



Test Report issued under the responsibility of:



TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number: E186249-A6063-CB-1
Date of issue.....: 2020-12-17
Total number of pages: 145

Applicant's name.....: **ASTEC INTERNATIONAL LTD**
Address: **16TH FL**
LU PLAZA
2 WING YIP ST
KWUN TONG KOWLOON HONG KONG

Name of Test Laboratory: UL International Limited
preparing the Report: 18/F Delta House, 3 On Yiu Street, Shatin, NT, Hong Kong

Test specification:
Standard: IEC 62368-1:2014 (Second Edition)
Test procedure: CB Scheme
Non-standard test method.....: N/A



Test Report Form No......: IEC62368_1B
Test Report Form(s) Originator: UL(US)
Master TRF.....: 2014-03

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Test Item description	: Switching Power Supply
Trade Mark	: None
Manufacturer	: ASTEC INTERNATIONAL LTD 16TH FL LU PLAZA 2 WING YIP ST KWUN TONG KOWLOON HONG KONG
Model/Type reference	: 73-690-0001i, iMP1-abc-abc-abc-abc-abc-abc-abc-xx (iMP1 series), MP1-abc-abc-abc-abc-abc-abc-abc-xx (MP1 series) Note: for use in Information Technology Equipment where "abc" and "abc" are any alphanumeric character or blank for specific model designation. Refer to Enclosure ID 6-01 for details.
Ratings	: AC input: 100-240V / 200-240V, 50/60/440Hz, 20/12A for model 73-690-0001i only AC input: 100-240V / 200-240V, 50/60Hz, 20/12A for model iMP1 series only AC input: 100-240Vac, 50/60Hz, 15A for model MP1 series only DC input: 120Vmin.-350Vmax. / 254Vmin.-350Vmax., 20/12A for model 73-690-0001i only DC input: 120Vmin.-300Vmax. / 254Vmin.-300Vmax., 20/12A for model iMP1 series only Output rating: For Model 73-690-0001i +375 to +395 V: 1800 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. +18M6Vcc: 0.1 A max. +18M7Vcc: 0.1 A max. For Model iMP1-abc-abc-abc-abc-abc-abc-abc-xx and MP1-abc-abc-abc-abc-abc-abc-abc-xx: DC +2 V to +60 V (See appended table 4.1.2 for details)
Testing procedure and testing location:	
<input type="checkbox"/>	CB Testing Laboratory:

Testing location/ address		
Tested by (name + signature).....		
Approved by (name + signature)		
<input checked="" type="checkbox"/>	Testing procedure: CTF Stage 1	
Testing location/ address.....		ASTEC INTERNATIONAL LTD - PHILIPPINE BRANCH 3RD & 4TH FL, TECHNO PLAZA ONE BLDG, 18 ORCHARD RD, EASTWOOD CITY CYBERPARK, BAGUMBAYAN, QUEZON CITY 1110 PHILIPPINES
Tested by (name + signature).....		Dennis Lam / Project Handler 
Approved by (name + signature)		Paul Wan / Reviewer 
<input type="checkbox"/>	Testing procedure: CTF Stage 2	
Testing location/ address.....		
Tested by (name + signature).....		
Witnessed by (name + signature).....		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: CTF Stage 3	
<input type="checkbox"/>	Testing procedure: CTF Stage 4	
Testing location/ address.....		
Tested by (name + signature).....		
Witnessed by (name + signature).....		
Approved by (name + signature)		
Supervised by (name + signature)		

List of Attachments (including a total number of pages in each attachment):

National Differences (30 pages)

Enclosures (75 pages)

Summary of testing:

Tests performed (name of test and test clause):

STEADY FORCE TEST, 250 N (4.4.4.2, ANNEX T.5)
 STEADY FORCE TEST, 30 N (4.4.4.2, ANNEX T.3)
 IMPACT TEST (4.4.4.4, ANNEX T.6)
 CLASSIFICATION OF ELECTRICAL ENERGY SOURCES (5.2, 5.7)
 DETERMINATION OF WORKING VOLTAGE (5.4.1.8)
 BALL PRESSURE TEST (5.4.1.10.3)
 HUMIDITY CONDITIONING (5.4.8)
 ELECTRIC STRENGTH TEST (5.4.9)
 SAFEGUARDS AGAINST CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR (5.5.2.2)
 RESISTANCE OF THE PROTECTIVE BONDING SYSTEM (5.6.6.2)
 PROSPECTIVE TOUCH VOLTAGE AND TOUCH CURRENT MEASUREMENT (5.7)
 INPUT TEST: SINGLE PHASE (B.2.5)
 NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT (B.2.6)
 SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)
 SIMULATED SINGLE FAULT CONDITIONS (B.4)
 TEST FOR THE PERMANENCE OF MARKINGS (ANNEX F.3.10)
 TRANSFORMER OVERLOAD (ANNEX G.5.3.3)
 LOCKED-ROTOR OVERLOAD TEST FOR D.C. MOTORS (ANNEX G.5.4.6)

Testing Location:

**CTF Stage 1: ASTEC INTERNATIONAL LTD - PHILIPPINE BRANCH
 3RD & 4TH FL, TECHNO PLAZA ONE BLDG,
 18 ORCHARD RD, EASTWOOD CITY CYBERPARK,
 BAGUMBAYAN, QUEZON CITY 1110 PHILIPPINES**

Summary of compliance with National Differences:

List of countries addressed: Australia / New Zealand, EU Group and National Differences, Japan, USA / Canada

EU Group and National Differences applies to CENELEC member countries: Austria , Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom

The product fulfils the requirements of: EN 62368-1:2014 + A11:2017

Copy of Marking Plate - Refer to Enclosure titled Marking Plate for copy.

TEST ITEM PARTICULARS:	
Classification of use by	Instructed person, Skilled person
Supply Connection	AC Mains External Circuit - not Mains connected ES3
Supply % Tolerance	+10%/-10% for AC input
Supply Connection – Type	pluggable equipment type A - mating connector
Considered current rating of protective device as part of building or equipment installation	20 A; building;
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer’s specified maximum operating ambient (°C)	50°C
IP protection class	IPX0
Power Systems	TN
Altitude during operation (m)	3048 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	Approx. 5kg
POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement :	P (Pass)
- test object does not meet the requirement :	F (Fail)
TESTING:	
Date of receipt of test item..... :	2020-02-19
Date (s) of performance of tests..... :	2020-07-08 to 2020-07-14
GENERAL REMARKS:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
Manufacturer’s Declaration per sub-clause 4.2.5 of IEC 60335-1:	

<p>The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable</p>
<p>When differences exist; they shall be identified in the General product information section.</p>	

<p>Name and address of factory (ies) :</p>	<p>1) ASTEC POWER PHILIPPINES INC 104 LAGUNA BLVD., LAGUNA TECHNOPARK, STA. ROSA LAGUNA, PHILIPPINES 4026</p> <p>2) SAGER ELECTRONICS 2940 EISENHOWER ST, SUITE 100 CARROLLTON TX 75007</p> <p>3) ARROW ELECTRONICS INC 105 FARADAY PARK, FARADAY ROAD, DORCAN, SWINDON WILTSHIRE SN3 5JF, UK</p> <p>4) AUTRONIC STEUER UND REGELTECHNIK GMBH SIEMENSSTRASSE 17 74343 SACHSENHEIM GERMANY</p> <p>5) ARROW ELECTRONICS INC 1955 E SKY HARBOR CIR N PHOENIX AZ 85034, USA</p> <p>6) ALVIC POWER SYSTEMS, DIV OF COSMOS POWER (SINGAPORE) PTE LTD #04-08 CITITECH INDUSTRIAL BLDG 629 ALJUNIED RD SINGAPORE 389838 SINGAPORE</p> <p>7) ARROW ELECTRONICS INC BOULEVARD LUIS DONALDO COLOSIO 1179 84048 NOGALES SON MEXICO</p> <p>8) ASTEC POWER PHILIPPINES INC MAIN ROAD COR. ROAD J CAVITE ECONOMIC ZONE AUTHORITY, TEJEROS CONVENTION, ROSARIO CAVITE, PHILIPPINES 4106</p> <p>9)</p>
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	<p>HONG GUAN TECHNOLOGY SDN BHD NO 15. LORONG MAK MANDIN JAYA 8 13400 BUTTERWORTH PENANG MALAYSIA</p> <p>10) SHENZHEN SUPERPOWER TECHNOLOGY CO., LTD. 4A-2, 4TH FL, BLDG 5 NANYOU TIAN AN INDUSTRIAL ESTATE DENG LIANG RD, NANYOU, NANSHAN SHENZHEN 518040 CHINA</p> <p>11) NEW J.R. ELECTRONIC CO., LTD. 10F-2 489 TA YOU RD TAOYUAN 330 TAIWAN</p> <p>12) TRC ELECTRONICS INC CO 4171 STONY LN DOYLESTOWN PA 18902</p> <p>FACTORIES 1 AND 8 ARE FOR 73-690-0001I ONLY. FACTORIES 1 TO 12 ARE FOR IMP1 SERIES AND MP1 SERIES.</p>
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GENERAL PRODUCT INFORMATION:

Report Summary

All applicable tests according to the referenced standard(s) have been carried out.

Product Description

Component - Switching Power Supply, Model iMP1-abbc-abbc-abbc-abbc-abbc-abbc-xx for use in Information Technology Equipment, where "abbc" is any alphanumeric character or blank for specific model designation. See report for details.

iMP1 configured model series consists of the front-end case model 73-690-0001i and any combination of separately approved DC-DC module series as output. Each iMP1 series model has 7 slots for the DC-DC converter modules. There are single, dual and triple output DC/DC converted modules, some of which occupy more than 1 slot.

The iMP1 series can be configured with various combination of the following DC-DC converter modules:

73-558-xxxxi series: Single output, 1500W (width: 4 slots)
 73-553-xxxx with or without suffix "i" series: Single output, 750W for "i-version" and 600W for non-"i" (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 73-690-0001i is a sub-assembly of model iMP1 series.

Model MP1-abc-abc-abc-abc-abc-abc-abc-xx are sub-assembly of model iMP1 series.

Additional application considerations – (Considerations used to test a component or sub-assembly) -

This report is based on previously conducted testing (see attachment in Enclosure ID 7-XX) and the review of product construction of original CBTR Ref. No. E186249-A155-CB-3 dated 2015-03-11, CBTR Ref. No. E186249-A155-CB-3-Correction 1 dated 2015-10-14, CBTC Ref. No. DK-44012-UL issued date 2015-03-12, CBTC Ref. No. DK-44013-UL issued date 2015-03-12, CBTR Ref. No. E186249-A155-CB-3-Amendment 1 dated 2020-07-22 and CBTC Ref. No. DK-44012-M1-UL dated 2020-07-23 issued by UL (Demko).

Refer to Section "Test performed (name of test and test clause)" covering all applicable performance tests and rationale for waived tests.

The label is a draft of an artwork for marking plate pending approval by National Certification Bodies and it shall not be affixed to products prior to such an approval.

Technical Considerations

- 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 details in report.
- The product is intended for use on the following power systems : TN
- Considered current rating of protective device as part of the building installation (A) : 20
- Mains supply tolerance (%) or absolute mains supply values : +10%/-10% for AC input
- The equipment disconnect device is considered to be : Input terminal block. Must also be checked in the end system.
- The following were investigated as part of the protective earthing/bonding : input terminal block PE to chassis
- The Risk Group of a lamp or lamp system (including LEDs) is : Exempt
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual
- The product was investigated to the following additional standard : EN 62368-1:2014 + A11:2017
- Model 73-690-0001i is a sub-assembly of model iMP1 series.
- Total loading of dual output modules not to exceed 144W and total loading of triple output modules not to exceed 36W.
- Maximum continuous output power at AC100-240V or DC120Vmin.-300Vmax input voltage for Model iMP1-abbc-abbc-abbc-abbc-abbc-abbc-xx is 1200W using normal airflow direction at 50°C ambient temperature.
- Maximum continuous output power at AC200-240V or DC254Vmin.-300Vmax. input voltage for model iMP1-abbc-abbc-abbc-abbc-abbc-abbc-xx is 1500W using normal airflow direction at 50°C ambient temperature. When using either 73-558-0005i or 73-558-0006i modules only at 1500W output power, the maximum ambient temperature is 40°C.
- Output power decreases 2.5% per °C from 50°C to 70°C ambient temperatures. When using either 73-558-0005i or 73-558-0006i modules only at 1500W output power, the output power decreases 1.67% per °C from 40°C to 70°C ambient temperature.

- Model iMP1 series has up to 7 output module slots, maximum three outputs for each module. Output voltage is set at factory and marked on the model label of configured model.

Engineering Conditions of Acceptability

When installed in an end-product, consideration must be given to the following:

- The following product-line tests are conducted for this product : Earthing Continuity, Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-Secondary: 443Vrms/ 568Vpk, Primary – Earthed Dead Metal: 444Vrms/ 568Vpk
- The following output circuits are at ES1 energy levels : All outputs
- The following output circuits are at PS3 energy levels : All outputs
- 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 end-product enclosures are required : Electrical, Fire, Mechanical
- 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 (Class F)
- The maximum continuous power supply output (Watts) relied on forced air cooling from : Two fans provided blowing air towards the components. See critical components list for details. Fan airflow can be reversed at up to 40°C ambient temperature.
- The equipment is suitable for direct connection to : AC mains supply
- The power supply was evaluated to be used at altitudes up to : 3048 m
- Additional UL Recognized fuse, rated 300Vdc suitable for DC application must be provided in the end-system for DC input.
- Fans : The fan provided in this sub-assembly is not intended for operator access.
- This power supply was not evaluated for end system mounting. When installed in the end system, the proper evaluation should be considered.
- Fan airflow direction may be normal (fans blow air towards the components) or reversible (fans blow air away from the components).
- Openings were not evaluated to meet fire enclosure opening requirement. It shall be considered in the end system.