



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 .....: E147630-A6005-CB-1

Date of issue.....: 2022-01-05

Total number of pages .....: 64

Name of Test Laboratory .....: UL RTP

preparing the Report .....: 12 Laboratory Drive, Research Triangle Park , NC, 27709, USA

Applicant's name.....: UNIPower L L C

Address .....: 210 N UNIVERSITY DR, SUITE 700  
CORAL SPRINGS FL 33065  
UNITED STATES

#### Test specification:

Standard .....: IEC 62368-1:2014

Test procedure .....: CB Scheme

Non-standard test method.....: N/A

TRF template used .....: IECEE OD-2020-F1:2020, Ed.1.3

Test Report Form No.....: IEC62368\_1D

Test Report Form(s) Originator .....: UL(US)

Master TRF.....: Dated 2021-02-04

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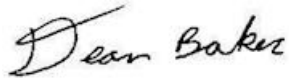
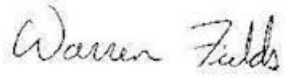
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**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

#### General disclaimer:

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test Item description .....	Component DC-DC Switch mode Power Supplies	
Trade Mark(s) .....	None	
Manufacturer .....	UNIPOWER L L C 210 N University Dr, Suite 700 Coral Springs FL 33065 UNITED STATES	
Model/Type reference .....	AL-070D-24XY-Z, AL-070DW-48XY-Z, AL-070D-48XY-Z, AL-085D-24XY-Z, AL-085DW-48XY-Z, AL-085D-48XY-Z, AL-070DW-48S2-601  X = S, or D, or T, or Q Y = up to 4 digits 0 - 9 Z = configuration (up to 4 digit/alpha suffix)	
Ratings .....	AL-070D-24XY-Z: Input: 18-36 Vdc, 8 A AL-070DW-48XY-Z: Input: 18-72 Vdc, 8 A AL-070D-48XY-Z: Input: 36-72 Vdc, 4.0 A  AL-085D-24XY-Z: Input: 18-36 Vdc, 8.0 A AL-085DW-48XY-Z: Input: 18-72 Vdc, 8.0 A AL-085D-48XY-Z: Input: 36-72 Vdc, 5.0 A  AL-070DW-48S2-601: Input: 18-60 Vdc, 8A	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/> CB Testing Laboratory:		
Testing location/ address .....	UL RTP, 12 Laboratory Drive, Research Triangle Park , NC, 27709, USA	
Tested by (name, function, signature) .....	Dean Baker / Project Handler	
Approved by (name, function, signature) .....	Warren Fields / Reviewer	
<input type="checkbox"/> Testing procedure: CTF Stage 1:		
Testing location/ address .....		
Tested by (name, function, signature) .....		
Approved by (name, function, signature) .....		
<input type="checkbox"/> Testing procedure: CTF Stage 2:		
Testing location/ address .....		
Tested by (name, function, signature) .....		

Witnessed by (name, function, signature) ...:			
Approved by (name, function, signature).....:			
<input type="checkbox"/>	Testing procedure: CTF Stage 3:		
<input type="checkbox"/>	Testing procedure: CTF Stage 4:		
Testing location/ address.....:			
Tested by (name, function, signature) .....			
Witnessed by (name, function, signature) ...:			
Approved by (name, function, signature).....:			
Supervised by (name, function, signature) ..:			

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

National Differences (31 pages)

Enclosures (85 pages)

**Summary of testing:****Tests performed (name of test and test clause):**

CLASSIFICATION OF ELECTRICAL ENERGY SOURCES (5.2.2.1-5.2.2.6)

DETERMINATION OF WORKING VOLTAGE (5.4.1.8)

HUMIDITY CONDITIONING (5.4.8)

ELECTRIC STRENGTH TEST – TYPE TESTING OF SOLID INSULATION (5.4.9.1)

INPUT TEST: SINGLE PHASE (B.2.5)

NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT (B.2.6, 5.4.1.4, 6.3, 9.2)

SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)

SIMULATED SINGLE FAULT CONDITIONS (B.4)

**Testing Location:****CBTL: UL RTP, 12 Laboratory Drive, Research Triangle Park , NC, 27709, USA**

2.2.2, 2.2.3, 2.2.4 - SELV Reliability Test and 2.2.7 - Voltage Measurements Test performed for evaluation to UL 1950, Third Edition and considered representative of test for IEC 62368-1:2014.

2.9.1, 2.9.2, 5.2.2 - Humidity Test performed for evaluation to IEC 60950-1:2001, First Edition and considered representative of test for IEC 62368-1:2014.

1.6.2 - Input Phase performed for evaluation to IEC 60950, Third Edition and UL 1950, Third Edition and considered representative of test for IEC 62368-1:2014

4.5.1, 1.4.12, 1.4.13 - Heating Test performed for evaluation to IEC 60950, Third Edition and considered representative of test for IEC 62368-1:2014

5.3.1, 5.3.4, 5.3.6 - Component Failure Test performed for evaluation to IEC 60950, Third Edition and considered representative of test for IEC 62368-1:2014

**Summary of compliance with National Differences:****List of countries addressed:** Australia / New Zealand, EU Group and National Differences, Japan, USA / Canada☒ **The product fulfils the requirements of:** IEC 62368-1:2014, EN 62368-1:2014 + A11:2017, BS EN 62368-1:2014 + A11:2017**Statement concerning the uncertainty of the measurement systems used for the tests**☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:****Procedure number, issue date and title:**

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.



☒ **Statement not required by the standard used for type testing**

(Note: When IEC or ISO standard requires a statement concerning the uncertainty of the measurement systems used for tests, this should be reported above. The informative text in parenthesis should be delete in both cases after selecting the applicable option)

**Copy of marking plate:**

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

**THE POWER SOLUTION<sup>®</sup>****MODEL: AL-070D-48S4-138****INPUT DC: 36-72V, 4A****OUTPUT DC: +24V/2.92A****MAX:70W****Power Solutions  
A Unipower LLC business (G)****THE POWER SOLUTION<sup>®</sup>****MODEL: AL-070D-48T125-175****INPUT DC: 36-72V $\overline{\square}$ , 4A****OUTPUT DC: +5V/4A, +12V/0.8A  
+48V/0.84A****MAX:70W****Power Solutions  
A Unipower LLC business (G)****THE POWER SOLUTION<sup>®</sup>****MODEL: AL-085D-48S2-958****INPUT DC: 36-72V, 5A****OUTPUT DC: +12V/7.08A****MAX:85W****Power Solutions  
A Unipower LLC business (G)****THE POWER SOLUTION<sup>®</sup>****MODEL: AL-085D-48Q1225-151****INPUT DC: 36-72V $\overline{\square}$ , 5A****OUTPUT DC: +5V/4A, +12V/2A  
-12V/1A, +48V/0.6A****MAX:85W****Power Solutions  
A Unipower LLC business (G)**

Note: The above markings are the minimum requirements required by the safety lab. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.

<b>TEST ITEM PARTICULARS:</b>	
Classification of use by	Skilled person
Supply Connection	External Circuit - not Mains connected ES1, ES2
Supply % Tolerance	ES2 DC Mains Input: No tolerance declared
Supply Connection – Type	for building-in
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)	N/A
Class of equipment	Class III
Access location	for building-in
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	50°C for model AL-070DW-48S2-601 and 25°C for all other models. Suitability to be determined in the end product evaluation.
IP protection class	IPX0
Power Systems	N/A
Altitude during operation (m)	2000 m or less
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	0.4 Kg
<b>POSSIBLE TEST CASE VERDICTS:</b>	
- 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)
<b>TESTING:</b>	
Date of receipt of test item.....:	2008-12-15, 2021-11-11
Date (s) of performance of tests.....:	2009-01-09, 2021-11-16, 2021-12-22 to 2021-12-29
<b>GENERAL REMARKS:</b>	
<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>	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60068-2-1:</b>	

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 ..... :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
<b>When differences exist; they shall be identified in the General product information section.</b>	
<b>Name and address of factory (ies) .....</b> :	GREEN CUBES TECHNOLOGY CORP TAIWAN BRANCH 7th Fl 6 Lane 497 Chung Cheng Rd Hsin Tien District New Taipei 23148 TAIWAN
<b>GENERAL PRODUCT INFORMATION:</b>	
<b>Report Summary</b> All applicable tests according to the referenced standard(s) have been carried out.	
<b>Product Description</b> Component DC to DC Switch mode power supply series for building in.	
<b>Model Differences</b> AL-070DW-48S2-601, Input 18-60 Vdc, 8A Output rated +12Vdc, 3A, Maximum Output 36W with convection cooling.  AL-070D-24XY-Z: Input: 18-36 Vdc, 8 A Output: See nomenclature description below Total Output Power of each of the supplies is 50 W with convection cooling; 70 W with forced-air cooling.  AL-070DW-48XY-Z: Input: 18-72 Vdc, 8A Output: See nomenclature description below Total Output Power of each of the supplies is 50 W with convection cooling; 70 W with forced-air cooling  AL-070D-48XY-Z: Input: 36-72 Vdc, 4.0 A Output: See nomenclature description below Total Output Power of each of the supplies is 50 W with convection cooling; 70 W with forced-air cooling.  AL-085D-24XY-Z: Input: 18-36 Vdc, 8.0 A Output: See nomenclature description below Total Output Power of each of the supplies is 65 W with convection cooling;	

85 W with forced-air cooling

AL-085DW-48XY-Z:

Input: 18-72 Vdc, 8.0 A

Output: See nomenclature description below

Total Output Power of each of the supplies is 65 W with convection cooling;

85 W with forced-air cooling

AL-085D-48XY-Z:

Input: 36-72 Vdc, 5.0 A

Output: See nomenclature description below

Total Output Power of each of the supplies is 65 W with convection cooling;

85 W with forced-air cooling

Where :

D = DC Input

24 = Input Voltage Range (18 - 36 V dc) or

48 = Input Voltage Range (36 - 72 V dc)

W = Input Voltage Range (18 - 60 V dc) or (18 - 72 Vdc) dc as noted

X = S (single), D (dual), T (triple) or Q (quad) outputs

Y = Output Voltage Configuration: (up to 4 digits) as follows:

0: 1.5V to <= 4V, 1: >4V to <= 5.7V, 2: >10V to <= 13.8V,

3: >13.8V to <= 16.5V, 4: >21V to <= 26V, 5: >32V to <= 48V, 6: >5.7V to <8V, 7: 26V to <= 32V, 8: >16.5V to <= 21V, 9: 8V to <= 10V

Z = configuration (up to 4 digit/alpha suffix)

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

All marking plates are identical except for the model number and output ratings. Marking label in report is representative of all models with ratings as specified in the report.

This report is based on a previous evaluation to IEC 60950-1:2005 (2nd Ed.), Am1:2009 + Am2:2013 under CBTR Ref UL E147630-A13-CB-3. CBTC US-27697-UL, US-27697-M1-UL including Amendments. Based on the previously conducted performance testing, only the tests conducted as part of this investigation were considered necessary. Test data is subject to acceptance by the receiving NCB.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

#### **Technical Considerations**

- The product was submitted and evaluated for use at the maximum ambient temperature (T<sub>ma</sub>) permitted by the manufacturer's specification of : 50°C for model AL-070DW-48S2-601 and 25°C for all other models. Suitability to be determined in the end product evaluation.
- The product is intended for use on the following power systems : No direct connection, DC mains supply
- Considered current rating of protective device as part of the building installation (A) : 20
- Mains supply tolerance (%) or absolute mains supply values : DC Mains: No tolerance declared; , No direct connection
- The equipment disconnect device is considered to be : N/A
- The product was investigated to the following additional standard : EN 62368-1:2014 + A11:2017; BS EN 62368-1:2014 + A11:2017

### Engineering Conditions of Acceptability

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

- The following output circuits are at ES1 energy levels : All Outputs
- The following output circuits are at PS3 energy levels : All
- 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 : Not been conducted
- The following end-product enclosures are required : Fire, Electrical
- 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) : T1 is Class B (130 °C)
- The following input terminals were evaluated as suitable for direct connection to the DC Mains Supply : All
- The power supplies provide basic insulation from input to ground and reinforced insulation from input to output.
- The power supplies are provided with overcurrent protection in the ungrounded (hot) side of the line.
- Heating Tests were performed on an open bench. Type J thermocouples were used to record temperatures. For testing utilizing forced air, a 32 CFM fan was placed on the input side of the unit under test. The Model AL-070DW-48S2-601, was tested at Maximum 36W with convection cooling. The Model Series AL-070DW-XY-Z and AL-070D-24XY-Z convection-cooled units were derated to 32 W for the input range of 18-24 V dc while units with the input range of 24-36 V dc were derated to 37.5 W. The Model Series AL-070DW-XY-Z and the AL-070D-24XY-Z forced air-cooled units with an input range of 18-24 V dc were derated to 52.5 W while AL-070D-24XY-Z forced air-cooled units with an input range of 24-36 V dc were derated to 60 W. AL-070D-48XY-Z convection-cooled units were derated to 50 W while units with forced air-cooled were derated to 70 W. The Model Series AL-085DW-XY-Z and AL-085D-24XY-Z convection-cooled units were derated to 37.5 W for the input range of 18-24 V dc while units with the input range of 24-36 V dc were derated to 48.75 W. The Model Series AL-085DW-XY-Z and AL-085D-24XY-Z air-cooled units were loaded to 65 W for the input range of 18-24 V dc while forced air-cooled units with the input range of 24-36 V dc units were loaded to 75 W. All other AL-085D-XY-Z convection-cooled units were derated to 65 W while the forced air-cooled units were loaded to 85 W. These tests should be repeated as part of the end product investigation.

**ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:**

(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.)

(Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.

**Electrically-caused injury (Clause 5):**

(Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification)

Example: +5 V dc input

ES1

Source of electrical energy	Corresponding classification (ES)
Input	ES2
Working Voltages	ES3
Output	ES1

**Electrically-caused fire (Clause 6):**

(Note: List sub-assembly or circuit designation and corresponding energy source classification)

Example: Battery pack (maximum 85 watts):

PS2

Source of power or PIS	Corresponding classification (PS)
All Circuits	PS3

**Injury caused by hazardous substances (Clause 7)**

(Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.)

Example: Liquid in filled component

Glycol

Source of hazardous substances	Corresponding chemical
-	-

**Mechanically-caused injury (Clause 8)**

(Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.)

Example: Wall mount unit

MS2

Source of kinetic/mechanical energy	Corresponding classification (MS)
-	-

**Thermal burn injury (Clause 9)**

(Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.)

Example: Hand-held scanner – thermoplastic enclosure

TS1

Source of thermal energy	Corresponding classification (TS)
To be evaluated in end product	To be evaluated in end product

**Radiation (Clause 10)**

(Note: List the types of radiation present in the product and the corresponding energy source classification.)

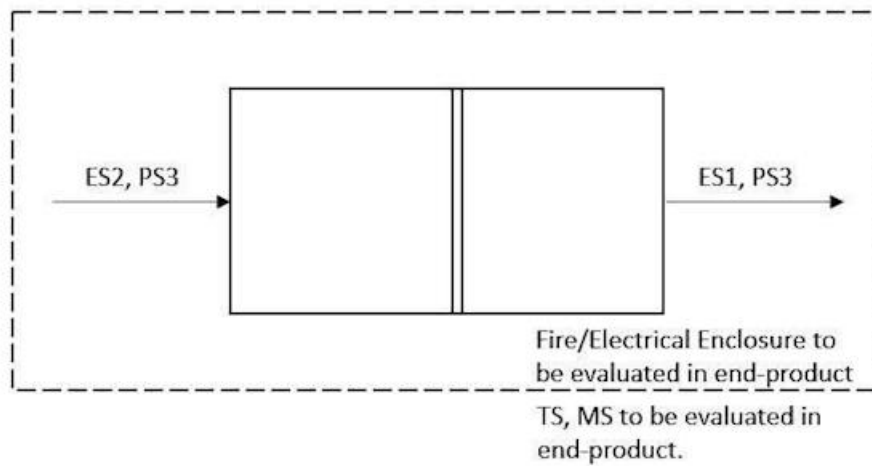
Example: DVD – Class 1 Laser Product

RS1

Type of radiation	Corresponding classification (RS)
-	-

**ENERGY SOURCE DIAGRAM**

Indicate which energy sources are included in the energy source diagram. Insert diagram below

☒ **ES**    ☒ **PS**    ☐ **MS**    ☐ **TS**    ☐ **RS**



OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	Possible Hazard			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Input	ES2	Basic insulation provided between earth connected parts	-	Double/Reinforced insulation provided between secondary ES1 outputs.  Suitable electrical enclosure to be evaluated as part of the end product evaluation.
Working Voltage	ES3	Basic insulation provided between earth connected parts	-	Double/Reinforced insulation provided between secondary ES1 outputs.  Suitable electrical enclosure to be evaluated as part of the end product evaluation.
Output	ES1	-	-	-
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
All Circuits	PS3	No ignition. Temperatures under normal and	Control of Fire Spread - components/materials complied with sub-clause	-

		abnormal conditions (see appended table 9.0)	6.4.5.2; Suitable Fire Enclosure to be determined as part of end product evaluation.	
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
-	-	-	-	-
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
-	-	-	-	-
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	To be evaluated in end-product.	-	-	To be evaluated in end-product.
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
-	-	-	-	-
Supplementary Information:				
(1) See attached energy source diagram for additional details.				
(2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault				

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Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>GENERAL REQUIREMENTS</b>		Pass
4.1.1	Acceptance of materials, components and subassemblies		Pass
4.1.2	Use of components		Pass
4.1.3	Equipment design and construction		Pass
4.1.15	Markings and instructions .....	(See Annex F)	Pass
4.4.4	Safeguard robustness	Unit intended for building-in. To be evaluated in end-product.	N/A
4.4.4.2	Steady force tests .....	(See Annex T.4, T.5)	N/A
4.4.4.3	Drop tests .....	(See Annex T.7)	N/A
4.4.4.4	Impact tests .....	(See Annex T.6)	N/A
4.4.4.5	Internal accessible safeguard enclosure and barrier tests .....	(See Annex T.3)	N/A
4.4.4.6	Glass Impact tests .....	(See Annex T.9, Annex U)	N/A
4.4.4.7	Thermoplastic material tests .....	(See Annex T.8)	N/A
4.4.4.8	Air comprising a safeguard .....	(See Annex T)	N/A
4.4.4.9	Accessibility and safeguard effectiveness		N/A
4.5	Explosion	No explosion during normal/abnormal and fault condition.	Pass
4.6	Fixing of conductors	No conductors	N/A
4.6.1	Fix conductors not to defeat a safeguard		N/A
4.6.2	10 N force test applied to .....		N/A
4.7	Equipment for direct insertion into mains socket - outlets	Not direct plug-in equipment	N/A
4.7.2	Mains plug part complies with the relevant standard .....		N/A
4.7.3	Torque (Nm) .....		N/A
4.8	Products containing coin/button cell batteries	No batteries	N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction		N/A
	Means to reduce the possibility of children removing the battery .....		—
4.8.4	Battery Compartment Mechanical Tests .....	(See Table 4.8.4)	N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object .....	(See Annex P) For building-in. Must be evaluated in end product. See the	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		Engineering Conditions of Acceptability section.	
<b>5</b>	<b>ELECTRICALLY-CAUSED INJURY</b>		Pass
5.2.1	Electrical energy source classifications .....	(See appended table 5.2)	Pass
5.2.2	ES1, ES2 and ES3 limits		Pass
5.2.2.2	Steady-state voltage and current .....	(See appended table 5.2)	Pass
5.2.2.3	Capacitance limits .....	(See appended table 5.2)	N/A
5.2.2.4	Single pulse limits .....	(See appended table 5.2)	N/A
5.2.2.5	Limits for repetitive pulses .....	(See appended table 5.2)	N/A
5.2.2.6	Ringing signals .....	(See Annex H)	N/A
5.2.2.7	Audio signals .....	(See Clause E.1 )	N/A
5.3	Protection against electrical energy sources	Unit intended for building-in. To be evaluated in end-product.	N/A
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
5.3.2.2	Contact requirements		N/A
	a) Test with test probe from Annex V .....		N/A
	b) Electric strength test potential (V) .....		N/A
	c) Air gap (mm) .....		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	Insulation materials and requirements		Pass
5.4.1.2	Properties of insulating material	Natural rubber, materials containing asbestos and hygroscopic materials are not used as insulation.	Pass
5.4.1.3	Humidity conditioning .....	(See sub-clause 5.4.8)	Pass
5.4.1.4	Maximum operating temperature for insulating materials .....	(See appended table 5.4.1.4)	Pass

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.1.5	Pollution degree.....:	PD2	—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage		Pass
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat softening temperature .....	(See appended table 5.4.1.10.2)	N/A
5.4.1.10.3	Ball pressure .....	(See appended table 5.4.1.10.3)	N/A
5.4.2	Clearances		Pass
5.4.2.2	Determining clearance using peak working voltage	(See appended table 5.4.2.2)	Pass
5.4.2.3	Determining clearance using required withstand voltage .....	(See appended table 5.4.2.3)	Pass
	a) a.c. mains transient voltage .....	-	—
	b) d.c. mains transient voltage .....	500Vpk	—
	c) external circuit transient voltage .....	-	—
	d) transient voltage determined by measurement...:	-	—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test	(See appended table 5.4.2.4)	N/A
5.4.2.5	Multiplication factors for clearances and test voltages.....:		N/A
5.4.3	Creepage distances .....	(See appended table 5.4.3)	Pass
5.4.3.1	General		Pass
5.4.3.3	Material Group .....	IIIb	—
5.4.4	Solid insulation		Pass
5.4.4.2	Minimum distance through insulation .....	(See appended table 5.4.4.2)	Pass
5.4.4.3	Insulation compound forming solid insulation		Pass
5.4.4.4	Solid insulation in semiconductor devices		Pass
5.4.4.5	Cemented joints		Pass
5.4.4.6	Thin sheet material		Pass
5.4.4.6.1	General requirements		Pass
5.4.4.6.2	Separable thin sheet material	UL R/C Tape rated 3000Vac	Pass

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Clause	Requirement + Test	Result - Remark	Verdict
	Number of layers (pcs) .....	1 layer for Basic and 2 layers for Supplementary Insulation	Pass
5.4.4.6.3	Non-separable thin sheet material		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material..... :	(See appended Table 5.4.9)	N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components	Not used as safeguard	N/A
5.4.4.9	Solid insulation at frequencies >30 kHz..... :	(See appended Table 5.4.4.9)	N/A
5.4.5	Antenna terminal insulation		N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
	Insulation resistance (MΩ) .....		—
5.4.6	Insulation of internal wire as part of supplementary safeguard .....	(See appended table 5.4.4.2)	N/A
5.4.7	Tests for semiconductor components and for cemented joints		Pass
5.4.8	Humidity conditioning		Pass
	Relative humidity (%) .....	95 %	—
	Temperature (°C) .....	40 C	—
	Duration (h) .....	48 h	—
5.4.9	Electric strength test..... :	(See appended table 5.4.9)	Pass
5.4.9.1	Test procedure for a solid insulation type test		Pass
5.4.9.2	Test procedure for routine tests		N/A
5.4.10	Protection against transient voltages between external circuit		N/A
5.4.10.1	Parts and circuits separated from external circuits	(See appended table 5.4.9)	N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test..... :	(See appended table 5.4.9)	N/A
5.4.10.2.3	Steady-state test .....	(See appended table 5.4.9)	N/A
5.4.11	Insulation between external circuits and earthed circuitry .....	(See appended table 5.4.9)	N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	Rated operating voltage $U_{op}$ (V) .....		—
	Nominal voltage $U_{peak}$ (V) .....		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Max increase due to variation $U_{sp}$ .....		—
	Max increase due to ageing $\Delta U_{sa}$ .....		—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ .....		—
5.5	Components as safeguards		Pass
5.5.1	General		Pass
5.5.2	Capacitors and RC units		Pass
5.5.2.1	General requirement		Pass
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector .....	(See appended table 5.5.2.2)	N/A
5.5.3	Transformers	(See Annex G.5.3)	Pass
5.5.4	Optocouplers	(See sub-clause 5.4 or Annex G.12)	Pass
5.5.5	Relays	(See Annex G.2)	N/A
5.5.6	Resistors	(See Annex G.10)	N/A
5.5.7	SPD's	(See Annex G.8)	N/A
5.5.7.1	Use of an SPD connected to reliable earthing		N/A
5.5.7.2	Use of an SPD between mains and protective earth		N/A
5.5.8	Insulation between the mains and external circuit consisting of a coaxial cable .....	(See Annex G.10.3)	N/A
5.6	Protective conductor		N/A
5.6.2	Requirement for protective conductors	Unit intended for building-in. To be evaluated in end-product.	N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm <sup>2</sup> ) .....		—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm <sup>2</sup> ).....		—
	Protective current rating (A) .....		—
5.6.4.3	Current limiting and overcurrent protective devices		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Requirement		N/A
	Conductor size (mm <sup>2</sup> ), nominal thread diameter (mm).....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method Resistance ( $\Omega$ ) .....	(See appended table 5.6.6.2)	N/A
5.6.7	Reliable earthing		N/A
5.7	Prospective touch voltage, touch current and protective conductor current		N/A
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current .....	(See appended table 5.7.4)	N/A
5.7.2.2	Measurement of prospective touch voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
	System of interconnected equipment (separate connections/single connection) .....		—
	Multiple connections to mains (one connection at a time/simultaneous connections) .....		—
5.7.4	Earthed conductive accessible parts .....	(See appended Table 5.7.4)	N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V) .....		—
	Measured current (mA) .....		—
	Instructional Safeguard .....	(See F.4 and F.5)	N/A
5.7.6	Prospective touch voltage and touch current due to external circuits		N/A
5.7.6.1	Touch current from coaxial cables		N/A
5.7.6.2	Prospective touch voltage and touch current from external circuits		N/A
5.7.7	Summation of touch currents from external circuits		N/A
	a) Equipment with earthed external circuits Measured current (mA) .....		N/A
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA) .....		N/A

<b>6</b>	<b>ELECTRICALLY- CAUSED FIRE</b>		Pass
6.2	Classification of power sources (PS) and potential ignition sources (PIS)		Pass
6.2.2	Power source circuit classifications		Pass
6.2.2.1	General	PS3 Declared	Pass
6.2.2.2	Power measurement for worst-case load fault.....	(See appended table 6.2.2)	N/A



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Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.3	Power measurement for worst-case power source fault .....	(See appended table 6.2.2)	N/A
6.2.2.4	PS1 .....	(See appended table 6.2.2)	N/A
6.2.2.5	PS2 .....	(See appended table 6.2.2)	N/A
6.2.2.6	PS3 .....	(See appended table 6.2.2)	Pass
6.2.3	Classification of potential ignition sources		Pass
6.2.3.1	Arcing PIS .....	(See appended table 6.2.3.1)	Pass
6.2.3.2	Resistive PIS .....	(See appended table 6.2.3.2)	Pass
6.3	Safeguards against fire under normal operating and abnormal operating conditions		Pass
6.3.1 (a)	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials .....	(See appended table 5.4.1.5, 6.3.2, 9.0, B.2.6)	Pass
6.3.1 (b)	Combustible materials outside fire enclosure		N/A
6.4	Safeguards against fire under single fault conditions		Pass
6.4.1	Safeguard Method	Control of fire spread	Pass
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	General		N/A
6.4.3.2	Supplementary Safeguards		N/A
	Special conditions if conductors on printed boards are opened or peeled		N/A
6.4.3.3	Single Fault Conditions .....	(See appended table 6.4.3)	N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		N/A
6.4.5	Control of fire spread in PS2 circuits		Pass
6.4.5.2	Supplementary safeguards .....	(See appended tables 4.1.2 and Annex G)	Pass
6.4.6	Control of fire spread in PS3 circuit	All components mounted to V-1 min. PWB	Pass
6.4.7	Separation of combustible materials from a PIS		N/A
6.4.7.1	General .....	(See tables 6.2.3.1 and 6.2.3.2)	N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers	Unit intended for building-in. To be evaluated in end-product.	N/A
6.4.8.1	Fire enclosure and fire barrier material properties		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure		N/A
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		N/A
6.4.8.3.1	Fire enclosure and fire barrier openings		N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) .....		N/A
	Needle Flame test		N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm) .....		N/A
	Flammability tests for the bottom of a fire enclosure .....		N/A
6.4.8.3.5	Integrity of the fire enclosure, condition met: a), b) or c) .....		N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating .....		N/A
6.5	Internal and external wiring		N/A
6.5.1	Requirements	No wiring	N/A
6.5.2	Cross-sectional area (mm <sup>2</sup> ) .....		—
6.5.3	Requirements for interconnection to building wiring .....	(See Annex Q.)	N/A
6.6	Safeguards against fire due to connection to additional equipment		N/A
	External port limited to PS2 or complies with Clause Q.1		N/A

<b>7</b>	<b>INJURY CAUSED BY HAZARDOUS SUBSTANCES</b>		N/A
7.2	Reduction of exposure to hazardous substances		N/A
7.3	Ozone exposure		N/A
7.4	Use of personal safeguards (PPE)		N/A
	Personal safeguards and instructions .....		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010) .....		—
7.6	Batteries .....	(See Annex M)	N/A

<b>8</b>	<b>MECHANICALLY-CAUSED INJURY</b>		N/A
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Clause	Requirement + Test	Result - Remark	Verdict
8.1	General	Unit intended for building-in. To be evaluated in end-product.	N/A
8.2	Mechanical energy source classifications		N/A
8.3	Safeguards against mechanical energy sources		N/A
8.4	Safeguards against parts with sharp edges and corners		N/A
8.4.1	Safeguards		N/A
8.5	Safeguards against moving parts		N/A
8.5.1	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
8.5.2	Instructional Safeguard ..... :		—
8.5.4	Special categories of equipment comprising moving parts		N/A
8.5.4.1	Large data storage equipment		N/A
8.5.4.2	Equipment having electromechanical device for destruction of media		N/A
8.5.4.2.1	Safeguards and Safety Interlocks..... :	(See Annex F.4 and Annex K)	N/A
8.5.4.2.2	Instructional safeguards against moving parts		N/A
	Instructional Safeguard ..... :		—
8.5.4.2.3	Disconnection from the supply		N/A
8.5.4.2.4	Probe type and force (N)..... :		N/A
8.5.5	High Pressure Lamps		N/A
8.5.5.1	Energy Source Classification		N/A
8.5.5.2	High Pressure Lamp Explosion Test ..... :	(See appended table 8.5.5.2)	N/A
8.6	Stability		N/A
8.6.1	Product classification		N/A
	Instructional Safeguard ..... :		—
8.6.2	Static stability		N/A
8.6.2.2	Static stability test		N/A
	Applied Force..... :		—
8.6.2.3	Downward Force Test		N/A
8.6.3	Relocation stability test		N/A
	Unit configuration during 10° tilt ..... :		—
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test (Applied Force) ..... :		N/A
	Position of feet or movable parts ..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
8.7	Equipment mounted to wall or ceiling		N/A
8.7.1	Mounting Means (Length of screws (mm) and mounting surface) .....		N/A
8.7.2	Direction and applied force .....		N/A
8.8	Handles strength		N/A
8.8.1	Classification		N/A
8.8.2	Applied Force .....		N/A
8.9	Wheels or casters attachment requirements		N/A
8.9.1	Classification		N/A
8.9.2	Applied force.....		—
8.10	Carts, stands and similar carriers		N/A
8.10.1	General		N/A
8.10.2	Marking and instructions		N/A
	Instructional Safeguard .....		—
8.10.3	Cart, stand or carrier loading test and compliance		N/A
	Applied force.....		—
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Applied horizontal force (N).....		—
8.10.6	Thermoplastic temperature stability (°C) .....		N/A
8.11	Mounting means for rack mounted equipment		N/A
8.11.1	General		N/A
8.11.2	Product Classification		N/A
8.11.3	Mechanical strength test, variable <i>N</i> .....		N/A
8.11.4	Mechanical strength test 250N, including end stops		N/A
8.12	Telescoping or rod antennas .....	(See Annex T)	N/A
	Button/Ball diameter (mm) .....		—

<b>9</b>	<b>THERMAL BURN INJURY</b>		N/A
9.2	Thermal energy source classifications	Unit intended for building-in. To be evaluated in end-product.	N/A
9.3	Safeguard against thermal energy sources		N/A
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard		N/A
9.4.2	Instructional safeguard .....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

<b>10</b>	<b>RADIATION</b>		N/A
10.2	Radiation energy source classification	No radiation sources	N/A
10.2.1	General classification		N/A
10.3	Protection against laser radiation		N/A
	Laser radiation that exists in the equipment:		—
	Normal, abnormal, single-fault ..... :	(See attached laser test report)	N/A
	Instructional safeguard..... :		—
	Tool ..... :		—
10.4	Protection against visible, infrared, and UV radiation		N/A
10.4.1	General		N/A
10.4.1.a)	RS3 for Ordinary and instructed persons ..... :		N/A
10.4.1.b)	RS3 accessible to a skilled person ..... :		N/A
	Personal safeguard (PPE) instructional safeguard ..... :		—
10.4.1.c)	Equipment visible, IR, UV does not exceed RS1 ..... :		N/A
10.4.1.d)	Normal, abnormal, single-fault conditions ..... :	(See appended table B.3 & B.4)	N/A
10.4.1.e)	Enclosure material employed as safeguard is opaque ..... :		N/A
10.4.1.f)	UV attenuation ..... :		N/A
10.4.1.g)	Materials resistant to degradation UV ..... :		N/A
10.4.1.h)	Enclosure containment of optical radiation ..... :		N/A
10.4.1.i)	Exempt Group under normal operating conditions ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.4.2	Instructional safeguard ..... :		N/A
10.5	Protection against x-radiation		N/A
10.5.1	X- radiation energy source that exists equipment : Normal, abnormal, single fault conditions	(See appended table B.3 & B.4)	N/A
	Equipment safeguards .....		N/A
	Instructional safeguard for skilled person .....		N/A
10.5.3	Most unfavourable supply voltage to give maximum radiation.....		—
	Abnormal and single-fault condition.....	(See appended table B.3 & B.4)	N/A
	Maximum radiation (pA/kg) .....		N/A
10.6	Protection against acoustic energy sources		N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output, dB(A) .....		N/A
	Output voltage, unweighted r.m.s. ....		N/A
10.6.4	Protection of persons		N/A
	Instructional safeguards .....		N/A
	Equipment safeguard prevent ordinary person to RS2 .....		—
	Means to actively inform user of increase sound pressure .....		—
	Equipment safeguard prevent ordinary person to RS2 .....		—
10.6.5	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.5.1	Corded passive listening devices with analog input		N/A
	Input voltage with 94 dB(A) $L_{Aeq}$ acoustic pressure output .....		—
10.6.5.2	Corded listening devices with digital input		N/A
	Maximum dB(A) .....		—
10.6.5.3	Cordless listening device		N/A
	Maximum dB(A) .....		—

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Clause	Requirement + Test	Result - Remark	Verdict
<b>B</b>	<b>NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS</b>		Pass
B.2	Normal Operating Conditions		Pass
B.2.1	General requirements .....	(See Test Item Particulars and appended test tables)	Pass
	Audio Amplifiers and equipment with audio amplifiers.....	(See Annex E)	N/A
B.2.3	Supply voltage and tolerances		Pass
B.2.5	Input test .....	(See appended table B.2.5)	Pass
B.3	Simulated abnormal operating conditions		Pass
B.3.1	General requirements .....	(See appended table B.3)	Pass
B.3.2	Covering of ventilation openings		N/A
B.3.3	D.C. mains polarity test		N/A
B.3.4	Setting of voltage selector.....		N/A
B.3.5	Maximum load at output terminals .....	Output overload and short condition	Pass
B.3.6	Reverse battery polarity		N/A
B.3.7	Abnormal operating conditions as specified in Clause E.2.		N/A
B.3.8	Safeguards functional during and after abnormal operating conditions		Pass
B.4	Simulated single fault conditions		Pass
B.4.2	Temperature controlling device open or short-circuited.....	(See appended table B.4)	N/A
B.4.3	Motor tests		N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature .....	(See Clause G.5)	N/A
B.4.4	Short circuit of functional insulation		N/A
B.4.4.1	Short circuit of clearances for functional insulation		N/A
B.4.4.2	Short circuit of creepage distances for functional insulation		N/A
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors		N/A
B.4.6	Short circuit or disconnect of passive components		Pass
B.4.7	Continuous operation of components		N/A
B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
B.4.9	Battery charging under single fault conditions .....	(See Annex M)	N/A
<b>C</b>	<b>UV RADIATION</b>		N/A
C.1	Protection of materials in equipment from UV radiation		N/A
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	UV light conditioning test		N/A
C.2.1	Test apparatus		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure apparatus		N/A
C.2.4	Xenon-arc light exposure apparatus		N/A
<b>D</b>	<b>TEST GENERATORS</b>		N/A
D.1	Impulse test generators		N/A
D.2	Antenna interface test generator		N/A
D.3	Electronic pulse generator		N/A
<b>E</b>	<b>TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS</b>		N/A
E.1	Audio amplifier normal operating conditions		N/A
	Audio signal voltage (V) .....		—
	Rated load impedance ( $\Omega$ ) .....		—
E.2	Audio amplifier abnormal operating conditions		N/A
<b>F</b>	<b>EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS</b>		Pass
F.1	General requirements		Pass
	Instructions – Language .....	English evaluated	—
F.2	Letter symbols and graphical symbols		N/A
F.2.1	Letter symbols according to IEC60027-1		N/A
F.2.2	Graphic symbols IEC, ISO or manufacturer specific		N/A
F.3	Equipment markings		Pass
F.3.1	Equipment marking locations		Pass
F.3.2	Equipment identification markings		Pass
F.3.2.1	Manufacturer identification .....	Unipower	—
F.3.2.2	Model identification .....	See “Models and Ratings”.	—
F.3.3	Equipment rating markings		Pass
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains		Pass



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Clause	Requirement + Test	Result - Remark	Verdict
F.3.3.3	Nature of supply voltage .....	DC	—
F.3.3.4	Rated voltage .....	See “Models and Ratings”.	—
F.3.3.5	Rated frequency .....	See “Models and Ratings”.	—
F.3.3.6	Rated current or rated power .....	See “Models and Ratings”.	—
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device		N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings .....		N/A
F.3.5.2	Switch position identification marking .....		N/A
F.3.5.3	Replacement fuse identification and rating markings .....		N/A
F.3.5.4	Replacement battery identification marking .....		N/A
F.3.5.5	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I Equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A
F.3.6.1.2	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A
F.3.6.2	Class II equipment (IEC60417-5172)		N/A
F.3.6.2.1	Class II equipment with or without functional earth		N/A
F.3.6.2.2	Class II equipment with functional earth terminal marking		N/A
F.3.7	Equipment IP rating marking .....		—
F.3.8	External power supply output marking		N/A
F.3.9	Durability, legibility and permanence of marking		Pass
F.3.10	Test for permanence of markings		Pass
F.4	Instructions		Pass
	a) Equipment for use in locations where children not likely to be present - marking		N/A
	b) Instructions given for installation or initial use		Pass
	c) Equipment intended to be fastened in place		N/A
	d) Equipment intended for use only in restricted access area		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	e) Audio equipment terminals classified as ES3 and other equipment with terminals marked in accordance F.3.6.1		N/A
	f) Protective earthing employed as safeguard		N/A
	g) Protective earthing conductor current exceeding ES 2 limits		N/A
	h) Symbols used on equipment		N/A
	i) Permanently connected equipment not provided with all-pole mains switch		N/A
	j) Replaceable components or modules providing safeguard function		N/A
F.5	Instructional safeguards		N/A
	Where "instructional safeguard" is referenced in the test report it specifies the required elements, location of marking and/or instruction		N/A
<b>G</b>	<b>COMPONENTS</b>		Pass
<b>G.1</b>	<b>Switches</b>		N/A
G.1.1	General requirements		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
<b>G.2</b>	<b>Relays</b>		N/A
G.2.1	General requirements		N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supply power		N/A
G.2.4	Mains relay, modified as stated in G.2		N/A
<b>G.3</b>	<b>Protection Devices</b>		N/A
G.3.1	Thermal cut-offs		N/A
G.3.1.1a) &b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Thermal cut-off connections maintained and secure		N/A
G.3.2	Thermal links		N/A
G.3.2.1a)	Thermal links separately tested with IEC 60691		N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H) .....		—
	Single Fault Condition.....		—
	Test Voltage (V) and Insulation Resistance ( $\Omega$ ) ..		—

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Clause	Requirement + Test	Result - Remark	Verdict
G.3.3	PTC Thermistors		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions .....	(See appended Table B.4)	N/A
<b>G.4</b>	<b>Connectors</b>		Pass
G.4.1	Spacings		Pass
G.4.2	Mains connector configuration .....		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
<b>G.5</b>	<b>Wound Components</b>		Pass
G.5.1	Wire insulation in wound components .....	Not used as insulation safeguard (See Annex J)	N/A
G.5.1.2 a)	Two wires in contact inside wound component, angle between 45° and 90°		N/A
G.5.1.2 b)	Construction subject to routine testing		N/A
G.5.2	Endurance test on wound components		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Time (s) .....		—
	Temperature (°C) .....		—
G.5.2.3	Wound Components supplied by mains		N/A
<b>G.5.3</b>	<b>Transformers</b>		Pass
G.5.3.1	Requirements applied (IEC61204-7, IEC61558-1/-2, and/or IEC62368-1) .....		N/A
	Position .....	T1	—
	Method of protection .....	Protection by inherent or external impedance	—
G.5.3.2	Insulation		Pass
	Protection from displacement of windings .....	Margin tape provided on each end of each winding.	—
G.5.3.3	Overload test.....	(See appended table B.3)	Pass
G.5.3.3.1	Test conditions	Transformers for switch mode power supply units are tested in the complete power supply unit or in the complete equipment. Test loads are applied to the output of the power supply unit.	Pass

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Clause	Requirement + Test	Result - Remark	Verdict
G.5.3.3.2	Winding Temperatures testing in the unit	(See appended table B.3)	Pass
G.5.3.3.3	Winding Temperatures - Alternative test method		N/A
<b>G.5.4</b>	<b>Motors</b>		N/A
G.5.4.1	General requirements		N/A
	Position .....		—
G.5.4.2	Test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4	Locked-rotor overload test		N/A
	Test duration (days) .....		—
G.5.4.5	Running overload test for d.c. motors in secondary circuits		N/A
G.5.4.5.2	Tested in the unit		N/A
	Electric strength test (V) .....		—
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h) .....		N/A
	Electric strength test (V) .....		—
G.5.4.6	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature .....		N/A
	Electric strength test (V) .....		N/A
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h) .....		N/A
	Electric strength test (V) .....		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage .....		—
<b>G.6</b>	<b>Wire Insulation</b>		N/A
G.6.1	General		N/A
G.6.2	Solvent-based enamel wiring insulation		N/A
<b>G.7</b>	<b>Mains supply cords</b>		N/A
G.7.1	General requirements		N/A
	Type .....		—
	Rated current (A) .....		—
	Cross-sectional area (mm <sup>2</sup> ), (AWG) .....		—

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Clause	Requirement + Test	Result - Remark	Verdict
G.7.2	Compliance and test method		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N) ..... :		—
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm) ... :		—
G.7.3.2.4	Strain relief comprised of polymeric material		N/A
G.7.4	Cord Entry ..... :	(See appended table 5.4.11.1)	N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Mass (g) ..... :		—
	Diameter (m) ..... :		—
	Temperature (°C) ..... :		—
G.7.6	Supply wiring space		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Test with 8 mm strand		N/A
<b>G.8</b>	<b>Varistors</b>		N/A
G.8.1	General requirements		N/A
G.8.2	Safeguard against shock		N/A
G.8.3	Safeguard against fire		N/A
G.8.3.2	Varistor overload test ..... :	(See appended table B.3)	N/A
G.8.3.3	Temporary overvoltage ..... :	(See appended table B.3)	N/A
<b>G.9</b>	<b>Integrated Circuit (IC) Current Limiters</b>		N/A
G.9.1 a)	Manufacturer defines limit at max. 5A.		N/A
G.9.1 b)	Limiters do not have manual operator or reset		N/A
G.9.1 c)	Supply source does not exceed 250 VA ..... :		—
G.9.1 d)	IC limiter output current (max. 5A) ..... :		—
G.9.1 e)	Manufacturers' defined drift ..... :		—
G.9.2	Test Program 1		N/A
G.9.3	Test Program 2		N/A
G.9.4	Test Program 3		N/A
<b>G.10</b>	<b>Resistors</b>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.10.1	General requirements	Provide functional insulation only	N/A
G.10.2	Resistor test		N/A
G.10.3	Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable		N/A
G.10.3.1	General requirements		N/A
G.10.3.2	Voltage surge test		N/A
G.10.3.3	Impulse test		N/A
<b>G.11</b>	<b>Capacitor and RC units</b>		Pass
G.11.1	General requirements		Pass
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors	See Table 4.1.2	Pass
<b>G.12</b>	<b>Optocouplers</b>		Pass
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results) .....	See Table 4.1.2	Pass
	Type test voltage Vini .....	N/A	—
	Routine test voltage, Vini,b .....	N/A	—
<b>G.13</b>	<b>Printed boards</b>		Pass
G.13.1	General requirements		Pass
G.13.2	Uncoated printed boards		Pass
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction) .....		—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation.....	(See appended table 5.4.4.5)	N/A
	Number of insulation layers (pcs) .....		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2a)	Thermal conditioning		N/A
G.13.6.2b)	Electric strength test		N/A
G.13.6.2c)	Abrasion resistance test		N/A
<b>G.14</b>	<b>Coating on components terminals</b>		N/A
G.14.1	Requirements .....	(See G.13)	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>G.15</b>	<b>Liquid filled components</b>		N/A
G.15.1	General requirements		N/A
G.15.2	Requirements		N/A
G.15.3	Compliance and test methods		N/A
G.15.3.1	Hydrostatic pressure test		N/A
G.15.3.2	Creep resistance test		N/A
G.15.3.3	Tubing and fittings compatibility test		N/A
G.15.3.4	Vibration test		N/A
G.15.3.5	Thermal cycling test		N/A
G.15.3.6	Force test		N/A
G.15.4	Compliance		N/A
<b>G.16</b>	<b>IC including capacitor discharge function (ICX)</b>		N/A
G.16 a)	Humidity treatment in accordance with sc 5.4.8 – 120 hours		N/A
G.16 b)	Impulse test using circuit 2 with $U_c =$ to transient voltage .....		N/A
G.16 C1)	Application of ac voltage at 110% of rated voltage for 2.5 minutes		N/A
G.16 C2)	Test voltage .....		—
G.16 D1)	10,000 cycles on and off using capacitor with smallest capacitance resistor with largest resistance specified by manufacturer		N/A
G.16 D2)	Capacitance .....		—
G.16 D3)	Resistance .....		—
<b>H</b>	<b>CRITERIA FOR TELEPHONE RINGING SIGNALS</b>		N/A
H.1	General		N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringling signal		N/A
H.3.1.1	Frequency (Hz) .....		—
H.3.1.2	Voltage (V) .....		—
H.3.1.3	Cadence; time (s) and voltage (V) .....		—
H.3.1.4	Single fault current (mA): .....		—
H.3.2	Tripping device and monitoring voltage .....		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage complied with		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V).....:		—
<b>J</b>	<b>INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION</b>		N/A
	General requirements	(See separate test report)	N/A
<b>K</b>	<b>SAFETY INTERLOCKS</b>		N/A
K.1	General requirements		N/A
K.2	Components of safety interlock safeguard mechanism .....	(See Annex G)	N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance .....	(See appended table B.4)	N/A
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A
K.6.2	Compliance and Test method.....:		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location) .....		N/A
K.7.2	Overload test, Current (A).....:		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test .....	(See appended table 5.4.9)	N/A
<b>L</b>	<b>DISCONNECT DEVICES</b>		N/A
L.1	General requirements	Unit intended for building-in. To be evaluated in end-product.	N/A
L.2	Permanently connected equipment		N/A
L.3	Parts that remain energized		N/A
L.4	Single phase equipment		N/A
L.5	Three-phase equipment		N/A
L.6	Switches as disconnect devices		N/A
L.7	Plugs as disconnect devices		N/A
L.8	Multiple power sources		N/A
<b>M</b>	<b>EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS</b>		N/A
M.1	General requirements		N/A
M.2	Safety of batteries and their cells		N/A
M.2.1	Requirements		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
M.2.2	Compliance and test method (identify method) .. :		N/A
M.3	Protection circuits		N/A
M.3.1	Requirements		N/A
M.3.2	Tests		N/A
	- Overcharging of a rechargeable battery		N/A
	- Unintentional charging of a non-rechargeable battery		N/A
	- Reverse charging of a rechargeable battery		N/A
	- Excessive discharging rate for any battery		N/A
M.3.3	Compliance ..... :	(See appended Tables and Annex M.3 and M.4)	N/A
M.4	Additional safeguards for equipment containing secondary lithium battery		N/A
M.4.1	General		N/A
M.4.2	Charging safeguards		N/A
M.4.2.1	Charging operating limits		N/A
M.4.2.2a)	Charging voltage, current and temperature ..... :	(See Annex M.4)	—
M.4.2.2 b)	Single faults in charging circuitry ..... :	(See Annex B.4)	—
M.4.3	Fire Enclosure		N/A
M.4.4	Endurance of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation		N/A
M.4.4.3	Drop and charge/discharge function tests		N/A
	Drop		N/A
	Charge		N/A
	Discharge		N/A
M.4.4.4	Charge-discharge cycle test		N/A
M.4.4.5	Result of charge-discharge cycle test		N/A
M.5	Risk of burn due to short circuit during carrying		N/A
M.5.1	Requirement		N/A
M.5.2	Compliance and Test Method (Test of P.2.3)		N/A
M.6	Prevention of short circuits and protection from other effects of electric current		N/A
M.6.1	Short circuits		N/A
M.6.1.1	General requirements		N/A
M.6.1.2	Test method to simulate an internal fault		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.6.1.3	Compliance (Specify M.6.1.2 or alternative method) .....		N/A
M.6.2	Leakage current (mA) .....		N/A
M.7	Risk of explosion from lead acid and NiCd batteries		N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
M.7.2	Compliance and test method		N/A
M.8	Protection against internal ignition from external spark sources of lead acid batteries		N/A
M.8.1	General requirements		N/A
M.8.2	Test method		N/A
M.8.2.1	General requirements		N/A
M.8.2.2	Estimation of hypothetical volume $V_z$ (m <sup>3</sup> /s) .....		—
M.8.2.3	Correction factors .....		—
M.8.2.4	Calculation of distance $d$ (mm) .....		—
M.9	Preventing electrolyte spillage		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse (Determination of compliance: inspection, data review; or abnormal testing) .....		N/A
<b>N</b>	<b>ELECTROCHEMICAL POTENTIALS</b>		N/A
	Metal(s) used .....		—
<b>O</b>	<b>MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES</b>		Pass
	Figures O.1 to O.20 of this Annex applied.....	Figures applied	—
<b>P</b>	<b>SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS</b>		N/A
P.1	General requirements	Unit intended for building-in. To be evaluated in end-product.	N/A
P.2.2	Safeguards against entry of foreign object		N/A
	Location and Dimensions (mm) .....		—
P.2.3	Safeguard against the consequences of entry of foreign object		N/A
P.2.3.1	Safeguards against the entry of a foreign object		N/A
	Openings in transportable equipment		N/A
	Transportable equipment with metalized plastic parts .....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
P.2.3.2	Openings in transportable equipment in relation to metallized parts of a barrier or enclosure (identification of supplementary safeguard) ..... :		N/A
P.3	Safeguards against spillage of internal liquids		N/A
P.3.1	General requirements		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Safeguards effectiveness		N/A
P.4	Metallized coatings and adhesive securing parts		N/A
P.4.2 a)	Conditioning testing		N/A
	T <sub>c</sub> (°C)..... :		—
	T <sub>r</sub> (°C) ..... :		—
	T <sub>a</sub> (°C) ..... :		—
P.4.2 b)	Abrasion testing ..... :	(See G.13.6.2)	N/A
P.4.2 c)	Mechanical strength testing ..... :	(See Annex T)	N/A
<b>Q</b>	<b>CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING</b>		N/A
Q.1	Limited power sources		N/A
Q.1.1 a)	Inherently limited output		N/A
Q.1.1 b)	Impedance limited output		N/A
	- Regulating network limited output under normal operating and simulated single fault condition		N/A
Q.1.1 c)	Overcurrent protective device limited output		N/A
Q.1.1 d)	IC current limiter complying with G.9		N/A
Q.1.2	Compliance and test method		N/A
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A) ..... :		—
	Current limiting method..... :		—
<b>R</b>	<b>LIMITED SHORT CIRCUIT TEST</b>		N/A
R.1	General requirements		N/A
R.2	Determination of the overcurrent protective device and circuit		N/A
R.3	Test method Supply voltage (V) and short-circuit current (A)). ..... :		N/A
<b>S</b>	<b>TESTS FOR RESISTANCE TO HEAT AND FIRE</b>		N/A
S.1	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Samples, material .....		—
	Wall thickness (mm) .....		—
	Conditioning (°C) .....		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	Flammability test for fire enclosure and fire barrier integrity		N/A
	Samples, material .....		—
	Wall thickness (mm) .....		—
	Conditioning (°C) .....		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	Test specimen does not show any additional hole		N/A
S.3	Flammability test for the bottom of a fire enclosure		N/A
	Samples, material .....		—
	Wall thickness (mm) .....		—
	Cheesecloth did not ignite		N/A
S.4	Flammability classification of materials		N/A
S.5	Flammability test for fire enclosure materials of equipment with a steady-state power exceeding 4000 W		N/A
	Samples, material .....		—
	Wall thickness (mm) .....		—
	Conditioning (test condition), (°C).....		—
	Test flame according to IEC 60695-11-20 with conditions as set out		N/A
	After every test specimen was not consumed completely		N/A
	After fifth flame application, flame extinguished within 1 min		N/A
<b>T</b>	<b>MECHANICAL STRENGTH TESTS</b>		N/A
T.1	General requirements		N/A
T.2	Steady force test, 10 N .....	(See appended table T.2)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
T.3	Steady force test, 30 N .....	(See appended table T.3)	N/A
T.4	Steady force test, 100 N .....	(See appended table T.4)	N/A
T.5	Steady force test, 250 N .....	(See appended table T.5)	N/A
T.6	Enclosure impact test	(See appended table T.6)	N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test .....	(See appended table T.7)	N/A
T.8	Stress relief test .....	(See appended table T.8)	N/A
T.9	Impact Test (glass)		N/A
T.9.1	General requirements		N/A
T.9.2	Impact test and compliance		N/A
	Impact energy (J) .....		—
	Height (m) .....		—
T.10	Glass fragmentation test .....	(See sub-clause 4.4.4.9)	N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm) .....		—
<b>U</b>	<b>MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION</b>		N/A
U.1	General requirements		N/A
U.2	Compliance and test method for non-intrinsically protected CRTs		N/A
U.3	Protective Screen .....	(See Annex T)	N/A
<b>V</b>	<b>DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)</b>		N/A
V.1	Accessible parts of equipment	Unit intended for building-in. To be evaluated in end-product.	N/A
V.2	Accessible part criterion		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: List of critical components					Pass
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>	
Input Connector	TKP (Taiwan King Ping)	P-8800 Series	250V/5A	UL1977. UL Standard has requirements that meet or exceed the relevant IEC requirements.	UL , --	
Input Connector - Alternate	Chyao Shiunn	JS-4001 Series	250V/5A	UL1977. UL Standard has requirements that meet or exceed the relevant IEC requirements.	UL , --	
Input Connector - Alternate	Samtec Inc.	JW Series	250V/5A	UL1977. UL Standard has requirements that meet or exceed the relevant IEC requirements.	UL , --	
Capacitors, CY1, CY2 (for AL-070D, AL-070DW Series), CY1-CY5 (for AL-085D, AL-085DW Series)	Walsin Technology Corp	AC Series	4700 pF max, 250 V min.	IEC 60384-14, UL1283, UL60384-14	UL (E146544) , VDE (40001829)	
Capacitors, CY1, CY2 (for AL-070D, AL-070DW Series), CY1-CY5 (for AL-085D, AL-085DW Series) - Alternate	Jyh Chung	JY Series	4700 pF max, 250 V min.	IEC 60384-14, UL1283, UL60384-14	UL (E187963) , VDE (123326)	
Capacitors, CY1, CY2 (for AL-070D, AL-070DW Series), CY1-CY5 (for AL-085D, AL-085DW Series) - Alternate	TDK	CS Series	4700 pF max, 250 V min.	IEC 60384-14, UL1283, UL60384-14	UL (E37861) , VDE (40029781)	

IEC 62368-1					
Clause	Requirement + Test		Result - Remark		Verdict

Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>
Coupling Capacitor, CY3, CY4 (for AL-070D, AL-070DW Series), CY6 (for AL-085D, AL-085DW Series)	Walsin Technology Corp	AC Series (AL-070D, AL-070DW Models)  AH Series (AL-085D, AL-085DW Models)	4700 pF max, 250V min.	IEC 60384-14, UL1283, UL60384-14	UL (E146544) , VDE (40001829, 40001804)
Coupling Capacitor, CY3, CY4 (for AL-070D, AL-070DW Series), CY6 (for AL-085D, AL-085DW Series) - Alternate	Jyh Chung	JY Series (AL-070D, AL-070DW Models)  JD Series (AL-085D, AL-085DW Models)	4700 pF max, 250V min.	IEC 60384-14, UL1283, UL60384-14	UL (E187963) , VDE (123326 and 137027)
Coupling Capacitor, CY3, CY4 (for AL-070D, AL-070DW Series), CY6 (for AL-085D, AL-085DW Series) - Alternate	TDK	CS Series (AL-070D, AL-070DW Models)  CS Series (AL-085D, AL-085DW Models)	4700 pF max, 250V min.	IEC 60384-14, UL1283, UL60384-14	UL (E37861) , VDE (40029781)
Capacitor CX1, CX2	Chian Chia Electronic Co., Ltd.	MEF Series	Metallized Polyester Film, 0.01uF - 3.3uF, 100V min.	Evaluated to IEC 62368-1:2014 as part of end product.	- , -
Capacitor CX1, CX2 - Alternate	Hua Jung Components Co., Ltd.	MEF Series	Metallized Polyester Film, 0.01uF - 10uF, 100V min.	Evaluated to IEC 62368-1:2014 as part of end product.	- , -
Opto Isolator, PC1	Lite-On Technology Corporation	LTV-817	Isolation thickness > 0.4 mm	IEC 62368-1:2018	UL , Demko (DK-108236-UL)
Opto Isolator, PC1 - Alternate	Cosmo	K1010	Isolation thickness > 0.4 mm	UL1577, IEC60747-5, IEC60950-1, EN60950-1	UL , VDE (101347), Fimko (FI 11876 A4)
Opto Isolator, PC1 - Alternate	SHARP	PC 123	Isolation thickness > 0.4 mm	UL1577, IEC60747-5,	UL , VDE (40008087),

IEC 62368-1					
Clause	Requirement + Test		Result - Remark		Verdict
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>
				IEC60950-1, EN60950-1	Fimko (FI 21408 A2)
Opto Isolator, PC1 - Alternate	Toshiba	TLP721	Isolation thickness > 0.4 mm	UL1577, IEC60747-5, IEC60950-1, EN60950-1	UL , VDE (40009373)
Transformer, T1(AL-070D, AL- 070DW Series)	Green Cubes Technology Corp Taiwan Branch	G020-3200- XXXXAB & G050- 3750-XXXXAB, where X can be any alphanumeric character.	Consisting of OBJY2 Class B insulation system components listed below:	Evaluated to IEC 62368-1:2014 as part of end product.	UL , --
Transformer, T1 (AL-070DW- 48S2-601)	Green Cubes Technology Corp Taiwan Branch	G050-3750- 1230AB	Consisting of OBJY2 Class B insulation system components listed below:	Evaluated to IEC 62368-1:2014 as part of end product.	UL , --
Transformer, T1  (AL-085D, AL- 085DW Series) - Alternate	Green Cubes Technology Corp Taiwan Branch	G050-A121- XXXAB, G050- A301-XXXAB, where X can be any alphanumeric character.	Consisting of OBJY2 Class B insulation system components listed below:	Evaluated to IEC 62368-1:2014 as part of end product.	UL , --
- Transformer, T1 - Insulation System	Green Cubes Technology Corp Taiwan Branch	HIS-8A	Provides Reinforced Insulation - Class B	UL 1446	UL (E229670) , --
- Transformer, T1 - Interwinding Insulation	3M COMPANY	1350F-1, 1350F- 2, 44D and 44T	1T - Basic Insulation, 3T - Reinforced Insulation. Polyester film tape, 130C	UL 510A	UL (E17385) , --
- Transformer, T1 - Margin Tape	SYMBIO INC	MY 130	PET Tape, 130C, 4mm wide, 1-3 layers to thickness of winding.	UL 510A	UL (E50292) , --
- Transformer, T1 - Tubing	ZEUS INDUSTRIAL PRODUCTS INC	TFE-TW-300	Teflon tubing, 300V, 200C, VW-1	UL 224	UL (E64007) , --



IEC 62368-1					
Clause	Requirement + Test		Result - Remark		Verdict

Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>
Line Choke, LE1 (Optional) (AL-070D, AL-070DW Series)	Green Cubes Technology Corp Taiwan Branch	G030-8902-3501	Contains OBWM2 Magnet Wire, Contains (OBJY2) Class B, designated HIS-8A	Evaluated to IEC 62368-1:2014 as part of end product.	-- , --
Line Choke, J1, J3 (Optional) (AL-070D, AL-070DW Series)	Green Cubes Technology Corp Taiwan Branch	G030-550A-4001	Contains OBWM2 Magnet Wire	Evaluated to IEC 62368-1:2014 as part of end product.	-- , --
Line Choke, LE3 (AL-085D, AL-085DW Series)	Green Cubes Technology Corp Taiwan Branch	G030-8202-6001 (for 24 VDC) G030-8902-3501 (for 48 VDC)	Contains OBWM2 Magnet Wire, Contains (OBJY2) Class B, designated HIS-8A	Evaluated to IEC 62368-1:2014 as part of end product.	-- , --
Fuse, F1 (F2 Optional for medical model) (AL-070D, AL-070DW Series)	Bel Fuse	5ST, 5STP, MRT	8A, 250V (for 24 VDC), 4A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-38383)
Fuse, F1 (F2 Optional for medical model) (AL-070D, AL-070DW Series) - Alternate	Cooper	S506	8A, 250V (for 24 VDC), 4A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-38694)
Fuse, F1 (F2 Optional for medical model) (AL-070D, AL-070DW Series) - Alternate	Conquer	UTE, UTE-A, MET	8A, 250V (for 24 VDC), 4A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-32183)
Fuse, F1 (F2 Optional for medical model) (AL-070D, AL-070DW Series) - Alternate	Littlefuse	218, 228	8A, 250V (for 24 VDC), 4A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-32433)
Fuse, F1 (F2 Optional for medical model)	Bel Fuse	5ST, 5STP, MRT	8A, 250V (for 24 VDC), 5A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-38383)

IEC 62368-1					
Clause	Requirement + Test		Result - Remark		Verdict
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>
(AL-085D, AL-085DW Series)					
Fuse, F1 (F2 Optional for medical model) (AL-085D, AL-085DW Series) - Alternate	Cooper	S506	8A, 250V (for 24 VDC), 5A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-38694)
Fuse, F1 (F2 Optional for medical model) (AL-085D, AL-085DW Series) - Alternate	Conquer	UTE, UTE-A, MET	8A, 250V (for 24 VDC), 5A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-32183)
Fuse, F1 (F2 Optional for medical model) (AL-085D, AL-085DW Series) - Alternate	Littlefuse	218, 228	8A, 250V (for 24 VDC), 5A, 250V (for 48 VDC)	IEC 60127, UL248-1, -14	UL , VDE (DE1-32433)
Printed Wiring Board	Interchangeable	Interchangeable	Min V-1, 130 °C	UL796. UL Standard has requirements that meet or exceed the relevant IEC requirements.	UL , --
Label	Esin Color Printing Co. Ltd.	EL02, EL03	125°C, for application to Capacitor C1	UL969. UL Standard has requirements that meet or exceed the relevant IEC requirements.	UL , --
Supplementary information:					
1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

IEC 62368-1				
Clause	Requirement + Test		Result - Remark	Verdict
4.8.4, 4.8.5	TABLE: Lithium coin/button cell batteries mechanical tests			N/A
(The following mechanical tests are conducted in the sequence noted.)				
4.8.4.2	TABLE: Stress Relief test			—
Part		Material	Oven Temperature (°C)	Comments
4.8.4.3	TABLE: Battery replacement test			—
Battery part no. .... :				—
Battery Installation/withdrawal		Battery Installation/Removal Cycle		Comments
		1		
		2		
		3		
		4		
		5		
		6		
		8		
		9		
		10		
4.8.4.4	TABLE: Drop test			—
Impact Area		Drop Distance	Drop No.	Observations
			1	
			2	
			3	
4.8.4.5	TABLE: Impact			—
Impacts per surface		Surface tested	Impact energy (Nm)	Comments
4.8.4.6	TABLE: Crush test			—
Test position		Surface tested	Crushing Force (N)	Duration force applied (s)
Supplementary information:				

4.8.5	TABLE: Lithium coin/button cell batteries mechanical test result	N/A
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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
Test position	Surface tested	Force (N)	Duration force applied (s)
Supplementary information:			

5.2		Table: Classification of electrical energy sources					Pass
5.2.2.2 – Steady State Voltage and Current conditions							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				U (Vrms or Vpk)	I (A <sub>pk</sub> or A <sub>rms</sub> )	Hz	
1*	72Vdc	T1 Pin 7 to 8	Normal	312 Vpk	Fig 4: 5.2 mApk Fig 5: 9.2 mApk	<30kHz	ES3
2*	72Vdc	48V Output	Normal	48V	-	DC	ES1
			S.C. D6	2.6V	-	DC	
3*	72Vdc	T1 Pin 10 to 9	Normal	30.4 Vpk	-	<30kHz	ES1
4*	72Vdc	T1 Pin 12 to 9	Normal	41.6Vpk	-	<30kHz	ES1
5**	72Vdc	T1 Pin F to 7	Normal	322 Vpk	Fig 4: 13mApk Fig 5: 28.6mApk	<30kHz	ES3
6**	72Vdc	48V Output	Normal	48V	-	DC	ES1
			S.C. D9	4.4V	-	DC	
			S.C. L1	1.3V	-	DC	
			S.C. L4	51.6V	-	DC	
7**	72Vdc	T1 Pin 8 to 11	Normal	51.0 Vpk	Fig 4: 3.0 mApk Fig 5: 5.1 mApk	<30kHz	ES2
8**	72Vdc	-12V Output	Normal	-12V	-	DC	ES1
			S.C. D7	1.3V	-	DC	
			S.C. L1	1.3V	-	DC	
			S.C. L4	14.3V	-	DC	
9**	72Vdc	T1 Pin 12 to 10	Normal	33.0 Vpk	-	<30kHz	ES1
10**	72Vdc	T1 Pin 9 to 11	Normal	37.2 Vpk	-	<30kHz	ES1
5.2.2.3 - Capacitance Limits							

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters		ES Class
				Capacitance, nF	Upk (V)	
-	-	-	Normal	-	-	-
			Abnormal	-	-	
			Single fault – SC/OC	-	-	

## 5.2.2.4 - Single Pulses

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Duration (ms)	Upk (V)	Ipk (mA)	
-	-	-	Normal	-	-	-	-
			Abnormal	-	-	-	
			Single fault – SC/OC	-	-	-	

## 5.2.2.5 - Repetitive Pulses

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ipk (mA)	
-	-	-	Normal	-	-	-	-
			Abnormal	-	-	-	
			Single fault – SC/OC	-	-	-	

## Test Conditions:

Normal –

Abnormal –

Supplementary information: SC=Short Circuit, OC=Open Circuit

\* Tested on model AL-070D-48T125-175

\*\* Tested on model AL-085D-48Q1225-151

<b>5.4.1.4, 6.3.2, 9.0, B.2.6</b>	<b>TABLE: Temperature measurements</b>					Pass
	Supply voltage (V) .....	18Vdc	48Vdc	72Vdc	-	—
	Ambient T <sub>min</sub> (°C) .....	-	-	-	-	—
	Ambient T <sub>max</sub> (°C) .....	51.3	51.3	51.3	-	—
	T <sub>ma</sub> (°C) .....	50	50	50	-	—
Maximum measured temperature T of part/at:			T (°C)			Allowed T <sub>max</sub> (°C)
Model AL-070DW-48S2-601			-	-	-	-

IEC 62368-1						
Clause	Requirement + Test		Result - Remark			Verdict
LE1		112.5	65.8	63.7	-	130
J1 Inductor coil		79.6	61.8	60.8	-	130
J3 Inductor coil		91.2	66.7	65.7	-	130
T1 core		105.4	88.0	87.4	-	110
T1 winding top		98.4	84.7	84.3	-	110
PWB near Q1		112.9	84.9	86.2	-	130
PWB near R18		76.1	75.5	76.1	-	130
PWB near R20		73.1	70.4	70.6	-	130
Supplementary information:						
-						
	Supply voltage (V) .....	72Vdc Output Short	18Vdc Output Overload	-	-	—
	Ambient T <sub>min</sub> (°C) .....	-	-	-	-	—
	Ambient T <sub>max</sub> (°C) .....	50.9	51.0	-	-	—
	Tma (°C) .....	50	50	-	-	—
Maximum measured temperature T of part/at:		T (°C)				Allowed T <sub>max</sub> (°C)
Model AL-070DW-48S2-601		-	-	-	-	-
LE1		60.6	118.7	-	-	-
J1 Inductor coil		58.4	86.6	-	-	-
J3 Inductor coil		61.2	105.8	-	-	-
T1 core		74.3	110.4	-	-	175
T1 winding top		71.1	107.8	-	-	175
PWB near Q1		69.5	117.3	-	-	-
PWB near R18		58.1	79.4	-	-	-
PWB near R20		59.9	77.2	-	-	-
Supplementary information:						
Model AL-070DW-48S2-601 tested in an environmental chamber at Tma of approx. 50°C. See Enclosed Test Records for additional data.						
	Supply voltage (V) .....	36*	48*	72*	36**	—
	Ambient T <sub>min</sub> (°C) .....	-	-	-	-	—
	Ambient T <sub>max</sub> (°C) .....	25	25	25	25	—
	Tma (°C) .....	25	25	25	25	—
Maximum measured temperature T of part/at:		T (°C)				Allowed T <sub>max</sub> (°C)
AL-070D-48T125-175		-	-	-	-	-

IEC 62368-1					
Clause	Requirement + Test		Result - Remark		Verdict
1 C1 Casing	50.7	46.3	43.7	26.4	105
2 T1 Winding	92.1	87.5	85.7	34.5	110
3 T1 Core	98.1	91.5	89.2	36.4	110
4 LE1 Winding	61.2	46.1	41.3	29.2	130
5 PWB near T1	64.2	61.8	60.1	27.8	130
AL-085D-48Q1225-151	-	-	-	-	-
1 C1 Casing	68.9	64	60.6	28.8	105
2 T1 Winding	85.2	85.2	90.4	41.7	110
3 T1 Core	86.4	87.8	92.6	44.3	110
4 LE3 Winding	61.6	61.1	62.6	39.6	130
5 T2 Winding	89.3	74	67.3	38.4	90
6 PWB near T1	72.6	72.2	76.4	34.7	130
Supplementary information:					
*Convective cooling					
**Forced air cooling					
All temperatures adjusted to T <sub>ma</sub> 25°C					
	Supply voltage (V) .....	36V (48V Overload)	36V (5V Overload)	36V (-12V Overload)	-
	Ambient T <sub>min</sub> (°C) .....	-	-	-	-
	Ambient T <sub>max</sub> (°C) .....	25	25	25	-
	T <sub>ma</sub> (°C) .....	25	25	25	-
Maximum measured temperature T of part/at:		T (°C)			Allowed T <sub>max</sub> (°C)
AL-070D-48T125-175	-	-	-	-	-
C1 Casing	64.1	70.5	-	-	-
T1 Winding	121.1	133.7	-	-	175
T1 Core	130.7	133.2	-	-	175
LE1 Winding	78.8	84.5	-	-	-
PWB near T1	87.2	95.4	-	-	-
AL-085D-48Q1225-151	-	-	-	-	-
C1 Casing	85.1	71.8	74.2	-	-
T1 Winding	104.8	90.1	91.5	-	175
T1 Core	104.9	89.5	91.3	-	175
LE3 Winding	69.4	60.5	61.8	-	-
T2 Winding	127.9	97.9	103.3	-	-
PWB near T1	90.5	77.3	79.3	-	-

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

All temperatures adjusted to Tma 25°C

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics		N/A
Penetration (mm).....:			—
Object/ Part No./Material	Manufacturer/t rademark	T softening (°C)	
Supplementary information:			

5.4.1.10.3	TABLE: Ball pressure test of thermoplastics			N/A
Allowed impression diameter (mm) .....		≤ 2 mm		—
Object/Part No./Material	Manufacturer/trademark	Test temperature (°C)	Impression diameter (mm)	
Supplementary information:				

<b>5.4.2.2, 5.4.2.4 and 5.4.3</b>	<b>TABLE: Minimum Clearances/Creepage distance</b>						Pass
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz) <sup>1</sup>	Required cl (mm)	cl (mm) <sup>2</sup>	Required <sup>3</sup> cr (mm)	cr (mm)
Input to Ground	72	72	DC	0.2	1.5	1.3	1.5
Input to SELV	72	72	DC	0.4	4.0	2.6	4.0
AL-070D-48T125-175	-	-	-	-	-	-	-
T1 Pin 1 to 12	45.2	14.8	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 1 to 11	10	2.7	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 1 to 10	41.2	12.1	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 1 to 9	6.8	2.5	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 1 to 7	314	93.4	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 1 to 8	7.6	1.3	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 3 to 12	62	24.5	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 3 to 11	66	34.4	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 3 to 10	46.0	23.0	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 3 to 9	70.0	33.6	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 3 to 7	412	129	<30kHz	0.4	4.0	3.0	4.0



IEC 62368-1							
Clause	Requirement + Test			Result - Remark			Verdict
T1 Pin 3 to 8	78	33.7	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 5 to 12	75.2	22.0	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 5 to 11	12.4	3.9	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 5 to 10	44	14.4	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 5 to 9	9.6	4.0	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 5 to 7	344	94.4	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 5 to 8	16.4	9.0	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 6 to 12	39.2	10.0	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 6 to 11	28.8	19.2	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 6 to 10	24.0	9.4	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 6 to 9	28.0	19.3	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 6 to 7	402	118	<30kHz	0.4	4.0	3.0	4.0
T1 Pin 6 to 8	61.6	27.0	<30kHz	0.4	4.0	3.0	4.0
PC1 Pin 3 to 1	5.0	3.4	<30kHz	0.4	8.0	3.0	8.0
PC1 Pin 3 to 2	8.8	3.0	<30kHz	0.4	8.0	3.0	8.0
PC1 Pin 4 to 1	8.6	3.0	<30kHz	0.4	8.0	3.0	8.0
PC1 Pin 4 to 2	8.6	3.0	<30kHz	0.4	8.0	3.0	8.0
AL-085D-48Q1225-151	-	-	-	-	-	-	-
T1 Pin 1 to 12	45.0	31.2	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 1 to 10	22.2	17.3	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 1 to 9	97.0	38.0	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 1 to 11	9.8	3.6	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 1 to 8	103	38.8	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 1 to F	172	128	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 1 to 7	12.0	4.8	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 3 to 12	96.0	68.0	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 3 to 10	78.0	52.0	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 3 to 9	74.0	52.0	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 3 to 11	56.0	37.7	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 3 to 8	17.6	3.8	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 3 to F	240	167	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 3 to 7	58.0	37.1	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 6 to 12	56.0	46.6	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 6 to 10	32.0	26.6	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 6 to 9	48.0	31.5	<30kHz	0.4	4.0	3.2	4.0

IEC 62368-1							
Clause	Requirement + Test			Result - Remark			Verdict
T1 Pin 6 to 11	24.0	16.6	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 6 to 8	62.0	20.0	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 6 to F	200	146	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 6 to 7	20.0	15.9	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 5 to 12	26.0	26.0	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 5 to 10	10.0	8.5	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 5 to 9	18.0	11.8	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 5 to 11	10.0	5.0	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 5 to 8	98.0	39.9	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 5 to F	168	127	<30kHz	0.4	4.0	3.2	4.0
T1 Pin 5 to 7	11.2	5.5	<30kHz	0.4	4.0	3.2	4.0
PC1 Pin 3 to 1	10.0	4.4	<30kHz	0.4	8.0	3.2	8.0
PC1 Pin 3 to 2	12.0	4.7	<30kHz	0.4	8.0	3.2	8.0
PC1 Pin 4 to 1	12.0	4.8	<30kHz	0.4	8.0	3.2	8.0
PC1 Pin 4 to 2	12.8	5.0	<30kHz	0.4	8.0	3.2	8.0
Supplementary information:							
Note 1: Only for frequency above 30 kHz							
Note 2: See table 5.4.2.4 if this is based on electric strength test							
Note 3: Provide Material Group							

5.4.2.3	TABLE: Minimum Clearances distances using required withstand voltage					Pass
	Overvoltage Category (OV):					N/A (DC Mains)
	Pollution Degree:					PD2
Clearance distanced between:		Required withstand voltage	Required cl (mm)	Measured cl (mm)		
Basic Insulation		500	0.2	1.5		
Reinforced Insulation		500	0.4	4.0		
Supplementary information:						
-						

5.4.2.4	TABLE: Clearances based on electric strength test			N/A
Test voltage applied between:		Required cl (mm)	Test voltage (kV) peak/ r.m.s. / d.c.	Breakdown Yes / No
Supplementary information:				

IEC 62368-1					
Clause	Requirement + Test			Result - Remark	Verdict
<b>5.4.4.2, 5.4.4.5 c) 5.4.4.9</b>	<b>TABLE: Distance through insulation measurements</b>				Pass
Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)
Reinforced Insulation (Bobbin)	171	<30 kHz	Solid Insulation	0.4 mm	1.0 mm
Supplementary in Transformer (in addition to 1 layer of Basic Insulation)	171	<30 kHz	Thin Sheet Insulation	Two Layers	Two Layers
Supplementary information:					
-					

5.4.9	TABLE: Electric strength tests			Pass
Test voltage applied between:		Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
Functional:				
-	-	-	-	
Basic/supplementary:				
Model AL-070D-48T125-175 Input to Ground	DC	+/-500	No	
Model AL-085D-48Q1225-151 Input to Ground	DC	+/-500	No	
Reinforced:				
Model AL-070D-48T125-175 Input to Output	DC	+/-800	No	
Model AL-085D-48Q1225-151 Input to Output	DC	+/-800	No	
Routine Tests:				
-	-	-	-	
Supplementary information:				
-				

5.5.2.2	TABLE: Stored discharge on capacitors					N/A
Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification	
Supplementary information:						
X-capacitors installed for testing are:						
[ ] bleeding resistor rating:						
[ ] ICX:						

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

## Notes:

## A. Test Location:

Phase to Neutral; Phase to Phase; Phase to Earth; and/or Neutral to Earth

## B. Operating condition abbreviations:

N – Normal operating condition (e.g., normal operation, or open fuse); S –Single fault condition

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

<b>5.6.6.2</b>	<b>TABLE: Resistance of protective conductors and terminations</b>				N/A
Accessible part	Test current (A)	Duration (min)	Voltage drop (V)	Resistance ( $\Omega$ )	
Supplementary information:					

5.7.2.2, 5.7.4	TABLE: Earthed accessible conductive part		N/A
Supply voltage .....		—	
Location	Test conditions specified in 6.1 of IEC 60990 or Fault Condition No in IEC 60990 clause 6.2.2.1 through 6.2.2.8, except for 6.2.2.7	Touch current (mA)	
	1		
	2*		
	3		
	4		
	5		
	6		
	8		
Supplementary Information:			
Notes: [1] Supply voltage is the anticipated maximum Touch Voltage [2] Earthed neutral conductor [Voltage differences less than 1% or more] [3] Specify method used for measurement as described in IEC 60990 sub-clause 4.3 [4] IEC60990, sub-clause 6.2.2.7, Fault 7 not applicable. [5] (*) IEC60990, sub-clause 6.2.2.2 is not applicable if switch or disconnect device (e.g., appliance coupler) provided.			

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.2.2	Table: Electrical power sources (PS) measurements for classification					Pass
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s*)	PS Classification	
All Circuits	-	Power (W) :	-	-	PS3	
		V <sub>A</sub> (V) :	-	-		
		I <sub>A</sub> (A) :	-	-		
Supplementary Information:						
(*) Measurement taken only when limits at 3 seconds exceed PS1 limits						

<b>6.2.3.1</b>	<b>Table: Determination of Potential Ignition Sources (Arcing PIS)</b>				Pass
Location		Open circuit voltage After 3 s (V <sub>p</sub> )	Measured r.m.s current (I <sub>rms</sub> )	Calculated value (V <sub>p</sub> x I <sub>rms</sub> )	Arcing PIS? Yes / No
Input DC Mains		72Vdc	-	-	Yes
Supplementary information:					
An Arcing PIS requires a minimum of 50 V (peak) a.c. or d.c. An Arcing PIS is established when the product of the open circuit voltage (V <sub>p</sub> ) and normal operating condition rms current (I <sub>rms</sub> ) is greater than 15.					

<b>6.2.3.2</b>	<b>Table: Determination of Potential Ignition Sources (Resistive PIS)</b>				Pass
Circuit Location (x-y)	Operating Condition (Normal / Describe Single Fault)	Measured wattage or VA During first 30 s (W / VA)	Measured wattage or VA After 30 s (W / VA)	Protective Circuit, Regulator, or PTC Operated? Yes / No (Comment)	Resistive PIS? Yes/No
All Circuits	Normal	-	-	-	Yes
Supplementary Information:					
A combination of voltmeter, VA and ammeter I <sub>A</sub> may be used instead of a wattmeter. If a separate voltmeter and ammeter are used, the product of (V <sub>A</sub> x I <sub>A</sub> ) is used to determine Resistive PIS classification. A Resistive PIS: (a) dissipates more than 15 W, measured after 30 s of normal operation, or (b) under single fault conditions has either a power exceeding 100 W measured immediately after the introduction of the fault if electronic circuits, regulators or PTC devices are used, or has an available power exceeding 15 W measured 30 s after introduction of the fault.					

<b>8.5.5</b>	<b>TABLE: High Pressure Lamp</b>		N/A
Description		Values	Energy Source Classification
Lamp type .....			—
Manufacturer .....			—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
Cat no. ....:		—	
Pressure (cold) (MPa) .....		MS_	
Pressure (operating) (MPa) .....		MS_	
Operating time (minutes) .....		—	
Explosion method .....		—	
Max particle length escaping enclosure (mm) .:		MS_	
Max particle length beyond 1 m (mm).....:		MS_	
Overall result .....			
Supplementary information:			

B.2.5 TABLE: Input test								Pass
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
18 Vdc	DC	2.751	8	49.5	-	F1	-	Model AL-070DW-48S2-601, rated load 12 Vdc, 3A, convection cooled
24 Vdc	DC	1.945	8	46.7	-	F1	-	Model AL-070DW-48S2-601, rated load 12 Vdc, 3A, convection cooled
36 Vdc	DC	1.259	8	45.3	-	F1	-	Model AL-070DW-48S2-601, rated load 12 Vdc, 3A, convection cooled
48 Vdc	DC	0.941	8	45.1	-	F1	-	Model AL-070DW-48S2-601, rated load 12 Vdc, 3A, convection cooled
60 Vdc	DC	0.757	8	45.4	-	F1	-	Model AL-070DW-48S2-601, rated load 12 Vdc, 3A, convection cooled
72 Vdc	DC	0.635	8	45.7	-	F1	-	Model AL-070DW-48S2-601, rated load 12 Vdc, 3A, convection cooled
36 Vdc	DC	2.4	4	87.9	-	-	-	Model AL-070D-48T125-175, All outputs loaded to ratings.
48 Vdc	DC	1.7	4	85.7	-	-	-	Model AL-070D-48T125-175, All

IEC 62368-1								
Clause	Requirement + Test				Result - Remark			Verdict
								outputs loaded to ratings.
72 Vdc	DC	1.1	4	85.1	-	-	-	Model AL-070D-48T125-175, All outputs loaded to ratings.
36 Vdc	DC	3.0	5	110.1	-	-	-	Model AL-085D-48Q1225-151, All outputs loaded to ratings.
48 Vdc	DC	2.2	5	109.0	-	-	-	Model AL-085D-48Q1225-151, All outputs loaded to ratings.
72 Vdc	DC	1.5	5	110.6	-	-	-	Model AL-085D-48Q1225-151, All outputs loaded to ratings.
Supplementary information:								
See Enclosed Test Records for additional test data.								
Equipment may be have rated current or rated power or both. Both should be measured								

B.3		TABLE: Abnormal operating condition tests						Pass
Ambient temperature (°C) .....					See Temp Table			—
Power source for EUT: Manufacturer, model/type, output rating ...:					-			—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
Output	Overload	18Vdc	2h	-	3.08	See Temp Table	See Temp Table	CT, NB, NT, NC
Output	Short	72Vdc	1h	-	1.45 (pk)	See Temp Table	See Temp Table	CT, NB, NT, NC, Hiccup Operation
Model AL-070D-48T125-175, 48V Output	Overload	36Vdc	1h 20m	-	-	See Temp Table	See Temp Table	OL=1.1A,NF, output cycled, NB, NF
Model AL-070D-48T125-175, 5V Output	Overload	36Vdc	2h	-	-	See Temp Table	See Temp Table	OL=4.5A, NB, NF
Model AL-085D-48Q1225-151, 48V Output	Overload	36Vdc	2h	-	-	See Temp Table	See Temp Table	OL=1.0A, NB, NF



IEC 62368-1								
Clause	Requirement + Test					Result - Remark		Verdict
Model AL-085D-48Q1225-151, 5V Output	Overload	36Vdc	1h 20m	-	-	See Temp Table	See Temp Table	OL=4.5A, NB, NF
Model AL-085D-48Q1225-151, -12V Output	Overload	36Vdc	1h 10m	-	-	See Temp Table	See Temp Table	OL=1.5A, NB, NF
Supplementary information:								
All outputs loaded to maximum rating followed by overload on single output as specified.								
CT - Constant temperatures attained NT - Tissue paper remained intact NC - Cheesecloth remained intact NB No indication of dielectric breakdown NF - No Flame NB No indication of dielectric breakdown								

<b>B.4</b>	<b>TABLE: Fault condition tests</b>							Pass
Ambient temperature (°C) .....					23.6		—	
Power source for EUT: Manufacturer, model/type, output rating ..					-		—	
Component No.	Fault Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
AL-070D-24T125, Q1	Short	36Vdc	<1s	F1	-	T1	25.1	CT, NC, NT, IP, NB
AL-085D-24Q1225, PC1	Short 1 to 2	72Vdc	45m	-	-	T1	75.2	CT, NC, NT, NB
AL-065D-48T122, Q1	Short D to S	72Vdc	1hr	-	-	T2	34.6	NC, NT, output voltage and current dropped to zero
AL-065D-48T122, U2	Short 7 to 2	72Vdc	1hr	-	-	T2	36.4	NC, NT, output voltage and current dropped to zero
AL-065D-48T122, IC1	Short 1 to 8	72Vdc	1hr	-	-	T1	34.6	NC, NT, 12V output dropped to 1.6A and 5V output dropped to 5.8A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

-

Annex M.3	TABLE: Batteries								N/A	
The tests of Annex M are applicable only when appropriate battery data is not available										
Is it possible to install the battery in a reverse polarity position? ..... :										
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition										
Max. current during fault condition										
Test results:									Verdict	
- Chemical leaks										
- Explosion of the battery										
- Emission of flame or expulsion of molten metal										
- Electric strength tests of equipment after completion of tests										
Supplementary information:										

Annex M.4	Table: Additional safeguards for equipment containing secondary lithium batteries					N/A
Battery/Cell No.	Test conditions	Measurements			Observation	
		U	I (A)	Temp (°C)		
	Normal					
	Abnormal					
	Single fault –SC/OC					
Supplementary Information:						
Battery identification	Charging at T <sub>lowest</sub> (°C)	Observation	Charging at T <sub>highest</sub> (°C)	Observation		

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary Information:

<b>Annex Q.1</b>	<b>TABLE: Circuits intended for interconnection with building wiring (LPS)</b>	N/A
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Note: Measured UOC (V) with all load circuits disconnected:

Output Circuit	Components	U <sub>oc</sub> (V)	I <sub>sc</sub> (A)		S (VA)	
			Meas.	Limit	Meas.	Limit

Supplementary Information:

SC=Short circuit, OC=Open circuit

<b>T.2, T.3, T.4, T.5</b>	<b>TABLE: Steady force test</b>	N/A
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Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation

Supplementary information:

<b>T.6, T.9</b>	<b>TABLE: Impact tests</b>	N/A
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Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation

Supplementary information:

<b>T.7</b>	<b>TABLE: Drop tests</b>	N/A
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Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation

Supplementary information:

<b>T.8</b>	<b>TABLE: Stress relief test</b>	N/A
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Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation

IEC 62368-1					
Clause	Requirement + Test			Result - Remark	Verdict
Supplementary information:					

**Enclosure**  
**National Differences**

Australia / New Zealand

EU Group and National Differences

Japan

USA / Canada

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT	
IEC 62368-1	
(AUSTRALIA / NEW ZEALAND) NATIONAL DIFFERENCES	
(Audio/video, information and communication technology equipment)	
Differences according to	AS/NZS 62368.1:2018
TRF template used	IECEE OD-2020-F3, Ed. 1.1
Attachment Form No.	AU_NZ_ND_IEC62368_1D
Attachment Originator	JAS-ANZ
Master Attachment	2021-04-19
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	NATIONAL DIFFERENCES	Pass
Appendix ZZ	Variations to IEC 62368-1:2014 (ED. 2.0) for Australia and New Zealand	Pass
ZZ1 Scope	This Appendix lists the normative variations to IEC 62368-1:2014 (ED. 2.0)	Pass
ZZ2 Variations	The following modifications are required for Australian/New Zealand conditions:	Pass
2	<p>Add the following to the list of normative references:</p> <p>The following normative documents are referenced in Appendix ZZ:</p> <p>-AS/NZS 3112, <i>Approval and test specification—Plugs and socket-outlets</i></p> <p>-AS/NZS 3123, <i>Approval and test specification—Plugs, socket-outlets and couplers for general industrial application</i></p> <p>-AS/NZS 3191, <i>Electric flexible cords</i></p> <p>-AS/NZS 60065, <i>Audio, video and similar electronic apparatus—Safety requirements (IEC 60065:2015 (ED.8.0) MOD)</i></p> <p>-AS/NZS 60320.1, <i>Appliance couplers for household and similar general purposes, Part 1: General requirements (IEC 60320-1, Ed.2.1 (2007) MOD)</i></p> <p>-AS/NZS 60320.2.2, <i>Appliance couplers for household and similar general purposes Part 2.2: Interconnection couplers for household and similar equipment (IEC 60320-2-2, Ed.2.0 (1998) MOD)</i></p> <p>-AS/NZS 60695.2.11, <i>Fire hazard testing, Part 2.11: Glowing/hot wire based test methods—Glow-wire flammability test method for end-products</i></p>	Pass

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>-AS/NZS 60695.11.5, <i>Fire hazard testing, Part 11.5: Test flames—Needle-flame test method—Apparatus, confirmatory test arrangement and guidance</i></p> <p>-AS/NZS 60695.11.10, <i>Fire hazard testing, Part 11.10: Test flames—50 W horizontal and vertical flame test methods</i></p> <p>-AS/NZS 60884.1, <i>Plugs and socket-outlets for household and similar purposes, Part 1: General requirements</i></p> <p>-AS/NZS 60950.1:2015, <i>Information technology equipment—Safety, Part 1: General requirements (IEC 60950-1, Ed.2.2 (2013), MOD)</i></p> <p>IEC 61032:1997, <i>Protection of persons and equipment by enclosures—Probes for verification</i></p> <p>-AS/NZS 61558.1:2008 (including Amendment 2:2015), <i>Safety of Power Transformers, Power Supplies, Reactors and Similar Products, Part 1: General requirements and tests (IEC 61558-1 Ed 2.1, MOD)</i></p> <p>-AS/NZS 61558.2.16, <i>Safety of transformers, reactors, power supply units and similar products for voltages up to 1 100 V, Part 2.16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units.</i></p>		
4.1.1	<p><b>Application of requirements and acceptance of materials, components and subassemblies</b></p> <p>1 Replace the text 'IEC 60950-1' with 'AS/NZS 60950.1:2015'.</p> <p>2 Replace the text 'IEC 60065' with 'AS/NZS 60065'.</p>		Pass
4.7	<b>Equipment for direct insertion into mains socket-outlets</b>		N/A
4.7.2	<p><b>Requirements</b></p> <p>Delete the text of the second paragraph and replace with the following:</p> <p>Equipment with a plug portion, suitable for insertion into a 10 A 3-pin flat-pin socket-outlet complying with AS/NZS 3112 shall comply with the requirements in AS/NZS 3112 for equipment with integral pins for insertion into socket-outlets.</p>		N/A
4.7.3	<p><b>Compliance Criteria</b></p> <p>Delete the first paragraph and Note 1 and Note 2 and replace with the following:</p>		N/A

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Compliance is checked by inspection and, if necessary, by the tests in AS/NZS 3112.		
4.8	Delete existing clause title and replace with the following: <b>4.8 Products containing coin/button cell batteries</b>		N/A
4.8.1	<b>General</b> 1 Second dashed point, delete the text and replace with the following: – include coin/button cell batteries with a diameter of 32 mm or less. 2 After the second dashed point, insert the following Note: NOTE 1: Batteries are specified in IEC 60086-2. 3 After the third dashed point, renumber the existing Note as 'NOTE 2'. 4 Fifth dashed point, delete the word 'lithium'.		N/A
4.8.2	<b>Instructional Safeguard</b> First line, delete the word 'lithium'.		N/A
4.8.3	<b>Construction</b> First line, after the word 'Equipment' insert the words 'containing one or more coin/button batteries and'		N/A
4.8.5	<b>Compliance criteria</b> Delete the first paragraph and replace with the following: Compliance is checked by applying a force of 30 N +/-1 N for 10 s to the battery compartment door/cover by a rigid test finger according to test probe 11 of IEC 61032:1997 at the most unfavourable place and in the most unfavourable direction. The force shall be applied in one direction at a time.		N/A
5.4.10.2	<b>Test Methods</b>		N/A
5.4.10.2.1	<b>General</b> Delete the first paragraph and replace with the following: In Australia only, the separation is checked by the test of both Clause 5.4.10.2.2 and Clause 5.4.10.2.3. In New Zealand, the separation is checked by the test of either Clause 5.4.10.2.2 or Clause 5.4.10.2.3.		N/A
Table 29	Replace the table with the following:		N/A



## IEC62368\_1D – ATTACHMENT

Clause	Requirement + Test	Result - Remark	Verdict																									
	<table><tr><td>Parts</td><td colspan="2">Impulse test</td><td colspan="2">Steady state test</td></tr><tr><td></td><td>New Zealand</td><td>Australia</td><td>New Zealand</td><td>Australia</td></tr><tr><td>Parts indicated in Clause 5.4.10.1 a) <sup>a</sup></td><td>2.5 kV 10/700 µs</td><td>7.0 kV for hand-held telephones and headsets, 2.5 kV for other equipment. 10/700 µs</td><td>1.5 kV</td><td>3 kV</td></tr><tr><td>Parts indicated in Clause 5.4.10.1 b) and c) <sup>a</sup></td><td colspan="2">1.5 kV 10/700 µs<sup>c</sup></td><td>1.0 kV</td><td>1.5 kV</td></tr><tr><td colspan="5"><sup>a</sup> Surge suppressors shall not be removed. <sup>b</sup> Surge suppressors may be removed, provided that such devices pass the impulse test of Clause 5.4.10.2.2 when tested as components outside the equipment. <sup>c</sup> During this test, it is allowed for a surge suppressor to operate and for a sparkover to occur in a GDT.</td></tr></table>	Parts	Impulse test		Steady state test			New Zealand	Australia	New Zealand	Australia	Parts indicated in Clause 5.4.10.1 a) <sup>a</sup>	2.5 kV 10/700 µs	7.0 kV for hand-held telephones and headsets, 2.5 kV for other equipment. 10/700 µs	1.5 kV	3 kV	Parts indicated in Clause 5.4.10.1 b) and c) <sup>a</sup>	1.5 kV 10/700 µs <sup>c</sup>		1.0 kV	1.5 kV	<sup>a</sup> Surge suppressors shall not be removed. <sup>b</sup> Surge suppressors may be removed, provided that such devices pass the impulse test of Clause 5.4.10.2.2 when tested as components outside the equipment. <sup>c</sup> During this test, it is allowed for a surge suppressor to operate and for a sparkover to occur in a GDT.						
Parts	Impulse test		Steady state test																									
	New Zealand	Australia	New Zealand	Australia																								
Parts indicated in Clause 5.4.10.1 a) <sup>a</sup>	2.5 kV 10/700 µs	7.0 kV for hand-held telephones and headsets, 2.5 kV for other equipment. 10/700 µs	1.5 kV	3 kV																								
Parts indicated in Clause 5.4.10.1 b) and c) <sup>a</sup>	1.5 kV 10/700 µs <sup>c</sup>		1.0 kV	1.5 kV																								
<sup>a</sup> Surge suppressors shall not be removed. <sup>b</sup> Surge suppressors may be removed, provided that such devices pass the impulse test of Clause 5.4.10.2.2 when tested as components outside the equipment. <sup>c</sup> During this test, it is allowed for a surge suppressor to operate and for a sparkover to occur in a GDT.																												
5.4.10.2.2	After the first paragraph, <i>insert</i> new Notes 201 and 202 as follows:  NOTE 201 For Australia, the 7 kV impulse simulates lightning surges on typical rural and semi-rural network lines.  NOTE 202 For Australia, the value of 2.5 kV for Clause 5.4.10.1 a) was chosen to ensure the adequacy of the insulation concerned and does not necessarily simulate likely overvoltages.		N/A																									
5.4.10.2.3	After the first paragraph, <i>insert</i> new Notes 201 and 202 as follows:  NOTE 201 For Australia, where there are capacitors across the insulation under test, it is recommended that d.c. test voltages are used.  NOTE 202 The 3 kV and 1.5 kV values for Australia have been determined considering the low frequency induced voltages from the power supply distribution system.		N/A																									
6	<b>Electrically-caused fire</b>		Pass																									
6.1	General  After the first paragraph, <i>insert</i> the following new paragraph:  Alternatively, the requirements of Clauses 6.2 to 6.5.2 are considered to be fulfilled if the equipment complies with the requirements of Clause 6.202		Pass																									
6.6	After Clause 6.6, add the new Clauses 6.201 and 6.202 as follows: <b>6.201 External power supplies, docking stations and other similar devices and</b> <b>6.202 Resistance to fire—Alternative tests</b> (see special national conditions)		N/A																									
8.5.4	<b>Special categories of equipment comprising moving parts</b>		N/A																									
8.5.4.1	<b>Large data storage equipment</b>  In the first dashed row and the second dashed rows replace ‘IEC 60950-1:2005’ with ‘AS/NZS 60950.1:2015’.		N/A																									
8.6	<b>Stability of equipment</b>		N/A																									
8.6.1 and Table 36	<b>Requirements</b>  1. Table 36, <i>insert</i> Footnote c at the end of the ‘Glass slide’ heading, and add a new Footnote c		N/A																									

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>after the text of Footnote b in the last row of Table 36 as follows:</p> <p>c The glass slide test is not applicable to floor standing equipment, even though the equipment may have controls or a display.</p> <p>2. Table 36, fifth row, <i>insert</i> '201' at the end of 'No stability requirements'</p> <p>3. Table 36, ninth row, <i>insert</i> '201' at the end of 'No stability requirements'</p> <p>4. Table 36, add the following new footnote:</p> <p>201 MS2 and MS3 television sets and display devices, designed only for fixing to a wall, ceiling or equipment rack, are not subjected to stability requirements only if the instructional safeguard of Clause 8.6.1.201 is provided. Otherwise, the glass slide requirements of Clause 8.6.4 and horizontal force requirements of Clause 8.6.5 apply.</p> <p>5. Second paragraph beneath Table 36, delete the words 'MS2 and MS3 television sets' and replace with 'MS2 and MS3 television sets and display devices'</p>		
8.6.1	<p>After Clause 8.6.1 <i>add</i> the following new clauses:</p> <p><b>8.6.1.201 Instructional safeguard for fixed-mount television sets</b></p> <p>(see special national conditions)</p>		N/A
Annex F Paragraph F.3.5.1	<p><b>Mains appliance outlet and socket-outlet markings</b></p> <p><i>Replace</i> 'IEC 60320-2-2' with 'AS/NZS 60320.2.2'.</p>		N/A
Annex G Paragraph G.4.2	<p><b>Mains connectors</b></p> <p>1 In the second line <i>insert</i> 'or AS/NZS 3123' after 'IEC 60906-1'.</p> <p>2 In the second line <i>insert</i> 'or AS/NZS 60320 series' after 'IEC 60320 series'</p> <p>3 <i>Add</i> the following new paragraph:</p> <p>10 A or 15 A 250 V flat pin plugs for the connection of equipment to mains-powered socket-outlets for household or similar general use shall comply with AS/NZS 3112 or AS/NZS 60884.1.</p>		N/A
Paragraph G.5.3.1	<p><b>Transformers, General</b></p> <p>1 In the third dashed point replace 'IEC 61558-1 and the relevant parts of IEC 61558-2' with 'AS/NZS 61558-1 and the relevant parts of AS/NZS 61558.2'</p> <p>2 In the fourth dashed point <i>replace</i> 'IEC 61558-2-16' with 'AS/NZS 61558.2.16'.</p>		Pass

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Clause	Requirement + Test	Result - Remark	Verdict
Paragraph G.7.1	<b>Mains supply cords, General</b> In the fourth dashed paragraph, <i>replace</i> 'IEC 60320-1' with 'AS/NZS 60320.1'		N/A
Table G.5	<b>Sizes of conductors</b> 1 In the second row, first column, <i>delete</i> '6' and <i>replace</i> with '7.5' 2 In the second row, second column, <i>delete</i> '0,75' and <i>replace</i> with '0.75 <sup>b</sup> 3 <i>Delete</i> Note 1. 4 <i>Replace</i> 'NOTE 2' with 'NOTE:'. 5 <i>Delete</i> the text of 'Footnote b' and <i>replace</i> with the following: <sup>b</sup> This nominal cross-sectional area is only allowed for Class II appliances if the length of the power supply cord, measured between the point where the cord, or cord guard, enters the appliance, and the entry to the plug does not exceed 2 m (0.5 mm <sup>2</sup> three-core supply flexible cords are not permitted; see AS/NZS 3191). 6 In Footnote c <i>replace</i> 'IEC 60320-1' with 'AS/NZS 60320.1' 7 In Footnote d <i>replace</i> 'IEC 60320-1' with 'AS/NZS 60320.1'		N/A
Annex M Paragraph M.3.2	<b>Protection circuits for batteries provided within the equipment, Test method</b> After the first dashed point add the following Note: NOTE 201: In cases where the voltage source is provided by power from an unassociated power source, consideration should be given to the effects of possible single fault conditions in the unassociated equipment. If the power source is unknown then it should be assumed that the maximum limit of SELV may be applied to the source input under assumed single fault conditions in the source when assessing the charging circuit in the equipment under test.		N/A
	<b>Special national conditions (if any)</b>		Pass
6.201	<b>External power supplies, docking stations and other similar devices</b> For external power supplies, docking stations and other similar devices, during and after abnormal operating conditions and during single fault conditions the output voltage— – at all ES1 outlets or connectors shall not increase by more than 10% of its rated output voltage under normal operating condition; and		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>– of a USB outlet or connector shall not increase by more than 3 V or 10% of its rated output voltage under normal operating conditions, whichever is higher.</p> <p>For equipment with multiple rated output voltages, the requirements apply with the equipment configured for each rated output voltage in turn.</p> <p>NOTE: This is intended to reduce the possibility of battery fire or explosion in attached equipment or accessories when charging secondary lithium batteries.</p> <p>Compliance shall be checked by measurement, taking into account the abnormal operating conditions of Annex B.3 and the simulated single-fault conditions of Annex B.4</p>		
6.202	<b>Resistance to fire - Alternative tests</b>		N/A
6.202.1	<p><b>General</b></p> <p>Parts of non-metallic material shall be resistant to ignition and spread of fire.</p> <p>This requirement does not apply to decorative trims, knobs and other parts unlikely to be ignited or to propagate flames from inside the equipment, or the following:</p> <p>a) Components that are contained in an enclosure having a flammability category of V-0 according to AS/NZS 60695.11.10 and having openings only for the connecting wires filling the openings completely, and for ventilation not exceeding 1 mm in width regardless of length.</p> <p>b) The following parts which would contribute negligible fuel to a fire:</p> <p>– small mechanical parts, the mass of which does not exceed 4 g, such as mounting parts, gears, cams, belts and bearings;</p> <p>– small electrical components, such as capacitors with a volume not exceeding 1 750 mm<sup>3</sup>, integrated circuits, transistors and optocoupler packages, if these components are mounted on material of flammability category V-1, or better, according to AS/NZS 60695.11.10.</p> <p>NOTE: In considering how to minimize propagation of fire and what ‘small parts’ are, account should be taken of the cumulative effect of small parts adjacent to each other for the possible effect of propagating the fire from one part to another.</p> <p><i>Compliance shall be checked by the tests of Clauses 6.202.2, 6.202.3 and 6.202.4.</i></p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>For the base material of printed boards, compliance shall be checked by the test of Clause 6.202.5.</p> <p>The tests shall be carried out on parts of non-metallic material which have been removed from the equipment. When the glow-wire test is carried out, the parts shall be placed in the same orientation as they would be in normal use.</p> <p>These tests are not carried out on internal wiring.</p>		
6.202.2	<p><b>Testing of non-metallic materials</b></p> <p>Parts of non-metallic material shall be subject to the glow-wire test of AS/NZS 60695.2.11 which shall be carried out at 550°C.</p> <p>Parts for which the glow-wire test cannot be carried out, such as those made of soft or foamy material, shall meet the requirements specified in ISO 9772 for category FH-3 material. The glow-wire test shall be not carried out on parts of material classified at least FH-3 according to ISO 9772 provided that the relevant part is not thinner than the sample tested.</p>		N/A
6.202.3	<p><b>Testing of insulating materials</b></p> <p>Parts of insulating material supporting Potential Ignition Sources shall be subject to the glow-wire test of AS/NZS 60695.2.11 which shall be carried out at 750°C.</p> <p>The test shall be also carried out on other parts of insulating material which are within a distance of 3 mm of the connection.</p> <p>NOTE: Contacts in components such as switch contacts are considered to be connections</p>		N/A
	<p>For parts which withstand the glow-wire test but produce a flame, other parts above the connection within the envelope of a vertical cylinder having a diameter of 20 mm and a height of 50 mm shall be subjected to the needle-flame test.</p> <p>However, parts shielded by a barrier which meets the needle-flame test need not be tested</p>		N/A
	<p>The needle-flame test shall be made in accordance with AS/NZS 60695.11.5 with the following modifications</p>		N/A

IEC62368_1D – ATTACHMENT													
Clause	Requirement + Test		Result - Remark	Verdict									
	<table><tr><td>Clause of AS/NZS 60695.11.5</td><td>Change</td></tr><tr><td>9 Test procedure</td><td></td></tr><tr><td>9.2 Application of needle-flame</td><td>Delete the first and second paragraphs and <i>replace</i> with the following: The specimen shall be arranged so that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1. If possible the flame shall be applied at least 10 mm from a corner.  The duration of application of the test flame shall be 30 s +1 s.</td></tr><tr><td>9.3 Number of test specimens</td><td>Replace with the following: The test shall be made on one specimen. If the specimen does not withstand the test, the test may be repeated on two further specimens, both of which shall withstand the test.</td></tr><tr><td>11 Evaluation of test results</td><td>Replace with the following: The duration of burning (tb) shall not exceed 30 s. However, for printed circuit boards, it shall not exceed 15 s.</td></tr></table> <p><b>The needle-flame test shall not be carried out on parts of material classified as V-0 or V-1 according to AS/NZS 60695.11.10, provided that the relevant part is not thinner than the sample tested.</b></p>	Clause of AS/NZS 60695.11.5	Change	9 Test procedure		9.2 Application of needle-flame	Delete the first and second paragraphs and <i>replace</i> with the following: The specimen shall be arranged so that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1. If possible the flame shall be applied at least 10 mm from a corner.  The duration of application of the test flame shall be 30 s +1 s.	9.3 Number of test specimens	Replace with the following: The test shall be made on one specimen. If the specimen does not withstand the test, the test may be repeated on two further specimens, both of which shall withstand the test.	11 Evaluation of test results	Replace with the following: The duration of burning (tb) shall not exceed 30 s. However, for printed circuit boards, it shall not exceed 15 s.		
Clause of AS/NZS 60695.11.5	Change												
9 Test procedure													
9.2 Application of needle-flame	Delete the first and second paragraphs and <i>replace</i> with the following: The specimen shall be arranged so that the flame can be applied to a vertical or horizontal edge as shown in the examples of Figure 1. If possible the flame shall be applied at least 10 mm from a corner.  The duration of application of the test flame shall be 30 s +1 s.												
9.3 Number of test specimens	Replace with the following: The test shall be made on one specimen. If the specimen does not withstand the test, the test may be repeated on two further specimens, both of which shall withstand the test.												
11 Evaluation of test results	Replace with the following: The duration of burning (tb) shall not exceed 30 s. However, for printed circuit boards, it shall not exceed 15 s.												
6.202.4	<p><b>Testing in the event of non-extinguishing material</b></p> <p>If parts, other than enclosures, do not withstand the glow wire tests of Clause 6.202.3, by failure to extinguish within 30 s after the removal of the glow wire tip, the needle-flame test detailed in Clause 6.202.3 shall be made on all parts of non-metallic material which are within a distance of 50 mm or which are likely to be impinged upon by flame during the tests of Clause 6.202.3. Parts shielded by a separate barrier which meets the needle-flame test need not be tested.</p> <p>NOTE 1: If the enclosure does not withstand the glow-wire test the equipment is considered to have failed to meet the requirements of Clause 6.202 without the need for consequential testing.</p> <p>NOTE 2: If other parts do not withstand the glow-wire test due to ignition of the tissue paper and if this indicates that burning or glowing particles can fall onto an external surface underneath the equipment, the equipment is considered to have failed to meet the requirements of Clause 6.202 without the need for consequential testing.</p> <p>NOTE 3: Parts likely to be impinged upon by the flame are considered to be those within the envelope of a vertical cylinder having a radius of 10 mm and a height equal to the height of the flame, positioned above the point of the material supporting, in contact with, or in close proximity to, connections.</p>			N/A									
6.202.5	<p><b>Testing of printed boards</b></p> <p>The base material of printed boards shall be subjected to the needle-flame test of Clause</p>			N/A									

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>6.202.3. The flame shall be applied to the edge of the board where the heat sink effect is lowest when the board is positioned as in normal use. The flame shall not be applied to an edge, consisting of broken perforations, unless the edge is less than 3 mm from a potential ignition source.</p> <p>The test is not carried out if—</p> <ul style="list-style-type: none"> <li>– the printed board does not carry any potential ignition source;</li> <li>– the base material of printed boards, on which the available apparent power at a connection exceeds 15 VA operating at a voltage exceeding 50 V and equal or less than 400 V (peak) a.c. or d.c. under normal operating conditions, is of flammability category V-1 or better according to AS/NZS 60695.11.10, or the printed boards are protected by an enclosure meeting the flammability category V-0 according to AS/NZS 60695.11.10, or made of metal, having openings only for connecting wires which fill the openings completely; or</li> <li>– the base material of printed boards, on which the available equipment power at a connection exceeds 15 VA operating at a voltage exceeding 400 V (peak) a.c. or d.c. under normal operating conditions, and base material of printed boards supporting spark gaps which provides protection against overvoltages, is of flammability category V-0 according to AS/NZS 60695.11.10 or the printed boards are contained in a metal enclosure, having openings only for connecting wires which fill the openings completely.</li> </ul> <p><i>Conformance</i> shall be determined using the smallest thickness of the material.</p> <p>NOTE: Available apparent power is the maximum apparent power which can be drawn from the supplying circuit through a resistive load whose value is chosen to maximize the apparent power for more than 2 min when the circuit supplied is disconnected.</p>		
6.202.6	<p><b>For open circuit voltages greater than 4 kV</b></p> <p>Potential ignition sources with open circuit voltages exceeding 4 kV (peak) a.c. or d.c. under normal operating conditions shall be contained in a FIRE ENCLOSURE which shall comply with flammability category V-1 or better according to AS/NZS 60695.11.10.</p>		N/A
8.6.1.201	<p><b>8.6.1.201 Instructional safeguard for fixed-mount television sets</b></p>		N/A

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>MS2 and MS3 television sets and display devices designed only for fixed mounting to a wall of ceiling or equipment rack shall, where required in Table 36, footnote 201, have an instructional safeguard in accordance with Clause F.5</p> <p>which may be on the equipment or included in the installation instructions or equivalent document accompanying the equipment.</p> <p>The elements of the instructional safeguard shall be as follows:</p> <ul style="list-style-type: none"> <li>– element 1a: not available;</li> <li>– element 2: 'Stability Hazard' or equivalent wording;</li> <li>– element 3: 'The television set may fall, causing serious personal injury or death' or equivalent text;</li> <li>– element 4: the following or equivalent text:</li> </ul> <p>To prevent injury, this television set must be securely attached to the floor/wall in accordance with the installation instructions</p>		
8.6.1.202	<p><b>Restraining device</b></p> <p>MS2 and MS3 television sets and display devices that are not solely fixed-mounted should be provided with a restraining device such as a fixing point to facilitate restraining the equipment from toppling forward. The restraining device shall be capable of withstanding a pull of 100 N in all directions without damage.</p> <p>Where a restraining device is provided, instructions shall be provided in the instructions for installation or instructions for use to ensure correct and safe installation.</p>		N/A



IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT	
IEC 62368-1	
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES	
(Audio/video, information and communication technology equipment - Part 1: Safety requirements)	
Differences according to	EN 62368-1:2014+A11:2017
Attachment Form No.	EU_GD_IEC62368_1D_II
Attachment Originator	Nemko AS
Master Attachment	Date 2021-02-04
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	CENELEC COMMON MODIFICATIONS (EN)					Pass																																				
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed “Z”.					Pass																																				
CONTENT S	<b>Add</b> the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords					Pass																																				
	Delete all the “country” notes in the reference document (IEC 62368-1:2014) according to the following list: <table><tr><td>0.2.1</td><td>Note</td><td>1</td><td>Note 3</td><td>4.1.15</td><td>Note</td></tr><tr><td>4.7.3</td><td>Note 1 and 2</td><td>5.2.2.2</td><td>Note</td><td>5.4.2.3.2.2 Table 13</td><td>Note c</td></tr><tr><td>5.4.2.3.2.4</td><td>Note 1 and 3</td><td>5.4.2.5</td><td>Note 2</td><td>5.4.5.1</td><td>Note</td></tr><tr><td>5.5.2.1</td><td>Note</td><td>5.5.6</td><td>Note</td><td>5.6.4.2.1</td><td>Note 2 and 3</td></tr><tr><td>5.7.5</td><td>Note</td><td>5.7.6.1</td><td>Note 1 and 2</td><td>10.2.1 Table 39</td><td>Note 2, 3 and 4</td></tr><tr><td>10.5.3</td><td>Note 2</td><td>10.6.2.1</td><td>Note 3</td><td>F.3.3.6</td><td>Note 3</td></tr></table>					0.2.1	Note	1	Note 3	4.1.15	Note	4.7.3	Note 1 and 2	5.2.2.2	Note	5.4.2.3.2.2 Table 13	Note c	5.4.2.3.2.4	Note 1 and 3	5.4.2.5	Note 2	5.4.5.1	Note	5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3	5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4	10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3	Pass
0.2.1	Note	1	Note 3	4.1.15	Note																																					
4.7.3	Note 1 and 2	5.2.2.2	Note	5.4.2.3.2.2 Table 13	Note c																																					
5.4.2.3.2.4	Note 1 and 3	5.4.2.5	Note 2	5.4.5.1	Note																																					
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5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4																																					
10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3																																					
	For special national conditions, see Annex ZB.					Pass																																				
1	Add the following note: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.			See Letter of Assurance.		Pass																																				
4.Z1	Protective devices included as integral parts of the equipment or as parts of the building installation:					Pass																																				
	a) Included as parts of the equipment					N/A																																				
	b) For components in series with the mains; by devices in the building installation					Pass																																				
	c) For pluggable type B or permanently connected; by devices in the building installation					N/A																																				
5.4.2.3.2.4	<b>Add</b> the following to the end of this subclause: The requirement for interconnection with <b>external circuit</b> is in addition given in EN 50491-3:2009.					N/A																																				

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
10.2.1	<b>Add</b> the following to c) and d) in table 39: For additional requirements, see 10.5.1.		N/A
10.5.1	<b>Add</b> the following after the first paragraph: For RS 1 compliance is checked by measurement under the following conditions: In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or presets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made. NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm <sup>2</sup> , at any point 10 cm from the outer surface of the apparatus. Moreover, the measurement shall be made under fault conditions causing an increase of the high-voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made. For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level. NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A
10.6.1	<b>Add</b> the following paragraph to the end of the subclause: EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		N/A
10.Z1	<b>Add</b> the following new subclause after 10.6.5. <b>10.Z1 Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz</b> The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body-mounted devices, attention is drawn to EN 50360 and EN 50566		N/A
G.7.1	<b>Add</b> the following note: NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A
Bibliography	<b>Add</b> the following standards: <b>Add</b> the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1.		Pass

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		
<b>ZB</b>	<b>ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)</b>		Pass
4.1.15	<b>Denmark, Finland, Norway and Sweden</b> To the end of the subclause the following is added: <b>Class I pluggable equipment type A</b> intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and <b>accessible</b> parts, have a marking stating that the equipment shall be connected to an earthed <b>mains</b> socket-outlet. The marking text in the applicable countries shall be as follows: In <b>Denmark</b> : "Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord." In <b>Finland</b> : "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In <b>Norway</b> : "Apparatet må tilkoples jordet stikkontakt" In <b>Sweden</b> : "Apparaten skall anslutas till jordat uttag"		N/A
4.7.3	<b>United Kingdom</b> To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A
5.2.2.2	<b>Denmark</b> After the 2nd paragraph add the following: A warning (marking <b>safeguard</b> ) for high <b>touch current</b> is required if the <b>touch current</b> exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and Annex G	<b>Finland and Sweden</b> To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least		N/A

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>consist of either</p> <ul style="list-style-type: none"> <li>• two layers of thin sheet material, each of which shall pass the electric strength test below, or</li> <li>• one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below.</li> </ul> <p>If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition</p> <ul style="list-style-type: none"> <li>• passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and</li> <li>• is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5kV.</li> </ul> <p>It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2.</p> <p>A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions:</p> <ul style="list-style-type: none"> <li>• the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11;</li> <li>• the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.</li> </ul>		
5.5.2.1	<p><b>Norway</b></p> <p>After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).</p>		N/A
5.5.6	<p><b>Finland, Norway and Sweden</b></p> <p>To the end of the subclause the following is added: Resistors used as <b>basic safeguard</b> or bridging <b>basic insulation</b> in <b>class I pluggable equipment type A</b> shall comply with G.10.1 and the test of G.10.2.</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.1	<p><b>Denmark</b>  <b>Add</b> to the end of the subclause  Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment.  <i>Justification:</i>  In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.</p>		N/A
5.6.4.2.1	<p><b>Ireland and United Kingdom</b>  After the indent for <b>pluggable equipment type A</b>, the following is added:  – the <b>protective current rating</b> is taken to be 13 A, this being the largest rating of fuse used in the <b>mains</b> plug.</p>		N/A
5.6.5.1	<p><b>Ireland and United Kingdom</b> To the second paragraph the following is added:  The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is:  1,25 mm<sup>2</sup> to 1,5 mm<sup>2</sup> in cross-sectional area.</p>		N/A
5.7.5	<p><b>Denmark</b>  To the end of the subclause the following is added:  The installation instruction shall be affixed to the equipment if the <b>protective conductor current</b> exceeds the limits of 3,5 mA a.c. or 10 mA d.c.</p>		N/A
5.7.6.1	<p><b>Norway and Sweden</b>  To the end of the subclause the following is added:  The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system.  It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example.  The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in:  “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard.  Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>frequency range (galvanic isolator, see EN 60728-11)”</p> <p>NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min.</p> <p>Translation to Norwegian (the Swedish text will also be accepted in Norway):  “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.”</p> <p>Translation to Swedish:  “Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.</p>		
5.7.6.2	<p><b>Denmark</b></p> <p>To the end of the subclause the following is added:</p> <p>The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .</p>		N/A
B.3.1 and B.4	<p><b>Ireland and United Kingdom</b></p> <p>The following is applicable:  To protect against excessive currents and short-circuits in the primary circuit of <b>direct plug-in equipment</b>, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the <b>direct plug-in equipment</b>, until the requirements of Annexes B.3.1 and B.4 are met</p>		N/A
G.4.2	<p><b>Denmark:</b></p> <p>Appliances rated ≤13 A provided with a plug according to DS 60884-2-D1:2011.  Class I equipment provided with socket-outlets provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a.  If a single-phase equipment having rated &gt;13 A or poly-phase equipment provided with a supply cord with a plug, plug in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2.  Mains socket outlets intended for providing power to Class II apparatus rated 2,5 A in accordance</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>with DS 60884-2-D1:2011 standard sheet DKA 1-4a.</p> <p>Other current rating socket outlets in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a</p>		
G.4.2	<p><b>United Kingdom</b> To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.</p>		N/A
G.7.1	<p><b>United Kingdom</b> To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a 'standard plug' in accordance with the Plugs and Sockets etc (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.</p>		N/A
G.7.1	<p><b>Ireland</b> To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard</p>		N/A
G.7.2	<p><b>Ireland and United Kingdom</b> To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm<sup>2</sup> is allowed for equipment which is rated over 10 A and up to and including 13 A.</p>		N/A
<b>ZC</b>	<b>ANNEX ZC, NATIONAL DEVIATIONS (EN)</b>		Pass

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Clause	Requirement + Test	Result - Remark	Verdict
10.5.2	<p><b>Germany</b> The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking. <i>Justification:</i> German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. <b>NOTE</b> Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int +49-531-592-6320, Internet: <a href="http://www.ptb.de">http://www.ptb.de</a></p>		N/A



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Clause	Requirement + Test	Result - Remark	Verdict

<b>ATTACHMENT TO TEST REPORT</b> <b>IEC 62368-1</b> <b>(JAPAN) NATIONAL DIFFERENCES</b> (Audio/video, information and communication technology equipment – Part 1: Safety requirements)	
<b>Differences according to .....</b>	J62368-1 (2020)
<b>TRF template used: .....</b>	IECEE OD-2020-F3, Ed. 1.1
<b>Attachment Form No. ....</b>	JP_ND_IEC62368_1D
<b>Attachment Originator .....</b>	UL (JP)
<b>Master Attachment .....</b>	Date 2021-02-04
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	National Differences	—
4.1.2	Where the component, or a characteristic of a component, is a safeguard or a part of a safeguard, components shall comply with the requirements of this standard or, where specified in a requirements clause, with the safety aspects of the relevant JIS component standards or IEC component standards, or components shall have properties equivalent to or better than these.	Pass
5.6.1	Mains socket-outlet and appliance outlet shall comply with Clause G.4.2A if they are incorporated as part of the equipment.	N/A
5.6.2.1	Mains connection of class 0I equipment: Instructional safeguard in accordance with Clause F.3.6.1A;  Mains plug having a lead wire for protective earthing connection of class 0I equipment;  Independent main protective earthing terminal installed by ordinary person.	N/A
5.6.2.2	This requirement does not apply to internal conductor of the cord set that is covered by the sheath of mains cord and is formed together with mains plug and appliance connector.	N/A
5.6.3	In case of class 0I equipment using power supply cord having two conductors (no earthing	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>conductor), the conductor of protective earthing lead wire shall comply with either of the following:</p> <ul style="list-style-type: none"> <li>– use of annealed copper wire with 1.6 mm diameter or corrosion-inhibiting metal wire having size and strength that are equivalent to or more than the above copper wire</li> <li>– single core cord or single core cab tire cable with 1.25 mm<sup>2</sup> or more cross-sectional area</li> </ul>		
5.7.3	For class 0I equipment that is provided with mains socket-outlet in the configuration as specified in JIS C 8282 series or JIS C 8303, or otherwise being considered to comply with relevant regulations, or that is provided with mains appliance outlet as specified in JIS C 8283-2-2 for the purpose of interconnection, the measurement is conducted on the system of the interconnected equipment having a single connection to the mains.		N/A
5.7.4	In case of class 0I equipment, touch current shall not exceed 1.41 mA peak or for sinusoidal wave, 1.0 mA r.m.s. when measured using the network specified in Figure 4 of IEC 60990.		N/A
6.4.3.3	<p>A fuse complying with JIS C 6575 series or a fuse having equivalent characteristics shall open within 1 s.</p> <p>For Class A fuse of JIS C 6575, replace “2.1 times” by “1.35 times” and in case of Class B fuse of JIS C 6575, replace “2.1 times” by “1.6 times”. A fuse not complying with JIS C 6575 series shall be tested with the breaking capacity taken into account.</p>		N/A
8.5.4.2.1	Only three-phase stationary equipment rated more than 200 V ac can be considered as being for use in locations where children are not likely to be present, when complying with Clause F.4.		N/A
8.5.4.2.2	For equipment installed where children may be present, an instructional safeguard shall be provided by easily understandable wording in accordance with Clause F.5, except that element 3 is optional.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.5.4.2.4	The media destruction device is tested according to Clause V.1.2 with applicable jointed test probes to the opening. And then the wedge probe per Figure V.4 shall not contact any moving part.		N/A
8.5.4.2.5	The wedge probe of Figure V.4 and applicable jointed test probes specified in Clause V.1.2 shall not contact any moving part. Instructional safeguard shall not be used instead of equipment safeguard for preventing access to hazardous moving parts.		N/A
9.2.6, Table 38	Handles, Knobs, grips, etc. and external surfaces either held, touched or worn against the body in normal use (> 1 min) <sup>b,c</sup>		N/A
F.3.5.1	Instructional safeguard of class 0I equipment in accordance with Clause F.5 when a mains socket-outlet as specified in JIS C 8282 series, JIS C 8303 or relevant regulation to which class I equipment can be connected is provided in accordance with Clause G.4.2A except for the cases where the socket-outlet is accessible only to skilled persons.		N/A
F.3.5.3	If the fuse is necessary for the safeguard function, the symbols indicating pre-arcing time-current characteristic.		N/A
F.3.6.1A	Marking for class 0I equipment  The requirements of Clauses F.3.6.1.1 and F.3.6.1.3 shall be applied to class 0I equipment.  For class 0I equipment, a marking of instructions and instructional safeguard shall be provided regarding the earthing connection.		N/A
F.3.6.2.1	Symbols, IEC 60417-5172 (2003-02) or IEC 60417-6092 (2011-10), shall not be used for class I equipment or class 0I equipment.		N/A
F.4	Instruction for audio equipment with terminals classified as ES3 in accordance with Table E.1, and for other equipment with terminals marked in accordance with F.3.6.1 and F.3.6.1A.  Installation instruction for the protective earthing connection for class 0I equipment provided with		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	independent main protective earthing terminal, where the cord for the protective earthing connection is not provided within the package for the equipment.		
G.3.2.1	The thermal link when tested as a separate component, shall comply with the requirements of JIS C 6691 or have properties equivalent to or better than that.		N/A
G.3.4	Except for devices covered by Clause G.3.5, overcurrent protective devices used as a safeguard shall comply with the relevant part of JIS C 6575 (corresponding to IEC60127) or shall have equivalent characteristics.  If there are no applicable IEC standards, overcurrent protective devices used as a safeguard shall comply with their applicable IEC standards.		N/A
G.4.1	This requirement is not applicable to Clauses G.4.2 and G.4.2A.		Pass
G.4.2	Mains connector shall comply with JIS C 8282 series, JIS C 8283 series, JIS C 8285, JIS C 8303 or IEC 60309 series.  Mains plugs and socket-outlets shall comply with JIS C 8282 series, JIS C 8303, IEC 60309 series, or have equivalent or better performance.  A power supply cord set provided with appliance connector that can fit appliance inlet complying with JIS C 8283-1 shall comply with JIS C 8286.  Construction preventing mechanical stress not to transmit to the soldering part of inlet terminal. Consideration for an equipment rated not more than 125 V provided with Type C14 and C18 appliance coupler complying with JIS C 8283 series.		N/A
G.4.2A	Mains socket-outlet and interconnection coupler provided with the class II, class I and class 0I equipment respectively.		N/A
G.7.1	A mains supply cord need not include the protective earthing conductor for class 0I		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	equipment provided with independent protective earthing conductor.		
G.8.3.3	Withstand $1,71 \times 1.1 \times U_0$ for 5 s.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT	
IEC 62368-1	
U.S.A. AND CANADA NATIONAL DIFFERENCES	
(Audio/video, information and communication technology equipment – Part 1: Safety requirements)	
Differences according to.....:	CSA/UL 62368-1:2014
TRF template used.....:	IECEE OD-2020-F3, Ed. 1.1
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IEC 62368-1 - US and Canada National Differences			
Special National Conditions based on Regulations and Other National Differences			
1.1	<p>All equipment is to be designed to allow installation according to the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part I, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2.</p> <p>Also, for such equipment marked or otherwise identified, installation is allowed per the Standard for the Protection of Information Technology Equipment, ANSI/NFPA 75.</p>	<p>Regarding section 9.2.3 of SCC Requirements and Guidance:</p> <p>1. The ability of the manufacturer to include these markings was verified by</p> <p>[visual inspection of the markings on the actual product.]</p> <p>[draft of labels that will be applied to the product.]</p> <p>[written confirmation from the customer of the markings that will appear on the product.]</p> <p>The marking and instructions match the exact translation when provided by the standard.</p> <p>Otherwise evidence just included both English and French markings with no verification of translation including all markings associated with the signal words DANGER, WARNING, and CAUTION.</p> <p>2. [The Manufacturer has a method to manage distribution of all products with Canadian certification mark not intended include the dual markings.]</p> <p>[The Manufacturer includes dual language markings on all products.]</p>	Pass

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Clause	Requirement + Test	Result - Remark	Verdict
1.4	Additional requirements apply to some forms of power distribution equipment, including sub-assemblies.		N/A
4.1.17	For lengths exceeding 3.05 m, external interconnecting flexible cord and cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the NEC.		N/A
	For lengths 3.05 m or less, external interconnecting flexible cord and cable assemblies that are not types specified in the NEC generally are required to have special construction features and identification markings.		N/A
4.8	Lithium coin / button cell batteries have modified special construction and performance requirements.		N/A
5.6.3	Protective earthing conductors comply with the minimum conductor sizes in Table G.5, except as required by Table G.7ADV.1 for cord connected equipment, or Annex DVH for permanently connected equipment		N/A
5.7.7	Equipment intended to receive telecommunication ringing signals complies with a special touch current measurement tests.		N/A
6.5.1	PS3 wiring outside a fire enclosure complies with single fault testing in B.4, or be current limited per one of the permitted methods.		N/A
Annex F (F.3.3.8)	Output terminals provided for supply of other equipment, except mains, supply are marked with a maximum rating or references to which equipment it is permitted to be connected.		Pass
Annex G (G.7.1)	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs.		N/A
Annex G (G.7.3)	Power supply cords are required to have attachment plugs rated not less than 125 percent of the rated current of the equipment.		N/A
	Flexible power supply cords are required to be compatible with Article 400 of the NEC, and Tables 11 and 12 of the CEC.		N/A
Annex G (G.7.5)	Minimum cord length is required to be 1.5 m, with certain constructions such as external power supplies allowed to consider both input and output cord lengths into the requirement. Power supply cords are required to be no longer than 4.5 m in length if used in ITE Rooms.		N/A
Annex H.2	Continuous ringing signals under normal operating conditions up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex H.4	For circuits with other than ringing signals and with voltages exceeding 42.4 V <sub>peak</sub> or 60 V d.c., the maximum acceptable current through a 2000 ohm resistor (or greater) connected across the voltage source with other loads disconnected is 7.1 mA peak or 30 mA d.c. under normal operating conditions.		N/A
Annex M	Battery packs for stationary applications comply with special component requirements.		N/A
Annex DVA (1)	Equipment intended for use in spaces used for environmental air are subjected to special flammability requirements for heat and visible smoke release.		N/A
	For ITE room applications, automated information storage systems with combustible media greater than 0.76 m <sup>3</sup> (27 cu ft) have a provision for connection of either automatic sprinklers or a gaseous agent extinguishing system with an extended discharge.		N/A
	Consumer products designed or intended primarily for children 12 years of age or younger are subject to additional requirements in accordance with U.S. & Canadian Regulations.		N/A
	Baby monitors additionally comply with ASTM F2951, Consumer Safety Specification for Baby Monitors.		N/A
Annex DVA (5.6.3)	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A.		N/A
Annex DVA (6.3)	The maximum quantity of flammable liquid stored in equipment complies with NFPA 30.		N/A
Annex DVA (6.4.8)	For ITE room applications, enclosures with combustible material measuring greater than 0.9 m <sup>2</sup> (10 sq ft) or a single dimension greater than 1.8 m (6 ft) have a flame spread rating of 50 or less. For equipment with the same dimensions for other applications, an external surface that is not a fire enclosure requires a min. flammability classification of V-1.		N/A
Annex DVA (10.3.1)	Equipment with lasers meets the U.S. Code of Federal Regulations 21 CFR 1040 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (10.5.1)	Equipment that produces ionizing radiation complies with the U.S. Code of Federal Regulations, 21 CFR 1020 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (F.3.3.3)	Equipment for use on a.c. mains supply systems with a neutral and more than one phase conductor (e.g. 120/240 V, 3-wire) require a special marking format for electrical ratings. Additional considerations apply for voltage ratings that exceed the attachment cap rating or are lower than the "Normal Operating Condition" in Table 2 of CAN/CSA C22.2 No. 235."		N/A
Annex DVA (F.3.3.5)	Equipment identified for ITE (computer) room installation is marked with the rated current		N/A
Annex DVA (G.1)	Vertically-mounted disconnect switches and circuit breakers have the "on" position indicated by the handle in the up position		N/A
Annex DVA (G.3.4)	Suitable NEC/CEC branch circuit protection rated at the maximum circuit rating is required for all standard supply outlets and receptacles (such as supplied in power distribution units) if the supply branch circuit protection is not suitable.		N/A
Annex DVA (G.4.2)	Equipment with isolated ground (earthing) receptacles complies with NEC 250.146(D) and CEC 10-112 and 10-906(8).		N/A
Annex DVA (G.4.3)	Where a fuse is used to provide Class 2 or Class 3 current limiting, it is not operator-accessible unless it is non- interchangeable.		N/A
Annex DVA (G.5.3)	Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, require special transformer overcurrent protection.		N/A
Annex DVA (G.5.4)	Motor control devices are required for cord-connected equipment with a mains-connected motor if the equipment is rated more than 12 A, or if the equipment has a nominal voltage rating greater than 120 V, or if the motor is rated more than 1/3 hp (locked rotor current over 43 A).		N/A
Annex DVA (Annex M)	For ITE room applications, equipment with battery systems capable of supplying 750 VA for five minutes have a battery disconnect means that may be connected to the ITE room remote power-off circuit.		N/A
Annex DVA (Q)	Wiring terminals intended to supply Class 2 outputs according to the NEC or CEC Part 1 are marked with the voltage rating and "Class 2" or equivalent; marking is located adjacent to the terminals and visible during wiring.		N/A
Annex DVB (1)	Additional requirements apply for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex DVC (1)	Additional requirements apply for equipment intended for mounting under kitchen cabinets.		N/A
Annex DVE (4.1.1)	Some equipment, components, sub-assemblies and materials associated with the risk of fire, electric shock, or personal injury have component or material ratings in accordance with the applicable national (U.S. and Canadian) component or material requirements. Components required to comply include: appliance couplers, attachment plugs, battery back-up systems, battery packs, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), power supply cords, direct plug-in equipment, electrochemical capacitor modules (energy storage modules with ultra-capacitors), enclosures (outdoor), flexible cords and cables, fuses (branch circuit), ground-fault current interrupters, interconnecting cables, data storage equipment, printed wiring, protectors for communications circuits, receptacles, surge protective devices, vehicle battery adapters, wire connectors, and wire and cables.		Pass
Annex DVH	Equipment for permanent connection to the mains supply is subjected to additional requirements.		Pass
Annex DVH (DVH.1)	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains are in accordance with the NEC/CEC.		N/A
Annex DVH (DVH.3.2)	Terminals for permanent wiring, including protective earthing terminals, are suitable for U.S./Canadian wire gauge sizes, rated 125 percent of the equipment rating, and are specially marked when specified.		N/A
Annex DVH (DVH.3.2)	Wire binding screws are not permitted to attach conductors larger than 10 AWG (5.3 mm <sup>2</sup> ).		N/A
Annex DVH (DVH.4)	Permanently connected equipment is required to have a suitable wiring compartment and wire bending space.		N/A
Annex DVH (DVH 5.5)	Equipment connected to a centralized d.c. power system, and having one pole of the DC mains input terminal connected to the main protective earthing terminal in the equipment, complies with special earthing, wiring, marking and installation instruction requirements.	Unit is for building-in, DC Mains requirements must be addressed during the end product evaluation.	Pass
Annex DVI (6.7)	Equipment intended for connection to telecommunication network outside plant cable is required to be protected against overvoltage from power line crosses.		N/A

IEC62368_1D – ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVJ (10.6.1)	Equipment connected to a telecommunication and cable distribution networks and supplied with an earphone intended to be held against, or in the ear is required to comply with special acoustic pressure requirements.		N/A

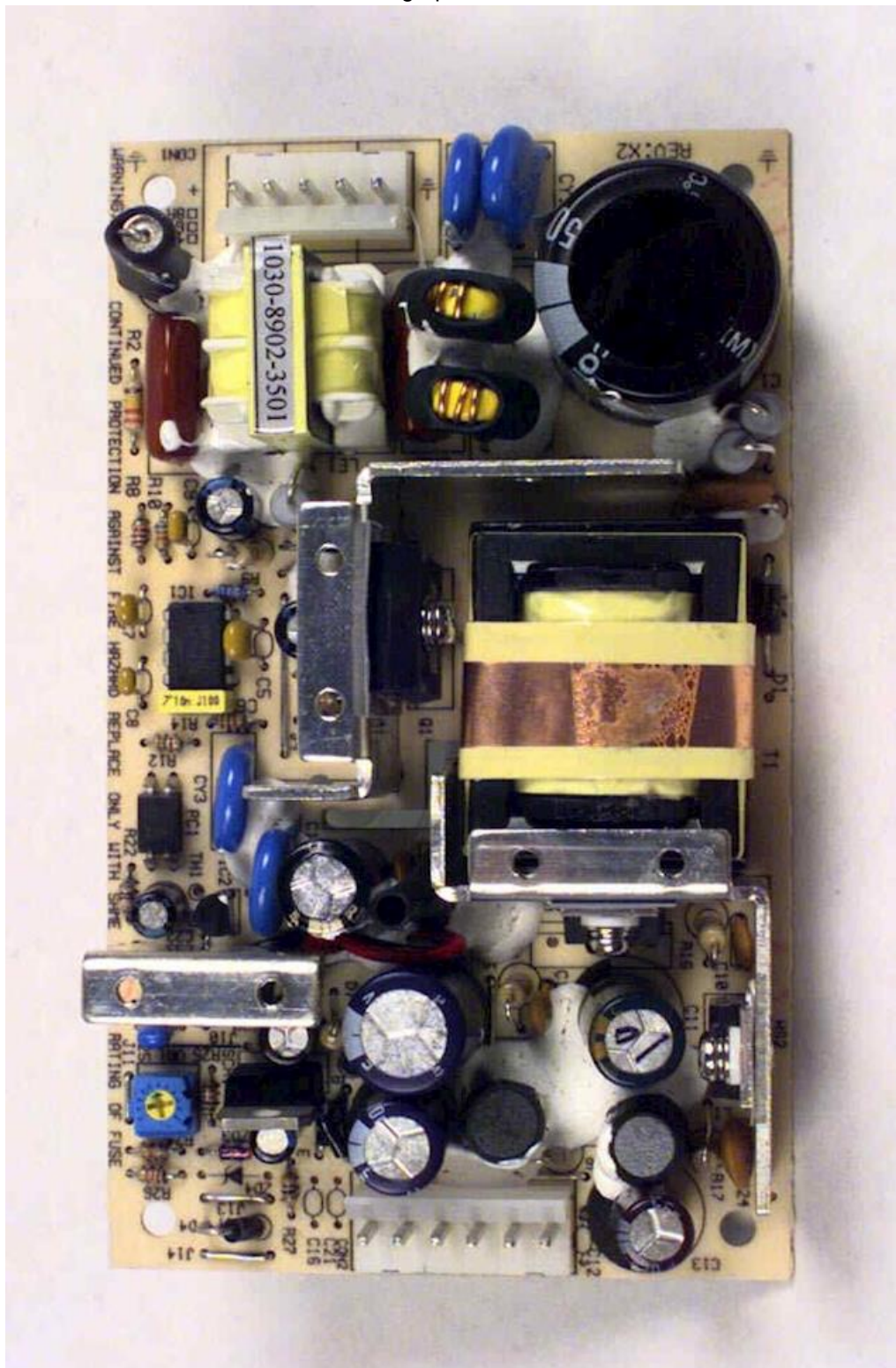
## Enclosures

## Enclosures

Type	Supplement Id	Description
Photographs	03-01	Top Side View
Photographs	03-02	Solder Side View
Photographs	03-03	AL-070D-48T125-175 Top View
Photographs	03-04	AL-070D-48T125-175 Solder Side View
Photographs	03-05	AL-085D-48Q1225-151 Top View
Photographs	03-06	AL-085D-48Q1225-151 Solder Side View
Diagrams	04-01	Transformer Construction Diagram
Diagrams	04-02	Line Choke Construction Diagram
Schematics + PWB	05-02	PWB Artwork and Component Layout
Manuals	06-01	Specifications
Miscellaneous	07-01	Additional Test Data - 1
Miscellaneous	07-02	Additional Test Data - 2
Miscellaneous	07-04	Letter of Assurance
Miscellaneous	07-05	Additional Test Data - 3
Miscellaneous	07-06	Additional Test Data - 4
Miscellaneous	07-07	Specification Sheet

Enclosures

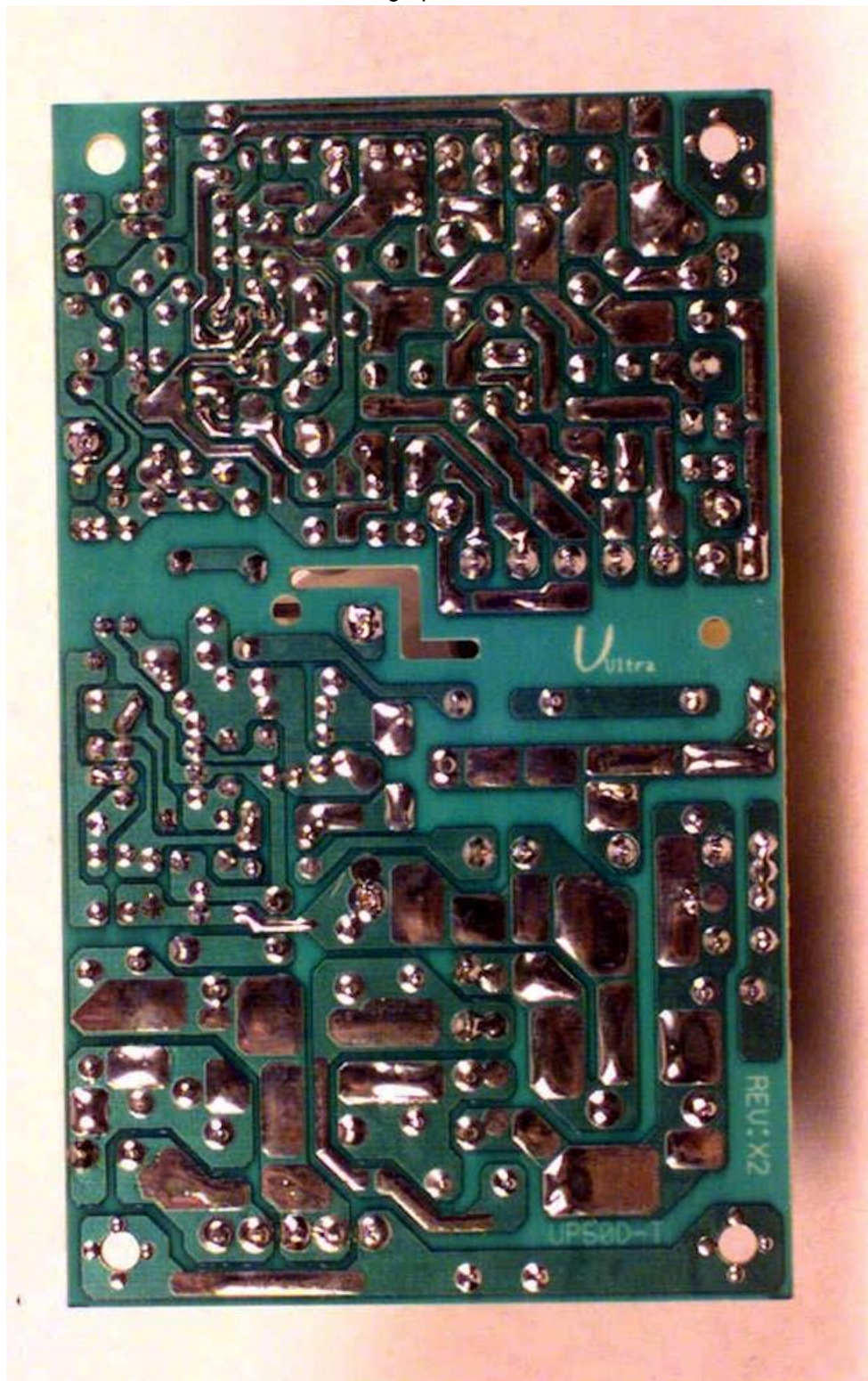
Photographs ID 03-01





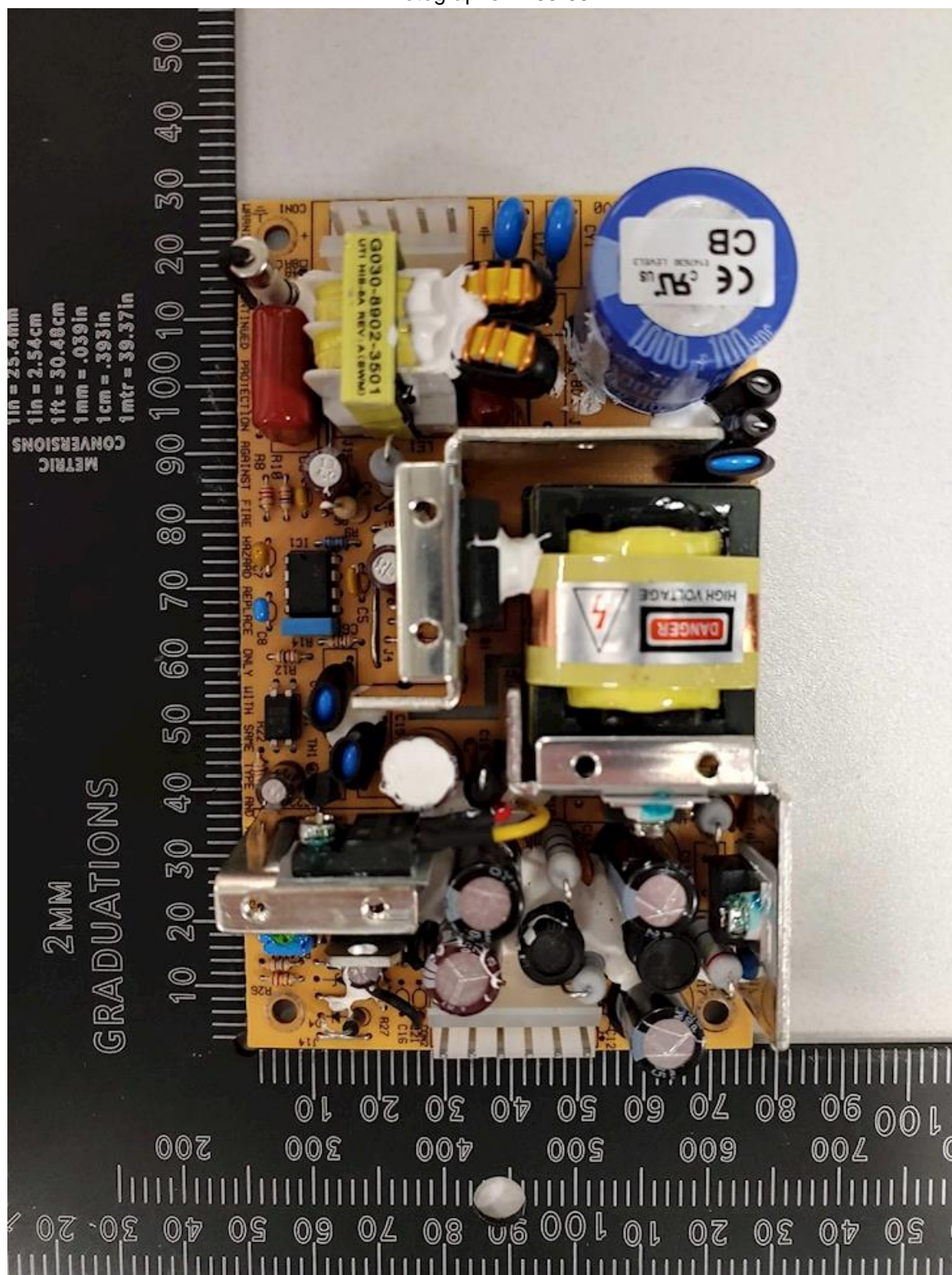
Enclosures

Photographs ID 03-02



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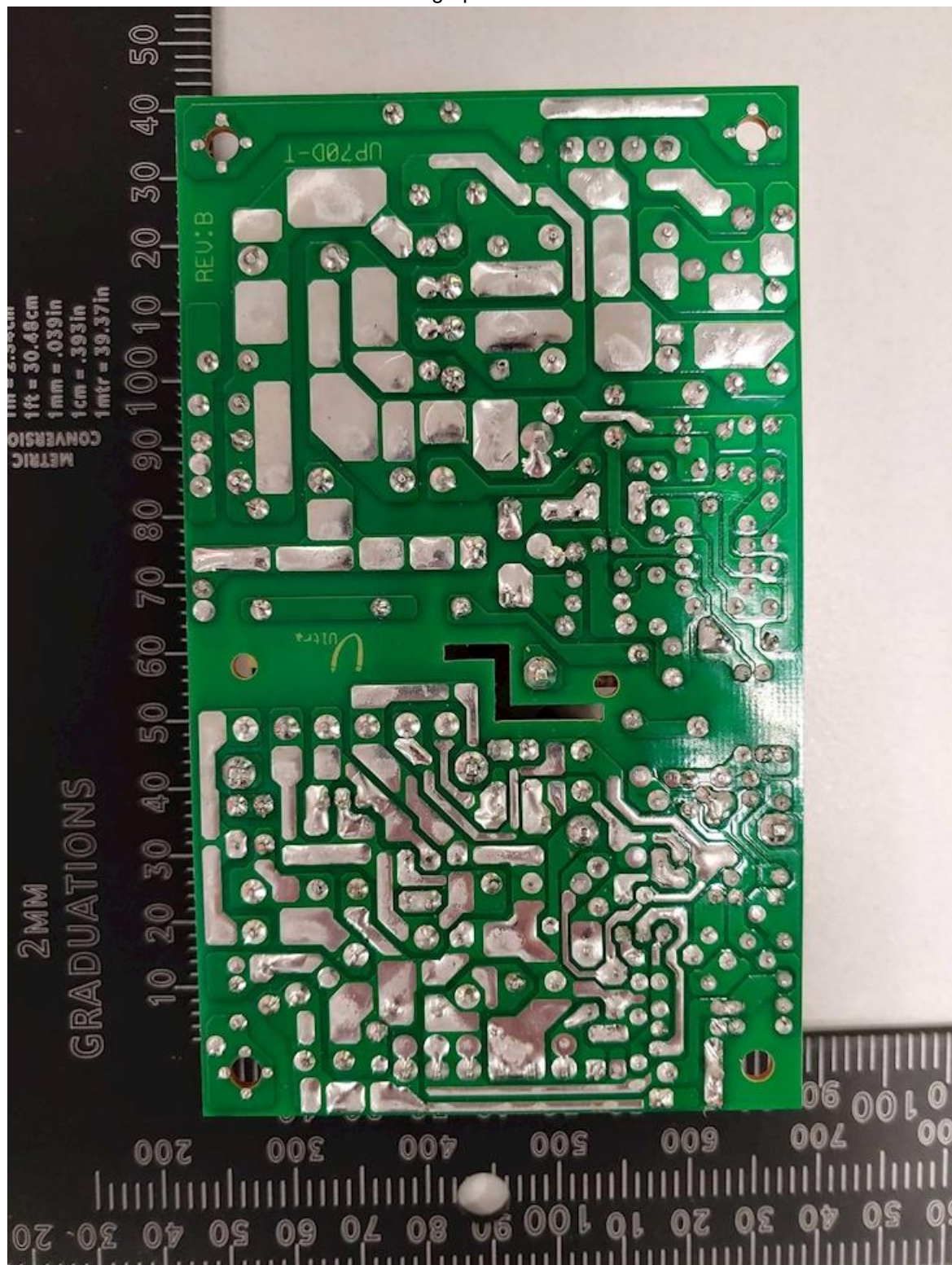
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Enclosures

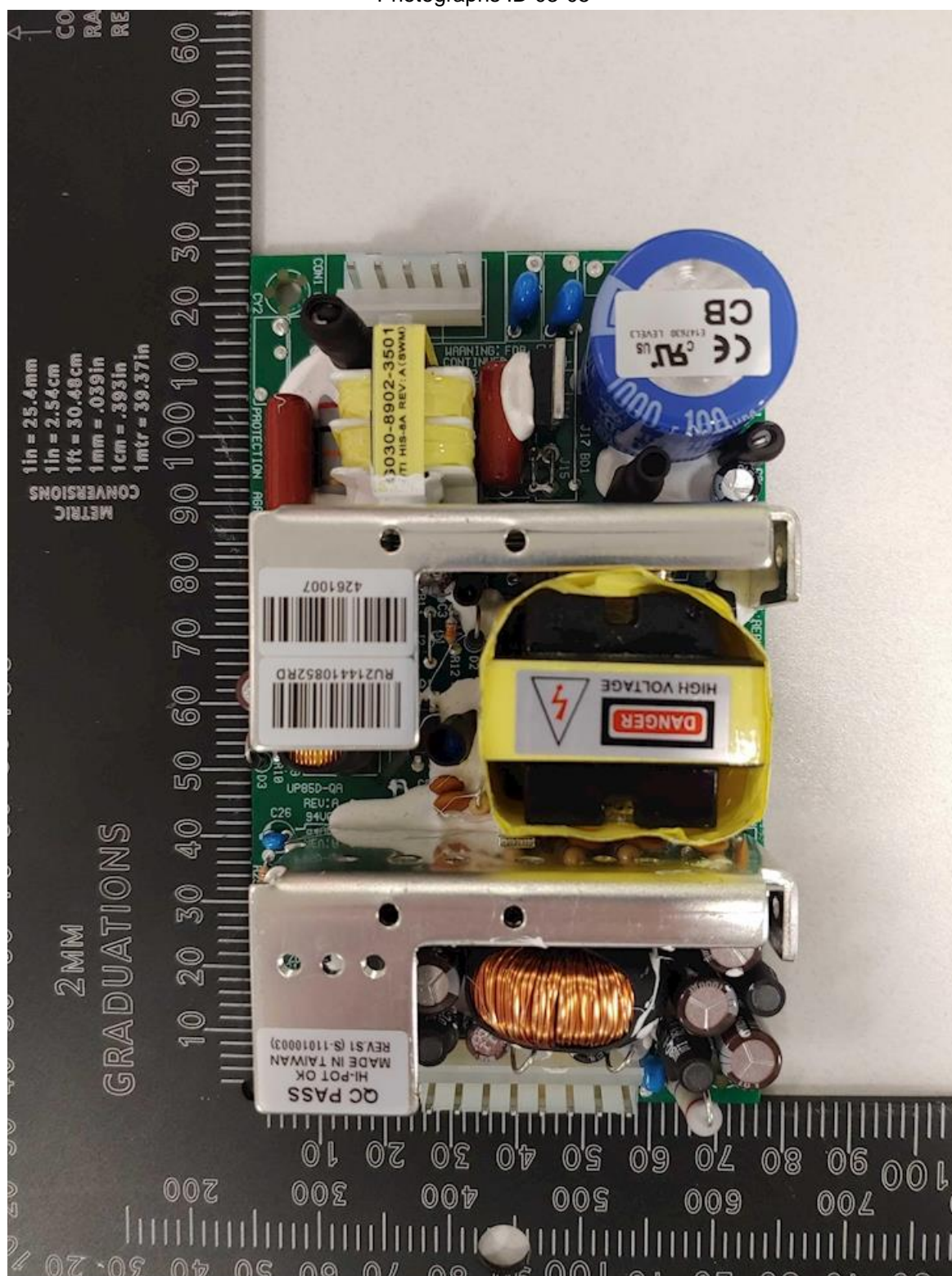
Photographs ID 03-04





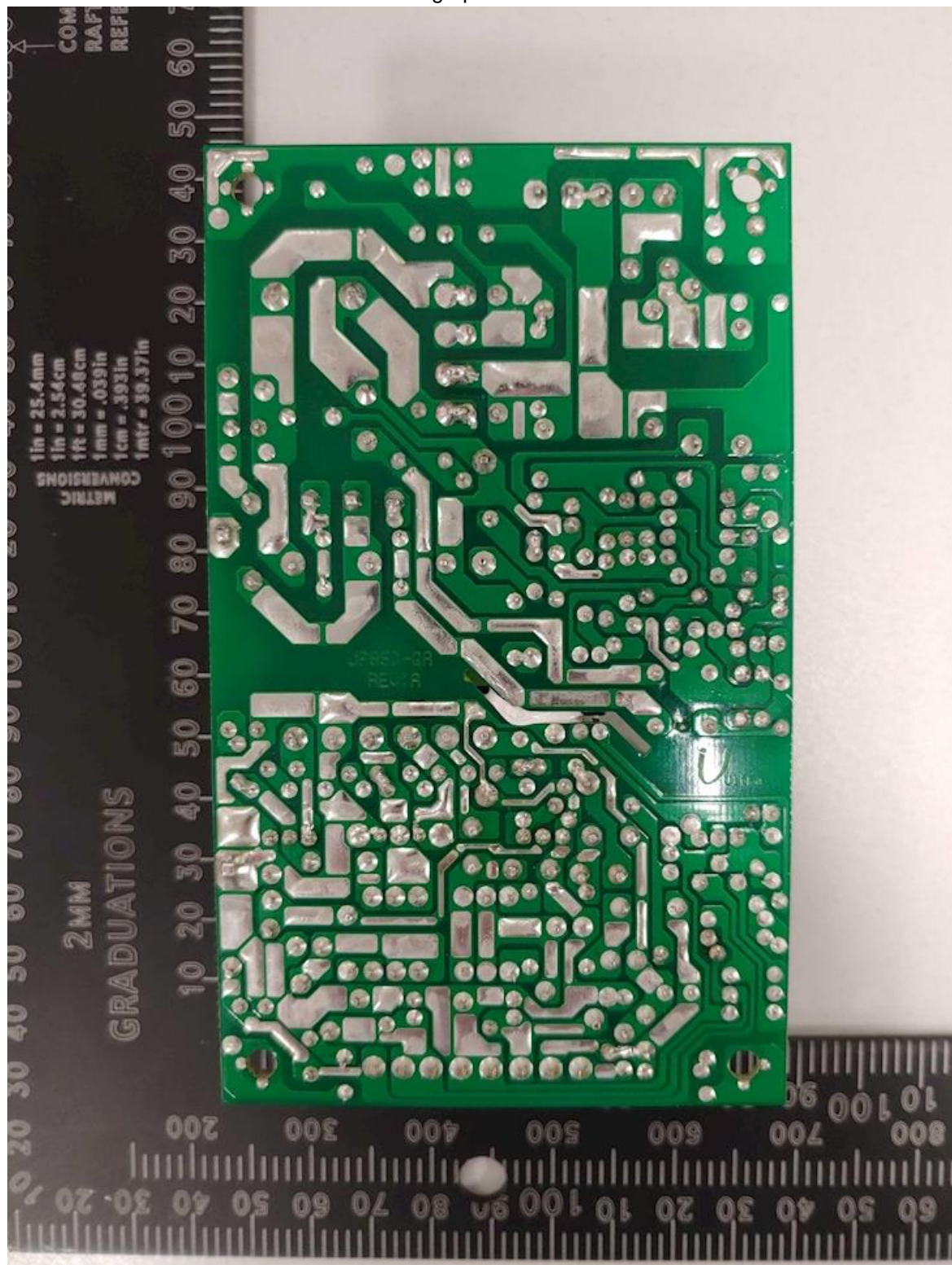
## Enclosures

Photographs ID 03-05



Enclosures

Photographs ID 03-06



## Enclosures

Diagrams ID 04-01

**Unipower LLC**

Transformer List Joe 11/03/'21

Model Name : AL-070D-48T125-175  
AL-085D-48Q1225-151

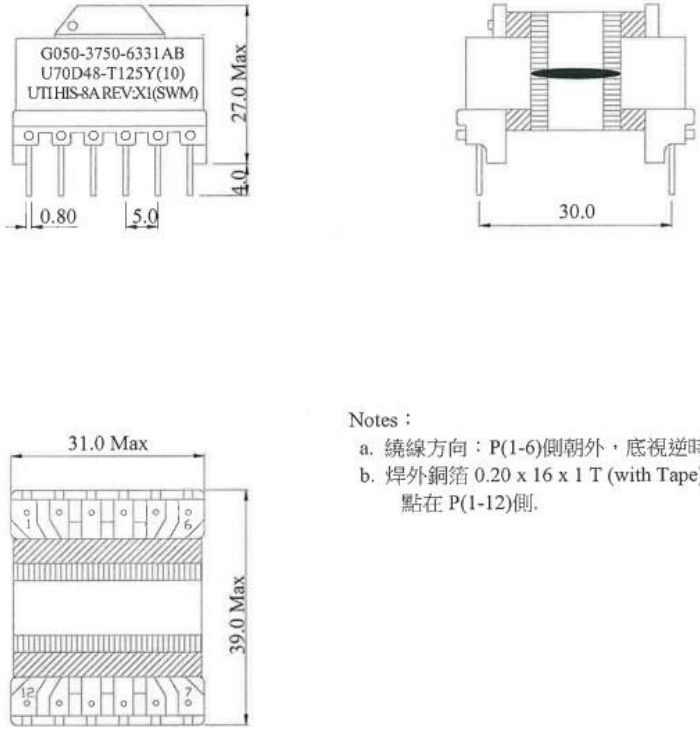

Vendor	Model/Series	Remark
Showwell(SWM)		



## Enclosures

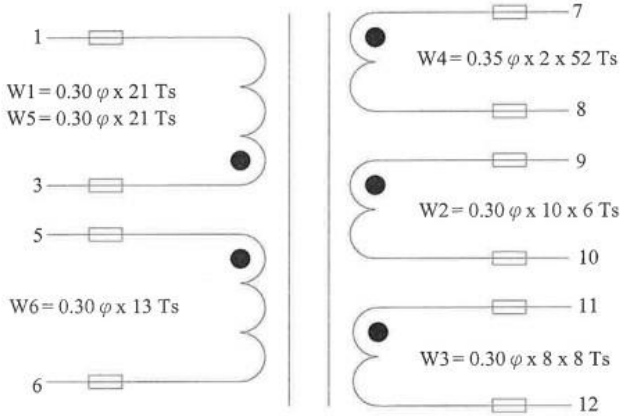
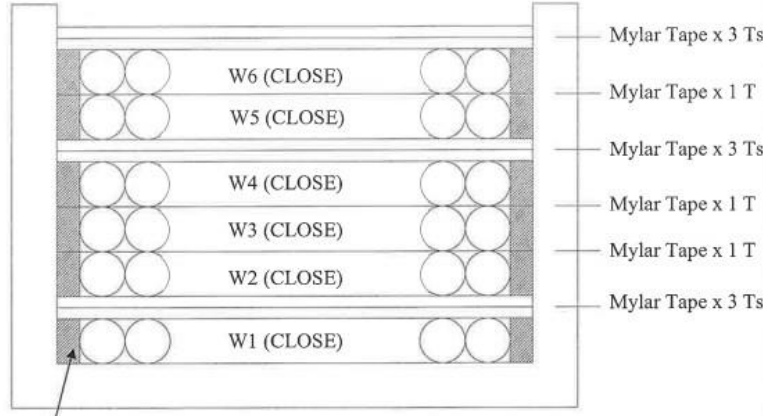

## Diagrams ID 04-01

T<sub>1</sub> for AL-070D-48T25-75 (4)

CUSTOMER P/N	G050-3750-6331AB	PART NO	FER028021042HL-PF	TOLERANCES		
DESCRIPTION	ER-28L	DATE	2021,10,29	.xx	.x	
DOC. NO		REV	A	PAGE	2 OF 4	±0.1 ±0.5
<p>1.DIMENSION :</p>  <p>Notes :</p> <p>a. 繞線方向 : P(1-6)側朝外, 底視逆時針</p> <p>b. 焊外銅箔 0.20 x 16 x 1 T (with Tape), 焊點在 P(1-12)側.</p> <p>2.INDUCTANCE : (@1KHz , 0.3V) L(1-3) = 75 uH ± 10%</p> <p>3.HI-POT : PRI TO SEC : AC 4.0 KV , 1 MINUTE , 5 mA. WINDING TO CORE : AC 1.0 KV , 1 MINUTE , 5 mA.</p> <p>4.PIN 2 , 4 CUTOFF.</p>						
 <p><b>展 耐 有 限 公 司</b> SHOWwell GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話 : (02)8521-5010 傳真 : (02)8521-5013 <a href="http://www.showwell.com.tw">http://www.showwell.com.tw</a></p>		APPROVED BY	CHECKED BY	DRAWING BY		
		張 哲 嘉	張 庭 毓	張 家 毓		


## Enclosures

## Diagrams ID 04-01

CUSTOMER P/N	G050-3750-6331AB	PART NO	FER028021042HL-PF			TOLERANCES	
DESCRIPTION	ER-28L	DATE	2021,10,29			.xx	.x
DOC. NO		REV	A	PAGE	3 OF 4	±0.1	±0.5
<p>5.OUTLINE :</p>  <p>W1 = 0.30 <math>\varphi</math> x 21 Ts W5 = 0.30 <math>\varphi</math> x 21 Ts W6 = 0.30 <math>\varphi</math> x 13 Ts W4 = 0.35 <math>\varphi</math> x 2 x 52 Ts W2 = 0.30 <math>\varphi</math> x 10 x 6 Ts W3 = 0.30 <math>\varphi</math> x 8 x 8 Ts</p>							
<p>6.SCHEMATIC :</p>  <p>Mylar Tape x 3 Ts Mylar Tape x 1 T Mylar Tape x 3 Ts Mylar Tape x 1 T Mylar Tape x 1 T Mylar Tape x 3 Ts W6 (CLOSE) W5 (CLOSE) W4 (CLOSE) W3 (CLOSE) W2 (CLOSE) W1 (CLOSE) Margent Tape x 4mm</p>							
 <p>展 尉 有 限 公 司 SHOWwell GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話: (02)8521-5010 傳真: (02)8521-5013 <a href="http://www.showwell.com.tw">http://www.showwell.com.tw</a></p>		APPROVED BY	CHECKED BY	DRAWING BY			
		張 哲 嘉	張 庭 毓	張 家 毓			

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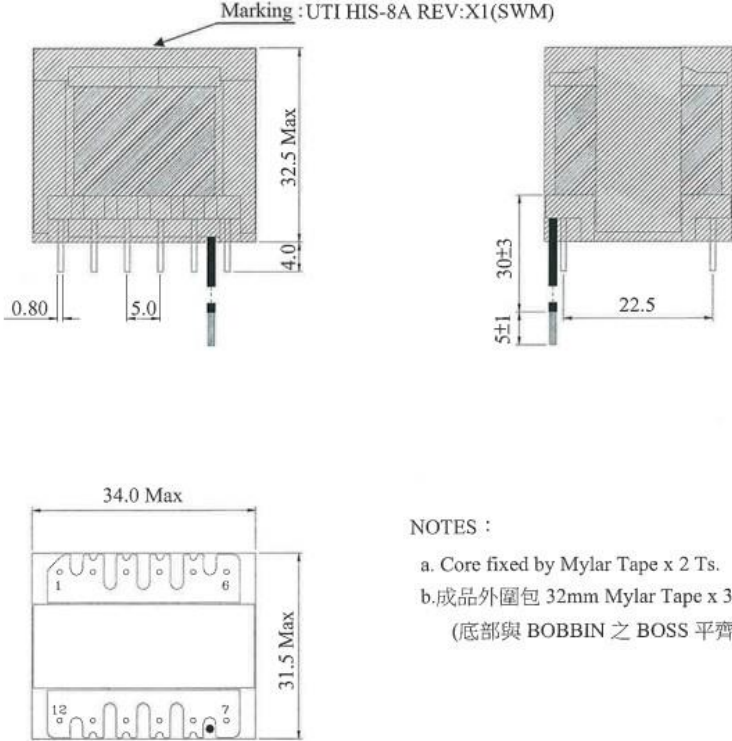

Diagrams ID 04-01

CUSTOMER P/N	G050-3750-6331AB	PART NO	FER028021042HL-PF			TOLERANCES	
DESCRIPTION	ER-28L	DATE	2021,10,29			.xx	.x
DOC. NO		REV	A	PAGE	4 OF 4	±0.1	±0.5
Material List							
NO.	ITEM	MATERIAL	SUPPLIER OF THE MATERIAL				RE-MARK
1	SYSTEM	CLASS 130(B), HIS-8A	GREEN CUBES, E229670 (UTI)				*
2	CORE	FERRITE CORE : ER-28L	PHILIPS COMPONENTS CO.,LTD (3C90) HIMAG MAGNETIC CORPORATION (MZ-4) KAWATEISU CORPORATION (MB4)				* * *
3	BOBBIN	HITACHI : CP-J-8800	HITACHI CHEMICAL CO., E42956				*
4	TAPE	SYMBIO: MY130 (b)	SYMBIO INC., E50292				*
5	WIRE	POLYURETHANE ENAMELLED COPPER WIRE UEY-2 OR UEYT, 130°C, MW28-C	1. JUNG SHING WIRE CO.,LTD. E174837				*
6	TUBE	TEFLON TUBE : TFE-TW-300	ZEUS INDUSTRIAL PRODUCT INC., E64007				*
7	VARNISH	HITACHI: WP-2952F-2G	HITACHI CHEMICAL CO., E72979				*
NOTES:ALL THE MATERIAL MAY BE CHANGED BY THE EQUIVALENT MATERIAL.							
 展 耐 有 限 公 司 SHOWWELL GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話: (02)8521-5010 傳真: (02)8521-5013 http://www.showwell.com.tw			APPROVED BY	CHECKED BY	DRAWING BY		
			張 哲 嘉	張 庭 毓	張 家 毓		

## Enclosures

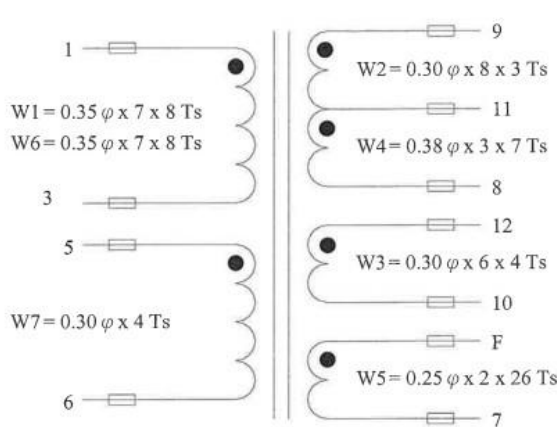
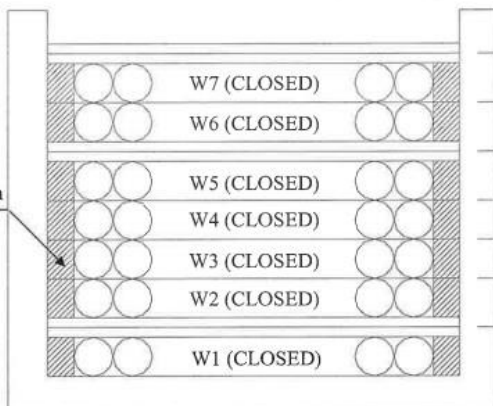

## Diagrams ID 04-01

71 for AL-085D-48Q1225-151 (4)

CUSTOMER P/N	G050-A301-5040AB	PART NO	FEI033021043V-PF			TOLERANCES	
DESCRIPTION	EI-33	DATE	2021,10,29			.xx	.x
UPDATE		REV	A	PAGE	2 OF 5	±0.1	±0.5
<p>1.DIMENSION:</p> <p>G050-A301-5040AB U85D48-Q12B5Z(10) Marking : UTI HIS-8A REV:X1(SWM)</p>  <p>NOTES :</p> <p>a. Core fixed by Mylar Tape x 2 Ts.</p> <p>b. 成品外圍包 32mm Mylar Tape x 3 Ts (底部與 BOBBIN 之 BOSS 平齊).</p> <p>2.INDUCTANCE : (@1KHz , 0.30V) L(1-3) = 243 uH ± 25%</p> <p>3.HI-POT : PRI TO SEC : AC 4.0 KV , 1 MINUTE , 10 mA. PRI &amp; SEC TO CORE : AC 2.0 KV , 1 MINUTE , 10 mA.</p> <p>4.PIN 2 , 4 CUTOFF.</p>							
 <p>展 耐 有 限 公 司 SHOWWELL GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話 : (02)8521-5010 傳真 : (02)8521-5013 http://www.showwell.com.tw</p>		APPROVED BY	CHECKED BY	DRAWING BY			
		張 哲 嘉	張 庭 毓	張 家 毓			

## Enclosures


## Diagrams ID 04-01

CUSTOMER P/N	G050-A301-5040AB	PART NO	FEI033021043V-PF			TOLERANCES	
DESCRIPTION	EI-33	DATE	2021,10,29			.xx	.x
UPDATE		REV	A	PAGE	3 OF 5	±0.1	±0.5
<p>6.OUTLINE :</p>  <p>W1 = 0.35 <math>\varphi</math> x 7 x 8 Ts W6 = 0.35 <math>\varphi</math> x 7 x 8 Ts W2 = 0.30 <math>\varphi</math> x 8 x 3 Ts W4 = 0.38 <math>\varphi</math> x 3 x 7 Ts W3 = 0.30 <math>\varphi</math> x 6 x 4 Ts W7 = 0.30 <math>\varphi</math> x 4 Ts W5 = 0.25 <math>\varphi</math> x 2 x 26 Ts</p>							
<p>7.SCHEMATIC :</p>  <p>Mylar Tape x 3 Ts Mylar Tape x 1 T Mylar Tape x 3 Ts Mylar Tape x 1 T Mylar Tape x 1 T Mylar Tape x 1 T Mylar Tape x 3 Ts</p> <p>Margent Tape x 4.0mm</p>							
 <p>展 耐 有 限 公 司 SHOWwell GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話: (02)8521-5010 傳真: (02)8521-5013 <a href="http://www.showwell.com.tw">http://www.showwell.com.tw</a></p>		APPROVED BY	CHECKED BY	DRAWING BY			
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## Enclosures

Diagrams ID 04-01

CUSTOMER P/N	G050-A301-5040AB	PART NO	FEI033021043V-PF			TOLERANCES	
DESCRIPTION	EI-33	DATE	2021,10,29			.xx	.x
DOC.NO		REV	A	PAGE	4 OF 4	±0.1	±0.5
Material List							
NO.	ITEM	MATERIAL	SUPPLIER OF THE MATERIAL			RE-MARK	
1	SYSTEM	CLASS 130(B), HIS-8A	GREEN CUBES, E229670 (UTI)			*	
2	CORE	FERRITE CORE : EI-33	PHILIPS COMPONENTS CO.,LTD (3C90) HIMAG MAGNETIC CORPORATION (MZ-4) KAWATETSU CORPORATION (MB4)			* * * *	
3	BOBBIN	HITACHI : CP-J-8800	HITACHI CHEMICAL CO., E42956			*	
4	TAPE	SYMBIO: MY130 (b)	SYMBIO INC., E50292			*	
5	WIRE	POLYURETHANE ENAMELLED COPPER WIRE UEY-2 OR UEYT, 130°C, MW28-C	1. JUNG SHING WIRE CO.,LTD. E174837			*	
6	TUBE	TEFLON TUBE : TFE-TW-300	ZEUS INDUSTRIAL PRODUCT INC., E64007			*	
7	VARNISH	HITACHI: WP-2952F-2G	HITACHI CHEMICAL CO., E72979			*	
NOTES:ALL THE MATERIAL MAY BE CHANGED BY THE EQUIVALENT MATERIAL.							
 展 尉 有 限 公 司 SHOWWELL GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話: (02)8521-5010 傳真: (02)8521-5013 http://www.showwell.com.tw		APPROVED BY	CHECKED BY		DRAWING BY		
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## Enclosures

Diagrams ID 04-02

**Unipower LLC**

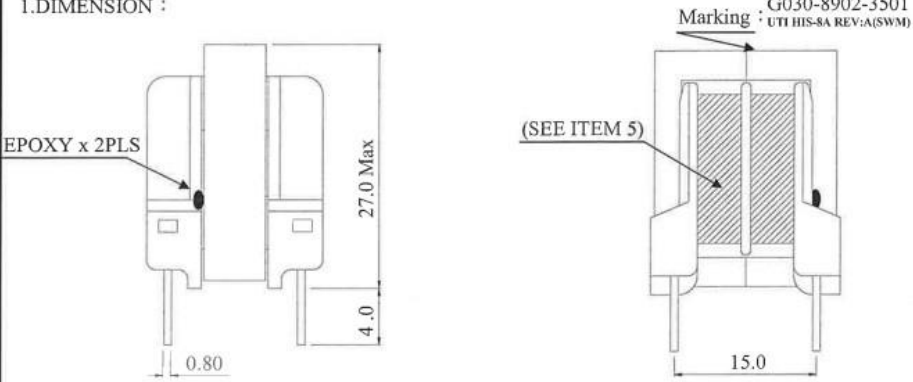
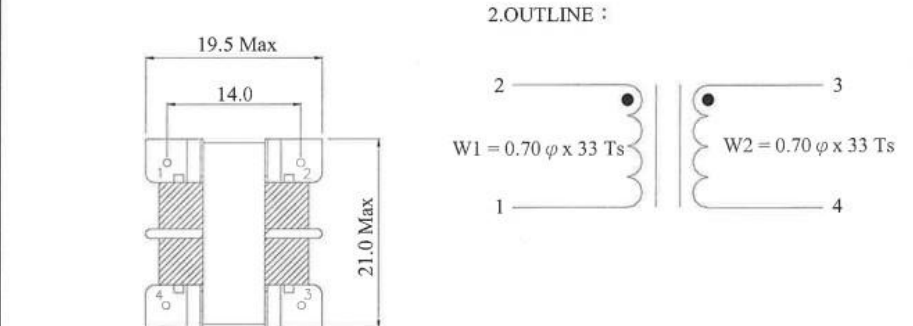

Line Choke List Joe 11/03/'21

Model Name : AL-070D-48T125-175  
AL-085D-48Q1225-151

Vendor	Model/Series	Remark
Showwell(SWM)	G030-8902-3501	LE1 for AL-070D , AL-070DW, AL-085D,and AL-085DW series
Showwell(SWM)	G030-550A-4001	J1&J3 for AL-070D , and AL-070DW series


## Enclosures

## Diagrams ID 04-02

CUSTOMER P/N	G030-8902-3501	PART NO	FEE0250379V-PF			TOLERANCES	
DESCRIPTION	EE-25	DATE	2021,09,23			.XX	.X
DOC. NO		REV	C	PAGE	2 OF 3	±0.1	±0.5
<p>1.DIMENSION :</p>  <p>2.OUTLINE :</p>  <p>3.INDUCTANCE : (@1KHz , 0.3V)  <math>L(2-1) = L(3-4) = 9.0 \text{ mH Min}</math></p> <p>4.HI-POT :  WINDING TO WINDING : AC <u>2.5</u> KV , <u>1</u> MINUTE , <u>5</u> mA.  WINDING TO CORE : AC <u>1.0</u> KV , <u>1</u> MINUTE , <u>5</u> mA.</p> <p>5.LAYERS INSULATION : BY MYLAR TAPE x 3 Ts.</p>							
 <b>展 尉 有 限 公 司</b> SHOWWELL GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話: (02)8521-5010 傳真: (02)8521-5013 <a href="http://www.showwell.com.tw">http://www.showwell.com.tw</a>		APPROVED BY	CHECKED BY	DRAWING BY			
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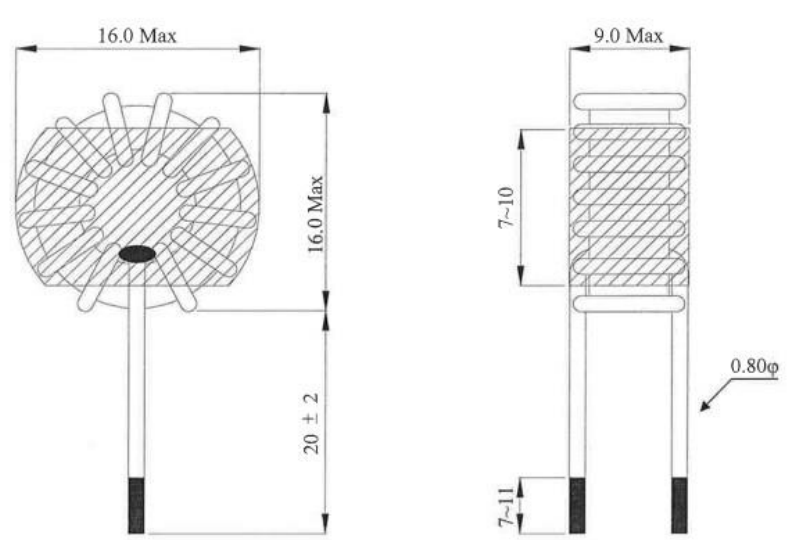
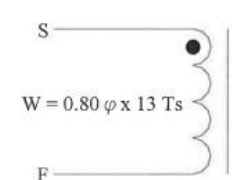

## Enclosures

Diagrams ID 04-02

CUSTOMER P/N	G030-8902-3501	PART NO	FEE0250379V-PF			TOLERANCES	
DESCRIPTION	EE-25	DATE	2021,09,23			.xx	.x
DOC. NO		REV	C	PAGE	3 OF 3	±0.1	±0.5
Material List							
NO.	ITEM	MATERIAL	SUPPLIER OF THE MATERIAL			RE-MARK	
1	SYSTEM	CLASS 130(B), HIS-8A	GREEN CUBES, E229670 (UTI)			*	
2	CORE	FERRITE CORE : UU-15.7	PHILIPS COMPONENTS CO.,LTD (3C90) HIMAG MAGNETIC CORPORATION (MZ-4) KAWATETSU CORPORATION (MB4)			* * *	
3	BOBBIN	HITACHI : CP-J-8800	HITACHI CHEMICAL CO., E42956			*	
4	TAPE	SYMBIO: MY130 (b)	SYMBIO INC., E50292			*	
5	WIRE	POLYURETHANE ENAMELLED COPPER WIRE UEY-2 OR UEYT, 130°C, MW28-C	1. JUNG SHING WIRE CO.,LTD. E174837			*	
6	VARNISH	HITACHI: WP-2952F-2G	HITACHI CHEMICAL CO., E72979			*	
NOTES:ALL THE MATERIAL MAY BE CHANGED BY THE EQUIVALENT MATERIAL.							
 展 尉 有 限 公 司 SHOWWELL GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話: (02)8521-5010 傳真: (02)8521-5013 http://www.showwell.com.tw		APPROVED BY	CHECKED BY		DRAWING BY		
		張 哲 嘉	張 庭 毓		張 家 毓		


## Enclosures

## Diagrams ID 04-02

CUSTOMER P/N	G030-550A-4001	PART NO	FTR01125307V-PF			TOLERANCES	
DESCRIPTION	T44-26	DATE	2011,04,08			.xx	.x
DOC. NO		REV	B	PAGE	2 OF 3	±0.1	±0.5
<p>1.DIMENSION : (UNIT : mm)</p>  <p>2.CORE : T44-26</p> <p>3.INDUCTANEC : (@1KHz , 0.3Vrms) L(S-F) = 5.0 uH Min</p> <p>4.D.C.R : (@25°C) R(S-F) = 50.0 mΩ Max</p> <p>5.HI-POT : COIL TO CORE : AC <u>0.50</u> KV , <u>1</u> SECOND , <u>5</u> mA.</p> <p>6.進出線點 EPOXY 故固定.</p> <p>7.TUBE : UL 94V-0 , 125°C</p> <p>8.須加貼料號標籤 : G030-550A-4001 UTI REV : A(SWM)</p> 							
 <p><b>展 耐 有 限 公 司</b> SHOWWELL GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話: (02)8521-5010 傳真: (02)8521-5013 <a href="http://www.showwell.com.tw">http://www.showwell.com.tw</a></p>		APPROVED BY	CHECKED BY	DRAWING BY			
		張 哲 嘉	許 阿 專	黃 美 卿			

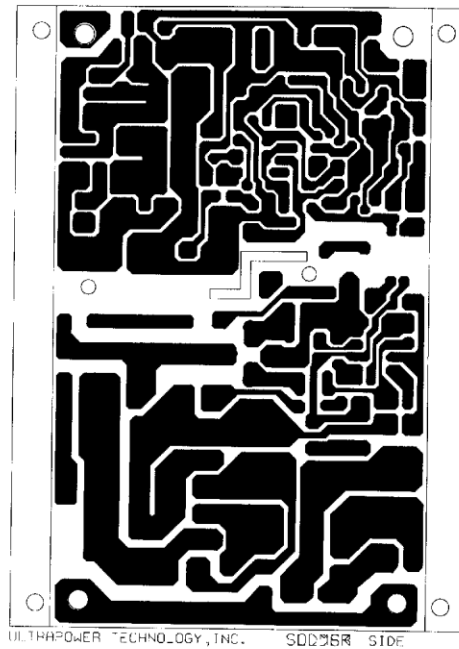
## Enclosures

Diagrams ID 04-02

CUSTOMER P/N	G030-550A-4001	PART NO	FTR01125307V-PF			TOLERANCES	
DESCRIPTION	T44-26	DATE	2011,04,08			.xx	.x
DOC. NO		REV	B	PAGE	3 OF 3	±0.1	±0.5
<b>Material List</b>							
NO.	ITEM	MATERIAL	SUPPLIER OF THE MATERIAL			RE-MARK	
1	SYSTEM	CLASS 130(B), HIS-8A	GREEN CUBES, E229670 (UTI)			*	
2	CORE	FERRITE CORE : T18 x 10 x 7	ACME ELECTRONICS CORPORATION (A10) JINGYUAN ELECTRONIC CO.,LTD (CH10)			* *	
3	WIRE	POLYURETHANE ENAMELLED COPPER WIRE UEY-2 OR UEYT, 130℃, MW28-C	1. JUNG SHING WIRE CO.,LTD. E174837			*	
4	TUBE	SHRINK TUBE : F32	SUMITOMO ELECTRIC FINE POLYMER INC E48762			*	
NOTES:1.ALL THE MATERIAL MAY BE CHANGED BY THE EQUIVALENT MATERIAL.							
 <b>展 尉 有 限 公 司</b> SHOWWELL GROUP CO., LTD 新北市新莊區思源路 593 巷 17 號 1 樓 電話 : (02)8521-5010 傳真 : (02)8521-5013 <a href="http://www.showwell.com.tw">http://www.showwell.com.tw</a>		APPROVED BY	CHECKED BY	DRAWING BY			
		張 哲 嘉	許 阿 專	黃 美 卿			

Enclosures

Schematics + PWB ID 05-02

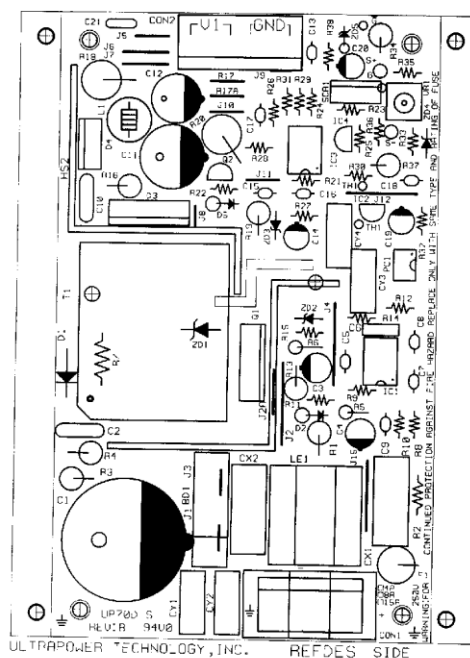


UP700-S REV.B  
01/09/09

For AL-0700W-4852-601

## Enclosures

## Schematics + PWB ID 05-02



UP70D-S REF.B  
01/09/09

For A2-070DW-4852-601



## Enclosures

Manuals ID 06-01

*Power Solutions Inc, Taiwan*APPROVAL SHEET

CUSTOMER NAME :

PRODUCTS :

DC TO DC SWITCHING POWER SUPPLY

MODEL NAME :

AL-070DW-48S2-601 (G)

(UP70D48-S2X (B-10) (G))

PART NAME :

G810-6433-1700-16AB

SAMPLE APPLY NO.:

UX026:R-9712007

Please sign and fax this page back to UTI to approve  
this power supply before mass-production.

BUYER APPROVAL SIGNATURE

Power Solutions Inc.

3380 S. Park Ave  
Titusville, FL 32780  
TEL: 321-268-1660  
FAX: 321-268-1966

Power Solutions Inc, Taiwan

7TH FL, NO.6 LANE 497 CHUNG CHENG RD,  
HSIN TIEN CITY, TAIPEI, TAIWAN  
TEL: 886-2-6629-5815  
FAX: 886-2-6629-5818

APPROVAL CHECKED PROJECT ENG.

REVISIONS			
REV→REV	NO#	DESCRIPTION	DATE
RD	S-9710016 (UX035)	Release REV.RD.	10/14/08

## Enclosures

## Manuals ID 06-01

RD->RD1	9710017	<ol style="list-style-type: none"> <li>1. Change C3, C4, C11, C12, C14, C19 and C20 from standard type to long-life type. Change C3 from 25V to 50V, C4 from 25V to 35V and C11 from 1500uF/16V to 2200uF/16V to keep more safe margin.</li> <li>2. Change F1 from 4A to 8A to meet low line 18VDC input.</li> <li>3. Change C8 from 472/50V to 102/50V and C9 from 331/50V to 102/50V to improve the feedback loop.</li> <li>4. Change R13 from 0.05/2W to 0.033/2W to meet low line 18VDC input.</li> <li>5. Change the primary winding of T1 to meet low line 18VDC input.</li> <li>6. Change R5 from 33 1/2W to 56 1/2W to improve the short-circuit protection.</li> <li>7. Change C21 from 103/500V to 104/500V to improve the Hi-Pot.</li> <li>8. Change R32 from 75 to 470, R19 from 10/2W to 100/2W, R20 from 150/5W to 120/5W and R26 from 220 to 120 to improve the feedback loop and regulation at no load condition.</li> <li>9. Change R29 from 100K to 91K and R31 from 1.8K to 750 to improve the constant current setting.</li> <li>10. Add the heat-shrink tubes at the bended legs of R18 and R19, and the Max. height of all parts can't be over 27.54mm (25mm+2.54mm) per customer's inquiry.</li> <li>11. Meet RoHS.</li> <li>12. REV.RD1 schematic;REV.RD1 BOM.</li> </ol>	11/18/08
RD1	S-9711004 (UX011)	<ol style="list-style-type: none"> <li>1. More sample for customer.</li> <li>2. REV.RD1 schematic;REV.RD1 BOM.</li> </ol>	11/19/08
RD1->RD1	S-9712020 (UX035)	<ol style="list-style-type: none"> <li>1. Change the model name from "-501" to "-601" on ID label per customer's requirement. And correct the height of power in inch unit.</li> <li>2. REV.RD1 schematic;REV.RD1 BOM.</li> </ol>	12/05/08
RD1->RD1	9712007	<ol style="list-style-type: none"> <li>1. Correct the Max. height of all parts from 27.54mm (25mm+2.54mm) to 27.94mm (25.4mm+2.54mm) to match the drawing.</li> <li>2. Correct the Safety approval from "60950" to "60950-1".</li> <li>3. REV.RD1 schematic;REV.RD1 BOM.</li> </ol>	12/09/08

## Enclosures

## Manuals ID 06-01

## Specifications

Model : AL-070DW-48S2-601 (G)

Electrical : (Unless specified otherwise, all parameters meet over the limits of Temperature, Load, and Input Voltage.)

■ Input Voltage Range(+48VDC Nominal).....	18VDC To 72VDC
■ Output Voltage V1.....	+12V
■ Output Current (Convection Cooling) @V1(Customer's special requirement).	Min. = 0A Max. = 3A
■ Output Power (Convection Cooling) (Customer's special requirement).....	36W Max.
■ Output Voltage Regulation V1.....	11.64V To 12.36V
■ Output Ripple & Noise (36W for full line) (10uF Aluminum Cap. and 0.1uF Ceramic Cap. paralleled between the end of output cables and loads @20MHz) @V1.....	<120mVp-p
■ Output Timing : (@Nominal Line) --Turn-On time.....	<1Sec
■ Input Current @48VDC.....	<3A
■ Efficiency @ Full Load : --48VDC.....	>70%
■ Transient Response : (50%~100% load change @100Hz & 1KHz; 0.2A/uS) --Voltage Deviation.....	< +/-5%
--Recovery Time (to within 1% of initial set point).....	<1mS
■ EMI and CE : --FCC PART 15, CLASS B.....	Yes
--CISPR 22, CLASS B.....	Yes
--CE EN55022, CLASS B.....	Certified
■ Short Circuit Protection (Auto-Recovery).....	Yes
■ Over Voltage Protection (Shut off the outputs and need to reset the AC power to recover the outputs.) @V1.....	14V < V1 < 16.5V
■ Brown-Out (Input voltage drops down to zero then back to nominal slowly, all outputs shall be auto-recovery).....	Yes
■ Safety Approval : --UL & cUL 60950-1.....	Approved
--EN60950-1.....	Approved
--CB REPORT.....	Available
■ Isolation (Hi-Pot) : --1000VAC, 1 Minute(or 1414VDC, 3 Seconds), INPUT/ FG, <10mA.....	Yes
-- 2000VAC, 1 Minute(or 2828VDC, 3 Seconds), INPUT/OUTPUT, <10mA..	Yes

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## Enclosures

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## Specifications

Model : AL-070DW-48S2-601 (G)

## ■ Temperature

--Operation.....	-20 to 50 Deg.C (★ Note 1)
--Storage.....	-40 to 85 Deg. C
--Derating (50 to 70 Deg.C).....	2.5% per Deg.C

\* Note 1: May not meet published specification below 0 Deg. C

## ■ Customer special requirements

--Use 3.3uF Cap. at CX1 location to improve the EMI of customer's system.....	Yes
--Output loading at 36W Max., convection cooling and 18VDC to 72VDC input voltage conditions.....	Yes
--Add heat-shrin tubes at the bended legs of R18 and R20, and the Max. height of all parts can't be over 27.94mm (25.4mm+2.54mm) (from the top of PCB).....	Yes
--Meet RoHS directive.....	Yes

Mechanical : (see attached)

## Enclosures

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Specifications  
Model : AL-070DW-48S2-601 (G)

## Mechanical :

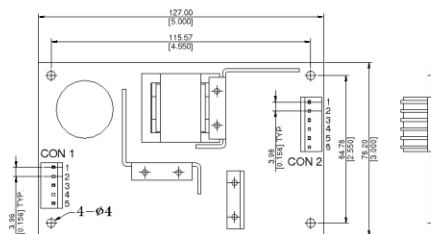
## ■ PIN ASSIGNMENT

## ■ MECHANICAL DRAWING (3" \* 5" \* 1.0")

## CONNECTOR 1

(MOLEX#09-65-2058 OR EQUIVALENT;  
MATING CONNECTOR= MOLEX#09-50-3051)

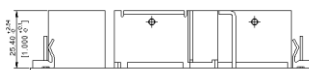
PIN1 FG  
PIN2 NEGATIVE(-)  
PIN3 NEGATIVE(-)  
PIN4 POSITIVE(+)  
PIN5 POSITIVE(+)



## CONNECTOR 2

(MOLEX#09-65-2068 OR EQUIVALENT;  
MATING CONNECTOR= MOLEX#09-50-3061)

PIN1~PIN3 +12V  
PIN4~PIN6 RET



TOLERANCE: mm  $\pm 0.5$   
[inch]  $\pm 0.02$   
UNIT: mm  
[inch]

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## Enclosures

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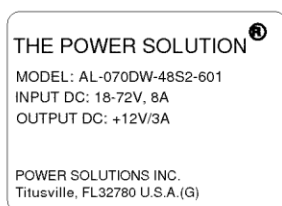


## Specifications

Model : AL-070DW-48S2-601 (G)

## Marking &amp; Label :

■ S/N Label (UTI Standard).....	Yes
■ QC Pass Label:	
--HI-POT.....	Yes
--QC Pass.....	Yes
--Manufacturing location .....	Yes
■ High Voltage Danger Label (UTI Standard).....	(Attached)
■ ID Label.....	(Attached)
■ Safety Label.....	(Attached)
■ RoHS Label.....	(Attached)



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**ENCLOSURE No. 6**

**Additional Test Data**

**(Total 9 Pages including this Cover Page)**



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TEST RECORD NO. 1

TEST PROGRAM DETAILS:

The manufacturer submitted a sample representing production of Models AL-070D-24T125, AL-085D-24Q1225 and AL-085D-48Q1225, which are representative production samples of the Models AL-070D-xyz and AL-085D-xyz Series.

The following tests were conducted in accordance with the Standard for Safety of Information Technology Equipment. CSA C22.2, No. 60950/UL60950, Third Edition. IEC 60950, Third Edition.

Due to testing of a similar model evaluated in the Report dated 4-27-01, only the following tests were deemed necessary.

Tests were conducted at UL.

The unit weights approximately 0.25 kg and was considered for building-in with exposed SELV circuits.

Maximum operating ambient: 25°C.

Unless otherwise indicated, all tests were conducted on Models AL-070D-24T125, AL-085D-24Q1225 and AL-085D-48Q1225.

Tests performed on Models AL-070D-24T125, AL-085D-24Q1225 and AL-085D-48Q1225 were considered to be representative of the AL-070D-xyz and AL-085D-xyz Series.

POWER SUPPLY REFERENCE PAGE

MODEL: AL-070D-24T125

Rated Input:

<u>Volts</u>	<u>Amperes</u>	<u>Watts</u>	<u>Hz</u>	<u>Phase</u>
18-36	8	-	dc	N/A

Rated Output:

<u>V1</u>	<u>A1</u>	<u>V2</u>	<u>A2</u>	<u>V3</u>	<u>A3</u>
5	5	12	2.2	48	1.3

## Enclosures

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## Output Test Load:

Condition A: 37.5 W (Convection Cooling)

<u>V1</u>	<u>A1</u>	<u>V2</u>	<u>A2</u>	<u>V3</u>	<u>A3</u>
5	4	12	0.5	48	0.22

Condition B: 52.5 W (Air-Cooled)

5	4	12	1	48	0.42
---	---	----	---	----	------

Maximum Output Power: 60 W (for inputs between 24-36 V dc)

Maximum Operating Ambient: 25°C

## External Forced Air Cooling:

1. Fan CFM: 32
2. Fan Distance from Unit: 0 cm
3. Fan Location: Primary side of unit
4. Air-flow Direction: From primary to secondary

## POWER SUPPLY REFERENCE PAGE

MODEL: AL-085D-24Q1225

## Rated Input:

<u>Volts</u>	<u>Amperes</u>	<u>Watts</u>	<u>Hz</u>	<u>Phase</u>
18-36	6.3	-	dc	N/A

## Rated Output:

<u>V1</u>	<u>A1</u>	<u>V2</u>	<u>A2</u>	<u>V3</u>	<u>A3</u>		
5	12	12	4	12	4	48	1.5

## Output Test Load:

Condition A: 47.5 W (Convection Cooling)

<u>V1</u>	<u>A1</u>	<u>V2</u>	<u>A2</u>	<u>V3</u>	<u>A3</u>		
5	5	12	0.5	12	0.5	48	0.23

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## RESULTS (Cont.)

Condition B: 65 W (Air-Cooled)

5	6	12	1	12	1	48	0.23
---	---	----	---	----	---	----	------

Maximum Operating Ambient: 25°C

External Forced Air Cooling:

1. Fan CFM: 32
2. Fan Distance from Unit: 0 cm
3. Fan Location: Primary side of unit
5. Air-flow Direction: From primary to secondary

## POWER SUPPLY REFERENCE PAGE

MODEL: AL-085D-48Q1225

Rated Input:

<u>Volts</u>	<u>Amperes</u>	<u>Watts</u>	<u>Hz</u>	<u>Phase</u>
36-72	4	-	dc	N/A

Rated Output:

<u>V1</u>	<u>A1</u>	<u>V2</u>	<u>A2</u>	<u>V3</u>	<u>A3</u>	<u>V4</u>	<u>A4</u>
5	12	12	4	12	4	48	1.5

Output Test Load:

Condition A: 72 W (Convection Cooling)

<u>V1</u>	<u>A1</u>	<u>V2</u>	<u>A2</u>	<u>V3</u>	<u>A3</u>	<u>V4</u>	<u>A4</u>
5	10	12	0.5	12	0.5	48	0.21

Condition B: 85 W (Air-Cooled)

5	12	12	0.5	12	0.5	48	0.27
---	----	----	-----	----	-----	----	------

Maximum Operating Ambient: 25°C

Sample Operation Position: On bench facing upward

External Forced Air Cooling:

1. Fan CFM: 32
2. Fan Distance from Unit: 0 cm
3. Fan Location: Primary side of unit
6. Air-flow Direction: From primary to secondary

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1.6.2 - INPUT TEST:  
SINGLE-PHASE

## METHOD

The unit was connected to a variable voltage as indicated and then operated normally under the conditions noted below until well warmed. The input current and average power were measured.

RESULTS Model AL-070D-24T125

Operating Condition	Input Condition		Input Current, A		Average Power Watts
	Volts	Hz	Rated	Measured	
Rated load A	18	Dc	8	4.97	83
Rated load A	24	Dc	8	3.65	84
Rated load A	36	Dc	8	2.32	80

The steady-state input current did not exceed the rated current at the rated voltage by more than 10% under the maximum normal load.

RESULTS Model AL-085D-24Q1225

Operating Condition	Input Condition		Input Current, A		Average Power Watts
	Volts	Hz	Rated	Measured	
Rated load B	18	Dc	6.3	5.59	93
Rated load B	24	Dc	6.3	3.92	88
Rated load B	36	Dc	6.3	2.58	88

The steady-state input current did not exceed the rated current at the rated voltage by more than 10% under the maximum normal load.

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RESULTS Model AL-085D-48Q1225

Operating Condition	Input Condition		Input Current, A		Average Power Watts
	Volts	Hz	Rated	Measured	
Rated B	36	Dc	4	2.43	83
Rated B	48	Dc	4	1.81	83
Rated B	72	Dc	4	1.22	84

The steady-state input current did not exceed the rated current at the rated voltage by more than 10% under the maximum normal load.

4.5.1, 1.4.12, 1.4.13 - HEATING TEST:

## METHOD

The sample was connected to a source of supply, as noted below, and operated until temperatures became stable. Temperatures were measured using the thermocouple method.

Continuous operation, until steady conditions were established.

Tmra was 25°C.

RESULTS Model AL-070D-24T125

Operating Condition	Input Condition		Input Current, A		Average Power Watts
	V	Hz	Rated	Measured	
Rated A	18	dc	8	4.10	69
Rated A	24	dc	8	3.65	84
Rated A	36	dc	8	2.32	80

The steady-state input current did not exceed the rated current at the rated voltage by more than 10% under the maximum normal load.

Test	Operating Condition	Input Condition		Duration
		V	Hz	
A	Rated load A	18	dc	1 h 7 min
B	Rated load A	24	dc	1 h 20 min
C	Rated load A	36	dc	1 h 5 min

## Enclosures

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Operating Condition	Input Condition		Input Current, A		Average Power Watts
	V	Hz	Rated	Measured	
Rated B	36	dc	4	2.42	83
Rated B	48	dc	4	1.81	83
Rated B	72	dc	4	1.22	84

The steady-state input current did not exceed the rated current at the rated voltage by more than 10% under the maximum normal load.

Test	Operating Condition	Input Condition		Duration
		V	Hz	
A	Rated load B	36	Dc	1 h 7 min
B	Rated load B	48	Dc	1 h 20 min
C	Rated load B	72	Dc	1 h 5 min

<u>Thermocouple Locations</u>	<u>Test A</u>	<u>Test B</u>	<u>Test C</u>
LE2 Winding	30.6	26.2	31.1
LE3 Winding	31.3	28.1	27.3
T1 Core	32.3	38.7	37.3
T1 Winding	35.2	38.2	39.2
Q1 Casing	38.9	36.3	49.0
Ambient	23.8	22.7	22.6

5.2.2 DIELECTRIC VOLTAGE WITHSTAND: (IEC 60601-1, Sub-Clause 20.4)

## METHOD

The test was conducted with the equipment under conditions specified in Table 20. Initially not more than 50 percent of the test voltage was applied. The test voltage was raised to its full value within a period of 10 s. The test voltage was raised to its full value within a period of 10 s. The test voltage was held at full value for 1 min. The test voltage was lowered over a period of 10 s to less than 50 percent of the full value.

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RESULTS Model AL-085D-48Q1225

There was no indication of dielectric breakdown.

TABLE 20: Dielectric Strength

Insulation Under Test (Area From Insulation Diagram)	Insulation Type: (OP-Operational) (BI-Basic/SI- Supplementary) (DI-Double/ RI-Reinforced)	Test Voltage (V)	Remarks
--	--	------------------------	---------

Primary to Ground	BI	1414 V dc	Passed
Primary to Secondary	RI	2828 V dc	Passed

5.3.1, 5.3.4, 5.3.6 - COMPONENT FAILURE TEST:

## METHOD

The sample was placed on a tissue paper covered softwood surface and covered with a single layer of cheesecloth. The sample was connected to a voltage source and operated normally. Once the unit was operating normally, the abnormal condition (i.e., short or open) was applied to each component noted below.

The unit was operated until ultimate results occurred, such as the opening of a reliable component, or thermal equilibrium was reached. During the test, all switches in the primary circuit were closed. Temperatures on the coils of safety isolating transformers were monitored.

If the circuit was interrupted by the opening of a component of unknown reliability, the test was repeated twice (three times total) using new components as necessary.

The following electric strength (ES) potentials were applied where indicated for one minute:

<u>Code</u>	<u>From</u>	<u>Location</u> <u>To</u>	<u>Potential Used (V)</u>
A	Pri	Chassis	1414 V dc
B	Pri	Sec	2828 V dc

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The following key and corresponding comments may be used to describe the final results.

## Comments Key:

IP - Internal protection operated (list component)  
CT - Constant temperatures were obtained  
TW - Transformer winding opened  
CD - Components damaged (list damaged components)  
NB - No indication of dielectric breakdown  
YB - Dielectric breakdown (indicate time and location)  
NC - Cheesecloth remained intact  
YC - Cheesecloth charred or flamed  
NT - Tissue paper remained intact  
YT - Tissue paper charred or flamed

## RESULTS

Model: AL-070D-24T125 Sample #: 1 Component: Q1 Condition: short

Input: 36 V dc Test Duration: < 1 s ES Code: A,B

Final Output: 0V, 0A

Transformer: T1 Maximum Temperature: 25.1°C Ambient: 23.6°C

Comments: CT, NC, NT, IP (f1), NB

Model: AL-085D-24Q1225

Model: AL-085D-T125 Sample #: 1 Component: PC1 - 1 to 2 Condition: short

Input: 72 V dc Test Duration: 45 min ES Code: A,B

Final Output: V01=0.5 V pulse V02=1.2 V pulse V03=21.1 V pulse

Transformer: T1 Maximum Temperature: 75.2°C Ambient: 22.6°C

Comments: CT, NC, NT, NB



Enclosures

Miscellaneous ID 07-02

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File E147630

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Issued: 4-27-01

TEST RECORD NO. 1

SAMPLES:

The manufacturer submitted representative production samples of their power supply Model AL-065D-48T122.

The following tests were conducted in accordance with the Standard for Safety of Information Technology Equipment, CSA-C22.2 No. 950 \* UL 1950, Third Edition, Including considerations for Fourth Amendment.

Tests were conducted at UL.

The test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the Standards noted above. Test results are valid only for the tested equipment.

These units weigh approximately 0.24 kg each and were considered to be for building-in with exposed SELV circuits.

Maximum operating ambient 25°C.

Tests performed on Model AL-065D-48T122 are considered to be representative of Models AL-065D-XYZ Series.

Only limited tests were performed on Models AL-065D-48T122 because of similarity in construction to the AL-065D-XYZ Series - See the Report found in File E188457 Volume 1 Section 1 and dated 3-23-95.

## Enclosures

## Miscellaneous ID 07-02

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## POWER SUPPLY REFERENCE PAGE

MODEL: AL-065D-48T122

## Rated Input:

Volts	Amperes	Watts	Hz	Phase
36-72	3	-	DC	-

## Rated Output:

V1	A1	V2	A2	V3	A3	
5	6	12	2.2	12	1.25	(65 W output - with cooling air)

## Output Test Load:

## Condition A

5	6	12	1.67	12	1.25	(65 W output - with cooling air)
---	---	----	------	----	------	----------------------------------

Maximum output power: 65 WSample Operating Position: On bench facing upwards

## External Forced Cooling:

1. Fan CFM: 28
2. Fan Distance from Unit: 0 cm
3. Fan Location: At input side
4. Airflow Direction: Primary to Secondary

## Enclosures

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## 1.2.2.1 MAXIMUM OUTPUT VOLTAGE, CURRENT, AND VOLT-AMPERE MEASUREMENT TEST:

## METHOD

A sample of power supply, Model AL-065D-48T122, was connected to 72 V dc. The following parameters for each output were measured:

- A. The maximum peak output voltage (V) under any resistive loading condition.
- B. The maximum rms output current (A) under any resistive loading condition.
- C. The maximum volt-ampere (VA) under any resistive loading condition.

## RESULTS AL-065D-48T122

Output Tested	(V)	Maximum (A)	(VA)	HAZ/EL (YES/NO)
+ 5 Vdc	4.44	12.0	71.04	No

1.6.2 - INPUT TEST:  
SINGLE PHASE

## METHOD

The unit was connected to a variable voltage as indicated and then operated normally under the conditions noted below until well warmed. The input current and average power were measured.

## RESULTS Model AL-065D-48T122

Operating Condition	Input Condition		Input Current, A		Average Power Watts
	Volts	Hz	Rated	Measured	
A	36	DC	3	2.56	87.7
A	48	DC	3	2.16	97.2
A	72	DC	3	1.47	95.8

The steady state input current did not exceed the rated current at the rated voltage by more than 10% under the maximum normal load.

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2.2.2, 2.2.3, 2.2.4 - SELV RELIABILITY TEST:

METHOD

The unit was connected to 72 V dc and operated normally. After the introduction of a fault, as noted below, voltages between the following points were measured.

RESULTS Model AL-065D-48T122

Accessible Part		Voltage Limiting Component	Fault	Maximum Vpk	Duration (ms)
From	To				
V o2+	Vo2-	U4-1 to 2	Short	12.8	-
V o1+	Vol-	D7	Short	1.36	-

2.2.7 - VOLTAGE MEASUREMENTS TEST:

METHOD

The unit was connected to 72 V dc and operated normally. Voltages between the following points were recorded.

RESULTS Model AM-120D-Q335

Measuring Points		Measured Voltage	
From	To	Volts, rms	Volts, peak
T2-1	T2-7	1.67	13.2
T2-1	T2-10	10.28	50.4
T2-3	T2-7	38.40	76.8
T2-3	T2-10	26.9	68.0
T2-3	T2-12	23.43	63.2

## Enclosures

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## 4.5.1 - HEATING TEST:

## METHOD

The sample was connected to a source of supply as noted below and operated until temperatures became stable. Temperatures were measured using the thermocouple method.

The sample operated under normal load as follows:

Continuous operation, until steady conditions were established.

Tmra was 25°C.

RESULTS Model AL-065D-48T122 (with external cooling)

Test	Operating Condition	Volts	Input Conditions	
			Hz	Duration
A	Rated load	36	DC	1 hr. 45 min.
A	Rated load	72	DC	2 hr. 10 min.
Thermocouple Locations		Maximum Temperature, °C		
		Test A	Test B	
T2 Core		33.5	31.1	
L2 Winding		31.3	28.8	
T1 Winding		28.7	24.4	
PWB under L3		38.6	37.6	
U2 Casing		31.0	29.2	
Q1 Casing		40.9	39.7	
Ambient		22.4	22.6	

## Enclosures

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4.3.1, 5.3.4, 5.3.6 - COMPONENT FAILURE TEST:

## METHOD

The sample was placed on a tissue-paper covered softwood surface and covered with a single layer of cheesecloth. The sample was connected to a voltage source and operated normally. Once the unit was operating normally, the abnormal condition (i.e. short or open) was applied to each component noted below.

The unit was operated until ultimate results occurred or thermal equilibrium was reached. During the test, all switches in the primary circuit were closed. Temperatures on the coils of safety isolating transformers were monitored.

If the circuit was interrupted by the opening of a component of unknown reliability the test was repeated twice (three times total), using new components as necessary.

The following electric strength (ES) potentials were applied where indicated for 1 minute:

Code	Location		Potential Used (V)
	From	To	
A	Primary	Chassis	1414 V dc
B	Primary	SELV	2828 V dc

The following key and corresponding comments may be used to describe the final results.

## Comments Key:

IP - Internal protection operated (list component)  
CT - Constant temperatures were obtained  
TW - Transformer winding opened  
CD - Components damaged (list damaged components)  
NB - No indication of dielectric breakdown  
YB - Dielectric breakdown (indicate time and location)  
NC - Cheesecloth remained intact  
YC - Cheesecloth charred or flamed  
NT - Tissue paper remained intact  
YT - Tissue paper charred or flamed

## Enclosures

## Miscellaneous ID 07-02

Vol1. 1 Section 4

File E147630

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Issued: 4-27-01

4.3.1, 5.3.4, 5.3.6 - COMPONENT FAILURE TEST: (cont'd)

## RESULTS

Model: AL-065D-48T122 Component: Q1 - D to S Condition: Short

Input: 72 V dc Test Duration: 1 hr. ES Code: A, B

Final Output: 0 V @ 0 A

Transformer: T2 Maximum Temperature: 36.4°C Ambient: 23.3°C

Comments: NC, NT. Fuse remained in tact, however all output voltages and current dropped to zero. Unit not working.

Model: AL-065D-48T122 Component: U2 - 7 to 2 Condition: Short

Input: 72 V dc Test Duration: 1 hr. ES Code: A, B

Final Output: 0 V @ 0 A

Transformer: T2 Maximum Temperature: 36.4°C Ambient: 23.3°C

Comments: NC, NT. Fuse remained in tact, however all output voltages and current dropped to zero. Unit not working.

Model: AL-065D-48T122 Component: IC1 - 1 to 8 Condition: Short

Input: 72 V dc Test Duration: 1 hr. ES Code: A, B

Final Output: 0 V @ 0 A

Transformer: T1 Maximum Temperature: 34.6°C Ambient: 23.0°C

Comments: NC, NT. Fuse remained in tact, however the +12 V, 1.76A output current dropped to 1.6 A and the +5 V output current dropped to 5.8 A.

## Enclosures

## Miscellaneous ID 07-02

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Page T1-8 of 10

Issued: 4-27-01

5.3.3, 5.3.6b, ANNEX C.1 - TRANSFORMER ABNORMAL OPERATION TEST:

## METHOD

The transformer was placed in the unit on a tissue paper covered softwood surface and covered with cheesecloth. The primary side of the transformer was connected to 72 V dc, then operated normally.

(Switcher) With the transformer operating at maximum specified load, each secondary winding was individually loaded after the rectifier (before the regulators). The load was adjusted until the maximum obtainable volt-ampere output was reached or to the point just before foldback.

The temperatures on the transformer core and coils obtained during the test were measured where indicated.

Tmra was 25°C.

ES Code	Location		Potential Used (V)
	From	To	
A	Primary	Chassis	1414 V dc
B	Primary	SELV	2828 V dc

The following key and corresponding comments may be used to describe the final results.

## Comments Key:

IP - Internal protection operated (list component)  
CT - Constant temperatures were obtained  
TW - Transformer winding opened  
CD - Components damaged (list damaged components)  
NB - No indication of dielectric breakdown  
YB - Dielectric breakdown (indicate time and location)  
NC - Cheesecloth remained intact  
YC - Cheesecloth charred or flamed  
NT - Tissue paper remained intact  
YT - Tissue paper charred or flamed



## Enclosures

## Miscellaneous ID 07-02

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File E147630

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Issued: 4-27-01

5.3.3, 5.3.6b, ANNEX C.1 - TRANSFORMER ABNORMAL OPERATION TEST: (cont'd)

RESULTS AL-065D-48T122

Transformer	Test Winding	Duration	Temperature °C		ES Code
			Ambient/Coil/Core		
T1 (pin 12-11)	Across D13	2-3/4 hrs.	24.2	59.1 / 45.8	A,B

Comments: CT, NB, NC, NT

The winding temperatures were within the permitted temperature limits.

## 4.3.6 - POWER SUPPLY OUTPUT SHORT CIRCUIT/OVERLOAD TEST:

## METHOD

The unit was placed on a tissue-covered softwood surface and covered with a single layer of cheesecloth. The unit was connected to a 72 V dc. Temperatures were monitored at the location(s) specified below.

The output was connected to a variable resistor to draw the maximum available output current with all other outputs loaded to maximum normal rating. If the unit employed foldback or overcurrent circuitry, the output current was adjusted to a level that was just below the point at which the power supply circuitry limited the output current. The trip point of overcurrent protective devices was considered to be 110% of their current rating; such devices were removed for this test and replaced with an ammeter. If the unit employed an overtemperature device the output current was adjusted to a level that was just below the point at which the overtemperature device operated.

If the initial point selected (below foldback) caused the power supply to foldback after several minutes, a point (10-20%) below foldback was selected. Temperatures were allowed to stabilize and using a stepwise procedure, the load was increased while monitoring temperatures. After temperatures stabilized, the load was increased to the next incremental point. The process was continued until foldback. The maximum temperature obtained before foldback was recorded. This same stepwise incremental procedure was used for units employing overtemperature protective service.

The equipment was operated until ultimate results (e.g., component opens, fire, etc.) or thermal equilibrium was obtained. If any test was terminated by opening of a component other than a reliable component (e.g. Listed/Recognized fuse, Recognized fusing resistor), the test was repeated an additional two times (three times total) using new components as necessary.

## Enclosures

## Miscellaneous ID 07-02

Vol1. 1 Section 4

File E147630

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Issued: 4-27-01

## 5.4.6 - POWER SUPPLY OUTPUT SHORT CIRCUIT/OVERLOAD TEST:

Following each test, an Electric Strength (ES) potential was applied between the points, noted below, for 1 minute after the insulation cooled to room temperature.

Code	Location		Potential Used (V)
	From	To	
A	Primary	Chassis	1414 V dc
B	Primary	SELV	2828 V dc

The following key and corresponding comments may be used to describe the final results.

## Comments Key:

IP - Internal protection operated (list component)  
CT - Constant temperatures were obtained  
TW - Transformer winding opened  
CD - Components damaged (list damaged components)  
NB - No indication of dielectric breakdown  
YB - Dielectric breakdown (indicate time and location)  
NC - Cheesecloth remained intact  
YC - Cheesecloth charred or flamed  
NT - Tissue paper remained intact  
YT - Tissue paper charred or flamed

RESULTS Model: AL-065D-48T122 Location: (SC) Vo1 ES Code: A,B

Output Under Test		
Initial	Final	Duration
5.0 V, 6.0 A	1.2 V, 0.2 A	2 hrs.

Transformer: T2 Max. Temp. 30.8°C Ambient: 24.6°C

Comments: CT, NB, NC, NT

RESULTS Model: AL-065D-48T122 Location: (OL) Vo2 ES Code: A,B

Output Under Test		
Initial	Final	Duration
12 V, 2.2 A	15.8 V, 4 A	2 hr.

Transformer: T2 Max. Temp. 87.5°C Ambient: 24.4°C

Comments: CT, NB, NC, NT

## Enclosures

## Miscellaneous ID 07-02

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File E147630

Page T2-1 of 1

Issued: 2001-04-27

New: 2005-12-05

TEST RECORD NO. 2

## SAMPLES:

The previously tested samples, Model Series AL-065D-24XYZ were evaluated in the input range of 18-36 VDC while Model Series AL-065D-48XYZ was evaluated in the input range of 36-72 VDC. The additional models utilize the input circuitry and the Isolation Transformer of the 18-36 VDC units with an extension of the range to 60 VDC. Since the highest current and temperatures occur at the lower input current ranges and the construction of the Isolation Transformers remain unchanged, no additional tests were considered necessary on Model Series AL-065DW-XYZ.

## Test Record Summary:

The results of this investigation indicate that the evaluated sample(s) comply with the applicable requirements, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Reviewed by:

Michael Lavorata  
Senior Project Engineer

David Alma  
Staff Engineer

## Enclosures

Miscellaneous ID 07-04

**UNIPOWER CORP**

UL LLC  
12 Laboratory Drive  
Research Triangle Park, NC 27709

Subject: Letter of Assurance - National Differences

This document confirms that <Unipower Corp>, will provide the following items needed to the accepting National Certification Bodies (NCBs) along with the CB test report.

**Markings and Safety Instructions** – Safety instructions and markings in the language suitable for the countries listed in the attached reports will be provided at the same time the CB test report is submitted to the NCB.

**EMC Test Report** – Where detailed in the National Differences, an EMC test report or Declaration of Conformity will accompany this product when sent to countries that require EMC test results as part of their certification process.

**Power Supply Cords and Plugs** – All power cords and plug assemblies provided with the unit will be certified and suitable for use in the countries listed in the attached CB test report.

**Multiple Factories** - This confirms that samples submitted for certification are representative of the products from each factory. The factories are as noted in this CB Test Report.

**Batteries** – Upon shipment of products to Switzerland, the requirements of the most up-to-date Swiss Ordinance Annex 2.15, Batteries of SR 814.81 will be met including provision of the necessary markings, documents, and annual reports relative to the disposal of the batteries to the Swiss Authorities.

**ROHS Directive** – We have been advised that we will need to provide evidence that our product complies with ROHS Directive 2011/65/EU. The accepting NCB may obtain this information from <Unipower Corp> by part number upon request.

*Robert Moss 5/23/16*

<Robert Moss>  
<Engineering Technician>  
<Unipower Corp>

## Enclosures

## Miscellaneous ID 07-05

File E147630

Project 08ME11664

File Date

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## DATA PACKAGE INFORMATION SHEET

Applicant Info	Applicant Name / Address: POWER SOLUTIONS INC 3380 S PARK AVE TITUSVILLE FL 32780 UNITED STATES
----------------	--

Product Info	UL 60950-1, 1st Edition, 2007-10-31 (Information Technology Equipment - Safety - Part 1: General Requirements) Standard: CSA C22.2 No. 60950-1-03, 1st Edition, 2006-07 (Information Technology Equipment - Safety - Part 1: General Requirements) IEC 60950-1:2001, First Edition				
CCNs:	QQGQ2/QQGQ8	Product	Component DC- DC Switchmode Power Supplies	Models	FUSES FOR MODEL AL-070DW-48S2-601

Test Location Info	DAP and UL: <input type="checkbox"/> CTDP <input type="checkbox"/> TCP <input type="checkbox"/> TPTDP <input type="checkbox"/> WTDTP <input checked="" type="checkbox"/> UL CB Scheme: <input checked="" type="checkbox"/> CBTL <input type="checkbox"/> RMT <input type="checkbox"/> SMT <input type="checkbox"/> TMP <input type="checkbox"/> WMT <input type="checkbox"/> The WTDTP/TMP/WMT test facility had the environment and capabilities necessary to perform the tests. Test Location Name/Address: Underwriters Laboratories Inc. 1285 Walt Whitman Road, Melville, NY, 11747, USA Last CTDP/TCP/TPTDP Assessment Date: _____ Last RMT/SMT Assessment Date: _____ Authorized Signatory or TCP Reviewer: Sign _____ UL WTDTP / WMT Witness: Sign _____ Print _____ Print _____
--------------------	--

UL Lab Pre-Test Info	Lab Hours: 2.5 Lab Submittal Date: 1/15/2009 Lab Due Date: ASAP Responsible Engineer: Sign AnnaMarie Vessey Print AnnaMarie Vessey Reviewer: Sign David R. Keen Ext. 22690 Print _____ Notes to Lab: John Tedesco has part 1 and 2 of this project, and has samples.
----------------------	--

UL Lab Info	Log Number: _____ Log In Date: _____ Log Out Date: _____ Log Out Reason: <input checked="" type="checkbox"/> Tests complete <input type="checkbox"/> Test failure <input type="checkbox"/> Need samples <input type="checkbox"/> Reason for Lab Extension: _____ Lab Technician: Sign John Tedesco 2009-01-20 Lab Supervisor: Sign _____ Print _____ Print _____
-------------	--

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## Enclosures

## Miscellaneous ID 07-05

File E147630

Project 08ME11664

File Date

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Test Data Approved By:	Responsible Engineer:	Sign	<u>AnnaMarie Vessey</u>	Reviewer:	Sign	
		Print	<u>AnnaMarie Vessey</u>		Print	<u>David R. Keen</u>
		Date	<u>1/21/09</u>		Date	

## Enclosures

## Miscellaneous ID 07-05

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File Date

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## LIST OF TESTS

<u>Test Name</u>	<u>Page</u>
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2.7 - DC CIRCUIT FUSE TEST (2009-01-20) .....	8
2.7 - DC CIRCUIT FUSE TEST (2009-01-20) .....	9
2.7 - DC CIRCUIT FUSE TEST (2009-01-20) .....	10

**Special Instructions** - Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

<u>Standard</u>	<u>Ambient Temperature, °C</u>	<u>Relative Humidity, %</u>	<u>Barometric Pressure, mBar</u>
	$\pm$	$\pm$	$\pm$
60065	25 $\pm$ 10	Max 75	Not specified
60601-1	+10 to +40	30 to 75	700 to 1060 hPa
60950	Not specified	Not specified	Not specified
60950-1	Not specified	Not specified	Not specified
61010-1	+15 to +35	Max 75	75 to 106 kPa

**Witness Test Data Program (WTDP) Information:**

## Environment:

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3)

[ ] Yes [ ] No [ ] N/A

## Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2)

[ ] Yes [ ] No

## Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)

[ ] Yes [ ] No [ ] N/A

## Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)

[ ] Yes [ ] No

## Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.

[ ] Yes [ ] No

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## Enclosures

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## POWER SUPPLY REFERENCE PAGE

MODEL: AL-070DW-48S2-601

Rated Input:

Volts	Amperes	Watts	Hz	Phase
18 – 72Vdc	8A	-	DC	single

Rated Output:

V1	A1	V2	A2	V3	A3	V4	A4	V5	A5	V6	A6
12	3										

☐ Output Test Load:

Condition A

--	--	--	--	--	--	--	--	--	--	--	--

Condition B

--	--	--	--	--	--	--	--	--	--	--	--

☒ Maximum Output Power: 36 W with convection cooling  
Maximum Ambient: 50 °C☒ Sample Operation Position: normal, component side up☐ External Forced Air Cooling:

1. Fan CFM: \_\_\_\_\_
2. Fan Distance from Unit: \_\_\_\_\_ cm
3. Fan Location: \_\_\_\_\_
4. Air-flow Direction: \_\_\_\_\_

☐ The following output terminals were connected to earth: \_\_\_\_\_☐ Input current at 80% rated load: \_\_\_\_\_ A☐ Temperature Dependent Equipment. Equipment configured with cooling fan(s) with temperature dependent control circuit, [ on ] [ off ] [ variable speed ].ULS-60950-1-1st -NWGQ -2002  
Doc. R\_7\_369Form Issued: 2003-03-31  
Revised: 2007-04-30

## Enclosures

## Miscellaneous ID 07-05

File E147630 Project 08ME11664 Print date 2009-01-07 Page 7 of 1044

Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-20  
signature printSample #: 5STP (1-5) Instrument Code / Range: \_\_\_\_\_

## 2.7 - DC CIRCUIT FUSE TEST

## METHOD

Five samples were tested in the "As Received" state. Each fuse listed below was supported as intended (e.g., fuseholder) in the product. The supply source was 75V dc, with a fault current (short circuit) capability of 80 A. The test voltage was continued for 30 seconds after the interruption of the current.

[ ] ~~Three samples of fuses with filler material (e.g., sand) were resistively loaded to 200 percent of their marked rating of \_\_\_\_\_ A. After the fuse opened, the circuit remained energized for 60 seconds.~~

## RESULTS

Comments Key:

FI - Fuse remains intact and cleared circuit	L# - Fuse overall length increased greater than 3.2 mm (# = increase value in mm)
HF - Hole developed in ferrule	BR - Body rupture
RS - Restrike of the fuse element (as indicated by smoking, arcing or unusual heating) following the time to clear circuit	

TEST FUSE: BEL, Type 5STP, rated 250V, 8A  
(Mfg. type designation and rating)

Sample No.	Test Current (Amp)	Short Circuit Comments
<u>1</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>
<u>2</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>
<u>3</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>
<u>4</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>

[ ]

Sample No.	Test Current (Amp)	200% Overload Comments
<u>5</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>

NOTES TO LAB: See engineer if any indications of restrike during any test.

ULS-60950-1-1st-NWQG -2002  
Doc. R 7 392

Form Issued: 2003-03-31  
Revised: 2007-04-30

Lab Conditions:	<u>20.6</u> °C	<u>47.5</u> %RH	Date: <u>2009-01-20</u>
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## Enclosures

## Miscellaneous ID 07-05

File E147630

Project 08ME11664

Print date 2009-01-07

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Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-20  
signature print  
Sample #: S506 (1-5) Instrument Code / Range: \_\_\_\_\_

## 2.7 - DC CIRCUIT FUSE TEST

## METHOD

Five samples were tested in the "As Received" state. Each fuse listed below was supported as intended (e.g., fuseholder) in the product. The supply source was 75V dc, with a fault current (short circuit) capability of 80 A. The test voltage was continued for 30 seconds after the interruption of the current.

[ ] ~~Three samples of fuses with filler material (e.g., sand) were resistively loaded to 200 percent of their marked rating of \_\_\_\_\_ A. After the fuse opened, the circuit remained energized for 60 seconds.~~

## RESULTS

Comments Key:

FI - Fuse remains intact and cleared circuit	L# - Fuse overall length increased greater than 3.2 mm (# = increase value in mm)
HF - Hole developed in ferrule	BR - Body rupture
RS - Restrike of the fuse element (as indicated by smoking, arcing or unusual heating) following the time to clear circuit	

TEST FUSE: **Bussman, Type S506, rated 250V, 8A**  
(Mfg. type designation and rating)

Sample No.	Test Current (Amp)	Short Circuit Comments
<u>1</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>
<u>2</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>
<u>3</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>
<u>4</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>

[ ]

Sample No.	Test Current (Amp)	200% Overload Comments
<u>5</u>	<u>80</u>	<u>FI, fuse length remained 21 mm before and after test</u>

NOTES TO LAB: See engineer if any indications of restrike during any test.

ULS-60950-1-1st -NWGQ -2002  
Doc. R 7 392

Form Issued: 2003-03-31  
Revised: 2007-04-30

Lab Conditions:	20.6 °C	47.5 %RH	Date:	2009-01-20
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## Enclosures

## Miscellaneous ID 07-05

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Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-20  
signature print  
Sample #: UTE (1-5) Instrument Code / Range: \_\_\_\_\_

## 2.7 - DC CIRCUIT FUSE TEST

## METHOD

Five samples were tested in the "As Received" state. Each fuse listed below was supported as intended (e.g., fuseholder) in the product. The supply source was 75V dc, with a fault current (short circuit) capability of 80 A. The test voltage was continued for 30 seconds after the interruption of the current.

[ ] Three samples of fuses with filler material (e.g., sand) were resistively loaded to 200 percent of their marked rating of \_\_\_\_\_ A. After the fuse opened, the circuit remained energized for 60 seconds.

## RESULTS

Comments Key:

FI - Fuse remains intact and cleared circuit	L# - Fuse overall length increased greater than 3.2 mm (# = increase value in mm)
HF - Hole developed in ferrule	BR - Body rupture
RS - Restrike of the fuse element (as indicated by smoking, arcing or unusual heating) following the time to clear circuit	

TEST FUSE: Conquer, Type UTE, rated 250V, 8A  
(Mfg. type designation and rating)

Sample No.	Test Current (Amp)	Short Circuit Comments
1	80	FI, fuse length remained 21 mm before and after test
2	80	FI, fuse length remained 21 mm before and after test
3	80	FI, fuse length remained 21 mm before and after test
4	80	FI, fuse length remained 21 mm before and after test

[ ]

Sample No.	Test Current (Amp)	200% Overload Comments
5	80	FI, fuse length remained 21 mm before and after test

Lab Conditions:	20.6 °C	47.5 %RH	Date: 2009-01-20
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NOTES TO LAB: See engineer if any indications of restrike during any test.

ULS-60950-1-1st-NWGQ -2002

Form Issued: 2003-03-31

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## Enclosures

## Miscellaneous ID 07-05

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Doc. R\_7\_392

Revised: 2007-04-30

Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-20  
signature print  
Sample #: 228 (1-5) Instrument Code / Range: \_\_\_\_\_

## 2.7 - DC CIRCUIT FUSE TEST

## METHOD

Five samples were tested in the "As Received" state. Each fuse listed below was supported as intended (e.g., fuseholder) in the product. The supply source was 75V dc, with a fault current (short circuit) capability of 80 A. The test voltage was continued for 30 seconds after the interruption of the current.

[ ] Three samples of fuses with filler material (e.g., sand) were resistively loaded to 200 percent of their marked rating of \_\_\_\_\_ A. After the fuse opened, the circuit remained energized for 60 seconds.

## RESULTS

Comments Key:

FI - Fuse remains intact and cleared circuit	L# - Fuse overall length increased greater than 3.2 mm (# = increase value in mm)
HF - Hole developed in ferrule	BR - Body rupture
RS - Restrike of the fuse element (as indicated by smoking, arcing or unusual heating) following the time to clear circuit	

TEST FUSE: Littelfuse, Type 228, rated 250V, 8A  
(Mfg. type designation and rating)

Sample No.	Test Current (Amp)	Short Circuit Comments
1	80	FI, fuse length remained 21 mm before and after test
2	80	FI, fuse length remained 21 mm before and after test
3	80	FI, fuse length remained 21 mm before and after test
4	80	FI, fuse length remained 21 mm before and after test

Sample No.	Test Current (Amp)	200% Overload Comments
5	80	FI, fuse length remained 21 mm before and after test

Lab Conditions:	20.6 °C	47.5 %RH	Date: 2009-01-20
-----------------	---------	----------	------------------

NOTES TO LAB: See engineer if any indications of restrike during any test.

ULS-60950-1-1st-NWQG -2002  
Doc. R\_7\_392

Form Issued: 2003-03-31  
Revised: 2007-04-30

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## Enclosures

Miscellaneous ID 07-06

File E147630

Project 08ME11664

File Date

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## DATA PACKAGE INFORMATION SHEET

Applicant Info	Applicant Name / Address: POWER SOLUTIONS INC 3380 S PARK AVE TITUSVILLE FL 32780 UNITED STATES
----------------	--

Product Info	UL 60950-1, 1st Edition, 2007-10-31 (Information Technology Equipment - Safety - Part 1: General Requirements) Standard: CSA C22.2 No. 60950-1-03, 1st Edition, 2006-07 (Information Technology Equipment - Safety - Part 1: General Requirements) IEC 60950-1:2001, First Edition
	CCNs: QQQQ2/QQGQ8 Product Component DC- DC Switchmode Power Supplies Models AL-070DW-48S2-601

Test Location Info	DAP and UL: <input type="checkbox"/> CTDP <input type="checkbox"/> TCP <input type="checkbox"/> TPTDP <input type="checkbox"/> WTDTP <input checked="" type="checkbox"/> UL CB Scheme: <input checked="" type="checkbox"/> CBTL <input type="checkbox"/> RMT <input type="checkbox"/> SMT <input type="checkbox"/> TMP <input type="checkbox"/> WMT <input type="checkbox"/> The WTDTP/TMP/WMT test facility had the environment and capabilities necessary to perform the tests. Test Location Name/Address: Underwriters Laboratories Inc. 1285 Walt Whitman Road, Melville, NY, 11747, USA Last CTDP/TCP/TPTDP Assessment Date: _____ Last RMT/SMT Assessment Date: _____ Authorized Signatory or TCP Reviewer: Sign _____ UL WTDTP / WMT Witness: Sign _____ Print _____ Print _____
--------------------	--

UL Lab Pre-Test Info	Lab Hours: 3 Lab Submittal Date: 1/12/2009 Lab Due Date: 1/20/2009 Responsible Engineer: Sign AnnaMarie Vessey Print AnnaMarie Vessey Reviewer: Sign David R. Keen Ext. 22690 Print _____ Notes to Lab: 2 Tests only – Please give to John Tedesco as he has Part 1 of this Test Plan
----------------------	---

UL Lab Info	Log Number: _____ Log In Date: _____ Log Out Date: _____ Log Out Reason: <input checked="" type="checkbox"/> Tests complete <input type="checkbox"/> Test failure <input type="checkbox"/> Need samples <input type="checkbox"/> Reason for Lab Extension: _____ Lab Technician: Sign John Tedesco 2009-01-20 Lab Supervisor: Sign _____ Print _____ Print _____
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## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

File Date

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Test Data Approved By:	Responsible Engineer:	Sign	<u>AnnaMarie Vessey</u>	Reviewer:	Sign	_____
		Print	<u>AnnaMarie Vessey</u>		Print	_____
		Date	<u>1/21/09</u>		Date	_____



## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

File Date

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## LIST OF TESTS

<u>Test Name</u>	<u>Page</u>
POWER SUPPLY REFERENCE PAGE .....	6
2.4.1, 2.4.2 - LIMITED CURRENT CIRCUIT MEASUREMENTS (2009-01-15) .....	7
2.9.1, 2.9.2, 5.2.2 - HUMIDITY TEST (2009-01-20) .....	12

**Special Instructions** - Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

<u>Standard</u>	<u>Ambient Temperature, °C</u>	<u>Relative Humidity, %</u>	<u>Barometric Pressure, mBar</u>
	$\pm$	$\pm$	$\pm$
60065	25 $\pm$ 10	Max 75	Not specified
60601-1	+10 to +40	30 to 75	700 to 1060 hPa
60950	Not specified	Not specified	Not specified
60950-1	Not specified	Not specified	Not specified
61010-1	+15 to +35	Max 75	75 to 106 kPa

**Witness Test Data Program (WTDP) Information:**

## Environment:

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2, 5.3.3)

[ ] Yes [ ] No [ ] N/A

## Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2)

[ ] Yes [ ] No

## Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6)

[ ] Yes [ ] No [ ] N/A

## Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2)

[ ] Yes [ ] No

## Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package.

[ ] Yes [ ] No

Miscellaneous ID 07-06

Page 4 of 13145

## TEST SAMPLE IDENTIFICATION

The table below is to provide correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

[illegible]



## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

Print date 2009-01-07

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## POWER SUPPLY REFERENCE PAGE

MODEL: AL-070DW-48S2-601

Rated Input:

Volts	Amperes	Watts	Hz	Phase
18 – 72Vdc	8A	-	DC	-

Rated Output:

V1	A1	V2	A2	V3	A3	V4	A4	V5	A5	V6	A6
12	3										

☐ Output Test Load:

Condition A

--	--	--	--	--	--	--	--	--	--	--	--

Condition B

--	--	--	--	--	--	--	--	--	--	--	--

☒ Maximum Output Power: 36 W with convection cooling  
Maximum Ambient: 50 °C☒ Sample Operation Position: normal, component side up☐ External Forced Air Cooling:

1. Fan CFM: \_\_\_\_\_
2. Fan Distance from Unit: \_\_\_\_\_ cm
3. Fan Location: \_\_\_\_\_
4. Air-flow Direction: \_\_\_\_\_

☐ The following output terminals were connected to earth: \_\_\_\_\_☐ Input current at 80% rated load: \_\_\_\_\_ A☐ Temperature Dependent Equipment. Equipment configured with cooling fan(s) with temperature dependent control circuit, [ on ] [ off ] [ variable speed ].ULS-60950-1-1st-NWGQ -2002  
Doc. R\_7\_369Form Issued: 2003-03-31  
Revised: 2007-04-30

## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

Print date 2009-01-07

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Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-20  
signature print  
Sample #: 3 Instrument Code / Range: \_\_\_\_\_

## 2.4.1, 2.4.2 - LIMITED CURRENT CIRCUIT MEASUREMENTS

## METHOD PART I

The unit was connected to 72 Vdc. An IEC leakage current meter described in Annex D of UL 60950-1 and a switch were connected between the user accessible part of a limited current circuit and either pole of the limited current circuit or earth as noted under RESULTS Part I. A storage oscilloscope was connected across the points under consideration. The switch was closed and the following values were recorded:

☐ Oscilloscope Method:

Vp - Peak Voltage  
V dc - dc Voltage  
Ap - Peak current =  $V_p/2000\ \Omega$   
dc - dc current =  $V_{dc}/2000\ \Omega$   
kHz - Circuit frequency in kilohertz

☐ In addition, a photograph or printout of the waveform was made.

☒ MIU - Annex D meter method

Measurements were made under both normal and single fault conditions as noted below.

Y1 Capacitors were not subjected to single fault conditions.

Measuring instrument used for test:

☒ Annex D.1 \_\_\_\_\_

☐ Annex D.2 \_\_\_\_\_

## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

Print date 2009-01-07

Page 8 of 1344

Tested by: \_\_\_\_\_ Tested by: \_\_\_\_\_ Test date: \_\_\_\_\_  
signature print

Sample #: \_\_\_\_\_ Instrument Code / Range: \_\_\_\_\_

**2.4.1, 2.4.2 - LIMITED CURRENT CIRCUIT MEASUREMENTS (con't)****RESULTS PART I****[ ] Oscilloscope Method:****User Accessible Live Part:** \_\_\_\_\_ **to Pole 1:** \_\_\_\_\_

Fault	Volts Peak	Volts dc	mA <sub>p</sub>	mA dc	Frequency kHz

**User Accessible Live Part:** \_\_\_\_\_ **to Pole 2:** \_\_\_\_\_

Fault	Volts Peak	Volts dc	mA <sub>p</sub>	mA dc	Frequency kHz

**User Accessible Live Part:** \_\_\_\_\_ **to Earth**

Fault	Volts Peak	Volts dc	mA <sub>p</sub>	mA dc	Frequency kHz

**The circuit's available current [complied] [did not comply] with the current limits of a Limited Current Circuit.****Comments:**

## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

Print date 2009-01-07

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Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-15  
signature printSample #: 3 Instrument Code / Range: \_\_\_\_\_

## 2.4.1, 2.4.2 - LIMITED CURRENT CIRCUIT MEASUREMENTS (con't)

[X] MIU - Annex D Meter Method:

User Accessible Live Part: Output side of CY3 to Earth

Fault	MIU
Normal Condition	<u>0.005</u>

User Accessible Live Part: Output side of CY4 to Earth

Fault	MIU
Normal Condition	<u>0.005</u>

User Accessible Live Part:

Fault	MIU

The circuit's available current [ complied ] [ ~~did not comply~~ ] with the current limits of a Limited Current Circuit.

Comments:

**From Eng.: APPLICATION GUIDELINE:****1.5.7.4-1 Method for measuring Limited Current from bridging components**

The measurement per sub-clause 2.4.2 should be taken directly at the output of both (or one Y1) bridging capacitors or bridging resistors to earthed parts, and from each bridging capacitor (or resistor), separately, and earth, if two are provided.

Lab Conditions:	<u>21.2</u> °C	<u>47.9</u> %RH	Date: <u>2009-01-15</u>
-----------------	----------------	-----------------	-------------------------

ULS-60950-1-1st-NWQG -2002  
Doc. R\_7\_386Form Issued: 2003-03-31  
Revised: 2007-04-30Form Copyright © 2005 Underwriters Laboratories Inc.  
Only those products bearing the UL Mark should be considered as being covered by UL.

Created by ULtraLink on 2009-01-07

## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

Print date 2009-01-07

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Tested by:

signature

Tested by:

John Tedesco

print

Test date: 2009-01-15Sample #: 3

Instrument Code / Range:

---

2.4.1, 2.4.2 - LIMITED CURRENT CIRCUIT MEASUREMENTS (con't)

---

## NOTES TO LAB:

1. Measurements using the 2000  $\Omega$  resistor - for frequencies not exceeding 1 kHz, the steady-state current drawn through a non-inductive resistor of 2000  $\Omega$  connected between an accessible part of a limited current circuit and either pole of the limited current circuit or earth shall not exceed 0.7 mA peak ac, or 2 mA dc. For frequencies above 1 kHz, the limit of 0.7 mA is multiplied by the value of the frequency in kilohertz but shall not exceed 70 mA peak. This method is recommended for single frequency circuits (i.e. pure sine wave only).
2. Measurements using the IEC leakage current meter - the current measured between the user accessible part of a limited current circuit and either pole of the limited current circuit or earth shall not exceed 0.5 mA rms (0.7 mA pk). This method is recommended for multi-frequency circuits.

## NOTES TO ENGINEER:

3. IEC 60384-14, Y1 Capacitors were not faulted.

ULS-60950-1-1st-NWGQ -2002  
Doc. R\_7\_386Form Issued: 2003-03-31  
Revised: 2007-04-30



## Enclosures

## Miscellaneous ID 07-06

File E147630

Project 08ME11664

Print date 2009-01-07

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Tested by: \_\_\_\_\_ Tested by: \_\_\_\_\_ Test date: \_\_\_\_\_  
signature print

Sample #: \_\_\_\_\_ Instrument Code / Range: \_\_\_\_\_

~~2.4.1, 2.4.2—LIMITED CURRENT CIRCUIT MEASUREMENTS (con't)~~~~METHOD PART II~~~~For the following accessible live part tested under METHOD PART I, the capacitance, stored charge or energy of that circuit was determined:~~~~If the open circuit voltage was less than 450 V peak or dc, the capacitance in microfarads was recorded.~~~~If the open circuit voltage exceeded 450 V peak or dc, but was less than 15,000 V peak or dc, the stored charge was recorded by using the formula  $\mu C = (\mu F) V$ .~~~~If the open circuit voltage exceeded 15,000 V peak or dc, the energy was recorded by using the formula  $J = 5(10)^{-7} (\mu F) V^2$ .~~~~RESULTS PART II~~

Location		Fault	Voltage	$\mu F$	$\mu C$	mJ
User Part	To					

~~[ ] The circuit complied with the other requirements of limited current circuit.~~~~[ ] The following exceeded the limit:~~

- ~~[ ] Capacitance (limit = 0.1  $\mu F$ )~~  
~~[ ] Stored Charge (limit = 45  $\mu C$ )~~  
~~[ ] Available Energy (limit = 350 mJ)~~

~~Comments:~~~~NOTES TO LAB:~~

- ~~1. If the open circuit voltage is less than 450 V peak or dc, the capacitance shall not exceed 0.1  $\mu F$ .~~  
~~2. If the open circuit voltage is between 450 V and 15,000 V peak or dc, the available stored charge shall not exceed 45  $\mu C$ .~~  
~~3. If the open circuit voltage exceeds 15,000 V peak or dc, the available energy shall not exceed 350 mJ.~~

~~ULS 60950-1 1st NWGQ 2002~~~~Form Issued: 2003-03-31~~~~Doc. R\_7\_386~~~~Revised: 2007-04-30~~

## Enclosures

## Miscellaneous ID 07-06

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Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-15  
signature printSample #: 3 Instrument Code / Range: \_\_\_\_\_

## 2.9.1, 2.9.2, 5.2.2 - HUMIDITY TEST

## METHOD

A humidity chamber was maintained within 1°C of temperature "t" between 20 and 30°C. The unit and any other separate components were brought to a temperature between t°C and t°C + 4°C. They were then placed in the chamber and held at a relative humidity of  $93 \pm 2$  percent for a period of 48 hours. Prior to conditioning, parts of the unit (covers) that could be removed without the use of tools were removed and separately placed in the chamber. During conditioning, cable entrances and/or a conduit opening were left open. During this treatment, the unit was not energized.

While still in the humidity chamber, but after all parts have been placed back on the unit, a dielectric potential was applied and maintained for a period of one minute between the points indicated below. During this test, all switching devices (switches, relays, triacs, etc.) in the primary circuit were closed.

	Location		Potential Used (V)	
	From	To	[ ] ac	[X] dc
A	Input	Output		2828 Vdc
B	Input	Ground		1414Vdc
C				
D				

## Enclosures

## Miscellaneous ID 07-06

File E147630 Project 08ME11664 Print date 2009-01-07 Page 13 of 1344

Tested by: \_\_\_\_\_ Tested by: John Tedesco Test date: 2009-01-20  
signature printSample #: 3 Instrument Code / Range: \_\_\_\_\_

2.9.1, 2.9.2, 5.2.2 - HUMIDITY TEST (con't)

## RESULTS

Conditioning Start Date/Time:	<u>2009-01-15/ 3:00 pm</u>	Conditioning End Date/Time	<u>2009-01-20/ 10:00 am</u>
-------------------------------	----------------------------	----------------------------	-----------------------------

The chamber temperature was 40 °C.The relative humidity was 95 percent.There [ ~~was~~ ] [ was no ] indication of breakdown as a result of applying the test voltage to the indicated locations for 60 seconds.

Location	Breakdown	
	Voltage	Time

## NOTES TO LAB:

1. If circuit capacitance causes false breakdowns, a dc potential equal to 1.414 times the ac potential may be applied.
2. Components providing a dc path in parallel with the insulation being tested may be disconnected prior to testing.

## NOTES TO ENGINEER:

1. National Deviations for Singapore require the Humidity Test to be conducted per Clause 10.2 of IEC60065. The humidity treatment is to be conducted for 120 hrs (5 days) at 40°C, relative humidity 90 to 95%, to comply with this deviation.

Due to testing time frame and availability of Humidity Chamber engineer (A.V.) approved a General purpose chamber with a 40 C Temperature.

Lab Conditions:	<u>20.3</u> °C	<u>47.0</u> %RH	Date: <u>2009-01-20</u>
-----------------	----------------	-----------------	-------------------------

ULS-60950-1-1st -NWGQ -2002  
Doc. R\_7\_396Form Issued: 2003-03-31  
Revised: 2007-04-30

## Enclosures

Miscellaneous ID 07-07

**Unipower LLC**

Specification List Joe 11/03/'21

Model Name : AL-070D-48T125-175  
AL-085D-48Q1225-151

Vendor	Model/Series	Remark
Green Cubes Technology		

Enclosures

Miscellaneous ID 07-07

**GREEN CUBES**  
THE POWER TO PERFORM**APPROVAL SHEET**

CUSTOMER NAME :

PRODUCTS :

DC TO DC SWITCHING POWER SUPPLY

MODEL NAME :

AL-070D-48T125-175 (G)  
(UP70D48-T125Y (B-10) (G))

PART NAME :

G810-6425-3700-05AB

SAMPLE APPLY NO.:

UX011:S-11010002

Please sign and fax this page back to GREEN CUBES  
TECHNOLOGY CORPORATION TAIWAN BRANCH (U.S.A.) to  
approve this power supply before mass-production.

BUYER APPROVAL SIGNATURE

**Power Solutions****A Unipower LLC Business**

210 N University Dr. Suite 700

Coral Springs, FL 33071 USA

TEL: 954-905-1066

FAX: 954-340-7901

**GREEN CUBES TECHNOLOGY  
CORPORATION TAIWAN BRANCH  
(U.S.A.)**

7TH FL, NO.6 LANE 497 CHUNG CHENG RD.,

HSIN TIEN CITY, TAIPEI, TAIWAN

TEL: 886-2-6629-5815

FAX: 886-2-6629-5818

APPROVAL CHECKED PROJECT ENG.

REVISIONS			
REV→REV	NO#	DESCRIPTION	DATE
S1	S-11010002 (UX011)	Samples for Safety, REV.S1 schematic.	11/03/21

## Enclosures

## Miscellaneous ID 07-07

## Specifications

## Model : AL-070D-48T125-175 (G)

**Electrical : (Unless specified otherwise, all parameters meet over the limits of Temperature, Load, and Input Voltage.)**

■ Input Voltage Range(+48VDC Nominal).....	36VDC	To 72VDC
■ Output Voltage V1.....	+5V	
V2.....	+12V	
V3.....	+48V	
■ Output Current (with 15CFM Air Flow)		
@V1.....	Min. = 0.4A	Max. = 4A
@V2.....	Min. = 0.08A	Max. = 0.8A
@V3.....	Min. = 0.084A	Max. = 0.84A
■ Output Power (with 15CFM Air Flow).....	70W	Max.
■ Output Voltage Regulation V1.....	4.75V	To 5.25V
Regulation V2.....	11.4V	To 12.6V
Regulation V3.....	43.2V	To 52.8V
■ Output Ripple & Noise (Convection rating @low line, Airflow rating @Nominal line) (10uF Aluminum Cap. and 0.1uF Ceramic Cap. paralleled between the end of output cables and loads @20MHz)		
@V1.....	<75mVp-p	
@V2.....	<120mVp-p	
@V3.....	<480mVp-p	
■ Output Timing : (@Nominal Line)		
--Turn-On time.....	<1Sec	
■ Input Current @48VDC.....	<3A	
■ Efficiency @ Full Load :		
--48VDC.....	>65%	
■ Transient Response : (50%~100% load change @100Hz & 1KHz; 0.2A/uS)		
--Voltage Deviation.....	< +/-5%	
--Recovery Time (to within 1% of initial set point).....	<1mS	
■ EMI and CE :		
--FCC PART 15, CLASS B.....	Yes	
--CISPR 22, CLASS B.....	Yes	
--CE EN55022, CLASS B.....	Certified	
■ Short Circuit Protection (Auto-Recovery).....	Yes	
■ Over Voltage Protection (Shut off the outputs and need to reset the AC power to recover the outputs.) @V1.....	6V < V1 < 7.2V	
■ Brown-Out (Input voltage drops down to zero then back to nominal slowly, all outputs shall be auto-recovery).....	Yes	

G810-6425-3700-05AB.S1

## Enclosures

Miscellaneous ID 07-07

## Specifications

Model : AL-070D-48T125-175 (G)

## ■ Safety Approval :

--UL & cUL 60950-1.....	Approved
--EN60950-1.....	Approved
--CB.....	Certified

## ■ Isolation (Hi-Pot) :

--1000VAC,1 Minute(or 1414VDC, 3 Seconds), INPUT/ FG, <10mA.....	Yes
-- 2000VAC,1 Minute(or 2828VDC, 3 Seconds), INPUT/OUTPUT, <10mA.,	Yes

## ■ Temperature

--Operation.....	-20 to 50 Deg.C (* Note 1)
--Storage.....	-40 to 85 Deg. C
--Derating (50 to 70 Deg.C).....	2.5% per Deg.C

\* Note 1: May not meet published specification below 0 Deg. C

## ■ Customer special requirements

--Meet RoHS directive.....	Yes
--Put "4261006" labels on unit and white box .....	Yes

Mechanical : (see attached)

## Enclosures

Miscellaneous ID 07-07

Specifications  
Model : AL-070D-48T125-175 (G)

**Mechanical :**

## ■ PIN ASSIGNMENT

## CONNECTOR 1

(MOLEX#09-65-2058 OR EQUIVALENT;  
MATING CONNECTOR= MOLEX#09-50-3051)

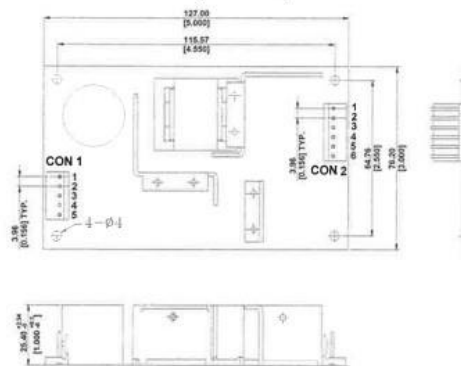
PIN1	FG
PIN2	NEGATIVE(-)
PIN3	NEGATIVE(-)
PIN4	POSITIVE(+)
PIN5	POSITIVE(+)

## CONNECTOR 2

(MOLEX#09-65-2068 OR EQUIVALENT;  
MATING CONNECTOR= MOLEX#09-50-3061)

PIN1	+12V
PIN2-PIN3	+5V
PIN4-PIN5	RET
PIN6	+48V

## ■ MECHANICAL DRAWING (3"×5"×1.0")



TOLERANCE: mm  $\pm 0.5$   
[inch]  $\pm 0.02$

UNIT: mm  
[inch]



## Enclosures

Miscellaneous ID 07-07

## Specifications

Model : AL-070D-48T125-175 (G)

## Marking &amp; Label :

■ S/N Label (GCT Standard).....	Yes
■ QC Pass Label:	
--HI-POT.....	Yes
--QC Pass.....	Yes
--Manufacturing location .....	Yes
■ High Voltage Danger Label (GCT Standard).....	Yes
■ ID Label.....	(Attached)
■ Safety Label.....	(Attached)
■ RoHS Label.....	(Attached)

**THE POWER SOLUTION®**  
MODEL: AL-070D-48T125-175  
INPUT DC: 36-72V  $\overline{\text{---}}$ , 4A  
OUTPUT DC: +5V/4A, +12V/0.8A  
+48V/0.84A  
MAX:70W  
Power Solutions  
A Unipower LLC business (G)

**RoHS**

4261006

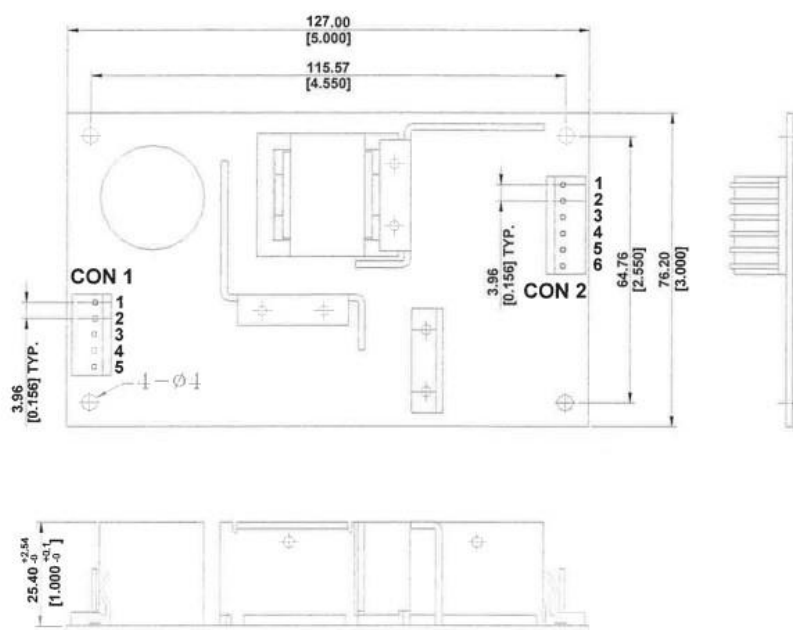
## Enclosures

Miscellaneous ID 07-07



## Specifications

Model : AL-070D-48T125-175 (G)



TOLERANCE:  $\frac{\text{mm } \pm 0.5}{[\text{inch}] \pm 0.02}$

UNIT:  $\frac{\text{mm}}{[\text{inch}]}$

## Enclosures

Miscellaneous ID 07-07

**GREEN CUBES**  
THE POWER TO PERFORM**APPROVAL SHEET**

CUSTOMER NAME :

PRODUCTS :

DC TO DC SWITCHING POWER SUPPLY

MODEL NAME :

AL-085D-48Q1225-151 (G)

(UP85D48-Q12B5Y (B-10) (G))

PART NAME :

G810-6425-4850-02AB

SAMPLE APPLY NO.:

UX011:S-11010003

Please sign and fax this page back to GREEN CUBES  
TECHNOLOGY CORPORATION TAIWAN BRANCH (U.S.A.) to  
approve this power supply before mass-production.

BUYER APPROVAL SIGNATURE

**Power Solutions****A Unipower LLC Business**

210 N University Dr. Suite 700

Coral Springs, FL 33071 USA

TEL: 954-905-1066

FAX: 954-340-7901

**GREEN CUBES TECHNOLOGY  
CORPORATION TAIWAN BRANCH  
(U.S.A.)**

7TH FL, NO.6 LANE 497 CHUNG CHENG RD.,

HSIN TIEN CITY, TAIPEI, TAIWAN

TEL: 886-2-6629-5815

FAX: 886-2-6629-5818

APPROVAL CHECKED PROJECT ENG.

REVISIONS			
REV→REV	NO#	DESCRIPTION	DATE
S1	S-11010003 (UX011)	Samples for Safety, REV.S1 schematic.	11/03/21

## Enclosures

## Miscellaneous ID 07-07

## Specifications

## Model : AL-085D-48Q1225-151 (G)

**Electrical : (Unless specified otherwise, all parameters meet over the limits of Temperature, Load, and Input Voltage.)**

■ Input Voltage Range(+48VDC Nominal).....	36VDC	To	72VDC
■ Output Voltage V1.....	+5V		
V2.....	+12V		
V3.....	-12V		
V4.....	+48V		
■ Output Current(with 15CFM Air Flow)			
@V1.....	Min. = 0.4A	Max. = 4A	
@V2.....	Min. = 0.2A	Max. = 2A	
@V3.....	Min. = 0.1A	Max. = 1A	
@V4.....	Min. = 0.06A	Max. = 0.6A	
■ Output Power(with 15CFM Air Flow).....	85W	Max.	
■ Output Voltage Regulation V1.....	4.75V	To	5.25V
Regulation V2.....	11.4V	To	12.6V
Regulation V3.....	-10.8V	To	-13.2V
Regulation V4.....	43.2V	To	52.8V
(Cross/Load Regulation is tested at 10% to 100% of rated load, and other outputs are set at 50% of rated load.)			
■ Output Ripple & Noise (Convection rating @low line, Airflow rating @Nominal line) (10uF Aluminum Cap. and 0.1uF Ceramic Cap. paralleled between the end of output cables and loads @20MHz)			
@V1.....	<75mVp-p		
@V2.....	<120mVp-p		
@V3.....	<120mVp-p		
@V4.....	<480mVp-p		
■ Output Timing : (@Nominal Line)			
--Turn-On time.....	<1Sec		
■ Input Current @48VDC.....	<4A		
■ Efficiency @ Full Load :			
--48VDC.....	>70%		
■ Transient Response : (50%~100% load change @100Hz & 1KHz; 0.2A/uS)			
--Voltage Deviation.....	< +/-5%		
--Recovery Time (to within 1% of initial set point).....	<1mS		
■ EMI and CE :			
--FCC PART 15, CLASS B.....	Yes		
--CISPR 22 / EN55022, CLASS B.....	Yes		
--CE.....	Comply		
■ Short Circuit Protection (Latch-Off).....	Yes		

G810-6425-4850-02AB.S1

## Enclosures

## Miscellaneous ID 07-07

## Specifications

## Model : AL-085D-48Q1225-151 (G)

■ Over Voltage Protection (Shut off the outputs and need to reset the AC power to recover the outputs.) @V1.....	6V < V1 < 7.2V
■ Brown-Out (Input voltage drops down to zero then back to nominal slowly, all outputs shall be auto-recovery).....	Yes
■ Safety Approval :	
--UL & cUL 60950-1.....	Approved
--EN60950-1.....	Approved
--CB.....	Certified
■ Isolation (Hi-Pot) :	
--1000VAC,1 Minute(or 1414VDC, 3 Seconds), INPUT/ FG, <10mA.....	Yes
-- 2000VAC,1 Minute(or 2828VDC, 3 Seconds), INPUT/OUTPUT, <10mA..	Yes
■ Temperature	
--Operation.....	-20 to 50 Deg.C (* Note 1)
--Storage.....	-40 to 85 Deg. C
--Derating (50 to 70 Deg.C).....	2.5% per Deg.C
* Note 1: May not meet published specification below 0 Deg. C	
■ Customer special requirements	
--Meet RoHS directive.....	Yes
--Meet reverse input protection.....	Yes
--Put "4261007" labels on unit and white box .....	Yes

Mechanical : (see attached)

## Enclosures

## Miscellaneous ID 07-07

Specifications  
Model : AL-085D-48Q1225-151 (G)

**Mechanical**

## ■ PIN ASSIGNMENT

## ■ MECHANICAL DRAWING (3"×5"×1.2")

## CONNECTOR 1

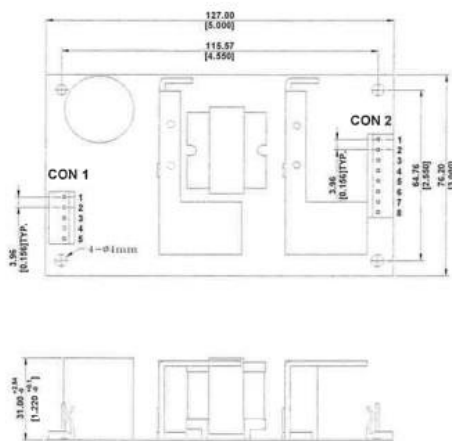
(MOLEX#09-65-2058 OR EQUIVALENT;  
MATING CONNECTOR= MOLEX#09-50-3051)

PIN1	FG
PIN2	NEGATIVE(-)
PIN3	NEGATIVE(-)
PIN4	POSITIVE(+)
PIN5	POSITIVE(+)

## CONNECTOR 2

(MOLEX#09-65-2088 OR EQUIVALENT;  
MATING CONNECTOR= MOLEX#09-50-3081)

PIN1	+12V
PIN2-PIN3	+5V
PIN4-PIN5	RET
PIN6	-12V
PIN7	+48V
PIN8	RET



TOLERANCE: mm  $\pm 0.5$   
[inch]  $\pm 0.02$

UNIT: mm  
[inch]

## Enclosures

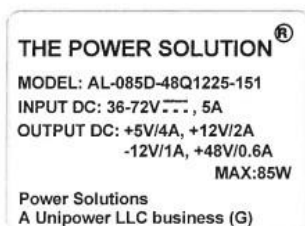
Miscellaneous ID 07-07

## Specifications

Model : AL-085D-48Q1225-151 (G)

## Marking &amp; Label :

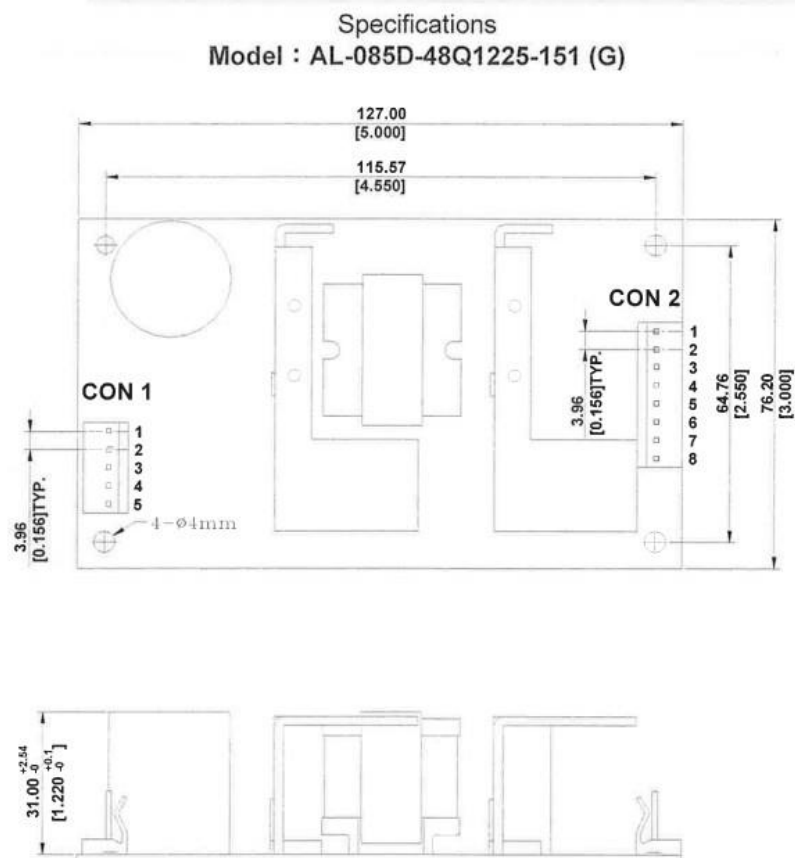
■ S/N Label (GCT Standard).....	Yes
■ QC Pass Label:	
--HI-POT.....	Yes
--QC Pass.....	Yes
--Manufacturing location .....	Yes
■ High Voltage Danger Label (GCT Standard).....	Yes
■ ID Label.....	(Attached)
■ Safety Label.....	(Attached)
■ RoHS Label.....	(Attached)



4261007

## Enclosures

Miscellaneous ID 07-07



TOLERANCE:  $\text{mm} \pm 0.5$   
 $[\text{inch}] \pm 0.02$

UNIT:  $\frac{\text{mm}}{[\text{inch}]}$