

UL TEST REPORT AND PROCEDURE

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| Standard: | UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment - Safety - Part 1: General Requirements) |
| Certification Type: | Component Recognition |
| CCN: | QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment) |
| Product: | Switching Power Supplies |
| Model: | CCH400PSXX and CCH600PSXX (where XX = can be any number between 12 to 48 designating the output voltage) |
| Rating: | Model CCH400PSXX Input: 100-240 Vac, 50/60 Hz, 6.5 A Model CCH600PSXX Input: 100-240 Vac, 50/60 Hz, 8.9 A Output: See Model Differences for ratings. |
| Applicant Name and Address: | XP POWER INC SUITE 150 1241 E DYER RD SANTA ANA CA 92705 UNITED STATES |

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

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Reviewed by: Linus Park

Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

- A. Authorization - The Authorization page may include additional Factory Identification Code markings.
- B. Generic Inspection Instructions -
 - i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.
 - ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.
 - iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

The product is a component AC-DC power supply for building-in, open frame type provided with a metal chassis, incorporating primary and SELV components and a baseplate for conduction cooling.

Model Differences

The power supplies in the series are differentiated by the output voltage and current ratings, number of turns of primary/secondary windings in the Transformer (T1 (Power)) and minor differences in the secondary circuit components.

Model CCH400PSXX Series is identical to Model CCH600PSXX Series with exception to the output ratings for their respective series.

Suffix "XX" denotes the output voltage rating.

See below for Output Ratings:

Model CCH400PS12: Output Rated: 12 Vdc, 34.0 A (400 W); Stand-by: 5 V, 0.5A

Model CCH400PS24: Output Rated: 24 Vdc, 17.0 A (400 W); Stand-by: 5 V, 0.5A

Model CCH400PS28: Output Rated: 28 Vdc, 14.5 A (400 W); Stand-by: 5 V, 0.5A

Model CCH400PS48: Output Rated: 48 Vdc, 8.5 A (400 W); Stand-by: 5 V, 0.5A

Model CCH600PS12: Output Rated: 12 Vdc, 50.0 A (600 W); Stand-by: 5 V, 0.5A

Model CCH600PS24: Output Rated: 24 Vdc, 25.0 A (600 W); Stand-by: 5 V, 0.5A

Model CCH600PS28: Output Rated: 28 Vdc, 21.5 A (600 W); Stand-by: 5 V, 0.5A

Model CCH600PS48: Output Rated: 48 Vdc, 12.5 A (600 W); Stand-by: 5 V, 0.5A

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : To be determined in the end-use product.
- Operating condition : continuous

- Access location : To be determined in the end-use product.
- Over voltage category (OVC) : OVC II
- Mains supply tolerance (%) or absolute mains supply values : +10%, -10%
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : N/A
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : Model CCH400PSXX: 6.5A, Model CCH600PSXX: 8.9A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 3048
- Altitude of test laboratory (m) : 40
- Mass of equipment (kg) : 1.5
- The product is intended for use on the following power systems: TN
- The equipment disconnect device is considered to be: determined in the end-product.,
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 (which includes all European national differences, including those specified in this test report).

Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- Consideration to repeating Heating and Touch Current Tests should be given in the end-product evaluation.
- Means of disconnection to be provided as part of the end-product.

- Components within the power supply are heat sunk to the base plate of the power supply. The base plate temperature should not exceed 85°C as part of the end product evaluation.
- The maximum continuous power supply output (Watts) relied on the base plate temperature not exceeding 85°C. End product shall determine appropriate heat sink size, maximum recommended ambient temperature, and output load to prevent the base plate temperature from exceeding 85°C.
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-Earthed Dead Metal: 243 Vrms, 366 Vpk, Primary-SELV: 353 Vrms, 631 Vpk
- The following secondary output circuits are SELV: All outputs
- The following secondary output circuits are at hazardous energy levels: All outputs
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The maximum investigated branch circuit rating is: 20 A
- The investigated Pollution Degree is: 2
- Proper bonding to the end-product main protective earthing termination is: Required
- An investigation of the protective bonding terminals has: Not been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral: CON3
- The following end-product enclosures are required: Mechanical, , Fire, and , Electrical
- The following Production-Line tests are conducted for this product: Earthing Continuity, , Electric Strength
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C): Platform: L1-L5, L7, L8, L12, L13, PFC Inductor, T1 and T3 (Class F, 155°C); Control Board: L15 and T1 (Class F, 155°C)
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing: Power Supply Baseplate (85°C)

Additional Information

The clearance distances have additionally been assessed for suitability up to 3048 m elevation (1.15 correction factor as per IEC 60664-1, Table A2).


Power supply is designed with a base plate that acts as a heat sink to all the power supply components; as a result, the actual component temperatures are based upon the relative temperature rise from the base plate temperature. Based upon this design, the base plate temperature should not exceed 85°C to insure component temperatures do not exceed their limits.

Nameplate Marking label provided is considered representative of all models.

Additional Standards

The product fulfills the requirements of: CSA C22.2 No. 60950-1-07 + A1:2011, , EN 60950-1:2006 + A1:2010 + A11:2009 + A12:2011, IEC 60950-1:2005 + A1:2009, UL 60950-1 2nd Ed. Revised 2011-12-19

Markings and instructions

| Clause Title | Marking or Instruction Details |
|--|--|
| Power rating - Ratings | Ratings (voltage, frequency/dc, current) |
| Power rating - Company identification | Listee's or Recognized company's name, Trade Name, Trademark or File Number |
| Power rating - Model | Model Number |
| Fuses - Non-operator access/soldered-in fuses | Unambiguous reference to service documentation for instructions for replacement of fuses replaceable only by service personnel |
| Terminal for main protective earthing | Provided adjacent to the main protective earthing terminal (60417-5019)  |
| Terminals for external primary power supply conductors | Capital letter "N" located adjacent to a terminal intended exclusively for connection of the primary power neutral conductor |

Special Instructions to UL Representative

Units provided with optional fuse, FS2, should also be provided with the "CAUTION: Double pole/neutral fusing". The marking is not required for single pole fused units.

| Production-Line Testing Requirements | | | | | | |
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| <u>Electric Strength Test Special Constructions - Refer to Generic Inspection Instructions, Part AC for further information.</u> | | | | | | |
| Model | Component | Removable Parts | Test probe location | V rms | V dc | Test Time, s |
| All Models | Transformer, T1 | - | Primary to Secondary | 300 0 | 4242 | 1 |
| <u>Earthing Continuity Test Exemptions - This test is not required for the following models:</u> | | | | | | |
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| <u>Electric Strength Test Exemptions - This test is not required for the following models:</u> | | | | | | |
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| <u>Electric Strength Test Component Exemptions - The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test:</u> | | | | | | |
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| <u>Sample and Test Specifics for Follow-Up Tests at UL</u> | | | | | | |
| Model | Component | Material | Test | Sample(s) | Test Specifics | |
| N/A | | | | | | |

| 1.5.1 | TABLE: list of critical components | | | | | Pass |
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| Object/part or Description | Manufacturer/ trademark | type/model | technical data | Product Category CCN(s) | Required Marks of Conformity | Supplement ID |
| Cover | Various | Various | Steel. Overall approx. 21.5 by 10 by 4.1 cm, min. 1 mm thick. Provided with numerous slot openings. Secured to Baseplate using screws. See Enclosure 4-20 for details | - | - | |
| Baseplate | Various | Various | Aluminum. Overall approx. 21.5 by 10.3 cm by 6 mm thick.. | - | - | |
| Printed Wiring Board – Input Main Board | Various | Various | Overall 21 by 3.9 cm. Rated min. V-1, 130°C (rated for direct support of live parts). Secured to Baseplate using screws. | ZMPV2 | UL | |
| Input Main Board - Primary Connector (CON 3) | AMP/TYCO | 1-350943-0 | Rated min 10A, 250V, min. 105°C. Pins secured through PWB by screws and soldered. | ECBT2 (E28476) | UL | |
| Input Main Board - Fuse (FS1) | Littelfuse | 216 Series (0216010XEP) | Rated 10A, min. 250V, min. 105°C. Mounted horizontally with leads soldered through Main PWB. | JDYX2, JDYX8 (E10480) | UL, cUL | |
| Input Main Board - Fuse (FS1)- Alternate | Bel Fuse Inc | 5HFP Series (5HFP10-R) | Rated 10A, min. 250V, min. 105°C. Mounted horizontally with leads soldered through Main PWB | JDYX2 (E20624) | UL, cUL | |
| Input Main Board - X- Capacitors (C6,C7,C9,C10,C58,C59) | Xiamen Faratronic | MKP62 Series (Type C42) | Rated max. 2.2 uF, min. 250V, marked "X2". | FOWX2, FOWX8 (E186600) | UL, cUL | |
| Input Main Board - X- Capacitors (C6,C7,C9,C10,C58,C59) - Alternate | Epcos/Siemens | B3292 Series | Rated max. 2.2 uF, min. 250V, marked "X2". | FOWX2, FOWX8 (E97863) | UL, cUL | |

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| Input Main Board - X-Capacitors (C6,C7,C9,C10,C58,C59) - Alternate | Vishay | F1778 Series | Rated max. 2.2 uF, min. 250V, marked "X2". | FOWX2, FOWX8 (E112471) | UL, cUL | |
| Input Main Board - X-Capacitors (C6,C7,C9,C10,C58,C59) - Alternate | Vishay | MKP 339 Series (2222 339 24105) | Rated max. 2.2 uF, min. 250V, marked "X2". | FOWX2, FOWX8 (E112471) | UL, cUL | |
| Input Main Board - X-Capacitors (C6,C7,C9,C10,C58,C59) - Alternate | Shiny Space | SX1 Series | Rated max. 2.2 uF, min. 250V, marked "X2". | FOWX2, FOWX8 (E186561) | UL, cUL | |
| Input Main Board - X-Capacitors (C6,C7,C9,C10,C58,C59) - Alternate | Xiamen Faratronic | MKP62 Series (Type C42) | Rated max. 2.2 uF, min. 250V, marked "X2". | FOWX2, FOWX8 (E186600) | UL, cUL | |
| Input Main Board - X-Capacitors (C6,C7,C9,C10,C58,C59) - Alternate | Yuon Yu Electronics Co. (Winday) | MPX Series | Rated max. 2.2 uF, min. 250V, marked "X2". | FOWX2 (E200119) | UL | |
| Input Main Board - Insulator Sheet – X-Capacitors (C6,C7) | 3M | 1218 | Two layers provided on side and top of capacitor body, min. 0.076 mm thick. | OANZ2 (E17385) | UL | |
| Input Main Board - Relay (RL1) | Omron | G5Q Series (G5Q-14 DC24) | Rated min. 24V, 10A (Not relied upon for isolation) | NRNT2 (E41515) | UL | |
| Input Main Board - Y-Capacitors (C12,C14,C55) | Murata | KH Series | Rated max. 4700 PF, min. 250V, marked "Y2". | FOWX2 (E37921) | UL | |
| Input Main Board - Y-Capacitors (C12,C14,C55) - Alternate | Panasonic | TS Series | Rated max. 4700 PF, min. 250V, marked "Y2". | FOWX2 (E62674) | UL | |
| Input Main Board - Y-Capacitors (C12,C14,C55) - Alternate | Vishay | WYO or WKO Series | Rated max. 4700 PF, min. 250V, marked "Y2". | FOWX2, FOWX8 (E183844) | UL, cUL | |

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| Input Main Board - Y-Capacitors (C12,C14,C55) - Alternate | TDK (TDK-EPC) | CS Series | Rated max. 4700 PF, min. 250V, marked "Y2". | FOWX2 (E37861) | UL | |
| Input Main Board - Y-Capacitors (C70,C71) | Murata | KH Series | Rated max. 1000 PF, min. 250V, marked "Y2". | FOWX2 (E37921) | UL | |
| Input Main Board - Y-Capacitors (C70,C71) - Alternate | Panasonic | TS Series | Rated max. 1000 PF, min. 250V, marked "Y2". | FOWX2 (E62674) | UL | |
| Input Main Board - Y-Capacitors (C70,C71) - Alternate | Vishay | WYO Series | Rated max. 1000 PF, min. 250V, marked "Y2". | FOWX2, FOWX8 (E183844) | UL, cUL | |
| Input Main Board - Inductor (L4) (PRI) | XP Power | Various (100XXXXX, where X can be any number between 0 and 9. Construction of Inductor 10012258 represents the entire series) | Toroidal. Core: 2 provided, approx. 7.1 mm OD by 9.6 mm high. Winding: (OBWM2), Copper Magnet Wire, rated min. 105°C. Provided with Inductor Support. See Enclosure 4-01 for construction details. Secured to PWB by solder. | - | - | |
| Input Main Board - Inductor Support for Inductor (L4) | Dupont | FR530 (Rynite) | Overall 16.87 by 27.7 mm by min. 0.7 mm thick. Rated V-0, min. 155°C. | QMFZ2 (E41938) | UL | |
| Input Main Board - Inductor Support for Inductor (L4) - Alternate | Chevron Phillips Chemical Co | R-4-230BL (Ryton) | Overall 16.87 by 27.7 mm by min. 0.7 mm thick. Rated V-0, min. 155°C. | QMFZ2 (E54700) | UL | |
| Input Main Board - Inductor (L1, L5, L12, L13) (PRI) | XP Power | Various (100XXXXX, where X can be any number between 0 and 9. Construction of Inductor 10009332 | Toroidal. Winding: (OBWM2), Copper Magnet Wire, rated min. 105°C. See Enclosure 4-02 for construction details. Secured to PWB and Baseplate using Clampbase Input Filter Cover. | - | - | |

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| | | represents the entire series) | | | | |
| Input Main Board - Clampbase Input Filter Cover (Inductors L1, L5, L12, L13) | Dupont | FR530 (Rynite) | Overall 8.5 by 5.8 by 2.1 cm, min. 0.9 mm thick. Rated V-0, min. 155°C Completely Covers Inductors L1, L5, L12, L13. | QMFZ2 (E41938) | UL | |
| Input Main Board - Gap Pad - Clampbase Input Filter Cover | Bergquist | GPV0-0.080-01-0816 | Rated V-0, min. 150°C, min. 2 mm thick. Provided between Inductors (Inputs 1A, 2, and 3) and Baseplate. See Enclosure 4-21 for details. | QMFZ2 (E59150) | - | |
| Input Main Board - Gap Pad - Clampbase Input Filter Cover | Bergquist | GPV0-0.080-01-0816 | Rated V-0, min. 150°C, min. 2 mm thick. Provided between Inductor (Input 1B) and Baseplate. See Enclosure 4-21 for details. | QMFZ2 (E59150) | - | |
| Input Main Board – Insulator Sheet - (Inductors L1, L5, L12, L13) | Dupont | Type HN | Kapton Film, rated V-0, min. 150°C, min. 0.075 mm thick. Provided between Gap Pads on Inductors L1, L5, L12, and L13 and Baseplate. See Enclosure 4-21 for details. | QMFZ2 (E39505) | UL | |
| Thermistor (TH1) - Optional | Various | Various | PTC. Rated min. 240 V, min. 150°C, min. 7 ohm, Iss min. 5 A (Not relied upon for safety). | - | - | |
| Input Main Board - Thermistor (TH1) - Optional | Ametherm | SL15 Series (SL15 7R005) | Rated 25 Ohm, 3 A (Not relied upon for safety). | - | - | |
| Input Main Board - Thermistor (TH1) - Optional | Epcos/ Siemens | B57237S0709M | NTC. Rated 16 ohm at 25°C, max. 4.0 A (Not relied for safety). | - | - | |
| Input Main Board - Diode Bridge (BR1) | Shindengen America | D20XB or D25XB series | Rated Rev. voltage (rms) min. 600 V, 20A, min. 150°C (Provides 2500 Vac isolation, relied upon for Basic Insulation). Secured to | QQQX2 (E142422) | UL | |

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| | | | Baseplate by screw. | | | |
| Input Main Board - Diode Bridge (BR1) - Alternate | Various | Various | Rated Rev. voltage (rms) min. 600 V, 20A, 150°C (Provides 2500 Vac isolation, relied upon for Basic Insulation). Secured to Baseplate by screw. | QQQX2 | UL | |
| Input Main Board – Diode Bridge (BR1) - Insulating Sheet | Dupont | 100HN | Kapton tape, overall 38 by 31 by min. 0.075mm thick. Provided between BR1 body and Baseplate. | QMFZ2 (E39505) | UL | |
| Input Main Board - Electrolytic Capacitor (C28) | Various | Various | Rated max. 220 uF, min. 50V, min. 105°C. Provided with integral pressure relief. | - | - | |
| Input Main Board – Inductor (L2) (PRI) | XP Power | Various (1000XXXX, where x can be any number between 0 and 9. Construction of Inductor 10010686 represents the entire series) | Toroidal. Core: Ferrite. Overall approx. 15.3 by 12 mm. Winding: Triple Insulated Wire, see Inductor (L2) – Triple Insulated Wire for details. Oriented Vertically provided with Mounting Base between PWB and Inductor body. See Enclosure 4-04 for construction details. Provided with Class F insulation system, see Inductor Insulation System for details. | - | - | |
| Input Main Board – Mounting Base - Inductor (L2) | Chevron Phillips Chemical Co | R-4-230BL | Overall 16.2 by 2 mm. Rated V-0, min. 2 mm thick. Provided between Inductor (L2) and PWB. See Enclosure 4-04 for details. | QMFZ2 (E54700) | UL | |
| Input Main Board - Inductor (PFC)(PRI) | XP Power | Various (1000XXXX, where x can be any number between 0 and 9. Construction of | Open-type. Class F. see Inductor (PFC) – Insulation System for details. Overall approx. 41.6 by 30.2 by 26 mm. Core: Ferrite Core. | - | - | |

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| | | Inductor 10009334 represents the entire series) | Bobbin: Overall approx. 32 O.D. by 18.5 mm, see Inductor (PFC) – Bobbin Material. Windings: Triple Insulated Wire, see Inductor (PFC) – Triple Insulated Wire for details. Provided with outerwrap, see Insulation System – Insulating Tape for details. Flying Leads provided with sleeving and tubing. See Sleeving/Tubing. Secured to Baseplate using PFC Clip, Foil Clamp, and screws. See Enclosure 4-03 for details. | | | |
| Input Main Board - Inductors (PFC and L2)(PRI) - Insulation System | XP Power | Class 155 (F) | Rated 155°C. | OBJY2 (E324960) | UL | |
| Input Main Board - Inductor (PFC and L2)(PRI) - Insulating Tape | 3M | 92, 1205 or 1350F | Polyester film tape, min. 1.0 mils (0.025 mm) thick, rated min. 130°C | OANZ2 (E17385) | UL | |
| Input Main Board - Inductor (PFC)(PRI) - Bobbin Material - Alternate | DuPont | FR530 or FR530L | Rated min. V-0, min. 1 mm thick, 155°C. | QMFZ2 (E41938) | UL | |
| Input Main Board - Inductor (PFC)(PRI) - Triple Insulating Wire | Great Leoflon Industrial Co., Ltd | TRW (F) | Reinforced Insulation. Rated 155°C, min. 600 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 6kV Dielectric test during component evaluation). | OBJT2 (E211989) | UL | |
| Input Main Board - | Kuo Kuang Electronic | REFU-F | Reinforced Insulation. Rated | OBJT2 (E222087) | UL | |

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| Inductor (PFC)(PRI) - Triple Insulating Wire - Alternate | Wire Co., Ltd | | 155°C, min. 1000 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 7.5kVrms Dielectric test during component evaluation). | | | |
| PFC Clip – Inductor (PFC) | Various | Various (XP Power Part No. 10009345) | Tin Plated Copper, min. 1mm thick. See Enclosure 4-03 for details. Secures PFC Inductor to Baseplate. | - | - | |
| Top Washer – PFC Clip – Inductor (PFC) | Various | Aluminum | Overall 25 mm dia by 2 mm thick. Secures PFC foil to top of PFC Clip. | - | - | |
| Foil Clamp – Inductor (PFC) | Various | Various (XP Power Part No. 10009707) | Aluminum alloy, overall 16.5 mm dia. by 2 mm thick. Secures PFC Inductor foil to bottom of Baseplate. | - | - | |
| Input Main Board - FETS (TR1, TR2) | Various (ST Microelectronics) | Various (STW26NM60N) | Rated 600V, 20A min. 150°C. Secured to main PCB by solder. Secured to Baseplate using Metal Plate, 32.5 by 18.2 by 0.6mm thick and Screws. Provided with plastic support. See FET Support for details. | - | - | |
| Input Main Board - Diode (D1) | Various (Philips Semi) | Various (BYV29-500) | Rated 500V, 9A. Secured to Baseplate using Metal Plate, 32.5 by 18.2 by 0.6mm thick and Screws. | - | - | |
| Input Main Board - Diode and FET Support – FETS (D1,TR1, TR2) | Chevron Phillips Chemical Co | R-4-230BL | Rated V-0, overall approx. 48.5 by 20.4 by min. 2 mm thick. Provided between Diode (D1), FETs (TR1, TR2) and PWB. | QMFZ2 (E54700) | UL | |
| Input Main Board – FETS (D1,TR1, TR2) - Insulating Sheet | Variousq | Various | Natural Mica, Rated V-0, overall approx. 52.5 by 34 by min. 0.15 mm thick. Provided between Diode (D1), FETs (TR1, TR2) and PWB. See | - | - | |

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| | | | Enclosure for details. | | | |
| Input Main Board – Electrolytic Capacitor (C5) | Various (Hitachi AIC Inc) | Various (HU42W561MRA S7PEPF) | Rated 450V, 560uF, min. 105°C. Provided with integral pressure relief. Provided with Capacitor Insulator. | - | - | |
| Input Main Board – Capacitor Insulator (C5) | Chevron Phillips Chemical Co | R-4-230BL (Ryton) | Rated V-0, min. 200°C. Overall 52.5 by 39 by 38.5 mm, min. 1.25 mm thick. Provided between Capacitor (C5) body bottom and side and Baseplate | QMFZ2 (E54700) | UL | |
| Input Main Board – Electrolytic Capacitor (C22) | Various | Various | Rated 35V, 47uF, min. 105°C. Provided with integral pressure relief. Provided with Capacitor Insulator. | - | - | |
| Input Main Board – Electrolytic Capacitor (C25) | Various | Various | Rated 63V, 18uF, min. 105°C. Provided with integral pressure relief. Provided with Capacitor Insulator. | - | - | |
| Input Main Board – Electrolytic Capacitor (C28) | Various | Various | Rated 50V, 220uF, min. 105°C. Provided with integral pressure relief. Provided with Capacitor Insulator. | - | - | |
| Printed Wiring Board - Standby Board | Various | Various | Overall approx. 9 by 6.5 cm. Rated min. V-1, 130°C (rated for direct support of live parts). Secured to Output Board by solder. Provided with three flying lead wires, 26 AWG completely sleeved. See Insulating Tubing/Sleeving. Lead wires (FL1 to FL3) soldered to Input Main Board. Provided with Flying Lead Support. See Enclosure 5-02 for details | ZMPV2 | UL | |
| Standby Board – Optical | Lite On | LTV-816 Series | Double protection, isolation | FPQU2, FPQU8 | UL, cUL | |

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| Isolator (OPT1) | Semiconductor | | voltage 5000 V | (E113898) | | |
| Standby Board – Optical Isolator (OPT1) - Alternate | Renesas (NEC) | PS2561 Series | Double protection, isolation voltage 5000 V | FPQU2 (E72422) | UL | |
| Standby Board – Electrolytic Capacitor (C76) | Various | Various | Rated max. 47uF, min. 35V, 105°C. Provided with integral pressure relief. | - | - | |
| Standby Board – Bridging Capacitor (C17) | Murata | KH Series | Rated max. 1000 PF, min. 250V, marked “Y2”. | FOWX2 (E37921) | UL | |
| Standby Board – Bridging Capacitor (C17) - Alternate | Panasonic | TS Series | Rated max. 1000 PF, min. 250V, marked “Y2”. | FOWX2 (E62674) | UL | |
| Standby Board – Bridging Capacitor (C17) - Alternate | Vishay | WYO or WKO Series | Rated max. 1000 PF, min. 250V, marked “Y2”. | FOWX2, FOWX8 (E183844) | UL, cUL | |
| Standby Board – Electrolytic Capacitor (C20) | Various | Various | Rated max. 100uF, min. 35V, 105°C. Provided with integral pressure relief. | - | - | |
| Standby Board – Transformer (T1) | XP Power | 1000XXXX, where X can be any number between 0 and 9. Constructional of transformer 10009330 represents the entire series | Open-type. Class F, see Transformer (T1) – Insulation System for details. Overall approx. 20.5 by 20.2 by 15.4 mm. Bobbin: Overall approx. 14.1 by 12.6 by 12.6 mm, min. 1.0 mm thick, see Transformer (T1) – Bobbin Material. Primary Windings: (OBWM2), Copper Magnetic Wire, rated min. 155°C. Secondary Windings: Triple Insulated Wire, see Transformer (T1) – Triple Insulated Wire for details. Provided with outerwrap, see Insulation System – Insulating | - | - | |

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| | | | Tape for details. See Enclosure 4-19 for details. | | | |
| Standby Board – Transformer (T1)(PRI) - Insulation System | XP Power | Class 155 (F) | Rated 155°C. | OBJY2 (E324960) | UL | |
| Standby Board – Transformer (T1) - Bobbin Material - Alternate | Sumitomo Bakelite Co., Ltd. | PM-9820 or PM-9630 or T375J | Rated V-0, min. 1 mm thick, 150°C. | QMFZ2 (E41429) | UL | |
| Standby Board – Transformer (T1) - Triple Insulating Wire | Great Leoflon Industrial Co., Ltd | TRW (F) | Reinforced Insulation. Rated 155°C, min. 600 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 6kV Dielectric test during component evaluation). | OBJT2 (E211989) | UL | |
| Standby Board – Transformer (T1) - Triple Insulating Wire - Alternate | Kuo Kuang Electronic Wire Co., Ltd | REFU-F | Reinforced Insulation. Rated 155°C, min. 1000 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 7.5kVrms Dielectric test during component evaluation). | OBJT2 (E222087) | UL | |
| Standby Board – Transformer (T1) - Outerwrap | 3M Corporation | 1350F | Polyester film tape, min. 0.25 mm thick | OANZ2 (E17385) | UL | |
| Standby Board – Transformer (T1) - Insulating Tubing/Sleeving | Sumitomo | Sumitube F32 or B2 | Rated min. 600 V, min. 125°C, VW-1, min. 0.4 mm thick. | YDPU2, YDPU8 (E48762) | - | |
| Standby Board – Electrolytic Capacitor (C36) | Various | Various | Rated max. 1000uF, min. 16V, 105°C. Provided with integral pressure relief. | - | Evaluated as part of this investigation | |
| Standby Board – Electrolytic Capacitor (C7) | Various | Various | Rated max. 180uF, min. 50V, 105°C. Provided with integral pressure relief. | - | Evaluated as part of this investigation | |
| Standby Board – Electrolytic Capacitor | Various | Various | Rated max. 220uF, min. 35V, 105°C. Provided with integral | - | Evaluated as part of this | |

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| (C58) | | | pressure relief. | | investigation | |
| Standby Board – CON1 | Various (Molex Inc) | Various (87833 Series) | Rated min. 125 Vac, 2 A. Copper alloy pins housed in bodies of QMFZ2, rated min. V-2. | ECBT2 (E29179) | UL | |
| Standby Board – CON2 | Various | Various | Rated min. 250 Vac, 1 A. Copper alloy pins housed in bodies of QMFZ2, rated min. V-2. | Listed or ECBT2 or QMFZ2 | UL | |
| Printed Wiring Board – Output Board | Various | Various | Overall 21 by 3.9 cm. Rated min. V-1, 130°C (rated for direct support of live parts). Secured to Baseplate using screws. | ZMPV2 | UL | |
| Output Board - Y-Capacitors (C90,C91) | Murata | KH Series | Rated max. 1000 PF, min. 250V, marked "Y2". | FOWX2 (E37921) | UL | |
| Output Board - Y-Capacitors (C90,C91) - Alternate | Panasonic | TS Series | Rated max. 1000 PF, min. 250V, marked "Y2". | FOWX2 (E62674) | UL | |
| Output Board - Y-Capacitors (C90,C91) (PRI) - Alternate | Vishay | WYO Series | Rated max. 1000 PF, min. 250V, marked "Y2". | FOWX2, FOWX8 (E183844) | UL, cUL | |
| Output Board - FETS (TR4, TR5) | Various (Vishay or International Rectifier) | Various (IRFP460PBF) | Rated 500V, 20A min. 150°C. Secured to Output Board by solder. Secured to Baseplate using metal screws, 32.5 by 18.2 by 0.6mm thick and . Provided with plastic support. See FET Support for details. | - | Evaluated as part of this investigation | |
| Output Board - FETS (TR4, TR5) - Insulator Sheet | Various | Various | Natural Mica, Rated V-0, overall approx. 52.5 by 34 by min. 0.15 mm thick. Provided between FETs TR4,TR5, and PWB. | - | Evaluated as part of this investigation | |
| Output Board – Resistor (R31) | Various | Various | Rated 100 ohm. Secured to Baseplate using Metal Plate, 32.5 by 18.2 by 0.6mm thick | - | - | |

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| | | | and Screws. Provided with plastic support. See Resistor Support for details. | | | |
| Output Board – FET and Resistor Support | Dupont | FR530 (Rynite) | Provided on FETs (TR4,TR5) and Resistor (R31). Overall 34.5 by 17 mm by min. 0.7 mm thick. Rated V-0, min. 155°C. | QMFZ2 (E41938) | UL | |
| Output Board – FET and Resistor Support - Alternate | Chevron Phillips Chemical Co | R-4-230BL (Ryton) | Provided on FETs (TR\$,TR5) and Resistor (R31). Overall 34.5 by 17 mm by min. 0.7 mm thick. Rated V-0, min. 155°C. | QMFZ2 (E54700) | UL | |
| Output Board - Capacitor (C15, C16) | Various (Faratronic) | Various (C222G105K90C00) | Rated 400V, 1uF. | - | - | |
| Output Board – Inductor (L3) | XP Power | Various (1000XXXX, where x can be any number between 0 and 9. Construction of Inductor 10010684 represents the entire series) | Toroidal. Core: Ferrite. Overall approx. 23.4 by 8.7 mm. Winding: Triple Insulated Wire, see Inductor (L3) – Triple Insulated Wire for details. Oriented Vertically provided with Mounting Base between PWB and Inductor body. See Enclosure 4-05 for construction details. Provided with Class F insulation system, see Inductor Insulation System for details. | - | - | |
| Output Board – Current/Drive Transformer (T3) | XP Power | Various (1000XXXX, where x can be any number between 0 and 9. Construction of Inductor 10009329 represents the entire series) | Toroidal. Class F, see Current/Drive Transformer (T3) - Insulation System for details. Core: Ferrite. Two provided, each overall approx. 12.4 mm OD by 6.7 mm wide. Secured to Printed Wiring Board using Carrier, See Carrier for details. See Enclosure 4-18 for construction details. | - | - | |

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| Output Board – Carrier - Current/Drive Transformer (T3) | Chevron Phillips Chemical Co | R-4-230BL (Ryton) | Overall 28.1 by 6.4 mm by min. 0.7 mm thick. Rated V-0, min. 155°C. | QMFZ2 (E54700) | UL | |
| Output Board - Current/Drive Transformer (T3) - Insulation System | XP Power | Class 155 (F) | Rated 155°C. | OBJY2 (E324960) | UL | |
| Output Board - Current/Drive Transformer (T3) - Triple Insulating Wire | Great Leoflon Industrial Co., Ltd | TRW (F) | Reinforced Insulation. Rated 155°C, min. 600 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 6kV Dielectric test during component evaluation). | OBJT2 (E211989) | UL | |
| Output Board - Current/Drive Transformer (T3) - Triple Insulating Wire - Alternate | Kuo Kuang Electronic Wire Co., Ltd | REFU-F | Reinforced Insulation. Rated 155°C, min. 1000 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 7.5kVrms Dielectric test during component evaluation). | OBJT2 (E222087) | UL | |
| Output Board – Transformer (T1) | XP Power | Various (1000XXXX, where x can be any number between 0 and 9. Construction of Inductor 10009306 represents the entire series) | Open-type. Class F, see Transformer (T1) – Insulation System for details. Overall approx. 41.6 by 30.2 by 26 mm. Core: Ferrite Core. Bobbin: Overall approx. 32 O.D. by 18.5 mm, see Transformer (T1) – Bobbin Material. Windings: Triple Insulated Wire, see Transformer (T1) – Triple Insulated Wire for details. Provided with outerwrap, see Insulation System – Insulating Tape for details. Flying Leads provided with | - | - | |

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| | | | sleeving and tubing. See Sleeving/Tubing. Secured to Baseplate using Transformer (T1) Clip, Foil Clamp, and screws. See Enclosure 4-14 to 4-17 for details. | | | |
| Output Board – Transformer (T1) - Insulation System | XP Power | Class 155 (F) | Rated 155°C. | OBJY2 (E324960) | UL | |
| Output Board – Transformer (T1) - Insulating Tape | 3M | 92, 1205 or 1350F | Polyester film tape, min. 1.0 mils (0.025 mm) thick, rated min. 130°C | OANZ2 (E17385) | UL | |
| Output Board – Transformer (T1) - Bobbin Material | DuPont | FR530 or FR530L | Rated min. V-0, min. 1 mm thick, 155°C. | QMFZ2 (E41938) | UL | |
| Output Board – Transformer (T1) - Triple Insulating Wire | Great Leoflon Industrial Co., Ltd | TRW (F) | Reinforced Insulation. Rated 155°C, min. 600 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 6kV Dielectric test during component evaluation). | OBJT2 (E211989) | UL | |
| Output Board – Transformer (T1) - Triple Insulating Wire - Alternate | Kuo Kuang Electronic Wire Co., Ltd | REFU-F | Reinforced Insulation. Rated 155°C, min. 1000 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 7.5kVrms Dielectric test during component evaluation). | OBJT2 (E222087) | UL | |
| Output Board - Transformer Clip – Transformer (T1) | Various | Various (XP Power Part No. 10009344) | Tin Plated Copper, min. 1mm thick. See Enclosure 4-14 to 4-17 for details. Secures PFC Inductor to Baseplate. | - | - | |
| Output Board -Top Washer – Transformer (T1) | Various | Aluminum | Overall 25 mm dia by 2 mm thick. Secures PFC foil to top of PFC Clip. | - | - | |
| Output Board -Foil | Various | Various (XP | Aluminum alloy, overall 16.5 | - | - | |

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| Clamp – Transformer (T1) | | Power Part No. 10009707) | mm dia. by 2 mm thick. Secures PFC Inductor foil to bottom of Baseplate. | | | |
| Output Board – Bridging Capacitor (C33) (PRI - SEC) | Array Electronics | 10004629 | Rated max. 1000 pF, min. 250 V, marked with “Y1”. | - | - | |
| Output Board – Bridging Capacitor (C33) (PRI - SEC) - Alternate | Kemet Electronics OY (Evox Rifa) | ERP (ERP610 Series) | Rated max. 1000 pF, min. 250 V, marked with “Y1”. | FOWX2, FOWX8 (E73869) | UL | |
| Output Board – Bridging Capacitor (C33) (PRI - SEC) - Alternate | Murata Mfg Co Ltd | KX Series | Rated max. 1000 pF, min. 250 V, marked with “Y1”. | FOWX2, FOWX8 (E37921) | UL, cUL | |
| Output Board – Bridging Capacitor (C33) (PRI - SEC) - Alternate | TDK-EPC Corp | CD Series | Rated max. 1000 pF, min. 250 V, marked with “Y1”. | FOWX2, (E37861) | UL, cUL | |
| Output Board – Bridging Capacitor (C33) (PRI - SEC) - Alternate | Vishay Electronic GMBH | VKP or VY1 Series | Rated max. 1000 pF, min. 250 V, marked with “Y1”. | FOWX2, FOWX8 (E183844) | UL, cUL | |
| Output Board – Electrolytic Capacitor (C32) | Various | Various | Rated max. 150 uF, min. 63V, min. 105°C. Provided with integral pressure relief. | - | - | |
| Thermistor (TH1) - Optional | Vishay | NTCLE203E3472 FB0Series | NTC. Rated min. 240 V, min. 150°C, min. 4.7k ohm, I _{ss} min. 5 A (Not relied upon for safety). Secured to bottom of Baseplate near Transformer T1. | XGPU2 (E14885) | UL | |
| Output Board – Resistor (R32) | Various | Various | Rated 4.7 ohm. Secured to Baseplate using Metal Plate, 58.7 by 18.2 by 0.6mm thick and Screws. Provided with plastic support. See Resistor Support for details. | - | - | |
| Output Board – Diodes (D2 – D4) | Various (Shindengen America Inc) | Various (S60SC6MT-5000) | Rated Rev. voltage (rms) min. 60V, 60A, min. 150°C. Secured to Output Board by solder. Secured to Baseplate using | - | - | |

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| | | | Metal Plate, 58.7 by 18.2 by 0.6mm thick and Screws. Provided with plastic support. See Diode Support for details. | | | |
| Output Board – Resistor (R32) and Diodes (D2 – D4) Support | Chevron Phillips Chemical Co | R-4-230BL | Rated V-0, overall approx. 61.5 by 4.2 by min. 0.7 mm thick. Provided between Resistor (R32) and Diodes (D2 – D4) and PWB. | QMFZ2 (E54700) | UL | |
| Output Board – Inductor (L7) | XP Power | Various (1000XXXX, where x can be any number between 0 and 9. Construction of Inductor 10009307 represents the entire series) | Open-type. Overall approx. 37 by 24.5 by 24.4 mm. Core: Ferrite Core. Bobbin: Overall approx. 25.7 O.D. by 15.2 mm, see Inductor (L7) – Bobbin Material. Windings: Copper foil, Winding W1a, 3 turns; Winding W1b, 5 turns. Provided with outerwrap,. Flying Leads provided with sleeving and tubing. See Sleeving/Tubing. Secured to Baseplate using Clip, Foil Clamp, and screws. See Enclosure 4-06 to 4-09 for details. | - | - | |
| Output Board – Inductor (L7) – Alternate | XP Power | Various (1000XXXX, where x can be any number between 0 and 9. Construction of Inductor 10009313 represents the entire series) | Open-type. Overall approx. 37 by 24.5 by 24.4 mm. Core: Ferrite Core. Bobbin: Overall approx. 25.7 O.D. by 15.2 mm, see Inductor (L7) – Bobbin Material. (OBWM2), Copper Magnet Wire, rated min. 105°C Provided with Copper foil and | | - | |

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| | | | outerwrap,. Flying Leads provided with sleeving and tubing. See Sleeving/Tubing. Secured to Baseplate using Clip, Foil Clamp, and screws. See Enclosure 4-06 to 4-09 for details. | | | |
| Output Board – Inductor (L7) - Insulating Tape | 3M | 92, 1205 or 1350F | Polyester film tape, min. 1.0 mils (0.025 mm) thick, rated min. 130°C | OANZ2 (E17385) | UL | |
| Output Board – Inductor (L7) - Insulating Tape – Alternate | Ideal Tape | IT-7170 | Polyester film tape, min. 1.0 mils (0.025 mm) thick, rated min. 130°C | OANZ2 (E82910) | UL | |
| Output Board – Inductor (L7) - Bobbin Material | Chevron Phillips Chemical Co | R-4-230BL (Ryton) | Rated min. V-0, min. 1 mm thick, 200°C. | QMFZ2 (E54700) | UL | |
| Output Board – Inductor (L7) - Bobbin Material - Alternate | DuPont | FR530 or FR530L | Rated min. V-0, min. 1 mm thick, 155°C. | QMFZ2 (E41938) | UL | |
| Output Board – Inductor (L7) - Triple Insulating Wire | Great Leoflon Industrial Co., Ltd | TRW (F) | Reinforced Insulation. Rated 155°C, min. 600 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 6kV Dielectric test during component evaluation). | OBJT2 (E211989) | UL | |
| Output Board – Inductor (L7)- Triple Insulating Wire - Alternate | Kuo Kuang Electronic Wire Co., Ltd | REFU-F | Reinforced Insulation. Rated 155°C, min. 1000 Vpk, min. 4.5 mil total nominal insulation thickness (Passed 7.5kVrms Dielectric test during component evaluation). | OBJT2 (E222087) | UL | |
| Output Board – Inductor (L7) - Clip | Various | Various (XP Power Part No. 10009346) | Tin Plated Copper, min. 1mm thick. See Enclosure 4-06 to 4-09 for details. Secures Inductor L7 to Baseplate. | - | - | |
| Output Board – Inductor | Various | Aluminum | Overall half moon shaped, 20.8 | - | - | |

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| (L7) - Top Washer –Clip – Inductor (PFC) | | | mm dia by 2 mm thick. Secures PFC foil to top of PFC Clip. | | | |
| Output Board – Inductor (L7) - Foil Clamp | Various | Various (XP Power Part No. 10009707) | Aluminum alloy, overall 16.5 mm dia. by 2 mm thick. Secures PFC Inductor foil to bottom of Baseplate. | - | - | |
| Output Board – Y-Capacitors (C11) | Murata | KY Series | Rated max. 470 PF, min. 250V, marked “Y2”. | FOWX2 (E37921) | UL | |
| Output Board – Y-Capacitors (C11) - Alternate | Panasonic | TS Series | Rated max. 470 PF, min. 250V, marked “Y2”. | FOWX2 (E62674) | UL | |
| Output Board – Y-Capacitors (C11) - Alternate | Vishay | WYO or WKO Series | Rated max. 470 PF, min. 250V, marked “Y2”. | FOWX2, FOWX8 (E183844) | UL, cUL | |
| Output Board – Y-Capacitors (C11) - Alternate | TDK (TDK-EPC) | CS Series | Rated max. 470 PF, min. 250V, marked “Y2”. | FOWX2 (E37861) | UL | |
| Output Board – Y-Capacitors (C80,C81,C82) | Murata | KH Series | Rated max. 4700 PF, min. 250V, marked “Y2”. | FOWX2 (E37921) | UL | |
| Output Board – Y-Capacitors (C80,C81,C82) - Alternate | Panasonic | TS Series | Rated max. 4700 PF, min. 250V, marked “Y2”. | FOWX2 (E62674) | UL | |
| Output Board – Y-Capacitors (C80,C81,C82) - Alternate | Vishay | WYO or WKO Series | Rated max. 4700 PF, min. 250V, marked “Y2”. | FOWX2, FOWX8 (E183844) | UL, cUL | |
| Output Board – Y-Capacitors (C80,C81,C82) - Alternate | TDK (TDK-EPC) | CS Series | Rated max. 4700 PF, min. 250V, marked “Y2”. | FOWX2 (E37861) | UL | |
| Output Board – Electrolytic Capacitor (C54) | Various | Various | Rated 63V, 18uF, min. 105°C. Provided with integral pressure relief. Provided with Capacitor | - | - | |

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| | | | Insulator. | | | |
| Output Board – Electrolytic Capacitor (C4) | Various | Various | Rated 16V, 1800uF, min. 105°C. Provided with integral pressure relief. Provided with Capacitor Insulator. | - | - | |
| Output Board – Electrolytic Capacitor (C4) | Various (ST Microelectronics) | Various (STW26NM60N) | Rated 16V, 22000uF, min. 105°C. Provided with integral pressure relief. Provided with Capacitor Insulator. | - | - | |
| Output Board – Busbar Assembly – 12V Models only | Various | Various | Three provided. Copper alloy, L-shaped, overall approx. 70 by 38.5, 2 mm thick. Soldered to Transformer (T1) and secured to Output Board by solder. Provided with plastic busbar support. See Bus Bar Support for material. Secured to bottom of Baseplate by a screw. See Enclosure 4-21 for details. | . | - | |
| Output Board – Bus Bar Assembly – 12V Models only – Bus Bar Support | Chevron Phillips Chemical Co | R-4-230BL (Ryton) | Rated min. V-0, min. 1 mm thick, 200°C. | QMFZ2 (E54700) | UL | |
| Output Board – Bus Bar Assembly – 12V Models only – Bus Bar Support - Alternate | DuPont | FR530 or FR530L | Rated min. V-0, min. 1 mm thick, 155°C. | QMFZ2 (E41938) | UL | |
| Output Board – Output Bus Bar | Various | Various | Copper alloy, overall approx. 47 by 14 by 2 mm thick. Secured to Output Board by solder. | - | - | |
| Output Board – Output Bus | Various | Various | S-shaped, copper alloy, overall approx. 61.6 by 15 by 2 mm thick. Secured to Output Board (SMD side) by solder and screws. | - | - | |
| Output Board – Terminal | Various | Various | U-shaped, Copper alloy, overall | - | - | |

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| Outputs (CON1, CON2) | | | approx. 12.9 by 11.6 by 2 mm thick. Secured to Output Board by solder. | | | |
| RTV | Nominative Performance Materials | RTV-128 | Rated min. HB, min. 105°C | QMFZ2 (E36952) | UL | |
| RTV - Alternate | Various | Various | Rated min. HB, min. 105°C | QMFZ2 | UL | |
| Insulating Sleeving/ Tubing | Various | Various | Rated 300V min., 125°C, min. VW-1, min. 0.4 mm thick. | YDPU2 | UL | |
| Wire Positioning Device | Various | Various | Rated min. 110°C. | ZODZ2 | UL | |

Enclosures

| <u>Type</u> | <u>Supplement Id</u> | <u>Description</u> |
|------------------|----------------------|--|
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| Photographs | 3-03 | Model CCH400PSXX/CCH600PSXX - Front and Rear View |
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| | | (Component/Trace Layout) |
| Manuals | | |
| Miscellaneous | | |