

UL TEST REPORT AND PROCEDURE

Standard:	ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10 + A1:12)(Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance) CAN/CSA-C22.2 No. 60601-1 (2014) (Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance)
Certification Type:	Component Recognition
CCN:	QQHM2, QQHM8 (Power Supplies, Medical and Dental)
Product:	Switching Power Supply
Model:	73-580-0001i and iMP8-abbc-abbc-abbc-abbc-abbc-XX
Rating:	<p>Note:"abbc" is any alphanumeric character or blank for specific model designation. Please refer to illustration.</p> <p>Input Ratings: 100-240/200-240VAC, 50/60Hz, 20A/12A or 120-300/254-300VDC, 20A/12A</p> <p>Output Ratings: (for 73-580-0001i using AC200-240V or DC254Vmin-300Vmax Input Voltage) +375V to +395V, 1500W; +5Vsb, 1.0A; +18M1Vcc, 0.1A; +18M2Vcc, 0.1A; +18M3Vcc, 0.1A; +18M4Vcc, 0.1A; +18M5Vcc, 0.1A; +18M6Vcc, 0.1A; Total Output Power: 1515.8W</p> <p>(for 73-580-0001i using AC100-240V or DC120Vmin-300Vmax Input Voltage) +375V to +395V, 1200W; +5Vsb, 1.0A; +18M1Vcc, 0.1A; +18M2Vcc, 0.1A; +18M3Vcc, 0.1A; +18M4Vcc, 0.1A; +18M5Vcc, 0.1A; +18M6vcc, 0.1A; Total Output Power: 1215.8W</p> <p>(For iMP8 series) 2-60VDC, 1200W max. (for 200-240VAC or 254-300VDC Input Voltage)</p> <p>2-60VDC, 1000W max. (for 100-240VAC or 120-300VDC Input Voltage)</p>

Applicant Name and Address:	ASTEC INTERNATIONAL LTD - PHILIPPINE BRANCH 16TH FL LU PLAZA 2 WING YIP ST KWUN TONG KOWLOON HONG KONG
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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.

Prepared by: Eileen Hu /

Reviewed by: Calvin Tang

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

For 73-580-0001i:

Class I equipment, for building-in. This power supply requires modules (DC-DC converter) before using in actual application in the end system. A separate qualification is needed when the modules are incorporated for proper configuration and use. Model 73-580-0001i is a sub-assembly of model iMP8 series.

For input voltage of AC200-240V or DC254Vmin-300Vmax at 50degC:

Output : +375V to +395V, 1500W;

+5Vsb, 1.0A;

+18M1Vcc, 0.1A;

+18M2Vcc, 0.1A;

+18M3Vcc, 0.1A;

+18M4Vcc, 0.1A;

+18M5Vcc, 0.1A;

+18M6Vcc, 0.1A;

Total Output Power: 1515.8Watts

For input voltage of AC100-240V or DC120Vmin-300Vmax at 50degC:

Output : +375V to +395V, 1200W;

+5Vsb, 1.0A;

+18M1Vcc, 0.1A;

+18M2Vcc, 0.1A;

+18M3Vcc, 0.1A;

+18M4Vcc, 0.1A;

+18M5Vcc, 0.1A;

+18M6Vcc, 0.1A;

Total Output Power: 1215.8 Watts

1. Maximum continuous output power for +375Vdc to +395Vdc output is 1500W at 200-240Vac / 254-300Vdc input voltage, and 1200W at 100-240Vac / 120-300Vdc input voltage using normal airflow direction or 30CFM external fan set-up condition at 50degC maximum ambient temperature and reverse airflow direction at 40degC maximum ambient temperature.

2. Output power decreases 2.55 per deg C from 50degC to 70degC ambient temperature for normal airflow or 30CFM external fan set-up, 40degC to 60 degC ambient temperature for reverse airflow direction.

For iMP8 Series:

Class I equipment, for building-in. This power supply consists of front-end AC/DC converter and chassis (73-580-0001i) and a combination of DC/DC modules which are separately approved.

Input ratings: 100-240Vac / 200-240Vac, 50/60Hz, 20A/12A or
DC 120Vmin-300Vmax / DC 254Vmin- 300Vmax; 20A/12A;

Output ratings:

Excluding +5Vsb at 200-240Vac or 254-300Vdc input voltage:

-1200W at maximum 50degC, normal airflow.

-Output rating derates 2.55 per deg C from 50degC to 70degC for normal airflow.

Excluding +5Vsb at 100-240Vac or 120-300Vdc input voltage:

-1000W at maximum 50degC, normal airflow.

-Output ratings derates 2.55 per deg C from 50degC to 70degC for normal airflow.

Notes:

1. Output classification level may be 1,3,5 or 6 depending on model configuration. "Level 1" is a CSA designation which denotes that outputs are either not suitable for, or have not been investigated for SELV. "Level 3" is a CSA designation which denotes that outputs are SELV and non-hazardous energy 240VA hazardous energy level. "Level 5" is a CSA designation which denotes that outputs are SELV and exceed 240VA hazardous energy level. "Level 6" is a CSA designation which denotes a multiple output power supply with outputs in any combination of Levels 1, 3 and 5.

2. The subject power supplies consist of a front-end, AC-DC converter, and chassis and modules, DC-DC converter modules, which are individually approved and listed under CB scheme.

Each iMP8 series model has 6 slots for DC-DC converter modules. There are single, dual and triple output DC-DC converter modules, some of which occupy more than 1 slot. The iMP8 series may be configured with various combinations of the following modules:

- Single output 210 watts module,(width = 1 slot) : 73-551-XXXXi series
- Single output 360 watts module,(width = 2 slots) : 73-552-XXXXi series
- Single output 750 watts module,(width = 3 slots) : 73-553-XXXXi series
- Single output 1500 watts module,(width = 4 slots) : 73-558-XXXXi series
- Dual output 144 watts module, (width = 1 slot) : 73-554-XXXXi series
- Triple output 36 watts module, (width = 1 slot) : 73-550-XXXXi series

Remark:

1. Clearance evaluated for operating altitude up to 10000 feet (3048 meters) above sea level.
2. All outputs are energy hazard (exceeding 240VA), when installing into end system, care must be taken that the output and associated wire(s) may not be touched.

Model Differences

Model 73-580-0001i is a sub-assembly of model iMP8 series.

Technical Considerations

- Classification of installation and use : For built-in
- Device type (component/sub-assembly/ equipment/ system) : Component
- Intended use (Including type of patient, application location) : Recognized power supply for medical equipment usage
- Mode of operation : Continuous
- Supply connection : To be evaluated in end product.
- Accessories and detachable parts included : None
- Other options include : None
- The product was investigated to the following additional standards: N/A,
- The product was not investigated to the following standards or clauses: Biocompatibility (ISO 10993-1), Clause 14, Programmable Electronic Systems, Electromagnetic Compatibility (IEC 60601-1-2), ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10 + A1:12)(Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance), CAN/CSA-C22.2 No. 60601-1 (2014)(Medical Electrical Equipment - Part 1: General Requirements for Basic Safety and Essential Performance)
- The degree of protection against harmful ingress of water is:: IPX0
- The mode of operation is: Continuous
- The product is suitable for use in the presence of a flammable anesthetics mixture with air or oxygen

or with nitrous oxide:: No

- For 73-580-0001i, the maximum continuous power for +375Vdc to +395Vdc output power is 1500W at 200-240Vac / 254-300Vdc input voltage, and 1200W at 100-240Vac / 120-300Vdc input voltage using normal airflow direction at 50degC ambient temperature and 40degC ambient temperature at reverse airflow direction. Output power decreases 2.5% per deg C from 50degC to 70degC ambient temperature for normal airflow.
- For iMP8 series , excluding +5Vsb output, the maximum continuous total power on DC-DC modules is 1200W at AC200-240V / DC254Vmin-300Vmax input voltage, and 1000W at AC100-240V / DC120Vmin-300Vmax input voltage using normal airflow direction at 50degC ambient temperature and reverse airflow direction at 40degC ambient temperature. Output power decreases 2.5% per deg C from 50degC to 70degC ambient temperature for normal airflow.

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:

- This power supply has been judged on the basis of the required creepage and clearances in the First Edition of the Standard for Medical Electrical Equipment, ANSI/AAMI ES 60601-1, Sub clause 8.9.
- 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 power supply was tested on a 30A branch circuit. If used on a branch circuit greater than this, additional testing may be necessary.
- The power supply was evaluated as 2 MOPP between Primary to Secondary and 1 MOPP from Primary to Earth see insulation diagram for details.
- Consideration should be given to measuring the temperatures on power electronic components and transformer windings when the power supply is installed in the end use equipment. The primary transformer (T501) on 73-580-0001i incorporates a Class 155 (F) insulation system.
- The secondary circuit of this power supply has not been evaluated for patient connected applications.
- The maximum ambient temperature 50 degree C.
- The following tests shall be performed in the end-product evaluation: Earthing and Potential Equalization Test, Temperature Test, Dielectric Voltage Withstand Tests, and Leakage Current Test.
- The maximum working voltage present is 442 V rms; 575Vpk. (Refer to report E182560-A51)
- For the purpose of spacing and insulation considerations, the input of these power supplies shall be derived from the end system mains of maximum 240Vac mains supply.
- This power supply shall be installed in compliance with the enclosure, mounting, spacing, casualty, markings and segregation requirements of the end use application.
- "Voltage or charge limitation" may need to be reconsidered if additional EMC filter is provided between appliance inlet/ power cord to the product.
- A suitable Mechanical, Electrical and Fire enclosure shall be provided in the end-use product.
- This power supply is operated up to 3048m above sea level as declared by manufacturer.
- Separation from secondary to earth need to evaluated in end product.
- End product Risk Management Process to include consideration of requirements specific to the Power Supply.

- The input and output connectors are not suitable for field connection.
- Proper bonding to the end-product main protective earthing termination is required.
- End product Risk Management Process to consider the need for simultaneous fault condition testing.
- End product Risk Management Process to consider the need for different orientations of installation during testing.
- End product to determine the acceptability of risk in conjunction to insulation to resistance to heat, moisture, and dielectric strength.
- End product to determine the acceptability of risk in conjunction to the movement of components and conductors as part of the power supply.
- 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.
- Temperature Test was conducted without Test Corner. End product to determine the acceptability of risk in conjunction to temperature testing without test corner as part of the power supply.
- End product to determine the acceptability of risk in conjunction to the Cleaning and Disinfection Methods as part of the power supply.
- End product to determine the acceptability of risk in conjunction to the Leakage of Liquids as part of the power supply.
- End product to determine the acceptability of risk in conjunction to the Arrangement of Indicators as part of the power supply.
- End product to determine the acceptability of risk in conjunction to the results of Mechanical Testing conducted as part of the power supply.
- 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.
- The end-product evaluation shall ensure that the requirements related to Accompanying Documents, Clause 7.9 are met.
- These power supplies are not evaluated for end system mounting. When installed in the end system, proper evaluation should be considered.
- This power supply has two fuse(F201,F202) connected in Live and Neutral.
- The touch time for external enclosure isn't determined by the client, end product shall consider it according to client's definition.
- During the evaluation, an external forced air-cooling from input terminal to output terminal with air flow 30 CFM is required when installing into the end system.
- Output power decreases 2.5 per deg C from 50degC to 70degC ambient temperature for normal airflow or 30CFM external fan set-up, 40degC to 60 degC ambient temperature for reverse airflow direction.