Test Report issued under the responsibility of:

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

Report Number .....:	E135494-A6043-CB-1
Date of issue.....:	2020-07-20
Total number of pages .....:	98
Applicant's name.....:	**TDK-LAMBDA UK LTD**
Address .....:	**KINGSLEY AVE** **ILFRACOMBE** **EX34 8ES UNITED KINGDOM**
Name of Test Laboratory preparing the Report .....:	UL VS Limited Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom
Test specification:	
Standard .....:	IEC 62368-1:2014 (Second Edition)
Test procedure .....:	CB Scheme
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62368_1B
Test Report Form(s) Originator .....:	UL(US)
Master TRF.....:	2014-03

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

General disclaimer:

The test results presented in this report relate only to the object tested.
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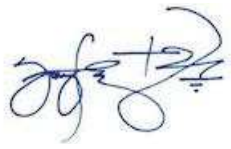
The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test Item description :	AC-DC Power Supply	
Trade Mark .....:	TDK-Lambda	
Manufacturer .....:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM	
Model/Type reference .....:	DRB480-24-1-xyz DRB480-48-1-xyz where x, y, z may be any letter or digit or blank, considered non safety relevant information, see model differences	
Ratings .....:	INPUT: 100-240VAC, 5.4A, 50/60Hz OUTPUT: DRB480-24-1-xyz: 24-26.4Vdc, 20-18.2A (max 480W) DRB480-48-1-xyz: 48-52.8 Vdc, 10-9.09A (max 480W)	
Testing procedure and testing location:		
☒ CB Testing Laboratory:		
Testing location/ address ..... :	UL VS Limited, Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom	
Tested by (name + signature).....:	Mark John De Sagun / Project Handler	
Approved by (name + signature) .....:	Dennis Butcher / Reviewer	
☐ Testing procedure: CTF Stage 1		
Testing location/ address..... :		
Tested by (name + signature).....:		
Approved by (name + signature) .....:		
☐ Testing procedure: CTF Stage 2		
Testing location/ address..... :		
Tested by (name + signature).....:		

Witnessed by (name + signature).....:		
Approved by (name + signature).....:		
☐ Testing procedure: CTF Stage 3		
☐ Testing procedure: CTF Stage 4		
Testing location/ address..... :		
Tested by (name + signature).....:		
Witnessed by (name + signature).....:		
Approved by (name + signature).....:		
Supervised by (name + signature) .....:		

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

National Differences (30 pages)
Enclosures (73 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing Location:** **CBTL: UL VS Limited, Unit 1-3 Horizon, Wade Road, Kingsland Business Park, Basingstoke RG24 8AH, United Kingdom**
CLASSIFICATION OF ELECTRICAL ENERGY SOURCES (5.2, 5.7)	
DETERMINATION OF WORKING VOLTAGE (5.4.1.8)	Test data taken from legacy report. See enclosure 7-03 for waiver of tests taken from 60950-1 report E135494-A109.
ELECTRIC STRENGTH TEST (5.4.9)	
SAFEGUARDS AGAINST CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR (5.5.2.2)	
PROSPECTIVE TOUCH VOLTAGE AND TOUCH CURRENT MEASUREMENT (5.7)	
POWER MEASUREMENTS (6.2.2.2, 6.2.2.3)	
INPUT TEST: SINGLE PHASE (B.2.5)	Additional tests conducted as confirmation testing for 62368 approval. See enclosure 7-03 for waiver of tests taken from 60950-1 report E135494-A109.
NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT (B.2.6)	Additional tests conducted as confirmation testing for 62368 approval. See enclosure 7-03 for waiver of tests taken from 60950-1 report E135494-A109.
SIMULATED ABNORMAL OPERATING CONDITIONS (B.3)	Additional tests conducted as confirmation testing for 62368 approval. See enclosure 7-03 for waiver of tests taken from 60950-1 report E135494-A109.
SIMULATED SINGLE FAULT CONDITIONS (B.4)	Additional tests conducted as confirmation testing for 62368 approval. See enclosure 7-03 for waiver of tests taken from 60950-1 report E135494-A109.

Summary of compliance with National Differences:

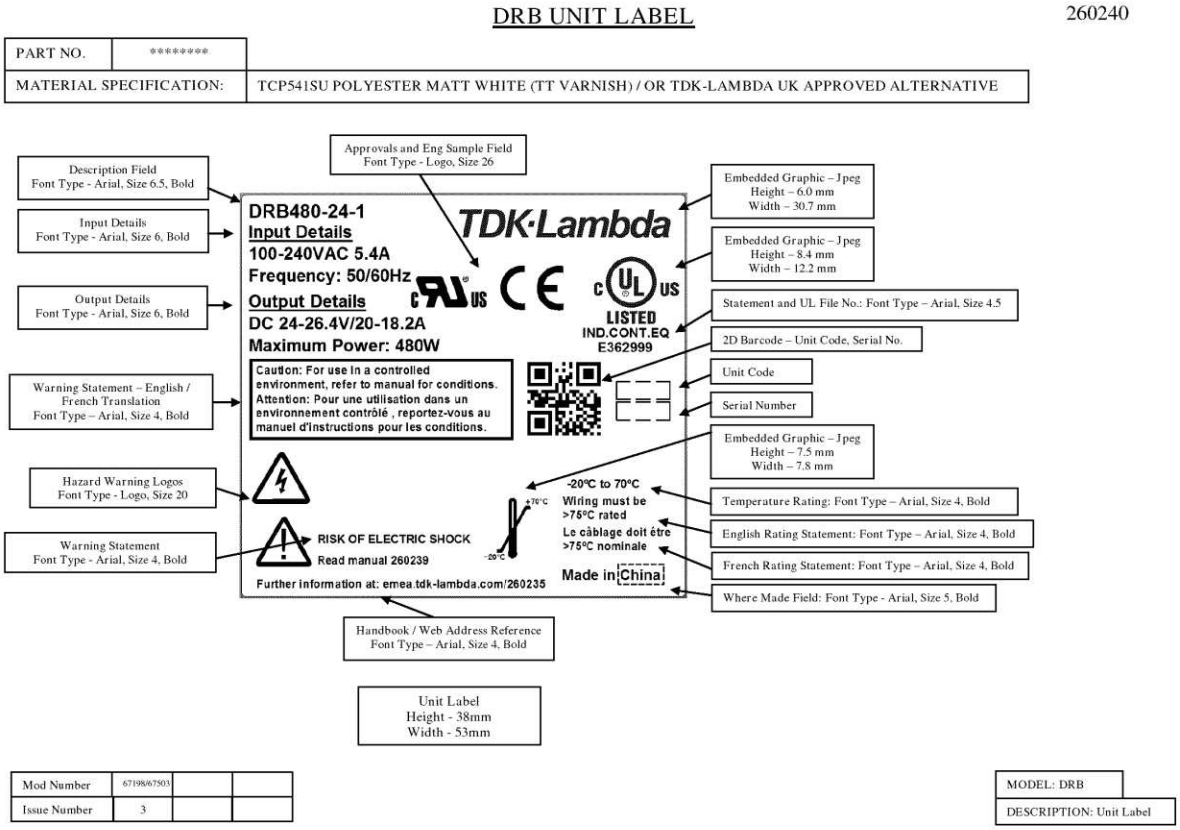
List of countries addressed: Australia / New Zealand, EU Group and National Differences, Japan, USA / Canada

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

☒ **The product fulfils the requirements of:** EN 62368-1:2014 + A11:2017, CSA CAN/CSA-C22.2 No. 62368-1 2nd Edition, Issued December 1, 2014

Copy of marking plate:

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



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

TEST ITEM PARTICULARS:	
Classification of use by	Skilled person
Supply Connection	AC Mains
Supply % Tolerance	+10%/-10%
Supply Connection – Type	mating connector
Considered current rating of protective device as part of building or equipment installation	20 A; building;
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I
Access location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified maximum operating ambient (°C)	50 (at 480W max. output power); 70 (derate linearly down to 300W)
IP protection class	IPX0
Power Systems	TN TT
Altitude during operation (m)	3000 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	1.18
POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
TESTING:	
Date of receipt of test item..... :	2020-06-09
Date (s) of performance of tests..... :	2020-07-03 TO 2020-07-07
GENERAL REMARKS:	
"(See Enclosure #)" refers to additional information appended to the report. **"(See appended table)" refers to a table appended to the report.** **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	PANYU TRIO MICROTRONICS CO LTD SHIJI INDUSTRIAL ESTATE DONGYONG NANSHA GUANGZHOU GUANGDONG 511453 CHINA

GENERAL PRODUCT INFORMATION:

Report Summary

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

Product Description

Device is AC/DC switch mode power supply for building-in on DIN rail.

Model Differences

suffix '-xyz' is optional and denotes customer-specific variant (like fixed voltage or no LED), and is deemed not safety relevant.

Model DRB480-48-1 is mechanically and electrically identical to model DRB480-24-1, except for:

-different output ratings

-different transformer TX1, output choke L5

-different FET on ASSY1

-passive elements in SELV circuit to accomodate different output ratings

-changed PWB layouts -- the safety relevant part (spacings, PE path) remain unchanged,

Primary side of all models is strictly identical.

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

DERATING INFORMATION:

Max. Output power: 480W up to 50°C, derate linearly down to 300W at 70°C. See manual.

Marking label is representative of entire variants.

Technical Considerations

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer’s specification of : 50°C (full load), 70°C (with derating)
- The product is intended for use on the following power systems : TT, TN
- Considered current rating of protective device as part of the building installation (A) : 20
- Mains supply tolerance (%) or absolute mains supply values : +10%/-10%
- The equipment disconnect device is considered to be : to be determined in End Product

- The following were investigated as part of the protective earthing/bonding : Printed wiring board trace (refer to Enclosure - Schematics + PWB for layouts)
- 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, CSA CAN/CSA-C22.2 NO. 62368-1 2nd Ed, Issued December 1, 2014
- Capacitors are rated for 230V due to the IT power system used in Norway. Further evaluation may be required in the end use product.
- Multilayer PWB's accepted under CBTR Ref. No. E349607-A23 dated 2014-07-31 and letter report, see enclosure 8-08 of this report. See enclosure 7-03 for rationale for waived tests.

Engineering Conditions of Acceptability

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

- The following product-line tests are conducted for this product : Earthing Continuity, Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary-Earthed Dead Metal: 326 Vrms, 584 Vpk, Primary-SELV: 264 Vrms, 550 Vpk
- The following output circuits are at ES1 energy levels : Output of DRB480-24 series
- The following output circuits are at ES2 energy levels : Output of DRB480-48 series
- The following output circuits are at PS3 energy levels : All outputs
- The maximum investigated branch circuit rating is : 20A
- The investigated Pollution Degree is : 2
- Proper bonding to the end-product main protective earthing termination is : Required
- An investigation of the protective bonding terminals has : Been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral : J7-2
- The following end-product enclosures are required : Mechanical, Fire, Electrical
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C) : Transformer T1 (class 155°C), Coil L4 (class 155°C), Coli L1 (class 155°C)
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : metal housing (85.8°C) - additional requirements for accessibility to be evaluated in end product.
- The power supply was evaluated to be used at altitudes up to : 3000 m

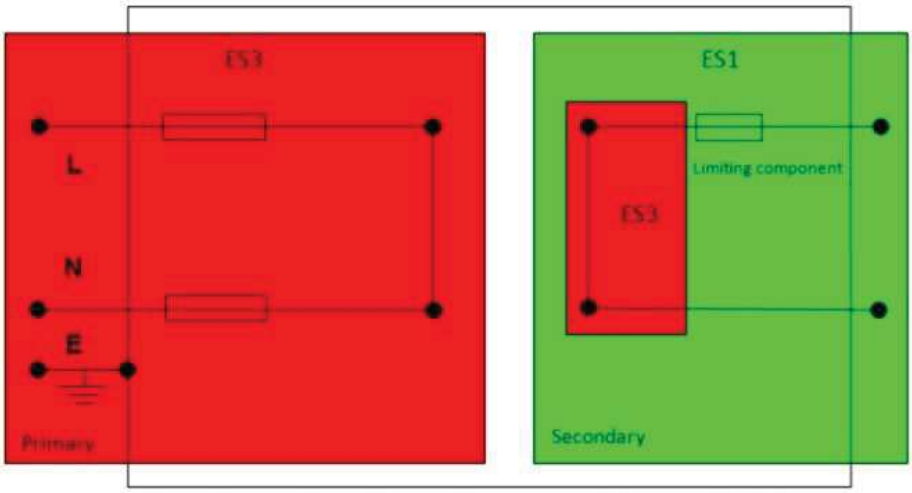
ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite 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)**
Primary circuits (not accessible)	ES3
Input connector (stored capacitance)	ES1
Internal Circuits (pre rectification)	ES3
Output/ Secondary circuits (post rectification) (DRB480-24: 24-26.4Vdc)	ES1
Output/ Secondary circuits (post rectification) (DRB480-48-1: 48-52.8 Vdc)	ES2 (declared)
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	**Corresponding classification (PS)**
All circuits	PS3 (declared)
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	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)**
Equipment Mass	MS1
Sharp Edges & Corners	MS1
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)**
Metal enclosure/chassis	TS3 (accessible to skilled persons only, to be considered in end-system)

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
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)**
LED indicator (within exempt group)	RS1

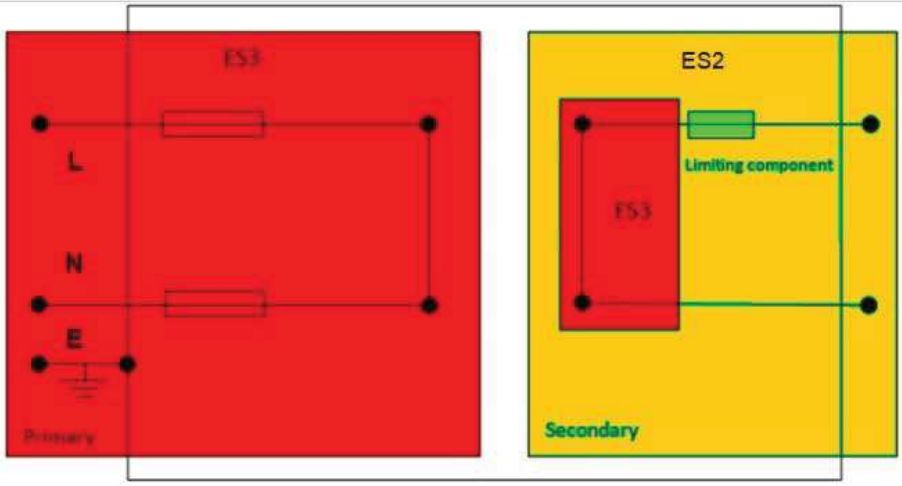
ENERGY SOURCE DIAGRAM
Indicate which energy sources are included in the energy source diagram. Insert diagram below

☒ ES ☒ PS ☒ MS ☒ TS ☒ RS

Electrical Energy Source Classification

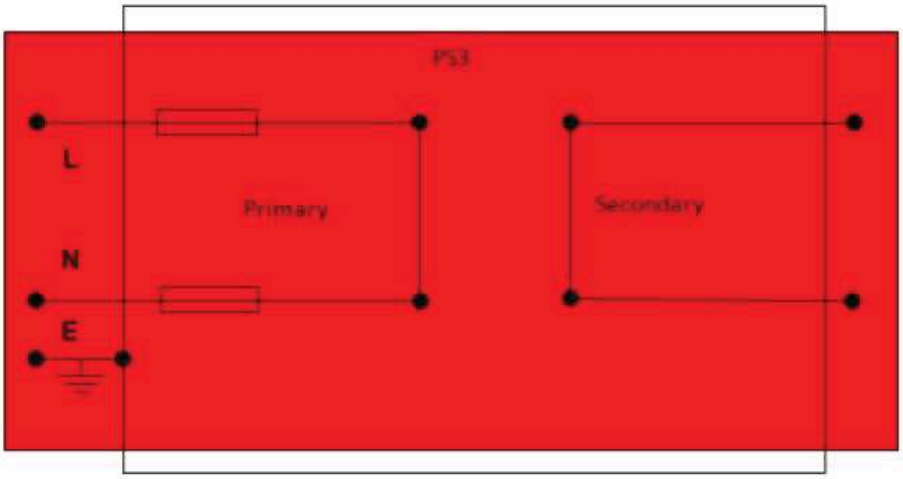


DRB480-24 series

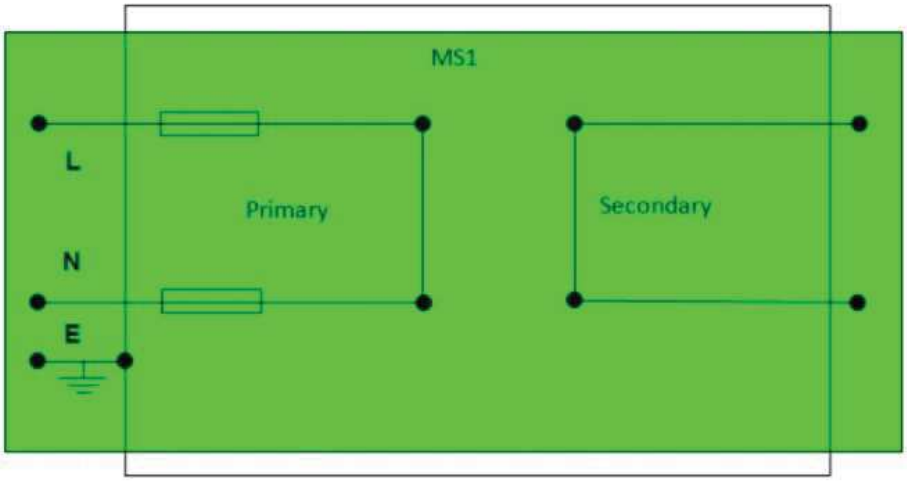


DRB480-48 series

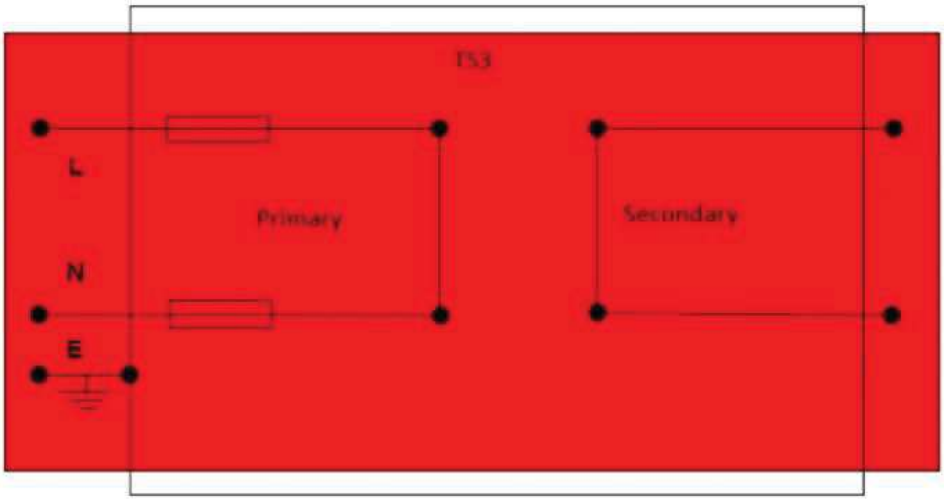
Power Energy Source Classification



Mechanical Energy Source Classification



Thermal Energy Source Classification



OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	**Possible Hazard**			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary Person	ES3: Pins of input terminal	Voltage is ES1 after 2 seconds	Voltage is ES1 after 2 seconds in SFC	N/A
Ordinary Person	ES3: Primary circuits	Y capacitors provided. Clearance and Creepage considered, Basic Insulation to Earthed circuits.	Earthed Chassis	N/A
Ordinary Person	ES3: Internal circuits	N/A	N/A	Clearance and Creepage considered, Reinforced Insulation between Primary and Secondary circuits and distance through insulation considered.
Ordinary Person	ES3: Internal circuits	Basic Insulation to Earthed circuits.	Supplementary insulation; Protectively earthed/ earthed chassis	N/A
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
Transformer: TX1,	PS3: Declared	No ignition occurred. No parts exceeding 300°C or 90% of its spontaneous ignition	Complies with G.5.3. Control of fire spread achieved with PWBs made of V-1 minimum. CoA requires a fire enclosure	N/A

		temperature	be provided by the end equipment manufacturer.	
PWB	PS3: Declared	No ignition occurred. No parts exceeding 300°C or 90% of its spontaneous ignition temperature	Control of fire spread achieved with PWBs made of V-1 minimum. CoA requires a fire enclosure be provided by the end equipment manufacturer.	N/A
All other components	PS3: Declared	No ignition occurred. No parts exceeding 300°C or 90% of its spontaneous ignition temperature	Control of fire spread achieved with PWBs made of V-1 minimum. CoA requires a fire enclosure be provided by the end equipment manufacturer.	N/A
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary Person	MS1: Sharp edges and corners	N/A (does not cause pain or injury)	N/A	N/A
Ordinary Person	MS1: Mass	N/A (≤ 7kg)	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary Person	TS3: Declared (to be considered in end application).	N/A	N/A	N/A
10.1	Radiation			
		Safeguards		

Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Basic	Supplementary	Reinforced
Ordinary Person	RS1: LED indicator	N/A (within exempt group)	N/A	N/A
Supplementary Information:				
(1) See attached energy source diagram for additional details. (2) “N” – Normal Condition; “A” – Abnormal Condition; “S” Single Fault				