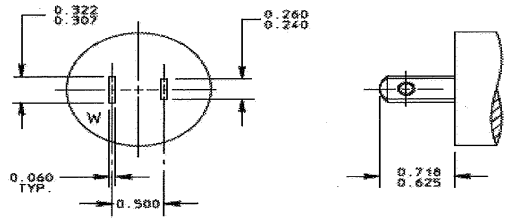
**FIGURE 1–15**
**PLUG AND RECEPTACLE**
**125 volts, 15 amperes, 2 pole, 2 wire**




RECEPTACLE




NON-POLARIZED PLUG




POLARIZED PLUG

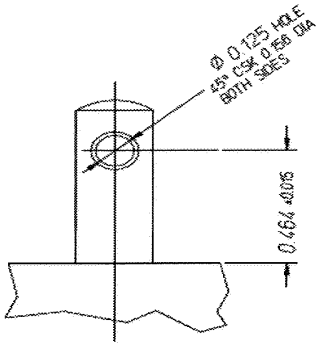
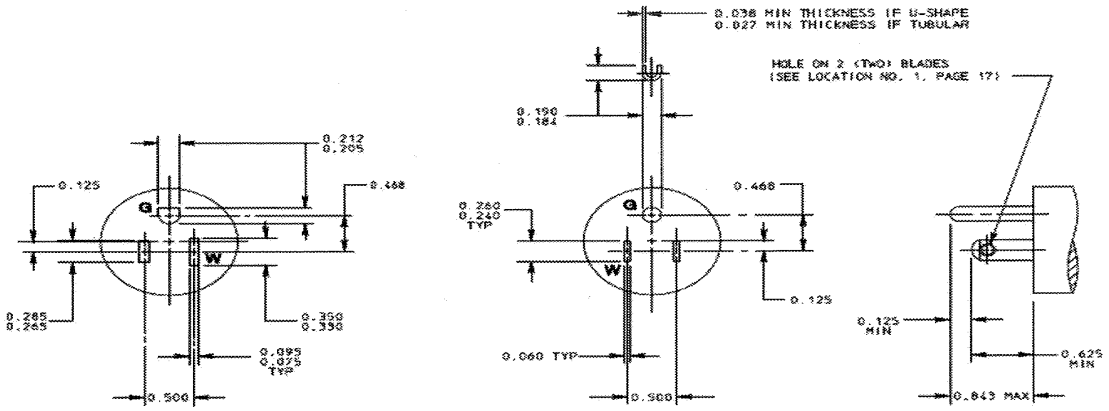


**FIGURE 5–15**
**PLUG AND RECEPTACLE**
**125 volts, 15 amperes, 2 pole, 3 wire, Grounding type**




**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.

File E525112
Project 4790162393

Issued: February 9, 2022

REPORT

On

# DIRECT PLUG-IN AND CORD-CONNECTED CLASS 2 POWER UNITS

CHANGZHOU POSITIVE ENERGY ELECTRICAL EQUIPMENT CO., LTD.
JIANGSU, CHINA

PRODUCT COVERED:

USL, CNL - Direct Plug-in type Class 2 Power Supplies, indoor use, Models ZNL-UAAABBB, Where “AAA” is 3 digits from 030 to 360 which represents the rated output voltage after divided by 10. (e.g.: 150 = 15.0 V dc, 320 = 32.0 V dc);. “BBB” is 3 digits from 010 to 200 which represents the rated output current after divided by 100. (e.g.: 030 = 0.3 A, 100 = 1.0 A);. Max output power is 24W.

GENERAL:

The units covered by this Report are direct plug-in type Class 2 Power Supplies.

The units consist of a switching mode transformer and other related electronic circuitry housed in a thermoplastic enclosure, and provided with non-polarized blades for connection to line voltage and an Output Cord terminated with a nonstandard polarized connector for output connection. Each units does not include a grounding connection, and has no user accessible metal parts, which are likely to become energized.

ELECTRICAL RATINGS:

| Model No. | Input | | | Output | | | Transformer Type |
|---|---|---|---|---|---|---|---|
| Cat. No. | V | Hz | A | V (dc) | A | *POWER(W)* | - |
| ZNL-UAAABBB | 110-120 | 50-60 | 0.5 | 3-36 | 0.1-2 | 0＜P≤13.5 | *EE18* |
| ZNL-UAAABBB | 110-120 | 50-60 | 0.5 | 3-36 | 0.1-2 | 13.5＜P ≤16 | EE20 |
| ZNL-UAAABBB | 110-120 | 50-60 | 0.5 | 3-36 | 0.1-2 | 16＜P ≤24 | EE22 |

NOMENCLATURE:
"AAA" = 3 digits from 030 to 360 which represents the rated output voltage after divided by 10. (e.g.: 150 = 15.0 V dc, 320 = 32.0 V dc); "BBB" is 3 digits from 010 to 200 which represents the rated output current after divided by 100. (e.g.: 030 = 0.3 A, 100 = 1.0 A). Max output power is 24W.

TECHNICAL CONSIDERATIONS (Not For Field Representative's Use):

USL Products designated UL have been investigated using US requirements as noted in the Test.

CNL Products designated CUL have been investigated using Canadian requirements as noted in the Test Record.

The maximum room ambient temperature is 25°C (Tmra) for indoor use units.

The units are weighing less than 1 pound (454 g).

CONSTRUCTION DETAILS:

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

| | |
|---|---|
| Abbreviations | Date of Manufacturing |
| Corrosion Protection | Cautionary Markings |
| Segregation | Spacings |
| Blade Construction | Printed Wiring Board |
| Markings | Instruction Manual |

For CNL Unit, Cautionary Markings and instructions shall be provided in both English and French.

Markings – See Sec. Gen., Markings for detail. The following markings shall be additionally provided:

“Class 2 Power Supply”

“CAUTION – Risk of Electric Shock.” and the following, “Do not expose to liquid, vapor, or rain” or “Dry location use only”.

Instruction Manual - See Sec. Gen., Instruction Manual. The following instructions shall be provided in the instruction manual:

The following instruction shall be preceded by “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

“For connection to a supply not in the U.S.A., use an attachment plug adapter of the proper configuration for the power outlet, if needed” or, “if the shape of the plug does not fit the power outlet, use an attachment plug adaptor of the proper configuration for the power outlet.”

Illustrations - The following Illustration is referenced in this report:

| ILL. No. | | Description |
|---|---|---|
| 1 | | Enclosure Construction |
| 2 | | Output Cord Strain Relief Dimension |
| 3 | | PWB Component and Trace layout |
| 4 | | Transformer EE22 Construction and Insulation detail |
| 5 | | Transformer EE20 Construction and Insulation detail |
| 6 | | Transformer EE18 Construction and Insulation detail |
| 7 | | Model Difference of components rating |

Model Difference –

1. Series ZNL-UAAABBB, share same PWB layout and Schematic Diagram except for different transformer and ratings.

2. All models within same series are identical to each other except for related components rating according to ILL.7.

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

CLASS 2 POWER SUPPLIES, MODEL ZNL-U120200 – FIG. 1
(ASLO REPRESENT other MODELS)

Fig. 1 represent external view of Model ZNL-U120200, It also represent other Models expect as noted below.

1. Enclosure – R/C (QMFZ2), SABIC INNOVATIVE PLASTICS B V (E45329), Type SE1X(GG)(f1), rated V-1, 105 °C, measured minimum 2 mm thick, ALL Color. Two halves construction secured together by ultrasonic welding. Enclosure Measured overall approx. 70 by 46.8 by 31.5 mm, Provided with an approx. 8 by 7 mm opening for Output Cord Strain Relief. See ILL.1 for construction details.

2. Blades - Non-polarized, non-grounding configuration, plated copper alloy(containing no less than 80 percent copper for outdoor use units), and each blade located minimum 8 mm from side of enclosure/blade module platform edge, integrally molded on blade module. See Sec. Gen. ILL. 1 for dimensions and location of blades.

3. Output Cord – R/C (AVLV2/8), or R/C (AVLV2) and CSA Certified, two stranded conductors, rated minimum 300 V, minimum 80°C, minimum 26 AWG. One end of cord terminated at internal connections by mechanical security before soldering to PWB, the other end terminated in a non-standard polarized output connector. Minimum 1.8 m external length. Provided with molded-on strain relief.

4. Output Cord Strain Relief – PVC bushing integrally molded on Output Cord and physically fitted in Enclosure. See ILL. 2 for construction details.

CLASS 2 POWER SUPPLY, MODEL ZNL-U120200 – FIG.2 and FIG. 3
(ASLO REPRESENT other MODELS)

General – Fig.2 and Fig. 3 represent internal view of Model ZNL-U120200, It also represent other Models expect as noted below.

1. Printed Wiring Board (PWB) – R/C (ZPMV2/8), rated minimum 130°C, V-0, overall approx. 62.7 mm by 38.8 mm by 1.6 mm thickness. See ILL. 3 for component and trace layout.

2. Fuse (F1) – R/C (JDYX2/8), HONG HU BLUELIGHT ELECTRONIC CO LTD (E324232), Type 6ET, rated 250 V ac, 2 A.

3. Line Filters (LF1) – Ring type, Secured on PWB by soldering,. Constructed as follows.

   a. Core – Ring type Construction, ferrite, overall measured OD 10 mm by ID 6 mm, thickness 4 mm.

   b. Windings (N1) – R/C (OBMW2), polyurethane enameled copper wire, rated minimum 130°C, see below windings information for turns and diameter.

   c. Windings (N2) – R/C (OBJT2), triple insulation wire, SHANGHAI HENGYI SPECIAL CABLE CO LTD (E346236), type HY-88, rated 130°C. See below table for Windings Information details.

   Winding Information:

| Winding No | Pin | | Size | Turns |
|---|---|---|---|---|
| N1 | 1 | 2 | 0.3 mm*1 | 13 |
| N2 | 4 | 3 | 0.3 mm*1 | 13 |

4. Bridge (BD1) – Rated minimum 2 A, minimum 1000 V.

5. Capacitors (EC1, EC2, EC3, EC4) – Electrolytic with integral pressure relief. See below table for details.

| Electrolytic Capacitors | Rating |
|---|---|
| EC1 | See ILL.7 for details. |
| EC2 | See ILL.7 for details. |
| EC3 | minimum 50 V, maximum 4.7uF, minimum 105°C |
| EC4 | See ILL.7 for details. |

6. Line Filters (L2) – Cylindrical inductor Construction, Overall sleeved with R/C (YDPU2/8) tubing, rated min. 600 V, min 125°C. Secured on PWB by soldering. Constructed as follows.

   a. Core – Ring type Construction, ferrite, overall measured 9 mm by 7 mm.

   b. Windings – R/C (OBMW2), polyurethane enameled copper wire, rated minimum 130°C, one coil, rated minimum 130°C, 0.23 mm diameter by 120.5 turns.

7. Diode (D3) – Rated minimum 40 V, minimum 2 A.

8. Resistors (R2, R3, R4, R5, R6, R7, R21, R27) – See ILL.7 for details.

9. IC (U1) – Manufactured by KANGYUAN, type CRE62539.

10. IC (U3) – Optional, Manufactured by KEXIN, type LM358.

11. Y-capacitor (CY1) – R/C (FOWX2/8), Class Y1, Rated the following type in the table may be used.

| Manufacturer | Type | rating |
|---|---|---|
| JYH HSU (JEC) ELECTRONICS LTD (E356696) | JD Series | MIN 400Vac, MAX 4700pF, MIN 125°C |
| DONG GUAN CITY JIANKUN ELECTRONICS TECHNOLOGY CO LTD (E340699) | JT | MIN 400Vac, MAX 4700pF, MIN 125°C |
| SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD (E208107) | CD | MIN 400Vac, MAX 4700pF, MIN 125°C |

12. Transformer (T1) – For output 16W＜P ≤24W, type EE22, Constructed as follows, See Ill. 4 for Transformer detail information:

A: Core – Ferrite, Open type construction, Overall measured approx 22.3 mm by 19.6 mm by 10.6 mm thick, wrapped by three layers of Insulation Tape, 0.05 mm thick. Core is considered as primary part.

B: Bobbin - Two-flange bobbin. R/C (QMFZ2/8), CHANG CHUN PLASTICS CO LTD(E59481), Type T375J, BK or BN color, rated V-0, 150°C, measured minimum 0.64 mm thick.

C: Primary Windings (N1, N4, N5) – R/C (OBMW2), Enameled copper magnet wire, rated 130°C Min. See below table Windings Information for turns and diameter.

D: Secondary Windings (N3) – R/C (OBJT2), SHANGHAI LUCKY TRADE CO LTD (E305883), Type TIW-B, rated 130°C. See below table Windings Information for turns and diameter.

Winding Information:

| Winding | Location | Pin No. | Wire Size, mm | No. of Turns |
|---|---|---|---|---|
| N1 | PRI | 4-3 | 0.33 X 1 | 25 |
| N2 | PRI | 2-NC | 0.15 X 2 | 20 |
| N3 | SEC | 7-6 | 0.75 X 1 | 7 |
| N4 | PRI | 1-2 | 0.15 X 2 | 10 |
| N5 | PRI | 3-5 | 0.33 X 1 | 23 |

Insulation Information

| Location | Material | Layers | Total Thickness (mm) |
|---|---|---|---|
| Outer-wrap | Insulation Tape | 3 | Min. 0.15 |
| N5 to N4 | Insulation Tape | 2 | Min. 0.10 |
| N4 to N3 | Insulation Tape | 2 | Min. 0.10 |
| N3 to N2 | Insulation Tape | 2 | Min. 0.10 |
| N2 to N1 | Insulation Tape | 2 | Min. 0.05 |
| N1 to Core | Bobbin | - | 0.64 |

E: Insulation Tape – R/C (OANZ2), JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111), Type CT* (b)(g), rated 130°C, 0.05 mm thick.

F: Tubing – R/C (YDPU2), Rated minimum 300V, 200°C.

G. Primary Crossover Lead Insulation – One layer of Insulation Tape is used as primary crossover lead insulation.

H. Varnish – R/C (OBOR2), John C Dolph Co (E317427), type BC-346A, rated min. 130°C.

13. Transformer (T1) – For output 13.5W＜P ≤16W, type EE20, Constructed as follows, See Ill. 5 for Transformer detail information:

A: Core – Ferrite, Open type construction, Overall measured approx 21.8 mm by 21.1 mm by 5.8 mm thick, wrapped by three layers of Insulation Tape, 0.05 mm thick. Core is considered as primary part.

B: Bobbin - Two-flange bobbin. R/C (QMFZ2/8), CHANG CHUN PLASTICS CO LTD(E59481), Type T375J, BK or BN color, rated V-0, 150°C, measured minimum 0.64 mm thick.

C: Primary Windings (N1, N4, N5) – R/C (OBMW2), Enameled copper magnet wire, rated 130°C Min. See below table Windings Information for turns and diameter.

D: Secondary Windings (N3) – R/C (OBJT2), SHANGHAI LUCKY TRADE CO LTD (E305883), Type TIW-B, rated 130°C. See below table Windings Information for turns and diameter.

| Winding | Location | Pin No. | Wire Size, mm | No. of Turns |
|---|---|---|---|---|
| N1 | PRI | 4-3 | 0.24 X 1 | 45 |
| N2 | PRI | 2-NC | 0.15 X 2 | 30 |
| N3 | SEC | 7-6 | 0.65 X 1 | 14 |
| N4 | PRI | 1-2 | 0.24 X 1 | 16 |
| N5 | PRI | 3-5 | 0.24 X 1 | 40 |

Insulation Information

| Location | Material | Layers | Total Thickness (mm) |
|---|---|---|---|
| Outer-wrap | Insulation Tape | 3 | Min. 0.15 |
| N5 to N4 | Insulation Tape | 2 | Min. 0.10 |
| N4 to N3 | Insulation Tape | 2 | Min. 0.10 |
| N3 to N2 | Insulation Tape | 2 | Min. 0.10 |
| N2 to N1 | Insulation Tape | 2 | Min. 0.05 |
| N1 to Core | Bobbin | - | 0.64 |

E: Insulation Tape – R/C (OANZ2), JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111), Type CT* (b)(g), rated 130°C, 0.05 mm thick.

F: Tubing – R/C (YDPU2), Rated minimum 300V, 200°C.

G. Primary Crossover Lead Insulation – One layer of Insulation Tape is used as primary crossover lead insulation.

H. Varnish – R/C (OBOR2), John C Dolph Co (E317427), type BC-346A, rated min. 130°C.

13. Transformer (T1) – For output 0＜P≤13.5W, type EE18, Constructed as follows, See Ill. 6 for Transformer detail information:

A: Core – Ferrite, Open type construction, Overall measured approx 18 mm by 13.5 mm by 8.1 mm thick, wrapped by three layers of Insulation Tape, 0.05 mm thick. Core is considered as primary part.

B: Bobbin - Two-flange bobbin. R/C (QMFZ2/8), CHANG CHUN PLASTICS CO LTD(E59481), Type T375J, BK or BN color, rated V-0, 150°C, measured minimum 0.64 mm thick.

C: Primary Windings (N1, N2) – R/C (OBMW2), Enameled copper magnet wire, rated 130°C Min. See below table Windings Information for turns and diameter.

D: Secondary Windings (N3) – R/C (OBJT2), SHANGHAI LUCKY TRADE CO LTD (E305883), Type TIW-B, rated 130°C. See below table Windings Information for turns and diameter.

| Winding | Location | Pin No. | Wire Size, mm | No. of Turns |
|---|---|---|---|---|
| N1 | PRI | 4-3 | 0.21 X 1 | 70 |
| N2 | PRI | 2-1 | 0.15 X 2 | 14 |
| N3 | SEC | 5-6 | 0.6 X 1 | 8 |

Insulation Information

| Location | Material | Layers | Total Thickness (mm) |
|---|---|---|---|
| Outer-wrap | Insulation Tape | 3 | Min. 0.15 |
| N3 to N2 | Insulation Tape | 2 | Min. 0.10 |
| N2 to N1 | Insulation Tape | 2 | Min. 0.05 |
| N1 to Core | Bobbin | - | 0.64 |

E: Insulation Tape – R/C (OANZ2), JINGJIANG YAHUA PRESSURE SENSITIVE GLUE CO LTD (E165111), Type CT* (b)(g), rated 130°C, 0.05 mm thick.

F: Tubing – R/C (YDPU2), Rated minimum 300V, 200°C.

G. Primary Crossover Lead Insulation – One layer of Insulation Tape is used as primary crossover lead insulation.

H. Varnish – R/C (OBOR2), John C Dolph Co (E317427), type BC-346A, rated min. 130°C.

Figure-1 Page-1

Figure-2 Page-1

Figure-3 Page-1

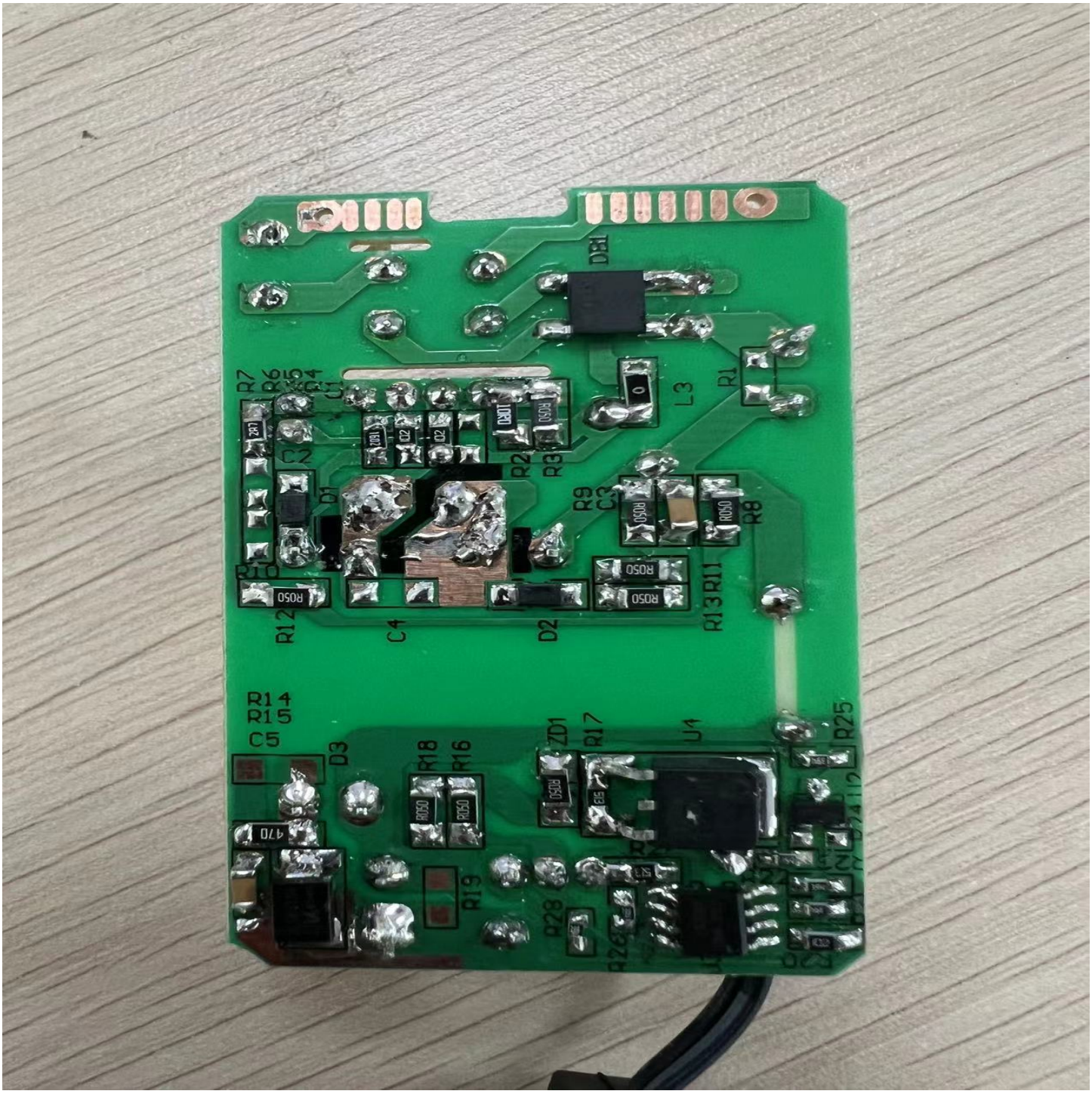


Illustration-1 Page-1

Unit: mm

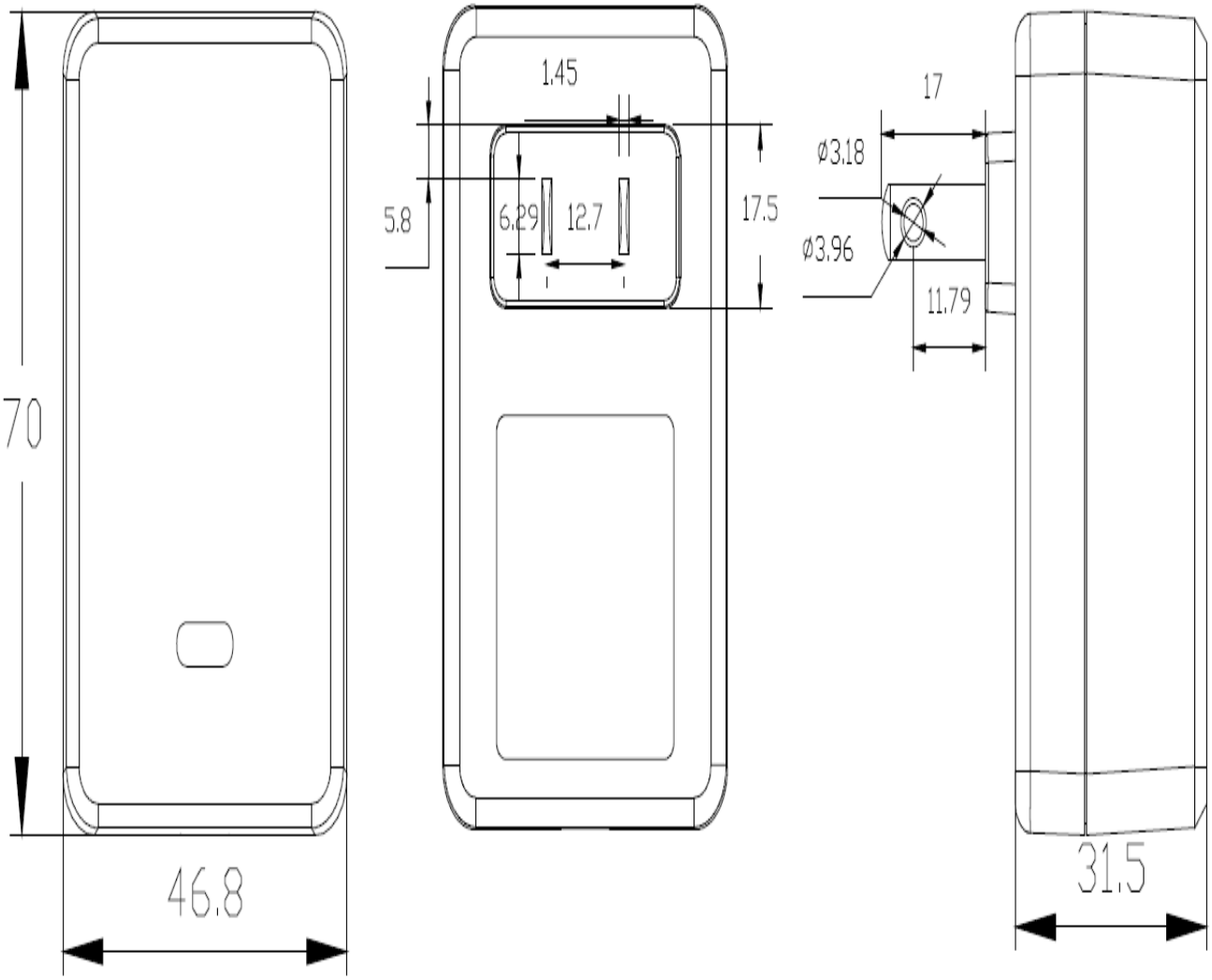
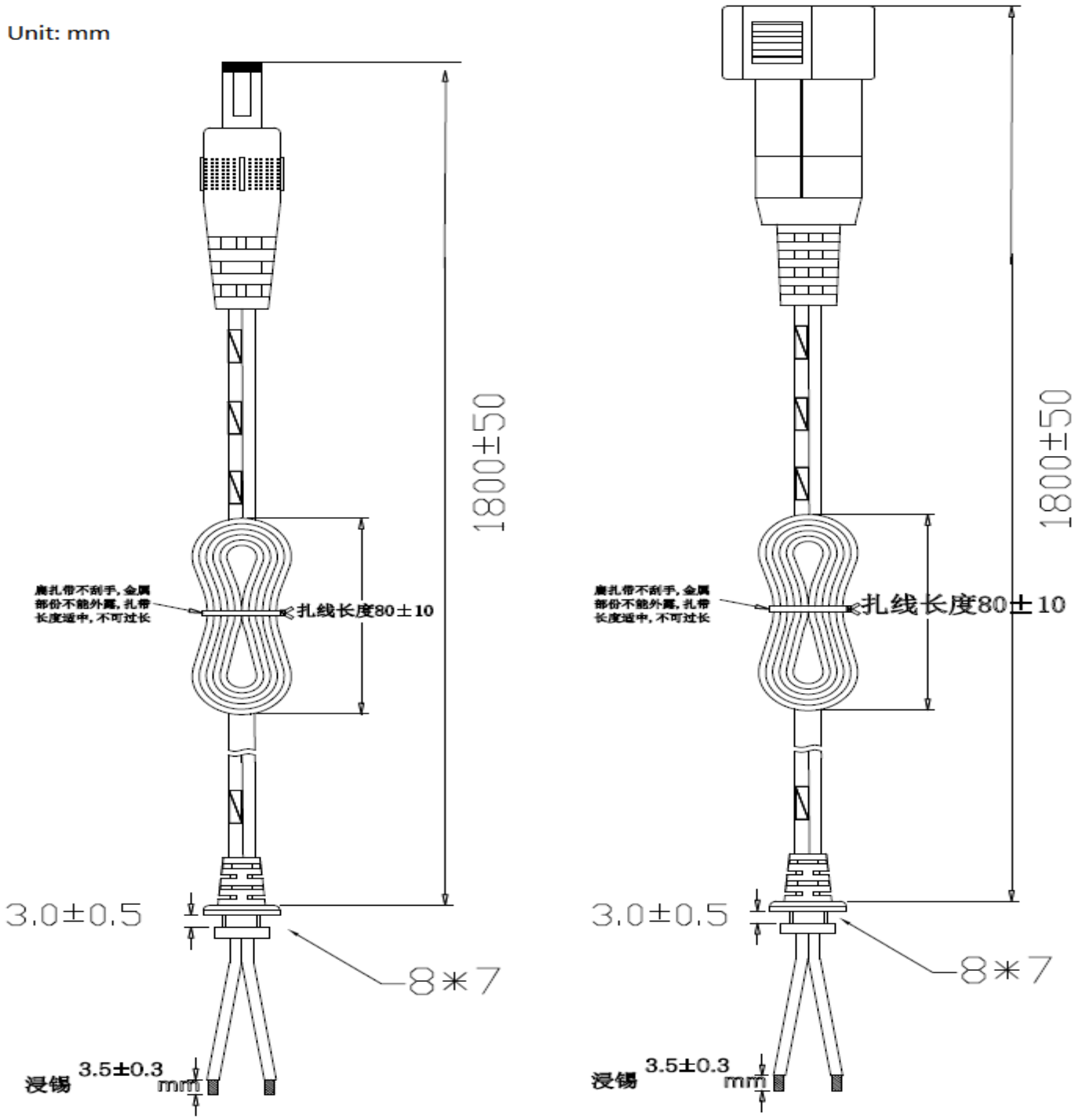


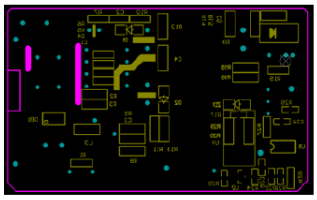
Illustration-2 Page-1



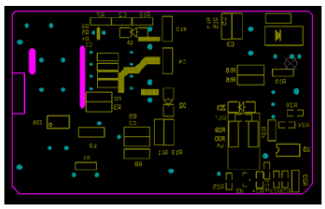
The following Page(s) are related to Illustration-3. The next supplement, if applicable, will be identified with a new Supplement Page Heading

底层

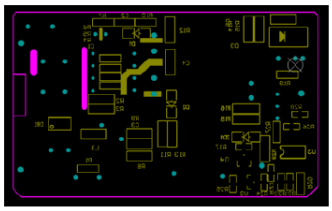
EE22 变压器



EE20 变压器

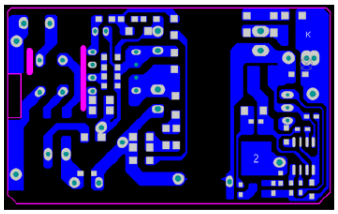


EE18 变压器

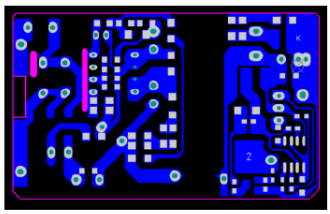


走线层

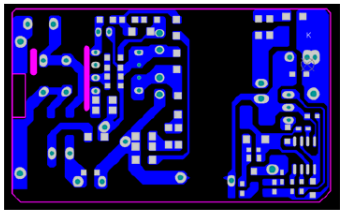
EE22 变压器



EE20 变压器



EE18 变压器



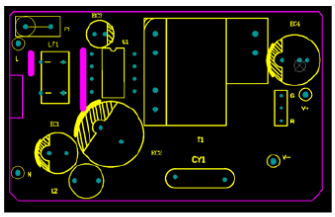
## PCB 图

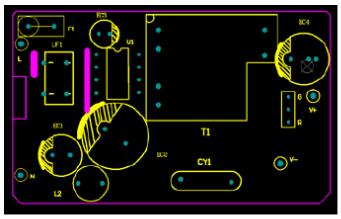
EE22 变压器

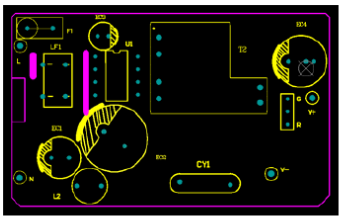
EE20 变压器

EE18 变压器

顶层



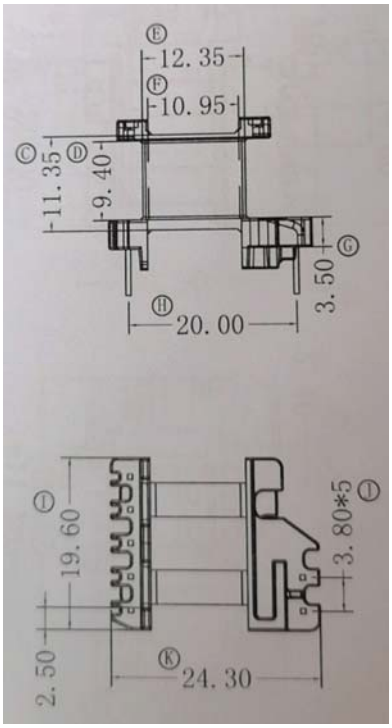


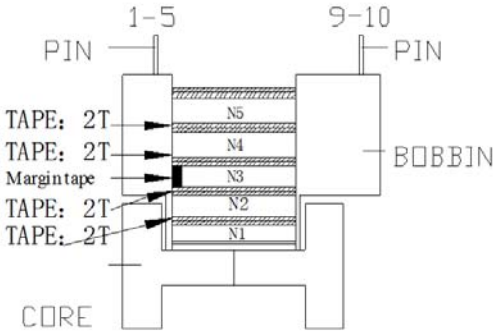


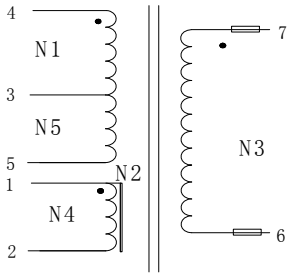
The following Page(s) are related to Illustration-4. The next supplement, if applicable, will be identified with a new Supplement Page Heading

EE22变压器规格书

一、外观图、结构图、原理图（单位：mm）




注：

1.骨架为EE22加宽立式，5+2PIN ，全脚。 成品时PIN3脚剪掉3/4。

2.磁芯中柱需研磨气隙，气隙置于PIN端，磁芯外包3Ts*10mm淡黄色Tape固定。

3.产品真空含浸。

**4.磁芯用0.33镀锡线连接PIN2脚**

二、电气特性/ELECTRICAL CHARACTERISTEC

| 序号 | 项目 | 测量点 | 技术要求 | 测试条件 | 测试仪器 |
|---|---|---|---|---|---|
| 1 | 电感量 | Lp4-5 | 0.7-0.9mH | 1KHz/1V | LCZ1062 |
| 2 | 漏感量 | LK4-5 | 40uH MAX | 10KHz/1V | LCZ1062 |
| 3 | 抗电强度 HI-POT | PRI-SEC | AC3750V | AC/50Hz 1mA 60S | TOS-7030 |
| | | SEC-CORE | AC1500V | | |
| 4 | 绝缘强度 INSULATION | PRI-SEC | ≥100MΩ | DC500V | TOS-7030 |
| | | SEC-CORE | | | |

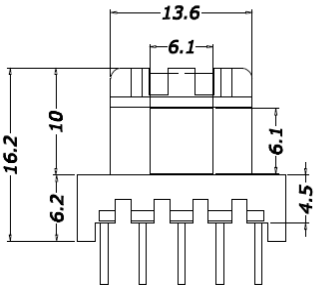
三、绕线表:**CNC绕线机：骨架PIN端朝机台,轴芯顺时针方向旋转绕制。**

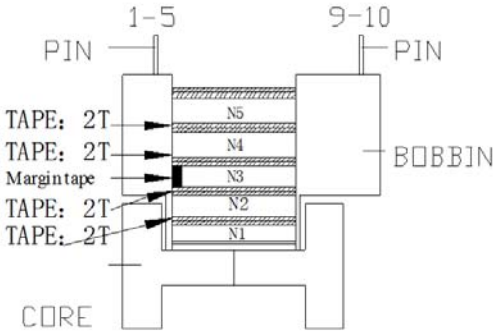
| 序号 NO. | 起头 START | 收尾 FINISH | 圈数 TURNS | 漆包线 WIRE | 挡墙、胶带圈数规格 | |
|---|---|---|---|---|---|---|
| | | | | | 绕制方式 | 胶带 TAPE |
| N1 | 4 | 3 | 25TS | 2UEWΦ0.33*1P | 密绕一层 | 2TS |
| N2 | 2 | NC | 20TS | 2UEWΦ0.15*2P | 密绕一层 | 2TS |
| N3 | 7 | 6 | 7TS | 04TEX-E-0.75 | 1mm挡墙 1-5脚边包4TS 套管套于7,6脚 排绕一层 | 2TS |
| N4 | 1 | 2 | 10TS | 2UEWΦ0.15*2P | 散绕一层 | 2TS |
| N5 | 3 | 5 | 23TS | 2UEWΦ0.33*1P | 密绕一层 | 2TS |

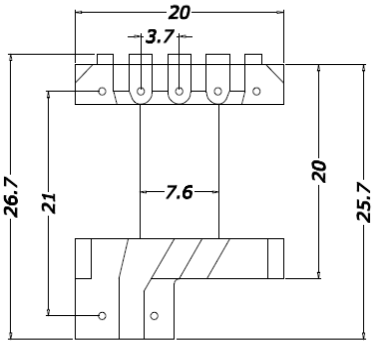
The following Page(s) are related to Illustration-5. The next supplement, if applicable, will be identified with a new Supplement Page Heading

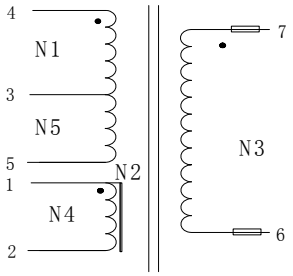
EE20变压器规格书

一、外观图、结构图、原理图（单位：mm）




注：

1.骨架为EE22加宽立式，5+2PIN ，全脚。 成品时PIN3脚剪掉3/4。

2.磁芯中柱需研磨气隙，气隙置于PIN端，磁芯外包3Ts*10mm淡黄色Tape固定。

3.产品真空含浸。

**4.磁芯用0.33镀锡线连接PIN2脚**

二、电气特性/ELECTRICAL CHARACTERISTEC

| 序号 | 项目 | 测量点 | 技术要求 | 测试条件 | 测试仪器 |
|---|---|---|---|---|---|
| 1 | 电感量 | Lp4-5 | 0.8-1.2mH | 1KHz/1V | LCZ1062 |
| 2 | 漏感量 | LK4-5 | 40uH MAX | 10KHz/1V | LCZ1062 |
| 3 | 抗电强度 HI-POT | PRI-SEC | AC3750V | AC/50Hz 1mA 60S | TOS-7030 |
| | | SEC-CORE | AC1500V | | |
| 4 | 绝缘强度 INSULATION | PRI-SEC | ≥100MΩ | DC500V | TOS-7030 |
| | | SEC-CORE | | | |

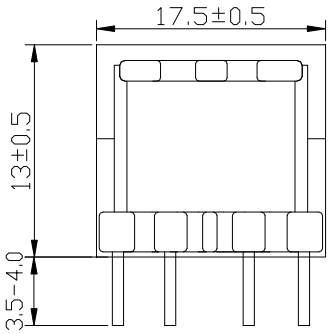
三、绕线表:**CNC绕线机：骨架PIN端朝机台,轴芯顺时针方向旋转绕制。**

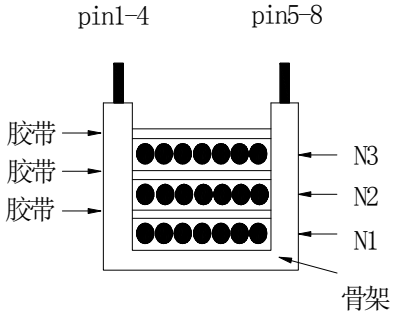
| 序号 NO. | 起头 START | 收尾 FINISH | 圈数 TURNS | 漆包线 WIRE | 挡墙、胶带圈数规格 MARGIN、TAPE TURNS | |
|---|---|---|---|---|---|---|
| | | | | | 绕制方式 | 胶带 TAPE |
| N1 | 4 | 3 | 45TS | 2UEWΦ0.24*1P | 密绕一层 | 2TS |
| N2 | 2 | NC | 30TS | 2UEWΦ0.15*2P | 散绕一层 | 2TS |
| N3 | 7 | 6 | 14TS | 04TEX-E-0.65 | 1.5mm挡墙 1-5脚边包4TS 套管套于9,10脚 排绕一层 | 2TS |
| N4 | 1 | 2 | 16TS | 2UEWΦ0.24*1P | 散绕一层 | 2TS |
| N5 | 3 | 5 | 40TS | 2UEWΦ0.24*1P | 密绕一层 | 2TS |

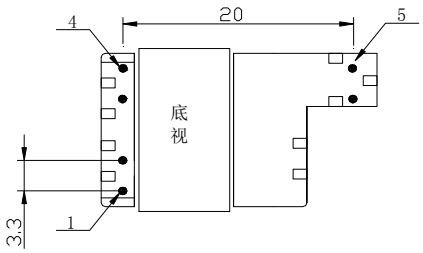
The following Page(s) are related to Illustration-6. The next supplement, if applicable, will be identified with a new Supplement Page Heading

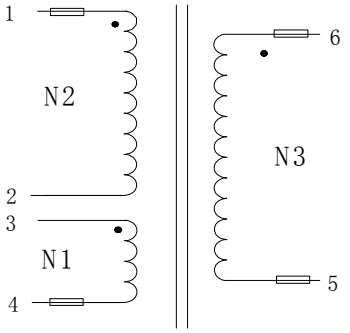
EE18变压器规格书

一、外观图、结构图、原理图（单位：mm）




注：

1.骨架为EE22加宽立式，5+2PIN ,全脚。 成品时PIN3脚剪掉3/4。

2.磁芯中柱需研磨气隙，气隙置于PIN端，磁芯外包3Ts*10mm淡黄色Tape固定。

3.产品真空含浸。

**4.磁芯用0.33镀锡线连接PIN2脚**

二、电气特性/ELECTRICAL CHARACTERISTEC

| 序号 | 项目 | 测量点 | 技术要求 | 测试条件 | 测试仪器 |
|---|---|---|---|---|---|
| 1 | 电感量 | Lp4-3 | 0.9-1.1mH±5% | 1KHz/1V | LCZ1062 |
| 2 | 漏感量 | LK4-5 | 40uH MAX | 10KHz/1V | LCZ1062 |
| 3 | 抗电强度 HI-POT | PRI-SEC | AC3750V | AC/50Hz 1mA 60S | TOS-7030 |
| | | SEC-CORE | AC1500V | | |
| 4 | 绝缘强度 INSULATION | PRI-SEC | ≥100MΩ | DC500V | TOS-7030 |
| | | SEC-CORE | | | |

三、绕线表:**CNC绕线机：骨架PIN端朝机台,轴芯顺时针方向旋转绕制。**

| 序号 NO. | 起头 START | 收尾 FINISH | 圈数 TURNS | 漆包线 WIRE | 挡墙、胶带圈数规格 MARGIN、TAPE TURNS | |
|---|---|---|---|---|---|---|
| | | | | | 绕制方式 | 胶带 TAPE |
| N1 | 4 | 3 | 70TS | 2UEWΦ0.21*1P | 4脚套管 密绕三层 | 2TS |
| N2 | 2 | 1 | 14TS | 2UEWΦ0.15*2P | 1脚套管 密绕一层 | 2TS |
| N3 | 5 | 6 | 8TS | 04TEX-E-0.6 | 套管套于5,6脚 排绕两层 | 2TS |

The following Page(s) are related to Illustration-7. The next supplement, if applicable, will be identified with a new Supplement Page Heading

## Model Difference of components rating for ZNL-UAAABBB series

The differences between the main models and the cover models are as below:

1, EC1, EC2 are adjusted with output power
2. R2, R3 are adjusted with output current.
3. EC4 is adjusted with output voltage and current
4. R4, R5, R6 are adjusted with output voltage
5. D3 is adjusted with output voltage and power
6. Transformer is used as below.

| Model No. | Input | | | Output | | | Transformer Type |
|---|---|---|---|---|---|---|---|
| Cat. No. | V | Hz | A | V (dc) | A | *POWER(W)* | |
| ZNL-UAAABBB | 110-120 | 50-60 | 0.5 | 3-36 | 0.1-2 | 0＜P≤13.5 | *EE18* |
| ZNL-UAAABBB | 110-120 | 50-60 | 0.5 | 3-36 | 0.1-2 | 13.5＜P ≤16 | EE20 |
| ZNL-UAAABBB | 110-120 | 50-60 | 0.5 | 3-36 | 0.1-2 | 16＜P ≤24 | EE22 |

| Components | EE18 | EE20 | EE22 |
|---|---|---|---|
| R2,R3, | 0.75R-15R, 0.25 W | 0.62R-12R, 0.25 W | 0.47R-10R, 0.25 W |
| R4, R5, R6, | 1.5K-2.2M, 0.125 W | 1.5K-2.2M, 0.125 W | 1.5K-2.2M, 0.125 W |
| R7 | 1R-15R, 0.125 W | 1R-15R, 0.125 W | 1R-15R, 0.125 W |
| R21 | 10K-200K, 0.1 W | 10K-200K, 0.1 W | 10K-200K, 0.1 W |
| R27 | 5.1K-100K, 0.125 W | 5.1K-100K, 0.125 W | 5.1K-100K, 0.125 W |
| EC1 | minimum 2.2uF/400V | Minimum10uF/400V | minimum 10uF/400V |
| EC2 | minimum 2.2uF/400V | minimum 10uF/400V | minimum 15uF/400V |
| EC4 | minimum 220uF/10V | minimum 220uF/10V | minimum 220uF/10V |
| D3 | minimum 40 V, minimum 2 A | minimum 40 V, minimum 2 A | minimum 40 V, minimum 2 A |
| LF1 | no | no | yes |

R2 or R3 = 0.5/I

I: Output current

(R4 or R5＋R6) / R4 or R5 = $V_0$*NA/2NS

$V_0$: Output Volteage

NS: Turns of Sec. coils

NA: Turns of Feedback coils