

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 62368-1, 2nd Ed, 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CAN/CSA C22.2 No. 62368-1-14, 2nd Ed, Issued: 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
<b>Complementary CCN:</b>	N/A
<b>Product:</b>	DC-To-DC Converters
<b>Model:</b>	iSA480 and iSC480-Series  Models:  iS(A/C)48***A%%V-0##(-R)  where: %%% represents a three digit current less than or equal to 30A in 1A increments *** represents a three digit voltage less than or equal to 28V in 100mV increments # represents a two digit combination of numbers and/or letters which indicate the feature set. -R option, designates ROHS compliance -total output power (current x voltage) is less than or equal to 82.5W
<b>Rating:</b>	Optional: Input DC 36 - 60 V (SELV) or DC 36 - 75 V max. 4 A Output: max. DC 28 V, 30A
<b>Applicant Name and Address:</b>	TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

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

Prepared By: Mengis Tesfay / Project Handler      Reviewed By: Scott Shepler / Reviewer

### Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

- A. Authorization - The Authorization page may include additional Factory Identification Code markings.
- B. Generic Inspection Instructions -
- i. Part AC details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.
  - ii. Part AE details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.
  - iii. Part AF details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

### Product Description

The product is a component type DC/DC power module, intended to be used as a component. The modules currently come in one input voltage range of 36 - 75Vdc input. The rated output current will be less than 30A. The product is available in two different mechanical configurations the iSA and iSC versions. The iSA series is a roughly 0.9"x1.3" design that has through-hole leads. The iSC series has an equivalent mechanical form factor but employs surface mount leads.

### Model Differences

All models within the iSA480 and iSC480-Series are similar in construction and employ identical mechanical configuration, using the same PWB, same transformer core set, and inductor core set, except for rating.

### Test Item Particulars

Classification of use by	Instructed person
Supply Connection	External Circuit - not Mains connected ES2
Supply % Tolerance	None
Supply Connection – Type	Not connected to Mains. For building in
Considered current rating of protective device as part of building or equipment installation	10 A; equipment
Equipment mobility	for building-in
Over voltage category (OVC)	other: Not directly connected to Mains
Class of equipment	Not classified
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	25°C
IP protection class	IPX0
Power Systems	N/A
Altitude during operation (m)	2000 m or less
Altitude of test laboratory (m)	app 179 m
Mass of equipment (kg)	0.10

### 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 : 25°C ambient.
- The product is intended for use on the following power systems : No direct connection
- Considered current rating of protective device as part of the building installation (A) : For building in. To be determined in the end product.
- Mains supply tolerance (%) or absolute mains supply values : No direct connection
- The equipment disconnect device is considered to be : N/A
- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual
- The product was investigated to the following additional standard : EN 62368-1:2014 + A11:2017; , BS EN 62368-1:2014 + A11:2017

### Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The following product-line tests are conducted for this product : Electric Strength
- The following output circuits are at ES1 energy levels : All
- The following output circuits are at PS3 energy levels : All
- The maximum investigated branch circuit rating is : EUT is for building in.
- The investigated Pollution Degree is : 2
- The following end-product enclosures are required : Electrical, Fire
- Heating Test shall be evaluated in end product.
- This component has been evaluated in 'control of fire spread' method assuming appropriate fire enclosure is provided in end product. Unless the fire enclosure is made of non-combustible or V-0 material, the separation from the PIS shall be considered
- Classification of PIS has not been conducted. Therefore, all electrical components and conductors including printed wirings were assumed to be arcing/resistive PIS.
- Unit intended for building-in and supplied power from secondary circuit which is isolated from primary circuit by double or reinforced insulation.
- The manufacturer specified max. 25°C ambient. 125°C case temperature
- 
- The DC/DC converter input is protected by 10 A fuse, provided by the end product.

### Additional Information

This report is based on VDE CB report reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1 which was previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2.

Testing conducted in accordance with IEC 60950-1:2005 (Second Edition), Am1:2009 + Am2:2013; UL 60950-1, 2nd Edition, 2014-10-14; and CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10, and was deemed equivalent to the test required by IEC62368-1, 2nd Edition, CAN/CSA-C22.2 NO. 62368-1 2nd Ed, Issued December 1, 2014, and UL 62368-1 2nd Ed, Issued December 1, 2014. Testing correlation explanation provided in Enclosure.

All original sample and test dates are noted in the testing portion of this report. Additionally, limited testing was deemed necessary for this investigation to IEC 62368-1. The following tests were performed under this investigation:

#### ELECTRIC STRENGTH TEST (5.4.9)

The nameplate included in the report is representative of all models covered under this report. The label includes: Optional "-R" appended to product code to indicate ROHS compliance.

**Additional Standards**

The product fulfills the requirements of: EN 62368-1:2014 + A11:2017;  
BS EN 62368-1:2014 + A11:2017

**Markings and Instructions**

Clause Title	Marking or Instruction Details
Equipment identification marking – Manufacturer identification	Listee's or Recognized companys name, Trade Name, Trademark or File Number
Equipment identification marking – model identification	Model Number

**Special Instructions to UL Representative**

N/A

<b>BD1.0</b>							<b>TABLE: Production-Line Testing Requirements</b>						
<b>BD1.1</b>							<b>Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.</b>						
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s							
N/A	-	-	-	-	-	-							
<b>BD1.2</b>							<b>Earthing Continuity Test Exemptions – This test is not required for the following models:</b>						
							All Models						
<b>BD1.3</b>							<b>Electric Strength Test Exemptions – This test is not required for the following models:</b>						
							--						
<b>BD1.4</b>							<b>Electric Strength Test Component Exemptions – The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test.</b>						
							N/A						

<b>BE1.0</b>						<b>Sample and Test Specifics for Follow-Up Tests at UL</b>					
Model	Component	Material	Test	Sample (s)	Test Specifics						
--	--	--	--	--	--						

4.1.2	TABLE: List of critical components					Pass
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Product Category CCN(s)	Mark(s) of conformity	Supplement ID
PWB	Interchangeable	Interchangeable	Min V-1, min 130 °C Multiple layers with Epoxy type film (FR-4) or Prepeg	ZPMV2	UL	
Opto- isolator U100/ U200	NEC	PS2911-1	rated 2500V isolation	FPQU2	UL	
Alternate Opto- isolator U100/ U200	Fairchild	FODB102	rated 2500V isolation	FPQU2	UL	
Alternate Opto- isolator U100/ U200	Interchangeable	Interchangeable	rated 2500V isolation	FPQU2	UL	
Transformer (T1)	Interchangeable	Interchangeable	Min. V-1, 130°C, multiple layers, with epoxy type film (FR-4) or (Prepreg) used to separate each layer. Provided with ferrite core.	ZPMV2	UL	
Thermistor (RT100)	Epcos	B59701A120A62	150 K Ohms @25 C max. 130 °C	U2	UL	
Output Inductor L2	Interchangeable	Interchangeable	Min. V-1, 130°C, multiple layers, with epoxy type film (FR-4) or (Prepreg) used to separate	ZPMV2	UL	

			each layer. Provided with ferrite core.			
Label	Identco International Corp	TTL139-401-10	Max temperature 175°C, Indoor use only	UL 969, IEC 62368-1.	UL	
Label	Interchangeable	Interchangeable	40°C, Suitable for each type of surface	PGJI2, PGDQ2	UL	
--	--	--	* UL standard has requirements that meet or exceed applicable IEC requirement.	--	--	



**Enclosures**







<b>Type</b>	<b>Supplement Id</b>	<b>Description</b>
Photographs	03-01	Top View
Photographs	03-02	Bottom View
Schematics + PWB	05-01	Schematics
Schematics + PWB	04-01	Component and Trace layout Layout
Schematics + PWB	05-02	PWB Trace layout
Miscellaneous	07-02	Test Equipment List
Miscellaneous	07-03	Model Matrix
Miscellaneous	07-04	Test correlation table




<b>ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:</b>	
(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.)	
<b>Electrically-caused injury (Clause 5):</b> (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 (All iSA480 and iSC480-Series)	ES2
Internal (All iSA480 and iSC480-Series)	ES2
Output (All iSA480 and iSC480-Series)	ES1
<b>Electrically-caused fire (Clause 6):</b> (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)
Input (All Models)	PS3 (declared)
Output (All Models)	PS3
<b>Injury caused by hazardous substances (Clause 7)</b> (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
N/A	--
<b>Mechanically-caused injury (Clause 8)</b> (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)
N/A	--
<b>Thermal burn injury (Clause 9)</b> (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)
PWB and Components (All Models)	TS3 (for building in, to be addressed in the end product)
<b>Radiation (Clause 10)</b> (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)
N/A	--

## DATA PACKAGE INFORMATION SHEET

Applicant Information	Name / Address: TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES
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Product Information	Standard: UL 62368-1, 2 <sup>nd</sup> Ed, 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CAN/CSA C22.2 No. 62368-1-14, 2 <sup>nd</sup> Ed, Issued: 2014-12-01 (Audio/video, information and communication technology equipment Part 1: Safety requirements) IEC 62368-1:2014 (Second Edition) EN 62368-1: 2014 + A11:2017
	CCNs: <u>QQJQ2/QQJQ8</u>
	Product: <u>DC-To-DC Converters</u>
	Models: <u>iSA48007A120V-XXX</u>

Test Location Information	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px; vertical-align: top;">Tests Conducted By**:</td> <td style="width: 10%; padding: 5px; vertical-align: top;">Sign</td> <td style="padding: 5px; text-align: center;">                       _____                      Tim Fellows                 </td> </tr> <tr> <td colspan="3" style="padding: 10px 0 0 0;">                     ** When all tests are conducted by one person, the printed name can be inserted here; otherwise, the name of the person conducting the test shall be entered on each page containing data (printed name only, signature not required).                 </td> </tr> <tr> <td style="padding: 5px; vertical-align: top;">Authorized Signatory or TCP Reviewer:</td> <td style="padding: 5px; vertical-align: top;">Sign</td> <td style="padding: 5px;">--</td> </tr> <tr> <td></td> <td style="padding: 5px; vertical-align: top;">Print</td> <td style="padding: 5px;">--</td> </tr> <tr> <td></td> <td style="padding: 5px; vertical-align: top;">Date</td> <td style="padding: 5px;">--</td> </tr> <tr> <td style="padding: 5px; vertical-align: top;">UL WTDP / WMT Witness:</td> <td style="padding: 5px; vertical-align: top;">Sign</td> <td style="padding: 5px; text-align: center;">                       _____                 </td> </tr> <tr> <td></td> <td style="padding: 5px; vertical-align: top;">Print</td> <td style="padding: 5px;"><u>Mengis Tesfay</u></td> </tr> </table>	Tests Conducted By**:	Sign	 _____ Tim Fellows	** When all tests are conducted by one person, the printed name can be inserted here; otherwise, the name of the person conducting the test shall be entered on each page containing data (printed name only, signature not required).			Authorized Signatory or TCP Reviewer:	Sign	--		Print	--		Date	--	UL WTDP / WMT Witness:	Sign	 _____		Print	<u>Mengis Tesfay</u>
Tests Conducted By**:	Sign	 _____ Tim Fellows																				
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Authorized Signatory or TCP Reviewer:	Sign	--																				
	Print	--																				
	Date	--																				
UL WTDP / WMT Witness:	Sign	 _____																				
	Print	<u>Mengis Tesfay</u>																				

Reviewed & Accepted By	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px; vertical-align: top;">Qualified Project Handler:</td> <td style="width: 10%; padding: 5px; vertical-align: top;">Sign</td> <td style="padding: 5px; text-align: center;">                       _____                 </td> </tr> <tr> <td></td> <td style="padding: 5px; vertical-align: top;">Print</td> <td style="padding: 5px;"><u>Mengis Tesfay</u></td> </tr> </table>	Qualified Project Handler:	Sign	 _____		Print	<u>Mengis Tesfay</u>
Qualified Project Handler:	Sign	 _____					
	Print	<u>Mengis Tesfay</u>					

# LIST OF TESTS

<u>Test Name</u>	<u>Page</u>
5.4.9 – ELECTRIC STRENGTH TEST .....	6

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>	
	±	±	±	±	±	±
60065	25	± 10	Max 75		Not specified	
60950	Not specified		Not specified		Not specified	
60950-1	Not specified		Not specified		Not specified	
62368-1	Not specified		Not specified		Not specified	

**RISK ANALYSIS RELATED TO TESTING PERFORMANCE:**

The following types of risks have been identified. Take necessary precautions. This list is not all inclusive.

<input type="checkbox"/> Electric shock	<input type="checkbox"/> Radiation
<input type="checkbox"/> Energy related hazards	<input type="checkbox"/> Chemical hazards
<input type="checkbox"/> Fire	<input type="checkbox"/> Noise
<input type="checkbox"/> Heat related hazards	<input type="checkbox"/> Vibration
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Other (Specify) _____

**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, 5.3.4)  Yes  No  N/A

Personnel:

Lab Management shall authorize personnel to operate particular types of equipment used in testing. (ISO/IEC 17025 5.2.5)  Yes  No

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.5.1, 5.5.2, 5.5.4, 5.5.5, 5.5.8)  Yes  No

Calibrations for testing equipment is traceable to SI Units. Refer to 00-OP-C0032 (Calibration Certificate Analysis. (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~~ ~~was not~~ deemed to have the environment and capabilities necessary to perform the tests included in this data package.

The CAS Staff as indicated below, (a competent L1, L2 or L3 in a similar CCN/Standard for a similar test method) was utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the rationale and approval.)

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	L1, L2 or L3 Competency	Similar CCN/Standard Competency	L3 Reviewer Approval & Date (Similar CCN/Standard)

The Field Services Staff Member, as indicated below, (with a competent program competency as authorized by the FOM) was informed and utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the information and approval.)

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	FOM Approver (name)	L3 Reviewer Approval & Date (Similar CCN/Standard)

## 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.

Sample Number	Sample Card Number	Date Received	Manufacturer, Product Identification and Ratings
M0028	SA2041737M0028	2021-01-10	TDK-Lambda Americas Inc. iSA48007A120V-XXX Input: 36-75Vdc, 4 amps dc max Output: 12Vdc, 7Adc
Sampling Procedure (if used) :			

To Be Completed By Staff Conducting the Testing:

TEST LOCATION:					
<input type="checkbox"/> UL or Affiliate	<input checked="" type="checkbox"/> WTDP	<input type="checkbox"/> CTDP	<input type="checkbox"/> TPTDP	<input type="checkbox"/> TCP	<input type="checkbox"/> PPP
	<input checked="" type="checkbox"/> CTF 2/ WMT	<input type="checkbox"/> CTF1/TMP	<input type="checkbox"/> CTF3 or CTF4/SMT		
Company Name	TDK-Lambda Americas Inc.				
Address	3320 Matrix Drive, Suite 100, Richardson, TX 75082				

LINK(s) TO OTHER UL LOCATIONS WHERE ADDITIONAL TEST DATA/OBSERVATIONS ARE STORED:

Link to separate data files for a test can be inserted here. The link must be a server that is accessible to UL staff, that provides for backup, required retention periods and a path, including file name that does not change and result in a broken link. Not applicable to DAP

Test Name	Full Link to Location
N/A	N/A

## TEST INSTRUMENTS REFERENCE LIST

UL test equipment information is recorded on Meter Use.

UL test equipment information is recorded on (insert location and local laboratory equipment system identification.)

Instr. Code	Instrument I.D.	Instrument Type	Range Used Or ***	Make and Model **	Calibration Date	
					Last	Due
1	IT0115	Hipot Tester	0-1500Vdc	Quadtech, Buardian 1030S	2020-04-24	2021-10-24
2	IT0249	Stop Watch	Seconds	Extech, HW30	2020-09-26	2021-12-26

"Chamber setting(s) [ was ] [ were ] monitored to ensure that the setting(s) [ was ] [ were ] stable throughout the test time frame. Any deviations from the setting(s) are noted below.

Date	Test	Instrument Code	Time period of deviation	Setting(s)
N/A	N/A	N/A	N/A	N/A

\*\* Information to be recorded when tests are conducted at a non-UL facility.

\*\*\* Refer to specific data sheet for individual scale used.

Tested by:



signature

Tested by: Timothy R. Fellows

Test date: 2021-01-19

Sample #: M0028

Instrument Code / Range: 1,2

#### 5.4.9 – ELECTRIC STRENGTH TEST

##### METHOD

The test voltage for the electric strength test was the highest value of the following three methods:

Method 1:

According to the required withstand voltage (Test voltage: Table 26)

Method 2:

According to the peak working voltage (Test voltage: Table 27)

Method 3:

According to the nominal mains voltage (Test voltage: Table 28)

The insulation was subjected to the highest test voltage as determined by Methods 1 – 3 as follows:

an a.c. voltage having a frequency of 50 Hz or 60 Hz

a d.c. voltage in one polarity and then repeated in reverse polarity

The voltage applied to the insulation under test was gradually raised from zero to the prescribed voltage and maintained at that value for 60 s.

Insulation coatings were tested with metal foil in contact with the insulating surface. This procedure was limited to places where the insulation was likely to be weak (for example, where there are sharp metal edges under the insulation).

Insulating linings were tested separately. Care was taken that the metal foil was placed such that no flashover occurred at the edges of the insulation. Where adhesive metal foil was used, the adhesive was conductive.

To avoid damage to components or insulations that are not involved in the test, ICs, or the like, were disconnected and equipotential bonding was used.

An MOV complying with Clause G.8 was removed during the test.

For equipment incorporating basic insulation and supplementary insulation in parallel with reinforced insulation, care was taken that the voltage applied to the reinforced insulation did not overstress the basic or supplementary insulation.



Tested by:



signature

Tested by: Timothy R. Fellows

Test date: 2021-01-19

print

Sample #: D0103

Instrument Code / Range: 1,2

5.4.9 – ELECTRIC STRENGTH TEST (con't)

RESULTS

Ambient Temperature, C \_\_\_\_\_

Relative Humidity, % \_\_\_\_\_

5.4.9	TABLE: Electric strength tests			Verdict
Test voltage applied between:	Voltage shape (AC, DC)	Test voltage (V)	Breakdown? Yes/No	
Functional:				
Basic/supplementary:				
Unit Input pins (1,2,3) to Unit output pins (4,5,6,7,8) (Test conducted on both polarities)	DC	+/- 1500	No	
Reinforced:				
Routine Tests:				
Supplementary information: Heated EUT for 30 minutes prior to testing				

There [was no] [~~was~~] indication of dielectric breakdown.

Comments: Test was conducted per client's request.  
N/A

Tested by:



signature

Tested by: Timothy R. Fellows

Test date: 2021-01-19

print

Sample #: D0103

Instrument Code / Range: 1,2

## 5.4.9 – ELECTRIC STRENGTH TEST (con't)

## NOTES TO LAB:

1. Where capacitors were in parallel with the insulation under test (for example, radio-frequency filter capacitors), d.c. test voltages may be used.
2. Components providing a d.c. path in parallel with the insulation to be tested, such as discharge resistors for filter capacitors and voltage limiting devices, may be disconnected.
3. An example of such a test method is an induced voltage test that is applied at a frequency sufficiently high to avoid saturation of the transformer. The input voltage is raised to a value that would induce an output voltage equal to the required test voltage.

## NOTES TO ENGINEER:

This test is referenced from the following Clauses:

Clause	Description
5.3.2.2	Air gap for ES3 voltages > 420 V peak
5.4.1.3	Hygroscopic materials
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound
5.4.1.7	Clearances in circuits generating starting pulses
5.4.4.9	Solid insulation at frequencies > 30 kHz
5.4.4.4	Solid insulation in semiconductor devices
5.4.4.6.4	Standard test for non-separable thin sheet material
5.4.4.6.5	Mandrel test
5.4.4.7	Solid insulation in wound components
5.4.5.3	Antenna terminal insulation, alternative test
5.4.6	Insulation of internal wire as a part of a supplementary safeguard
5.4.7	Test for semiconductor components and for cemented joints
5.4.10	Safeguards against transient voltages from external circuits
5.4.11.3	Separation between external circuits and earth
5.5.2.1	Capacitors/RC Units as a basic or supplementary safeguard
B.4.4.2	Short circuit of creepage distances for functional insulation
B.4.4.3	Short circuit of functional insulation on coated printed boards
G.2.1	Requirements for relays
G.3.2.1	Requirements for thermal links
G.5.1.2	Protection against mechanical stress in wound components
G.5.2.1	Endurance test on wound components
G.5.3.1	Transformers, General
G.5.3.3.3	Alternative test method for transformers
G.5.4.4.2	Locked-rotor overload for dc motors
G.5.4.5.2	Running overload for dc motors
G.5.4.6.3.1	Alternative method for locked-rotor overload for dc motors
G.6.2	Solvent-based enamel winding insulation
G.7.4	Cord entry
Table G.10	Application of Y capacitors

Tested by:



signature

Tested by:

Timothy R. Fellows

print

Test date:

2021-01-19

Sample # : D0103Instrument Code / Range: 1,2

## 5.4.9 – ELECTRIC STRENGTH TEST

G.12	Optocouplers as safeguards
Table G.14	Insulation in printed boards
G.13.6.2	Tests on coated boards
G.13.6.2	Abrasion resistance test, coated printed boards
Annex J	Insulated winding wire for use with interleaved insulation
K.7	Interlock circuit isolation

IEC 62368-1			
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. Additional Safeguards to be determined in the end product.	Pass
4.4.4.2	Steady force tests .....		N/A
4.4.4.3	Drop tests.....		N/A
4.4.4.4	Impact tests.....		N/A
4.4.4.5	Internal accessible safeguard enclosure and barrier tests .....		N/A
4.4.4.6	Glass Impact tests.....		N/A
4.4.4.7	Thermoplastic material tests .....		N/A
4.4.4.8	Air comprising a safeguard .....		N/A
4.4.4.9	Accessibility and safeguard effectiveness		N/A
4.5	Explosion		N/A
4.6	Fixing of 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		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	Product does not contain lithium coin / button cell 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.....		N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object .....	This component is DC to DC converter intended for building in. To be determined in the end product.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<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	Input is ES2 and Output circuit is classified as ES1.	Pass
5.2.2.2	Steady-state voltage and current.....	(See appended table 5.2)	Pass
5.2.2.3	Capacitance limits .....		N/A
5.2.2.4	Single pulse limits.....		N/A
5.2.2.5	Limits for repetitive pulses.....		N/A
5.2.2.6	Ring signals .....		N/A
5.2.2.7	Audio signals .....		N/A
5.3	Protection against electrical energy sources	Unit is for building-in. To be provided in the end product.	Pass
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	Unit is for building-in.	Pass
5.3.2.1	Accessibility to electrical energy sources and safeguards	Unit is for building in. Accessible to Instructed or Skilled person.	Pass
5.3.2.2	Contact requirements	To be considered in end product.	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, asbestos or hygroscopic materials are not used.	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
5.4.1.5	Pollution degree.....	PD-2	—
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

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Clause	Requirement + Test	Result - Remark	Verdict
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 .....		N/A
5.4.1.10.3	Ball pressure .....		N/A
5.4.2	Clearances		Pass
5.4.2.2	Determining clearance using peak working voltage	See appended 5.4.2.2	Pass
5.4.2.3	Determining clearance using required withstand voltage .....	No direct connection to Mains	N/A
	a) a.c. mains transient voltage .....		—
	b) d.c. mains transient voltage .....		—
	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		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 .....	Material Group IIIb $100 \leq CTI < 175$	—
5.4.4	Solid insulation		Pass
5.4.4.2	Minimum distance through insulation .....		N/A
5.4.4.3	Insulation compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs) .....		N/A
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.....		N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.4.9	Solid insulation at frequencies >30 kHz..... :		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 ..... :		N/A
5.4.7	Tests for semiconductor components and for cemented joints	Planar transformer	N/A
5.4.8	Humidity conditioning	Test originally conducted as part of 60950-1 evaluation in VDE CB Report ref 215288-CI3-1. Test deemed not necessary and was not reconducted under 62368-1 report.	N/A
	Relative humidity (%) ..... :	95 %	—
	Temperature (°C) ..... :	25 °C	—
	Duration (h) ..... :	72 hours	—
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	Equipment is for building in. To be considered in the end product.	N/A
5.4.10.1	Parts and circuits separated from external circuits		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..... :		N/A
5.4.10.2.3	Steady-state test ..... :		N/A
5.4.11	Insulation between external circuits and earthed circuitry ..... :		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) ..... :		—
	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

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.1	General		Pass
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector .....		N/A
5.5.3	Transformers	See Annex G.5.3	Pass
5.5.4	Optocouplers	See Annex G.12	Pass
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPD's		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 .....		N/A
5.6	Protective conductor		N/A
5.6.2	Requirement for protective conductors		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
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 (Ω) .....		N/A
5.6.7	Reliable earthing		N/A
5.7	Prospective touch voltage, touch current and protective conductor current		Pass



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Clause	Requirement + Test	Result - Remark	Verdict
5.7.2	Measuring devices and networks		Pass
5.7.2.1	Measurement of touch current .....	Outputs meet ES1 based on Voltages	N/A
5.7.2.2	Measurement of prospective touch voltage	Outputs meet ES1 based on Voltages	Pass
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 .....		N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V) .....		—
	Measured current (mA) .....		—
	Instructional Safeguard .....		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	(See appended table 6.2.2)	Pass
6.2.2.2	Power measurement for worst-case load fault.....	(See appended table 6.2.2)	Pass
6.2.2.3	Power measurement for worst-case power source fault .....	(See appended table 6.2.2)	Pass
6.2.2.4	PS1 .....		N/A
6.2.2.5	PS2 .....		N/A
6.2.2.6	PS3 .....	Input and outputs are PS3 classified	Pass

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.3	Classification of potential ignition sources	All parts in the internal circuits were considered as Arcing PIS and Resistive PIS.	Pass
6.2.3.1	Arcing PIS .....	All parts in the internal circuits were considered as Arcing PIS and Resistive PIS. (See appended table 6.2.3.1)	Pass
6.2.3.2	Resistive PIS .....	All parts in the internal circuits were considered as Arcing PIS and Resistive PIS. (See appended table 6.2.3.1)	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	No combustible material.	N/A
6.4	Safeguards against fire under single fault conditions		Pass
6.4.1	Safeguard Method	“Control fire spread” method applied. The suitability of a fire enclosure should be considered in the end-product.	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	Test was conducted with a 10 A external fuse during single fault test. Additional testing may be considered in an end product.	Pass
6.4.3.1	General		Pass
6.4.3.2	Supplementary Safeguards	Fire enclosure to be provided in the end product.	N/A
	Special conditions if conductors on printed boards are opened or peeled		N/A
6.4.3.3	Single Fault Conditions .....	See B.2	Pass
	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 .....	All parts are mounted on a min. V-1 PWB.	Pass
6.4.6	Control of fire spread in PS3 circuit	All parts are mounted on a min. V-1 PWB.	Pass
6.4.7	Separation of combustible materials from a PIS	To be considered in the end application	Pass

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Clause	Requirement + Test	Result - Remark	Verdict

6.4.7.1	General .....	Supplementary Safeguard provided such as PWB min. V-1. Fire enclosure should be considered in the end-product.	Pass
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	Fire enclosure should be considered in the end-product.	Pass
6.4.8.1	Fire enclosure and fire barrier material properties		N/A
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		N/A
6.5.2	Cross-sectional area (mm <sup>2</sup> ) .....		—
6.5.3	Requirements for interconnection to building wiring .....		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

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Clause	Requirement + Test	Result - Remark	Verdict
	Personal safeguards and instructions.....:		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010).....:		—
7.6	Batteries .....		N/A
<b>8</b>	<b>MECHANICALLY-CAUSED INJURY</b>		N/A
8.1	General		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.....:		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 .....		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

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Clause	Requirement + Test	Result - Remark	Verdict
	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 .....		—
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 .....		N/A
	Button/Ball diameter (mm) .....		—
<b>9</b>	<b>THERMAL BURN INJURY</b>		Pass
9.2	Thermal energy source classifications	TS3	Pass
9.3	Safeguard against thermal energy sources	Unit is for building-in - shall be considered in the final end-use	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard		N/A
9.4.2	Instructional safeguard .....		N/A
<b>10</b>	<b>RADIATION</b>		N/A
10.2	Radiation energy source classification		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 .....		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 .....		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		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.....:		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.....		N/A
B.2.3	Supply voltage and tolerances		N/A
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	No ventilation openings.	N/A
B.3.3	D.C. mains polarity test	Not DC mains.	N/A
B.3.4	Setting of voltage selector.....		N/A
B.3.5	Maximum load at output terminals.....	(See appended table B.3)	Pass
B.3.6	Reverse battery polarity	No batteries.	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.....		N/A
B.4.3	Motor tests		N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature .....		N/A
B.4.4	Short circuit of functional insulation		Pass
B.4.4.1	Short circuit of clearances for functional insulation		Pass
B.4.4.2	Short circuit of creepage distances for functional insulation		Pass
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		N/A
B.4.7	Continuous operation of components		Pass
B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions		N/A
B.4.9	Battery charging under single fault conditions.....		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
<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 ..... :	Unit intended for building-in. No means for direct connection to AC mains supply. Electrical rating is not mandatorily required.	—
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 ..... :	Refer to the Model information at the beginning of this Test Report.	—
F.3.2.2	Model identification ..... :	Refer to the Rating information at the beginning of this Test Report.	—

<b>IEC 62368-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
F.3.3	Equipment rating markings	Unit intended for building-in. No marking on unit.	Pass
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains	Unit intended for building-in.	Pass
F.3.3.3	Nature of supply voltage .....		—
F.3.3.4	Rated voltage .....		—
F.3.3.5	Rated frequency.....		—
F.3.3.6	Rated current or rated power .....	Unit intended for building-in.	—
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		N/A
F.3.10	Test for permanence of markings		N/A
F.4	Instructions		N/A
	a) Equipment for use in locations where children not likely to be present - marking		N/A
	b) Instructions given for installation or initial use		N/A
	c) Equipment intended to be fastened in place		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	d) Equipment intended for use only in restricted access area		N/A
	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.....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Test Voltage (V) and Insulation Resistance ( $\Omega$ ) ..:		—
G.3.3	PTC Thermistors		N/A
G.3.4	Overcurrent protection devices	External Fuse used. See Engineering Conditions of Acceptability.	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 .....		N/A
<b>G.4</b>	<b>Connectors</b>		N/A
G.4.1	Spacings		N/A
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 .....		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 .....	Planar type construction	—
	Method of protection .....		—
G.5.3.2	Insulation		Pass
	Protection from displacement of windings .....	Planar type construction	—
G.5.3.3	Overload test.....	(See appended table B.3)	Pass
G.5.3.3.1	Test conditions		Pass
G.5.3.3.2	Winding Temperatures testing in the unit		N/A
G.5.3.3.3	Winding Temperatures - Alternative test method		N/A
<b>G.5.4</b>	<b>Motors</b>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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) .....		—
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

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Clause	Requirement + Test	Result - Remark	Verdict
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 .....		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 .....		N/A
G.8.3.3	Temporary overvoltage .....		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
G.10.1	General requirements		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

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Clause	Requirement + Test	Result - Remark	Verdict
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>		N/A
G.11.1	General requirements		N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
<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) .....		Pass
	Type test voltage Vini .....	1500 VDC isolation	—
	Routine test voltage, Vini,b .....	1500 VDC isolation	—
<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.....		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 .....		N/A
<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

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Clause	Requirement + Test	Result - Remark	Verdict
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 <sub>c</sub> = 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
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		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 .....		N/A



<b>IEC 62368-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance .....		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 .....		N/A
<b>L</b>	<b>DISCONNECT DEVICES</b>		N/A
L.1	General requirements		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
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 .....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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 ..... :		—
M.4.2.2 b)	Single faults in charging circuitry ..... :		—
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
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

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Clause	Requirement + Test	Result - Remark	Verdict
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>		N/A
	Figures O.1 to O.20 of this Annex applied.....		—
<b>P</b>	<b>SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS</b>		N/A
P.1	General requirements		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
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 .....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
P.4.2 c)	Mechanical strength testing .....		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
	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

<b>IEC 62368-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	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 enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 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 .....		N/A
T.3	Steady force test, 30 N .....		N/A
T.4	Steady force test, 100 N .....		N/A
T.5	Steady force test, 250 N .....		N/A
T.6	Enclosure impact test		N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test .....		N/A
T.8	Stress relief test .....		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.....		N/A
T.11	Test for telescoping or rod antennas		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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 .....		N/A
<b>V</b>	<b>DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)</b>		N/A
V.1	Accessible parts of equipment		N/A
V.2	Accessible part criterion		N/A

**Test Record No. 1**

The manufacturer submitted representative production samples of Model iSA48025A033V-0##, which were used for test purposes. Testing of the model iSA48025A033V-0## was considered representative of all models. Evaluation is based on previously conducted UL/CUL certification under E220248-A9 report and VDE CB report, reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1, which was previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1, and Amendment 2. Testing conducted in accordance with IEC 60950-1:2005 (Second Edition), Am1:2009 + Am2:2013; UL 60950-1, 2nd Edition, 2014-10-14; and CAN/CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10, was deemed equivalent to test required by IEC62368-1, 2nd Edition, CAN/CSA-C22.2 NO. 62368-1 2nd Ed, Issued December 1, 2014, and UL 62368-1 2nd Ed, Issued December 1, 2014. Testing correlation explanation is provided in Enclosure.

The following tests were conducted:

<b>Tests performed (name of test and test clause):</b>	<b>Testing location:</b> TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES
DETERMINATION OF WORKING VOLTAGE (5.4.1.8)	2.10.2 - Determination of Working Voltage. Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Tests were covered under VDE CB report, reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1 which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.
ELECTRIC STRENGTH TEST (5.4.9)	Electric Strength (5.2.2). Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under on VDE CB report reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1 which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute. Test was also repeated per UL/CSA/IEC 62368-1.
INPUT TEST: SINGLE PHASE (B.2.5)	INPUT TEST (1.6.2). Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013

	<p>evaluation was considered equivalent. Test was covered under VDE CB report, reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1 which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 &amp; 2 by VDE Testing and Certification Institute.</p>
<p>NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT (B.2.6)</p>	<p>HEATING TEST. 4.5. Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under VDE CB report, reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1 which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 &amp; 2 by VDE Testing and Certification Institute.</p>
<p>SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)</p>	<p>Abnormal Operation (5.3.1 - 5.3.9). Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under VDE CB report, reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1 which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 &amp; 2 by VDE Testing and Certification Institute.</p>
<p>SIMULATED SINGLE FAULT CONDITIONS (B.4)</p>	<p>FAULT CONDITION TEST (5.3); Power Supply Output Short-Circuit/Overload (5.3.7) Component Failure (5.3.1, 5.3.4, 5.3.7). Testing conducted under IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013 evaluation was considered equivalent. Test was covered under VDE CB report, reference 2520400-3336-0014/169220, and Amendment 1 report reference 215288-CI3-1 with its respective CB Test Certificate Ref. CB DE1-50435 and CB DE1-50435/A1 which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 &amp; 2 by VDE Testing and Certification Institute.</p>



The following tests were waived:	Rationale for Waiving
HUMIDITY CONDITIONING (5.4.8)	Test originally conducted as part of 60950-1 evaluation in VDE CB Report ref 215288-CI3-1. Test deemed not necessary and was not reconducted under 62368-1 report.
TEST FOR THE PERMANENCE OF MARKINGS (ANNEX F.3.10)	Evaluated under E220248- A6002

Test results are valid only for the tested equipment. These tests are considered representative of the products covered by this Test Report. The test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the Standard(s) referenced at the beginning of this Test Report.

The following supplements are provided as part of this Test Record. NOTE: These supplements are only available to the Applicant via the myUL™ Client Portal.

Type	Supplement Id	Description
Attachment	02-01	CRD
Datasheet	02-02	Datasheet

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

4.8.4, 4.8.5	<b>TABLE: Lithium coin/button cell batteries mechanical tests</b>		N/A
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**(The following mechanical tests are conducted in the sequence noted.)**

4.8.4.2	<b>TABLE: Stress Relief test</b>		—
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Part	Material	Oven Temperature (°C)	Comments

4.8.4.3	<b>TABLE: Battery replacement test</b>		—
---------	--	--	---

Battery part no. .... :			—
-------------------------	--	--	---

Battery Installation/withdrawal	Battery Installation/Removal Cycle	Comments
	1	
	2	
	3	
	4	
	5	
	6	
	8	
	9	
	10	

4.8.4.4	<b>TABLE: Drop test</b>		—
---------	-------------------------	--	---

Impact Area	Drop Distance	Drop No.	Observations
		1	
		2	
		3	

4.8.4.5	<b>TABLE: Impact</b>		—
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Impacts per surface	Surface tested	Impact energy (Nm)	Comments

4.8.4.6	<b>TABLE: Crush test</b>		—
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Test position	Surface tested	Crushing Force (N)	Duration force applied (s)

Supplementary information:

4.8.5	<b>TABLE: Lithium coin/button cell batteries mechanical test result</b>		N/A
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Test position	Surface tested	Force (N)	Duration force applied (s)

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

<b>5.2</b>	<b>Table: Classification of electrical energy sources</b>	Pass
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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 (Apk or Arms)	Hz	
1	75 VDC	Input and Internal (All iSA480 and iSC480-Series)	Normal	75 VDC	--	--	ES2
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	
2	75 VDC	Output (All iSA480 and iSC480-Series)	Normal	28 VDC	--	--	ES1
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

5.2.2.3 - Capacitance Limits

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)	lpk (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)	lpk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	

IEC 62368-1							
Clause	Requirement + Test			Result - Remark			Verdict
<b>5.2</b>	<b>Table: Classification of electrical energy sources</b>						Pass
			Single fault – SC/OC	--	--	--	
Test Conditions: Normal – Abnormal - Supplementary information: SC=Short Circuit, OC=Open Circuit							
--							

IEC 62368-1							
Clause	Requirement + Test			Result - Remark			Verdict
<b>5.4.1.4, 6.3.2, 9.0, B.2.6</b>	<b>TABLE: Temperature measurements</b>						Pass
	Supply voltage (V) .....	36	48	75	--		—
	Ambient T <sub>min</sub> (°C) .....	25	25	25	--		—
	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)	
IC101, body		66	66	72	--	130	
U200, body		51	51	54	--	130	
Q305 near drain		78	72	78	--	130	
R125, body		89	85	91	--	130	
RT100, body		74	72	79	--	130	
U100, body		71	72	80	--	130	
Q103 near pin 1		77	74	81	--	130	
T1, core		96	97	111	--	130	
T1, winding		99	101	114	--	130	
Q300 near drain		93	94	102	--	130	
CR208, body		97	99	111	--	130	
CR303 near tab		92	95	111	--	130	
Q303 near drain		96	106	119	--	130	
Q201 near drain		98	103	117	--	130	
L2, core		85	91	102	--	130	
L2, winding		82	85	94	--	130	
PCB, control board		60	57	62	--	130	
C400, body		46	47	49	--	130	
L101, body		65	61	65	--	130	
Supplementary information:							
MNL: iSA48025A033V-0##, rated 36-75Vdc, output 3 3V, 25A							
Temperature T of winding:		t <sub>1</sub> (°C)	R <sub>1</sub> (Ω)	t <sub>2</sub> (°C)	R <sub>2</sub> (Ω)	T (°C)	Allowed T <sub>max</sub> (°C)
--		--	--	--	--	--	--
Supplementary information:							
Note 1: T <sub>ma</sub> should be considered as directed by applicable requirement							
Note 2: T <sub>ma</sub> is not included in assessment of Touch Temperatures (Clause 9)							

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

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

<b>5.4.1.10.3</b>	<b>TABLE: Ball pressure test of thermoplastics</b>		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)
Primary to Secondary	75 VDC	--	<30 Khz	0.2	1.0	1.3	1.4
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							

<b>5.4.2.3</b>	<b>TABLE: Minimum Clearances distances using required withstand voltage</b>			N/A
<b>Overvoltage Category (OV):</b>				
<b>Pollution Degree:</b>				
Clearance distanced between:	Required withstand voltage	Required cl (mm)	Measured cl (mm)	
Supplementary information:				
EUT is for building in. Transient voltage not considered				

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

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

Supplementary information:
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<b>5.4.4.2,</b> <b>5.4.4.5 c)</b> <b>5.4.4.9</b>	<b>TABLE: Distance through insulation measurements</b>	N/A
--	--	-----

Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)

Supplementary information:
for basic insulation, no minimum distance through insulation is specified;

<b>5.4.9</b>	<b>TABLE: Electric strength tests</b>	Pass
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Test voltage applied between:	Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
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Functional:			
-------------	--	--	--

Basic/supplementary:			
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Input to Output (62368-1)	DC	1500*	No
Input to Output (Reverse Polarity) (62368-1)	DC	1500*	No

Reinforced:			
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--	--	--	--

Routine Tests:			
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--	--	--	--

Supplementary information:
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\*No direct connection to Mains, Method 2 was used. Per Table 27, Test potential of 430 VDC was to be applied. Per client higher potential of 1500 VDC was used.

<b>5.5.2.2</b>	<b>TABLE: Stored discharge on capacitors</b>	N/A
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Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification

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

X-capacitors installed for testing are:

bleeding resistor rating:

ICX:

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

5.6.6.2	TABLE: Resistance of protective conductors and terminations				N/A
Accessible part	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)	
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 <sup>*</sup>	PS Classification	
75 VDC	All circuits	Power (W) :	--	--	PS3 (To be employed in an end product)	
		V <sub>A</sub> (V) :	--	--		
		I <sub>A</sub> (A) :	--	--		
Supplementary Information:						
(*) Measurement taken only when limits at 3 seconds exceed PS1 limits						

6.2.3.1	Table: Determination of Potential Ignition Sources (Arcing PIS)				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	
All Circuits	--	--	--	Yes. To be addressed in the end product	
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.					

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				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	--	--	--	--	Yes. To be addressed in the end product
Supplementary Information:					
<p>A combination of voltmeter, V<sub>A</sub> and ammeter I<sub>A</sub> may be used instead of a wattmeter.</p> <p>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.</p> <p>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.</p>					

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

8.5.5	TABLE: High Pressure Lamp	N/A	
Description	Values	Energy Source Classification	
Lamp type .....		—	
Manufacturer .....		—	
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
36	DC	1.621	4	94.4	--	--	--	NNL
48	DC	1.965	4	94.4	--	--	--	MNL
75	DC	1.282	4	96.2	--	--	--	MNL
Supplementary information:								
Test performed on model iSA48025A033V-0##, rated 36-75Vdc - Output: MNL indicates the sample was loaded to an output of 3.3V, 25A 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) .....						25 C		—
Power source for EUT: Manufacturer, model/type, output rating ..:						Model iSA48025A033V-0##, DC 36 -75 V, 4 A		—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
T1	Overload	75 VDC	23.43 MIN	--	10A	--	--	NT, NC, NB, CT: T1 core =126C, T1 winding=130 C, fold back=27.05A

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

B.3 TABLE: Abnormal operating condition tests								Pass
Ambient temperature (°C) .....					25 C		—	
Power source for EUT: Manufacturer, model/type, output rating ..:					Model iSA48025A033V-0##, DC 36 -75 V, 4 A		—	
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
POWER SUPPLY OUTPUT SHORT CIRCUIT/OVER LOAD TEST - See Below	--	--	--	--	--	--	--	--
T1	Short	75 VDC	23 min.	--	10	--	--	NT, NC, NB, CT:T1 winding=39C, core = 43°C, Control PWB=33OC, winding=106 C, core=l16C,
T1	Overload	75 VDC	31 min.	--	10	--	--	NT, NC, NB, CT: T1 core=126OC, T1 winding = 130°C, fold back=27.05A
Supplementary information:								
Test table is provided to record abnormal and fault conditions for all applicable energy sources including Thermal burn injury. Column "Abnormal/Fault." Specify if test condition by indicating "Abnormal" then the condition for a Clause B.3 test or "Single Fault" then the condition for Clause B.4.								

B.4 TABLE: Fault condition tests								Pass
Ambient temperature (°C) .....					25		—	
Power source for EUT: Manufacturer, model/type, output rating ..:					Model iSA48025A033V-0##, DC 36 -75 V, 4 A		—	
Component No.	Fault Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
C350	SHORT	75	10 MIN.	--	10	--	--	NT, NC, NB, 0V pk out, blew fuse, no hazard
T1(B2 to Pin5 of Q201)	short	75	10 min.	--	10	--	--	NT, NC, NB, 0V pk out, blew fuse, no hazard

IEC 62368-1								
Clause	Requirement + Test					Result - Remark		Verdict
Primary Bias winding: CRIOI pin2 to PIN GND IN	short	75	10 min.	--	10	--	--	NT, NC, NB, , Hiccup mode for one minute then OV pk out, fuse okay, CD: Q305, R125, R131, R109, R137, Q104, CR102. R106, IC101, CR105, defect, no hazard
C351	short	75	10 MIN.	--	10	--	--	NT, NC, NB, OV pk out, blew fuse, no hazard
Q305	short	75	10 min.	--	10	--	--	NT, NC, NB, O vpk out, fuse okay, CD:R125, R131, Q104, CR102, ICIOI defect
L101	short	75	10 min.	--	10	--	--	NT, NC, NB, 3.3Vpk out, fuse okay, no hazard
T1 (pin VDS to Q200 pin 5)	short	75	10 min.	--	10	--	--	NT, NC, NB, 3.3Vpk out, fuse okay, no hazard
T1 (pin VDS to Q200pin 5)	short	75	10 min	--	10	--	--	NT, NC, NB, OV pk out, blew fuse, no hazard
L2	Overload	75	23 min	--	10	--	--	NT, NC, NB, Control PWB=68C, fold back=27.05A
L2	short	75	31 min.	--	10	--	--	NT, NC, NB, winding=33°C , core=35OC, Control PWB=68C
Supplementary information:								

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

iSA48025A033V-0## performed on model:  
 rated 36-75Vdc, output 3.3V, Test 25A. DC input: DC48V@ 1.94A.

Annex M	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:									
- Chemical leaks									Verdict
- 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			
Supplementary Information:							

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Clause	Requirement + Test	Result - Remark	Verdict

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<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

Supplementary information:

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Clause	Requirement + Test	Result - Remark	Verdict



**Enclosure**  
**National Differences**  
USA / Canada

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

<b>ATTACHMENT TO TEST REPORT IEC 62368-1 2th Ed.</b> <b>U.S.A. NATIONAL DIFFERENCES</b> Audio/video, information and communication technology equipment – Part 1: Safety requirements	
<b>Differences according to</b>	CSA/UL 62368-1:2014
<b>Attachment Form No.</b>	US&CA_ND_IEC623681B
<b>Attachment Originator</b>	UL(US)
<b>Master Attachment</b>	Date 2015-06
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<b>IEC 62368-1 - US and Canadian National Differences</b> <b>Special National Conditions based on Regulations and Other National Differences</b>			
1.1	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. Also, for such equipment marked or otherwise identified, installation is allowed per the Standard for the Protection of Information Technology Equipment, ANSI/NFPA 75.	Noted	Pass
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

<b>IEC62368_1B - ATTACHMENT</b>			
Clause	Requirement + Test	Result - Remark	Verdict
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.		N/A
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
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

<b>IEC62368_1B - ATTACHMENT</b>			
Clause	Requirement + Test	Result - Remark	Verdict
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
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

<b>IEC62368_1B - ATTACHMENT</b>			
Clause	Requirement + Test	Result - Remark	Verdict
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
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.		N/A
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

<b>IEC62368_1B - ATTACHMENT</b>			
Clause	Requirement + Test	Result - Remark	Verdict
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.		N/A
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
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