
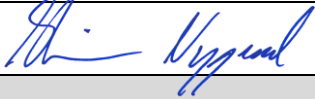




<p><b>TEST REPORT</b>  <b>IEC 62368-1</b>  <b>Audio/video, information and communication technology equipment</b>  <b>Part 1: Safety requirements</b></p>
<p><b>Report Number</b> ..... 384757                  Date of issue ..... February 14, 2020                  Total number of pages ..... 51</p>
<p><b>Applicant's name</b> ..... <b>Power Integrations, Inc.</b>                  Address ..... 5245 Hellyer Avenue, San Jose, CA 95138, USA</p>
<p><b>Test specification:</b>                  Standard ..... IEC 62368-1:2014 (Second Edition)                  Test procedure ..... CB scheme                  Non-standard test method ..... N/A</p>
<p><b>Test Report Form No.</b> ..... IEC62368_1B                  Test Report Form(s) Originator ..... UL(US)                  Master TRF ..... 2014-03</p>
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<p><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.</p>

Test Item description .....	IC including capacitor discharge function (ICX)	
Trade Mark .....	CAPZero-3	
Manufacturer .....	Same as Applicant	
Model/Type reference .....	CAP300DG	
Ratings .....	240V AC, 50-60Hz nominal	
Testing procedure and testing location:		
<input checked="" type="checkbox"/> Testing Laboratory:	<b>Nemko AS</b>	
Testing location/ address .....	Philip Pedersens vei 11 NO-1366 Lysaker Norway	
<input type="checkbox"/> Associated Testing Laboratory:		
Testing location/ address .....		
Tested by (name + signature) .....	Ole Morten Aaslund (Project handler)	
Approved by (name + signature) .....	Steinar Nygaard (Reviewer)	
<input type="checkbox"/> Testing procedure: Elsewhere:		
Testing location/ address .....		
Tested by (name + signature) .....		
Approved by (name + signature) .....		

<p><b>List of Attachments (including a total number of pages in each attachment):</b></p> <p>European group differences and national differences (9 pages)          Photos (2 pages)          Data sheet (6 pages)</p>	
<p><b>Summary of testing:</b></p> <p>Equipment under test (EUT) is an Integrated Circuit including capacitor discharge function (ICX). Requirements for such a component are covered by Annex G.16. Annex G.16 of IEC 62368-1:2018 have been used as the test requirements have been clarified in this standard.</p> <p>Compliance were checked by evaluation of the available data and by conducting tests required by G.16. After tests described in G.16 the capacitor discharge tests were performed according to clause 5.5.2.2. The circuit tested continues to comply with 5.5.2.2. Refer clause 5.5.2.2 for details.</p> <p>Note that compliance with 5.5.2.2 must also be checked when the ICX forms part of an end product.</p> <p>In addition to tests of G.16 evaluation of available data from the manufacturer have been made to prove that the discharge function of the ICX remains the same also during single fault conditions:          The ICX has two dedicated pins for the D1 and D2 terminals which add redundancy during single fault testing (short-circuit or open-circuits). Thus if one pin is physically disconnected from the device or PCB, the ICX will continue to function normally. During a short-circuit the outcome is the same as if the ICX had not been used and results in the discharge resistors being connected in series continuously. Refer also "Product Description" and "Additional application considerations".</p> <p>Extended surge tests performed by the manufacturer to maximize the voltage stress of the ICX. Tests showed that the ICX continued to function as intended even when exposed to surge levels far beyond its intended application.</p>	
<p><b>Tests performed (name of test and test clause):</b></p> <p>5.4.8 Humidity conditioning</p> <p>5.5.2.2 Safeguards against capacitor discharge after disconnection of a connector</p> <p>D.1 Impulse test</p> <p>G.16 IC including capacitor discharge function (ICX)</p>	<p><b>Testing location:</b></p> <p>Nemko AS          Philip Pedersens vei 11          NO-1366 Lysaker          Norway</p>

**Summary of compliance with National Differences:****List of countries addressed**

All CENELEC members as listed in EN 62368-1:2014 + A11:2017

- The product fulfils the requirements of  
IEC 62368-1:2014  
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 Certification Bodies that own these marks.

The following markings are printed on the body of the ICX:

- Power Integrations Logo
- Date code
- Part no.
- Serial no.



<b>Calibration</b>	All instruments used in the tests given in this test report are calibrated and traceable to national or international standards. Further information about traceability will be given on request.
<b>Measurement uncertainty</b>	Measurement uncertainties are calculated for all instruments and instrument set-ups given in this report. Calculations are based on the principles given in the standard EA-4/02 (Dec. 1999), IEC Guide 115:2007 and other relevant internal Nemko-procedures. Further information about measurement uncertainties will be given on request
<b>Evaluation of results</b>	If not explicitly stated otherwise in the standard, the test is passed if the measured value is equal to or below (above) the limit line, regardless of the measurement uncertainty. If the measured value is above (below) the limit line, the test is not passed - ref IEC Guide 115:2007. The instrumentation accuracy is within limits agreed by IECCE-CTL.

TEST ITEM PARTICULARS:	
Classification of use by .....	<input checked="" 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"/> +____%/ -____%
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 type="checkbox"/> permanent connection <input type="checkbox"/> mating connector <input checked="" type="checkbox"/> other:component for building-in
Considered current rating of protective device as part of building or equipment installation .....	N/A
Equipment mobility .....	<input type="checkbox"/> movable (base unit and interface box) <input type="checkbox"/> hand-held (handset) <input type="checkbox"/> transportable (handset) <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 type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III Not applicable, component for building-in
Access location .....	<input type="checkbox"/> restricted access location <input checked="" type="checkbox"/> N/A
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:	105°C
IP protection class .....	<input type="checkbox"/> IPX0 <input type="checkbox"/> IP____ Not applicable, component for building-in
Power Systems .....	<input type="checkbox"/> TN <input type="checkbox"/> TT <input type="checkbox"/> IT - ____ V <sub>L-L</sub> Not applicable, component for building-in
Altitude during operation (m) .....	<input checked="" type="checkbox"/> 2000 m or less <input type="checkbox"/> ____ m
Altitude of test laboratory (m) .....	<input checked="" type="checkbox"/> 2000 m or less (20 m) <input type="checkbox"/> ____ m
Mass of equipment (kg) .....	<input checked="" type="checkbox"/> < 10 g

<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..... :	November 2019
Date (s) of performance of tests..... :	November 2019 – January 2020
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 checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>Not applicable</b>
<b>When differences exist; they shall be identified in the General product information section.</b>	
<b>Name and address of factory (ies) .....</b>	Tianshui Huatian Technology Co., Ltd. (TSHT) No.88 Chiyu Road, Qinzhou District Tianshui City, Gansu Province 741001, P.R. China  Hefei Tongfu Microelectronics Co., Ltd (HTF) No. 578, Weixing Road Hefei, Anhui Province 231200, P.R. China
<b>GENERAL PRODUCT INFORMATION:</b>	
<b>Product Description</b>	
<p>The equipment under tests is an IC including discharge function (ICX). It is used to cope with environmental issues, as it limits the power consumption in standby conditions. The ICX blocks current through X-capacitor discharge resistor when AC voltage is connected, and it automatically discharges X-capacitor trough discharge resistors when AC is disconnected. Figure below shows a typical application of the ICX:</p>	
<p style="text-align: center;">PI-7507a-030819</p>	
<p>Resistors R1+R2 shall be rated for 50% of the system input voltage to allow for the short-circuit of the ICX, D1 to D2 pins, during single fault test.</p>	

During testing the ICX was mounted on a PCB together with a mains fuse (3.15A), X-capacitors and discharge resistors. Refer attached photos for mounting. Values of X-capacitors and discharge resistors are as per recommendation from the manufacturer, and corresponds to table below.

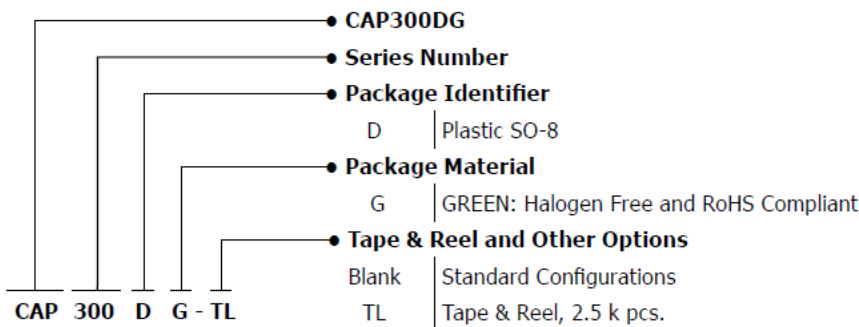
Product <sup>3</sup>	BV <sub>DSS</sub>	Total X Capacitance	Total Series Resistance <sup>2</sup> (R1 + R2)
<b>CAP300DG</b>	1000 V	200 nF to 6 µF	54 kΩ Minimum

Table 1. Component Table.

Notes:

1. IEC 62301 clause 4.5 rounds standby power use below 5 mW to zero.
2. Values are nominal. RC time constant is <1 second.
3. Packages: D: SO-8.

Description of model name CAP300DG:



**Model Differences**

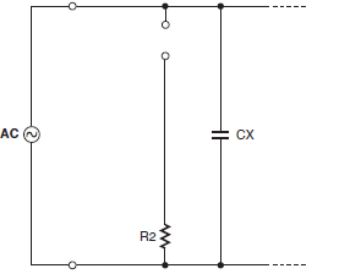
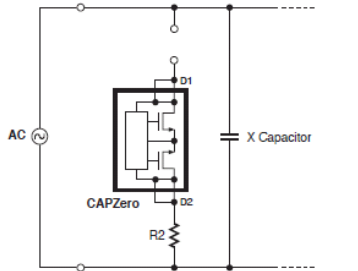
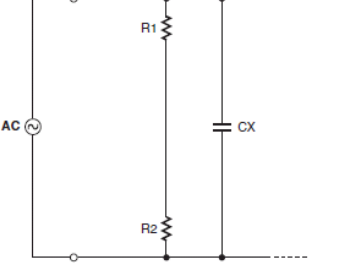
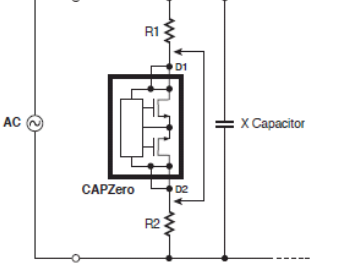
Only one model

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

Evaluation of single fault conditions:

The ICX has two dedicated pins for the D1 and D2 terminals which add redundancy during single fault testing (short-circuit or open-circuits). Thus if one pin is physically disconnected from the device or PCB, the ICX will continue to function normally. During a short-circuit the outcome is the same as if the ICX had not been used and results in the discharge resistors being connected in series continuously. Figure on next page summarizes the results of the worst case single fault tests.



Test	Test With Existing System	CAPZero Equivalent	Comments
<p><b>Open Circuit:</b> Disconnect one pin of any device to see effect on system</p>	 <p style="text-align: right;">PI-5907-041310</p>	 <p style="text-align: right;">PI-8604-110811</p>	<p>Lifting any one pin of the CAPZero device has no effect as 2 pins are connected to each drain terminal. The only way to create an open circuit is by lifting the leads of one of the discharge resistors. This is therefore equivalent to existing system without CAPZero.</p>
<p><b>Short Circuit:</b> Short any 2 adjacent pins to see effect on system</p>	 <p style="text-align: right;">PI-5908-041310</p>	 <p style="text-align: right;">PI-8605-110811</p>	<p>Shorting D1 and D2 pins creates a condition equivalent to an existing system not using CAPZero.</p>

Evaluation of maximum ambient temperature:

Extended tests performed by the manufacturer to prove that the ICX is also reliable at the maximum specified ambient temperature (105°C).

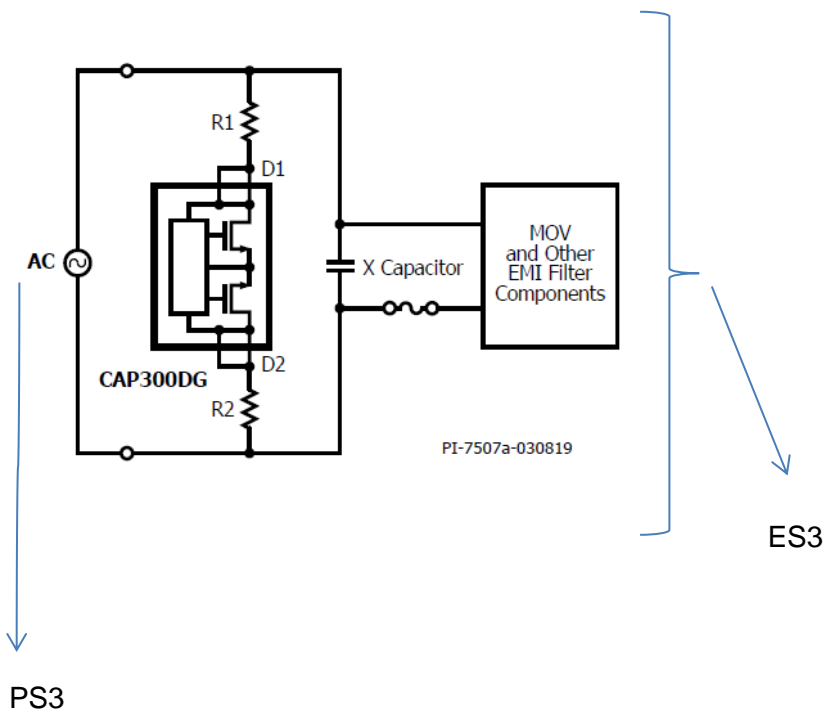
Refer also attached Data sheet from the manufacturer for further details.

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

<b>ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:</b>			
<p>(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.)</p>			
<p><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</p>			
		ES1	
<b>Source of electrical energy</b>		<b>Corresponding classification (ES)</b>	
Charged X-capacitor		ES3, but ES1 after 2 sec (ICX will be located in a circuit classified as ES3, however it complies as a safeguard against capacitor discharge after disconnection of a connector, and therefore considered as ES1 after 2 sec)	
<p><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):</p>			
		PS2	
<b>Source of power or PIS</b>		<b>Corresponding classification (PS)</b>	
The ICX will be located in a circuit intended to be supplied from PS3		PS3	
<p><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</p>			
		Glycol	
<b>Source of hazardous substances</b>		<b>Corresponding chemical</b>	
N/A		N/A	
<p><b>Mechanically-caused injury (Clause 8)</b>            (Note: List moving part(s), fan, special installations, etc. &amp; corresponding MS classification based on Table 35.)            Example: Wall mount unit</p>			
		MS2	
<b>Source of kinetic/mechanical energy</b>		<b>Corresponding classification (MS)</b>	
N/A		N/A	
<p><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</p>			
		TS1	
<b>Source of thermal energy</b>		<b>Corresponding classification (TS)</b>	
N/A		N/A	
<p><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</p>			
		RS1	
<b>Type of radiation</b>		<b>Corresponding classification (RS)</b>	
N/A		N/A	

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

ENERGY SOURCE DIAGRAM
Indicate which energy sources are included in the energy source diagram. Insert diagram below
<input checked="" type="checkbox"/> ES <input checked="" type="checkbox"/> PS <input type="checkbox"/> MS <input type="checkbox"/> TS <input type="checkbox"/> RS



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

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, Instructed, Skilled	ES3 (ICX serves as the safeguard, refer Annex G.16 i.e. ES1 after 2 sec)			
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
N/A				
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
N/A				
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3: High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
N/A				
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
N/A				
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
N/A				
Supplementary Information:				
(1) See attached energy source diagram for additional details.				
(2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault				

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>GENERAL REQUIREMENTS</b>		P
4.1.1	Acceptance of materials, components and subassemblies	-	P
4.1.2	Use of components	-	P
4.1.3	Equipment design and construction	-	P
4.1.15	Markings and instructions .....	(See Annex F)	P
4.4.4	Safeguard robustness	Component for building-in. Must be evaluated as part of an end product.	N/A
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	Component for building-in. Must be evaluated as part of an end product.	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	Component for building-in. Must be evaluated as part of an end product.	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	Component for building-in. Must be evaluated as part of an end product.	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	Component for building-in. Must	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	conductive object..... :	be evaluated as part of an end product.	
<b>5</b>	<b>ELECTRICALLY-CAUSED INJURY</b>		<b>P</b>
5.2.1	Electrical energy source classifications..... :	Component is intended to be located in areas with ES3.	P
5.2.2	ES1, ES2 and ES3 limits	ES3	P
5.2.2.2	Steady-state voltage and current..... :	-	N/A
5.2.2.3	Capacitance limits ..... :	The electrical energy source is considered to be the X-capacitor(s). Values of X-capacitors covered are min. 200nF and max. 6µF. ES1 limit is 60Vp for 6µF, and 75Vp for 100nF.	P
5.2.2.4	Single pulse limits ..... :	-	N/A
5.2.2.5	Limits for repetitive pulses ..... :	-	N/A
5.2.2.6	Ringling signals ..... :	-	N/A
5.2.2.7	Audio signals ..... :	-	N/A
5.3	Protection against electrical energy sources	Component for building-in. Must be evaluated as part of an end product.	N/A
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	-	N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards	-	N/A
5.3.2.2	Contact requirements	-	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		P
5.4.1.2	Properties of insulating material	-	N/A
5.4.1.3	Humidity conditioning ..... :	-	N/A
5.4.1.4	Maximum operating temperature for insulating materials ..... :	-	N/A
5.4.1.5	Pollution degree ..... :	-	—
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

IEC 62368-1			
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	-	N/A
5.4.1.9	Insulating surfaces	-	N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted	-	N/A
5.4.1.10.2	Vicat softening temperature..... :	-	N/A
5.4.1.10.3	Ball pressure ..... :	-	N/A
5.4.2	Clearances	Component for building-in. Must be evaluated as part of an end product.	N/A
5.4.2.2	Determining clearance using peak working voltage	-	N/A
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 ..... :	Component for building-in. Must be evaluated as part of an end product.	N/A
5.4.3.1	General	-	N/A
5.4.3.3	Material Group ..... :	-	—
5.4.4	Solid insulation	Component for building-in. Must be evaluated as part of an end product.	N/A
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

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
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
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	-	N/A
5.4.8	Humidity conditioning	Refer also G.16 a)	P
	Relative humidity (%).....	(93±3)%	—
	Temperature (°C) .....	(40±2)°C	—
	Duration (h) .....	120h	—
5.4.9	Electric strength test .....	-	N/A
5.4.9.1	Test procedure for a solid insulation type test	-	N/A
5.4.9.2	Test procedure for routine tests	-	N/A
5.4.10	Protection against transient voltages between external circuit	-	N/A
5.4.10.1	Parts and circuits separated from external circuits	-	N/A
5.4.10.2	Test methods	-	N/A
5.4.10.2.1	General	-	N/A
5.4.10.2.2	Impulse test .....	-	N/A
5.4.10.2.3	Steady-state test.....	-	N/A
5.4.11	Insulation between external circuits and earthed circuitry .....	-	N/A
5.4.11.1	Exceptions to separation between external circuits and earth	-	N/A
5.4.11.2	Requirements	-	N/A
	Rated operating voltage $U_{op}$ (V).....	-	—
	Nominal voltage $U_{peak}$ (V).....	-	—
	Max increase due to variation $U_{sp}$ .....	-	—
	Max increase due to ageing $\Delta U_{sa}$ .....	-	—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ .....	-	—



IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.5	Components as safeguards		
5.5.1	General	-	P
5.5.2	Capacitors and RC units	ICX is tested and complies with Annex G.16.	P
5.5.2.1	General requirement	ICX is tested and complies with Annex G.16.	P
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector.....:	(See appended table 5.5.2.2)	P
5.5.3	Transformers	-	N/A
5.5.4	Optocouplers	-	N/A
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		
5.6.2	Requirement for protective conductors	-	N/A
5.6.2.1	General requirements	-	N/A
5.6.2.2	Colour of insulation	-	N/A
5.6.3	Requirement for protective earthing conductors	-	N/A
	Protective earthing conductor size (mm <sup>2</sup> ) .....	-	—
5.6.4	Requirement for protective bonding conductors	-	N/A
5.6.4.1	Protective bonding conductors	-	N/A
	Protective bonding conductor size (mm <sup>2</sup> ). .....	-	—
	Protective current rating (A) .....	-	—
5.6.4.3	Current limiting and overcurrent protective devices	-	N/A
5.6.5	Terminals for protective conductors	-	N/A
5.6.5.1	Requirement	-	N/A
	Conductor size (mm <sup>2</sup> ), nominal thread diameter (mm). .....	-	N/A
5.6.5.2	Corrosion	-	N/A
5.6.6	Resistance of the protective system	-	N/A
5.6.6.1	Requirements	-	N/A
5.6.6.2	Test Method Resistance (Ω).....:	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.7	Reliable earthing	-	N/A
5.7	Prospective touch voltage, touch current and protective conductor current		N/A
5.7.2	Measuring devices and networks	-	N/A
5.7.2.1	Measurement of touch current .....	-	N/A
5.7.2.2	Measurement of prospective touch voltage	-	N/A
5.7.3	Equipment set-up, supply connections and earth connections	-	N/A
	System of interconnected equipment (separate connections/single connection) .....	-	—
	Multiple connections to mains (one connection at a time/simultaneous connections) .....	-	—
5.7.4	Earthed conductive accessible parts .....	-	N/A
5.7.5	Protective conductor current	-	N/A
	Supply Voltage (V).....	-	—
	Measured current (mA).....	-	—
	Instructional Safeguard.....	-	N/A
5.7.6	Prospective touch voltage and touch current due to external circuits	-	N/A
5.7.6.1	Touch current from coaxial cables	-	N/A
5.7.6.2	Prospective touch voltage and touch current from external circuits	-	N/A
5.7.7	Summation of touch currents from external circuits	-	N/A
	a) Equipment with earthed external circuits Measured current (mA).....	-	N/A
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA) .....	-	N/A

<b>6</b>	<b>ELECTRICALLY- CAUSED FIRE</b>		N/A
6.2	Classification of power sources (PS) and potential ignition sources (PIS)		N/A
6.2.2	Power source circuit classifications	Assumed to be PS3, but must be evaluated in the end product.	N/A
6.2.2.1	General	-	N/A
6.2.2.2	Power measurement for worst-case load fault ... :	-	N/A
6.2.2.3	Power measurement for worst-case power source fault .....	-	N/A
6.2.2.4	PS1 .....	-	N/A
6.2.2.5	PS2 .....	-	N/A
6.2.2.6	PS3 .....	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.2.3	Classification of potential ignition sources	-	N/A
6.2.3.1	Arcing PIS .....	-	N/A
6.2.3.2	Resistive PIS .....	-	N/A
6.3	Safeguards against fire under normal operating and abnormal operating conditions		N/A
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 .....	-	N/A
6.3.1 (b)	Combustible materials outside fire enclosure	-	N/A
6.4	Safeguards against fire under single fault conditions		N/A
6.4.1	Safeguard Method	-	N/A
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	-	N/A
6.4.3.1	General	-	N/A
6.4.3.2	Supplementary Safeguards	-	N/A
	Special conditions if conductors on printed boards are opened or peeled	-	N/A
6.4.3.3	Single Fault Conditions .....	-	N/A
	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	-	N/A
6.4.5.2	Supplementary safeguards .....	-	N/A
6.4.6	Control of fire spread in PS3 circuit	-	N/A
6.4.7	Separation of combustible materials from a PIS	-	N/A
6.4.7.1	General .....	-	N/A
6.4.7.2	Separation by distance	-	N/A
6.4.7.3	Separation by a fire barrier	-	N/A
6.4.8	Fire enclosures and fire barriers	-	N/A
6.4.8.1	Fire enclosure and fire barrier material properties	-	N/A
6.4.8.2.1	Requirements for a fire barrier	-	N/A
6.4.8.2.2	Requirements for a fire enclosure	-	N/A
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier	-	N/A
6.4.8.3.1	Fire enclosure and fire barrier openings	-	N/A
6.4.8.3.2	Fire barrier dimensions	-	N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) .....	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Needle Flame test	-	N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm) .....	-	N/A
	Flammability tests for the bottom of a fire enclosure .....	-	N/A
6.4.8.3.5	Integrity of the fire enclosure, condition met: a), b) or c) .....	-	N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating .....	-	N/A
6.5	Internal and external wiring		N/A
6.5.1	Requirements	-	N/A
6.5.2	Cross-sectional area (mm <sup>2</sup> ) .....	-	—
6.5.3	Requirements for interconnection to building wiring .....	-	N/A
6.6	Safeguards against fire due to connection to additional equipment	-	N/A
	External port limited to PS2 or complies with Clause Q.1	-	N/A

<b>7</b>	<b>INJURY CAUSED BY HAZARDOUS SUBSTANCES</b>		N/A
7.2	Reduction of exposure to hazardous substances	Component for building-in. Must be checked in the end product.	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) .....	-	—
7.6	Batteries.....	-	N/A

<b>8</b>	<b>MECHANICALLY-CAUSED INJURY</b>		N/A
8.1	General	Component for building-in. Must be checked in the end product.	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

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

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.9.1	Classification	-	N/A
8.9.2	Applied force .....	-	—
8.10	Carts, stands and similar carriers	-	N/A
8.10.1	General	-	N/A
8.10.2	Marking and instructions	-	N/A
	Instructional Safeguard.....	-	—
8.10.3	Cart, stand or carrier loading test and compliance	-	N/A
	Applied force .....	-	—
8.10.4	Cart, stand or carrier impact test	-	N/A
8.10.5	Mechanical stability	-	N/A
	Applied horizontal force (N) .....	-	—
8.10.6	Thermoplastic temperature stability (°C).....	-	N/A
8.11	Mounting means for rack mounted equipment	-	N/A
8.11.1	General	-	N/A
8.11.2	Product Classification	-	N/A
8.11.3	Mechanical strength test, variable <i>N</i> .....	-	N/A
8.11.4	Mechanical strength test 250N, including end stops	-	N/A
8.12	Telescoping or rod antennas .....	-	N/A
	Button/Ball diameter (mm) .....	-	—

<b>9</b>	<b>THERMAL BURN INJURY</b>		N/A
9.2	Thermal energy source classifications	Component for building-in. Must be checked in the end product.	N/A
9.3	Safeguard against thermal energy sources	-	N/A
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard	-	N/A
9.4.2	Instructional safeguard .....	-	N/A

<b>10</b>	<b>RADIATION</b>		N/A
10.2	Radiation energy source classification	Component for building-in. Must be checked in the end product.	N/A
10.2.1	General classification	-	N/A
10.3	Protection against laser radiation	-	N/A
	Laser radiation that exists equipment:	-	—
	Normal, abnormal, single-fault.....	-	N/A
	Instructional safeguard .....	-	—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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
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..... :	-	—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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>B</b>	<b>NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS</b>		P
B.2	Normal Operating Conditions	Tested according to the requirements of Annex G.16.	P
B.2.1	General requirements .....	-	P
	Audio Amplifiers and equipment with audio amplifiers .....	-	N/A
B.2.3	Supply voltage and tolerances	-	N/A
B.2.5	Input test.....	-	N/A
B.3	Simulated abnormal operating conditions		N/A
B.3.1	General requirements .....	-	N/A
B.3.2	Covering of ventilation openings	-	N/A
B.3.3	D.C. mains polarity test	-	N/A
B.3.4	Setting of voltage selector .....	-	N/A
B.3.5	Maximum load at output terminals .....	-	N/A
B.3.6	Reverse battery polarity	-	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	-	N/A
B.4	Simulated single fault conditions		N/A
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>IEC 62368-1</b>			
Clause	Requirement + Test	Result - Remark	Verdict
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	-	N/A
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
<b>C</b>	<b>UV RADIATION</b>		N/A
C.1	Protection of materials in equipment from UV radiation	-	N/A
C.1.2	Requirements	-	N/A
C.1.3	Test method	-	N/A
C.2	UV light conditioning test	-	N/A
C.2.1	Test apparatus	-	N/A
C.2.2	Mounting of test samples	-	N/A
C.2.3	Carbon-arc light-exposure apparatus	-	N/A
C.2.4	Xenon-arc light exposure apparatus	-	N/A
<b>D</b>	<b>TEST GENERATORS</b>		P
D.1	Impulse test generators	Refer G.16.	P
D.2	Antenna interface test generator	-	N/A
D.3	Electronic pulse generator	-	N/A
<b>E</b>	<b>TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS</b>		N/A
E.1	Audio amplifier normal operating conditions	-	N/A
	Audio signal voltage (V) ..... :	-	—
	Rated load impedance ( $\Omega$ ) ..... :	-	—
E.2	Audio amplifier abnormal operating conditions	-	N/A
<b>F</b>	<b>EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS</b>		P
F.1	General requirements	-	P
	Instructions – Language ..... :	English	—
F.2	Letter symbols and graphical symbols	-	N/A
F.2.1	Letter symbols according to IEC60027-1	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
F.2.2	Graphic symbols IEC, ISO or manufacturer specific	-	N/A
F.3	Equipment markings		P
F.3.1	Equipment marking locations	On the body of the ICX.	P
F.3.2	Equipment identification markings	Refer below:	P
F.3.2.1	Manufacturer identification .....	The logo of Power Integrations applied.	—
F.3.2.2	Model identification .....	CAP300DG	—
F.3.3	Equipment rating markings	Not for direct connection to the mains. No ratings marked on the component itself.	P
F.3.3.1	Equipment with direct connection to mains	-	N/A
F.3.3.2	Equipment without direct connection to mains	-	P
F.3.3.3	Nature of supply voltage .....	Intended for AC, but not marked.	—
F.3.3.4	Rated voltage .....	Rated nominal voltage is declared to be 240V AC.	—
F.3.3.4	Rated frequency .....	50-60Hz nominal.	—
F.3.3.6	Rated current or rated power .....	Not rated.	—
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	Component for building-in. Classification must be considered for the end product.	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

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
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	Laser engraved.	P
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
	i) Permanently connected equipment not provided with all-pole mains switch	-	N/A
j)	j) Replaceable components or modules providing safeguard function	-	N/A
F.5	Instructional safeguards	-	N/A
	Where “instructional safeguard” is referenced in the test report it specifies the required elements, location of marking and/or instruction	-	N/A
<b>G</b>	<b>COMPONENTS</b>		<b>P</b>
<b>G.1</b>	<b>Switches</b>		<b>N/A</b>
G.1.1	General requirements	-	N/A
G.1.2	Ratings, endurance, spacing, maximum load	-	N/A
<b>G.2</b>	<b>Relays</b>		<b>N/A</b>
G.2.1	General requirements	-	N/A
G.2.2	Overload test	-	N/A
G.2.3	Relay controlling connectors supply power	-	N/A
G.2.4	Mains relay, modified as stated in G.2	-	N/A
<b>G.3</b>	<b>Protection Devices</b>		<b>N/A</b>
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

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
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 ( $\Omega$ ). :	-	—
G.3.3	PTC Thermistors	-	N/A
G.3.4	Overcurrent protection devices	-	N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided	-	N/A
G.3.5.2	Single faults conditions .....	-	N/A
<b>G.4</b>	<b>Connectors</b>		N/A
G.4.1	Spacings	-	N/A
G.4.2	Mains connector configuration .....	-	N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely	-	N/A
<b>G.5</b>	<b>Wound Components</b>		N/A
G.5.1	Wire insulation in wound components.....	-	N/A
G.5.1.2 a)	Two wires in contact inside wound component, angle between 45° and 90°	-	N/A
G.5.1.2 b)	Construction subject to routine testing	-	N/A
G.5.2	Endurance test on wound components	-	N/A
G.5.2.1	General test requirements	-	N/A
G.5.2.2	Heat run test	-	N/A
	Time (s) .....	-	—
	Temperature (°C) .....	-	—
G.5.2.3	Wound Components supplied by mains	-	N/A
<b>G.5.3</b>	<b>Transformers</b>		N/A
G.5.3.1	Requirements applied (IEC61204-7, IEC61558-1/-2, and/or IEC62368-1) .....	-	N/A
	Position.....	-	—
	Method of protection .....	-	—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.5.3.2	Insulation	-	N/A
	Protection from displacement of windings .....	-	—
G.5.3.3	Overload test .....	-	N/A
G.5.3.3.1	Test conditions	-	N/A
G.5.3.3.2	Winding Temperatures testing in the unit	-	N/A
G.5.3.3.3	Winding Temperatures - Alternative test method	-	N/A
<b>G.5.4</b>	<b>Motors</b>		N/A
G.5.4.1	General requirements	-	N/A
	Position .....	-	—
G.5.4.2	Test conditions	-	N/A
G.5.4.3	Running overload test	-	N/A
G.5.4.4	Locked-rotor overload test	-	N/A
	Test duration (days) .....	-	—
G.5.4.5	Running overload test for d.c. motors in secondary circuits	-	N/A
G.5.4.5.2	Tested in the unit	-	N/A
	Electric strength test (V) .....	-	—
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h) .....	-	N/A
	Electric strength test (V) .....	-	—
G.5.4.6	Locked-rotor overload test for d.c. motors in secondary circuits	-	N/A
G.5.4.6.2	Tested in the unit	-	N/A
	Maximum Temperature .....	-	N/A
	Electric strength test (V) .....	-	N/A
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h) .....	-	N/A
	Electric strength test (V) .....	-	N/A
G.5.4.7	Motors with capacitors	-	N/A
G.5.4.8	Three-phase motors	-	N/A
G.5.4.9	Series motors	-	N/A
	Operating voltage .....	-	—
<b>G.6</b>	<b>Wire Insulation</b>		N/A
G.6.1	General	-	N/A
G.6.2	Solvent-based enamel wiring insulation	-	N/A
<b>G.7</b>	<b>Mains supply cords</b>		N/A
G.7.1	General requirements	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Type .....	-	—
	Rated current (A).....	-	—
	Cross-sectional area (mm <sup>2</sup> ), (AWG) .....	-	—
G.7.2	Compliance and test method	-	N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords	-	N/A
G.7.3.2	Cord strain relief	-	N/A
G.7.3.2.1	Requirements	-	N/A
	Strain relief test force (N) .....	-	—
G.7.3.2.2	Strain relief mechanism failure	-	N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)....	-	—
G.7.3.2.4	Strain relief comprised of polymeric material	-	N/A
G.7.4	Cord Entry .....	-	N/A
G.7.5	Non-detachable cord bend protection	-	N/A
G.7.5.1	Requirements	-	N/A
G.7.5.2	Mass (g) .....	-	—
	Diameter (m) .....	-	—
	Temperature (°C) .....	-	—
G.7.6	Supply wiring space	-	N/A
G.7.6.2	Stranded wire	-	N/A
G.7.6.2.1	Test with 8 mm strand	-	N/A
<b>G.8</b>	<b>Varistors</b>		N/A
G.8.1	General requirements	-	N/A
G.8.2	Safeguard against shock	-	N/A
G.8.3	Safeguard against fire		N/A
G.8.3.2	Varistor overload test .....	-	N/A
G.8.3.3	Temporary overvoltage .....	-	N/A
<b>G.9</b>	<b>Integrated Circuit (IC) Current Limiters</b>		N/A
G.9.1 a)	Manufacturer defines limit at max. 5A.	-	N/A
G.9.1 b)	Limiters do not have manual operator or reset	-	N/A
G.9.1 c)	Supply source does not exceed 250 VA .....	-	—
G.9.1 d)	IC limiter output current (max. 5A) .....	-	—
G.9.1 e)	Manufacturers' defined drift .....	-	—
G.9.2	Test Program 1	-	N/A
G.9.3	Test Program 2	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.9.4	Test Program 3	-	N/A
<b>G.10</b>	<b>Resistors</b>		N/A
G.10.1	General requirements	-	N/A
G.10.2	Resistor test	-	N/A
G.10.3	Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable	-	N/A
G.10.3.1	General requirements	-	N/A
G.10.3.2	Voltage surge test	-	N/A
G.10.3.3	Impulse test	-	N/A
<b>G.11</b>	<b>Capacitor and RC units</b>		N/A
G.11.1	General requirements	-	N/A
G.11.2	Conditioning of capacitors and RC units	-	N/A
G.11.3	Rules for selecting capacitors	-	N/A
<b>G.12</b>	<b>Optocouplers</b>		N/A
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results) .....	-	N/A
	Type test voltage Vini .....	-	—
	Routine test voltage, Vini,b .....	-	—
<b>G.13</b>	<b>Printed boards</b>		N/A
G.13.1	General requirements	-	N/A
G.13.2	Uncoated printed boards	-	N/A
G.13.3	Coated printed boards	-	N/A
G.13.4	Insulation between conductors on the same inner surface	-	N/A
	Compliance with cemented joint requirements (Specify construction) .....	-	—
G.13.5	Insulation between conductors on different surfaces	-	N/A
	Distance through insulation .....	-	N/A
	Number of insulation layers (pcs) .....	-	—
G.13.6	Tests on coated printed boards	-	N/A
G.13.6.1	Sample preparation and preliminary inspection	-	N/A
G.13.6.2a)	Thermal conditioning	-	N/A
G.13.6.2b)	Electric strength test	-	N/A
G.13.6.2c)	Abrasion resistance test	-	N/A
<b>G.14</b>	<b>Coating on components terminals</b>		N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.14.1	Requirements .....	-	N/A
<b>G.15</b>	<b>Liquid filled components</b>		N/A
G.15.1	General requirements	-	N/A
G.15.2	Requirements	-	N/A
G.15.3	Compliance and test methods	-	N/A
G.15.3.1	Hydrostatic pressure test	-	N/A
G.15.3.2	Creep resistance test	-	N/A
G.15.3.3	Tubing and fittings compatibility test	-	N/A
G.15.3.4	Vibration test	-	N/A
G.15.3.5	Thermal cycling test	-	N/A
G.15.3.6	Force test	-	N/A
G.15.4	Compliance	-	N/A
<b>G.16</b>	<b>IC including capacitor discharge function (ICX)</b> <i>- tested as per the requirements of clause G.16 of IEC 62368-1:2018</i>		P
a)	Humidity treatment in accordance with sc5.4.8 – 120 hours	Humidity treatment for 120 h at a temperature of (40±2)°C and a relative humidity of (93±3)%	P
b)	Impulse test using circuit 2 with Uc = to transient voltage .....	Impulse tests as described performed. Uc = 2500Vpeak.	P
C1)	Application of ac voltage at 120% of rated voltage for 2.5 minutes	A voltage of 288V AC applied for 2.5 minutes.	P
C2)	Test voltage .....	288V AC based on the rated voltage of 240V AC.	—
D1)	10,000 cycles on and off using a capacitor with the largest capacitance and a resistor with the smallest resistance as specified by manufacturer	10 000 cycles of power on and off (cycle time is 1 s) performed.	P
D2)	Capacitance .....	Min. 200nF, max. 6µF	—
D3)	Resistance .....	Min. 54kΩ	—
<b>H</b>	<b>CRITERIA FOR TELEPHONE RINGING SIGNALS</b>		N/A
H.1	General	-	N/A
H.2	Method A	-	N/A
H.3	Method B	-	N/A
H.3.1	Ringling signal	-	N/A
H.3.1.1	Frequency (Hz) .....	-	—
H.3.1.2	Voltage (V) .....	-	—
H.3.1.3	Cadence; time (s) and voltage (V) .....	-	—
H.3.1.4	Single fault current (mA): .....	-	—
H.3.2	Tripping device and monitoring voltage .....	-	N/A



IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage complied with	-	N/A
H.3.2.2	Tripping device	-	N/A
H.3.2.3	Monitoring voltage (V) .....	-	—
<b>J</b>	<b>INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION</b>		N/A
	General requirements	-	N/A
<b>K</b>	<b>SAFETY INTERLOCKS</b>		N/A
K.1	General requirements	-	N/A
K.2	Components of safety interlock safeguard mechanism .....	-	N/A
K.3	Inadvertent change of operating mode	-	N/A
K.4	Interlock safeguard override	-	N/A
K.5	Fail-safe	-	N/A
	Compliance .....	-	N/A
K.6	Mechanically operated safety interlocks	-	N/A
K.6.1	Endurance requirement	-	N/A
K.6.2	Compliance and Test method .....	-	N/A
K.7	Interlock circuit isolation	-	N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location) .....	-	N/A
K.7.2	Overload test, Current (A) .....	-	N/A
K.7.3	Endurance test	-	N/A
K.7.4	Electric strength test .....	-	N/A
<b>L</b>	<b>DISCONNECT DEVICES</b>		N/A
L.1	General requirements	-	N/A
L.2	Permanently connected equipment	-	N/A
L.3	Parts that remain energized	-	N/A
L.4	Single phase equipment	-	N/A
L.5	Three-phase equipment	-	N/A
L.6	Switches as disconnect devices	-	N/A
L.7	Plugs as disconnect devices	-	N/A
L.8	Multiple power sources	-	N/A
<b>M</b>	<b>EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS</b>		N/A
M.1	General requirements	-	N/A
M.2	Safety of batteries and their cells	-	N/A
M.2.1	Requirements	-	N/A

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

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
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 $V_z$ (m <sup>3</sup> /s)..... :	-	—
M.8.2.3	Correction factors..... :	-	—
M.8.2.4	Calculation of distance $d$ (mm) ..... :	-	—
M.9	Preventing electrolyte spillage	-	N/A
M.9.1	Protection from electrolyte spillage	-	N/A
M.9.2	Tray for preventing electrolyte spillage	-	N/A
M.10	Instructions to prevent reasonably foreseeable misuse (Determination of compliance: inspection, data review; or abnormal testing) ..... :	-	N/A
<b>N</b>	<b>ELECTROCHEMICAL POTENTIALS</b>		N/A
	Metal(s) used ..... :	-	—
<b>O</b>	<b>MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES</b>		N/A
	Figures O.1 to O.20 of this Annex applied..... :	-	—
<b>P</b>	<b>SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS</b>		N/A
P.1	General requirements	-	N/A
P.2.2	Safeguards against entry of foreign object	-	N/A
	Location and Dimensions (mm) ..... :	-	—
P.2.3	Safeguard against the consequences of entry of foreign object	-	N/A
P.2.3.1	Safeguards against the entry of a foreign object	-	N/A
	Openings in transportable equipment	-	N/A
	Transportable equipment with metalized plastic parts ..... :	-	N/A
P.2.3.2	Openings in transportable equipment in relation to metallized parts of a barrier or enclosure (identification of supplementary safeguard) ..... :	-	N/A
P.3	Safeguards against spillage of internal liquids	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
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
<b>Q</b>	<b>CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING</b>		N/A
Q.1	Limited power sources	-	N/A
Q.1.1 a)	Inherently limited output	-	N/A
Q.1.1 b)	Impedance limited output	-	N/A
	- Regulating network limited output under normal operating and simulated single fault condition	-	N/A
Q.1.1 c)	Overcurrent protective device limited output	-	N/A
Q.1.1 d)	IC current limiter complying with G.9	-	N/A
Q.1.2	Compliance and test method	-	N/A
Q.2	Test for external circuits – paired conductor cable	-	N/A
	Maximum output current (A) ..... :	-	—
	Current limiting method..... :	-	—
<b>R</b>	<b>LIMITED SHORT CIRCUIT TEST</b>		N/A
R.1	General requirements	-	N/A
R.2	Determination of the overcurrent protective device and circuit	-	N/A
R.3	Test method Supply voltage (V) and short-circuit current (A). ..... :	-	N/A
<b>S</b>	<b>TESTS FOR RESISTANCE TO HEAT AND FIRE</b>		N/A
S.1	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W	-	N/A
	Samples, material ..... :	-	—
	Wall thickness (mm)..... :	-	—
	Conditioning (°C)..... :	-	—

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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).....	-	—
	Cheesecloth did not ignite	-	N/A
S.4	Flammability classification of materials	-	N/A
S.5	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W	-	N/A
	Samples, material .....	-	—
	Wall thickness (mm).....	-	—
	Conditioning (test condition), (°C).....	-	—
	Test flame according to IEC 60695-11-20 with conditions as set out	-	N/A
	After every test specimen was not consumed completely	-	N/A
	After fifth flame application, flame extinguished within 1 min	-	N/A
<b>T</b>	<b>MECHANICAL STRENGTH TESTS</b>		N/A
T.1	General requirements	-	N/A
T.2	Steady force test, 10 N .....	-	N/A
T.3	Steady force test, 30 N .....	-	N/A
T.4	Steady force test, 100 N .....	-	N/A
T.5	Steady force test, 250 N .....	-	N/A
T.6	Enclosure impact test	-	N/A

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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) .....	-	—
<b>U</b>	<b>MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION</b>		N/A
U.1	General requirements	-	N/A
U.2	Compliance and test method for non-intrinsically protected CRTs	-	N/A
U.3	Protective Screen .....	-	N/A
<b>V</b>	<b>DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)</b>		N/A
V.1	Accessible parts of equipment	-	N/A
V.2	Accessible part criterion	-	N/A

<b>4.1.2</b>	<b>TABLE: List of critical components</b>					N/A
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1</sup>	
- Description <sup>2)</sup> :						
Supplementary information: <sup>1)</sup> Provided evidence ensures the agreed level of compliance. See OD-CB2039. <sup>2)</sup> Description line content is optional. Main line description needs to clearly detail the component used for testing						

<b>4.8.4, 4.8.5</b>	<b>TABLE: Lithium coin/button cell batteries mechanical tests</b>				N/A
(The following mechanical tests are conducted in the sequence noted.)					
<b>4.8.4.2</b>	<b>TABLE: Stress Relief test</b>				—
Part	Material	Oven Temperature (°C)	Comments		
<b>4.8.4.3</b>	<b>TABLE: Battery replacement test</b>				—
Battery part no. ....:			—		
Battery Installation/withdrawal	Battery Installation/Removal Cycle	Comments			
	1				
	2				
	3				
	4				
	5				
	6				
	8				
	9				
	10				
	<b>4.8.4.4</b>	<b>TABLE: Drop test</b>			
Impact Area	Drop Distance	Drop No.	Observations		
		1			
		2			
		3			
<b>4.8.4.5</b>	<b>TABLE: Impact</b>				—
Impacts per surface	Surface tested	Impact energy (Nm)	Comments		

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.8.4, 4.8.5	<b>TABLE: Lithium coin/button cell batteries mechanical tests</b>		N/A
<b>(The following mechanical tests are conducted in the sequence noted.)</b>			
4.8.4.6	<b>TABLE: Crush test</b>		—
Test position	Surface tested	Crushing Force (N)	Duration force applied (s)
Supplementary information:			

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

5.2	<b>Table: Classification of electrical energy sources</b>						N/A
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			Normal				
			Abnormal				
			Single fault – SC/OC				
			Normal				
			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				



IEC 62368-1							
Clause	Requirement + Test			Result - Remark			Verdict
			Single fault – SC/OC				
5.2.2.4 - Single Pulses							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Duration (ms)	Upk (V)	lpk (mA)	
			Normal				
			Abnormal				
			Single fault – SC/OC				
5.2.2.5 - Repetitive Pulses							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	lpk (mA)	
			Normal				
			Abnormal				
			Single fault – SC/OC				
Test Conditions: Normal – Abnormal - Supplementary information: SC=Short Circuit, OC=Short Circuit							

5.4.1.4, 6.3.2, 9.0, B.2.6	TABLE: Temperature measurements						N/A	
	Supply voltage (V) .....						—	
	Ambient T <sub>min</sub> (°C) .....						—	
	Ambient T <sub>max</sub> (°C) .....						—	
	T <sub>ma</sub> (°C) .....						—	
Maximum measured temperature T of part/at:				T (°C)			Allowed T <sub>max</sub> (°C)	
Supplementary information:								
Temperature T of winding:		t <sub>1</sub> (°C)	R <sub>1</sub> (Ω)	t <sub>2</sub> (°C)	R <sub>2</sub> (Ω)	T (°C)	Allowed T <sub>max</sub> (°C)	Insulation class

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

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)

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics		N/A
Penetration (mm)..... :			—
Object/ Part No./Material	Manufacturer/t rademark	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							N/A
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequenc y (kHz) <sup>1</sup>	Required cl (mm)	cl (mm) <sup>2</sup>	Required <sup>3</sup> cr (mm)	cr (mm)	

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

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.2.3	<b>TABLE: Minimum Clearances distances using required withstand voltage</b>		N/A
	<b>Overvoltage Category (OV):</b>		
	<b>Pollution Degree:</b>		
Clearance distanced between:	Required withstand voltage	Required cl (mm)	Measured cl (mm)
Supplementary information:			

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

5.4.4.2, 5.4.4.5 c) 5.4.4.9	<b>TABLE: Distance through insulation measurements</b>					N/A
Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)	
Supplementary information:						

IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
<b>5.4.9</b>	<b>TABLE: Electric strength tests</b>		N/A
Test voltage applied between:	Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
Functional:			
Basic/supplementary:			
Reinforced:			
Routine Tests:			
Supplementary information:			

<b>5.5.2.2</b>	<b>TABLE: Stored discharge on capacitors</b>				P
Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification
Supply: 265V / 60 Hz Vpeak: 378V *)	Phase to Phase	N	No switch	1.1V	ES1
Supply: 265V / 60 Hz Vpeak: 380V **)	Phase to Phase	N	No switch	6.7V	ES1
Supplementary information:					
X-capacitors mounted during testing: *) 200nF; **) 6µF					
<input checked="" type="checkbox"/> bleeding resistor rating: R1 and R2: Minimum 54kΩ					
<input checked="" type="checkbox"/> ICX: Equipment under test is an ICX component					
Notes:					
A. Test Location:					
Phase to Neutral; Phase to Phase; Phase to Earth; and/or Neutral to Earth					
B. Operating condition abbreviations:					
N – Normal operating condition (e.g., normal operation, or open fuse); S –Single fault condition					

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

5.6.6.2	TABLE: Resistance of protective conductors and terminations				N/A
Accessible part	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)	

Supplementary information:

5.7.2.2, 5.7.4	TABLE: Earthed accessible conductive part		N/A
Supply voltage .....			—
Location	Test conditions specified in 6.1 of IEC 60990 or Fault Condition No in IEC 60990 clause 6.2.2.1 through 6.2.2.8, except for 6.2.2.7		Touch current (mA)
	1		
	2*		
	3		
	4		
	5		
	6		
	8		

Supplementary Information:

Notes:

- [1] Supply voltage is the anticipated maximum Touch Voltage
- [2] Earthed neutral conductor [Voltage differences less than 1% or more]
- [3] Specify method used for measurement as described in IEC 60990 sub-clause 4.3
- [4] IEC60990, sub-clause 6.2.2.7, Fault 7 not applicable.
- [5] (\*) IEC60990, sub-clause 6.2.2.2 is not applicable if switch or disconnect device (e.g., appliance coupler) provided.

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

6.2.2	Table: Electrical power sources (PS) measurements for classification					N/A
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s <sup>*)</sup>	PS Classification	
A		Power (W) :				
		V <sub>A</sub> (V) :				
		I <sub>A</sub> (A) :				
B		Power (W) :				
		V <sub>A</sub> (V) :				
		I <sub>A</sub> (A) :				
C		Power (W) :				
		V <sub>A</sub> (V) :				
		I <sub>A</sub> (A) :				
D		Power (W) :				
		V <sub>A</sub> (V) :				
		I <sub>A</sub> (A) :				

Supplementary Information:

(\*) Measurement taken only when limits at 3 seconds exceed PS1 limits

6.2.3.1	Table: Determination of Potential Ignition Sources (Arcing PIS)				N/A
Location	Open circuit voltage After 3 s (V <sub>p</sub> )	Measured r.m.s current (I <sub>rms</sub> )	Calculated value (V <sub>p</sub> x I <sub>rms</sub> )	Arcing PIS? Yes / No	

Supplementary information:

An Arcing PIS requires a minimum of 50 V (peak) a.c. or d.c. An Arcing PIS is established when the product of the open circuit voltage (V<sub>p</sub>) and normal operating condition rms current (I<sub>rms</sub>) is greater than 15.

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

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				N/A
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

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.

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:			

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

B.2.5	TABLE: Input test							N/A
U (V)	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status	

Supplementary information:  
Equipment may be have rated current or rated power or both. Both should be measured

B.3	TABLE: Abnormal operating condition tests								N/A
Ambient temperature (°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	

Supplementary information:  
Test table is provided to record abnormal and fault conditions for all applicable energy sources including Thermal burn injury. Column "Abnormal/Fault." Specify if test condition by indicating "Abnormal" then the condition for a Clause B.3 test or "Single Fault" then the condition for Clause B.4.

B.4	TABLE: Fault condition tests								N/A
Ambient temperature (°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	

Supplementary information:



IEC 62368-1										
Clause	Requirement + Test			Result - Remark				Verdict		
<b>Annex M</b>	<b>TABLE: Batteries</b>								N/A	
The tests of Annex M are applicable only when appropriate battery data is not available									N/A	
Is it possible to install the battery in a reverse polarity position?..... :									N/A	
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition										
Max. current during fault condition										
Test results:										
- Chemical leaks									N/A	
- Explosion of the battery									N/A	
- Emission of flame or expulsion of molten metal									N/A	
- Electric strength tests of equipment after completion of tests									N/A	
Supplementary information:										

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

<b>Annex M.4</b>	<b>Table: Additional safeguards for equipment containing secondary lithium batteries</b>	N/A	
------------------	--	-----	--

Battery/Cell No.	Test conditions	Measurements			Observation
		U	I (A)	Temp (C)	
	Normal				
	Abnormal				
	Single fault –SC/OC				
	Normal				
	Abnormal				
	Single fault – SC/OC				

Supplementary Information:

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

Supplementary Information:

<b>Annex Q.1</b>	<b>TABLE: Circuits intended for interconnection with building wiring (LPS)</b>	N/A
------------------	--	-----

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

Output Circuit	Components	U <sub>oc</sub> (V)	I <sub>sc</sub> (A)		S (VA)	
			Meas.	Limit	Meas.	Limit

Supplementary Information:

SC=Short circuit, OC=Open circuit

IEC 62368-1					
Clause	Requirement + Test			Result - Remark	Verdict
<b>T.2, T.3, T.4, T.5</b>	<b>TABLE: Steady force test</b>				N/A
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation
Supplementary information:					

<b>T.6, T.9</b>	<b>TABLE: Impact tests</b>				N/A
Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation	
Supplementary information:					

<b>T.7</b>	<b>TABLE: Drop tests</b>				N/A
Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation	
Supplementary information:					

<b>T.8</b>	<b>TABLE: Stress relief test</b>					N/A
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation	
Supplementary information:						

Page 1 of 9		Report No.: 384757																																					
IEC62368_1B - ATTACHMENT																																							
Clause	Requirement + Test	Result - Remark	Verdict																																				
<b>ATTACHMENT TO TEST REPORT</b> <b>IEC 62368-1</b> <b>EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES</b> (Audio/video, information and communication technology equipment - Part 1: Safety requirements)																																							
<b>Differences according to</b> ..... : EN 62368-1:2014+A11:2017																																							
<b>Attachment Form No.</b> ..... : EU_GD_IEC62368_1B_II																																							
<b>Attachment Originator</b> ..... : Nemko AS																																							
<b>Master Attachment</b> ..... : Date 2017-09-22																																							
<b>Copyright © 2017 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.</b>																																							
	<b>CENELEC COMMON MODIFICATIONS (EN)</b>		—																																				
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed “Z”.		—																																				
CONTENTS	<b>Add</b> the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords		—																																				
	<b>Delete</b> all the “country” notes in the reference document (IEC 62368-1:2014) according to the following list:		—																																				
	<table border="1"> <tbody> <tr> <td>0.2.1</td> <td>Note</td> <td>1</td> <td>Note 3</td> <td>4.1.15</td> <td>Note</td> </tr> <tr> <td>4.7.3</td> <td>Note 1 and 2</td> <td>5.2.2.2</td> <td>Note</td> <td>5.4.2.3.2.2 Table 13</td> <td>Note c</td> </tr> <tr> <td>5.4.2.3.2.4</td> <td>Note 1 and 3</td> <td>5.4.2.5</td> <td>Note 2</td> <td>5.4.5.1</td> <td>Note</td> </tr> <tr> <td>5.5.2.1</td> <td>Note</td> <td>5.5.6</td> <td>Note</td> <td>5.6.4.2.1</td> <td>Note 2 and 3</td> </tr> <tr> <td>5.7.5</td> <td>Note</td> <td>5.7.6.1</td> <td>Note 1 and 2</td> <td>10.2.1 Table 39</td> <td>Note 2, 3 and 4</td> </tr> <tr> <td>10.5.3</td> <td>Note 2</td> <td>10.6.2.1</td> <td>Note 3</td> <td>F.3.3.6</td> <td>Note 3</td> </tr> </tbody> </table>		0.2.1	Note	1	Note 3	4.1.15	Note	4.7.3	Note 1 and 2	5.2.2.2	Note	5.4.2.3.2.2 Table 13	Note c	5.4.2.3.2.4	Note 1 and 3	5.4.2.5	Note 2	5.4.5.1	Note	5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3	5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4	10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3	—
0.2.1	Note	1	Note 3	4.1.15	Note																																		
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10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3																																		
	For special national conditions, see Annex ZB.		—																																				

1	<p><b>Add the following note:</b></p> <p>NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.</p>	Compliance with RoHS Directive 2011/65/EU must be considered before applying the CE mark.	—
4.Z1	<p><b>Add the following new subclause after 4.9:</b></p> <p>To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. <b>mains</b>, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c):</p> <p>a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment;</p> <p>b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation;</p> <p>c) it is permitted for <b>pluggable equipment type B</b> or <b>permanently connected equipment</b>, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions.</p> <p>If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for <b>pluggable equipment type A</b> the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
5.4.2.3.2.4	<p><b>Add the following to the end of this subclause:</b></p> <p>The requirement for interconnection with <b>external circuit</b> is in addition given in EN 50491-3:2009.</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
10.2.1	<p>Add the following to <sup>c)</sup> and <sup>d)</sup> in table 39:</p> <p>For additional requirements, see 10.5.1.</p>	No X-radiation.	N/A

10.5.1	<p><b>Add</b> the following after the first paragraph:  <i>For RS 1 compliance is checked by measurement under the following conditions:</i></p> <p><i>In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or presets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made.</i></p> <p>NOTE Z1 Soldered joints and paint lockings are examples of adequate locking.</p> <p><i>The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm<sup>2</sup>, at any point 10 cm from the outer surface of the apparatus.</i></p> <p><i>Moreover, the measurement shall be made under fault conditions causing an increase of the high-voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made.</i></p> <p><i>For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level.</i></p> <p>NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.</p>	No X-radiation.	N/A
10.6.1	<p><b>Add</b> the following paragraph to the end of the subclause:  EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.</p>	Equipment is not a personal music player.	N/A
10.Z1	<p><b>Add</b> the following new subclause after 10.6.5.  <b>10.Z1 Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz</b></p> <p>The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz).</p> <p>For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body-mounted devices, attention is drawn to EN 50360 and EN 50566</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
G.7.1	<p><b>Add</b> the following note:  NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.</p>	Component for building-in. Must be evaluated as part of an end product.	N/A

Bibliography	<p><b>Add</b> the following standards:</p> <p><b>Add</b> the following notes for the standards indicated:</p> <p>IEC 60130-9 NOTE Harmonized as EN 60130-9.</p> <p>IEC 60269-2 NOTE Harmonized as HD 60269-2.</p> <p>IEC 60309-1 NOTE Harmonized as EN 60309-1.</p> <p>IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series.</p> <p>IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4.</p> <p>IEC 60664-5 NOTE Harmonized as EN 60664-5.</p> <p>IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified).</p> <p>IEC 61508-1 NOTE Harmonized as EN 61508-1.</p> <p>IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1.</p> <p>IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4.</p> <p>IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6.</p> <p>IEC 61643-1 NOTE Harmonized as EN 61643-1.</p> <p>IEC 61643-21 NOTE Harmonized as EN 61643-21.</p> <p>IEC 61643-311 NOTE Harmonized as EN 61643-311.</p> <p>IEC 61643-321 NOTE Harmonized as EN 61643-321.</p> <p>IEC 61643-331 NOTE Harmonized as EN 61643-331.</p>	—	
<b>ZB</b>	<b>ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)</b>	—	
4.1.15	<p><b>Denmark, Finland, Norway and Sweden</b></p> <p>To the end of the subclause the following is added:</p> <p><b>Class I pluggable equipment type A</b> intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and <b>accessible</b> parts, have a marking stating that the equipment shall be connected to an earthed <b>mains</b> socket-outlet.</p> <p>The marking text in the applicable countries shall be as follows:</p> <p>In <b>Denmark</b>: "Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord."</p> <p>In <b>Finland</b>: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan"</p> <p>In <b>Norway</b>: "Apparatet må tilkoples jordet stikkontakt"</p> <p>In <b>Sweden</b>: "Apparaten skall anslutas till jordat uttag"</p>	<p>Component for building-in. Must be evaluated as part of an end product.</p>	N/A
4.7.3	<p><b>United Kingdom</b></p> <p>To the end of the subclause the following is added:</p> <p>The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex</p>	<p>Component for building-in. Must be evaluated as part of an end product.</p>	N/A

5.2.2.2	<p><b>Denmark</b></p> <p>After the 2nd paragraph add the following:  A warning (marking <b>safeguard</b>) for high <b>touch current</b> is required if the <b>touch current</b> exceeds the limits of 3,5 mA a.c. or 10 mA d.c.</p>	<p>Component for building-in.  Must be evaluated as part of an end product.</p>	N/A
5.4.11.1 and Annex G	<p><b>Finland and Sweden</b></p> <p>To the end of the subclause the following is added:  For separation of the telecommunication network from earth the following is applicable:  If this insulation is solid, including insulation forming part of a component, it shall at least consist of either</p> <ul style="list-style-type: none"> <li>• two layers of thin sheet material, each of which shall pass the electric strength test below, or</li> <li>• one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below.</li> </ul> <p>If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition</p> <ul style="list-style-type: none"> <li>• passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and</li> <li>• is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5kV.</li> </ul> <p>It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2.</p> <p>A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions:</p> <ul style="list-style-type: none"> <li>• the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11;</li> <li>• the additional testing shall be performed on all the test specimens as described in EN 60384-14;</li> </ul> <p>the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.</p>	<p>Component for building-in.  Must be evaluated as part of an end product.</p>	N/A
5.5.2.1	<p><b>Norway</b></p> <p>After the 3rd paragraph the following is added:  Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).</p>	<p>Component for building-in.  Must be evaluated as part of an end product.</p>	N/A



5.5.6	<p><b>Finland, Norway and Sweden</b></p> <p>To the end of the subclause the following is added: Resistors used as <b>basic safeguard</b> or bridging <b>basic insulation</b> in <b>class I pluggable equipment type A</b> shall comply with G.10.1 and the test of G.10.2.</p>	<p>Component for building-in. Must be evaluated as part of an end product.</p>	N/A
5.6.1	<p><b>Denmark</b></p> <p><b>Add</b> to the end of the subclause</p> <p>Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment.</p> <p><i>Justification:</i> In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.</p>	<p>Component for building-in. Must be evaluated as part of an end product.</p>	N/A
5.6.4.2.1	<p><b>Ireland and United Kingdom</b></p> <p>After the indent for <b>pluggable equipment type A</b>, the following is added:</p> <p>– the <b>protective current rating</b> is taken to be 13 A, this being the largest rating of fuse used in the <b>mains</b> plug.</p>	<p>Component for building-in. Must be evaluated as part of an end product.</p>	N/A
5.6.5.1	<p>To the second paragraph the following is added:</p> <p>The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm<sup>2</sup> to 1,5 mm<sup>2</sup> in cross-sectional area.</p>	<p>Component for building-in. Must be evaluated as part of an end product.</p>	N/A
5.7.5	<p><b>Denmark</b></p> <p>To the end of the subclause the following is added:</p> <p>The installation instruction shall be affixed to the equipment if the <b>protective conductor current</b> exceeds the limits of 3,5 mA a.c. or 10 mA d.c.</p>	<p>Component for building-in. Must be evaluated as part of an end product.</p>	N/A

5.7.6.1	<p><b>Norway and Sweden</b></p> <p>To the end of the subclause the following is added: The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system.</p> <p>It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example.</p> <p>The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)”</p> <p>NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min.</p> <p>Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.”</p> <p>Translation to Swedish: ”Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
5.7.6.2	<p><b>Denmark</b></p> <p>To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .</p>	Component for building-in. Must be evaluated as part of an end product.	N/A

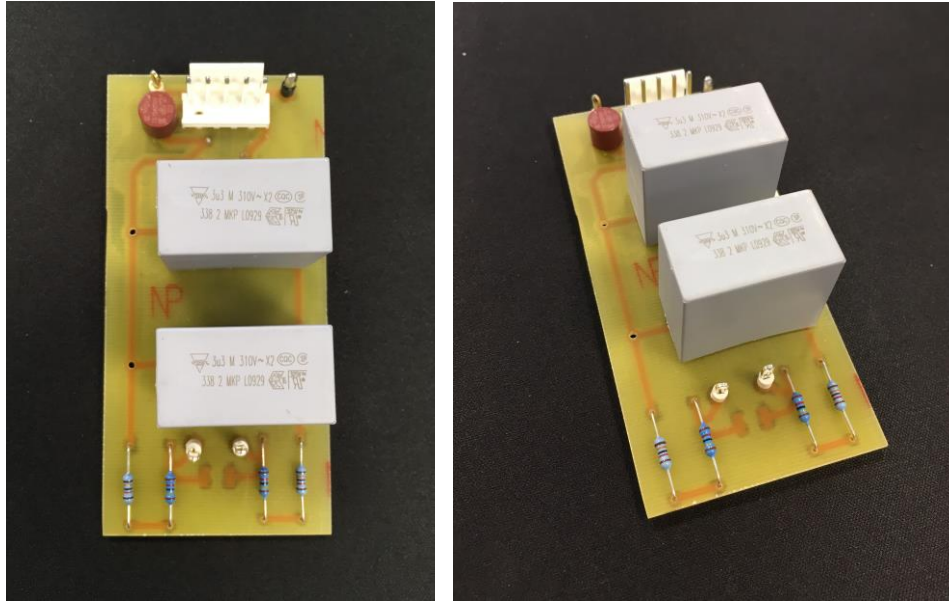
B.3.1 and B.4	<p><b>Ireland and United Kingdom</b></p> <p>The following is applicable:</p> <p>To protect against excessive currents and short-circuits in the primary circuit of <b>direct plug-in equipment</b>, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the <b>direct plug-in equipment</b>, until the requirements of Annexes B.3.1 and B.4 are met</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
G.4.2	<p><b>Denmark</b></p> <p>To the end of the subclause the following is added:</p> <p>Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011.</p> <p>CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a.</p> <p>If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2.</p> <p>Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a.</p> <p>Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c.</p> <p>Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a</p> <p><i>Justification:</i> Heavy Current Regulations, Section 6c</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
G.4.2	<p><b>United Kingdom</b></p> <p>To the end of the subclause the following is added:</p> <p>The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.</p>	Component for building-in. Must be evaluated as part of an end product.	N/A

G.7.1	<p><b>United Kingdom</b></p> <p>To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a 'standard plug' in accordance with the Plugs and Sockets etc (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations.</p> <p>NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
G.7.1	<p><b>Ireland</b></p> <p>To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
G.7.2	<p><b>Ireland and United Kingdom</b></p> <p>To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm<sup>2</sup> is allowed for equipment which is rated over 10 A and up to and including 13 A.</p>	Component for building-in. Must be evaluated as part of an end product.	N/A
<b>ZC</b>	<b>ANNEX ZC, NATIONAL DEVIATIONS (EN)</b>		—
10.5.2	<p><b>Germany</b></p> <p>The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking.</p> <p><i>Justification:</i> German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM.</p> <p><b>NOTE</b> Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int +49-531-592-6320, Internet: <a href="http://www.ptb.de">http://www.ptb.de</a></p>	No CRT.	N/A

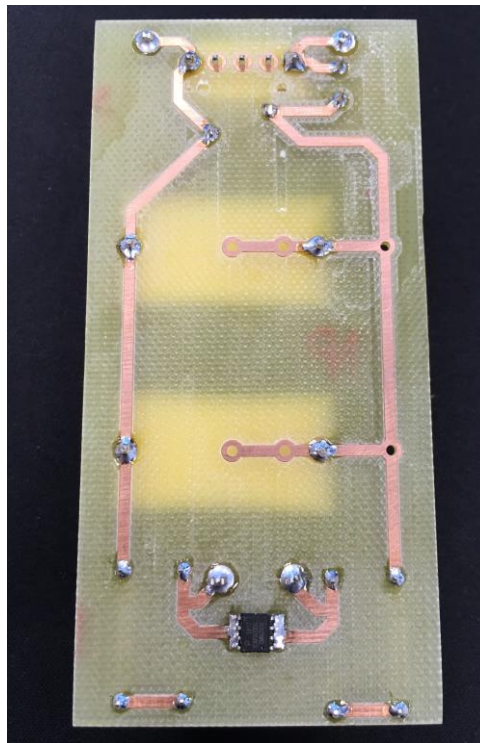


## Photographs

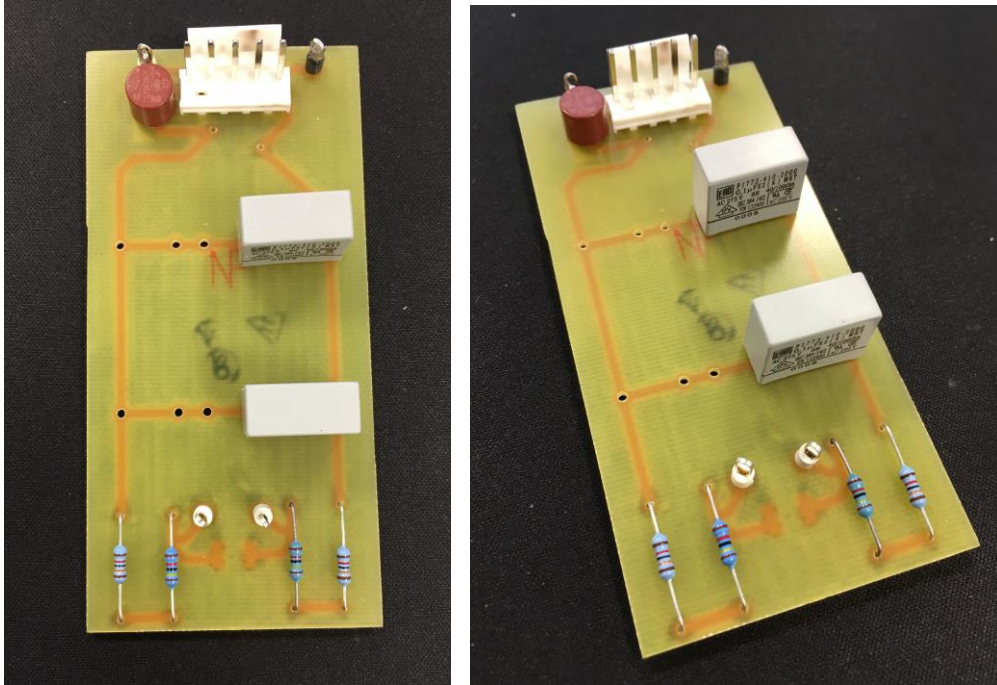
Order No. 384757



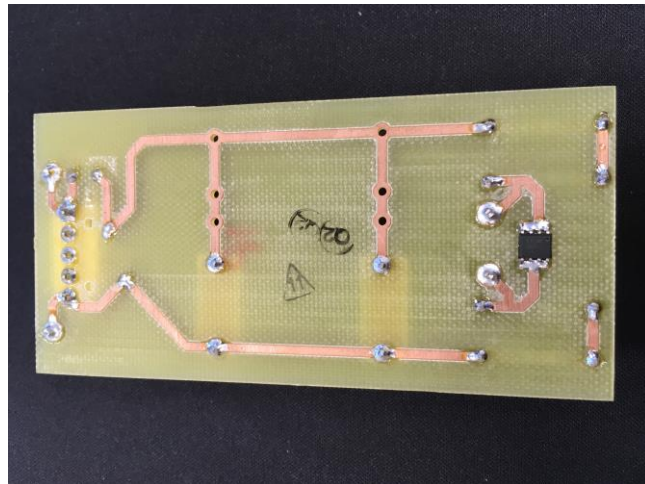
Test board of CAP300DG with capacitors with largest value and resistors with smallest value mounted



Bottom side of test board



Test board of CAP300DG with capacitors with smallest value and resistors with smallest value mounted



Bottom side of test board



Data sheet

Order No. 384757



**CAP300DG**  
**CAPZero™-3**

Zero<sup>1</sup> Loss Automatic X Capacitor Rapid Discharge IC

**Product Highlights**

- Meets IEC 60335 X capacitor discharge of <34 V in <1 sec
- One part to cover X capacitor values up to 6 μF
- Blocks current through X capacitor discharge resistors when AC voltage is connected
- Automatically discharges X capacitors through discharge resistors when AC is disconnected
- Simplifies EMI filter design – larger X capacitor allows smaller inductive components with no change in consumption
- Only two terminals – meets safety standards for use before or after system input fuse
- >4 mm creepage on package and PCB
- Self supplied – no external bias required
- High common mode surge immunity – no external ground connection
- High differential surge withstand – 1000 V internal MOSFETs
- NEMKO and CB certification pending

**EcoSmart™ – Energy Efficient**

- <5 mW consumption at 230 VAC for all X capacitor values

**Applications**

- All AC-DC converters with X capacitors of 100 nF up to 6 μF
- Appliances requiring ErP Lot 6 compliance
- Adapters requiring ultra low no-load consumption
- All converters requiring very low standby power
- Lossless generation of zero crossing signal

**Description**

When AC voltage is applied, CAP300DG blocks current flow in the X capacitor safety discharge resistors, reducing the power loss to less than 5 mW, or essentially zero<sup>1</sup> at 230 VAC. When AC voltage is disconnected, CAP300DG automatically discharges the X capacitor by connecting the series discharge resistors. This operation allows total flexibility in the choice of the X capacitor to optimize differential mode EMI filtering and reduce inductor costs, with no change in power consumption.

Designing with CAP300DG is simply a matter of selecting the appropriate external resistor values for the X capacitor value being used to achieve the necessary time constant. The simplicity and ruggedness of the two terminal CAP300DG IC makes it an ideal choice in systems designed to meet ErP Lot 6 requirements.

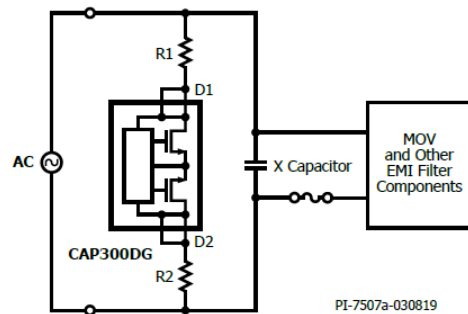


Figure 1. Typical Application – Not a Simplified Circuit.

**Component Table**

Product <sup>3</sup>	BV <sub>DSS</sub>	Total X Capacitance	Total Series Resistance <sup>2</sup> (R1 + R2)
CAP300DG	1000 V	200 nF to 6 μF	54 kΩ Minimum

Table 1. Component Table.

Notes:

1. IEC 62301 clause 4.5 rounds standby power use below 5 mW to zero.
2. Values are nominal. RC time constant is <1 second.
3. Packages: D: SO-8.

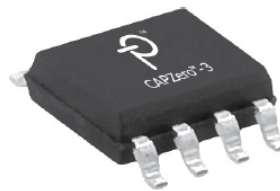


Figure 2. SO-8 D Package.



## Data sheet

Order No. **384757**

### CAP300DG

#### Pin Functional Description

The pin configuration of Figure 3 ensures that the width of the SO-8 package is used to provide creepage and clearance distance of over 4 mm.

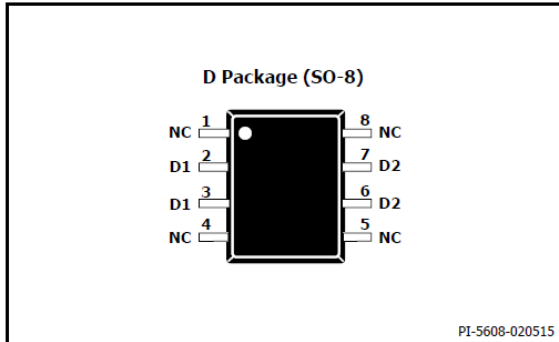


Figure 3. Pin Configuration.

Although electrical connections are only made to pins 2, 3, 6 and 7, it is recommended that pins 1-4 and pins 5-8 are coupled together on the PCB – see Applications Section.

#### Key Application Considerations

##### Breakdown Voltage Selection

The system configuration variables include the placement of the system MOV and X capacitor(s) as well as the differential surge voltage specifications of the application.

As shown in Table 1, the CAP300DG has a breakdown voltage of 1000 V. For applications where the system MOV is placed in position 1 (MOV<sub>POS1</sub> in Figure 4), the CAP300DG will provide adequate voltage withstand for surge requirements of 3 kV or higher.

For MOV placement that is not directly across the X Capacitor1 (for example MOV<sub>POS2</sub> in Figure 4) the CAP300DG devices can be used up to a surge specification of 1.5 kV. For differential surge voltage specifications of >1.5 kV it is recommended that the MOV is always placed in the location shown in Figure 4 as MOV<sub>POS1</sub>.

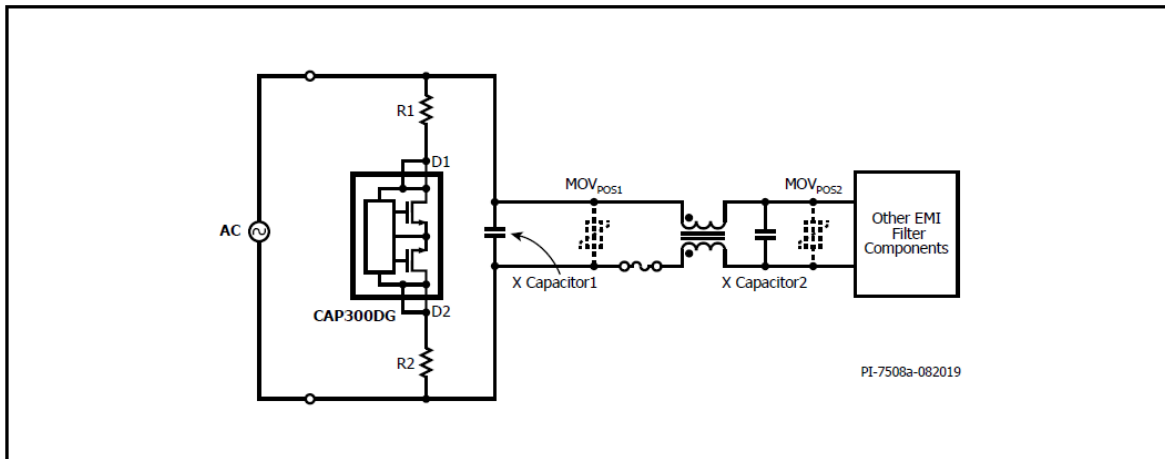


Figure 4. Placement Options of MOV.



**CAP300DG**

**PCB Layout and External Resistor Selection**

Figure 5 shows a typical PCB layout configuration for CAP300DG. The external resistors in this case are divided into two separate surface mount resistors to distribute loss under fault conditions – for example where a short-circuit exists between CAP300DG terminals D1 and D2.

Resistors R1 and R2 should also be rated for 50% of the system input voltage again to allow for the short-circuiting of CAP300DG D1 to D2 pins during single point fault testing.

If lower dissipation or lower voltage across each resistor is required during fault tests, the total external resistance can be divided into more discrete resistors, however the total resistance must be equal to or greater than 54 kΩ.

**Safety**

CAP300DG meets safety requirements even if placed before the system input fuse. If a short-circuit is placed between D1 and D2 terminals of CAP300DG, the system is identical to existing systems where CAP300DG is not used.

With regard to open circuit tests, it is not possible to create a fault condition through a single pin fault (for example lifted pin test) since there are two pins connected to each of D1 and D2. If several pins are lifted to create an open circuit, the condition is identical to an open circuit X capacitor discharge resistor in existing systems where CAP300DG is not used. If redundancy against open circuit faults is required, two CAP300DG and R1 / R2 configurations can be placed in parallel.

**Discharge Operation**

To meet the safety regulations of appliances, when the AC supply is disconnected, CAP300DG will discharge the X capacitor to <34 V levels according to the above functional description.

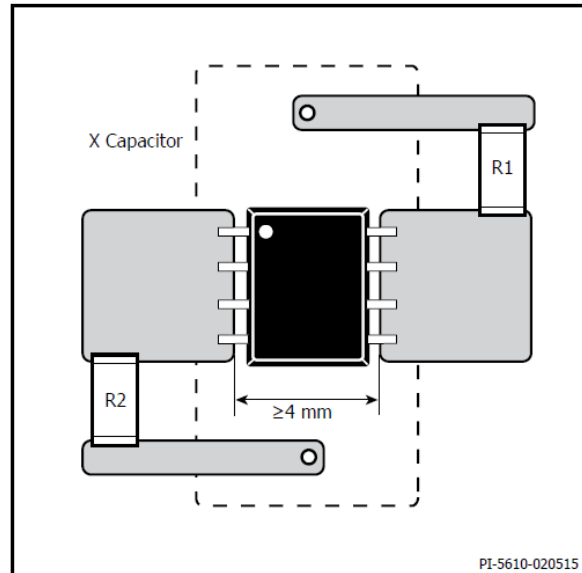


Figure 5. Typical PCB Layout.



## Data sheet

Order No. 384757

### CAP300DG

#### Absolute Maximum Ratings<sup>(4)</sup>

DRAIN Pin Voltage<sup>(1)</sup> .....1000 V  
 DRAIN Peak Current<sup>(2)</sup> ..... 10.9 mA  
 Storage Temperature .....-65 °C to 150 °C  
 Lead Temperature<sup>(3)</sup> .....260 °C  
 Operating Ambient Temperature.....-10 °C to 105 °C  
 Maximum Junction Temperature.....-10 °C to 110 °C

Notes:

1. Voltage of D1 pin relative to D2 pin in either polarity.
2. The peak DRAIN current is allowed while the DRAIN voltage is simultaneously less than 400 V.
3. 1/16 in. from case for 5 seconds.
4. The Absolute Maximum Ratings specified may be applied one at a time without causing permanent damage to the product. Exposure to Absolute Maximum Rating conditions for extended periods of time may affect product reliability.

#### Thermal Resistance

Thermal Resistance: D Package<sup>(1)</sup>:

( $\theta_{JA}$ ).....160 °C/W (Single layer JEDEC PCB)  
 ( $\theta_{JC}$ )..... 40 °C/W (Bottom)  
 ( $\theta_{JC}$ )..... 75 °C/W (Top)

Notes:

1. Reference thermal resistance test conditions: JEDEC JESD51-3, SEMI Test Method #G43-87, and MIL-STD-883 Method 10121.1.

Parameter	Symbol	Conditions $T_A = -10$ to $105$ °C (Unless Otherwise Specified)	Min	Typ	Max	Units
<b>Control Functions</b>						
AC Removal Detection Time	$t_{DETECT}$	Line Cycle Frequency 47-63 Hz		22	31.4	ms
Drain Saturation Current <sup>A,B</sup>	$I_{DSAT}$	CAP300DG	6.3			mA
Supply Current	$I_{SUPPLY}$	$T_A = 25$ °C			21.7	μA

Notes

- A. Saturation current specifications ensure a natural RC discharge characteristic at all voltages up to 265 VAC peak with the external resistor values specified in Table 1.
- B. Specifications are guaranteed by characterization and design.



# Data sheet

Order No. 384757

**CAP300DG**

## Typical Performance Characteristics

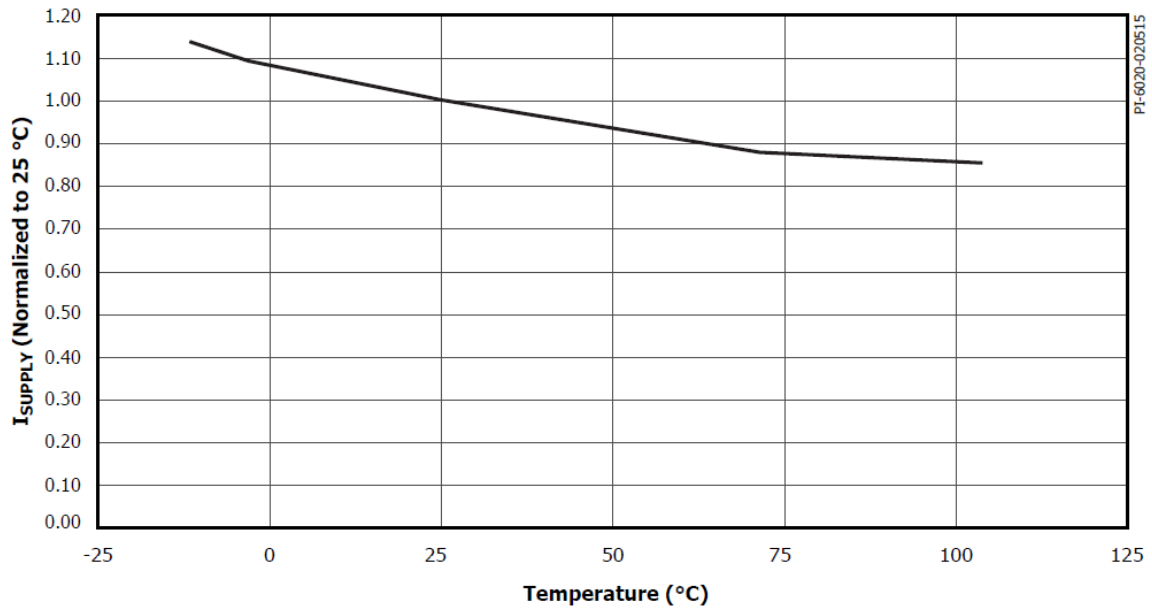


Figure 6. I<sub>SUPPLY</sub> vs. Temperature.



Data sheet

Order No. 384757

**CAP300DG**

