

UL TEST REPORT AND PROCEDURE

Standard:	UL 60950-1, 2nd Edition, 2019-05-09 (Information Technology Equipment - Safety - Part 1: General Requirements) CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10 (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)
Complementary CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Product:	DC Power Supply
Model:	HPCSF-400Px, mHPCSF-400Px (where x maybe maximum 50 characters, any alphanumeric character, hyphen or blank, which denotes control number)
Rating:	100-240Vac, 50/60Hz, 3.8-1.6A DC OUTPUT: CH1: 3.3 Vdc, maximum 16 A (peak 20 A) CH2: 5 Vdc, maximum 16 A (peak 20 A) CH3: 12 Vdc, maximum 25 A (peak 30 A) CH4: -12 Vdc, maximum 0.5 A (peak 0.5 A) CH5: 5VSB, maximum 2 A (peak 3 A) Peak: maximum 5 seconds Interval: 45 seconds Total Wattage: 310 W maximum (CH1+CH2: 90 W maximum, CH3: 300 W maximum, CH4: 6 W maximum, CH5: 10 W maximum) Total Peak Wattage: 400 W maximum (CH1+CH2: 120 W maximum, CH3: 360 W maximum, CH4: 6 W maximum, CH5: 15 W maximum)
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Issue Date: 2011-11-15

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Report Reference #

E161936-A57-UL

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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.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

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Handler

Reviewed By: Deborah Jennings-Conner /
Reviewer

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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

This equipment is component type power supply.

Model Differences

HPCSF-400P**+x (where * any alphanumeric character, where + maybe any alphanumeric character except for "N", "T", "Z", where x maybe maximum 47 characters, any alphanumeric character, hyphen or blank):

Optional switch (SW401) was provided; Condenser capacity of line to ground capacitors (C105, C106, C133): maximum 2200pF; Suffixes denote control number which does not affect safety.

HPCSF-400P**Nx (where * any alphanumeric character, where x maybe maximum 47 characters, any alphanumeric character, hyphen or blank):

Optional switch (SW401) was not provided; Condenser capacity of line to ground capacitors (C105, C106, C133): maximum 2200pF; Suffixes * and x denote control number which does not affect safety.

HPCSF-400P**Tx (where * any alphanumeric character, where x maybe maximum 47 characters, any alphanumeric character, hyphen or blank):

Optional switch (SW401) was provided, Condenser capacity of line to ground capacitors (C105, C106, C133): maximum 4700pF; Suffixes * and x denote control number which does not affect safety.

HPCSF-400P**Zx (where * any alphanumeric character, where x maybe maximum 47 characters, any alphanumeric character, hyphen or blank):

Optional switch (SW401) was not provided, Condenser capacity of line to ground capacitors (C105, C106, C133): maximum 4700pF; Suffixes * and x denote control number which does not affect safety.

Model mHPCSF-400Px is identical to Model HPCSF-400Px except for model designation, Fuses (F401, F402) (Type 215 only). Suffix x denote control number which does not affect safety.

Test Item Particulars

Mass of equipment (kg)	1.0 kg
Equipment mobility	for building-in
Connection to the mains	pluggable equipment pluggable A

Operating condition	continuous
Access location	operator accessible
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -10% (-15% to -10% with output derating)
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)	20 A
Pollution degree (PD)	PD 2
IP protection class	IP X0
Altitude of operation (m)	Up to 2000 m
Altitude of test laboratory (m)	approximately 10 to 20 m

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 40°C (100% Load), 60°C (60% Load)
- The means of connection to the mains supply is : Pluggable A, Detachable power cord
- The product is intended for use on the following power systems : TN
- The equipment disconnect device is considered to be : Appliance inlet
- The following were investigated as part of the protective earthing/bonding : Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)

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:

- The following Production-Line tests are conducted for this product : Earthing Continuity and Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-Earthed Dead Metal: 342 Vrms, 700 Vpk, Primary-SELV: 342 Vrms, 724 Vpk
- The following secondary output circuits are SELV : CH1: 3.3 Vdc, CH2: 5 Vdc, CH3: 12 Vdc, CH4: -12 Vdc and CH5: 5VSB
- The following secondary output circuits are at hazardous energy levels : CH3: 12 Vdc
- The following secondary output circuits are at non-hazardous energy levels : CH1: 3.3 Vdc, CH2: 5 Vdc, CH4: -12 Vdc, CH5: 5VSB
- The following output terminals were referenced to earth during performance testing : CN204 Pin 1
- The power supply terminals and/or connectors are : Suitable for factory wiring only
- 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 : Not required
- An investigation of the protective bonding terminals has : Been conducted
- The following end-product enclosures are required : Electrical and Fire (except chassis at Appliance inlet side with optional switch)
- The Heating Test shall be evaluated in the end-product.
- The volumes (VR201 and VR202) for the output voltage adjustments are intended to adjust at factory only.
- This power supply employs a fuse in its neutral phase. Suitable marking or statement in the service manual per cl.2.7.6 shall be provided with end-product.
- Power switch has not been evaluated as main disconnect device per cl.3.4.
- If optional switch was provided, chassis at Appliance inlet side has been evaluated as an external fire/electrical enclosure. If optional switch was not provided, shall be evaluated in the end-product investigation. Chassis at Appliance inlet side does not comply with the requirement for bottom side of fire enclosure.
- The following line to ground capacitors have the variation of the capacitance respectively. Therefore, consideration shall be given in conducting Touch current test in end product application with respect to the variation. , C103, C104, C106 and C133: 0 - 4700pF, C116 and C134: 0 – 2200pF, C105.
- The following line to line capacitors have the variation of the capacitance respectively. Therefore, consideration shall be given in conducting Capacitance discharge test in end product application with respect to the variation. , C101 and C102: 0 - 1.0µF

Additional Information

This equipment is temperature dependent equipment.

When the temperature of transistor (Q202) changes, thermistor (TH201) detects it changing and controls fan speed. Fan speed is maximum when short circuit thermistor (TH201). When the room ambient is approximately 25°C and output is the rating condition, fan speed is maximum speed.

Fan has two types as follows.

- Nidec Corporation, Type a60R12MMAB

- Minebea Motor Manufacturing Corporation, Type 2406VL-04W-B4

Maximum air flow is the same, but is different in the characteristic of that Static Pressure versus Air Flow curves (see Enclosure Id 7-06). Therefore, Unless specified in particular, tests were conducted with Type a60R12MMAB.

Line Filter (LF101) has two types as follows.

- Nipron Co., Ltd. or Ueno Corporation, Type LT6119 X ("X" maybe maximum 50 characters, any alphanumeric number or blank, which denotes control number)

- JFE Ferrite Corporation, Type DR18a-0510-H

All tests were conducted at employing Type LT6119 due to Type DR18a-0510-H is same construction as Type LT6119 except for type name and manufacturer that do not affect the safety requirement.

Line Filter (LF102, LF103) has three types as follows.

- Nipron Co., Ltd., Type LT6118 X ("X" maybe maximum 50 characters, any alphanumeric number or blank, which denotes control number)
- JFE Ferrite Corporation, Type DR20AJ-0520-H
- Ueno Corporation, Type ADR20K-0520T

All tests were conducted at employing Type LT6118 due to Type DR20AJ-0520-H and Type ADR20K-0520T is same construction as Type LT6118 except for type name and manufacturer that do not affect the safety requirement.

Transformer (T101):

All tests were conducted at employing Nipron Co., Ltd., Type MT6105 due to difference was only manufacturer.

Transformer (T102):

All tests were conducted at employing Nipron Co., Ltd., Type MT6106 due to difference was only manufacturer.

Transformer (T103):

All tests were conducted at employing Nipron Co., Ltd., Type DT6027 due to difference was only manufacturer.

Inductor (L101):

All tests were conducted at employing Nipron Co., Ltd., Type LT6164 due to difference was only manufacturer.

Insulation Sheet (between PWB (6164P1 Board or 6255P1 Board, 6164P2 Board or 6255P2 Board, 6164P3 Board or 6255P3 Board) and Chassis:

All tests were conducted at employing AGC Polycarbonate Co., Ltd., Type CFR. Type CFR was considered representative of the other Insulation Sheet because all Insulation Sheet were evaluated to Distance through insulation measurements tests by previous models.

Tests were conducted with following output load conditions (CH1, CH2, CH3, CH4, CH5).

Condition A (Rated Load):

3.3 Vdc/ 8 A, 5 Vdc/ 8 A, 12 Vdc/ 19 A, -12 Vdc/ 0.5 A, 5VSB/ 2 A

Condition B (Maximum continuous load, Most unfavorable load for T101, total 310W):

3.3 Vdc/ 0 A, 5Vdc/ 0 A, 12 Vdc/ 24.5A, -12 Vdc/ 0.5A, 5VSB/ 0 A

Condition C (Maximum continuous load, Most unfavorable load for T102 and CH1, total 310W):

3.3 Vdc/ 16 A, 5 Vdc/ 7.5 A, 12 Vdc/ 17.5 A, -12 Vdc/ 0 A, 5VSB/ 2 A

Condition D (Maximum continuous load, Most unfavorable load for T102 and CH2, total 310W):

3.3 Vdc/ 3.1 A, 5 Vdc/ 16 A, 12 Vdc/ 17.5 A, -12 Vdc/ 0 A, 5VSB/ 2 A

Condition E (Pulse, Most unfavorable load for T101, total 400W)

3.3 Vdc/ 0 A, 5 Vdc/ 3.8 A, 12 Vdc/ 30 A, -12 Vdc/ 0.5 A, 5VSB/ 3 A

Condition F (Pulse, Most unfavorable load for T102 and CH1, total 400W)

3.3 Vdc/ 20 A, 5 Vdc/ 10.8 A, 12 Vdc/ 21.6 A, -12 Vdc/ 0.5 A, 5VSB/ 3 A

Condition G (Pulse, Most unfavorable load for T102 and CH2, total 400W)

3.3 Vdc/ 6.1 A, 5 Vdc/ 20 A, 12 Vdc/ 21.6 A, -12 Vdc/ 0.5 A, 5VSB/ 3 A

Condition H (No Load)

3.3 Vdc/ 0 A, 5 Vdc/ 0 A, 12 Vdc/ 0 A, -12 Vdc/ 0 A, 5VSB/ 0 A

This equipment may be provided with Back-Up Function with Capacitor Pack, if AC Mains stops, output is supplied from Capacitor Pack.

Additional Standards

The product fulfills the requirements of:

Markings and Instructions

Clause Title	Marking or Instruction Details
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1.7.1 Power rating - Ratings	Ratings (voltage, frequency/dc, current)
1.7.1 Power rating - Company identification	Listee's or Recognized company's name, Trade Name, Trademark or File Number
1.7.1 Power rating - Model	Model Number
1.7.6 Fuses - Rating	Rated current and voltage and type located on or adjacent to fuse or fuseholder.
1.7.8.3 Symbols - On/Off switch	All other controls to be marked with
Special Instructions to UL Representative Inspect the transformer(s) listed below per AA1.1 - C. When the tests are conducted at other location, inspect test record and specification sheet provided by the component manufacturer. Verify the specification sheet indicates 100% routine test specified in below be conducted at the Component manufacturer.	

BD1.0						
TABLE: Production-Line Testing Requirements						
BD1.1						
Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.						
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s
HPCSF-400Px (where x maybe maximum 50 characters, any alphanumeric character, hyphen or blank, which denotes control number)	Transformers (T101, T102)	N/A	Primary to Secondary	3000	4242	1
BD1.2						
Earthing Continuity Test Exemptions – This test is not required for the following models:						
N/A						
BD1.3						
Electric Strength Test Exemptions – This test is not required for the following models:						
N/A						
BD1.4						
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:						
N/A						

BE1.0					
Sample and Test Specifics for Follow-Up Tests at UL					
Model	Component	Material	Test	Sample (s)	Test Specifics
N/A	--	--	--	--	--