UL TEST REPORT AND PROCEDURE

Standard:	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-(Audio/video, information and communication technology equipment Part 1: Safety requirements)
Certification Type:	Component Recognition
CCN:	QQJQ2, QQJQ8 (Power Supplies for Use in Audio/Video, Information and Communication Technology Equipment)
Complementary CCN:	N/A
Product:	DC-To-DC Converters
Model:	iQL48***A%%%V-0##-R; where *** represents a three digit output current between 8 A – 60 A; (Note that the first digit is always “0”); where %%% represents a three digit output voltage between 1.2 V – 28 V, (Note that the third digit is preceded by a decimal point. Example 120 implies 12.0 Volts.) followed by where 0## or 0xx is a three digit number or alphanumeric character indicating a mechanical or control function modification. iQL24***A%%%V-0##-R; where *** represents a three digit output current between 17A – 50 A; where %%% represents a three digit output voltage between 1.2 V – 12 V, (Note that the third digit is preceded by a decimal point. Example 120 implies 12.0 Volts.) followed by where 0## or 0xx is a three digit number or alphanumeric character indicating a mechanical or control function modification. The matrix under Misc enclosure indicate various iQL model numbers with the output power levels up to 308W. The highest output power module is 28 Vdc / 11 A / 308 W.
Rating:	iQL48***A%%%V-0##-R; Input: DC 18 – 75 Vdc, max. 14.6 A Output: DC 1.2 - 28 Vdc, max. 60 A, max. 308 W

	iQL24***A%%%V-0##-R; Input: DC 18 – 36 Vdc, max. 14.5 A Output: DC 1.2 - 12 Vdc, max. 50 A, max. 252 W
Applicant Name and Address:	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 to DC power module with a planar power transformer. The converter is provided with input terminal pins for factory installation onto a printed wiring board with a connection to a dc source of supply and output terminal pins. These models have been evaluated as having Basic insulation from input to output. The product employs a multilayer PWB planar transformer. The input voltage range is from DC 36 – 75 V input. The output voltage range will be between 1 V and 28 Vdc depending upon the model number.

The product is available in one mechanical configuration using the same transformer core set and inductor core set except for the air gap used in the inductor. The house-keeping transformers used for the bias supply, current sensing, and gate drive purposes are also the same for all iQL series.

Model Differences

All models within the iQL Series employ identical mechanical configuration, using the same PWB, same transformer winding turns ratio, same transformer core set, and inductor core set.

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	For building in. 15 A fuse to be provided in an end product. A; equipment
Equipment mobility	for building-in
Over voltage category (OVC)	other: Not 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 180 m m
Mass of equipment (kg)	0.10

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 25°C
- 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. 15 A fuse to be provided in an 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

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 : Output Terminal
- The maximum investigated branch circuit rating is : EUT is for building in. 15 A external fuse is to be provided in the end product.
- 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.

Additional Information

This report is based on VDE CB report reference 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively 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.

The nameplate included in the report is representative of all models covered under this report.

Additional Standards

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

Markings and Instructions

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

Special Instructions to UL Representative

N/A

BD1.0	TABLE: Production-Line Testing Requirements					
BD1.1	**Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.**					
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s
N/A	-	-	-	-	-	-
BD1.2	**Earthing Continuity Test Exemptions – This test is not required for the following models:**					
	All Models					
BD1.3	**Electric Strength Test Exemptions – This test is not required for the following models:**					
BD1.4	**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.**					
	N/A					

BE1.0	Sample and Test Specifics for Follow-Up Tests at UL				
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
iQL Series Models	--	--	--	--	--	
Main isolating (T1) Planar transformer Printed Wiring Board (PWB): Top and Bottom	Interchangeable	Interchangeable	PWB rated V-1, 130 C, Multiple layered PWB.	ZPMV2	UL	
Inductor (L2) Planar type	Interchangeable	Interchangeable	Min V-1, 130 °C	ZPMV2	UL	
Input Inductor (L1)	Interchangeable	Interchangeable	SMT, rated 125°C	--	--	
PWB	Interchangeable	Interchangeable	Min. V-1, 130°C	ZPMV2	UL	
Gate Transformer (T151)	Bourns (Dongguan) Electronics Co.,LTD	P/n AT00143	See attached construction diagram Class 155 (F) Electrical Insulation Systems TM-F4 (OBJY2, E230441)	--	--	
Bias Transformer (T300)	Bourns (Dongguan) Electronics Co.,LTD	AT00131	See attached construction diagram Class 155 (F) Electrical Insulation Systems TM-F4 (OBJY2, E230441)	--	--	
Current Sensing Transformer (TS1)	Bourns (Dongguan) Electronics Co.,LTD	AT00160	See attached construction diagram Class 155 (F) Electrical Insulation Systems TM-F4 (OBJY2, E230441)	--	--	
Thermistor (RT1)	TDK	NTCG	150K ohm @ 25 C	XGPU2	UL	
Thermistor (RT1) - Alternate	Interchangeable	Interchangeable	Rated 32 Vdc, 125°C.	XGPU2	UL	
Optocoupler	NEC	PS2911-1	min. 1500V dc isolation	FPQUT2	UL	

Alternate	Interchangeable	Interchangeable	Single protection non-optical isolator at 2500 V	FPPT2	UL	
Label	Identco International Corp	TTL139-401-10	Max temperature 175ºC, Indoor use only	PGDQ2 or PGJI2	UL	
Alternate Label	Interchangeable	Interchangeable	Suitable for application to enclosure	PGDQ2 or PGJI2	UR	

Enclosures

Type	Supplement Id	Description
Photographs	03-01	iQL-series bottom side
Photographs	03-02	iQL series top side
Photographs	03-03	iQL series
Diagrams	04-01	Gate Transformer (T151)
Diagrams	04-02	Bias Transformer (T300)
Diagrams	04-03	Current Sensing Transformer (TS1)
Schematics + PWB	05-01	Schematics and board trace layout
Miscellaneous	07-01	Model Matrix
Miscellaneous	07-02	Equipment List
Miscellaneous	07-03	Letter of Assurance
Miscellaneous	07-04	Test correlation

Test Record No. 1

The manufacturer submitted representative production samples of Model iQL48***A%%%V-0##-R; and iQL24***A%%%V-0##-R

The report is based on VDE CB report reference 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively which was previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1, and Amendment 2. . Test was also covered under E220248-A15, and E220248-A24. 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 the test required per 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.

The following tests were conducted:

Tests performed (name of test and test clause):	**Testing location:** TDK-LAMBDA AMERICAS INC SUITE 100 3320 MATRIX DR RICHARDSON TX 75082 UNITED STATES
DETERMINATION OF WORKING VOLTAGE (5.4.1.8)	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 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.
HUMIDITY CONDITIONING (5.4.8)	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 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively 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)	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 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute. Test repeated per UL/CSA/IEC 62368-1.
INPUT TEST: SINGLE PHASE (B.2.5)	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 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.
NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT (B.2.6)	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 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.
SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)	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 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.
SIMULATED SINGLE FAULT CONDITIONS (B.4)	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 218758-CI3-3 and CB Test Certificate Ref. DE1-56444 respectively which were previously evaluated to UL/CSA/IEC 60950-1, 2nd edition, + Amendment 1 & 2 by VDE Testing and Certification Institute.
The following tests were waived:	**Rationale for Waiving**

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
Datasheet	02-01	Datasheet

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

4.8.4, 4.8.5	**TABLE: Lithium coin/button cell batteries mechanical tests**	N/A

(The following mechanical tests are conducted in the sequence noted.)

4.8.4.2	**TABLE: Stress Relief test**	—

Part	**Material**	**Oven Temperature (°C)**	**Comments**

4.8.4.3	**TABLE: Battery replacement test**	—
Battery part no. ..... :		—

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

4.8.4.4	**TABLE: Drop test**	—

Impact Area	Drop Distance	Drop No.	Observations
		1	
		2	
		3	

4.8.4.5	**TABLE: Impact**	—

Impacts per surface	**Surface tested**	**Impact energy (Nm)**	**Comments**

4.8.4.6	**TABLE: Crush test**	—

Test position	**Surface tested**	**Crushing Force (N)**	**Duration force applied (s)**

Supplementary information:

4.8.5	**TABLE: Lithium coin/button cell batteries mechanical test result**	N/A

Test position	**Surface tested**	**Force (N)**	**Duration force applied (s)**

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

Supplementary information:			

5.2	Table: Classification of electrical energy sources						Pass
5.2.2.2 – Steady State Voltage and Current conditions							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				U (Vrms or Vpk)	I (Apk or Arms)	Hz	
1	Instructed Person (Model iQL48 Series)	Input	Normal	75 VDC	--	DC	ES2
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	
2	Instructed Person (Models iQL48 Series)	Output	Normal	28 VDC	--	DC	ES1
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	
3	Instructed Person (Model iQL24 Series)	Input	Normal	36 VDC	--	DC	ES1
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	
4	Instructed Person (Model iQL24 Series)	Output	Normal	12 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)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	

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

5.2	**Table: Classification of electrical energy sources**						Pass
			Single fault – SC/OC	--	--	--	
5.2.2.5 - Repetitive Pulses							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	
Test Conditions: Normal – Abnormal - Supplementary information: SC=Short Circuit, OC=Open Circuit							

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

5.4.1.4, 6.3.2, 9.0, B.2.6	**TABLE: Temperature measurements**					Pass
	Supply voltage (V) ..... :	36 VDC	48 VDC	75 VDC	-	—
	Ambient T_{min} (°C) ..... :	23.6	23.4	23.3	-	—
	Ambient T_{max} (°C) ..... :	--	--	--	-	—
	Tma (°C) ..... :	23.6	23.4	23.3	-	—
Maximum measured temperature T of part/at:		T (°C)				Allowed T_{max} (°C)
CR301		67.6	68.8	64.7	--	--
Q403		121.8	124	123	-	--
TS1 Current Sensing Transformer body		100	100	88.6	-	--
Q113		111.3	112.6	105.4	-	--
T1 Planar @ PWB (top)		81.8	84.7	72.4	-	130
Q413, body		86.2	87	77.4	-	130
T1 Planar @PWB (Bottom)		113.3	115.2	109.1	-	--
CR330		72	72.7	64.1	-	--
T151 Gate Transformer body		43.3	42.6	34	-	130
Model iQL48060A033V-0XX loaded to 3.3V, 60A(data below) Amendment No. 1 testing		36 VDC Input	48VDC Input	75V dc Input	Abnormal 48V dc (no force air)	--
T1 winding		101.5	96.3	102.7	127.8	130
T1 Core		81.4	79.1	86.1	113.7	130
L2 Winding		85.6	82.6	88.6	110.1	130
L2 Core		70.9	69.8	76.3	100.7	130
Q403		102.8	97.9	107.1	133.5	130
T151		62.0	59.0	60.9	91.2	90
T300		74.7	71.8	75.3	107.6	90
TS1		76.3	72.0	74.6	109.2	90
L100		66.8	63.0	65.0	94.8	130
Q113		97.9	92.0	97.2	121.2	130
U102		77.5	74.0	78.2	98.2	130
C605		68.8	66.8	71.2	98.6	130
Model iQL48011A280V-0XX loaded to 28 V, 11 A(data below) '		36 VDC Input/Ambient 22.5 °C	48 VDC Input/ Ambient 22.5 °C	75V DC Input/Ambient 22.6 °C	-	--
Main Transformer (T1) Core		65.9	68.2	97.6	-	130
Main Transformer (T1) Winding PWB		79.8	82.0	117.6	-	130

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

Output Inductor (L2) Core	57.6	64.5	97.9	-	1300
Output Inductor (L2) Winding	57.2	61.8	91.2	-	130
I Sense transformer (TS1) Winding	58.7	58.2	81.7	-	90
Gate Transformer (T151) Winding	58.1	57.8	77.0	-	90
U102 Pin	63.0	64.6	93.5	-	130
Primary FET (Q113) tab	81.7	84.6	119.6	-	130
Bias transformer (T300) Winding	59.6	60.3	83.4	-	90
Model iQL48011A280V-0XX loaded to 28 V, 11 A (data below)	Abnormal 48V dc (no force air)/ Ambient 25.0 °C	Overload Testing temperature test data/Ambient 23.9 °C	Short Circuit Testing temperature test data/Ambient 22.5 °C	-	-
Main Transformer (T1) Core	127.5	104.5	23.4	-	-
Main Transformer (T1) Winding PWB	140.8	126.4	23.6	-	-
Output Inductor (L2) Core	115.1	104.3	23.1	-	-
Output Inductor (L2) Winding	107.4	97.7	23.2	-	-
I Sense transformer (TS1) Winding	119.3	87.7	22.5	-	-
Gate Transformer (T151) Winding	92.7	82.4	23.2	-	-
U102 Pin	102.2	99.8	24.2	-	-
Primary FET (Q113) tab	143.3	128.5	23.7	-	-
Bias transformer (T300) Winding	102.8	89.0	25.4	-	-

Supplementary information:

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	t_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class

Supplementary information:

Note 1: Tma should be considered as directed by applicable requirement

Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)

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

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

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

5.4.2.2, 5.4.2.4 and 5.4.3	TABLE: Minimum Clearances/Creepage distance						Pass
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz)[1]	Required cl (mm)	cl (mm)[2]	Required[3] cr (mm)	cr (mm)
iQL48025A120V-0xx	--	--	--	--	--	--	--
Q114-3 to Q401	108	43.5	<30 Khz	0.2	1.4	1.4	1.4
Q114-3 to L1 in	71	25	<30 Khz	0.2	1.4	1.4	1.4
Q112-3 to L1 in	65	23.3	<30 Khz	0.2	1.4	1.4	1.4
Q112-3 to Q401-3	65	22.7	<30 Khz	0.2	1.4	1.4	1.4
Q112-3 to Q411-3	102	42.9	<30 Khz	0.2	1.4	1.4	1.4
Q114-3 to Q411-3	60	12.3	<30 Khz	0.2	1.4	1.4	1.4
Q401-3 to Q411-3	73.5	23.5	<30 Khz	0.2	1.4	1.4	1.4
V out (GND) to Q401-3	86	29.4	<30 Khz	0.2	1.4	1.4	1.4
V out (GND) to Q411-3	86	29.5	<30 Khz	0.2	1.4	1.4	1.4
V out (GND) to L1 in	43.5	20.3	<30 Khz	0.2	1.4	1.4	1.4
T300 (Pin 1-Pin4)	151	79.2	<30 Khz	0.2	1.4	1.4	1.4
T300 (Pin 2-Pin5)	56.2	11.6	<30 Khz	0.2	1.4	1.4	1.4
T300 (Pin 3-Pin5)	25.6	4.4	<30 Khz	0.2	1.4	1.4	1.4
T300 (Pin 5-Pin6)	50	12.1	<30 Khz	0.2	1.4	1.4	1.4
Test below conducted on Model: iQL48060A033V-00x. Amend No. 1 testing	-	-	-	-	-	-	--

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

T300A (BIAS) (Pin 1 to 6)	45.8	12.35	<30 Khz	0.2	1.2	1.4	1.4
T300A (Pin 2 to 5)	44.0	11.55	<30 Khz	0.2	1.2	1.4	1.4
T300A (BIAS) (Pin 2 to 6)	11.3	2.20	<30 Khz	0.2	1.2	1.4	1.4
T300A (Pin 1 to 5)	6.9	1.74	<30 Khz	0.2	1.2	1.4	1.4
T300B (Pin 3 to 5)	8.7	3.62	<30 Khz	0.2	1.2	1.4	1.4
T300B (Pin 4 to 5)	81.0	25.30	<30 Khz	0.2	1.2	1.4	1.4
T300B (Pin 3 to 6)	52.0	12.60	<30 Khz	0.2	1.2	1.4	1.4
T300B (Pin 4 to 6)	39.0	12.80	<30 Khz	0.2	1.2	1.4	1.4
T300B (Pin 6 to 5)	21.0	12.40	<30 Khz	0.2	1.2	1.4	1.4
TS1A (Pin 3 to 1)	8.4	2.36	<30 Khz	0.2	1.2	1.4	1.4
TS1A (Pin 4 to 2)	8.8	2.91	<30 Khz	0.2	1.2	1.4	1.4
TS1A (Pin 3 to 2)	6.0	2.77	<30 Khz	0.2	1.2	1.4	1.4
TS1A (Pin 4 to 1)	14.8	2.42	<30 Khz	0.2	1.2	1.4	1.4
T151(Pin 6-3)	15.0	7.44	<30 Khz	0.2	1.2	1.4	1.4
T151(Pin 6-1)	8.0	0.976	<30 Khz	0.2	1.2	1.4	1.4
T151(Pin 4-1)	14.8	7.35	<30 Khz	0.2	1.2	1.4	1.4
T151(Pin 4-3)	7.5	1.04	<30 Khz	0.2	1.2	1.4	1.4
T1A-TP101 to T1B (8-10)	53.0	29.17	<30 Khz	0.2	1.2	1.4	1.4
T1A-TP101 to T1B (4-6)	46.0	18.63	<30 Khz	0.2	1.2	1.4	1.4
T1A-TP102 to Q401-3	51.3	29.15	<30 Khz	0.2	1.2	1.4	1.4
T1A-TP101 to L1	46.0	23.78	<30 Khz	0.2	1.2	1.4	1.4
T1A-TP102 to (8-10)	43.3	18.57	<30 Khz	0.2	1.2	1.4	1.4
T1A-TP102 to L1	45.1	23.53	<30 Khz	0.2	1.2	1.4	1.4
Test below conducted on Model: iQL48011A280V-00x. Tests of E220248-A15-UL-2, Amendment #1	--	--	--	--	--	--	--
Main Transformer TP101 to T1 pins 8 to 10	170.3	74.17	<30 Khz	0.2	1.2	1.4	1.4
Main Transformer TP101 to T1 Secondary Center Tap	92.2	36.61	<30 Khz	0.2	1.2	1.4	1.4
Main Transformer TP101 to T1 pins 4 to 6	110.9	35.54	<30 Khz	0.2	1.2	1.4	1.4
Main Transformer TP102 to T1 pins 8 to 10	114.1	35.89	<30 Khz	0.2	1.2	1.4	1.4
Main Transformer TP102 to T1 secondary center tap	92.2	36.14	<30 Khz	0.2	1.2	1.4	1.4
Main Transformer TP102 to T1 pins 4 to 6	171.9	73.8	<30 Khz	0.2	1.2	1.4	1.4
Current Sensing Transformer	31.9	6.32	<30 Khz	0.2	1.2	1.4	1.4

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Clause	Requirement + Test	Result - Remark	Verdict

TS1 pin 4 to pin 1							
Current Sensing Transformer TS1 pin 3 to pin 1	31.3	6.36	<30 Khz	0.2	1.2	1.4	1.4
Current Sensing Transformer TS1 pin 4 to pin 2	35.8	6.56	<30 Khz	0.2	1.2	1.4	1.4
Current Sensing Transformer TS1 pin 3 to pin 2	31.9	6.58	<30 Khz	0.2	1.2	1.4	1.4
Bias Transformer T300 pins 3 to pin 6	60.6	13.38	<30 Khz	0.2	1.2	1.4	1.4
Bias Transformer T300 pins 3 to pin 5	31.3	5.0	<30 Khz	0.2	1.2	1.4	1.4
Bias Transformer T300 pins 4 to pin 6	41.9	12.16	<30 Khz	0.2	1.2	1.4	1.4
Bias Transformer T300 pins 4 to pin 5	98.4	22.81	<30 Khz	0.2	1.2	1.4	1.4
Opto U102B Pin 1 to pin 4	12.66	3.984	<30 Khz	0.2	1.2	1.4	1.4
Opto U102B Pin 2 to pin 4	12.03	3.786	<30 Khz	0.2	1.2	1.4	1.4
Opto U102B Pin 1 to pin 3	8.91	3.841	<30 Khz	0.2	1.2	1.4	1.4
Opto U102B Pin 2 to pin 3	8.59	3.952	<30 Khz	0.2	1.2	1.4	1.4
Gate Transformer T151 pin 3 to pin 4	19.1	2.94	<30 Khz	0.2	1.2	1.4	1.4
Gate Transformer T151 pin 3 to pin 6	28.1	8.58	<30 Khz	0.2	1.2	1.4	1.4
Gate Transformer T151 pin 1 to pin 4	28.1	8.55	<30 Khz	0.2	1.2	1.4	1.4
Gate Transformer T151 pin 1 to pin 6	19.7	2.99	<30 Khz	0.2	1.2	1.4	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							

5.4.2.3	**TABLE: Minimum Clearances distances using required withstand voltage**			N/A
	Overvoltage Category (OV):			
	Pollution Degree:			
Clearance distanced between:		Required withstand voltage	Required cl (mm)	Measured cl (mm)
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

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

5.4.4.2, 5.4.4.5 c) 5.4.4.9	TABLE: Distance through insulation measurements					N/A
Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)	
--	--	--	--	--	--	
Supplementary information:						
No through insulation thickness requirement for the prepreg between layers since this converter which is being evaluated as having Basic insulation.						

5.4.9	TABLE: Electric strength tests			Pass
Test voltage applied between:		Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
Functional:				
Basic/supplementary:				
Input to Secondary Output		DC	1500	NO
T1 Pri to Sec		DC	1500	NO
T300 Pri to Sec		DC	1500	NO
T151 Pri to Sec		DC	1500	NO
Ts1 Pri to Sec		DC	1500	NO
iQL24017A120V-0xx Input Pins 1 – 3 to Output Pins 4-4		DC	1500	NO
iQL24050A033V-0xx Input Pins 1 – 3 to Output Pins 4-4		DC	1500	NO
iQL48011A280V-0xx Input Pins 1 – 3 to Output Pins 4-4		DC	1500	NO
iQL24017A120V-0xx Input Pins 1 – 3 to Output Pins 4-4		DC	1500	NO
iQL24050A033V-0## Input to Output *		DC	1500	NO
iQL24050A033V-0## Input to Output (Reverse Polarity) *		DC	1500	NO
iQL48025A033V-0## Input to Output *		DC	1500	NO

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Clause	Requirement + Test	Result - Remark	Verdict

5.4.9	TABLE: Electric strength tests		Pass
Test voltage applied between:	Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
iQL48025A033V-0## Input to Output (Reverse Polarity) *	DC	1500	NO
Reinforced:			
Routine Tests:			
Supplementary information:			
*Potential 1500 AC was used per client's request The potential is a lot higher than what is required per 62368-1.			

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

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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.

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Clause	Requirement + Test	Result - Remark	Verdict

6.2.2	Table: Electrical power sources (PS) measurements for classification				Pass
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s*)	PS Classification
All circuits	--	Power (W) :	--	--	PS3 (To be employed in an end product)
		V_A (V) :	--	--	
		I_A (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 (Vp)	Measured r.m.s current (Irms)	Calculated value (V_p x I_{rms})	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 (Vp) and normal operating condition rms current (Irms) 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:					
A combination of voltmeter, VA and ammeter IA may be used instead of a wattmeter. If a separate voltmeter and ammeter are used, the product of (VA x IA) is used to determine Resistive PIS classification. A Resistive PIS: (a) dissipates more than 15 W, measured after 30 s of normal operation, or (b) under single fault conditions has either a power exceeding 100 W measured immediately after the introduction of the fault if electronic circuits, regulators or PTC devices are used, or has an available power exceeding 15 W measured 30 s after introduction of the fault.					

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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
--	--	--	--	--	--	--	--	Test performed on model iQL48025A120V-0xx, , rated 36-75Vdc - Output: MNL indicates the sample was loaded to an output of 12V, 25A
36 V	DC	9.23	10	332.8	--	--	--	Maximum Normal Load
48 V	DC	7.01	10	336.48	--	--	--	Maximum Normal Load
75 V	DC	4.58	10	343.5	--	--	--	Maximum Normal Load
--	--	--	--	--	--	--	--	iQL48060A033V-00x
36 V	DC	6.1	6.2	218.4	--	--	--	Maximum Normal Load
48 V	DC	4.5	6.2	216.9	--	--	--	Maximum Normal Load
75 V	DC	2.9	6.2	219.1	--	--	--	Maximum Normal Load

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Clause	Requirement + Test	Result - Remark	Verdict

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
--	--	--	--	--	--	--	--	* iQL24017A120V-0xx
19 V	DC	11.3	14	--	--	--	20	Maximum Normal Load
24 V	DC	8.9	14	--	--	--	20	Maximum Normal Load
36 V	DC	6.1	14	--	--	--	20	Maximum Normal Load
--	--	--	--	--	--	--	--	** iQL24050A033V-0xx
18 V	DC	10.3	14	--	--	--	20	Maximum Normal Load
24 V	DC	7.6	14	--	--	--	20	Maximum Normal Load
36 V	DC	5.1	14	--	--	--	20	Maximum Normal Load
--	--	--	--	--	--	--	--	*** iQL48011A280V-0xx
36 V	DC	9.3	10.5	--	--	--	15	Maximum Normal Load
48 V	DC	7.0	10.5	--	--	--	15	Maximum Normal Load
75 V	DC	4.8	10.5	--	--	--	15	Maximum Normal Load
Supplementary information:								
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 ..:			--					—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
iQL48025A Transformer Overload Abnormal Operation	-	-	-	-	-	--	--	--

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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 ..:		--	—

Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
T1	Overload	75	16 min	--	15	--	--	NT, NC, NB, Obesrved temp Core=81.4C, Winding 124.6
iQL48025A Power Supply Output short Circuit/Overload test	-	-	-	-	-	--	--	--
Vout	Overload	75	16 min.	--	15	--	--	NT, NC, CT T1core =79°C, WindingT1=124.6°C
Vout	Short	75	19 Min	--	15	--	--	NT, NC, NB, T1core=22.6°C, T1Winding=23.1°C,
P/S OUTPUT SC/OL TEST Model iQL48060A033V-0XX loaded to 3.3V, 60A(data below)	-	-	-	-	-	--	--	--
Output @ 3.3 V	Overload	75 VDC	19.94	-	15	--	--	CT,NT,NB,NC, hotspot Q403=120C, SEE TEMP TABLE
Output @ 3.3 V	Short	75 VDC	38.96	-	15	--	--	CT,NT,NB,NC, SEE TEMP TABLE
Abnormal Operation test (No Air Flow) Model iQL48011A280V-0XX (data below)	-	-	-	-	-	--	--	--

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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 ..:			--						—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation	
EUT	No Air flow	48 VDC	12 minutes, 41 Seconds	-	15	--	--	NB, NC, Unit Thermal protection activated, See table 4.5 for temperature data.	
Output	Overload	75 VDC	17 minutes, 35 Sec	_	15	--	--	CT, NC, See table 4.5 for temperature data.	
Output	Short Circuit	75 VDC	31 Minutes, 7 Sec	_	15	--	--	CT, NC, See table 4.5 for temperature data.	
Supplementary information:									

B.4	TABLE: Fault condition tests								Pass
Ambient temperature (°C) .....:			25 C						—
Power source for EUT: Manufacturer, model/type, output rating ..:			--						—
Component No.	Fault Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation	
iQL48025A120V: Component Failure Test	-	-	-	--	-	--	--	--	
Q401	short (Source to Drain)	75	1 minute	--	15	--	--	NC, NT, NB, Unit went to hiccup mode	
R405	short	75	1 minute	--	15	--	--	NC, NT, NB. Unit hits OVP(14.8v) then shuts down. 3X	
CR303	Short	75	1 minute	--	15	--	--	NC, NT, NB, Unit runs till OTP enabled Max temperature observed 95.@T1. Run test 3X	

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C531	short	75	1 minute	--	15	--	--	NC, NT, NB, Unit runs till OTP enabled Max temperature observed 122.3.@T1. Run test 3X
L1	Short	75	1 minute	--	15	--	--	NC, NT, NB, Unit shutts off immediately. Run test 3X
COMPONENT FAILURE TEST Model iQL48060A033 V-0XX loaded to 3.3V, 60A(data below)	-	-	-	-	-	--	--	--
Q113	Drain - Source	75Vin	60 Sec	-	15	--	--	Unit went into Hiccup, Sample #2,CT, NC,NB
Q303	Drain - Source	75Vin	60 Sec	-	15	--	--	Damaged R311 & R312, dis-colored Cheese Cloth, Sample # 2, 3, 4, CT, NB
L100	Shorted	75Vin	60 Sec	-	15	--	--	Unit operated without issue, Sample #5, CT,NB, NC
Q412	Drain - Source	75Vin	60 Sec	-	15	--	--	Unit went into Hiccup, Sample #5,CT,NB,NC
COMPONENT FAILURE TEST Model iQL48011A280 V-0XX (data below)	-	-	-	-	-	--	--	--

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Clause	Requirement + Test	Result - Remark	Verdict

Q303 (Pins 1-4)	Short	75	5 min (each test)	_	15	--	--	Output to 0V, CD: (R308, R312 Open and Q303 open gate), NC, NB (tested three times
R533 (Pin 1-2)	Short	75	Instantly	_	15	--	--	Output to 0V, CD: (Shorted Q112, and Q113), Open F1, NC, NB
Q114 pin 1-4	Short	75	5 min	_	15	--	--	Output to 0V, CD: (Shorted Q112), Open F1, NC, NB
T300 pin 5-6	Short	75	5 min	_	15	--	--	Output to 0V, IP, (IC300, R310, R311, R312, C307), NC, NB
C102 pin 1-2	Short	75	5 min	_	15	--	--	Output to 0V, Open F1, NC, NB
Q403 pin 1-5	Short	75	5 min	_	15	--	--	Output to 0V(hiccup), IP: (TS1, R530, CR531, C531, R533, R534, R526, R527, C427, and IC400), NC, NB
Supplementary information:								

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Clause	Requirement + Test	Result - Remark	Verdict

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:		Verdict
- Chemical leaks		
- Explosion of the battery		
- Emission of flame or expulsion of molten metal		
- Electric strength tests of equipment after completion of tests		
Supplementary information:		

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

Battery identification	Charging at T_{lowest} (°C)	Observation	Charging at $T_{highest}$ (°C)	Observation
Supplementary Information:				

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Clause	Requirement + Test	Result - Remark	Verdict

Annex Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**	N/A

Note: Measured UOC (V) with all load circuits disconnected:

Output Circuit	Components	U_{oc} (V)	I_{sc} (A)		S (VA)	
			Meas.	Limit	Meas.	Limit

Supplementary Information:

SC=Short circuit, OC=Open circuit

T.2, T.3, T.4, T.5	**TABLE: Steady force test**	N/A

Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation

Supplementary information:

T.6, T.9	**TABLE: Impact tests**	N/A

Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation

Supplementary information:

T.7	**TABLE: Drop tests**	N/A

Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation

Supplementary information:

T.8	**TABLE: Stress relief test**	N/A

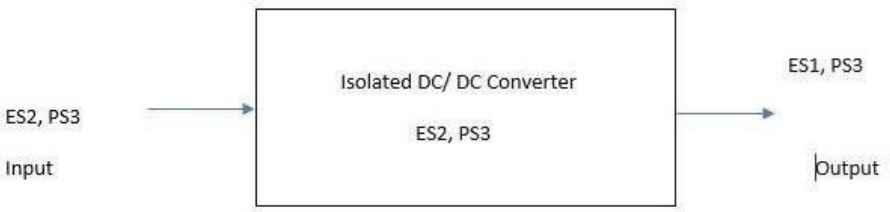
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation

Supplementary information:

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.	
Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input ES1	
Source of electrical energy	**Corresponding classification (ES)**
Input (All Models)	ES2
Output (All Models)	ES1
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	**Corresponding classification (PS)**
Input (All Models)	PS3 (declared)
Output (All Models)	PS3
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	**Corresponding chemical**
N/A	--
Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2	
Source of kinetic/mechanical energy	**Corresponding classification (MS)**
N/A	--
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	**Corresponding classification (TS)**
PWB and Components	TS3 (for building in, to be addressed in the end product)
Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1	
Type of radiation	**Corresponding classification (RS)**
N/A	-

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

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



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Clause	Requirement + Test	Result - Remark	Verdict
4	**GENERAL REQUIREMENTS**		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
5	**ELECTRICALLY-CAUSED INJURY**		Pass
5.2.1	Electrical energy source classifications ..... :	(See appended table 5.2)	Pass
5.2.2	ES1, ES2 and ES3 limits	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	Ringing 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. Energy source ES2	Pass
5.3.2.1	Accessibility to electrical energy sources and safeguards	Energy source is ES2. 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		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	EUT is for building in	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 ..... :		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 ≤ 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		Pass
5.4.8	Humidity conditioning		Pass
	Relative humidity (%) ..... :	93 %	—
	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 ΔU_{sa} ..... :		—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ ..... :		—
5.5	Components as safeguards		Pass
5.5.1	General		Pass
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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^2) .....:		—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2).....:		—
	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^2), 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
5.7.2	Measuring devices and networks		Pass
5.7.2.1	Measurement of touch current .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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
6	**ELECTRICALLY- CAUSED FIRE**		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
6.2.3	Classification of potential ignition sources	All parts in the internal circuits were considered as Arcing PIS and Resistive PIS.	Pass

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Clause	Requirement + Test	Result - Remark	Verdict
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 15 A external fuse during single fault test. Additional testing may be considered in an end product.	Pass
6.4.3.1	General		N/A
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
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

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Clause	Requirement + Test	Result - Remark	Verdict
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	Fire enclosure should be considered in the end-product.	N/A
6.4.8.2.1	Requirements for a fire barrier	Provided in the end-product	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^2) .....:		—
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

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

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Clause	Requirement + Test	Result - Remark	Verdict
7.6	Batteries ..... :		N/A

8	**MECHANICALLY-CAUSED INJURY**		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
	Unit configuration during 10° tilt .....:		—
8.6.4	Glass slide test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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 *N* .....:		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)..... :		—

9	**THERMAL BURN INJURY**		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
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.4.2	Instructional safeguard ..... :		N/A

10	**RADIATION**		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
10.4.2	Instructional safeguard ..... :		N/A
10.5	Protection against x-radiation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.5.1	X- radiation energy source that exists equipment:		N/A
	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).....:		—

B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		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

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Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
B.4.4.1	Short circuit of clearances for functional insulation		N/A
B.4.4.2	Short circuit of creepage distances for functional insulation		N/A
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors		N/A
B.4.6	Short circuit or disconnect of passive components		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
C	**UV RADIATION**		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

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Clause	Requirement + Test	Result - Remark	Verdict
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
D	**TEST GENERATORS**		N/A
D.1	Impulse test generators		N/A
D.2	Antenna interface test generator		N/A
D.3	Electronic pulse generator		N/A
E	**TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS**		N/A
E.1	Audio amplifier normal operating conditions		N/A
	Audio signal voltage (V) .....:		—
	Rated load impedance (Ω) .....:		—
E.2	Audio amplifier abnormal operating conditions		N/A
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		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.	—
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.....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
G	**COMPONENTS**		Pass
G.1	**Switches**		N/A
G.1.1	General requirements		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.2	**Relays**		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
G.3	**Protection Devices**		Pass
G.3.1	Thermal cut-offs		N/A
G.3.1.1a) &b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Thermal cut-off connections maintained and secure		N/A
G.3.2	Thermal links		N/A
G.3.2.1a)	Thermal links separately tested with IEC 60691		N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H) ..... :		—
	Single Fault Condition ..... :		—
	Test Voltage (V) and Insulation Resistance (Ω). :		—
G.3.3	PTC Thermistors		Pass
G.3.4	Overcurrent protection devices	External Fuse used. See Engineering Conditions of Acceptability.	Pass
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

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Clause	Requirement + Test	Result - Remark	Verdict
G.4	**Connectors**		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
G.5	**Wound Components**		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
G.5.3	**Transformers**		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
G.5.4	**Motors**		N/A
G.5.4.1	General requirements		N/A
	Position .....:		—
G.5.4.2	Test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4	Locked-rotor overload test		N/A
	Test duration (days) .....:		—
G.5.4.5	Running overload test for d.c. motors in secondary circuits		N/A
G.5.4.5.2	Tested in the unit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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 ..... :		—
G.6	**Wire Insulation**		N/A
G.6.1	General		N/A
G.6.2	Solvent-based enamel wiring insulation		N/A
G.7	**Mains supply cords**		N/A
G.7.1	General requirements		N/A
	Type ..... :		—
	Rated current (A) ..... :		—
	Cross-sectional area (mm^2), (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
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

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Clause	Requirement + Test	Result - Remark	Verdict
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
G.8	**Varistors**		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
G.9	**Integrated Circuit (IC) Current Limiters**		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
G.10	**Resistors**		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
G.10.3.2	Voltage surge test		N/A
G.10.3.3	Impulse test		N/A
G.11	**Capacitor and RC units**		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
G.12	**Optocouplers**		Pass

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Clause	Requirement + Test	Result - Remark	Verdict
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results).....:		Pass
	Type test voltage Vini .....:	1500 VDDC isolation	—
	Routine test voltage, Vini,b .....:	1500 VDDC isolation	—
G.13	**Printed boards**		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
G.14	**Coating on components terminals**		N/A
G.14.1	Requirements .....:		N/A
G.15	**Liquid filled components**		N/A
G.15.1	General requirements		N/A
G.15.2	Requirements		N/A
G.15.3	Compliance and test methods		N/A
G.15.3.1	Hydrostatic pressure test		N/A
G.15.3.2	Creep resistance test		N/A
G.15.3.3	Tubing and fittings compatibility test		N/A
G.15.3.4	Vibration test		N/A
G.15.3.5	Thermal cycling test		N/A
G.15.3.6	Force test		N/A
G.15.4	Compliance		N/A
G.16	**IC including capacitor discharge function (ICX)**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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 Uc = 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 .....:		—
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		N/A
H.1	General		N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringing 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) .....:		—
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		N/A
	General requirements		N/A
K	**SAFETY INTERLOCKS**		N/A
K.1	General requirements		N/A
K.2	Components of safety interlock safeguard mechanism		N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance .....:		N/A
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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
L	**DISCONNECT DEVICES**		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
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		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
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 .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
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
M.8.2.2	Estimation of hypothetical volume *Vz* (m^3/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

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Clause	Requirement + Test	Result - Remark	Verdict
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
N	**ELECTROCHEMICAL POTENTIALS**		N/A
	Metal(s) used ..... :		—
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		N/A
	Figures O.1 to O.20 of this Annex applied..... :		—
P	**SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS**		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
	Tc (°C)..... :		—
	Tr (°C) ..... :		—
	Ta (°C)..... :		—
P.4.2 b)	Abrasion testing ..... :		N/A
P.4.2 c)	Mechanical strength testing ..... :		N/A
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		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

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Clause	Requirement + Test	Result - Remark	Verdict
	- 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.....:		—
R	**LIMITED SHORT CIRCUIT TEST**		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
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		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
	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).....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	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
T	**MECHANICAL STRENGTH TESTS**		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
	Torque value (Nm) .....:		—
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFECTS OF IMPLOSION**		N/A
U.1	General requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
U.2	Compliance and test method for non-intrinsically protected CRTs		N/A
U.3	Protective Screen .....:		N/A
V	**DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)**		N/A
V.1	Accessible parts of equipment		N/A
V.2	Accessible part criterion		N/A

Enclosure
National Differences

USA / Canada

IEC62368_1B - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62368-1 2th Ed. U.S.A. NATIONAL DIFFERENCES Audio/video, information and communication technology equipment – Part 1: Safety requirements	
Differences according to	CSA/UL 62368-1:2014
Attachment Form No.	US&CA_ND_IEC623681B
Attachment Originator	UL(US)
Master Attachment	Date 2015-06

IEC 62368-1 - US and Canadian National Differences Special National Conditions based on Regulations and Other National Differences			
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

IEC62368_1B - ATTACHMENT			
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 Vpeak 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 m3 (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

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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 m2 (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

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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 1are 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

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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 mm2).		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