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-A6063-CB-1
Date of issue .....:	2023-01-05 ; Amendment 1 : 2024-03-27
Total number of pages .....:	277
Name of Testing Laboratory preparing the Report .....:	UL VS Limited
Applicant's name.....:	**TDK-LAMBDA UK LTD**
Address .....:	**KINGSLEY AVE** **ILFRACOMBE** **DEVON** **EX34 8ES UNITED KINGDOM**
Test specification:	
Standard .....:	IEC 62368-1: 2018
Test procedure.....:	CB Scheme
Non-standard test method.....:	N/A
TRF template used .....:	IECEE OD-2020-F1:2021, Ed.1.4
Test Report Form No.....:	IEC62368_1E
Test Report Form(s) Originator...:	UL(US)
Master TRF .....:	Dated 2022-04-14

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Test Item description :	AC-DC Switch Mode Power Supply
Trade Mark(s) .....:	TDK-Lambda
Manufacturer .....:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM
Model/Type reference .....:	- (K)CUS250M-xxVx/yyyyyyy/(NNNNL), where N is a string of numbers which identifies the non-standard requirement and L is an optional letter, starting with 'A' which is incremented for any customer revisions. - CUS250M-xxVx/yyyyyyy/(SPNN), where SP represents a sales code. NN may be any number of characters indicating non-safety related model differences e.g.: Extra labels on the unit. - (K)CUS250MD-xxVx/yyyyyyy/(NNNNL), where D represents DC input, where N is a string of numbers which identifies the non-standard requirement and L is an optional letter, starting with 'A' which is incremented for any customer revisions. - CUS250MD-xxVx/yyyyyyy/(SPNN), where D represents DC input, SP represents a sales code. NN may be any number of characters indicating non-safety related model differences e.g.: Extra labels on the unit. Where xxVx = Channel 1 standard output voltages, may be 12V, 15V, 18V 24V, 28V, 36V, 48V. The letter "V" only applies to the non-standard output voltages. E.g. 12V6 to represent 12.6V. Where yyyyyyy = unit options such as case options (may be blank, U, A, F, or C), Connector options (may be blank or M), Fuse options (may be blank or E), signal, standby options (may be blank, G, J, or K), Leakage current options (may be blank or T), Output connector options (may be blank or L), Coating options (may be blank or P).
Ratings .....:	Input: 100-240Vac, 3.1A max, 47-440Hz Input: 133-318Vdc, 3.0A max Output: 12 Vdc, 20.83 A or 15 Vdc, 16.66 A or 18 Vdc, 13.88 A or 24 Vdc, 10.42 A or 28 Vdc, 8.92 A or 36 Vdc, 6.94 A or 48 Vdc, 5.2 A

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒ **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, function, signature).....:	Daniel Wong / Project Handler	
Approved by (name, function, signature) ..:	David Snook / Reviewer	
☐ **Testing procedure: CTF Stage 1:**		
Testing location/ address .....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature) ..:		
☐ **Testing procedure: CTF Stage 2:**		
Testing location/ address .....:		
Tested by (name, function, signature).....:		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature) ..:		
☒ **Testing procedure: CTF Stage 3:**		
☐ **Testing procedure: CTF Stage 4:**		
Testing location/ address .....:	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE EX34 8ES UNITED KINGDOM	
Tested by (name, function, signature).....:	Kieren Laffey / Tester	

Witnessed by (name, function, signature) . :	Tracy Burgess / Safety Engineering Manager	See GPI for details
Approved by (name, function, signature) .. :	David Snook / Reviewer	
Supervised by (name, function, signature) :	Daniel Wong / Handler	

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

National Differences (6 pages)
Enclosures (40 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing Location:**
	Unless otherwise noted, test are all conducted in
	CTF Stage 3: TDK-LAMBDA UK LTD
	KINGSLEY AVE
	ILFRACOMBE
	EX34 8ES UNITED KINGDOM
5.2.2.1-5.2.2.6 – CLASSIFICATION OF ELECTRICAL ENERGY SOURCES	
5.4.1.8 – DETERMINATION OF WORKING VOLTAGE	
5.4.9.1 – ELECTRIC STRENGTH TEST – TYPE TESTING OF SOLID INSULATION	
5.5.2.2 – CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR	
5.6.6.2 – RESISTANCE OF THE PROTECTIVE BONDING SYSTEM	
B.2.5 – INPUT TEST: SINGLE PHASE	
B.2.6, 5.4.1.4, 6.3, 9.3, B.1.5 – NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT	
B.3 – SIMULATED ABNORMAL OPERATING CONDITIONS	
B.4 – SIMULATED SINGLE FAULT CONDITIONS	
G.5.3.3 – TRANSFORMER OVERLOAD	
R.1-R.4 - LIMITED SHORT CIRCUIT TEST	

Summary of compliance with National Differences (List of countries addressed):

EU Group Differences, Japan - JP, United States of America - US, Canada - CA

☒ **The product fulfils the requirements of** EN IEC 62368-1:2020+A11:2020

CSA/UL 62368-1:2019

J62368-1(2023)

Use of uncertainty of measurement for decisions on conformity (decision rule) :

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty (“simple acceptance” decision rule, previously known as “accuracy method”).

☐ Other:… (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

Information on uncertainty of measurement:

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE. IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

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

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:	
Product group	built-in component
Classification of use by	Skilled person
Supply Connection	AC Mains DC Mains
Supply tolerance	+10%/-10%
Supply connection – type	mating connector
Considered current rating of protective device	20 A; Location: building
Equipment mobility	for building-in
Over voltage category (OVC)	OVC II
Class of equipment	Class I Class II
Special installation location	N/A
Pollution degree (PD)	PD 2
Manufacturer's specified Tma (°C)	50°C maximum rated ambient (with appropriate deratings) 70°C maximum extended ambient for fan variants 75°C maximum extended ambient for cover variants 80°C maximum extended ambient for open frame and U Channel only variants
IP protection class	IPX0
Power systems	TN TT
Altitude during operation (m)	5000 m
Altitude of test laboratory (m)	2000 m or less
Mass of equipment (kg)	<1
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 .....:	2021-05-17 to 2023-10-23
Date (s) of performance of tests .....:	2023-02-02 to 2023-10-23
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) ..... :	TDK-LAMBDA UK LTD KINGSLEY AVE ILFRACOMBE DEVON EX34 8ES UNITED KINGDOM TDK-LAMBDA MALAYSIA SDN BHD LOT 2 & 3, BATU 9 3/4 KAWASAN PERINDUSTRIAN BANDAR BARU JAYA GADING 26070 KUANTAN Pahang MALAYSIA Panyu Trio Microtronics Co Ltd SHIJI INDUSTRIAL ESTATE DONGYONG NANSHA GUANGZHOU Guangdong Sheng 511453 CHINA Trio-Tronics (Thailand) Ltd 7/295 Mu. 6 Map Yang Phon Sub-District Pluak Daeng District Rayong THAILAND

General product information and other remarks:

The original report was modified on 2024-03-27 to include the following changes/additions:

Technical amendment

This report is updated to include the changes/ additions as below:

1. Added new DC input range and output voltages 15V, 18V, 28V, 36V and 48V;
2. Added marking plate for the DC input model;
3. Updated TEST ITEM PARTICULARS table to include the DC Mains;
4. Added two new factories information:
5. Updated GENERAL PRODUCT INFORMATION section to include the DC input and output information:
6. Updated the ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE and ENERGY SOURCE DIAGRAM;
7. Updated Enclosure section to include new user manual, DRAFT CB CERTIFICATE and certificates of fuses (477 series and UDE series).
8. Updated test tables below:

- Table 5.4.4.2 Minimum Distance Through Insulation;
- Table 5.4.2., 5.4.3 Minimum Clearances/Creepage Distance;
- Table 5.4.1.4, 6.3.2, 9.0, B.2.6 - Temperature measurements;
- Table 5.4.9 Electric strength tests;
- Table 5.5.2.2 SAFEGUARDS AGAINST CAPACITOR DISCHARGE AFTER DISCONNECTION OF A CONNECTOR;
- Table B.2.5 Input Test;
- Table B.3, B.4 Abnormal Operating And Fault Condition Tests;
- Table 5.2 Classification of electrical energy sources;
- Table 5.4.1.8 - Working Voltage Measurement;
- Table 5.6.6 Resistance of protective conductors and terminations;
- Table 5.4.4.9 Solid Insulation At Frequencies
- Table 4.1.2 Critical Component List

This report should be read in conjunction with the (i) CBTR E135494-A6063-CB-1-Original, dated 2023-01-05 and CBTC DK-135319-UL, dated 2023-01-05.

In this report, additional tests were conducted. See Summary of Testing for details.

Product Description

The CUS250M is an AC-DC switch mode power supply designed for building in to end equipment in either a class I or class II configuration.

For end-product Class I configuration, the power supply needs to be reliably earthed, professionally installed and fixed with suitable metal screws.

For end-product Class II configuration, no earth connection is required however the power supply needs to be fixed so that it is insulated from any unearthed accessible conductive part by reinforced insulation.

The CUS250M can be cooled via forced air (top fan and customer air versions), convection or conduction. It is available in the following mechanical configurations:

• Standard model with integral metal baseplate.
• U channel,
• U channel with cover,
• U channel, cover and top mounted fan,
• M3 inserts for underside mounting,
• Custom baseplate / U chassis with alternate fixings / inserts

The unit is fitted with two fuses as standard with one fuse in the live line and one in the neutral line. Option E allows for a single fuse to be fitted in the live line.

Input Parameters

Nominal Input Voltage	100*– 240Vac, 133 – 318Vdc
Input Voltage Range	80** – 264Vac, 120 – 350Vdc
Input Frequency Range	47 – 440Hz
Maximum Input Current	3.1Arms, 3.0Adc

All ratings apply for ambient temperatures up to 50°C (see Variations and Limitations below)

*Output power is reduced by 1%/V between 100V and 90Vac (225W max at 90Vac) however product was tested with full load (250W at 90Vac).

**Output power is reduced by 2%/V between 90V and 80Vac (180W max at 80Vac)

Output Parameters

The model variants listed below may be fan, forced air, conduction or convection cooled. The output parameters are shown in the table below.

CUS250M CH1 Outputs:

Model	Vout Range (V)	Max Iout (A)	Max Pout (W)
12	12 – 13.2	20.83	250
15	15 – 16.5	16.66	250
18	18 – 19.8	13.88	250
24	24 – 26.4	10.42	250
28	28 – 30.8	8.92	250
36	36 – 39.6	6.94	250
48	48 – 52.8	5.2	250

CUS250M Standby Output:

Model	Vout Fixed (V)	Max Iout (A)	Max Pout (W)
5	5	0.1	0.5

CUS250M Fan Output:

Model	Vout Fixed (V)	Iout (A)
F	11.6	0.5

Variations and Limitations:

• Customer forced air cooling max ambient: 85°C (see note 1)

• Convection and conduction/cold plate cooling (U channel with cover, Option A) max ambient: 75°C (see note 1)

• Convection and conduction/cold plate cooling (U channel (U Option) and open frame) max ambient: 80°C (see note 1)

• Fan cooling max ambient: 70°C (F Option) (output power de-rated linearly by 2.5W/°C above 50°C)

Note 1: Maximum output power and current ratings are dependent on the ambient used in the end equipment. Refer to the CUS250M Instruction Manual included in Enclosure 6-01 of this report for further details.

Model Differences

The CUS250M has a maximum rated power of 250W and has several nominal output voltages of 12Vdc, 15Vdc, 18Vdc, 24Vdc, 28Vdc, 36Vdc and 48Vdc. Output parameters are shown in the table above.

Nomenclature

Unit Product Code:CUS250M-xxVx/yyyyyyy

CUS250M may be followed by 'D' for DC Input

Where: xxVx = Channel 1 output voltage, may be any value, from within the output voltage adjustment range from the "Output Parameters" table above.

Where yyyyyyy = unit options from the list of standard options below

Case Options
Blank = Open frame (with integral baseplate)
U = U channel
A = U channel with cover
F = U channel, cover and top mounted fan
C = M3 inserts for underside mounting
N = Custom baseplate / U chassis with alternate fixings / inserts

Connector Options:
Blank = JST connector
M = Molex type connector

Fuse Options:
Blank = Dual fuse (standard)
E = Single fuse in live line

Signal, Standby Options:
Blank = No options (CH1 and fan supply are standard)
G = 5V, 0.1A standby supply, remote on/off (enable), DC_OK, AC_Fail
J = 5V, 0.1A standby supply, remote on/off (inhibit), DC_OK, AC_Fail
K = Remove fan supply (CH1 only)

Leakage Current Options:
Blank = Standard leakage (<150µA)
T = Reduced leakage current (<50µA)

Output Connector Options:
Blank = Screw terminal
L* = Custom option *can be any number denoting different connector type

Coating Options:
Blank = No coating
P = Protective coating

Example: CUS250M-24V5/UEP = 24.5V with U channel, JST connector, single fuse in the live line, no options, standard leakage and protective coating.

Non-standard models:

1) Unit product code may be prefixed with 'K' followed by any standard product code followed by /NNNNL where N is a string of numbers which identifies the non-standard requirement and L is an optional letter, starting with 'A' which is incremented for any customer revisions denoting different output connector types.

Example: KCUS250M-24/0001A

2) Unit product code may be suffixed by /NNNNL where N is a string of numbers which identifies the non-standard requirement. L is an optional letter, starting with 'A', which is incremented for any customer revisions denoting different output connector types.

Example: CUS250M-24/0001A

3) Unit product code may be suffixed by /SPNN (where NN may be any number of characters indicating non-safety related model differences e.g.: Extra labels on the unit) (SP represents a sales code).

Example: CUS250M-24/FE/SP01

Additional Information

The marking label provided is representative of all models and ratings.

The following tests were selected as representative of the test program applicable to model covered by this CBTR: Operating temperature measurement conditions (Cl. B.2.6), Simulated Abnormal Operating Conditions (B.3), and Electric Strength (Cl. 5.4.9).

These tests have been witnessed for models selected as representative of the standard covered by this report and the applicable test program. (4790099713, DA file 331).

This report is based on previously conducted testing and the review of product construction evaluated per IEC/UL 62368-1 2nd edition in CB report Ref. No E135494-A6052-CB-1 with certificate no. DK-120503-UL issued on 2021-11-05.

The following method must be used for determining the safe operation of PSUs.

The PSU shall be evaluated by Heating Test in the end product application. The components listed in the following table must not exceed the temperatures given.

CUS250M forced air cooling temperature table:

Circuit Reference	Description Max.	Temperature (°C)
L1	Common Mode Choke	110
L3	PFC Choke	125
L4	Differential Mode Choke	140
C5	Film Capacitors	105
C6, C104, XC104, XC105, XC400, XC502	Electrolytic Capacitors	85 (105)
C1	X Capacitors	110
C2, C3, C100, C102, C103	Y Capacitors	119 (125)
TX1	Transformer Winding	125
TX300	Transformer Winding	110
XU100, XU301, XU402	Opto-couplers	106 (125)
XD1, XD2, XD3, XD4	Bridge Diodes	130
XQ2	FET	130
J1	Input Connector	105

The CUS250M has a set of power curves defined by the design specification (copies of these curves are provided in the Instruction Manual) which state the maximum power level at different ambient temps. Testing was carried out to reflect the various points of consideration for each power curve.

Heating test at +/- 10% input tolerance at full rated load was conducted at unit with top fan (F option). The unit was able to operate at this condition, as required by the standard, without failure.

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 maximum rated ambient (with appropriate deratings), 70°C maximum extended ambient for fan variants, 75°C maximum extended ambient for cover variants, 80°C maximum extended ambient for open frame and U Channel only variants
- The product is intended for use on the following power systems : TN, TT, DC mains supply
- Considered current rating of protective device as part of the building installation (A) : 20
- Mains supply tolerance (%) or absolute mains supply : +10%/-10% for both AC and DC supplies
- The equipment disconnect device is considered to be : Provided in the end-equipment
- 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 IEC 62368-1:2020+A11:2020, CAN/CSA C22.2 No. 62368-1:19, 3rd Edition
- The means of connection to the mains supply is: to be determined in the end-equipment
- For Class I construction, the power supply will need to be reliably earthed, professionally installed and fixed with suitable metal screws. For Class II construction no earthing connection is required however the power supply needs to be fixed so that it is insulated from any unearthed accessible conductive part by reinforced insulation.
- Capacitors are rated for 230V due to the IT power system used in Norway. Further evaluation may be required in the end equipment for IT power systems
- The total output power and current ratings are both de-rated to ensure power curves are met. Refer to the Instruction Manual included in Enclosure 6-01 of this report.
- IEC 62368-1:2014 2nd Edition report has been accepted for UL/IEC 62368-1:2018 3rd Edition since the technical requirements are the same. Test results from the 2nd Edition report are considered valid for UL/IEC 62368-1 3rd Edition.

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 Test, Electric Strength
- The end-product Electric Strength Test is to be based upon a maximum working voltage of : Primary – Earthed Dead Metal: 408 Vrms/562 Vpk, Primary-Secondary: 463 Vrms/618 Vpk
- The following output circuits are at ES1 energy levels : CH1 output (12V, 15V, 18V, 24V, 28V, 36V models)
- The following output circuits are at ES2 energy levels : CH1 output (48V model)
- The following output circuits are at PS3 energy levels : All circuits (declared)
- The maximum investigated branch circuit rating is : 20 A
- The investigated Pollution Degree is : 2
- Proper bonding to the end-product main protective earthing termination is : Required (except Class II models)
- An investigation of the protective bonding terminals has : not been conducted
- The following input terminals/connectors must be connected to the end-product supply neutral : Neutral terminal marked as "N" of input connector
- The following end-product enclosures are required : Electrical, Fire, Mechanical
- The following magnetic devices (e.g. transformers or inductor) are provided with an OBJY2 insulation system with the indicated rating greater than Class A (105°C) : TX1 (Class F), TX300 (Class B).
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : see "CUS250M forced air cooling temperature table:" in additional information section.
- The power supply was evaluated to be used at altitudes up to : "5,000 m"
- The power supply terminals and/or connectors are: Not investigated for field wiring
- The following output terminals were referenced to earth during performance testing: All outputs and their return lines individually referenced to earth to obtain maximum working voltages
- For option E (single fuse in the live line) the end equipment must be provided with a polarized plug
- For protection from moving parts, the required mechanical enclosure must prevent access to the fan blades. Fan blades should only be accessible to a skilled person after the removal of the metal enclosure. The moving part is obvious.
- Prospective touch voltage, touch current and protective conductor current has not been evaluated for frequency above 63Hz supply and must be evaluated in the end equipment
- Prospective touch voltage and touch current has not been evaluated for Class II constructions and must be evaluated in the end equipment.
- Marking for equipment provided with fuses located in both line and neutral of a single phase mains to be considered in end-product
- Fan provided classified as MS1 class and is not accessible to Ordinary or Instructed persons.
- This product is not permitted to be connected in series.
- 12V units utilizing the JST B4P-VH(LF)(SN) connector under Option L are restricted to 240W.

OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS				
Clause	**Possible Hazard**			
5	Electrically-caused injury			
Class and Energy Source (e.g. ES3: Primary circuit)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
ES3: Pins of input terminal (not accessible, unit for building in)	Ordinary Persons	Voltage is ES1 after 2 seconds	Voltage is ES1 after 2 seconds in a SFC	N/A
ES3: Primary circuits (Class I)	Ordinary Persons (outputs may be accessible)	Y Capacitors (Area Z1. See Encl. 7-02)	Earthed Chassis	N/A
ES3: Primary circuits (Class I)	Ordinary Persons (outputs may be accessible)	Creepage and Clearance (Area B. See Encl. 7-02)	Earthed Chassis	N/A
ES3: Primary circuits (Class I)	Ordinary Persons (outputs may be accessible)	Distance through insulation (Area B. See Encl. 7-02)	Earthed Chassis	N/A
ES3: Primary circuits (Class I & Class II)	Ordinary Persons (outputs may be accessible)	N/A	N/A	Opto-couplers (Area C. See Encl. 7-02)
ES3: Primary circuits (Class I & Class II)	Ordinary Persons (outputs may be accessible)	N/A	N/A	Transformers (Area D, E. See Encl. 7-02)
ES3: Primary circuits (Class I & Class II)	Ordinary Persons (outputs may be accessible)	N/A	N/A	Creepage and Clearance (Area F. See Encl. 7-02)
ES3: Primary circuits (Class II)	Ordinary Persons (outputs may be accessible)	Creepage and Clearance (Area B. See Encl. 7-02)	Creepage and Clearance (Area G. See Encl. 7-02)	N/A
ES3: Primary circuits (Class II)	Ordinary Persons (outputs may be accessible)	Y Capacitors (Area Z1. See Encl. 7-02)	Y Capacitors (Area Z2. See Encl 7-02)	N/A

ES3: Primary circuits (Class II)	Ordinary Persons (outputs may be accessible)	N/A	N/A	Distance through insulation (Plastic baseplate at 0.8mm)
ES2: Secondary circuits after rectification (TX1) 48V models	Ordinary Persons (outputs may be accessible)	N/A	N/A	Creepage and Clearance (Area D, F. See Encl.7-02)
ES1: Secondary circuits after rectification (TX1) 12V, 15V, 18V, 24V, 28V, 36V models	Ordinary Persons (outputs may be accessible)	-	-	-
6	Electrically-caused fire			
Class and Energy Source (e.g. PS2: 100 Watt circuit)	Material part (e.g. Printed board)	Safeguards		
		B	1st S	2nd S
PS3: Declared	Transformers TX1 and TX300	No ignition, no part exceeding 90% of the ignition temp. or 300 °C during normal and abnormal conditions	Complies with Annex G.5.3	N/A
PS3: Declared	PWBs	No ignition, no part exceeding 90% of the ignition temp. or 300 °C during normal and abnormal conditions	Control of Fire Spread achieved with PWBs constructed from materials of at least V-1 rating	N/A
PS3: Declared	All other components	No ignition, no part exceeding 90% of the ignition temp. or 300 °C during normal and abnormal conditions	Components mounted on PWBs constructed from materials of at least V-1 rating. CoA requires that a fire enclosure be provided by	N/A

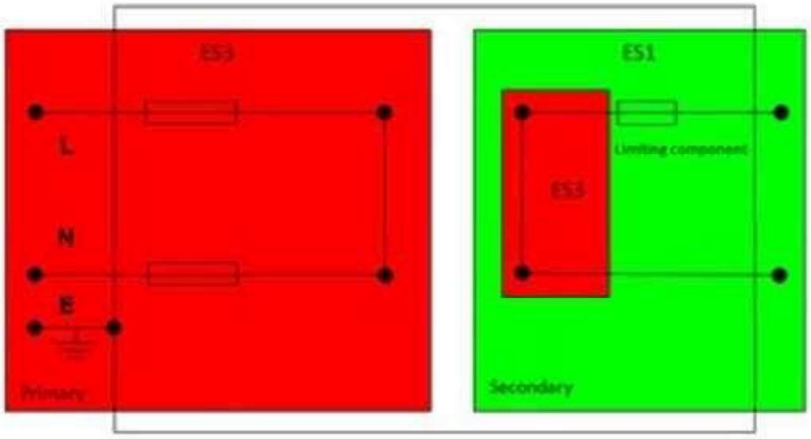
			the end equipment manufacturer	
7	Injury caused by hazardous substances			
Class and Energy Source (e.g. Ozone)	Body Part (e.g., Skilled)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
8	Mechanically-caused injury			
Class and Energy Source (e.g. MS3: Plastic fan blades)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
MS1: Sharp Edges and Corners	Ordinary Persons, Skilled Persons	N/A	N/A	N/A
MS1: Fan Blades	Ordinary Persons, Skilled Persons	N/A*	N/A	N/A
MS1: Mass	Ordinary Persons, Skilled Persons	N/A	NA	N/A
9	Thermal burn			
Class and Energy Source (e.g. TS1: Keyboard caps)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
TS3: Declared (to be considered in the end equipment)	Ordinary Persons	N/A	N/A	N/A
10	Radiation			
Class and Energy Source (e.g. RS1: PMP sound output)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
Supplementary Information:				
"B" – Basic Safeguard; "S" – Supplementary Safeguard; "R" – Reinforced Safeguard (1) See attached energy source diagram for additional details. (2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault *Conditions of acceptibility dictates that a mechanical enclosure be provided in the end equipment. Mechanical enclosure used to prevent access. Fan blades only accessible to skilled persons after removal of the metal enclosure and the moving part is obvious.				

ENERGY SOURCE DIAGRAM
Optional. Manufacturers are to provide the energy sources diagram identify declared energy sources and identifying the demarcations are between power sources. Recommend diagram be provided included in power supply and multipart systems. Insert diagram below. Example diagram designs are; Block diagrams; image(s) with layered data; mechanical drawings

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

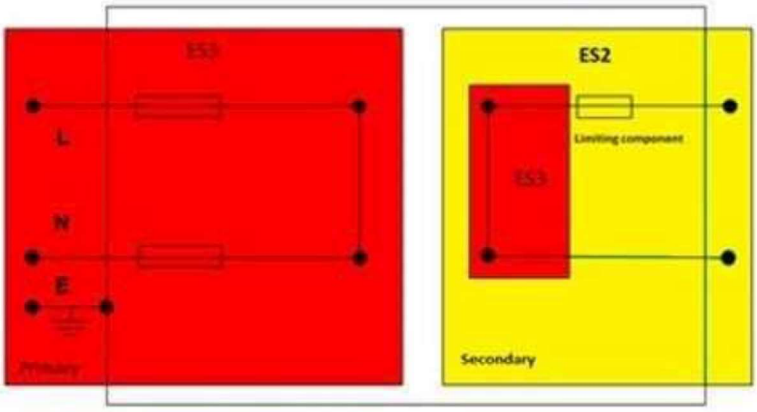
Electrical Source Classification

12V, 15V, 18V, 24V, 28V, 36V output models



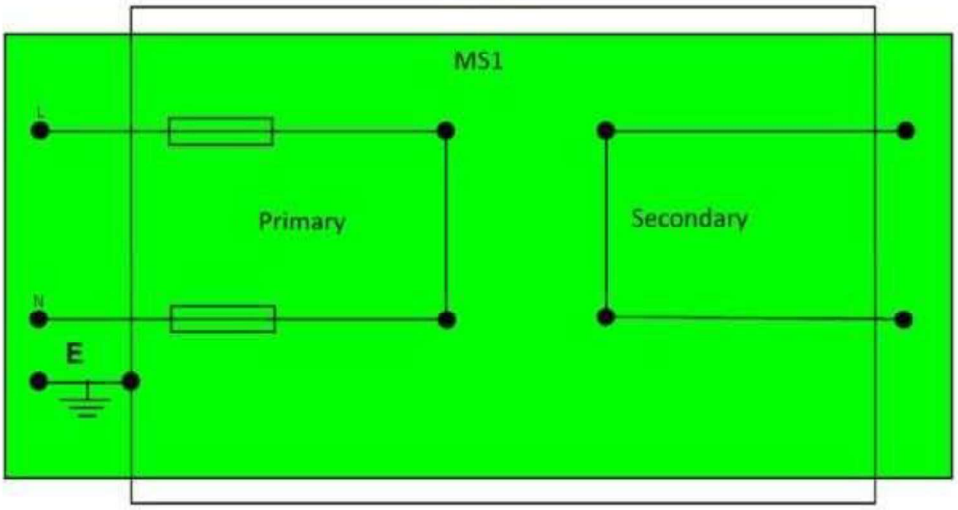
Electrical Source Classification

48V output model



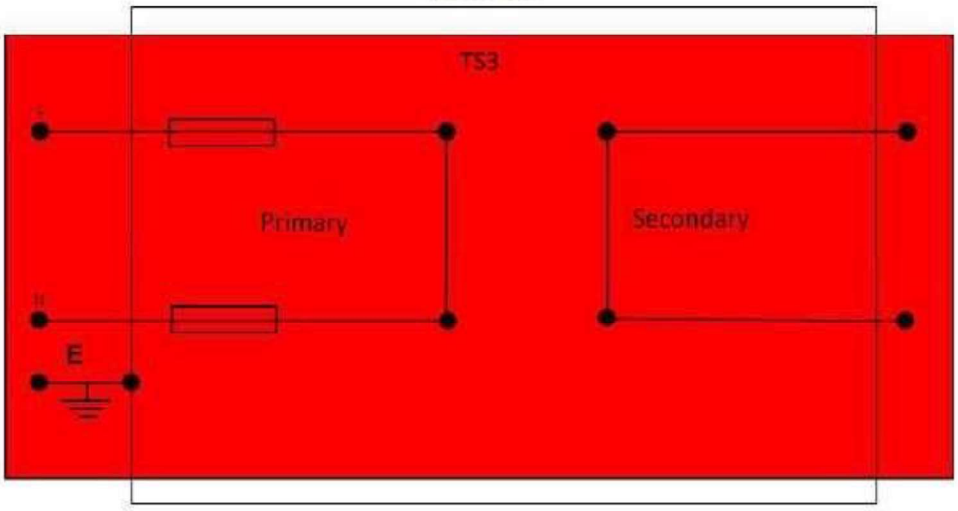
Mechanical Source Classification

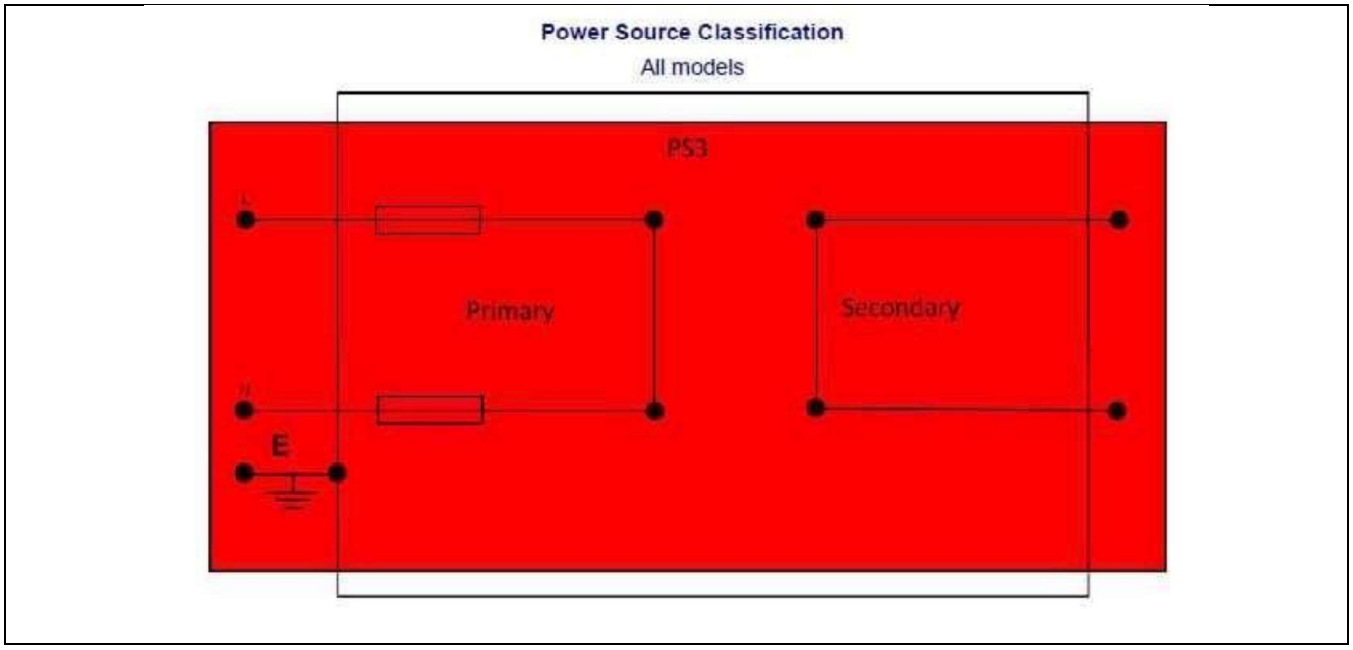
All models



Thermal Source Classification

All models




Power Source Classification
All models
PS3
Primary
Secondary
E