

UL TEST REPORT AND PROCEDURE

Standard:	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)
Certification Type:	Component Recognition
CCN:	QQGQ2, QQGQ8 (Power Supplies for Information Technology Equipment Including Electrical Business Equipment)
Product:	Switching Power Supply for building-in
Model:	73-540-0001i, 73-540-0001i-E, iMP4-abbc-abbc-abbc-abbc-xx (iMP4 series), and iMP4E-abbc-abbc-abbc-abbc-xx (iMP4E series)
Rating:	<p>Note: For use in Information Technology Equipment where "a", "b", "c" and "x" are any alphanumeric character or blank for specific DC-DC module model designation. Refer to Enclosure Miscellaneous ID 7-01 for details.</p> <p>Input rating:</p> <p>(For Model 73-540-0001i) AC input: 100-240V / 200-240V, 12/9A, 50/60Hz DC input: 120Vmin.-300Vmax. / 254Vmin.-300Vmax., 12/9A</p> <p>(For Model 73-540-0001i-E) AC input: 100-240V / 200-240V, 12/9A, 50/60Hz</p> <p>(For Model iMP4-abbc-abbc-abbc-abbc-xx) AC input: 100-240V / 200-240V, 12/9A, 50/60Hz DC input: 120Vmin.-300Vmax. / 254Vmin.-300Vmax., 12/9A</p> <p>(For Model iMP4E-abbc-abbc-abbc-abbc-xx) AC input: 100-240V / 200-240V, 12/9A, 50/60Hz</p> <p>Output rating:</p> <p>(For Models 73-540-0001i and 73-540-0001i-E) +375 to +395V: 1200 W max. +5Vsb: 1.0 A max. +18M1Vcc: 0.1 A max. +18M2Vcc: 0.1 A max. +18M3Vcc: 0.1 A max. +18M4Vcc: 0.1 A max. +18M5Vcc: 0.1 A max.</p> <p>(For Models iMP4-abbc-abbc-abbc-abbc-xx and iMP4E-abbc-abbc-abbc-abbc-xx) DC +1.5V to +60 V Depends on DC-DC modules used. Refer to Critical Component List for details.</p>
Applicant Name and Address:	ASTECH INTERNATIONAL LTD

Issue Date: 2012-03-16
2015-06-26

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Report Reference #

E186249-A210-UL

16TH FLOOR, LU PLAZA
2 WING YIP STREET, KWUN TONG KOWLOON, HONG KONG

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: Brian Wong

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

Models iMP4-abbc-abbc-abbc-abbc-abbc-xx and iMP4E-abbc-abbc-abbc-abbc-abbc-xx may be named iMP4 series and iMP4E series in this report correspondingly.

Component - Switching Power Supply, Class I equipment, Model iMP4-abbc-abbc-abbc-abbc-abbc-xx for use in Information Technology Equipment, where "a", "b", "c" and "x" are any alphanumeric character or blank for specific DC-DC module model designation. Refer to Critical Component List for details.

iMP4 series and iMP4E series consist of the front-end case Model 73-540-0001i (for iMP4 series) or 73-540-0001i-E (for iMP4E series) and any combination of separately approved DC-DC module series as output. Each iMP4 or iMP4E series model has 5 slots for the DC-DC converter modules used as output. There are single, dual and triple output DC-DC converter modules some of which occupy more than 1 slot.

The iMP4 or iMP4E series can be configured with various combination of the following DC-DC converter modules:

- 73-558-xxxxi series: single output, 1500W (width: 4slots)
- 73-553-xxxxi series: single output, 750W (width: 3 slots)
- 73-553-xxxx series: single output, 600W (width: 3 slots)
- 73-552-xxxx with or without suffix "i" series: single output, 360W (width: 2 slots)
- 73-551-xxxx with or without suffix "i" series: single output, 210W (width: 1 slot)
- 73-554-xxxx with or without suffix "i" series: dual output, 144W (width: 1 slot)
- 73-550-xxxx with or without suffix "i" series: triple output, 36W (width: 1 slot)

Model Differences

Model 73-540-0001i is identical to 73-540-0001i-E except for the AC inlet is used on model 73-540-0001i-E instead of input connector is used for 73-540-0001i. Also model 73-540-0001i-E has no DC input voltage rating.

Model iMP4 series is identical to iMP4E series except for the front-end case module used. iMP4 series uses 73-540-0001i while the iMP4E series uses Model 73-540-0001i-E (with AC inlet) as front-end case module.

Model 73-540-0001i is a subassembly of Model iMP4 series while Model 73-540-0001i-E is a subassembly of Model iMP4E series.

Technical Considerations

- Equipment mobility : for building-in
- Connection to the mains : Must be considered in the end system
- Operating condition : continuous
- Access location : operator accessible
- Over voltage category (OVC) : Must be considered in the end system
- Mains supply tolerance (%) or absolute mains supply values : +10%, -10%
- Tested for IT power systems : No
- IT testing, phase-phase voltage (V) : -
- Class of equipment : Class I (earthed)
- Considered current rating of protective device as part of the building installation (A) : 16 A
- Pollution degree (PD) : PD 2
- IP protection class : IP X0
- Altitude of operation (m) : 3048m (10,000ft)
- Altitude of test laboratory (m) : less than 2000m
- Mass of equipment (kg) : Approximate 4kg.
- Maximum continuous output power at AC100-240V / DC 120Vmin.-300Vmax. input voltage for Model iMP4-abbc-abbc-abbc-abbc-abbc-xx (iMP4 series) is 750W using normal or forward airflow direction at 50°C ambient temperature.
- Maximum continuous output power at AC 200-240V / DC254Vmin.-300Vmax. input voltage for Model iMP4-abbc-abbc-abbc-abbc-abbc-xx (iMP4 series) is 1158W using normal or forward airflow direction at 50°C ambient temperature.
- Maximum combined output power is 914W on AC 100-240V or DC120Vmin.-300Vmax. input voltage for model 73-540-0001i.
- Maximum combined output power is 914W on AC 100-240V input voltage for model 73-540-0001i-E.
- Maximum combined output power is 1314W at AC200-240V or DC254Vmin.-300Vmax. input voltage for Model 73-540-0001i
- Maximum combined output power is 1314 on AC200-240V input voltage for Model 73-540-0001i-E.
- The output power of Models 73-540-0001i, 73-540-0001i-E, iMP4 series and iMP4E series decreases 2.5% per °C from 50°C to 70°C ambient temperature.
- Model iMP4-abbc-abbc-abbc-abbc-abbc-xx was evaluated for input voltage AC100-240V / DC120Vmin.-300Vmax., maximum 1158W and input voltage AC200-240V / DC254Vmin.-300Vmax., maximum 750W continuous output in 50°C to 70°C for normal airflow. Airflow direction is reversible, up to 40°C ambient at 100% load.
- The fan used can be separately provided and evaluated by the system, with at least 33.5 CFM airflow.
- Model iMP4-abbc-abbc-abbc-abbc-abbc-xx has up to 5 output modules, maximum of three outputs each module. Output voltage set at factory and marked adjacent to each connector. Total loading of dual output modules not to exceed 144W and total loading of triple output modules not to exceed 36W.
- Model 73-540-0001i is a sub-assembly of Model iMP4-abbc-abbc-abbc-abbc-abbc-xx while Model 73-540-0001i-E is a sub-assembly of Model iMP4E-abbc-abbc-abbc-abbc-abbc-xx.
- Specific configured model iMP4-2Q0-2Q0-1L0-24-A is operated at fan-off condition with DC-DC module outputs disabled or inhibited. At this condition all outputs are set at 0V / 0A except +5Vsb output which is set at 1.0 A.

- The product was submitted and evaluated for use at the maximum ambient temperature (T_{ma}) permitted by the manufacturer's specification of: 50°C and up to 70°C at derated power. See report for details.
- The means of connection to the mains supply is: to be considered in the end system application.
- The product is intended for use on the following power systems: TN
- The equipment disconnect device is considered to be: Must be considered in the end system application. Front-end module 73-540-0001i is provided with an input connector while 73-540-0001i-E is provided with an IEC 60320 approved appliance inlet.
- The class of laser product is: Class 1 (I) for indication purpose only (LED)
- The product was investigated to the following additional standards: EN 60950-1:2006 + A11:2009 +A1:2010 +A12:2011 +A2:2013 (which includes all European national differences, including those specified in this test report).
- The following are available from the Applicant upon request: Installation (Safety) Instructions / Manual
- LEDs provided in the product are considered low power devices: Yes
- The following were investigated as part of the protective earthing/bonding: input terminal/connector PE to chassis

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 component has been judged on the basis of the required creepages and clearances in the Second Edition of the Standard for Safety of Information Technology Equipment, Sub-clause 2.10, and which covers the end-use product for which the component was designed. The functional insulations among the primary circuits and among the secondary circuits have been evaluated by short-circuiting the insulation per sub-clause 5.3.4. c) of UL60950-1, Second Edition and CAN/CSA-C22.2 No. 60950-1-07, Second Edition.
- This power supply has been evaluated for use in Class I equipment as defined in UL 60950-1, Second Edition and CAN/CSA-C22.2 No. 60950-1-07, Second Edition, and shall be properly earthed in the end-use. An additional evaluation shall be made if the power supply is intended for use in other than Class I equipment.
- Fan airflow direction may be normal (fan blows air towards the components) or reversed (fan blows air away from components). Maximum ambient temperature at reversed air flow is 40°C.
- This power supply was not evaluated for end system mounting. When installed in the end system, the proper evaluation should be considered.
- This power supply is classified Level 6 as defined by UL60950-1, Second Edition and CAN/CSA-C22.2 No. 60950-1-07, Second Edition.
- This power supply has been evaluated for use in 25°C and 50°C ambient and up to 70°C with decreased output power as described in the report.
- The secondary outputs of the DC-DC modules are considered SELV except for the secondary output of the 48V DC-DC modules which exceeds 60Vdc and is not suitable for SELV. The end system must provide at least basic insulation from the user or service personnel to the outputs of the power supply. There is also hazardous energy level that exceeds 240VA at the output of all power supplies.
- A suitable power supply disconnection means is to be provided by the end use equipment.
- Earthing terminal at the input connector is not considered protective earthing terminal but is considered bonding terminal. Power supply chassis is to be reliably bonded to protective earthing in end use equipment before energized.

- Additional UL Recognized Fuse, rated 300Vdc suitable for DC application must be provided in the end-system for DC input.
- Fan-off condition with output disabled (0V / 0A) applies to specific configured model iMP4-2Q0-2Q0-1L0-24-A only.
- This power supply can be operated in elevation of maximum 3048 meter (10,000 ft) above sea level. Annex G of UL60950-1, Second Edition and CAN/CSA-C22.2 no. 60950-1-07, Second Edition was used in determining clearance requirement.
- EMC / EMI compliance has not been investigated and is not part of this report. Must be considered in the end system.
- See Enclosure Miscellaneous ID7-02 for Ventilation Airflow Diagram.
- 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: 441 Vrms, 552 Vpk, Primary-Earthed Dead Metal: 440 Vrms, 560 Vpk
- The following secondary output circuits are SELV: +5Vsb and all outputs from DC-DC modules series except for the outputs of DC-DC modules 73-558-0048i, 73-553-0048i, 73-553-0048, 73-552-0048i, 73-552-0048, 73-551-0048i and 73-551-0048. The said outputs are considered non-SELV and must be properly considered in the end system application.
- The following secondary output circuits are at hazardous energy levels: All outputs from the DC-DC module series except outputs from 73-550-xxxxi, 73-550-xxxx (36W module), 73-554-xxxxi, 73-554-xxxx (144W modules), and +5Vsb output of front-end module 73-540-0001i.
- The following secondary output circuits are at non-hazardous energy levels: Outputs from 73-550-xxxxi, 73-550-xxxx (36W module), 73-554-xxxxi, 73-554-xxxx (144W modules), and +5Vsb output of front-end module 73-540-0001i. ,
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The maximum investigated branch circuit rating is: 30 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): T501 Auxiliary Transformer (front-end module 73-540-0001i), Class F. Transformer is also considered on individually certified DC-DC module series.
- The following end-product enclosures are required: Mechanical, Fire, Electrical
- The maximum continuous power supply output (Watts) relied on forced air cooling from: one fan provided blowing air from the outside of the power supply towards the components. See List of Critical Components Table for details. Fan airflow can be reversed at up to 40°C ambient temperature at full load.
- The equipment is suitable for direct connection to: AC mains supply
- The fans included as part of this component are suitable for use in a user access area: Yes. Fan is provided with Fan grill.