

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:	QQHM2, QQHM8 (Power Supplies, Medical and Dental)
Product:	Power Supply
Model:	mNSP3-450P, mPCSA-500P
Rating:	<p>Input: 100-240 V, 4.8-2.0 A, 50/60 Hz Output: CH1: 3.3 V, 20 A, CH2: 5 V, 22 A, CH3: 12 V, 22 A, CH4: -12 V, 0.5 A, CH5: 5 VSB, 2 A CH1 + CH2: total maximum 160 W CH3: maximum 264 W CH1 + CH2 + CH3: total maximum 285 W CH4: maximum 6 W CH5: maximum 10 W CH1 + CH2 + CH3 + CH4 + CH5: total maximum 301 W</p> <p>Peak Output for mNSP3-450P (max 5 sec., duty 1/10): CH1: 3.3 V, 30 A, CH2: 5 V, 33 A, CH3: 12 V, 30 A, CH4: -12 V, 0.5 A, CH5: 5 VSB, 2.5 A CH1 + CH2: total maximum 200 W CH3: maximum 360 W CH1 + CH2 + CH3: total maximum 432 W CH4: maximum 6 W CH5: maximum 12.5 W CH1 + CH2 + CH3 + CH4 + CH5: total maximum 450.5 W</p> <p>Peak Output for mPCSA-500P (max 5 sec., duty 1/10): CH1: 3.3 V, 30 A, CH2: 5 V, 33 A, CH3: 12 V, 30 A, CH4: -12 V, 0.5 A, CH5: 5 VSB, 2.5 A CH1 + CH2: total maximum 200 W CH3: maximum 360 W CH1 + CH2 + CH3: total maximum 482 W CH4: maximum 6 W CH5: maximum 12.5 W CH1 + CH2 + CH3 + CH4 + CH5: total maximum 500.5 W</p>

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Report Reference #

E161936-A29-UL

Applicant Name and Address:

NIPRON CO LTD
2-57 OHAMA-CHO
AMAGASAKI-SHI
HYOGO-KEN 660-0095 JAPAN

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.

Prepared By: Yusuke Enokimura, Tsutomu
Abe / Project Handler

Reviewed By: Tadao Nakayama, Jun Orito /
Reviewer

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 product is component switching mode power supply for building into an end application.

Model Differences

Model mPCSA-500P is similar to mNSP3-450P, except for output peak power and no provision of external battery function. All components of both models other than battery circuit are same.

Test Item Particulars

Equipment mobility	for building-in
Connection to the mains	pluggable equipment pluggable A
Operating condition	continuous
Access location	N/A
Over voltage category (OVC)	OVC II
Mains supply tolerance (%) or absolute mains supply values	+10%, -15%
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)	< 2000
Altitude of test laboratory (m)	Approx. 10 to 20 m
Mass of equipment (kg)	N/A

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of : 45°C (100% load), 60°C (70% load)
- The means of connection to the mains supply is : Detachable power cord

- The product is intended for use on the following power systems : TN
- The equipment disconnect device is considered to be : Appliance coupler
- The product was investigated to the following additional standards : UL60601-1, 1st Edition, CAN/CSA C22.2 No. 601.1-M90, ANSI/AAMI ES60601-1:2005/C1:2009 (includes National Differences for USA), CAN/CSA-C22.2 No. 60601-1:08 (includes National Differences for Canada).
- The product was not investigated to the following standards or clauses: Clause 36, Electromagnetic Compatibility (IEC 60601-1-2), Clause 48, Biocompatibility (ISO 10993-1), Clause 52.1, Programmable Electronic Systems (IEC 60601-1-4).
- The degree of protection against harmful ingress of water is: Ordinary.
- This power supply also has been judged on the basis of the required creepage and Clearances in the First Edition of the Standard for Medical Electrical Equipment, UL 60601-1, Sub clause 57.10 and ANSI/AAMI ES60601-1: 2005, Sub clause 8.9 and CAN/CSA-C22.2 No. 60601-1 (2008), Sub clause 8.9.
- Scope of Power Supply evaluation defers the following clauses of ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1 (2008) to the be determined as part of the end product: Clause 7.5 (Safety Signs), Clause 7.9 (Accompanying Documents), Clause 9 (ME Hazard), Clause 10 (Radiation), Clause 14 (PEMS), Clause 16 (ME Systems).

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 : Electric Strength, Earthing Continuity
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-SELV: 557 Vrms, 1.06 KVpk, 1.58 KVpp, Primary-Earthed Dead Metal: 420 Vrms, 816 Vpk, 1.13 K Vpp
- The following secondary output circuits are SELV : All outputs
- The following secondary output circuits are at hazardous energy levels : 12 Vdc
- The following secondary output circuits are at non-hazardous energy levels : 3.3 Vdc, 5 Vdc, -12 Vdc, 5VSB
- The power supply terminals and/or connectors are : Suitable for factory wiring only (Output connectors)
- The maximum investigated branch circuit rating is : 20 A
- The investigated Pollution Degree is : 2
- The front bezel complies with the requirements for a : 5V flame rating
- The following end-product enclosures are required : Fire, Electrical, Mechanical
- The peak output current is limited within continuous five seconds. In the case of use repeatedly, the time ratio is assumed to be 10% or less.
- This power supply has been evaluated as a Class I, continuous operation, ordinary Equipment and has not been evaluated for use in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide. An additional evaluation shall be made if the power supply is intended for use in other than Class I equipment.
- This secondary circuit of this power supply has not been evaluated for patient connected applications.
- Leakage current tests should be repeated in the end-product application.
- The power supply was evaluated as Double Insulation between Primary and Secondary and Basic Insulation between Primary and Chassis. See enclosure for Insulation Diagram.
- Touch temperature of Fan Guard was not evaluated. It should be evaluated in end-product.
- Front Bezel has not been evaluated as top or bottom enclosure.
- Mechanical strength test on Front Bezel was not evaluated. It should be evaluated in end-product.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): Power supply provides the following MOPP (means of patient protection)/MOOP (means of operator protection): 2MOPP based upon a working voltage 557 Vrms, 1060 Vpk between Primary to Secondary, 1MOPP based upon a working voltage 420 Vrms, 816 Vpk between Primary and Earth/Metal flame.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product Risk Management Process to include consideration of requirements specific to the Power Supply.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product Risk Management Process to consider the acceptability of risk for components which are identified as High-Integrity Component.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product Risk Management Process to consider the need for simultaneous fault condition testing.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product Risk Management Process to consider the need for different orientations of installation during testing.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): Humidity conditioning test was conducted on the power supply with 40 °C, 93 %RH, 120 hrs. End product Risk Management Process to determine risk acceptability criteria.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product to determine the acceptability of risk in conjunction to the results of Mechanical Testing conducted as part of the power supply.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product to determine the acceptability of risk in conjunction to the selection of components as it pertains to the intended use, essential performance, transport, storage conditions as part of the power supply.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product to determine the acceptability of risk in conjunction to insulation to resistance to heat, moisture, and dielectric strength.

- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product to determine the acceptability of risk in conjunction to the routing of wires away from moving parts and sharp edges as part of the power supply.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): Power supply has been evaluated with a protective earth and could be used in Class I applications. To be further evaluated in the end product.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): End product to determine the acceptability of risk in conjunction to battery housings from which gases can escape during charging or discharging likely to result in a Hazard ventilated to minimize risk of accumulation and ignition.

Additional Information

The input voltage tolerance (+10%, -15%) was specified by the customer request. (90% load at 85 V input, 100% load at 90-264 V input)

Unless otherwise noted, all tests were conducted on Model mNSP3-450P with Battery pack, Type BS12A-P24/5.0L or BS10A-H24/2.0L. Some tests were conducted on mNSP3-450P with 500Wp load.

Test conditions are as follows.

Condition A:

CH1: 3.3 V, 15.2 A, CH2: 5 V, 22 A/30 Ap, CH3: 12 V, 10.4 A/23.5 Ap, CH4: -12 V, 0.5 A, CH5: 5 VSB, 2 A/2.5 Ap, Total 301 W/500.5 Wp

Condition B:

CH1: 3.3 V, 2.4 A, CH2: 5 V, 2.6 A/22.8 Ap, CH3: 12 V, 22 A/30 Ap, CH4: -12 V, 0.5 A, CH5: 5 VSB, 2 A/2.5 Ap, Total 301 W/500.5 Wp

Condition C: (70% of Condition A)

CH1: 3.3 V, 10.6 A, CH2: 5 V, 15.4 A/21 Ap, CH3: 12 V, 7.3 A/16.5 Ap, CH4: -12 V, 0.35 A, CH5: 5 VSB, 1.4 A/1.8 Ap, Total 210 W/350 Wp

Condition D: (70% of Condition B)

CH1: 3.3 V, 1.7 A, CH2: 5 V, 1.8 A/16 Ap, CH3: 12 V, 15.4 A/21 Ap, CH4: -12 V, 0.35 A, CH5: 5 VSB, 1.4 A/1.8 Ap, Total 210 W/350 Wp

Condition E: (90% of Condition A)

CH1: 3.3 V, 13.7 A, CH2: 5 V, 19.8 A/27 Ap, CH3: 12 V, 9.4 A/21.2 Ap, CH4: -12 V, 0.45 A, CH5: 5 VSB, 1.8 A/2.3 Ap, Total 271 W/450 Wp

Condition F: (90% of Condition B)

CH1: 3.3 V, 2.2 A, CH2: 5 V, 2.3 A/20.5 Ap, CH3: 12 V, 19.8 A/27 Ap, CH4: -12 V, 0.45 A, CH5: 5 VSB, 1.8 A/2.3 Ap, Total 271 W/450 Wp

Maximum ambient: 45°C (100% load), 60°C (70% load)

Additional Standards

The product fulfills the requirements of: UL60601-1, 1st Edition, CAN/CSA C22.2 No. 601.1-M90, ANSI/AAMI ES60601-1:2005/C1:2009, CAN/CSA-C22.2 No. 60601-1:08

Markings and Instructions

Clause Title	Marking or Instruction Details
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
2.7.6 Warning to service personnel	"CAUTION: Double pole/neutral fusing"
Special Instructions to UL Representative Inspect the transformer listed in BD1.1 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 BD1.1 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
mNSP3-450P, mPCSA-500P	Transformer (T1, T2, T3, T4)	--	Primary winding - Secondary winding	4000	--	1
mNSP3-450P, mPCSA-500P	Complete unit	--	Primary - GND/Secondary	1776	--	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	--	--	--	--	--