



Test Report issued under the responsibility of:



<b>TEST REPORT</b> <b>IEC 62368-1</b> <b>Audio/video, information and communication technology equipment</b> <b>Part 1: Safety requirements</b>	
<b>Report Number</b> .....	30581696.300
<b>Date of issue</b> .....	March 2, 2021
<b>Total number of pages</b> .....	94 pages + Attachments
<b>Applicant's name</b> .....	TDK-Lambda Americas Inc.
<b>Address</b> .....	401 Mile of Cars Way, Suite 325, National City, CA, 91950 USA
<b>Test specification:</b>	
Standard .....	IEC 62368-1:2014 (Second Edition)
Test procedure .....	CB Scheme
Non-standard test method .....	N/A
<b>Test Report Form No</b> .....	IEC62368_1B
Test Report Form(s) Originator .....	UL(US)
Master TRF .....	2014-03
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<b>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.</b>	
<b>General disclaimer:</b>	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.	

Test Item description .....	Switch Mode Power Supply	
Trade Mark .....	<b>TDK-Lambda</b>	
Manufacturer.....	Same as applicant	
Model/Type reference .....	1) LZS-A500-3; 2) LZS-A 1000-3; 3) LZS-A 1000-2; 4) LZS-A 1500-3-001, 5) LZS-A 1500-4,	
Ratings .....	1) Input: 100-240Vac, 7.3A, 47-63Hz (Operating Range 85-265 V)  2) Input: 100-240Vac, 15A, 47-63Hz (Operating Range 85-265 V)  3) Input: 100-240Vac, 15A, 47-63Hz (Operating Range 85-265 V)  4) Input: 100-240Vac, 18A, 47-63Hz (Operating Range 85-265 V)  5) Input: 100-240Vac, 18A, 47-63Hz (Operating Range 85-265 V)  Output: see rating table for details	
Testing procedure and testing location:		
<input type="checkbox"/>	CB Testing Laboratory:	TUV Rheinland of North America, Inc.
Testing location/ address .....		1279 Quarry Lane, Ste. A, Pleasanton, CA 94566 USA
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address.....		
Tested by (name + signature) .....		
Approved by (name + signature).....		
Testing procedure: TMP/CTF Stage 1		
Testing location/ address.....		
Tested by (name + signature) .....		
Approved by (name + signature).....		
<input checked="" type="checkbox"/>	Testing procedure: WMT/CTF Stage 2	TDK-Lambda Americas, Inc
Testing location/ address.....		401 Mile of Cars Way, Suite 325 National City, CA 91950
Tested by (name + signature) .....		Anthony Villasenor <i>A Villasenor</i>
Witnessed by (name + signature) .....		Dan Aquino <i>[Signature]</i>
Approved by (name + signature).....		Chan Wang <i>[Signature]</i>

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

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

- Attachment 1: National Differences (38 pages)
- Attachment 2: Photographs (7 pages)
- Attachment 3: Transformer Diagrams (22 pages)
- Attachment 4: PCB Layouts (60 pages)
- Attachment 5: Schematic (23 page)
- Attachment 6: Enclosure Diagrams (16 pages)

**Summary of testing:**

The test data was taken from the TUV CB report 30581696.024 which is in accordance with IEC 60950-1.

The product was tested on a bench top with full load which drew the output power to the max. rated value. Refer to body of report and appended tables for details of each test.

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

- 30581696.300  
 Electrical Strength Test (5.4.9)  
 Safeguards Against Capacitor Discharge after Disconnection of a Capacitor (5.5.2.2)  
 Touch Current Test (5.7.2)
- 30581696.024  
 Input Test (B.2.5)  
 Safeguards Against Capacitor Discharge after Disconnection of a Capacitor (5.5.2.2)  
 Resistance of the protective bonding system (5.6.6)  
 Maximum operating temperatures for materials, components and systems (5.4.1.4, 6.3.2, 9.0, B.2.6)  
 Touch Current Test (5.7.2)  
 Electrical Strength Test (5.4.9)  
 Simulated single fault conditions (B.4)  
 Simulated Abnormal operating condition tests (B.3)  
 Power Supply Output Short-Circuit / Overload Test (5.3.7)

**Testing location:**

- 30581696.300  
 TDK-Lambda Americas, Inc.  
 401 Mile of Cars Way, Suite 325  
 National City, CA 91950
- 30581696.024  
 TDK-Lambda Americas, Inc.  
 401 Mile of Cars Way, Suite 325  
 National City, CA 91950

**Summary of compliance with National Differences:**

**List of countries addressed**






EU Group Differences, EU Special National Conditions, CA, DK, US, AU, NZ, IT, JP






Explanation of used codes: CA = Canada, DK = Denmark, US = United States of America, AU = Australia, NZ = New Zealand, IT = Italy, JP = Japan

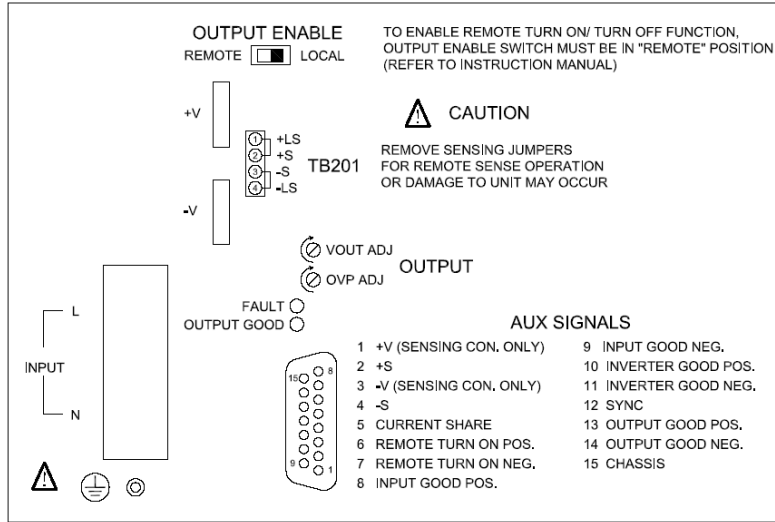
**The product fulfils the requirements of EN 62368-1:2014+A11:2017.**

**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.

<b>TDK·Lambda</b>		CE	c <b>UL</b> <sup>®</sup> <b>US</b> E133400
<b>LZS-A500-3</b>			
REGULATED POWER SUPPLY		c <b>UL</b> <sup>®</sup> <b>US LISTED</b>	
<u>INPUT</u>	<u>OUTPUT</u>	IND. CONT. EQ. 64WA	
100-240 VAC (~)	18.0-29.4 VDC (---)		
47-63 Hz	MAX. RATINGS		
7.3A RMS MAX.	21A (504W) 60°C		
	12.6A (302W) 70°C		
	REV. K		
SEE MANUAL FOR CONNECTIONS AND OTHER INPUT INFORMATION		C APPROVED	
	YYWWFFXXXXXX	TEMP CODE: T3C @ 70°C & 60°C CLASS 1, DIV 2, GROUPS A,B,C & D	
			
		ASSEMBLED IN XXXXXX ZZZZ	

<b>TDK·Lambda</b>		CE	c <b>UL</b> <sup>®</sup> <b>US</b> E133400
<b>LZS-A1000-3</b>			
REGULATED POWER SUPPLY		c <b>UL</b> <sup>®</sup> <b>US LISTED</b>	
<u>INPUT</u>	<u>OUTPUT</u>	IND. CONT. EQ. 64WA	
100-240 VAC (~)	18.0-29.4 VDC (---)		
47-63 Hz	MAX. RATINGS		
15A RMS MAX.	42A (1008W) 60°C		
	25.2A (605W) 70°C		
	REV. M		
SEE MANUAL FOR CONNECTIONS AND OTHER INPUT INFORMATION		APPROVED	
	YYWWFFXXXXXX	TEMP CODE: T3 @ 70°C TEMP CODE: T3A @ 60°C CLASS 1, DIV 2, GROUPS A,B,C & D	
			
		ASSEMBLED IN XXXXXX ZZZZ	



**TDK-Lambda**

**LZS-A1000-2**  
 REGULATED POWER SUPPLY

IND. CONT. EQ. 64WA

<p><b>INPUT</b></p> <p>100-240 VAC (~)              47-63 Hz              15A RMS MAX.</p>	<p><b>OUTPUT</b></p> <p>10.0-15.75 VDC (≡)              MAX. RATINGS              84A (1008W) 60°C              50.4A (605W) 70°C</p>
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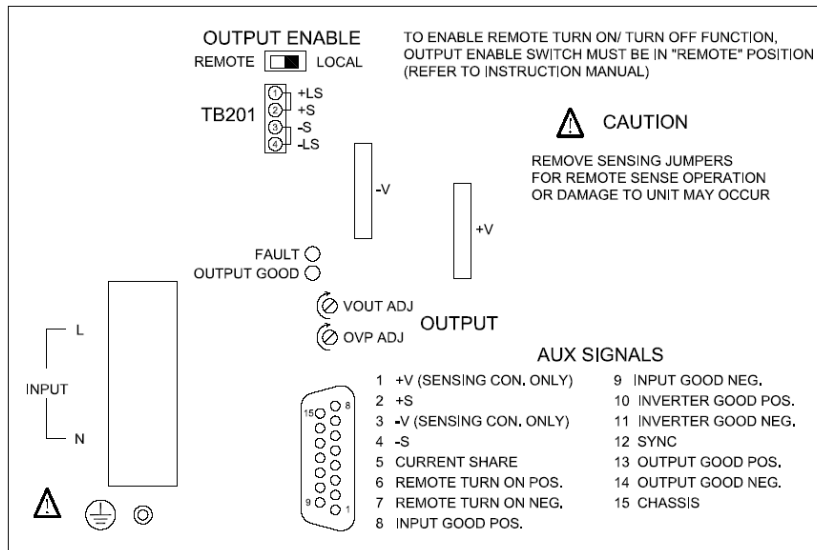
REV. E



YYWWFFXXXXXX



ASSEMBLED IN XXXXXX ZZZZ

TEMP CODE: T3 @ 70°C  
 TEMP CODE: T3A @ 60°C  
 CLASS 1, DIV 2, GROUPS A,B,C & D

SEE MANUAL FOR CONNECTIONS AND OTHER INPUT INFORMATION




**TDK-Lambda**  

**LZS-A1500-4**  
REGULATED POWER SUPPLY  

IND. CONT. EQ.  
64WA

**INPUT**

100-240 VAC (~)  
47-63 Hz  
18A RMS MAX.



  
SEE MANUAL FOR CONNECTIONS AND OTHER INPUT INFORMATION

**OUTPUT**

OUTPUT VOLTAGE: 36.0 - 56.0 VDC (---)  
OUTPUT CURRENT: 31.5A MAX.

MAX. OUTPUT POWER


V <sub>in</sub>	P <sub>o</sub> @ 50°C	P <sub>o</sub> @ 60°C	P <sub>o</sub> @ 70°C
85VAC	1200W	1125W	675W
90VAC	1300W	1200W	720W
95VAC	1400W	1275W	765W
100VAC	1512W	1350W	810W
105VAC	1512W	1425W	855W
110-265VAC	1512W	1512W	907W



APPROVED



TEMP CODE: T4A @ 50°C  
TEMP CODE: T4 @ 60°C  
TEMP CODE: T4A @ 70°C

REV. X4

  
YYWWFFXXXXXX

ASSEMBLED IN XXXXXX ZZZZ


**TDK-Lambda**  

**LZS-A1500-3-001**  
REGULATED POWER SUPPLY  

IND. CONT. EQ.  
64WA

**INPUT**

100-240 VAC (~)  
47-63 Hz  
18A RMS MAX.



  
SEE MANUAL FOR CONNECTIONS AND OTHER INPUT / OUTPUT INFORMATION

**OUTPUT**

OUTPUT VOLTAGE: 18.0-29.4 VDC (---)  
OUTPUT CURRENT: 63A MAX.

MAX. OUTPUT POWER


V <sub>in</sub>	P <sub>o</sub> @ 50°C	P <sub>o</sub> @ 60°C	P <sub>o</sub> @ 70°C
85VAC	1200W	1125W	675W
90VAC	1300W	1200W	720W
95VAC	1400W	1275W	765W
100VAC	1512W	1350W	810W
105VAC	1512W	1425W	855W
110-265VAC	1512W	1512W	907W

APPROVED

TEMP CODE: T4A @ 50°C  
TEMP CODE: T4 @ 60°C  
TEMP CODE: T4 @ 70°C  
CLASS I, DIV 2, GROUPS A,B,C & D

REV. A

  
YYWWFFXXXXXX

ASSEMBLED IN XXXXXX ZZZZ

<b>TEST ITEM PARTICULARS:</b>	
Classification of use by .....	<input type="checkbox"/> Ordinary person <input checked="" type="checkbox"/> Instructed person <input checked="" type="checkbox"/> Skilled person <input type="checkbox"/> Children likely to be present
Supply Connection.....	<input checked="" type="checkbox"/> AC Mains <input type="checkbox"/> DC Mains <input type="checkbox"/> External Circuit - not Mains connected - <input type="checkbox"/> ES1 <input type="checkbox"/> ES2 <input checked="" type="checkbox"/> ES3
Supply % Tolerance .....	<input checked="" type="checkbox"/> +10%/-10% <input type="checkbox"/> +20%/-15% <input type="checkbox"/> + ___% / - ___% <input type="checkbox"/> None
Supply Connection – Type .....	<input type="checkbox"/> pluggable equipment type A - <input type="checkbox"/> non-detachable supply cord <input type="checkbox"/> appliance coupler <input type="checkbox"/> direct plug-in <input type="checkbox"/> mating connector <input type="checkbox"/> pluggable equipment type B - <input type="checkbox"/> non-detachable supply cord <input type="checkbox"/> appliance coupler <input checked="" type="checkbox"/> permanent connection <input type="checkbox"/> mating connector <input type="checkbox"/> other: _____
Considered current rating of protective device as part of building or equipment installation.....	Protective device as part of the building installation (20A for North American) Installation location: <input checked="" type="checkbox"/> building; <input type="checkbox"/> equipment
Equipment mobility .....	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in <input type="checkbox"/> rack-mounting <input type="checkbox"/> wall-mounted
Over voltage category (OVC) .....	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other: _____
Class of equipment .....	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III
Access location .....	<input type="checkbox"/> restricted access location <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Operator Accessible.
Pollution degree (PD) .....	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
Manufacturer's specified maximum operating ambient:	70°C
IP protection class .....	<input checked="" type="checkbox"/> IPX0 <input type="checkbox"/> IP ___
Power Systems .....	<input checked="" type="checkbox"/> TN <input type="checkbox"/> TT <input type="checkbox"/> IT - ___ V <sub>L-L</sub>
Altitude during operation (m) .....	<input type="checkbox"/> 2000 m or less <input checked="" type="checkbox"/> 3000 m
Altitude of test laboratory (m) .....	<input type="checkbox"/> 2000 m or less <input checked="" type="checkbox"/> 3000 m
Mass of equipment (kg) .....	<input checked="" type="checkbox"/> less than 18kg
<b>POSSIBLE TEST CASE VERDICTS:</b>	
- test case does not apply to the test object .....	N/A
- test object does meet the requirement .....	P (Pass)

- test object does not meet the requirement..... :	F (Fail)
<b>TESTING:</b>	
Date of receipt of test item..... :	01/15/2021 (30581696.300) 08/10/2012 (30581696.024)
Date (s) of performance of tests ..... :	01/15/2021 (30581696.300) 08/10/2012 (30581696.024)
<b>GENERAL REMARKS:</b>	
<p>"(See Enclosure #)" refers to additional information appended to the report.  "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC62368-1:</b>	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
<b>When differences exist; they shall be identified in the General product information section.</b>	
Name and address of factory (ies) :	Panyu Trio Microtronics Co., Ltd. Shiji Industrial Estate, Guangzhou, Guandong, 190 China



**GENERAL PRODUCT INFORMATION:****Product Description:**

The equipment is a switch-mode power supply. All models have equivalent construction from a safety-critical standpoint and differ only in output voltage and current due to variations in output resistance values.

The subject power supplies being evaluated in this report are fully enclosed, custom made, single output with forced air-cooling switch mode power supplies

**Conditions of Acceptability:**

1. This units are considered to operate under the conditions of:
  - Pollution Degree 2 environment
  - Equipment mobility: Component for building-in
  - Class of Equipment: Class I (grounded)
2. Rated ambient 60°C at full load, 70°C at 60% load.
3. Fire enclosure requirements must be addressed in the end product.
4. Output is considered to be at hazardous energy levels.
5. All heating tests must be re-evaluated in the end use application.
6. All fuses used are non-user accessible and replaceable UL/CSA-fuses (no further testing necessary).

Output Rating: See below for details.

**Model LZS-A500-3**

Input Voltage (Vac)	Output Voltage (Vdc)	Max Output Current (A)	Max Output Power (W)	Max Ambient (°C)
100-240	18.0-29.4	21.0	504	60
100-240	18.0-29.4	12.6	302	70

**Model LZS-A1000-3**

Input Voltage (Vac)	Output Voltage (Vdc)	Max Output Current (A)	Max Output Power (W)	Max Ambient (°C)
100-240	18.0-29.4	42.0	1008	60
100-240	18.0-29.4	25.5	605	70

**Model LZS-A1000-2**

Input Voltage (Vac)	Output Voltage (Vdc)	Max Output Current (A)	Max Output Power (W)	Max Ambient (°C)
100-240	10.0-15.75	84.0	1008	60
100-240	10.0-15.75	50.4	605	70

**Model LZS-A1500-3-001**

Input Voltage (Vac)	Output Voltage (Vdc)	Max Output Current (A) @ 50°C max ambient	Max Output Power (W) @ 50°C max ambient	Max Output Current (A) @ 60°C max ambient	Max Output Power (W) @ 60°C max ambient	Max Output Current (A) @ 70°C max ambient	Max Output Power (W) @ 70°C max ambient
85	18	63	1134	62.5	1125	37.5	675
	24	50	1200	46.9	1125	28.2	675
	29.4	40.8	1200	38.3	1125	23.0	675
90	18	63	1134	63	1134	40	720
	24	54.2	1300	50	1200	30	720
	29.4	44.2	1300	40.8	1200	24.5	720
95	18	63	1134	63	1134	42.5	765

	24	58.4	1400	53.1	1275	31.9	765
	29.4	47.6	1400	43.4	1275	26.1	765
100	18	63	1134	63	1134	45	810
	24	63	1512	56.3	1350	33.8	810
	29.4	51.4	1512	46.0	1350	27.6	810
105	18	63	1134	63	1134	47.5	855
	24	63	1512	59.4	1425	35.7	855
	29.4	51.4	1512	48.5	1425	29.1	855
110 – 265	18	63	1134	63	1134	50.4	907
	24	63	1512	63	1512	37.8	907
	29.4	51.42	1512	51.42	1512	30.9	907

## Model LZS-A1500-4

Input Voltage (Vac)	Output Voltage (Vdc)	Max Output Current (A) @ 50°C max ambient	Max Output Power (W) @ 50°C max ambient	Max Output Current (A) @ 60°C max ambient	Max Output Power (W) @ 60°C max ambient	Max Output Current (A) @ 70°C max ambient	Max Output Power (A) @ 70°C max ambient
85	36	31.5	1134	31.25	1125	18.75	675
	48	25	1200	23.45	1125	14.1	675
	54	22.25	1200	20.85	1125	12.5	675
90	36	31.5	1134	31.5	1134	20	720
	48	27.1	1300	25	1200	15	720
	54	24.1	1300	22.25	1200	13.35	720
95	36	31.5	1134	31.5	1134	21.25	765
	48	29.2	1400	26.6	1275	15.95	765
	54	25.95	1400	23.6	1275	14.2	765
100	36	31.5	1134	31.5	1134	22.5	810
	48	31.5	1512	28.15	1350	16.9	810
	54	28	1512	25	1350	15	810
105	36	31.5	1134	31.5	1134	23.75	855
	48	31.5	1512	29.7	1425	17.85	855
	54	28	1512	26.4	1425	15.85	855
110 – 265	36	31.5	1134	31.5	1134	25.2	907
	48	31.5	1512	31.5	1512	18.9	907
	54	27	1512	28	1512	16.8	907

**History of CB report:**

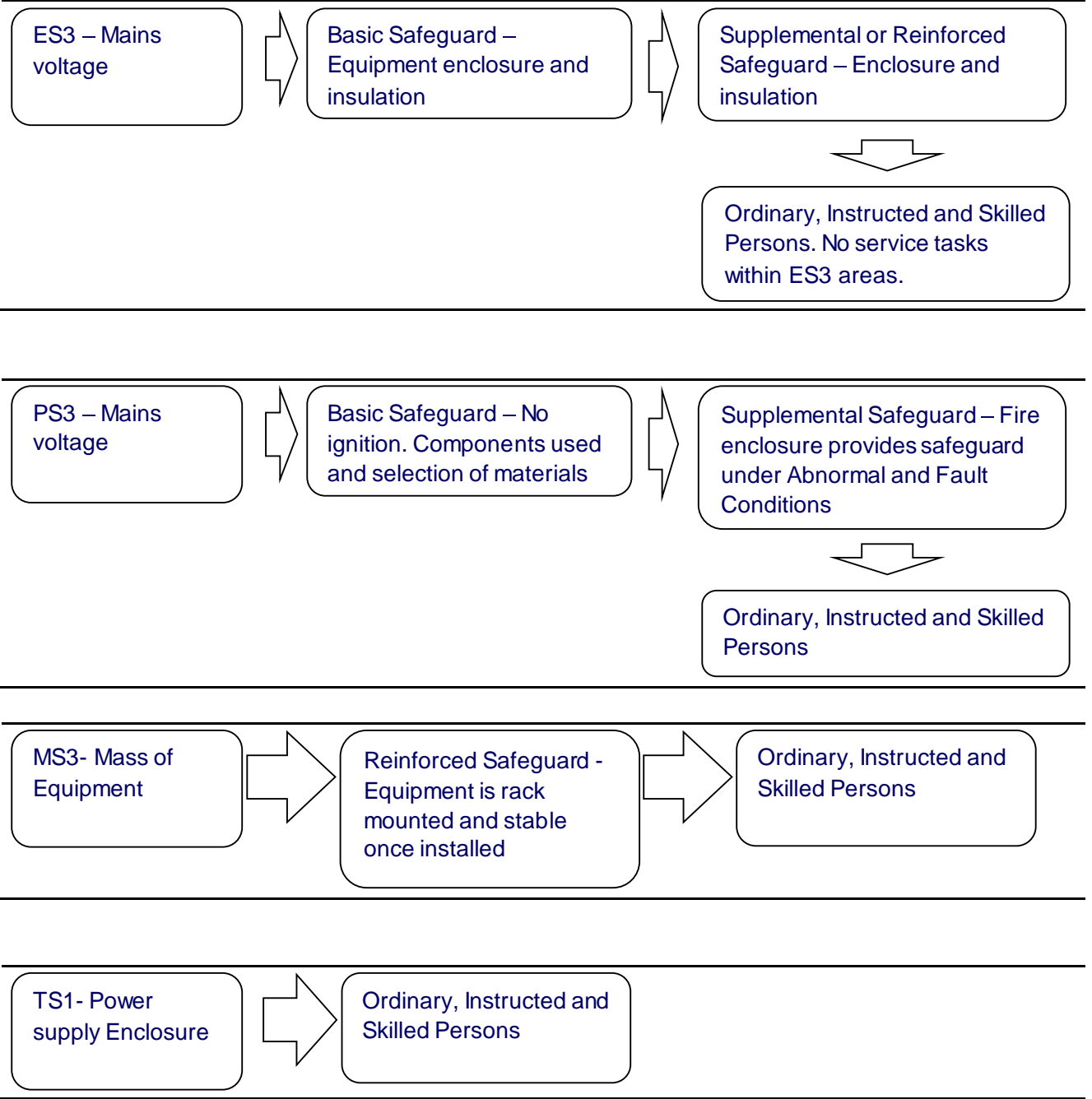
30581696.300 - Original IEC/EN 62368-1 CB report

<b>ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:</b>	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.)	
<b>Electrically-caused injury (Clause 5):</b> (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input <span style="float: right;">ES1</span>	
<b>Source of electrical energy</b>	<b>Corresponding classification (ES)</b>
Primary circuit	ES3
Output circuit	ES3
<b>Electrically-caused fire (Clause 6):</b> (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): <span style="float: right;">PS2</span>	
<b>Source of power or PIS</b>	<b>Corresponding classification (PS)</b>
Power Supply Primary circuit	PS3
Power Supply Output circuit	PS3
<b>Injury caused by hazardous substances (Clause 7)</b> (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component <span style="float: right;">Glycol</span>	
<b>Source of hazardous substances</b>	<b>Corresponding chemical</b>
No hazardous substances present in the product.	N/A
<b>Mechanically-caused injury (Clause 8)</b> (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit <span style="float: right;">MS2</span>	
<b>Source of kinetic/mechanical energy</b>	<b>Corresponding classification (MS)</b>
Equipment Weight/Mass	MS3
Sharp Edges	MS1
<b>Thermal burn injury (Clause 9)</b> (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure <span style="float: right;">TS1</span>	
<b>Source of thermal energy</b>	<b>Corresponding classification (TS)</b>
Power Supply Enclosure	TS1
<b>Radiation (Clause 10)</b> (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product <span style="float: right;">RS1</span>	
<b>Type of radiation</b>	<b>Corresponding classification (RS)</b>
No ionizing radiation produced in the product.	N/A

**ENERGY SOURCE DIAGRAM**

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

ES     PS     MS     TS     RS



<b>OVERVIEW OF EMPLOYED SAFEGUARDS</b>				
<b>Clause</b>	<b>Possible Hazard</b>			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	ES3: primary circuit	Enclosure	Earth	Insulation/ Enclosure
Ordinary	ES3: power supply output	Enclosure	Earth	Insulation/ Enclosure
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
Input	PS3: Mains circuits	Component s and selection of materials	Equipment Enclosure	Insulation/ Enclosure
Output	PS3: Output	Component s and selection of materials	Equipment Enclosure	Insulation/ Enclosure
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
No hazardous substances present in the product.	-	-	-	-
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	MS3: Mass of Equipment	Enclosure	-	-
Ordinary	MS1: Sharp Edges	Enclosure	-	-
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	TS1: Accessible surfaces	Enclosure	-	-
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
No ionizing radiation produced in the product.	-	-	-	-
Supplementary Information: (1) See attached energy source diagram for additional details. (2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault				