

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 60950-1, 2nd Edition, 2014-10-14 (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)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
<b>Complementary CCN:</b>	QQHM2, QQHM8 (Power Supplies, Medical and Dental)
<b>Product:</b>	Power Supply
<b>Model:</b>	GPSA-360-12XXXX, GPSA-360-24XXXX, mGPSA-360-12XXXX, and mGPSA-360-24XXXX (' X ' = Maybe any alphanumeric character, ' - ' or blank, not affected to safety.)
<b>Rating:</b>	Models GPSA-360-12XXXX and mGPSA-360-12XXXX Input: 100-240 Vac, 50/60 Hz, 6.3-2.4 A Output: CH1: 12 Vdc, 30 A; CH2: 12 VSB, 0.3 A (Total maximum power 363.6 W.) Output Peak: CH1: 12 Vdc, 40 A; CH2: 12 VSB, 0.3 A (Total maximum power 483.6 W.)  Models GPSA-360-24XXXX and mGPSA-360-24XXXX Input: 100-240 Vac, 50/60 Hz, 6.3-3.0 A Output: CH1: 24 Vdc, 15 A; CH2: 12 VSB, 0.3 A (Total maximum power 363.6 W.) Output Peak: CH1: 24 Vdc, 20.8 A; CH2: 12 VSB 0.3 A at input 100 Vac (Total maximum power 502.8 W.) CH1: 24 Vdc, 25 A; CH2: 12 VSB, 0.3 A at input 200 Vac (Total maximum power 603.6 W.)
<b>Applicant Name and Address:</b>	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.

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

### Model Differences

Models GPSA-360-12XXXX and GPSA-360-24XXXX differences as follows.

- Model designation
- Ratings
- Model GPSA-360-24XXXX provided with Battery Unit.

Model mGPSA-360-12XXXX is identical to Model GPSA-360-12XXXX, except for model designation only.

Model mGPSA-360-24XXXX is identical to Model GPSA-360-24XXXX, except for model designation only.

('X' maybe any alphanumeric character, ' ' or blank, not affected to safety.)

### Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : pluggable A
- Operating condition : continuous
- Access location : N/A
- 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) : 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) : Power Supply: Approximately 1.5 kg / Battery Unit: Approximately 1.9 kg

- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of: Power Supply: 40°C (100% Load) and 60°C (60% Load), Battery Unit: 50°C
- The product is intended for use on the following power systems: TN
- The product was investigated to the following additional standards: UL 60601-1, First Edition, dated April 25, 2003 including revisions through April 26, 2006 (includes National Differences for USA), CAN/CSA-C22.2 No. 601.1-M90 (R2005) (includes National Differences for Canada), EN 60601-1: 1990 + A1: 1993 + A2: 1995, (except EMC limitations, EN 60601-1-2, Biocompatibility, EN 10993-1, Programmable Electronic Systems, IEC 60601-1-4) and 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 of UL60601-1, 1st Edition, CAN/CSA C22.2 No. 601.1-M90: Clause 36, Electromagnetic Compatibility (IEC 601-1-2), Clause 48, Biocompatibility (ISO 10993-1), Clause 52.1, and Programmable Electronic Systems (IEC 601-1-4)
- The degree of protection against harmful ingress of water is: Ordinary
- 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: Earthing Continuity and Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of: Primary-SELV: 345 Vrms, 616 Vpk, 1.14 kVp-p
- The following secondary output circuits are SELV: 12 Vdc Output (for Models GPSA-360-12XXXX and mGPSA-360-12XXXX), 24 Vdc Output (for Models GPSA-360-24XXXX and mGPSA-360-24XXXX), and 12 VSB Output (for Models GPSA-360-12XXXX, GPSA-360-24XXXX, mGPSA-360-12XXXX, and mGPSA-360-24XXXX)
- The following secondary output circuits are at hazardous energy levels: 12 Vdc Output (for Models GPSA-360-12XXXX and mGPSA-360-12XXXX) and 24 Vdc Output (for Models GPSA-360-24XXXX and mGPSA-360-24XXXX)
- The following secondary output circuits are at non-hazardous energy levels: 12 VSB Output (for Models GPSA-360-12XXXX, GPSA-360-24XXXX, mGPSA-360-12XXXX, and mGPSA-360-24XXXX)
- 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: Required
- An investigation of the protective bonding terminals has: Been conducted
- 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): Transformer (T101) (Class B) and Transformer (T102) (Class B)
- The following end-product enclosures are required: Electrical, Fire, and 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.

- The power supply FG Terminal of Terminal Block (TB101) is connected to printed wiring board trace directly; the Limited Short-Circuit Test in CSA C22.2 No. 0.4, Bonding of Electrical Equipment not conducted due to building-in type component. The evaluation shall be considered in the end-product.
- Leakage Current Test shall be considered in the end-product.
- The secondary circuit of the power supply not evaluated for patient connected applications.
- Reinforced Insulation/Double Insulation is provided between the primary and output of the power supply.
- The power supply is intended for use in end-product used in a hospital or related health care facility.
- 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, CAN/CSA C22.2 No. 601.1-M90, 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.
- The power supply shall be installed in compliance with the enclosure, mounting, spacing, casualty markings, and segregation requirements of the end-product.
- The power supply evaluated as Class I, continuous operation, and ordinary equipment. The power supply not evaluated for use in the presence of flammable anesthetic mixture with air, oxygen or nitrous oxide. The output circuits not evaluated for direct patient connection (Type B, BF or CF).
- The end-product shall ensure that the requirements related to Accompanying Documents, Clause 6.8 are met.
- The power supply is provided with ventilation openings. The Abnormal Operation (Blocked Ventilation Openings) Test not conducted due to building-in type component. The evaluation shall be considered in the 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): 2MOOP based upon a working voltage 345 Vrms, 616 Vpk between Primary to Secondary, 1MOOP based upon a working voltage 345 Vrms, 616 Vpk between Primary and Earth/Metal flame.
- (For ANSI/AAMI ES60601-1:2005 and CAN/CSA-C22.2 No. 60601-1:2008 investigation): The risk management requirements of the standard were not addressed and must be considered in the end product investigation.
- (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 25 °C, 93 %RH, 48 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): 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 rated voltage tolerance (+10%, -10%) was specified by the manufacturer request.

Tests were conducted on Model mGPSA-360-12 or Model mGPSA-360-24. Model mGPSA-360-12 and Model mGPSA-360-24 are identical output power at load condition.

[Test conducted following condition.]

Output Test Conditions for Model mGPSA-360-12 as follows.

- Condition A: 12 Vdc, 30 A load continuous operation.
- Condition B: 12 Vdc, 40 A load 5 seconds and 12 Vdc, 28.88 A load 45 seconds intermittent operation.
- Condition C: 12 Vdc, 0 A no load operation.

Output Test Conditions for Model mGPSA-360-24 as follows.

- Condition D: 24 Vdc, 15 A load continuous operation.
- Condition E: 24 Vdc, 20.8 A load 5 seconds and 24 Vdc, 14.35 A load 45 seconds (at input 100 Vac) intermittent operation.
- Condition F: 24 Vdc, 25 A load 5 seconds and 24 Vdc, 13.88 A load 45 seconds (at input 240 Vac) intermittent operation.
- Condition G: 24 Vdc, 0 A no load operation.
- Condition H: Battery Unit charge (connected Power Supply).
- Condition I: Battery Unit discharge (Output: 24 V dc, 7.08 A).
- Condition J: Battery Unit discharge (Output: 24 Vdc, 10 A load 10 seconds and 24 Vdc, 5.5 A load 18.6 seconds intermittent operation).

(\*1): 12VSB Output was loaded 12 Vdc, 0.3 A, except for Conditions C, G, and H.

Airflow of DC Fans is changeable. Airflow of DC Fans was fixed under 25°C ambient condition.

- All Conditions except for Conditions C and G: 8000 rpm (Thermistor (TH202) was replaced with resistor rated 0 to 1 kohm.)
- Condition C and G: 4000 rpm (Thermistor (TH202) was replaced with resistor rated 6.6 kohm.)

Battery Units are optional for Models mGPSA-360-24 and GPSA-360-24 as follows.

- Type BS14x-H24/2.5L [x: A or O to Z (Fan not provided.)]
- Type BS14y-H24/2.5L [y: B to N (Fan provided.)]

Unless otherwise noted, all tests were conducted on Model mGPSA-360-24 and these test results were considered to be representative of Model mGPSA-360-12.

Maximum Output Voltage, Current and Volt-Ampere Measurement Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

Input Test was conducted for following condition.

- Condition A and B for Model mGPSA-360-12.
- Condition D, E and F for Model mGPSA-360-24.

SELV Reliability Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

Humidity Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

Determination of Working Voltage - Working Voltage Measurement Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

Determination of Working Voltage - Hazardous Voltage (Circuit) Measurement Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

Heating Test was conducted for following condition.

For Model mGPSA-360-12

- Condition B

For Model mGPSA-360-24

- Conditions D, E, F, H, I, and J.

Electric Strength Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

Transformer Abnormal Operation Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

Power Supply Output Short-Circuit/Overload Test was conducted on Models mGPSA-360-12 and mGPSA-360-24.

The power supply required silicon bond to reduced components damage. See Enclosure Id. 7-09 (Area of Silicon Bond) for details.

#### **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.
1.7.6 Fuses - Operator caution statement	"CAUTION: For continued protection against risk of fire, replace only with same type and rating of fuse".
2.7.6 Warning to service personnel	"CAUTION: Double pole/neutral fusing"
<b>Special Instructions to UL Representative</b> Inspect the Transformer(s) 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.	

# **Production-Line Testing Requirements**

## **Electric Strength Test Special Constructions - Refer to Generic Inspection Instructions, Part AC for further information.**

Model	Component	Removable Parts	Test probe location	V rms	V dc	Test Time, s
GPSA-360-12XXXX, GPSA-360-24XXXX, mGPSA-360-12XXXX, and mGPSA-360-24XXXX ( ' X ' = Maybe any alphanumeric character, ' - ' or blank)	Transformers (T101, T102)	N/A	Primary to Secondary	400 0	--	1
GPSA-360-12XXXX, GPSA-360-24XXXX, mGPSA-360-12XXXX, and mGPSA-360-24XXXX ( ' X ' = Maybe any alphanumeric character, ' - ' or blank)	Complete Unit	N/A	Primary to Ground and Secondary	177 6	--	1

## **Earthing Continuity Test Exemptions - This test is not required for the following models:**

N/A

## **Electric Strength Test Exemptions - This test is not required for the following models:**

N/A

## **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

## **Sample and Test Specifics for Follow-Up Tests at UL**

Model	Component	Material	Test	Sample(s)	Test Specifics
N/A	--	--	--	--	--