Test Report issued under the responsibility of:

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

Report Number..... :	**E482061-4791162548-1 Original**
Date of issue ..... :	**2023-03-29**
Total number of pages ..... :	**57**
Name of Testing Laboratory preparing the Report ..... :	UL-CCIC Company Limited No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China
Applicant's name ..... :	FAIRCHILD SEMICONDUCTOR TECHNOLOGY (SHANGHAI) CO LTD
Address ..... :	UNIT 01-07, 7F, LONGEMONT YES TOWER NO.399 KAIXUAN RD, CHANGNING DISTRICT SHANGHAI 200050 CHINA
Test specification:	
Standard ..... :	IEC 62368-1:2023
Test procedure..... :	CB Scheme
Non-standard test method..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2023, Ed.1.6
Test Report Form No. ..... :	IEC62368_1F
Test Report Form(s) Originator.... :	UL Solutions (US)
Master TRF ..... :	Dated 2023-08-18

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Over-Voltage, Over-Current Protection Load Switch
Trademark(s) ..... :	Onsemi
Manufacturer ..... :	ON SEMICONDUCTOR PHILIPPINES INC. – CEBU MACTAN ECONOMIC ZONE 1, LAPU-LAPU CITY, CEBU, 6015 PHILIPPINES
Model/Type reference ..... :	FPF2895UCX, FPF2895CUCX
Ratings ..... :	(Optional) Input Voltage Range: 4Vdc to 22Vdc Current Limit Rating: 500mA to 5A

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**		
Testing location/ address.....:		UL-CCIC Company Limited, No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China	
Tested by (name, function, signature).....:		Austin Huang / Project Handler	Austin Huang
Approved by (name, function, signature)...:		Jie Qian / Reviewer	Jie Qian
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name + signature).....:			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)...:			
☐	**Testing procedure: CTF Stage 3:**		
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:			
Tested by (name, function, signature).....:			

Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)...:		
Supervised by (name, function, signature) :		

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

Attachment 1 - National Differences (23pages)
Attachment 2- Enclosures (27pages)

Summary of testing:

Tests performed (name of test, test clause and date test performed):	**Testing location: (CBTL, SPTL, CTF, Subcontractor)**
IC CURRENT LIMITERS (ANNEX G.9)	CBTL: UL-CCIC Company Limited No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China

Summary of compliance with National Differences

List of countries addressed: Japan, USA / Canada

- IECEE Member countries that are also CENELEC members
  Compliance with Group Differences evaluated ☐ **yes** ☐ **No** ☒ N/A

- IECEE Member countries with published National Differences which were evaluated:
  CA, JP, US

- IECEE Member countries that did not publish any National Differences:
  N/A

To support compliance with published National Differences, attach a compilation of relevant ND and/or GD TRFs to the CB Test Report

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

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

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

Information on uncertainty of measurement:

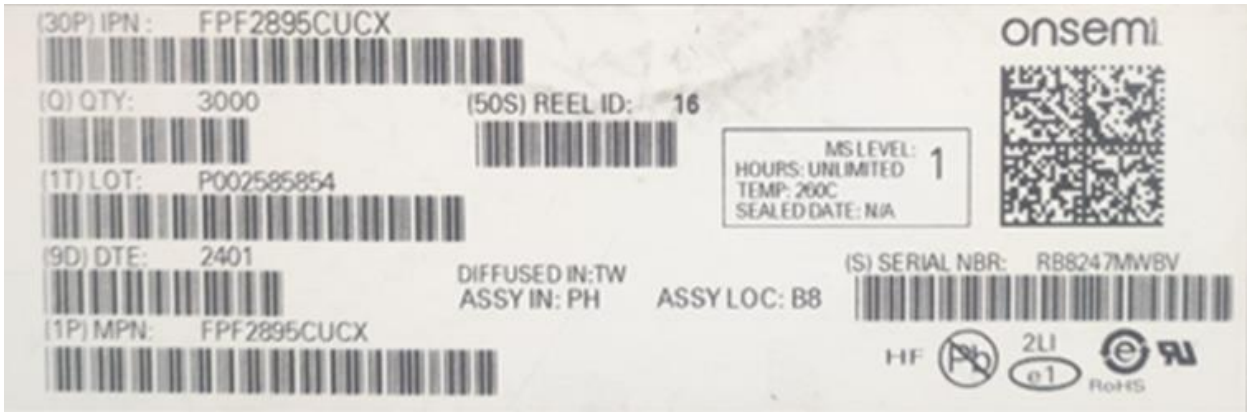
The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

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

Copy of marking plate:

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



Test item particulars:	
Product group .....:	☐ end product ☒ built-in component
Classification of use by .....:	☒ Ordinary person ☐ Children likely present ☐ Instructed person ☐ Skilled person
Supply connection.....:	☐ AC mains ☐ DC mains ☒ not mains connected: ☒ ES1 ☐ ES2 ☐ ES3
Supply tolerance .....:	☐ +10%/-10% ☐ +20%/-15% ☐ + %/ - % ☒ None
Supply connection – type .....:	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: not directly connected to the mains
Considered current rating of protective device... :	☐ A; Location: ☐ building ☐ equipment ☒ N/A
Equipment mobility..... :	☐ movable ☐ hand-held ☐ transportable ☐ direct plug-in ☐ stationary ☒ for building-in ☐ wall/ceiling-mounted ☐ SRME/rack-mounted ☐ other:
Overvoltage category (OVC) ..... :	☒ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☐ other:
Class of equipment ..... :	☐ Class I ☐ Class II ☐ Class II with functional earthing ☒ Class III ☐ Not classified ☐
Special installation location ..... :	☒ N/A ☐ restricted access area ☐ outdoor location ☐
Pollution degree (PD) ..... :	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified T_{ma}..... :	85 °C ☐ Outdoor: minimum °C
IP protection class ..... :	☒ IPX0 ☐ IP___
Power systems ..... :	☐ TN ☐ TT ☐ IT - V_{L-L} ☒ not AC mains
Altitude during operation (m) ..... :	☒ 2000 m or less ☐ m
Altitude of test laboratory (m) ..... :	☒ 2000 m or less ☐ m
Mass of equipment (kg) ..... :	Approximately 0.015 g

Possible test case verdicts:

- test case does not apply to the test object.....: N/A

- test object does meet the requirement.....: P (Pass)

- test object does not meet the requirement.....: F (Fail)

Testing.....:

Date of receipt of test item .....: 2024-01-19, 2024-01-22

Date (s) of performance of tests.....: 2024-02-03 to 2024-02-06

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....: ON SEMICONDUCTOR PHILIPPINES INC. – CEBU
MACTAN ECONOMIC ZONE 1, LAPU-LAPU CITY, CEBU, 6015 PHILIPPINES

General product information and other remarks:

Product Description

The component power distribution switch (IC Current Limiter) limits the output current to within the specified output ratings. These devices provide current limiting and short-circuit protection when supplied by a power source (e.g., 250 VA) in accordance with those specified for LPS outputs in Table 2B. These devices are for use in SELV circuits only.

The test circuit of the Evaluation Board with Resistor (Rset) is 0.89 or 8.89 Kohm.

Model Differences

Model FPF2895CUCX is identical to model FPF2895UCX except some parameters, see enclosure 03-02 for details.

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

The label is a draft of an artwork for marking plate pending approval by National Certification Bodies and it

shall not be affixed to products prior to such an approval.

Technical Considerations

These devices were tested in the circuit shown below. If different circuit is used in end product, then the end product engineer shall determine the suitability. Resistor R3 can between 290 ohms and 11900 ohms.

Engineering Conditions of Acceptability

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

The investigated Pollution Degree is : 2

1. The IC current limiters are intended for installation in SELV circuits only. The spacing between the input and output pins are not investigated.

2. The IC current limiters limit the current to the manufacturer's specified value (not more than 5 A) under normal operating conditions with any specified drift taken into account.

3. The IC current limiters are entirely electronic and have no means for manual operation or reset.

4. The IC current limiters limit the current to 5 A, taking into account the manufacturer's specified drift after each of the conditioning tests given in the test programs specified in G.9.3.

5. The terminals of these IC current limiters are for factory wiring only.

6. These devices were tested in the circuit shown in IC Spec. If different circuit is used in end product, then the end product engineer shall determine the suitability. Resistor R3 can be between 290 ohms and 11900 ohms.

OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS				
Clause	**Possible Hazard**			
5	Electrically-caused injury			
Class and Energy Source (e.g. ES3: Primary circuit)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
6	Electrically-caused fire			
Class and Energy Source (e.g. PS2: 100 Watt circuit)	Material part (e.g. Printed board)	Safeguards		
		B	1st S	2nd S
N/A	N/A	N/A	N/A	N/A
7	Injury caused by hazardous substances			
Class and Energy Source (e.g. Ozone)	Body Part (e.g., Skilled)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
8	Mechanically-caused injury			
Class and Energy Source (e.g. MS3: Plastic fan blades)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
9	Thermal burn			
Class and Energy Source (e.g. TS1: Keyboard caps)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
10	Radiation			
Class and Energy Source (e.g. RS1: PMP sound output)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
N/A	N/A	N/A	N/A	N/A
Supplementary Information: “B” – Basic Safeguard; “S” – Supplementary Safeguard; “R” – Reinforced Safeguard				

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

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Clause	Requirement + Test	Result - Remark	Verdict
4	**GENERAL REQUIREMENTS**		P
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components		N/A
4.1.3	Equipment design and construction		P
4.1.4	Specified ambient temperature for outdoor use (°C) ..... :		N/A
4.1.5	Constructions and components not specifically covered		N/A
4.1.8	Liquids, refrigerants and liquid filled components (LFCs)	(See Clause G.15)	N/A
4.1.15	Markings and instructions	(See Annex F)	P
4.4.3	Safeguard robustness		N/A
4.4.3.1	General	To be evaluated in end product.	N/A
4.4.3.2	Steady force tests	(See Clause T.3, T.4, T.5)	N/A
4.4.3.3	Drop tests	(See Clause T.7)	N/A
4.4.3.4	Impact tests	(See Clause T.6)	N/A
4.4.3.5	Internal accessible safeguard tests	(See Clause T.3)	N/A
4.4.3.6	Glass impact tests	(See Clause T.9)	N/A
4.4.3.7	Glass fixation test		N/A
	Glass impact test (1J)	(See Clause T.9)	N/A
	Push/pull test (10 N)		N/A
4.4.3.8	Thermoplastic material tests	(See Clause T.8)	N/A
4.4.3.9	Air comprising a safeguard		N/A
4.4.3.10	Accessibility, glass, safeguard effectiveness		N/A
4.4.4	Displacement of a safeguard by an insulating liquid		N/A
4.4.5	Safety interlocks	(See Annex K)	N/A
4.5	**Explosion**		P
4.5.1	General	(See Annex M for batteries)	N/A
4.5.2	No explosion during normal/abnormal operating conditions	(See Clause B.2, B.3)	N/A
	No harm by explosion during single fault conditions	(See Clause B.4)	N/A
4.6	**Fixing of conductors and conductive parts**		N/A
	Fix conductors and conductive parts not to defeat a safeguard		N/A
	Compliance is checked by test ..... :	(See Clause T.2)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.7	**Equipment for direct insertion into mains socket–outlets**		N/A
4.7.2	Mains plug part complies with relevant standard ... :		N/A
4.7.3	Torque (Nm) ..... :		N/A
4.8	**Equipment containing coin or button cell batteries**		N/A
4.8.1	General		N/A
4.8.2	Instructional safeguard ..... :		N/A
4.8.3	Coin or button cell battery compartment, door or cover construction		N/A
	Open torque test		N/A
4.8.4.2	Stress relief test	(See Clause T.8)	N/A
4.8.4.3	Battery replacement test		N/A
4.8.4.4	Drop test	(See Clause T.7)	N/A
4.8.4.5	Impact test	(See Clause T.6)	N/A
4.8.4.6	Crush test		N/A
4.8.5	Compliance		N/A
	30N force test with test probe		N/A
	20N force test with test hook		N/A
4.9	**Likelihood of fire or shock due to entry of conductive object**		N/A
4.10	**Component requirements**		N/A
4.10.1	Disconnect device	(See Annex L)	N/A
4.10.2	Switches and relays	(See Annex G)	N/A
4.10.3	Mains power supply cords	(See Clause G.7)	N/A
4.10.4	Batteries and their protection circuits	(See Annex M)	N/A

5	**ELECTRICALLY-CAUSED INJURY**		N/A
5.2	**Classification and limits of electrical energy sources**		N/A
5.2.2	ES1 and ES2 limits		N/A
5.2.2.2	Steady-state voltage and current limits ..... :	(See appended table 5.2)	N/A
5.2.2.3	Capacitance limits ..... :	(See appended table 5.2)	N/A
5.2.2.4	Single pulse limits..... :	(See appended table 5.2)	N/A
5.2.2.5	Limits for repetitive pulses..... :	(See appended table 5.2)	N/A
5.2.2.6	Ringing signals	(See Annex H)	N/A
5.2.2.7	Audio signals	(See Clause E.1)	N/A
5.3	**Protection against electrical energy sources**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons		N/A
5.3.1 a)	ES2/ES3 circuits that are not ES2/ES3 mains		N/A
5.3.1 b)	Skilled persons not unintentional contact ES3 bare conductors		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
	Accessibility to outdoor equipment bare parts		N/A
5.3.2.2	Contact requirements		N/A
	Test with test probe from Annex V..... :		—
5.3.2.2 a)	Air gap – electric strength test potential (V)..... :	(See appended table 5.4.9)	N/A
5.3.2.2 b)	Air gap – distance (mm) ..... :		N/A
5.3.2.3	Compliance		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	**Insulation materials and requirements**		N/A
5.4.1.2	Properties of insulating material		N/A
5.4.1.3	Compliance		N/A
	Non-hygroscopic materials		N/A
5.4.1.4	Maximum operating temperature for insulating materials ..... :	(See appended table 5.4.1.4, 9.3, B.1.5, B.2.6)	N/A
5.4.1.5	Pollution degrees..... :		—
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 test		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage ..... :	(See appended table 5.4.1.8)	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 test ..... :	(See appended table 5.4.1.10.2)	N/A
5.4.1.10.3	Ball pressure test..... :	(See appended table 5.4.1.10.3)	N/A
5.4.2	Clearances		N/A
5.4.2.1	General requirements		N/A
	Clearances in circuits connected to AC Mains, Alternative method	(See Annex X)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.2.2	Procedure 1 for determining clearance		N/A
	Temporary overvoltage ..... :		—
5.4.2.3	Procedure 2 for determining clearance		N/A
5.4.2.3.2.2	AC mains transient voltages ..... :		—
5.4.2.3.2.3	DC mains transient voltages ..... :		—
5.4.2.3.2.4	External circuit transient voltages ..... :		—
5.4.2.3.2.5	Transient voltage determined by measurement..... :		—
5.4.2.3.3	Exceptions of determining required withstand voltage ..... :		N/A
5.4.2.3.4	Determining clearances using required withstand voltage ..... :	(See appended table 5.4.2, 5.4.3)	N/A
5.4.2.4	Determining the adequacy of a clearance using an electric strength test ..... :	(See appended table 5.4.2, 5.4.3)	N/A
5.4.2.5	Multiplication factors for clearances and test voltages..... :		—
5.4.2.6	Clearance measurement..... :	(See appended table 5.4.2, 5.4.3)	N/A
5.4.3	Creepage distances		N/A
5.4.3.1	General		N/A
5.4.3.3	Material group and CTI..... :		—
5.4.3.4	Creepage distances measurement..... :	(See appended table 5.4.2, 5.4.3)	N/A
5.4.4	Solid insulation		N/A
5.4.4.1	General requirements		N/A
5.4.4.2	Minimum distance through insulation ..... :	(See appended table 5.4.4.2)	N/A
5.4.4.3	Insulating compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Insulating compound forming 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	(See appended table 5.4.9)	N/A
	Number of layers (pcs) ..... :		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
	Number of layers (pcs) ..... :		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material..... :	(See appended table 5.4.9)	N/A
5.4.4.6.5	Mandrel test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz, E_P, K_R, d, V_{PW} (V) ..... :	(See appended table 5.4.4.9)	N/A
	Alternative by electric strength test, tested voltage (V), K_R ..... :	(See appended tables 5.4.4.9 and 5.4.9)	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
5.4.5.3	Insulation resistance (MΩ) ..... :		N/A
	Electric strength test ..... :	(See appended table 5.4.9)	N/A
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		N/A
	Relative humidity (%), temperature (°C), duration (h) ..... :		—
5.4.9	Electric strength test	(See appended table 5.4.9)	N/A
5.4.10	Safeguards against transient voltages from external circuits		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..... :	(See appended table 5.4.9)	N/A
5.4.10.3	Verification for insulation breakdown..... :		N/A
5.4.11	Separation between external circuits and earth		N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	Surge suppressors bridge separation between external circuit and earth		N/A
	Rated operating voltage U_{op} (V)..... :		—
	Nominal voltage U_{peak} (V)..... :		—
	Max increase due to variation ΔU_{sp} ..... :		—
	Max increase due to ageing ΔU_{sa} ..... :		—
5.4.11.3	Test method and compliance ..... :	(See appended table 5.4.9)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test voltage (V) of additional test ..... :		—
	Measured current (mA) of additional test ..... :		N/A
5.4.12	Insulating liquid		N/A
5.4.12.1	General requirements		N/A
5.4.12.2	Electric strength of an insulating liquid ..... :	(See appended table 5.4.9)	N/A
5.4.12.3	Compatibility of an insulating liquid		N/A
	Thermal classification of IEC 60085 ..... :		—
5.4.12.4	Container for insulating liquid		N/A
5.5	**Components as safeguards**		N/A
5.5.1	General		N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Capacitor discharge after disconnection of a connector ..... :	(See appended table 5.5.2.2)	N/A
5.5.3	Transformers	(See Clause G.5.3)	N/A
5.5.4	Optocouplers	(See Clause 5.4 or Clause G.12)	N/A
5.5.5	Relays	(See Clause 5.4)	N/A
5.5.6	Resistors	(See Clause G.10)	N/A
	Application type of resistors ..... :		—
5.5.7	Surge suppressors	(See Clause G.8)	N/A
	GDT……:		N/A
5.5.8	Insulation between the mains and an external circuit consisting of a coaxial cable ..... :		N/A
	Insulation resistance (MΩ) ..... :		N/A
	Electric strength test ..... :	(See appended table 5.4.9)	N/A
5.5.9	Safeguards for socket-outlets in outdoor equipment		N/A
	RCD rated residual operating current (mA)..... :		—
5.6	**Protective conductor**		N/A
5.6.2	Requirements 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	Requirements for protective earthing conductors		N/A
	Protective earthing conductor size (mm^2) ..... :		—
	Protective earthing conductor serving as a reinforced safeguard		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Protective earthing conductor serving as a double safeguard		N/A
5.6.4	Requirements for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2). ..... :		—
5.6.4.2	Protective current rating (A) ..... :		—
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Terminal size for connecting protective earthing conductors (mm)..... :		N/A
	Terminal size for connecting protective bonding conductors (mm)..... :		N/A
	Relevant IEC standard ..... :		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective bonding system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test method..... :	(See appended table 5.6.6)	N/A
5.6.6.3	Resistance (Ω) or voltage drop ..... :	(See appended table 5.6.6)	N/A
5.6.7	Reliable connection of a protective earthing conductor		N/A
5.6.8	Functional earthing		N/A
	Conductor size (mm^2) ..... :		N/A
	Class II with functional earthing marking ..... :		N/A
	Appliance inlet cl & cr (mm)..... :		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 voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
5.7.4	Unearthed accessible parts..... :	(See appended table 5.7.4)	N/A
5.7.5	Earthed accessible conductive parts..... :	(See appended table 5.7.5)	N/A
5.7.6	Requirements when touch current exceeds ES2 limits		N/A
	Protective conductor current (mA)..... :		N/A
	Instructional Safeguard ..... :		N/A
5.7.7	Prospective touch voltage and touch current associated with external circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.7.7.1	Touch current from coaxial cables		N/A
5.7.7.2	Prospective touch voltage and touch current associated with paired conductor cables		N/A
5.7.8	Summation of touch currents from external circuits		N/A
	a) Equipment connected to an earthed external circuit, current (mA) ..... :		N/A
	b) Equipment connected to an unearthed external circuit, current (mA) ..... :		N/A
5.8	**Backfeed safeguard in battery backed up supplies**		N/A
	Mains terminal ES ..... :	(See appended table 5.8)	N/A
	Air gap (mm) ..... :	(See appended table 5.4.2, 5.4.3)	N/A
6	**ELECTRICALLY- CAUSED FIRE**		N/A
6.2	**Classification of power sources and potential ignition sources**		N/A
6.2.2	Power source circuit classifications ..... :	(See appended table 6.2.2)	N/A
6.2.3	Classification of potential ignition sources		N/A
6.2.3.1	Arcing PIS ..... :	(See appended table 6.2.3.1)	N/A
6.2.3.2	Resistive PIS ..... :	(See appended table 6.2.3.2)	N/A
6.3	**Safeguards against fire under normal operating and abnormal operating conditions**		N/A
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials ..... :	(See appended table 5.4.1.4, 9.3, B.1.5 and B.2.6)	N/A
	Combustible materials not inside a fire enclosure.... :		N/A
6.4	**Safeguards against fire under single fault conditions**		N/A
6.4.1	Safeguard method ..... :		—
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	Supplementary safeguards		N/A
6.4.3.2	Single fault conditions ..... :	(See appended table B.4)	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 circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.7	Separation of combustible materials from a PIS		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
6.4.8.2	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 and properties		N/A
	Openings dimensions (mm) ..... :		N/A
	Flammability tests for the top of a fire enclosure	(See Clause S.2)	N/A
6.4.8.3.4	Bottom openings and properties		N/A
	Openings dimensions (mm) ..... :		N/A
	Flammability tests for the bottom of a fire enclosure	(See Clause S.3)	N/A
	Instructional Safeguard ..... :		N/A
6.4.8.3.5	Side openings and properties		N/A
	Openings dimensions (mm) ..... :		N/A
6.4.8.3.6	Integrity of a fire enclosure, condition met: a), b) or c)..... :		N/A
6.4.8.4	Separation of a PIS from a fire enclosure and a fire barrier distance (mm) or flammability rating..... :		N/A
6.4.9	Flammability of insulating liquid		N/A
	Auto ignition temperature (°C)..... :		N/A
	Flashpoint temperature (°C)..... :		N/A
6.5	**Internal and external wiring**		N/A
6.5.1	General requirements		N/A
6.5.2	Requirements for interconnection to building wiring ..... :		N/A
6.5.3	Internal wiring size (mm^2) for socket-outlets ..... :		N/A
6.6	**Safeguards against fire due to the connection to additional equipment**		N/A

7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**	N/A
7.2	**Reduction of exposure to hazardous substances**	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.3	**Ozone exposure**		N/A
7.4	**Use of personal safeguards or personal protective equipment (PPE)**		N/A
	Personal safeguards and instructions ..... :		—
7.5	**Use of instructional safeguards and instructions**		N/A
	Instructional safeguard (ISO 7010) ..... :		—
8	**MECHANICALLY-CAUSED INJURY**		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	Requirements		N/A
	Instructional Safeguard ..... :		N/A
8.4.2	Compliance criteria		N/A
8.5	**Safeguards against moving parts**		N/A
8.5.1	Requirements		N/A
	Fingers, jewellery, clothing, hair, etc., contact with MS2 or MS3 parts		N/A
	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
	A manually activated stopping device for moving MS3		N/A
	Moving MS3 parts only accessible to skilled person		N/A
8.5.2	Instructional safeguard ..... :		N/A
8.5.4	Special categories of equipment containing moving parts		N/A
8.5.4.1	General		N/A
8.5.4.2	Equipment containing work cells with MS3 parts		N/A
8.5.4.2.1	Protection of persons in the work cell		N/A
8.5.4.2.2	Access protection override		N/A
8.5.4.2.2.1	Override system		N/A
8.5.4.2.2.2	Visual indicator		N/A
8.5.4.2.3	Emergency stop system		N/A
	Maximum stopping distance from the point of activation (m) ..... :		N/A
	Space between end point and nearest fixed mechanical part (mm)..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.5.4.2.4	Endurance requirements		N/A
	Mechanical system subjected to 100 000 cycles of operation		N/A
	- Mechanical function check and visual inspection		N/A
	- Cable assembly ..... :		N/A
8.5.4.3	Equipment having electromechanical device for destruction of media		N/A
8.5.4.3.1	Equipment safeguards		N/A
8.5.4.3.2	Instructional safeguards against moving parts ..... :		N/A
8.5.4.3.3	Disconnection from the supply		N/A
8.5.4.3.4	Cut type and test force (N) ..... :		N/A
8.5.4.3.5	Compliance		N/A
8.5.5	High pressure lamps		N/A
	Explosion test ..... :		N/A
8.5.5.3	Glass particles dimensions (mm) ..... :		N/A
8.6	**Stability of equipment**		N/A
8.6.1	Requirements		N/A
	Instructional safeguard for MS2 and MS3 television sets ..... :		N/A
8.6.2	Static stability		N/A
8.6.2.2	Static stability test ..... :		N/A
8.6.2.3	Downward force test		N/A
8.6.3	Relocation stability		N/A
	Wheels diameter (mm) ..... :		—
	Tilt test		N/A
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test ..... :		N/A
8.7	**Equipment mounted to wall, ceiling or other structure**		N/A
8.7.1	Requirements		N/A
	Mount means type ..... :		N/A
8.7.2	Test methods		N/A
	Test 1, additional downwards force (N) ..... :		N/A
	Horizontal force to a wall or another structure		N/A
	Test 2, number of attachment points and test force (N) ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test 3, nominal diameter (mm) and applied torque (Nm) ..... :		N/A
8.8	**Handles strength**		N/A
8.8.1	General		N/A
8.8.2	Handle strength test		N/A
	Number of handles ..... :		—
	Weight applied (kg)..... :		—
8.9	**Wheels or casters attachment requirements**		N/A
8.9.2	Pull test		N/A
8.10	**Carts, stands and similar carriers**		N/A
8.10.1	General		N/A
8.10.2	Marking and instructions ..... :		N/A
8.10.3	Cart, stand or carrier loading test		N/A
	Loading force applied (N)..... :		N/A
8.10.4	Cart, stand or carrier impact test	(See Clause T.6)	N/A
	Loading force applied (N) on each supporting surface ..... :		N/A
8.10.5	Mechanical stability		N/A
	Force applied (N)..... :		N/A
8.10.6	Thermoplastic temperature stability	(See Clause T.8)	N/A
8.11	**Mounting means for slide-rail mounted equipment (SRME)**		N/A
8.11.1	General		N/A
8.11.2	Requirements		N/A
	Instructional Safeguard ..... :		N/A
8.11.3	Mechanical strength test		N/A
8.11.3.1	Downward force test, force applied (N) ..... :		N/A
8.11.3.2	Lateral push force test		N/A
8.11.3.3	Integrity of slide rail end stops		N/A
8.11.4	Compliance criteria		N/A
8.12	**Telescoping or rod antennas**		N/A
	No sharp edges or points		N/A
	Button/ball diameter (mm)..... :		N/A

9	**THERMAL BURN INJURY**	N/A
9.2	**Thermal energy source classifications**	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.3	**Touch temperature limits**		N/A
9.3.1	Touch temperatures of accessible parts..... :	(See appended table 5.4.1.4, 9.3, B.1.5, B.2.6)	N/A
9.3.2	Test method and compliance		N/A
9.4	**Safeguards against thermal energy sources**		N/A
9.5	**Requirements for safeguards**		N/A
9.5.1	Equipment safeguard		N/A
9.5.2	Instructional safeguard..... :		N/A
9.6	**Requirements for wireless power transmitters**		N/A
9.6.1	General		N/A
9.6.2	Specification of the foreign objects		N/A
9.6.3	Test method and compliance criteria..... :	(See appended table 9.6)	N/A
10	**RADIATION**		N/A
10.2	**Radiation energy source classifications**		N/A
10.2.1	General classification		N/A
	Lasers..... :		—
	Lamps and lamp systems..... :		—
	Image projectors..... :		—
	X-Ray..... :		—
	Personal music player ..... :		—
10.3	**Safeguards against laser radiation**		N/A
	The standard(s) equipment containing laser(s) comply..... :		N/A
10.4	**Safeguards against optical radiation from lamps and lamp systems (including LED types)**		N/A
10.4.1	General requirements		N/A
	Instructional safeguard provided for accessible radiation level needs to exceed		N/A
	Risk group marking and location ..... :		N/A
	Information for safe operation and installation		N/A
10.4.2	Requirements for equipment safeguards		N/A
	UV radiation exposure..... :	(See Annex C)	N/A
10.4.3	Instructional safeguard ..... :		N/A
10.5	**Safeguards against X-radiation**		N/A
10.5.1	Requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructional safeguard for skilled persons..... :		N/A
10.5.3	Maximum radiation (pA/kg) ..... :	(See appended tables B.3 & B.4)	N/A
10.6	**Safeguards against acoustic energy sources**		N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output $L_{Aeq,T}$, dB(A) ..... :		N/A
	Unweighted RMS output voltage (mV) ..... :		N/A
	Digital output signal (dBFS) ..... :		N/A
10.6.3	Requirements for dose-based systems		N/A
10.6.3.1	General requirements		N/A
10.6.3.2	Dose-based warning and automatic decrease		N/A
10.6.3.3	Exposure-based warning and requirements		N/A
	30 s integrated exposure level (MEL30)..... :		N/A
	Warning for MEL ≥ 100 dB(A)..... :		N/A
10.6.4	Measurement methods		N/A
10.6.5	Protection of persons		N/A
	Instructional safeguards ..... :		N/A
10.6.6	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.6.1	Corded listening devices with analogue input		N/A
	Listening device input voltage (mV) ..... :		N/A
10.6.6.2	Corded listening devices with digital input		N/A
	Max. acoustic output $L_{Aeq,T}$, dB(A) ..... :		N/A
10.6.6.3	Cordless listening devices		N/A
	Max. acoustic output $L_{Aeq,T}$, dB(A) ..... :		N/A

B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		P
B.1	**General**		N/A
B.1.5	Temperature measurement conditions	(See appended table 5.4.1.4, 9.3, B.1.5, B.2.6)	N/A
B.1.6	Specific output conditions		N/A
B.2	**Normal operating conditions**		P
B.2.1	General requirements..... :	(See Test Item Particulars and appended test tables)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Audio Amplifiers and equipment containing an audio amplifiers ..... :	(See Annex E)	N/A
B.2.3	Supply voltage and tolerances		N/A
B.2.5	Input test ..... :	(See appended table B.2.5) (See Clause E.3 for audio amplifier)	N/A
B.2.6.4	Equipment intended for building-in or rack-mounting		N/A
B.3	**Simulated abnormal operating conditions**		N/A
B.3.1	General		N/A
B.3.2	Covering of ventilation openings		N/A
	Instructional safeguard ..... :		N/A
B.3.3	DC 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	Audio amplifier abnormal operating conditions	(See Clause E.3.2)	N/A
B.3.8	Safeguards functional during and after abnormal operating conditions ..... :	(See appended table B.3, B.4)	N/A
B.4	**Simulated single fault conditions**		N/A
B.4.1	General		N/A
B.4.2	Temperature controlling device		N/A
B.4.3	Blocked motor test		N/A
B.4.4	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 disconnection of passive components		N/A
B.4.7	Continuous operation of components		N/A
B.4.8	Compliance criteria during and after single fault conditions ..... :	(See appended table B.3, B.4)	N/A
B.4.9	Battery charging and discharging under single fault conditions	(See Annex M)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
C	**UV RADIATION**		N/A
C.1	**Protection of materials in equipment from UV radiation**		N/A
C.1.2	Requirements		N/A
C.1.3	Test method and compliance criteria		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 test		N/A
C.2.4	Xenon-arc light-exposure test		N/A
D	**TEST GENERATORS**		N/A
D.1	**Impulse test generators**		N/A
D.2	**Antenna interface test generator**		N/A
D.3	**Electronic pulse generator**		N/A
E	**TEST CONDITIONS FOR EQUIPMENT INTENDED TO AMPLIFY AUDIO SIGNALS**		N/A
E.1	**Electrical energy source classification for audio signals**		N/A
	Maximum non-clipped output power (W) ..... :		—
	Rated load impedance (Ω) ..... :		—
	Open-circuit output voltage (V)..... :		—
	Instructional safeguard ..... :		—
E.2	**Audio signals used during test**		N/A
E.2.1	Pink noise test signal		N/A
E.2.2	Sine-wave signal		N/A
E.3	**Operating conditions of equipment containing an audio amplifier**		N/A
E.3.1	Normal operating conditions	(See appended table B.2.5, E.3.1)	N/A
E.3.2	Abnormal operating conditions	(See appended table B.3, B.4)	N/A
E.3.3	Audio equipment temperature measurement conditions……:		N/A
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		P
F.1	**General**		N/A
	Language ..... :		—
F.2	**Letter symbols and graphical symbols**		N/A
F.2.1	Letter symbols according to IEC 60027-1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
F.2.2	Graphic symbols according to IEC, ISO or manufacturer specific		N/A
F.3	**Equipment markings**		P
F.3.1	Equipment marking locations		P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification ..... :	ON SEMICONDUCTOR PHILIPPINES INC. – CEBU	P
F.3.2.2	Model identification ..... :	FPF2895UCX, FPF2895CUCX	P
F.3.3	Equipment rating markings		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 the supply voltage..... :		N/A
F.3.3.4	Rated voltage ..... :	(Optional) Input Voltage Range: 4Vdc to 22Vdc	P
F.3.3.5	Rated frequency ..... :		N/A
F.3.3.6	Rated current or rated power ..... :	(Optional) Current Limit Rating: 500mA to 5A	P
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device		N/A
F.3.5	Markings on 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
	Instructional safeguards for neutral fuse ..... :		N/A
F.3.5.4	Replacement battery identification marking ..... :	(See Clause M.10)	N/A
F.3.5.5	Neutral conductor terminal		N/A
F.3.5.6	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal..... :		N/A
F.3.6.1.2	Protective bonding conductor terminals ..... :		N/A
F.3.6.2	Equipment class marking ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
F.3.6.3	Functional earthing terminal marking ..... :		N/A
F.3.7	Equipment IP rating marking ..... :		N/A
F.3.8	External power supply unit output marking ..... :		N/A
F.3.9	Durability, legibility and permanence of markings		N/A
F.3.10	Test for permanence of markings		N/A
F.4	**Instructions**		N/A
	– Information prior to installation and initial use		N/A
	– Equipment for use in locations where children not likely to be present		N/A
	– Instructions for installation and interconnection		N/A
	– Equipment intended for use only in restricted access area		N/A
	– Equipment intended to be fastened in place		N/A
	– Instructions for audio equipment terminals		N/A
	– Protective earthing used as a safeguard		N/A
	– Protective conductor current exceeding ES2 limits		N/A
	– Graphic symbols used on equipment		N/A
	– Permanently connected equipment not provided with all-pole mains switch		N/A
	– Replaceable components or modules providing safeguard function		N/A
	– Equipment containing insulating liquid		N/A
	– Installation instructions for outdoor equipment		N/A
F.5	Instructional safeguards		N/A
G	**COMPONENTS**		P
G.1	**Switches**		N/A
G.1.1	General		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.1.3	Test method and compliance criteria		N/A
G.2	**Relays**		N/A
G.2.1	Requirements and compliance criteria		N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supplying power to other equipment		N/A
G.2.4	Test method and compliance criteria		N/A
G.3	**Protective devices**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.3.1	Thermal cut-offs		N/A
	Thermal cut-outs separately approved according to IEC 60730-1 with conditions indicated in a) & b)		N/A
	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Test method and compliance criteria		N/A
G.3.2	Thermal links		N/A
G.3.2.1	a) Thermal links tested separately according to IEC 60691 with specifics		N/A
	b) Thermal links tested as part of the equipment		N/A
G.3.2.2	Test method and compliance criteria		N/A
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.3.4		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions..... :	(See appended table B.3, B.4)	N/A
G.4	**Connectors**		N/A
G.4.1	Spacings		N/A
G.4.2	Mains connectors configuration..... :		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	**Wound components**		N/A
G.5.1	Wire insulation in wound components		N/A
G.5.1.2	Protection against mechanical stress		N/A
G.5.2	Endurance test		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Test time (days per cycle) ..... :		—
	Test temperature (°C)..... :		—
G.5.2.3	Wound components supplied from the mains		N/A
G.5.2.4	Compliance criteria		N/A
G.5.3	Transformers		N/A
G.5.3.1	General		N/A
	Compliance method..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.5.3.2	Insulation		N/A
	Protection from displacement of windings..... :		—
G.5.3.3	Transformer overload tests		N/A
G.5.3.3.1	Test conditions		N/A
	Position..... :		N/A
	Method of protection..... :		N/A
G.5.3.3.2	Winding temperatures		N/A
G.5.3.3.3	Winding temperatures - alternative test method		N/A
G.5.3.4	Transformers using FIW		N/A
G.5.3.4.1	General		N/A
	FIW wire nominal diameter..... :		—
G.5.3.4.2	Transformers with basic insulation only		N/A
G.5.3.4.3	Transformers with double insulation or reinforced insulation ..... :		N/A
G.5.3.4.4	Transformers with FIW wound on metal or ferrite core		N/A
G.5.3.4.5	Thermal cycling test and compliance		N/A
G.5.3.4.6	Partial discharge test		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements		N/A
G.5.4.2	Motor overload 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) ..... :		—
	Electric strength test..... :	(See appended table 5.4.9)	N/A
G.5.4.5	Running overload test for DC motors		N/A
G.5.4.5.2	Tested in the unit		N/A
	Electric strength test..... :	(See appended table 5.4.9)	N/A
G.5.4.5.3	Alternative method		N/A
	Electric strength test..... :	(See appended table 5.4.9)	N/A
G.5.4.6	Locked-rotor overload test for DC motors		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature (°C)..... :		N/A
	Electric strength test..... :	(See appended table 5.4.9)	N/A
G.5.4.6.3	Alternative method		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Electric strength test ..... :	(See appended table 5.4.9)	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 (V) ..... :		—
G.6	**Wire Insulation**		N/A
G.6.1	General		N/A
G.6.2	Enamelled winding wire insulation		N/A
G.7	**Mains power supply cords and interconnection cables**		N/A
G.7.1	General requirements		N/A
	Type..... :		—
G.7.2	Cross sectional area (mm^2 or AWG) ..... :		N/A
G.7.3	Cord anchorages and strain relief		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N) ..... :		N/A
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)..... :		N/A
G.7.3.2.4	Strain relief and cord anchorage 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	Test method and compliance criteria		N/A
	Overall diameter or minor overall dimension, *D* (mm) ..... :		—
	Radius of curvature after test (mm)..... :		—
G.7.6	Supply wiring space		N/A
G.7.6.1	General requirements		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Requirements		N/A
G.7.6.2.2	Test with 8 mm strand		N/A
G.8	**Varistors**		N/A
G.8.1	General requirements		N/A
G.8.2	Safeguards against fire		N/A
G.8.2.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.8.2.2	Varistor overload test		N/A
G.8.2.3	Temporary overvoltage test		N/A
G.9	**Integrated circuit (IC) current limiters**		P
G.9.1	Requirements		P
	IC limiter output current (max. 5A) ..... :	(Optional) Current Limit Rating: 500mA to 5A	—
	Manufacturers' defined drift ..... :	(Optional) Current Limit Rating: 500mA to 5A	—
G.9.2	Test Program		N/A
G.9.3	Compliance criteria		P
G.10	**Resistors**		N/A
G.10.1	General		N/A
G.10.2	Conditioning		N/A
G.10.3	Resistor test		N/A
	Changes of resistance (%) ..... :		N/A
	Measured current with the lowest resistance value :		N/A
G.10.4	Voltage surge test		N/A
	Changes of resistance (%) ..... :		N/A
G.10.5	Impulse test		N/A
	Changes of resistance (%) ..... :		N/A
G.10.6	Overload test		N/A
	Changes of resistance (%) ..... :		N/A
G.11	**Capacitors and RC units**		N/A
G.11.1	General requirements		N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	**Optocouplers**		N/A
	Optocouplers comply with IEC 60747-5-5 with specifics		N/A
	Type test voltage $V_{ini,a}$ ..... :		—
	Routine test voltage, $V_{ini,b}$ ..... :		—
G.13	**Printed boards**		N/A
G.13.1	General requirements		N/A
G.13.2	Uncoated printed boards		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
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.13.6.2	Test method and compliance criteria		N/A
G.14	**Coating on components terminals**		N/A
G.14.1	Requirements ..... :	(See Clause G.13)	N/A
G.15	**Pressurized liquid filled components or LFC assemblies**		N/A
G.15.1	Requirements		N/A
G.15.2	Test methods and compliance criteria for self-contained LFC		N/A
G.15.2.1	Hydrostatic pressure test, applied test pressure .... :		N/A
G.15.2.2	Creep resistance test		N/A
G.15.2.3	Tubing and fittings compatibility test, the change of tensile strength (%)..... :		N/A
G.15.2.4	Vibration test		N/A
G.15.2.5	Thermal cycling test, test temperature (°C)..... :		N/A
G.15.2.6	Force test		N/A
G.15.2.7	Compliance criteria		N/A
G.15.3	Test methods and compliance for a modular LFC		N/A
G.15.3.2	Hydrostatic pressure test, applied test pressure .... :		N/A
G.15.3.3	Creep resistance test		N/A
G.15.3.4	Tubing and fittings compatibility test, the change of tensile strength (%)..... :		N/A
G.15.3.5	Thermal cycle test, test temperature (°C) ..... :		N/A
G.15.3.6	Force test		N/A
G.15.3.7	Compliance criteria		N/A
G.16	**IC including capacitor discharge function (ICX)**		N/A
G.16.1	Condition for fault tested is not required		N/A
	ICX with associated circuitry tested in equipment		N/A
	ICX tested separately		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.16.2	Tests		N/A
	Smallest capacitance and smallest resistance specified by ICX manufacturer for impulse test..... :		—
	Mains voltage that impulses to be superimposed on..... :		—
	Largest capacitance and smallest resistance for ICX tested by itself for 10000 cycles test ..... :		—
G.16.3	Capacitor discharge test..... :	(See appended table 5.5.2.2)	N/A
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		N/A
H.1	**General**		N/A
H.2	**Method A**		N/A
H.3	**Method B**		N/A
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz) ..... :		—
H.3.1.2	Voltage (V) ..... :		—
H.3.1.3	Cadence; time (s) and voltage (V) ..... :		—
H.3.1.4	Single fault condition current (mA): ..... :		—
H.3.2	Tripping device and monitoring voltage		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V) ..... :		N/A
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		N/A
J.1	**General**		N/A
	Winding wire insulation..... :		—
	Solid round winding wire, diameter (mm)..... :		N/A
	Solid square and rectangular (flatwise bending) winding wire, cross-sectional area (mm^2)..... :		N/A
J.2/J.3	Tests and Manufacturing	(See separate test report)	—
K	**SAFETY INTERLOCKS**		N/A
K.1	**General requirements**		N/A
	Instructional safeguard ..... :		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

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Clause	Requirement + Test	Result - Remark	Verdict
K.5	**Fail-safe**		N/A
K.5.1	Under single fault condition		N/A
K.6	**Mechanically operated safety interlocks**		N/A
K.6.1	Endurance requirement		N/A
K.7	**Interlock circuit isolation**		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements		N/A
	In circuit connected to mains, separation distance for contact gaps (mm)..... :		N/A
	In circuit isolated from mains, separation distance for contact gaps (mm)..... :		N/A
	Electric strength test before and after the test of K.7.2 ..... :	(See appended table 5.4.9)	N/A
K.7.2	Overload test, Current (A) ..... :		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test	(See appended table 5.4.9)	N/A
L	**DISCONNECT DEVICES**		N/A
L.1	**General requirements**		N/A
L.2	**Permanently connected equipment**		N/A
	Instructions for permanently connected equipment		N/A
L.3	**Parts that remain energized**		N/A
L.4	**Single-phase equipment**		N/A
	Instructions for single pole disconnect device		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
	Instructions for pluggable equipment		—
L.8	**Multiple power sources**		N/A
	Instructional safeguard ..... :		N/A
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		N/A
M.1	**General requirements**		N/A
M.2	**Safety of batteries and their cells**		N/A
M.2.1	Batteries and their cells comply with relevant IEC standards..... :		N/A
M.3	**Protection circuits for batteries provided within the equipment**		N/A
M.3.1	Requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.3.2	Test method		N/A
	Overcharging of a rechargeable battery		N/A
	Excessive discharging		N/A
	Unintentional charging of a non-rechargeable battery		N/A
	Reverse charging of a rechargeable battery		N/A
M.3.3	Compliance criteria	(See appended table M.3)	N/A
M.4	**Additional safeguards for equipment containing a secondary lithium battery**		N/A
M.4.1	General		N/A
	IEC 62133-2 batteries used for sub-system power powering application..... :		N/A
M.4.2	Charging safeguards		N/A
M.4.2.1	Requirements		N/A
M.4.2.2	Test		N/A
M.4.2.2.1	General		N/A
M.4.2.2.2	Abnormal operating conditions		N/A
M.4.2.2.3	Single fault conditions		N/A
M.4.2.3	Compliance criteria..... :	(See appended table M.4.2)	N/A
M.4.3	Fire enclosure..... :		N/A
M.4.4	Drop test of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation and procedure for the drop test		N/A
M.4.4.3	Drop, Voltage on reference and dropped batteries (V); voltage difference during 24 h period (%): ..... :		N/A
M.4.4.4	Check of the charge/discharge function		N/A
M.4.4.5	Charge / discharge cycle test		N/A
M.4.4.6	Compliance criteria		N/A
M.5	**Risk of burn due to short-circuit during carrying**		N/A
M.5.1	Requirement		N/A
M.5.2	Test method and compliance criteria		N/A
M.6	**Safeguards against short-circuits**		N/A
M.6.1	External and internal faults		N/A
M.6.2	Compliance criteria		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
	Calculated hydrogen generation rate ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.7.2	Test method and compliance criteria		N/A
	Minimum air flow rate, Q (m^3/h) ..... :		N/A
M.7.3	Ventilation tests		N/A
M.7.3.1	General		N/A
M.7.3.2	Ventilation test – alternative 1		N/A
	Hydrogen gas concentration (%) ..... :		N/A
M.7.3.3	Ventilation test – alternative 2		N/A
	Obtained hydrogen generation rate ..... :		N/A
M.7.3.4	Ventilation test – alternative 3		N/A
	Hydrogen gas concentration (%) ..... :		N/A
M.7.4	Marking ..... :		N/A
M.8	**Protection against internal ignition from external spark sources of rechargeable batteries with aqueous electrolyte**		N/A
M.8.1	General		N/A
M.8.2	Test method		N/A
M.8.2.1	General		N/A
M.8.2.2	Estimation of hypothetical volume V_Z (m^3/s) ..... :		—
M.8.2.3	Correction factors ..... :		—
M.8.2.4	Calculation of distance d (mm) ..... :		—
M.9	**Preventing electrolyte spillage**		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	**Instructions to prevent reasonably foreseeable misuse**		N/A
	Instructional safeguard ..... :		N/A
N	**ELECTROCHEMICAL POTENTIALS**		N/A
	Material(s) used ..... :		—
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		N/A
	Value of X (mm) ..... :		—
P	**SAFEGUARDS AGAINST CONDUCTIVE OBJECTS**		N/A
P.1	**General**		N/A
P.2	**Safeguards against entry or consequences of entry of a foreign object**		N/A
P.2.1	General		N/A
	Location and Dimensions (mm) ..... :		—
P.2.2	Safeguard requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The ES3 and PS3 keep-out volume in Figure P.4 not applicable to transportable equipment		N/A
	Transportable equipment with metalized plastic parts..... :		N/A
P.2.3	Consequence of entry test ..... :		N/A
P.3	**Safeguards against spillage of internal liquids**		N/A
P.3.1	General		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Compliance criteria		N/A
P.4	**Metallized coatings and adhesives securing parts**		N/A
P.4.1	General		N/A
P.4.2	Tests		N/A
	Conditioning, T_C (°C) ..... :		—
	Duration (weeks) ..... :		—
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		P
Q.1	**Limited power sources**		P
Q.1.1	Requirements		P
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network limited output		N/A
	d) Overcurrent protective device limited output		N/A
	e) IC current limiter complying with G.9	See G.9 for details.	P
Q.1.2	Test method and compliance criteria ..... :	See G.9 for details.	P
	Current rating of overcurrent protective device (A) :		N/A
Q.2	**Test for external circuits – paired conductor cable**		N/A
	Maximum output current (A) ..... :		N/A
	Current limiting method ..... :		—
R	**LIMITED SHORT CIRCUIT TEST**		N/A
R.1	**General**		N/A
R.2	**Test setup**		N/A
	Overcurrent protective device for test ..... :		—
R.3	**Test method**		N/A
	Cord/cable used for test ..... :		—
R.4	**Compliance criteria**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		N/A
S.1	**Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W**		N/A
	Samples, material..... :		—
	Wall thickness (mm) ..... :		—
	Conditioning (°C) ..... :		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	**Flammability test for fire enclosure and fire barrier integrity**		N/A
	Samples, material..... :		—
	Wall thickness (mm) ..... :		—
	Conditioning (°C) ..... :		—
	- Material did not show any additional holes for combustible materials		N/A
	- Cheesecloth did not ignite for top openings		N/A
S.3	**Flammability test for the bottom of a fire enclosure**		N/A
S.3.1	Mounting of samples		N/A
S.3.2	Test method and compliance criteria		N/A
	Mounting of samples ..... :		—
	Wall thickness (mm) ..... :		—
	Cheesecloth did not ignite		N/A
S.4	**Flammability classification of materials**		N/A
S.5	**Flammability test for fire enclosure materials of equipment with a steady state power exceeding 4 000 W**		N/A
	Samples, material..... :		—
	Wall thickness (mm) ..... :		—
	Conditioning (°C) ..... :		—
S.6	**Grille covering material, cloth, and reticulated foam**		N/A
	Samples, material..... :		—
	Measured distance from the centre of the fuel tablet (mm)……:		N/A
T	**MECHANICAL STRENGTH TESTS**		N/A
T.1	**General**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
T.2	**Steady force test, 10 N ..... :**	(See appended table T.2, T.3, T.4, T.5)	N/A
T.3	**Steady force test, 30 N ..... :**	(See appended table T.2, T.3, T.4, T.5)	N/A
T.4	**Steady force test, 100 N ..... :**	(See appended table T.2, T.3, T.4, T.5)	N/A
T.5	**Steady force test, 250 N ..... :**	(See appended table T.2, T.3, T.4, T.5)	N/A
T.6	**Enclosure impact test**	(See appended table T.6, T.9)	N/A
	Fall test		N/A
	Swing test		N/A
T.7	**Drop test ..... :**	(See appended table T.7)	N/A
T.8	**Stress relief test..... :**	(See appended table T.8)	N/A
T.9	**Glass Impact Test..... :**	(See appended table T.6, T.9)	N/A
T.10	**Glass fragmentation test**		N/A
	Number of particles counted ..... :		N/A
T.11	**Test for telescoping or rod antennas**		N/A
	Torque value (Nm) ..... :		N/A
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION**		N/A
U.1	**General**		N/A
	Instructional safeguard**..... :**		N/A
U.2	**Test method and compliance for non-intrinsically protected CRTs**		N/A
U.3	**Protective screen**		N/A
V	**DETERMINATION OF ACCESSIBLE PARTS**		N/A
V.1	**Accessible parts of equipment**		N/A
V.1.1	General		N/A
V.1.2	Surfaces and openings tested with jointed test probes		N/A
V.1.3	Openings tested with straight unjointed test probes		N/A
V.1.4	Plugs, jacks, connectors tested with blunt probe		N/A
V.1.5	Slot openings tested with wedge probe		N/A
V.1.6	Terminals tested with rigid test wire		N/A
V.2	**Accessible part criterion**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
X	**ALTERNATIVE METHOD FOR DETERMINING CLEARANCES FOR INSULATION IN CIRCUITS CONNECTED TO AN AC MAINS NOT EXCEEDING 420 V PEAK (300 V RMS)**		N/A
	Clearance..... :	(See appended table X)	N/A
Y	**CONSTRUCTION REQUIREMENTS FOR OUTDOOR ENCLOSURES**		N/A
Y.1	**General**		N/A
Y.2	**Resistance to UV radiation**		N/A
Y.3	**Resistance to corrosion**		N/A
Y.3.1	Metallic parts of outdoor enclosures are resistant to effects of water-borne contaminants by ..... :		N/A
Y.3.2	Test apparatus		N/A
Y.3.3	Water – saturated sulphur dioxide atmosphere		N/A
Y.3.4	Test procedure..... :		N/A
Y.3.5	Compliance criteria		N/A
Y.4	**Gaskets**		N/A
Y.4.1	General		N/A
Y.4.2	Gasket tests		N/A
Y.4.3	Tensile strength and elongation tests, changes of tensile strength and elongation..... :		N/A
	Alternative test methods..... :		N/A
Y.4.4	Compression test		N/A
Y.4.5	Oil resistance, change of swell / shrink (%)..... :		N/A
Y.4.6	Securing means	(See Clause P.4)	N/A
Y.5	**Protection of equipment within an outdoor enclosure**		N/A
Y.5.1	General		N/A
Y.5.2	Protection from moisture		N/A
	Relevant tests of IEC 60529 or Y.5.3..... :		N/A
Y.5.3	Water spray test		N/A
Y.5.4	Protection from plants and vermin		N/A
Y.5.5	Protection from excessive dust		N/A
Y.5.5.1	General		N/A
	Relevant tests of IEC 60529 or Y.5.5.2 or Y.5.5.3 . :		N/A
Y.5.5.2	IP5X equipment		N/A
Y.5.5.3	IP6X equipment		N/A
Y.6	**Mechanical strength of enclosures**		N/A
Y.6.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Y.6.2	Impact test ..... :	(See appended table T.6, T.9)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

5.2	**TABLE: Classification of electrical energy sources**						N/A
Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters				ES Class
			U (V)	I (mA)	Type[1)]	Additional Info [2)]	
Supplementary information:							
1) Type: Steady state (SS), Capacitance (CP), Single pulse (SP), Repetitive pulses (RP), etc. 2) Additional Info: Frequency, Pulse duration, Pulse off time, Capacitance value, etc.							

5.4.1.8	**TABLE: Working voltage measurement**			N/A
Location	Peak voltage (V)	RMS voltage (V)	Frequency (Hz)	Comments
Supplementary information:				

5.4.1.10.2	**TABLE: Vicat softening temperature of thermoplastics**		N/A
Method ..... :	ISO 306 / B50		—
Object/ Part No./Material	Manufacturer/trademark	Thickness (mm)	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	Thickness (mm)	Test temperature (°C)	Impression diameter (mm)
Supplementary information:				

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

5.4.2, 5.4.3	**TABLE: Minimum Clearances/Creepage distance**							N/A
Clearance (cl) and creepage distance (cr) at/of/between:	U_p (V)	U_{rms} (V)	Freq [1] (Hz)	Required cl (mm)	cl (mm)	E.S. [2] (V)	Required cr (mm)	cr (mm)
Supplementary information:								
1) Only for frequency above 30 kHz 2) Complete Electric Strength voltage (E.S. (V) when 5.4.2.4 applied)								

5.4.4.2	**TABLE: Minimum distance through insulation**			N/A
Distance through insulation (DTI) at/of	Peak voltage (V)	Insulation	Required DTI (mm)	Measured DTI (mm)
Supplementary information:				

5.4.4.9	**TABLE: Solid insulation at frequencies >30 kHz**					N/A
Insulation material	E_P	Frequency (kHz)	K_R	Thickness d (mm)	Insulation	V_{PW} (Vpk)
Supplementary information:						

5.4.9	**TABLE: Electric strength tests**			N/A
Test voltage applied between:	Voltage shape (Surge, Impulse, AC, DC, etc.)	Test voltage (V)	Breakdown Yes / No	
Supplementary information:				

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

5.5.2.2	TABLE: Stored discharge on capacitors				N/A
Location	Supply voltage (V)	Operating and fault condition [1)]	Switch position	Measured voltage (Vpk)	ES Class
Supplementary information:					
X-capacitors installed for testing: [ ] bleeding resistor rating: [ ] ICX: 1) Normal operating condition (e.g., normal operation), SC= short circuit, OC= open circuit					

5.6.6	TABLE: Resistance of protective conductors and terminations			N/A
Location	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)
Supplementary information:				

5.7.4	TABLE: Unearthed accessible parts					N/A
Location	Operating and fault conditions	Supply Voltage (V)	Parameters			ES class
			Voltage (V_{rms} or V_{pk})	Current (A_{rms} or A_{pk})	Freq. (Hz)	
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit						

5.7.5	TABLE: Earthed accessible conductive part			N/A
Supply voltage (V).....:				—
Phase(s) .....:	[ ] Single Phase; [ ] Three Phase: [ ] Delta [ ] Wye			
Power Distribution System .....:	[ ] TN [ ]TT [ ] IT			
Location	Fault Condition No in IEC 60990 clause 6.2.2	Touch current (mA)	Comment	
Supplementary Information:				

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

5.8	**TABLE: Backfeed safeguard in battery backed up supplies**					N/A
Location	Supply voltage (V)	Operating and fault condition	Time (s)	Open-circuit voltage (V)	Touch current (A)	ES Class
Supplementary information:						
Abbreviation: SC= short circuit, OC= open circuit						

6.2.2	**TABLE: Power source circuit classifications**					N/A
Location	Operating and fault condition	Voltage (V)	Current (A)	Max. Power[1)] (W)	Time (S)	PS class
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit 1) Measured after 3 s for PS1 and measured after 5 s for PS2 and PS3.						

6.2.3.1	**TABLE: Determination of Arcing PIS**			N/A
Location	Open circuit voltage after 3 s (Vpk)	Measured r.m.s current (A)	Calculated value	Arcing PIS? Yes / No
Supplementary information:				

6.2.3.2	**TABLE: Determination of resistive PIS**		N/A
Location	Operating and fault condition	Dissipate power (W)	Resistive PIS? Yes / No
Supplementary information:			
Abbreviation: SC= short circuit; OC= open circuit			

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

8.5.5	**TABLE: High pressure lamp**			N/A
Lamp manufacturer	Lamp type	Explosion method	Longest axis of glass particle (mm)	Particle found beyond 1 m Yes / No
Supplementary information:				

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

9.6	**TABLE: Temperature measurements for wireless power transmitters**								N/A
Supply voltage (V) .....:									—
Max. transmitting power (W).....:									—
Part A [1)]									
Foreign objects	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm		
	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	
Steel disc									
Aluminium ring									
Aluminium foil									
Measurement temperature T of part/at:	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm		
	T (°C)	Ambient (°C)	T (°C)	Ambient (°C)	T (°C)	Ambient (°C)	T (°C)	Ambient (°C)	
Part B [2)]									
Foreign objects	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm		
	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	
Steel disc									
Aluminium ring									
Aluminium foil									
Measurement temperature T of part/at:	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm		
	T (°C)	Ambient (°C)	T (°C)	Ambient (°C)	T (°C)	Ambient (°C)	T (°C)	Ambient (°C)	
Supplementary information:									
1) The test is performed by powering up the transmitter and then placing each of the foreign objects specified in 9.6.2 in direct contact with the transmitter. 2) The test is performed by first placing each of the foreign objects specified in 9.6.2 in direct contact with the transmitter and then powering up transmitter.									

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

5.4.1.4, 9.3, B.1.5, B.2.6	**TABLE: Temperature measurements**					N/A
Supply voltage (V) ..... :						—
Ambient temperature during test T_{amb} (°C) .... :						—
Maximum measured temperature *T* of part/at:	*T* (°C)					Allowed T_{max} (°C)

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

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

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

B.2.5, E.3.1	**TABLE: Input test for equipment containing audio amplifiers**											N/A
Operation Condition:	Signal type	Frequency (Hz)	Output loads (Ω)	Load setup								
A1	Sine wave input	1000		All channels driven, (maximum) non-clipped output power								
A2	Peak response frequency			All channels driven, (maximum) non-clipped output power								
B1	Sine wave input	1000		All channels driven, 1/8 non-clipped output power								
B2	Peak response frequency			All channels driven, 1/8 non-clipped output power								
C	Band-limited pink noise signal	N/A		All channels driven, 1/8 non-clipped output power								
D												
Input									Amplifier Output			
Cond.	U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Ch.	U (V)	P (W)	Load (Ω)
Supplementary information:												

B.3, B.4	**TABLE: Abnormal operating and fault condition tests**						N/A
Ambient temperature T_{amb} (°C) ..... :							—
Power source for EUT: Manufacturer, model/type, outputrating .. :							—
Component No.	Condition	Supply voltage (V)	Test time	Fuse no.	Fuse current (A)	Observation	
Supplementary information:							

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

M.3	**TABLE: Protection circuits for batteries provided within the equipment**							N/A
Is it possible to install the battery in a reverse polarity position?.....:								—
Equipment Specification	Charging							
	Voltage (V)			Current (A)				
Manufacturer/type	Battery specification							
	Non-rechargeable batteries		Rechargeable batteries					
	Discharging current (A)	Unintentional charging current (A)	Charging		Discharging current (A)	Reverse charging current (A)		
			Voltage (V)	Current (A)				
Note: The tests of M.3.2 are applicable only when above appropriate data is not available.								
Specified battery temperature (°C) .....:								
Component No.	Fault condition	Charge/ discharge mode	Test time	Temp. (°C)	Current (A)	Voltage (V)	Observation	
Supplementary information:								
Abbreviation: SC= short circuit; OC= open circuit NL= no chemical leakage; NS= no spillage of liquid; NE= no explosion; NF= no emission of flame or expulsion of molten metal.								

M.4.2	**TABLE: Charging safeguards for equipment containing a secondary lithium battery**					N/A
Maximum specified charging voltage (V).....:						—
Maximum specified charging current (A) .....:						—
Highest specified charging temperature (°C) .....:						
Lowest specified charging temperature (°C) .....:						
Battery manufacturer/type	Operating and fault condition	Measurement			Observation	
		Charging voltage (V)	Charging current (A)	Temp. (°C)		
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature						

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

Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**							P
Output Circuit	Condition	U_{oc} (V)	Time (s)	I_{sc} (A)		S (VA)		
				Meas.	Limit	Meas.	Limit	
Supplementary Information:								

T.2, T.3, T.4, T.5	**TABLE: Steady force test**						N/A
Location/Part	Material	Thickness (mm)	Probe	Force (N)	Test Duration (s)	Observation	
Supplementary information:							

T.6, T.9	**TABLE: Impact test**				N/A
Location/Part	Material	Thickness (mm)	Height (mm)	Observation	
Supplementary information:					

T.7	**TABLE: Drop test**				N/A
Location/Part	Material	Thickness (mm)	Height (mm)	Observation	
Supplementary information:					

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

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

X	**TABLE: Alternative method for determining minimum clearances distances**		N/A
Clearance distanced between:	Peak of working voltage (V)	Required cl (mm)	Measured cl (mm)
Supplementary information:			

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

4.1.2	**TABLE: Critical components information**				**P**
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
01. Current Carrying Parts	--	--	Stainless steel, silver, gold, nickel, aluminium, copper or copper alloy. May be plated with tin, lead, silver or gold.	--	--, --
02. Insulated Coating	--	--	Epoxy, and a high pressure, high temperature molding process.	--	--, --
Supplementary information: [1)] Provided evidence ensures the agreed level of compliance. See OD-2039. [2)] License available upon request.					

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Customer's Testing Facility according to CTF stage 1 or CTF stage 2 procedure has been used.
Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date

Statement of Measurement Uncertainty

The Test Report shall include a statement concerning the uncertainty of the measurement systems used for the tests conducted when it is required by the standard, client or other authorities.
In such cases, the table below may be used for reporting U of M.

(This page may be removed from the final Test Report when not required. See also clause 4.8 in OD 2020 for more details.)

Clause #	Parameter/ Measurement / test method	Requirement % or k	Calculated U of M*

*Note: Calculations leading to the reported value are on file with the NCB

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT **IEC 62368-1:2023** **CANADA NATIONAL DIFFERENCES** Audio/video, information and communication technology equipment Part 1: Safety requirements			
Differences according to.....:	National standard CSA C22.2 No. 62368-1:19		
TRF template used: .....:	IECEE OD-2020-F3:2022, Ed. 1.2		
Attachment Form No.....:	CA_ND_IEC62368_1F		
Attachment Originator .....:	CSA Group		
Master Attachment.....:	2023-09-12		
CSA C22.2 No. 62368-1:19 is an adoption with deviations of IEC 62368-1:2018. The NCB will, however, accept use of IEC 62368-1:2023 for the purpose of demonstration of compliance with CSA C22.2 No. 62368-1:19, provided that the following National Deviations are addressed.			
	National Differences		
Table 13	Replace this table with Table 13 of CSA C22.2 No. 62368-1:19.		N/A
5.4.2.4	Replace this subclause with 5.4.1.4 of CSA C22.2 No. 62368-1:19		N/A
5.5.2.2	Replace this subclause with 5.5.2.2 of CSA C22.2 No. 62368-1:19		N/A
5.5.7	Replace the 2nd dash of the 3rd paragraph as following: "– the GDT shall comply with: The electric strength test of 5.4.9.1 for BASIC INSULATION; and The external CLEARANCE and CREEPAGE DISTANCE requirements of 5.4.2 and 5.4.3 respectively for BASIC INSULATION"		N/A
6.2.3.2	Replace this subclause with 6.2.3.2 of CSA C22.2 No. 62368-1:19.		N/A
6.4.3.1	Replace this subclause with 6.4.3.1 of CSA C22.2 No. 62368-1:19		N/A
6.4.5.2	Replace this subclause with 6.4.5.2 of CSA C22.2 No. 62368-1:19.		N/A
6.4.8.3.5	Replace this 6.4.8.3.5 with 6.4.5.2 of CSA C22.2 No. 62368-1:19.		N/A
G.15.3.2	The test duration of hydrostatic pressure test for self-contained LFC shall be 2 min.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
P.2.1	Delete the following: "– side openings that do not exceed 11 times the thickness of the enclosure, as described in Figure P.3."		N/A
1 (1DV.1) (1.3)	All equipment is to be designed to allow installation in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part 1, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2. Also, for such equipment marked or otherwise identified, installation is allowed per the Standard for the Protection of Information Technology Equipment, ANSI/NFPA 75.		N/A
1 (1DV.2.1)	This standard includes additional requirements for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities. See Annex DVB.		N/A
1 (1DV.2.2)	This standard includes additional requirements for equipment intended for mounting under cabinets. See Annex DVC.		N/A
1 (1DV.2.3)	IEC 62368-3 clause 5 for DC power transfer at ES1 or ES2 voltage levels is considered informative. IEC 62368-3 clause 6 for remote power feeding telecommunication (RFT) circuits is considered normative (see ITU K.50). Alternatively, equipment with RFT circuits are given in either UL 2391 or CSA/UL 60950-21. RFT-C circuits are not permitted unless the RFT-C circuit complies with RFT-V limits (≤ 200V per conductor to earth).		N/A
1 (1DV.3)	For protection against direct lightning strikes, reference is made to NFPA 780 and CAN/CSA-B72 for additional requirements.		N/A
1 (DV.5)	Additional requirements apply to some forms of power distribution equipment, including sub-assemblies.		N/A
4.1 (4.1.17)	*For lengths exceeding 3.05 m, external interconnecting cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the NEC.*		N/A
	For lengths 3.05 m or less, external interconnecting cable assemblies that are not types specified in the NEC generally are required to have special construction features and identification markings.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
4.6 (4.6.2)	Wire-wrap terminals have special construction and performance requirements.		N/A
4.8 (4.8.3, 4.8.4.5, 4.8.5)	Coin / button cell batteries have modified special construction and performance requirements.		N/A
5.4.2.3.2 (5.4.2.3.2.1)	*Surge Arrestors and Transient Voltage Surge Suppressors installed external to the equipment are required to comply with the appropriate NEC and CEC requirements.*		N/A
5.5.9	Receptacles, rated 125-V, single phase, 15- or 20-A accessible to either ordinary, instructed, or skilled persons are required to be provided with GFCI Protection for Personnel if the equipment containing the receptacles is installed outdoors. The protection devices are required to comply with UL 943, and CAN/CSA C22.2 No.144.		N/A
5.6.3	Protective earthing conductors comply with the minimum conductor sizes in Table G.7, except as required by Table G.7ADV.1 for cord connected equipment, or Annex DVH for permanently connected equipment.		N/A
5.7.8 (5.7.8.1)	Equipment intended to receive telecommunication ringing signals is required to comply with a special touch current measurement tests.		N/A
6.5.1	PS3 wiring outside a fire enclosure is required to comply with single fault testing in B.4, or be current limited per one of the permitted methods.		N/A
Annex F (F.3.3.9)	Output terminals provided for supply of other equipment, except mains supply, are required to be marked with a maximum rating or reference to equipment permitted to be connected.		N/A
Annex F (F.3.7)	Outdoor Enclosures are required to be classified and marked in accordance with UL 50 or 50E, or CAN/CSA C22.2 No. 94.1 or 94.2.		N/A
Annex G (G.7)	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs.		N/A
	Power supply cords are required to have attachment plugs rated not less than 125 percent of the rated current of the equipment.		N/A
	Flexible power supply cords are required to be compatible with Article 400 of the NEC, and Tables 11 and 12 of the CEC.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
	Minimum cord length is required to be 1.5 m, with certain constructions such as external power supplies allowed to consider both input and output cord lengths into the requirement. Power supply cords are required to be no longer than 4.5 m in length if used in ITE Rooms.		N/A
	Power supply cords for outdoor equipment are required to be suitable outdoor use type as required by Section 400.4 of the NEC and Rule 4-012 of the CEC, i.e., marked “W.”		N/A
Annex H.2	Continuous ringing signals under normal operating conditions up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions.		N/A
Annex H.4	For circuits with other than ringing signals and with voltages exceeding 42.4 Vpeak or 60 Vd.c., the maximum acceptable current through a 2000 ohm resistor (or greater) connected across the voltage source with other loads disconnected is 7.1 mA peak or 30 mA d.c. under normal operating conditions.		N/A
Annex Q (Q.3)	Equipment with paired conductor and/or coax communications cables/wiring connected to building wiring are required to have special voltage, current, power and marking requirements.		N/A
Annex DVA (1)	Equipment that is designed such that it may be powered from a separate electrical service, is required to meet applicable requirements for service equipment for control and protection of services and their installation and complies with Article 230 of the National Electrical Code (NEC), NFPA 70 and Section 6 of the Canadian Electrical Code, Part I, CSA C22.1.		N/A
	Equipment intended for use in spaces used for environmental air (plenums) are subjected to special flammability requirements for heat and visible smoke release.		N/A
	For ITE room applications, automated information storage systems with combustible media greater than 0.76 m^3 (27 cu ft) are required to have a provision for connection of either automatic sprinklers or a gaseous agent extinguishing system with an extended discharge.		N/A
	Consumer products designed or intended primarily for children 12 years of age or younger are subject to additional requirements in accordance with U.S. and Canadian Regulations.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
	Baby monitors are required to additionally comply with ASTM F2951, Consumer Safety Specification for Baby Monitors.		N/A
	Storage batteries and battery management equipment, other than associated with lead-acid batteries, and including battery backup systems that are not an integral part of stationary AV and ICT equipment, such as provided in separate cabinets, are required to be certified (listed) to the appropriate standard(s) for such storage batteries and equipment.		N/A
Annex DVA (5.6)	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A.		N/A
Annex DVA (6.3)	The maximum quantity of flammable liquid stored in equipment is required to comply with NFPA 30.		N/A
Annex DVA (6.4.8)	For ITE room applications, enclosures with combustible material measuring greater than 0.9 m^2 (10 sq ft) or a single dimension greater than 1.8 m (6 ft) are required to have a flame spread rating of 50 or less. For equipment with the same dimensions for other applications, an external surface that is not a fire enclosure requires a minimum flammability classification of V-1.		N/A
Annex DVA (10.3)	Equipment with lasers is required to meet the U.S. Code of Federal Regulations 21 CFR 1040 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (10.5)	Equipment that produces ionizing radiation is required to comply with the U.S. Code of Federal Regulations, 21 CFR 1020 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (F.3.3.4)	Equipment for use on a.c. mains supply systems with a neutral and more than one phase conductor (e.g. 120/240 V, 3-wire) require a special marking format for electrical ratings. Additional considerations apply for voltage ratings that exceed the attachment cap rating or that are lower than the “Normal Operating Condition” in Table 2 of CAN/CSA C22.2 No. 235.”		N/A
Annex DVA (F.3.3.6)	Equipment identified for ITE (computer) room installation is required to be marked with the rated current.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (G.1)	Vertically-mounted disconnect switches and circuit breakers are required to have the "on" position indicated by the handle in the up position, where mounted in an enclosure, vertically mounted **disconnect switches** and **circuit breakers** with vertical operating means extending outside the enclosure are required to indicate in a location visible when accessing the external operating means whether the switch or circuit breaker is in the open (off) or closed (on) position.		N/A
Annex DVA (G.3.4)	Suitable NEC/CEC branch circuit protection rated at the maximum circuit rating is required for all standard supply outlets and receptacles (such as supplied in power distribution units) if the supply branch circuit protection is not suitable.		N/A
	Where a fuse is used to provide Class 2 or Class 3 current limiting, it is not operator-accessible unless it is non- interchangeable.		N/A
Annex DVA (G.4.2)	Equipment with isolated ground (earthing) receptacles is required to comply with NEC 250.146(D) and CEC 10-400 and 10-612.		N/A
Annex DVA (G.4.3)	Interconnection of units by conductors supplied by a limited power source, or a Class 2 circuit defined in the NEC/CEC may have field wiring connections other than specified in DVH.3, such as wire-wrap and crimp-on types, if the limited power source and Class 2 circuits are separated from all other circuits by barriers, routing or fixing.		N/A
Annex DVA (G.5.3)	Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, require special transformer overcurrent protection.		N/A
Annex DVA (G.5.4)	Motor control devices are required for cord-connected equipment with a mains-connected motor if the equipment is rated more than 12 A, or if the equipment has a nominal voltage rating greater than 120 V, or if the motor is rated more than 1/3 hp (locked rotor current over 43 A).		N/A
Annex DVA (G.7)	Flexible cords used outdoors are required to have the suffix “W” marked on the flexible cord.		N/A
Annex DVA (M)	For ITE room applications, equipment with battery systems capable of supplying 750 VA for five minutes are required to have a battery disconnect means that may be connected to the ITE room remote power-off circuit.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (Q)	If applicable per NEC 725.121(C), some limited power sources supplied from AV/ICT equipment are required to have a label indicating the maximum voltage and rated current output for per conductor for each connection point. Where multiple connection points have the same rating, a single label is permitted to be used.		N/A
	Wiring terminals intended to supply Class 2 outputs in accordance with the NEC or CEC Part 1are required to be marked with the voltage rating and “Class 2” or equivalent. The marking is located adjacent to the terminals and visible during wiring.		N/A
	Applicable parts of Chapter 8 of the NEC, and Rules 54 and 60 of the CEC, may be applicable to ITE installed outdoors with connections to communication systems.		N/A
Annex DVB (1)	Additional requirements apply for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities.		N/A
Annex DVC (1)	Additional requirements apply for equipment intended for mounting under kitchen cabinets.		N/A
Annex DVE (4.1.1)	Some equipment, components, sub-assemblies and materials associated with the risk of fire, electric shock, or personal injury are required to have component or material ratings in accordance with the applicable national (U.S. and Canadian) component or material requirements. These equipment and components include: appliance couplers, attachment plugs, battery backup systems, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), direct plug-in equipment, electrochemical capacitor modules (energy storage modules with ultracapacitors), enclosures (outdoor), flexible cords and cables, fuses (branch circuit), ground-fault current interrupters, interconnecting cables, modular data centres, power supply cords, some power distribution equipment, printed wiring, protectors for communications circuits, receptacles, surge protective devices, vehicle battery adapters, wire connectors, and wire and cables.		N/A
Annex DVH	Equipment for permanent connection to the mains supply is subjected to additional requirements.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVH (DVH.1)	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains are required to be in accordance with the NEC/CEC.		N/A
Annex DVH (DVH.2.1)	For safe and reliable connection to a mains, permanently connected equipment is to be provided.		N/A
Annex DVH (DVH.2.2)	Additional considerations for D.C. mains.		N/A
Annex DVH (DVH.3.2.1)	Terminals for permanent wiring, including protective earthing terminals, are required to be suitable for U.S./Canadian wire gauge sizes, rated 125 percent of the equipment rating, and be specially marked when specified.		N/A
Annex DVH (DVH.3.2.3)	Wire binding screws are not permitted to attach conductors larger than 10 AWG (5.3 mm^2).		N/A
Annex DVH (DVH.3.2.4)	All associated mains supply terminals are located in proximity to each other and to the main protective earthing terminal, if any.		N/A
Annex DVH (DVH.3.2.5)	Terminals are located, guarded or insulated so that, should a strand of a conductor escape when the conductor is fitted, there is no likelihood of accidental contact between such a strand and accessible conductive parts or unearthed conductive parts separated from accessible conductive parts by supplementary insulation only.		N/A
Annex DVH (DVH.3.3)	When field connection to an external circuit is via wires (example, free conductors), the wires are not smaller than 18 AWG (0.82 mm^2) and the free length of the wire inside an outlet box or wiring compartment is 150 mm or more.		N/A
Annex DVH (DVH.3.4)	Size of protective earthing conductors and terminals	(See sub-clause 5.6.5)	N/A
Annex DVH (DVH.4)	Permanently connected equipment is required to have a suitable wiring compartment and wire bending space.		N/A
Annex DVH (DVH.4.1)	Wire bending space		N/A
Annex DVH (DVH.4.2)	Volume of wiring compartment		N/A
Annex DVH (DVH.4.3)	Separation of circuits		N/A
Annex DVH (DVH.5)	Equipment markings and instructional safeguards		N/A
Annex DVH (DVH.5.1)	Identification of protective earthing terminal		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVH (DVH.5.2)	Identification of terminal for earthed conductor (neutral)		N/A
Annex DVH (DVH.5.3)	Identification of terminals for aluminium conductors		N/A
Annex DVH (DVH.5.4)	Wire temperature ratings		N/A
Annex DVH (DVH 5.5)	Equipment connected to a centralized d.c. power system, and having one pole of the DC mains input terminal connected to the main protective earthing terminal in the equipment, is required to comply with special earthing, wiring, marking and installation instruction requirements.		N/A
Annex DVI (6.7)	Equipment intended for connection to telecommunication network outside plant cable is required to be protected against overvoltage from power line crosses.		N/A
Annex DVJ (10.6.1)	Equipment connected to a telecommunication and cable distribution networks and supplied with an earphone intended to be held against, or in the ear is required to comply with special acoustic pressure requirements.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT **IEC 62368-1:2023** **JAPAN NATIONAL DIFFERENCES** Audio/video, information and communication technology equipment – Part 1: Safety requirements			
Differences according to.....: J62368-1(2023)			
TRF template used: .....: IECEE OD-2020-F3:2022, Ed. 1.2			
Attachment Form No.....: JP_ND_IEC62368_1F **Attachment Originator .....**: UL Solutions (JP) **Master Attachment**.....: Dated 2023-10-19			
J62368-1(2023) is an adoption of IEC 62368-1:2018 with national conditions that deviate from it. However, the NCB will accept use of IEC 62368-1:2023 for the purpose of demonstration of compliance with J62368-1(2023) only for the products out of scope of the Electrical Appliance and Materials Safety Acts (also known as PSE), provided that the following National Differences are addressed.			
	National Differences		
4.1.2	Where the component, or a characteristic of a component, is a safeguard or a part of a safeguard, components shall comply with the requirements of this document or, where specified in a requirements clause, with the safety aspects of the relevant JIS component standards or IEC component standards, or components shall have properties equivalent to or better than these.		N/A
5.6.1	Mains socket-outlet and interconnection coupler shall comply with Clause G.4.2A if they are incorporated as part of the equipment.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.2.1	Connection for protective conductor of class 0I equipment provided with instructional safeguard in accordance with Clause F.3.6.1A is considered to make earlier and break later than supply connection. Mains plug having a lead wire for protective earthing connection of class 0I equipment shall comply with all of the following: – Not to be used for equipment having a rated voltage of 150 V or more – Clip is not used for the earthing connection of the lead wire. – The lead wire for earthing is at least 10 cm long If class 0I equipment provides an independent main protective earthing terminal and is intended to be installed by ordinary person, earthing wire shall be provided in the package of the equipment.		N/A
5.6.2.2	Internal earthing conductor of the cord set that is covered by the sheath of mains cord and is formed together with mains plug and appliance connector need not be green-and-yellow.		N/A
5.6.3	In case of class 0I equipment using power supply cord having two conductors (no earthing conductor), the conductor of protective earthing lead wire shall comply with either of the following: – use of annealed copper wire with 1.6 mm diameter or corrosion-inhibiting metal wire having size and strength that are equivalent to or more than the above copper wire – single core cord or single core cab tire cable with 1.25 mm^2 or more cross-sectional area		N/A
5.7.3	For class 0I equipment that is provided with mains socket-outlet in the configuration as specified in JIS C 8282 series, JIS C 8300 or JIS C 8303, or that is provided with mains appliance outlet as specified in JIS C 8283 series for the purpose of interconnection, the measurement is conducted on the system of the interconnected equipment having a single connection to the mains.		N/A
5.7.5	In case of class 0I equipment, touch current shall not exceed 1.41 mA peak or for sinusoidal wave, 1.0 mA r.m.s. when measured using the network specified in Figure 4 of IEC 60990:2016.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
6.4.3.2	A fuse complying with JIC C 6575 series or a fuse having equivalent characteristics shall open within 1 s. A fuse having time/current characteristics other than those specified in IEC 60127 shall be tested with the characteristics taken into account. In case of Class A fuse of JIS C 6575, replace “2.1 times” by “1.35 times” and in case of Class B fuse of JIS C 6575, replace “2.1 times” by “1.6 times”.		N/A
8.5.4.3.1	Only three-phase stationary equipment rated more than AC 200 V can be considered as being for use in locations where children are not likely to be present, when complying with Clause F.4.		N/A
8.5.4.3.2	For equipment installed where children may be present, an instructional safeguard shall be provided by easily understandable wording in accordance with Clause F.5, except that element 3 is optional.		N/A
8.5.4.3.4	The media destruction device is tested according to Clause V.1.2 with applicable jointed test probes to the opening. And then the wedge probe per Figure V.4 shall not contact any moving part.		N/A
8.5.4.3.5	The wedge probe of Figure V.4 and applicable jointed test probes specified in Clause V.1.2 shall not contact any moving part. Instructional safeguard shall not be used instead of equipment safeguard for preventing access to hazardous moving parts.		N/A
F.3.5.1	When the mains socket-outlet is configured in accordance with JIS C 8282 series, JIS C 8300 or JIS C 8303, the assigned current or power shall be marked. If the voltage of the socket-outlet is the same as the mains voltage, the voltage need not be marked. Instructional safeguard of Class 0I equipment shall be provided with an instructional safeguard in accordance with Clause F.5 when a mains socket-outlet as specified in JIS C 8282 series, JIS C 8300 or JIS C 8303 to which class I equipment can be connected is provided in accordance with Clause G.4.2A except for the cases where the socket-outlet is accessible only to skilled persons.		N/A
F.3.5.3	If the fuse is necessary for the safeguard function, the symbols indicating pre-arcing time-current characteristic shall be included.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
F.3.6.1A	Marking for class 0I equipment The requirements of Clauses F.3.6.1.1 and F.3.6.1.2 shall be applied to class 0I equipment. For class 0I equipment, a marking of instructions shall be provided regarding the earthing connection. In addition to the above, for class 0I equipment, an instruction to connect earthing before and disconnect earthing after the connection of supply conductors shall be marked on the visible place of the main body or shall be in the text of an accompanying document.		N/A
F.3.6.2	Symbols, IEC 60417-5172 (2003-02) or IEC 60417-6092 (2011-10), shall not be used for class I equipment or class 0I equipment.		N/A
F.3.8A	Attention marking for aging deterioration of CRT television Year of manufacture, standard usage period by design according to JIS C 9921-5 and cautionary statement for possible risks of aging deterioration when used beyond the specified period shall be marked on CRT television except for industrial use CRT television.		N/A
F.4	For audio equipment with terminals classified as ES3 in accordance with Table E.1, and for other equipment with terminals marked in accordance with F.3.6.1 and F.3.6.1A, the instructions shall require that the external wiring connected to these terminals shall be installed by a skilled person, or shall be connected by means of ready-made leads or cords that are constructed in a way that would prevent contact with any ES3 circuit. For class 0I equipment provided with independent main protective earthing terminal, where the cord for the protective earthing connection is not provided in the package of the equipment, if the protective earthing connection is made by instructed person or skilled person, the suitable installation instruction for the protective earthing connection shall be provided.		N/A
G.3.2.1	The thermal link when tested as a separate component, shall comply with the requirements of JIS C 6691 or have properties equivalent to or better than that.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
G.3.4	Except for devices covered by Clause G.3.5, overcurrent protective devices used as a safeguard shall comply with the applicable JIS or IEC standard in accordance with 4.1.2 or shall have equivalent or better properties. Such a protective device shall have adequate breaking (rupturing) capacity to interrupt the maximum fault current (including short-circuit current) that can flow.		N/A
G.4.1	This requirement does not apply to connectors covered in Clauses G.4.2 and G.4.2A.		N/A
G.4.2	Mains connectors, mains plugs and socket-outlets shall comply with JIS C 8283 series, JIS C 8285, IEC 60309 series, JIS C 8282 series, JIS C 8300, JIS C 8303, or have equivalent or better properties. A power supply cord set provided with appliance connector that can fit appliance inlet complying with JIS C 8283-1 shall comply with JIS C 8286. Construction shall prevent mechanical stress not to transmit to the soldering part of appliance inlet terminal. When an equipment is rated not more than 125 V and all of the following are met, Type C14 and C18 appliance inlet complying with JIS C 8283-3 can be considered as rated 15 A. – The temperature of appliance inlet does not exceed the value specified in JIS C 8283-1 under the most unfavourable normal operating condition as specified in Clause B.2.1. – "Use only designated cord set attached in this equipment" or equivalent text is described in the operating instruction. If the cord set is not provided in the package of the equipment, suitable information regarding to the cord set is described in the operating instruction.		N/A
G.4.2A	Mains socket-outlet and interconnection coupler provided with the class II, class I and class 0I equipment respectively		N/A
G.7.1	A mains supply cord need not include the protective earthing conductor for class 0I equipment provided with independent protective earthing conductor.		N/A
G.7.2 Table G.7	Cross-sectional area of equipment rated up to and including 3 A shall be 0.75 mm^2.		N/A

ATTACHMENT to TRF IEC62368_1F			
Clause	Requirement + Test	Result - Remark	Verdict
G.7.6.1 Table G.9	The cross-sectional area of mains cords according to JIS C 3010 may comply with relevant Japanese wiring regulation. For cables other than those complying with JIS C 3662 series or JIS C 3663 series, the terminals shall be suitable for the size of the intended cables.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT **IEC 62368-1:2023** **US NATIONAL DIFFERENCES** (**Audio/Video, information and communication technology equipment – Part 1:Safety requirements**)			
Differences according to.....:	UL 62368-1:revised October 22, 2021		
TRF template used: .....:	IECEE OD-2020-F3:2022, Ed. 1.2		
Attachment Form No.....:	US_ND_IEC62368_1F		
Attachment Originator .....:	UL Solutions (US)		
Master Attachment.....:	Dated 2023-10-05		
US 62368-1, revised October 22, 2021 (also known as CSA/UL 62368-1:2019) is an adoption of IEC 62368-1:2018 with national conditions that deviate from it. However, the NCB will accept use of IEC 62368-1:2023 for the purpose of demonstration of compliance with UL 62368-1, revised October 22, 2021)also known as CSA/UL 62368-1:2019), provided that the following national conditions are addressed. When this document is used, the requirements of IEC 62368-1:2023 apply except as modified below.			
IEC 62368-1 - US National Differences **Special National Conditions based on Regulations and Other National Differences**			
1 (1DV.1) (1.3)	All equipment is to be designed to allow installation in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part 1, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2. Also, for such equipment marked or otherwise identified, installation is allowed per the Standard for the Protection of Information Technology Equipment, ANSI/NFPA 75.		N/A
1 (1DV.2.1)	This standard includes additional requirements for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities. See Annex DVB.		N/A
1 (1DV.2.2)	This standard includes additional requirements for equipment intended for mounting under cabinets. See Annex DVC.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1 (1DV.2.3)	IEC 62368-3 clause 5 for DC power transfer at ES1 or ES2 voltage levels is considered informative. IEC 62368-3 clause 6 for remote power feeding telecommunication (RFT) circuits is considered normative (see ITU K.50). Alternatively, equipment with RFT circuits are given in either UL 2391 or CSA/UL 60950-21. RFT-C circuits are not permitted unless the RFT-C circuit complies with RFT-V limits (≤ 200V per conductor to earth).		N/A
1 (1DV.3)	For protection against direct lightning strikes, reference is made to NFPA 780 and CAN/CSA-B72 for additional requirements.		N/A
1 (DV.5)	Additional requirements apply to some forms of power distribution equipment, including sub-assemblies.		N/A
4.1 (4.1.17)	For lengths exceeding 3.05 m, external interconnecting cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the NEC.		N/A
	For lengths 3.05 m or less, external interconnecting cable assemblies that are not types specified in the NEC generally are required to have special construction features and identification markings.		N/A
4.6 (4.6.2)	Wire-wrap terminals have special construction and performance requirements.		N/A
4.8 (4.8.3, 4.8.4.5, 4.8.5)	Coin / button cell batteries have modified special construction and performance requirements.		N/A
5.4.2.3.2 (5.4.2.3.2.1)	Surge Arrestors and Transient Voltage Surge Suppressors installed external to the equipment are required to comply with the appropriate NEC and CEC requirements.		N/A
5.5.9	Receptacles, rated 125-V, single phase, 15- or 20-A accessible to either ordinary, instructed, or skilled persons are required to be provided with GFCI Protection for Personnel if the equipment containing the receptacles is installed outdoors. The protection devices are required to comply with UL 943, and CAN/CSA C22.2 No.144.		N/A
5.6.3	Protective earthing conductors comply with the minimum conductor sizes in Table G.7, except as required by Table G.7ADV.1 for cord connected equipment, or Annex DVH for permanently connected equipment.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.7.8 (5.7.8.1)	Equipment intended to receive telecommunication ringing signals is required to comply with a special touch current measurement tests.		N/A
6.5.1	PS3 wiring outside a fire enclosure is required to comply with single fault testing in B.4, or be current limited per one of the permitted methods.		N/A
Annex F (F.3.3.9)	Output terminals provided for supply of other equipment, except mains supply, are required to be marked with a maximum rating or reference to equipment permitted to be connected.		N/A
Annex F (F.3.7)	Outdoor Enclosures are required to be classified and marked in accordance with UL 50 or 50E, or CAN/CSA C22.2 No. 94.1 or 94.2.		N/A
Annex G (G.7)	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs.		N/A
	Power supply cords are required to have attachment plugs rated not less than 125 percent of the rated current of the equipment.		N/A
	Flexible power supply cords are required to be compatible with Article 400 of the NEC, and Tables 11 and 12 of the CEC.		N/A
	Minimum cord length is required to be 1.5 m, with certain constructions such as external power supplies allowed to consider both input and output cord lengths into the requirement. Power supply cords are required to be no longer than 4.5 m in length if used in ITE Rooms.		N/A
	Power supply cords for outdoor equipment are required to be suitable outdoor use type as required by Section 400.4 of the NEC and Rule 4-012 of the CEC, i.e., marked “W.”		N/A
Annex H.2	Continuous ringing signals under normal operating conditions up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions.		N/A
Annex H.4	For circuits with other than ringing signals and with voltages exceeding 42.4 Vpeak or 60 Vd.c., the maximum acceptable current through a 2000 ohm resistor (or greater) connected across the voltage source with other loads disconnected is 7.1 mA peak or 30 mA d.c. under normal operating conditions.		N/A
Annex Q (Q.3)	Equipment with paired conductor and/or coax communications cables/wiring connected to building wiring are required to have special voltage, current, power and marking requirements.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (1)	Equipment that is designed such that it may be powered from a separate electrical service, is required to meet applicable requirements for service equipment for control and protection of services and their installation and complies with Article 230 of the National Electrical Code (NEC), NFPA 70 and Section 6 of the Canadian Electrical Code, Part I, CSA C22.1.		N/A
	Equipment intended for use in spaces used for environmental air (plenums) are subjected to special flammability requirements for heat and visible smoke release.		N/A
	For ITE room applications, automated information storage systems with combustible media greater than 0.76 m^3 (27 cu ft) are required to have a provision for connection of either automatic sprinklers or a gaseous agent extinguishing system with an extended discharge.		N/A
	Consumer products designed or intended primarily for children 12 years of age or younger are subject to additional requirements in accordance with U.S. and Canadian Regulations.		N/A
	Baby monitors are required to additionally comply with ASTM F2951, Consumer Safety Specification for Baby Monitors.		N/A
	Storage batteries and battery management equipment, other than associated with lead-acid batteries, and including battery backup systems that are not an integral part of stationary AV and ICT equipment, such as provided in separate cabinets, are required to be certified (listed) to the appropriate standard(s) for such storage batteries and equipment.		N/A
Annex DVA (5.6)	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A.		N/A
Annex DVA (6.3)	The maximum quantity of flammable liquid stored in equipment is required to comply with NFPA 30.		N/A
Annex DVA (6.4.8)	For ITE room applications, enclosures with combustible material measuring greater than 0.9 m^2 (10 sq ft) or a single dimension greater than 1.8 m (6 ft) are required to have a flame spread rating of 50 or less. For equipment with the same dimensions for other applications, an external surface that is not a fire enclosure requires a minimum flammability classification of V-1.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (10.3)	Equipment with lasers is required to meet the U.S. Code of Federal Regulations 21 CFR 1040 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (10.5)	Equipment that produces ionizing radiation is required to comply with the U.S. Code of Federal Regulations, 21 CFR 1020 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (F.3.3.4)	Equipment for use on a.c. mains supply systems with a neutral and more than one phase conductor (e.g. 120/240 V, 3-wire) require a special marking format for electrical ratings. Additional considerations apply for voltage ratings that exceed the attachment cap rating or that are lower than the “Normal Operating Condition” in Table 2 of CAN/CSA C22.2 No. 235.”		N/A
Annex DVA (F.3.3.6)	Equipment identified for ITE (computer) room installation is required to be marked with the rated current.		N/A
Annex DVA (G.1)	Vertically-mounted disconnect switches and circuit breakers are required to have the "on" position indicated by the handle in the up position, where mounted in an enclosure, vertically mounted **disconnect switches** and **circuit breakers** with vertical operating means extending outside the enclosure are required to indicate in a location visible when accessing the external operating means whether the switch or circuit breaker is in the open (off) or closed (on) position.		N/A
Annex DVA (G.3.4)	Suitable NEC/CEC branch circuit protection rated at the maximum circuit rating is required for all standard supply outlets and receptacles (such as supplied in power distribution units) if the supply branch circuit protection is not suitable.		N/A
	Where a fuse is used to provide Class 2 or Class 3 current limiting, it is not operator-accessible unless it is non- interchangeable.		N/A
Annex DVA (G.4.2)	Equipment with isolated ground (earthing) receptacles is required to comply with NEC 250.146(D) and CEC 10-400 and 10-612.		N/A
Annex DVA (G.4.3)	Interconnection of units by conductors supplied by a limited power source, or a Class 2 circuit defined in the NEC/CEC may have field wiring connections other than specified in DVH.3, such as wire-wrap and crimp-on types, if the limited power source and Class 2 circuits are separated from all other circuits by barriers, routing or fixing.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVA (G.5.3)	Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, require special transformer overcurrent protection.		N/A
Annex DVA (G.5.4)	Motor control devices are required for cord-connected equipment with a mains-connected motor if the equipment is rated more than 12 A, or if the equipment has a nominal voltage rating greater than 120 V, or if the motor is rated more than 1/3 hp (locked rotor current over 43 A).		N/A
Annex DVA (G.7)	Flexible cords used outdoors are required to have the suffix “W” marked on the flexible cord.		N/A
Annex DVA (M)	For ITE room applications, equipment with battery systems capable of supplying 750 VA for five minutes are required to have a battery disconnect means that may be connected to the ITE room remote power-off circuit.		N/A
Annex DVA (Q)	If applicable per NEC 725.121(C), some limited power sources supplied from AV/ICT equipment are required to have a label indicating the maximum voltage and rated current output for per conductor for each connection point. Where multiple connection points have the same rating, a single label is permitted to be used.		N/A
	Wiring terminals intended to supply Class 2 outputs in accordance with the NEC or CEC Part 1are required to be marked with the voltage rating and “Class 2” or equivalent. The marking is located adjacent to the terminals and visible during wiring.		N/A
	Applicable parts of Chapter 8 of the NEC, and Rules 54 and 60 of the CEC, may be applicable to ITE installed outdoors with connections to communication systems.		N/A
Annex DVB (1)	Additional requirements apply for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities.		N/A
Annex DVC (1)	Additional requirements apply for equipment intended for mounting under kitchen cabinets.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVE (4.1.1)	Some equipment, components, sub-assemblies and materials associated with the risk of fire, electric shock, or personal injury are required to have component or material ratings in accordance with the applicable national (U.S. and Canadian) component or material requirements. These equipment and components include: appliance couplers, attachment plugs, battery backup systems, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), direct plug-in equipment, electrochemical capacitor modules (energy storage modules with ultracapacitors), enclosures (outdoor), flexible cords and cables, fuses (branch circuit), ground-fault current interrupters, interconnecting cables, modular data centres, power supply cords, some power distribution equipment, printed wiring, protectors for communications circuits, receptacles, surge protective devices, vehicle battery adapters, wire connectors, and wire and cables.		N/A
Annex DVH	Equipment for permanent connection to the mains supply is subjected to additional requirements.		N/A
Annex DVH (DVH.1)	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains are required to be in accordance with the NEC/CEC.		N/A
Annex DVH (DVH.2.1)	For safe and reliable connection to a mains, permanently connected equipment is to be provided.		N/A
Annex DVH (DVH.2.2)	Additional considerations for D.C. mains.		N/A
Annex DVH (DVH.3.2.1)	Terminals for permanent wiring, including protective earthing terminals, are required to be suitable for U.S./Canadian wire gauge sizes, rated 125 percent of the equipment rating, and be specially marked when specified.		N/A
Annex DVH (DVH.3.2.3)	Wire binding screws are not permitted to attach conductors larger than 10 AWG (5.3 mm^2).		N/A
Annex DVH (DVH.3.2.4)	All associated mains supply terminals are located in proximity to each other and to the main protective earthing terminal, if any.		N/A
Annex DVH (DVH.3.2.5)	Terminals are located, guarded or insulated so that, should a strand of a conductor escape when the conductor is fitted, there is no likelihood of accidental contact between such a strand and accessible conductive parts or unearthed conductive parts separated from accessible conductive parts by supplementary insulation only.		N/A

IEC62368_1F ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex DVH (DVH.3.3)	When field connection to an external circuit is via wires (example, free conductors), the wires are not smaller than 18 AWG (0.82 mm^2) and the free length of the wire inside an outlet box or wiring compartment is 150 mm or more.		N/A
Annex DVH (DVH.3.4)	Size of protective earthing conductors and terminals	(See sub-clause 5.6.5)	N/A
Annex DVH (DVH.4)	Permanently connected equipment is required to have a suitable wiring compartment and wire bending space.		N/A
Annex DVH (DVH.4.1)	Wire bending space		N/A
Annex DVH (DVH.4.2)	Volume of wiring compartment		N/A
Annex DVH (DVH.4.3)	Separation of circuits		N/A
Annex DVH (DVH.5)	Equipment markings and instructional safeguards		N/A
Annex DVH (DVH.5.1)	Identification of protective earthing terminal		N/A
Annex DVH (DVH.5.2)	Identification of terminal for earthed conductor (neutral)		N/A
Annex DVH (DVH.5.3)	Identification of terminals for aluminium conductors		N/A
Annex DVH (DVH.5.4)	Wire temperature ratings		N/A
Annex DVH (DVH 5.5)	Equipment connected to a centralized d.c. power system, and having one pole of the DC mains input terminal connected to the main protective earthing terminal in the equipment, is required to comply with special earthing, wiring, marking and installation instruction requirements.		N/A
Annex DVI (6.7)	Equipment intended for connection to telecommunication network outside plant cable is required to be protected against overvoltage from power line crosses.		N/A
Annex DVJ (10.6.1)	Equipment connected to a telecommunication and cable distribution networks and supplied with an earphone intended to be held against, or in the ear is required to comply with special acoustic pressure requirements.		N/A

Enclosures

Type	Supplement Id	Description
Photographs	03-01	ID view of Model FPF2895UCX
Photographs	03-02	Difference between model FPF2895UCX and model FPF2895CUCX refer to their Spec(see enclosure 04-01 and 04-02 for details)
Photographs	03-03	ID view of Model FPF2895CUCX
Diagrams	04-01	Model FPF2895UCX Spec (FPF2895 is FPF2895UCX in this spec)
Diagrams	04-02	Model FPF2895CUCX Spec (FPF2895C is FPF2895CUCX in this spec)

Photographs ID 03-01

Photographs ID 03-02

FPF2895UCX

V_{OVLO}	Over−Voltage Lockout	OV1 = LOW, OV2 = LOW	V_{IN} Rising	22.54	23.00	23.46	V
			V_{IN} Falling	22.34	–	–	
		OV1 = LOW, OV2 = HIGH	V_{IN} Rising	9.90	10.00	10.10	
			V_{IN} Falling	9.85	–	–	
		OV1 = HIGH, OV2 = LOW	V_{IN} Rising	13.72	14.00	14.28	
			V_{IN} Falling	13.52	–	–	
		OV1 = HIGH, OV2 = HIGH	V_{IN} Rising	5.90	5.95	6.00	
			V_{IN} Falling	5.85	–	–	

FPF2895CUCX

V_{OVLO}	Over−Voltage Lockout (Note 3)	OV1 = LOW, OV2 = LOW	V_{IN}Rising	22.20	23.00	23.46	V
			V_{IN}Falling	22.00	–	–	
		OV1 = LOW, OV2 = HIGH	V_{IN}Rising	9.80	10.00	10.10	
			V_{IN}Falling	9.75	–	–	
		OV1 = HIGH, OV2 = LOW	V_{IN}Rising	16.30	16.80	17.10	
			V_{IN}Falling	16.10	–	–	
		OV1 = HIGH, OV2 = HIGH	V_{IN}Rising	5.85	5.95	6.00	
			V_{IN}Falling	5.80	–	–	

Photographs ID 03-03

Diagrams ID 04-01

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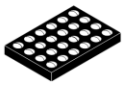
28 V / 5 A Rated Current Limit Switch with OVP and TRCB

FPF2895



WLCSP24 2.6x1.67x0.612
CASE 567TQ

Description

The FPF2895 features a 28 V and 5 A rated current limit power switch, which offers Over−Current Protection (OCP), Over−Voltage Protection (OVP), and True Reverse Current Block (TRCB) to protect system. It has low On−resistance of typical 27 mΩ with WL−CSP can operate over an input voltage range of 4 V to 22 V.

The FPF2895 supports 10% of current limit accuracy, over−current range of 500 mA to 5 A, flexible operations such as selectable OVP, selectable ON polarity and selectable OCP behavior, which can be optimized according to system requirements.

The FPF2895 is available in a 24−bump, 1.67 mm x 2.60 mm Wafer−Level Chip−Scale Package (WL−CSP) with 0.4 mm pitch.

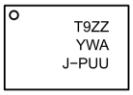
Features

- 28 V / 5 A Capability
- Wide Input Voltage Range: 4 V~22 V
- Ultra Low On−Resistance
  - Typ. 27 mΩ at 5 V and 25°C
- Adjustable Current Limit with External RSET
  - 500 mA~5 A
- Selectable OVLO with OV1 and OV2 Logic Input
  - 5.95 V 50 mV
  - 10 V 100 mV
  - 14 V 280 mV
  - 23 V 460 mV
- Selectable ON Polarity
- Selectable Over−Current Behavior
  - Auto−Restart Mode
  - Current Source Mode
- True Reverse Current Block
- Thermal Shutdown
- Open Drain Fault FLAGB Output
- UL60950−1, IEC60950−1 and IEC62368−1 Certification 5 A Max Loading
- Robust ESD Capability
  - 2 kV HBM & 1 kV CDM
  - 15 kV Air Discharge & 8 kV Contact Discharge under IEC 61000−4−2

Applications

- Laptop, Desktop Computing and Monitor
- Power Accessories

MARKING DIAGRAM



T9 = Specific Device Code
ZZ = Assembly Lot
YW = 2−Digits Date Code
A = Assembly Location
J− = X− Coordinates with Dash as Separator*
P = Y Coordinates*
UU = Two Digit Wafer ID*
*For **onsemi** internal use only.

ORDERING INFORMATION

See detailed ordering and shipping information on page 9 of this data sheet.

FPF2895

Application Diagram

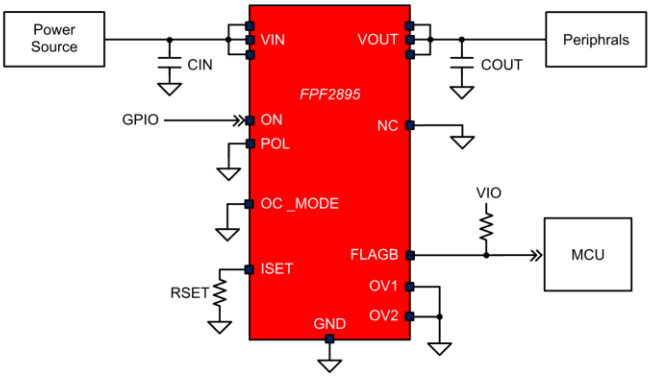


Figure 1. Typical Application

Block Diagram

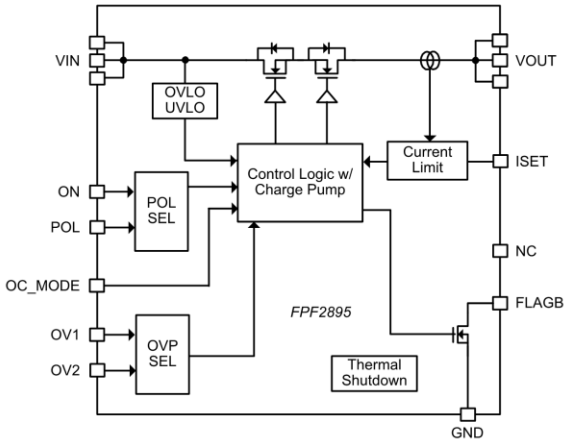


Figure 2. Functional Block Diagram

FPF2895

PIN CONFIGURATION

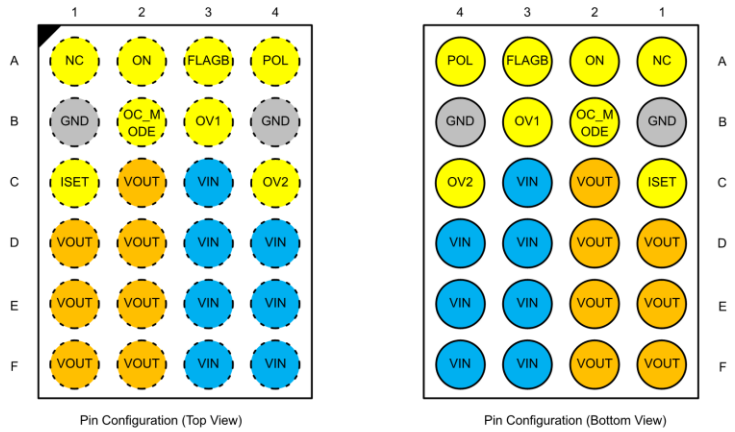


Figure 3. 24 Ball WL_CSP, 4 x 6 Array, 0.4 mm Pitch, 250 μm Ball

PIN DEFINITIONS

Name	Bump	Type	Description
VIN	C3, D3, D4, E3, E4, F3, F4	Input/Supply	Switch Input and Device Supply
VOUT	C2, D1, D2, E1, E2, F1, F2	Output	Switch Output to Load
NC	A1	Dummy	Recommended to connect to GND
ON	A2	Input	Internal pull−down resistor of 5 MΩ is included. Active polarity is depending on POL state. (Note 1)
POL	A4	Input	Enable Polarity Selection. Internal pull−up of 5 MΩ is included. HIGH (or Floating): Active LOW LOW: Active HIGH (Note 1)
FLAGB	A3	Output	Active LOW, open drain output indicates an over−current, under−voltage, over−voltage, or over−temperature state.
ISET	C1	Input	A resistor from ISET to ground set the current limit for the switch. See below selection Table 1.
OC_MODE	B2	Input	OCP behavior can be selected. Internal pull−up of 5 MΩ is included. HIGH (or Floating): Auto−restart mode during over−current condition. LOW: Current source mode during over−current condition. (Note 1)
OV1	B3	Input	Over−Voltage Selection Input 1. Internal pull−up of 5 MΩ is included and see below selection Table 2. (Note 1)
OV2	C4	Input	Over−Voltage Selection Input 2. Internal pull−up of 5 MΩ is included and see Table 2. (Note 1)
GND	B1, B4	GND	Device Ground

1. To avoid external noise influence when floating, recommend to connect these pins to a certain level.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Min	Max	Unit
VIN, VOUT	VIN, VOUT to GND		−0.3	28.0	V
V_{PIN}	ON, POL, OC_MODE, ISET, FLAGB and OVn to GND		−0.3	6.0	V
I_{SW}	Continuous Switch Current		−	5.5	A
t_{PD}	Total Power Dissipation at T_A = 25°C		−	2.08	W
T_{STG}	Storage Junction Temperature		−65	+150	°C
T_J	Operating Junction Temperature		−	+150	°C
T_L	Lead Temperature (Soldering, 10 Seconds)		−	+260	°C
Θ_{JA}	Thermal Resistance, Junction−to−Ambient (1 in.^{2} Pad of 2 oz. Copper)		−	60 (Note 2)	°C/W
ESD	Electrostatic Discharge Capability	Human Body Model, ANSI/ESDA/JEDEC JS−001	2	−	kV
		Charged Device Model, JESD22−C101	1	−	
	IEC61000−4−2 System Level	Air Discharge	15	−	
		Contact Discharge	8	−	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
2. Measured using 2S2P JEDEC std. PCB.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{IN}	Supply Voltage	4.0	22.0	V
C_{IN} / C_{OUT}	Input and Output Capacitance	1.0	−	μF
T_A	Ambient Operating Temperature	−40	+85	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, V_{IN} = 4 to 22 V, T_A = −40 to 85°C; typical values are at V_{IN} = 5 V, C_{IN} = C_{OUT} = 1 μF, ON = HIGH, POL = OV1 = OV2 = OC_MODE = GND and T_A = 25°C.)

Symbol	Parameter	Condition		Min	Typ	Max	Unit
BASIC OPERATION							
V_{IN}	Input Voltage			4	−	22	V
I_{SD_IN}	V_{IN} Shutdown Current	V_{ON} = OFF, V_{IN} = 5.5 V, V_{OUT} = Short to GND		−	75	100	μA
I_Q	Quiescent Current	I_{OUT} = 0 mA, V_{ON} = ON	V_{IN} = 5 V	−	270	330	μA
			V_{IN} = 12 V	−	300	400	
			V_{IN} = 20 V	−	350	450	
R_{ON}	On Resistance	T_A = 25°C, I_{OUT} = 1 A	V_{IN} = 5 V	−	27	39	mΩ
			V_{IN} = 12 V	−	27	39	
			V_{IN} = 20 V	−	27	39	
I_{ON}	ON Input Leakage	V_{ON} = V_{IN} or GND		−	−	2	μA
V_{IH}	ON Input Logic High Voltage	V_{IN} = 3 V~23 V		1.2	−	−	V
V_{IL}	ON Input Logic Low Voltage	V_{IN} = 3 V~23 V		−	−	0.4	V
V_{P_LOW}	FLAGB Output Logic Low Voltage	V_{IN} = 5 V, I_{SINK} = 5 mA		−	0.1	0.2	V
I_{LKG}	FLAGB Output High, Leakage Current	V_{IN} = 5 V, Switch ON		−	−	1	μA
PROTECTIONS							
I_{LIM}	Current Limit (Note 3)	V_{IN} = 5 V, V_{OUT} = 4 V, R_{SET} = 2.96 kΩ, T_A = −40 to 85°C		1.35	1.50	1.65	A
		V_{IN} = 5 V, V_{OUT} = 4 V, R_{SET} = 1.48 kΩ, T_A = −40 to 85°C		2.7	3.0	3.3	
V_{FOLD}	ILIM Foldback Trip Voltage (Note 3)	V_{OUT} under I_{LIM} Mode		−	2	−	V

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, V_{IN} = 4 to 22 V, T_A = −40 to 85°C; typical values are at V_{IN} = 5 V, C_{IN} = C_{OUT} = 1 μF, ON = HIGH, POL = OV1 = OV2 = OC_MODE = GND and T_A = 25°C.) (continued)

Symbol	Parameter	Condition		Min	Typ	Max	Unit
PROTECTIONS							
I_{FOLD}	ILIM Foldback Gain (Note 3)	V_{IN} = 5 V, V_{OUT} < V_{FOLD}, TA = 25°C, OC_MODE = HIGH		–	500	–	mA
		V_{IN} = 5 V, V_{OUT} < V_{FOLD}, TA = 25°C, OC_MODE = LOW		–	250	–	mA
V_{UVLO}	Under−Voltage Lockout	V_{IN} Increasing		–	2.70	2.95	V
		V_{IN} Decreasing		–	2.5	–	
	UVLO Hysteresis			–	200	–	mV
V_{OVLO}	Over−Voltage Lockout	OV1 = LOW, OV2 = LOW	V_{IN} Rising	22.54	23.00	23.46	V
			V_{IN} Falling	22.34	–	–	
		OV1 = LOW, OV2 = HIGH	V_{IN} Rising	9.90	10.00	10.10	
			V_{IN} Falling	9.85	–	–	
		OV1 = HIGH, OV2 = LOW	V_{IN} Rising	13.72	14.00	14.28	
			V_{IN} Falling	13.52	–	–	
		OV1 = HIGH, OV2 = HIGH	V_{IN} Rising	5.90	5.95	6.00	
			V_{IN} Falling	5.85	–	–	
t_{OVP}	OVP Response Time (Note 3)	R_L = 100 Ω, C_L = 0 μF, V_{IN} > V_{OVLO} to V_{OUT} = 0.9 x V_{IN}		–	–	150	ns
V_{T_RCB}	TRCB Protection Trip Point	V_{OUT} − V_{IN}		–	25	40	mV
V_{R_RCB}	TRCB Protection, Release Point	V_{IN} − V_{OUT}		–	25	40	mV
t_{RCB}	TRCB Response Time (Note 3)	V_{IN} = 5 V, V_{ON} = HIGH/LOW		–	5	–	μs
$t_{RCB\_Release}$	TRCB Release Time (Note 3)	V_{IN} = 5 V, Enabled		–	1	–	μs
t_{OC}	Over Current Response Time (Note 3)	V_{IN} = 5 V, Moderate OC		–	20	–	μs
		V_{IN} = 5 V, Hard Short		–	5	–	μs
I_{SD_OUT}	VOUT Shutdown Current	V_{ON} = OFF, V_{OUT}T = 5 V, V_{IN} = Short to GND		–	–	2	μA
TSD	Thermal Shutdown (Note 3)	Shutdown Threshold		–	150	–	°C
		Hysteresis		–	20	–	
DYNAMIC BEHAVIOR							
t_{DON}	Delay On Time	R_L = 100 Ω, C_L = 1 μF		–	1	–	ms
t_R	VOUT Rise Time	R_L = 100 Ω, C_L = 1 μF		–	1	–	ms
t_{ON}	Turn−On Time	R_L = 100 Ω, C_L = 1 μF		–	2	–	ms
t_{DOFF}	Delay Off Time	R_L = 100 Ω, C_L = 1 μF		–	10	–	μs
t_F	VOUT Fall Time	R_L = 100 Ω, C_L = 1 μF		–	200	–	μs
t_{OFF}	Turn−Off Time	R_L = 100 Ω, C_L = 1 μF		–	210	–	μs
t_{BLANK}	Over−Current Blanking Time (Note 3)	OC_MODE = HIGH		–	5	–	ms
t_{RSTRT}	Auto−Restart Time (Note 3)	OC_MODE = HIGH		–	200	–	ms
t_{QUAL}	Over−Current Qualification Time (Note 3)	OC_MODE = LOW		–	5	–	ms
t_{DEB}	FLAGB Debounce Time (Note 3)	Restart−up during or after OC		–	3	–	ms
		Restart−up during or after Thermal shutdown		–	15	–	
		Restart−up during or after UVLO		–	1	–	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Guaranteed by characterization and design, not production test.

Setting Current Limit

FPF2895 current limit is set with an external resistor connected between ISET and GND. This resistor is selected using the following equation:

$$R_{SET}\,(k\Omega) = 4448.6/I_{LIM}\,(mA) \qquad \text{(eq. 1)}$$

The resistor can be selected using 0. Resistor tolerance of 1% or less is recommended.

Table 1. ILIM VS. RSET LOOK−UP TABLE

RSET (kΩ)	ILIM (A)		
	Min.	Typ.	Max.
8.89	450	500	550
7.41	540	600	660
6.35	630	700	770
5.56	720	800	880
4.94	810	900	990
4.45	900	1000	1100
4.04	990	1100	1210
3.71	1080	1200	1320
3.42	1170	1300	1430
3.18	1260	1400	1540
2.96	1350	1500	1650
2.78	1440	1600	1760
2.62	1530	1700	1870
2.47	1620	1800	1980
2.34	1710	1900	2090
2.22	1800	2000	2200
2.12	1890	2100	2310
2.02	1980	2200	2420
1.93	2070	2300	2530
1.85	2160	2400	2640
1.78	2250	2500	2750
1.71	2340	2600	2860
1.65	2430	2700	2970
1.59	2520	2800	3080
1.53	2610	2900	3190
1.48	2700	3000	3300
1.43	2790	3100	3410
1.39	2880	3200	3520
1.35	2970	3300	3630
1.31	3060	3400	3740
1.27	3150	3500	3850
1.24	3240	3600	3960
1.20	3330	3700	4070
1.17	3420	3800	4180
1.14	3510	3900	4290
1.11	3600	4000	4400

Table 1. ILIM VS. RSET LOOK−UP TABLE (continued)

RSET (kΩ)	ILIM (A)		
	Min.	Typ.	Max.
1.08	3690	4100	4510
1.06	3780	4200	4620
1.03	3870	4300	4730
1.01	3960	4400	4840
0.99 (Note 4)	4050	4500	4950
0.97	4140	4600	5060
0.95	4230	4700	5170
0.93	4320	4800	5280
0.91	4410	4900	5390
0.89	4500	5000	5500

4. Passed UL&CB certification with max. 5 A output current.

Table 2. OVLO LEVEL SELECTION

OV1	OV2	OVLO
LOW	LOW	23 V 460 mV
LOW	HIGH (Floating)	10 V 100 mV
HIGH (Floating)	LOW	14 V 280 mV
HIGH (Floating)	HIGH (Floating)	5.95 V 50 mV

Table 3. DEVICE ENABLE POLARITY SELECTION

POL	ON	Device State	ON Polarity
LOW	LOW (Floating)	OFF	Active HIGH
LOW	HIGH	ON	
HIGH (Floating)	LOW (Floating)	ON	Active LOW
HIGH (Floating)	HIGH	OFF	

Timing Diagrams

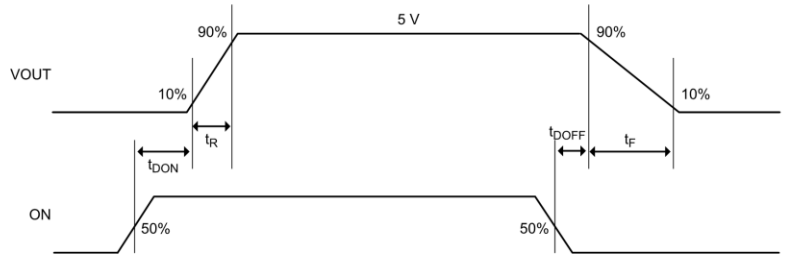


Figure 4. Normal ON/OFF Operation by ON (POL = GND)

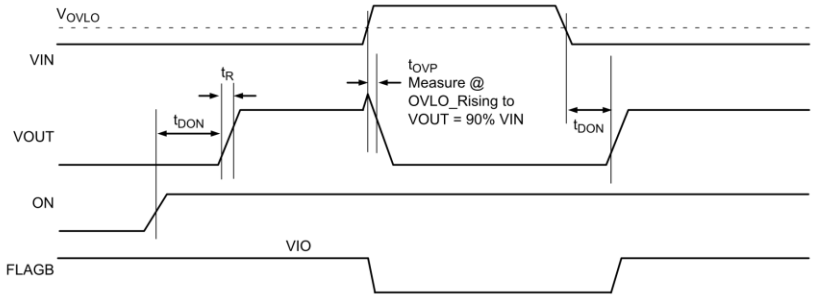


Figure 5. OVLO Operation (POL = GND & FLAGB is Pulled Up with an External VIO)

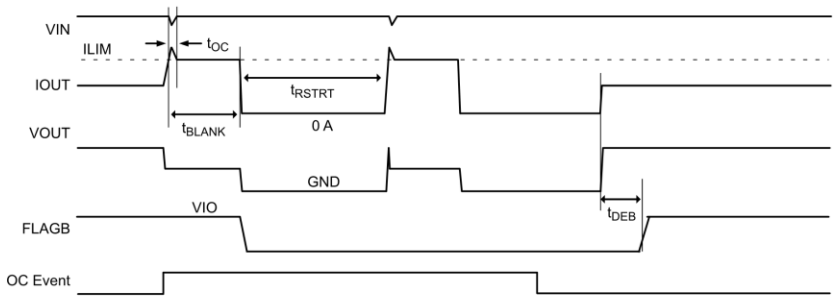


Figure 6. Current Limit Operation (OC_MODE = HIGH & FLAGB is Pulled Up with an External VIO)

Timing Diagrams (continued)

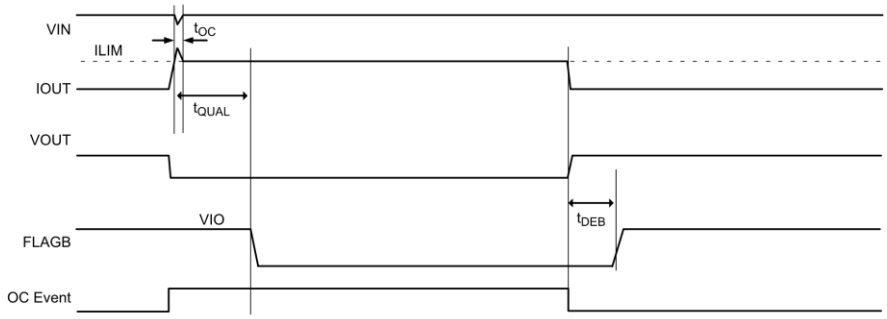


Figure 7. Current Limit Operation (OC_MODE = LOW & FLAGB is Pulled Up with an External VIO)

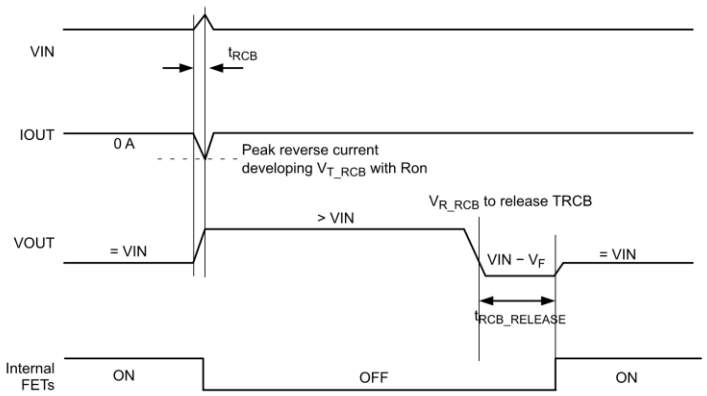


Figure 8. TRCB Operation (Device is Enabled)

ORDERING INFORMATION

Part Number	Operating Temperature Range	Top Mark	Package	Shipping†
FPF2895UCX	−40°C – +85°C	T9	24−Ball, 0.4 mm Pitch WLCSP (Pb−Free, Halide Free)	3000 / Tape & Reel

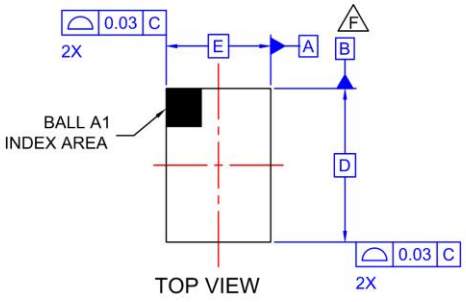
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

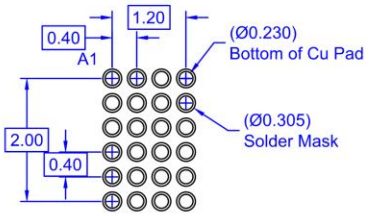
ON Semiconductor®

WLCSP24 2.6x1.67x0.612
CASE 567TQ
ISSUE O

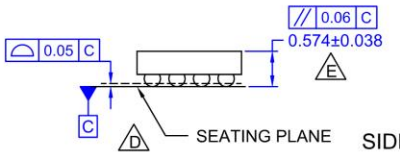
DATE 31 MAR 2017

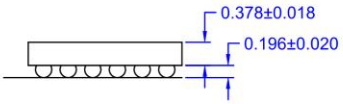


TOP VIEW

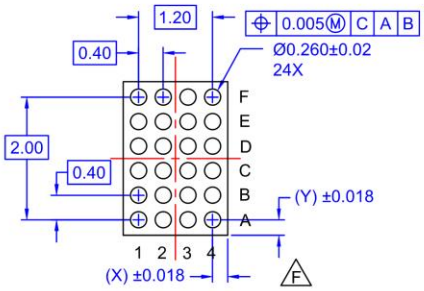


RECOMMENDED LAND PATTERN
(NSMD PAD TYPE)





SIDE VIEWS



BOTTOM VIEW

NOTES
A. NO JEDEC REGISTRATION APPLIES.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCE PER ASMEY14.5M, 2009.
D. DATUM C IS DEFINED BY THE SPHERICAL CROWNS OF THE BALLS.
E. PACKAGE NOMINAL HEIGHT IS 574 ± 38 MICRONS (536-612 MICRONS).
F. FOR DIMENSIONS D, E, X, AND Y SEE PRODUCT DATASHEET.

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DESCRIPTION:	**WLCSP24 2.6x1.67x0.612**	**PAGE 1 OF 1**

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◊

Diagrams ID 04-02

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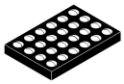
Current Limit Switch, with OVP and TRCB, 28 V / 5 A Rated

FPF2895C



WLCSP24 2.6x1.67x0.612
CASE 567TQ

Description

The FPF2895C features a 28 V and 5 A rated current limit power switch, which offers Over−Current Protection (OCP), Over−Voltage Protection (OVP), and True Reverse Current Block (TRCB) to protect system. It has low On−resistance of typical 27 mΩ with WL−CSP can operate over an input voltage range of 4 V to 22 V.

The FPF2895C supports 10% of current limit accuracy, flexible operations such as selectable OVP, selectable ON polarity and selectable OCP behavior, which can be optimized according to system requirements.

The FPF2895C is available in a 24−bump, 1.67 mm x 2.60 mm Wafer−Level Chip−Scale Package (WLCSP) with 0.4 mm pitch.

Features

- 28 V / 5 A Capability
- Wide Input Voltage Range: 4 V ~ 22 V
- Ultra Low On−Resistance
  - Typ. 27 mΩ at 5 V and 25 °C
- Adjustable Current Limit with external RSET
  - 500 mA ~ 5 A
- Selectable OVLO with OV1 and OV2 Logic Input
  - 5.95 V 50 mV
  - 10 V 100 mV
  - 16.8 V 300 mV
  - 23 V 460 mV
- Selectable ON Polarity
- Selectable Over-Current Behavior
  - Auto−Restart Mode
  - Current Source Mode
- True Reverse Current Block
- Thermal Shutdown
- Open Drain Fault FLAGB Output
- UL60950−1, IEC60950−1 and IEC62368−1 Certification 5 A Max Loading
- Robust ESD Capability
  - 2 kV HBM & 1 kV CDM
  - 15 kV Air Discharge & 8 kV Contact Discharge under IEC 61000−4−2

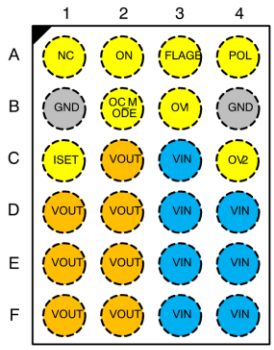
Applications

- Laptop, Desktop Computing and Monitor
- Power Accessories

MARKING DIAGRAM

3G = Specific Device Code
ZZ = Assembly Lot
YW = 2−Digits Date Code
A = Assembly Location
J− = X− Coordinates with dash as separator*
P = Y Coordinates*
UU = Two Digit Wafer ID*
*For **onsemi** internal use only.

PIN CONFIGURATION



ORDERING INFORMATION

See detailed ordering and shipping information on page 10 of this data sheet.

FPF2895C

Application Diagram

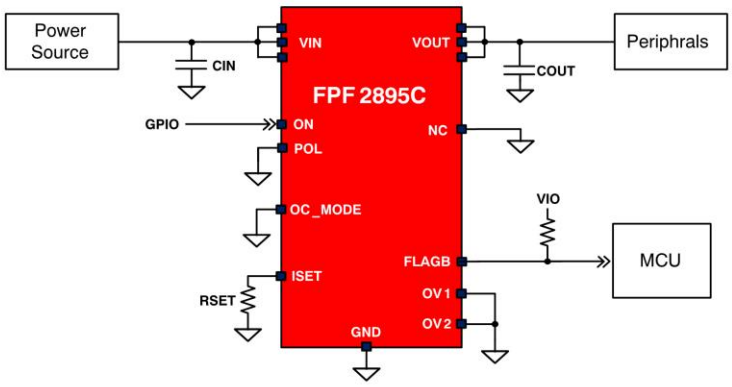


Figure 1. Typical Application

Block Diagram

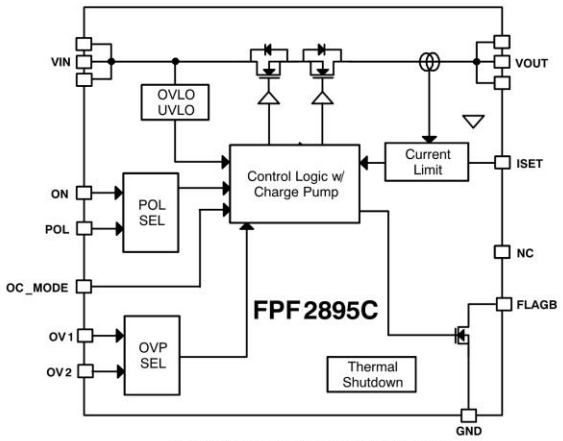
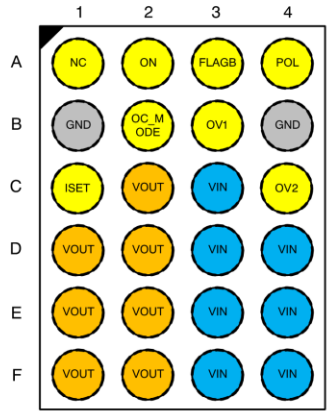


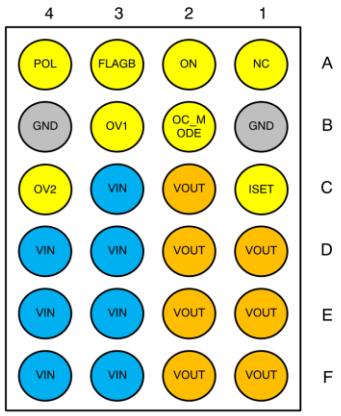
Figure 2. Functional Block Diagram

FPF2895C

PIN CONFIGURATION



Pin Configuration (Top View)



Pin Configuration (Bottom View)

Figure 3. 24 Ball WL_CSP, 4 x 6 Array, 0.4 mm Pitch, 250 μm Ball

Table 1. PIN DEFINITIONS

Name	Bump	Type	Description
VIN	C3, D3, D4, E3, E4, F3, F4	Input/Supply	Switch Input and Device Supply
VOUT	C2, D1, D2, E1, E2, F1, F2	Output	Switch Output to Load
NC	A1	Dummy	Recommended to connect to GND
ON	A2	Input	Internal pull−down resistor of 1 MΩ is included. Active polarity is depending on POL state (Note 1)
POL	A4	Input	Enable Polarity Selection. Internal pull/up of 1 MΩ is included. HIGH (or Floating): Active LOW LOW: Active HIGH (Note 1)
FLAGB	A3	Output	Active LOW, open drain output indicates an over−current, under−voltage, over−voltage, or over−temperature state.
ISET	C1	Input	A resistor from ISET to ground set the current limit for the switch. See below selection Table 6.
OC_MODE	B2	Input	OCP behavior can be selected. Internal pull−up of 1 MΩ is included. HIGH (or Floating): Auto−restart mode during over−current condition. LOW: Current source mode during over−current condition. (Note 1)
OV1	B3	Input	Over−Voltage Selection Input 1. Internal pull−up of 1 MΩ is included and see below selection Table 7. (Note 1)
OV2	C4	Input	Over−Voltage Selection Input 2. Internal pull−up of 1 MΩ is included and see Table 7 (Note 1)
GND	B1, B4	GND	Device Ground

1. To avoid external noise influence when floating, recommend to connect these pins to a certain level.

Table 2. ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Min.	Max.	Unit
VIN, VOUT	VIN, VOUT to GND		−0.3	28.0	V
V_{PIN}	ON, POL, OC_MODE, ISET, FLAGB and OVn to GND		−0.3	6.0	V
I_{SW}	Continuous Switch Current		–	5.5	A
t_{PD}	Total Power Dissipation at T_A = 25°C		–	2.08	W
T_{STG}	Storage Junction Temperature		−65	+150	°C
T_J	Operating Junction Temperature		–	+150	°C
T_L	Lead Temperature (Soldering, 10 Seconds)		–	+260	°C
θ_{JA}	Thermal Resistance, Junction−to−Ambient (1in.^{2} pad of 2 oz. copper)		–	60 (Note 2)	°C/W
ESD	Electrostatic Discharge Capability	Human Body Model, ANSI/ESDA/JEDEC JS−001	2	–	kV
		Charged Device Model, JESD22−C101	1	–	
	IEC61000−4−2 System Level	Air Discharge	15	–	
		Contact Discharge	8	–	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
2. Measured using 2S2P JEDEC std. PCB.

Table 3. RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min.	Max.	Unit
V_{IN}	Supply Voltage	4.0	22.0	V
C_{IN} / C_{OUT}	Input and Output Capacitance	1.0	–	μF
T_A	Ambient Operating Temperature	−40	+85	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Table 4. ELECTRICAL CHARACTERISTICS (Unless otherwise noted, V_{IN} = 4 to 22 V, T_A = −40 to 85°C; typical values are at V_{IN} = 5 V, C_{IN} = C_{OUT} = 1 μF, ON = HIGH, POL = OV1 = OV2 = OC_MODE = GND and T_A = 25°C.)

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
BASIC OPERATION							
V_{IN}	Input Voltage (Note 4)			4	–	22	V
I_{SD_IN}	V_{IN} Shutdown Current	V_{ON} = OFF, V_{IN} = 5.5 V, V_{OUT} = Short to GND		–	75	100	μA
I_Q	Quiescent Current	I_{OUT} = 0 mA, V_{ON} = ON	V_{IN} = 5 V	–	270	330	μA
			V_{IN} = 12 V	–	300	400	
			V_{IN} = 20 V	–	350	450	
R_{ON}	On Resistance	T_A = 25°C, I_{OUT} = 1 A	V_{IN} = 5 V	–	27	39	mΩ
			V_{IN} = 12 V	–	27	39	
			V_{IN} = 20 V	–	27	39	
I_{ON}	ON Input Leakage	V_{ON} = V_{IN} or GND		–	–	10	μA
V_{IH}	Logic Pin Input (ON, POL, OV1, OV2, OC_MODE) High Voltage	V_{IN} = 3 V ~ 23 V		1.2	–	–	V
V_{IL}	Logic Pin Input (ON, POL, OV1, OV2, OC_MODE) Low Voltage	V_{IN} = 3 V ~ 23 V		–	–	0.4	V
V_{P_LOW}	FLAGB Output Logic Low Voltage	V_{IN} = 5 V, I_{SINK} = 5 mA		–	0.1	0.2	V
I_{LKG}	FLAGB Output High, Leakage Current	V_{IN} = 5 V, Switch ON		–	–	1	μA

Table 4. ELECTRICAL CHARACTERISTICS (Unless otherwise noted, V_{IN} = 4 to 22 V, T_A = −40 to 85°C; typical values are at V_{IN} = 5 V, C_{IN} = C_{OUT} = 1 μF, ON = HIGH, POL = OV1 = OV2 = OC_MODE = GND and T_A = 25°C.)

PROTECTIONS							
I_{LIM}	Current Limit (Note 3)	V_{IN} = 5 V, V_{OUT} = 4 V, R_{SET} = 3.01 kΩ, T_A = −40 to 85°C		1.35	1.50	1.65	A
		V_{IN} = 5 V, V_{OUT} = 4 V, R_{SET} = 1.54 kΩ, T_A = −40 to 85°C		2.85	3.00	3.15	
V_{FOLD}	ILIM Foldback Trip Voltage (Note 3)	V_{OUT} under ILIM Mode		–	2	–	V
I_{FOLD}	ILIM Foldback Current (Note 3)	V_{IN} = 5 V, V_{OUT} < V_{FOLD}, T_A = 25°C, OC_MODE = HIGH		–	500	–	mA
		V_{IN} = 5 V, V_{OUT} < V_{FOLD}, T_A = 25°C, OC_MODE = LOW		–	250	–	mA
V_{UVLO}	Under−Voltage Lockout	V_{IN} Increasing		–	2.70	2.95	V
		V_{IN} Decreasing		–	2.5	–	
	UVLO Hysteresis			–	200	–	mV
V_{OVLO}	Over−Voltage Lockout (Note 3)	OV1 = LOW, OV2 = LOW	V_{IN}Rising	22.20	23.00	23.46	V
			V_{IN}Falling	22.00	–	–	
		OV1 = LOW, OV2 = HIGH	V_{IN}Rising	9.80	10.00	10.10	
			V_{IN}Falling	9.75	–	–	
		OV1 = HIGH, OV2 = LOW	V_{IN}Rising	16.30	16.80	17.10	
			V_{IN}Falling	16.10	–	–	
		OV1 = HIGH, OV2 = HIGH	V_{IN}Rising	5.85	5.95	6.00	
			V_{IN}Falling	5.80	–	–	
T_{OVP}	OVP Response Time (Note 3)	R_L = 100 Ω, C_L = 0 μF, V_{IN} > V_{OVLO} to V_{OUT} = 0.9 × V_{IN}		–	–	150	ns
V_{T_RCB}	TRCB Protection Trip Point	V_{OUT} – V_{IN}		–	25	40	mV
V_{R_RCB}	TRCB Protection, Release Point	V_{IN} – V_{OUT}		–	25	40	mV
t_{RCB}	TRCB Response Time (Note 3)	V_{IN} = 5 V, V_{ON} = HIGH/LOW		–	5	–	μs
$t_{RCB\_Release}$	TRCB Release Time (Note 3)	V_{IN} = 5 V, Enabled		–	1	–	μs
t_{OC}	Over Current Response Time (Note 3)	V_{IN} = 5 V, Moderate OC		–	20	–	μs
		V_{IN} = 5 V, Hard Short		–	5	–	
I_{SD_OUT}	VOUT Shutdown Current	V_{ON} = OFF, V_{OUT} = 5 V, V_{IN} = Short to GND		–	–	2	μA
TSD	Thermal Shutdown (Note 3)	Shutdown Threshold		–	150	–	°C
		Hysteresis		–	20	–	
DYNAMIC BEHAVIOR							
t_{DON}	Delay On Time	R_L = 100 Ω C_L = 1 μF		–	1	–	ms
t_R	V_{OUT} Rise Time	R_L = 100 Ω C_L = 1 μF		–	1	–	ms
t_{ON}	Turn−On Time	R_L = 100 Ω C_L = 1 μF		–	2	–	ms
t_{DOFF}	Delay Off Time	R_L = 100 Ω C_L = 1 μF		–	10	–	μs
t_F	V_{OUT} Fall Time	R_L = 100 Ω C_L = 1 μF		–	200	–	μs
t_{OFF}	Turn−Off Time	R_L = 100 Ω C_L = 1 μF		–	210	–	μs
t_{BLANK}	Over−Current Blanking Time (Note 3)	OC_MODE = HIGH		–	5	–	ms
t_{RSTRT}	Auto−Restart Time (Note 3)	OC_MODE = HIGH		–	200	–	ms
t_{QUAL}	Over−Current Qualification Time (Note 3)	OC_MODE = LOW		–	5	–	ms
t_{DEB}	FLAGB De−bounce Time (Note 3)	Restart−up during or after OC		–	3	–	ms
		Restart−up during or after Thermal shutdown		–	15	–	
		Restart−up during or after UVLO		–	1	–	

3. Guaranteed by characterization and design, not production test.
4. To avoid output voltage is coupled to high during cold start, the slew rate of Vin should be less than 10 mV/μs

Setting Current Limit

FPF2895C current limit is set with an external resistor connected between I_{SET} and GND. This resistor is selected using the following equation:

R_{SET} (kΩ) = 4448.6/Ilim [mA]

Resistor tolerance of 1% or less is recommended.

Table 5. ILIM VS. RSET LOOK−UP TABLE

RSET [kΩ]	ILIM [mA]		
	Min.	Typ.	Max.
8.89	450	500	550
7.41	540	600	660
6.35	630	700	770
5.56	720	800	880
4.94	810	900	990
4.45	900	1000	1100
4.04	990	1100	1210
3.71	1080	1200	1320
3.42	1170	1300	1430
3.18	1260	1400	1540
2.96	1350	1500	1650
2.78	1440	1600	1760
2.62	1530	1700	1870
2.47	1620	1800	1980
2.34	1710	1900	2090
2.22	1800	2000	2200
2.12	1890	2100	2310
2.02	1980	2200	2420
1.93	2070	2300	2530
1.85	2160	2400	2640
1.78	2250	2500	2750
1.71	2340	2600	2860
1.65	2430	2700	2970
1.59	2520	2800	3080
1.53	2610	2900	3190
1.48	2700	3000	3300
1.43	2790	3100	3410
1.39	2880	3200	3520
1.35	2970	3300	3630
1.31	3060	3400	3740
1.27	3150	3500	3850
1.24	3240	3600	3960
1.20	3330	3700	4070
1.17	3420	3800	4180
1.14	3510	3900	4290
1.11	3600	4000	4400
1.08	3690	4100	4510
1.06	3780	4200	4620
1.03	3870	4300	4730
1.01	3960	4400	4840

Table 5. ILIM VS. RSET LOOK−UP TABLE

RSET [kΩ]	ILIM [mA]		
	Min.	Typ.	Max.
0.99 (Note 5)	4050	4500	4950
0.97	4140	4600	5060
0.95	4230	4700	5170
0.93	4320	4800	5280
0.91	4410	4900	5390
0.89	4500	5000	5500

5. Passed UL&CB certification with max. 5 A output current.

Table 6. OVLO LEVEL SELECTION

OV1	OV2	OVLO
LOW	LOW	23 V 460 mV
LOW	HIGH (Floating)	10 V 100 mV
HIGH (Floating)	LOW	16.3 V 300 mV
HIGH (Floating)	HIGH (Floating)	5.95 V 50 mV

Table 7. DEVICE ENABLE POLARITY SELECTION

POL	ON	Device State	ON Polarity
LOW	LOW (Floating)	OFF	Active HIGH
LOW	HIGH	ON	
HIGH (Floating)	LOW (Floating)	ON	Active LOW
HIGH (Floating)	HIGH	OFF	

TIMING DIAGRAMS

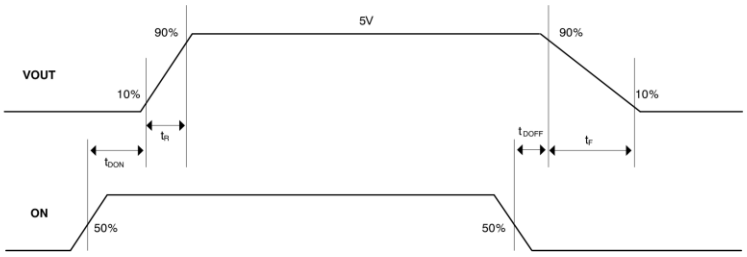


Figure 4. Normal ON/OFF Operation by ON (POL = GND)

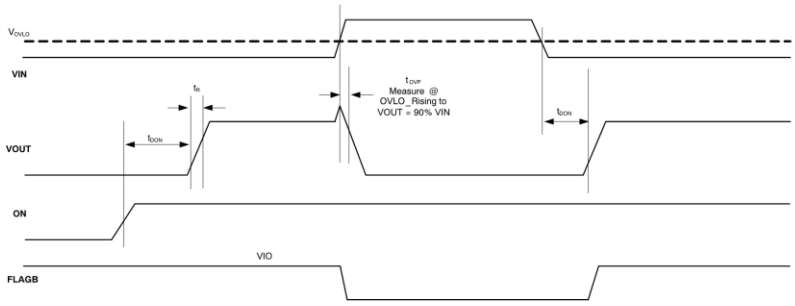


Figure 5. OVLO Operation (POL = GND & FLAGB is Pulled Up With an External VIO)

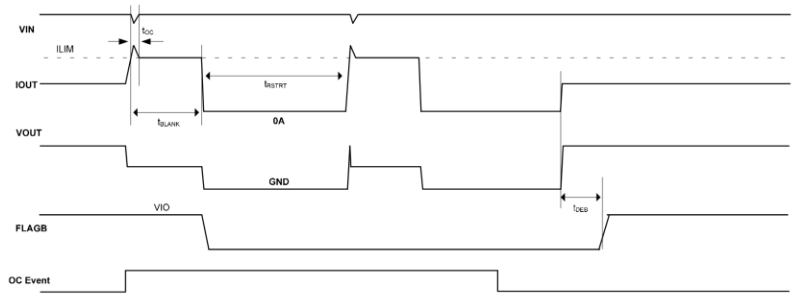


Figure 6. Current Limit Operation (OC_MODE=HIGH & FLAGB is Pulled Up With an External VIO)

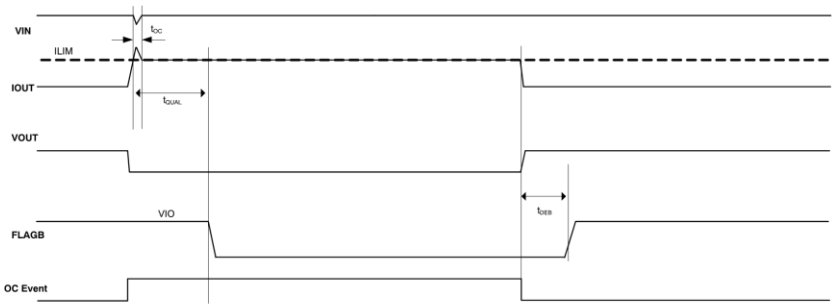


Figure 7. Current Limit Operation (OC_MODE = LOW & FLAGB Is Pulled Up With an External VIO)

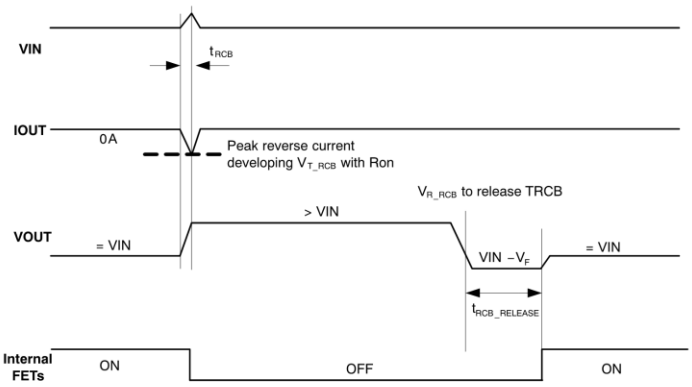


Figure 8. TRCB Operation (Device is Enabled)

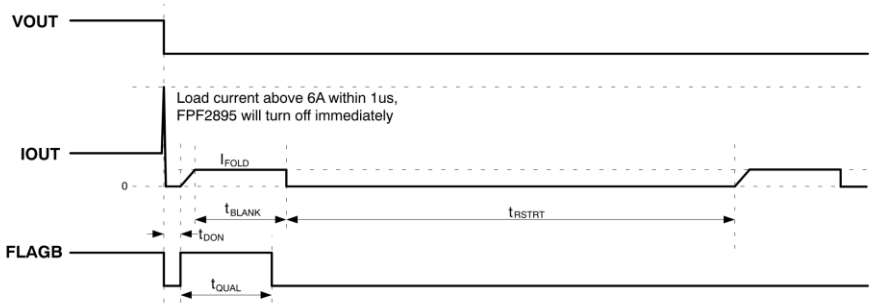


Figure 9. VOUT Hard Short to GND (OC_MODE=HIGH & FLAGB Is Pulled Up With an External VIO)

FPF2895C

PRODUCT−SPECIFIC DIMENSIONS

D	E	X	Y
2600 μm 30 μm	1670 μm 30 μm	235 μm 18 μm	300 μm 18 μm

ORDERING INFORMATION

Part Number	Operating Temperature Range	Top Mark	Package	Shipping†
FPF2895CUCX	−40°C − +85°C	3G	24−Ball, 0.4 mm Pitch WLCSP	Tape & Reel

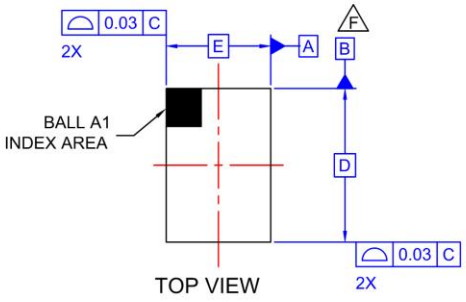
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

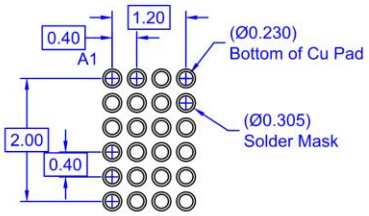
ON Semiconductor®

WLCSP24 2.6x1.67x0.612
CASE 567TQ
ISSUE O

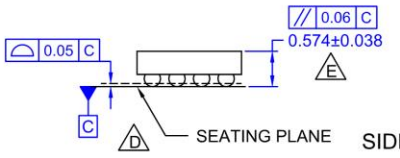
DATE 31 MAR 2017

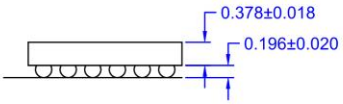


TOP VIEW

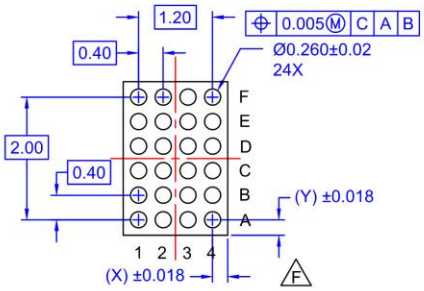


RECOMMENDED LAND PATTERN
(NSMD PAD TYPE)





SIDE VIEWS



BOTTOM VIEW

NOTES
A. NO JEDEC REGISTRATION APPLIES.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCE PER ASMEY14.5M, 2009.
D. DATUM C IS DEFINED BY THE SPHERICAL CROWNS OF THE BALLS.
E. PACKAGE NOMINAL HEIGHT IS 574 ± 38 MICRONS (536-612 MICRONS).
F. FOR DIMENSIONS D, E, X, AND Y SEE PRODUCT DATASHEET.

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DESCRIPTION:	**WLCSP24 2.6x1.67x0.612**	**PAGE 1 OF 1**

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