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TEST REPORT
IEC 60950-1
Information technology equipment – Safety – Part 1: General requirements

Report Number.....:	257636
Date of issue.....:	May 19, 2014
Total number of pages	45 pages and refer to page 3
Applicant's name .....:	ON Semiconductor
Address.....:	5005 East McDowell Rd, Phoenix, AZ, 85008, U.S.A.
Test specification:	
Standard .....:	IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013
Test procedure .....:	CB Scheme
Non-standard test method .....:	N/A
Test Report Form No. .....:	IEC60950_1F
Test Report Form(s) Originator ....:	SGS Fimko Ltd
Master TRF .....:	Dated 2014-02

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 CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

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

Test item description ..... :	AC/DC Flyback Controller	
Trade Mark ..... :	ON	
Manufacturer ..... :	Same as applicant	
Model/Type reference ..... :	NCP1244; NCP1246; NCP1247; NCP1248; NCP1240; SCY99126; SCY99157	
Ratings ..... :	HV pin: 11mA / 500 VDC , VCC pin: 28V (Applicable for use to mains supply 100-240Vac 60-50Hz)	
Testing procedure and testing location:		
☒ **CB Testing Laboratory:**	Nemko Taiwan	
Testing location/ address.....:	5 Fl., No. 409, Sec.2, Tiding Blvd., Neihu, Taipei 114, Taiwan	
☐ **Associated CB Testing Laboratory:**		
Testing location/ address.....:		
Tested by (name + signature).....:	Jason Chu	
Approved by (name + signature).....:	Roger Liou	
☐ **Testing procedure: TMP/CTF Stage 1:**		
Testing location/ address.....:		
Tested by (name + signature).....:		
Approved by (name + signature).....:		
☐ **Testing procedure: WMT/CTF Stage 2:**		
Testing location/ address.....:		
Tested by (name + signature).....:		
Witnessed by (name + signature).....:		
Approved by (name + signature).....:		

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

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

1. Photos (1 page)
2. Unit datasheet (40 pages)
3. European Group difference and nation differences (20 pages)

Additional National differences according to IEC 60950-1 2 ed./Am1:

4. Korean differences (1 page)
5. Canadian differences (6 pages)
6. US differences (8 pages)
7. Germany differences (1 page)
8. Israel differences (4 pages)

Additional National differences according to IEC 60950-1 2 ed.:

9. Australian / New Zealand differences (8 pages)
10. China differences (6 pages)
11. Singapore differences (3 pages)

Additional National differences according to IEC 60950-1 1 ed.:

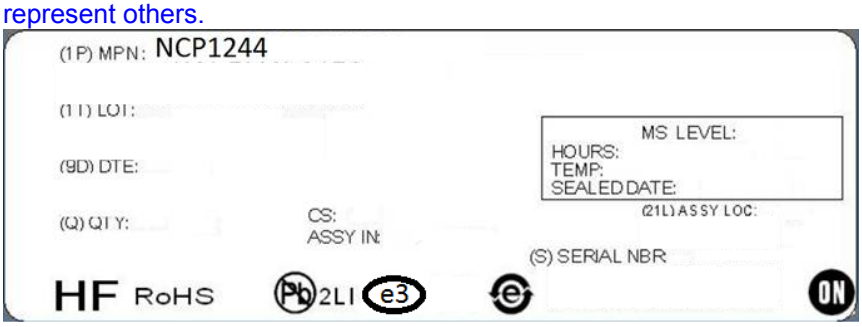
12. Japan differences (12 pages)

Summary of testing:	
Tests performed (name of test and test clause): 1.7 Marking and instructions 2.1 Protection from electric shock and energy hazards 2.9 Electrical insulation Test based on CTL decision sheet, DSH 1080 Operation condition: Normal Load: The IC was connected to 110% of rated input voltage based on CTL decision sheet, DSH 1080.	**Testing location:** See page 2
Radio and television interference suppression compliance with the EMC directive is necessary for achieving type certification. The appliance shall comply with the relevant EMC standards, depending on the equipment in question. In NO, compliance with standards for radio interference suppression is a part of Nemko's certification. In FI, DK and SE compliance is not necessary for achieving safety certification.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, has not been tested for EMC, the end product must be tested with this integrated circuit (IC) installed.
1.7, Power rating and identification markings	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.
1.7.2.1, Note 3 Language of safety markings/instructions.	Instructions and equipment marking related to safety is applied in the language that is acceptable in the country in which the equipment is to be sold.
Summary of compliance with National Differences The sample(s) tested compliance with the requirements of IEC 60950-1: 2005 (2nd Edition); Am1: 2009; Am2: 2013 and all CENELEC members as listed in EN 60950-1: 2006 +A11: 2009+A1: 2010+A12: 2011+ A2: 2013. At the time of issuing this test report, not all countries are listed for IEC 60950-1:2005 (2nd Edition); Am2: 2013. Therefore this test report includes national differences for IEC 60950-1: 2005 (2nd Edition), IEC 60950-1: 2005 (2nd Edition) + A1: 2010 and IEC 60950-1: 2001 1st Edition. All national differences listed in the IECEE Online CB Bulletin are covered by the Common Modifications, Special National Conditions, National Deviations, and the National Requirements noted above except for the countries which are documented in Attachment. National Differences attached to this test report: refer to List of attachments for details.	

Copy of marking plate:

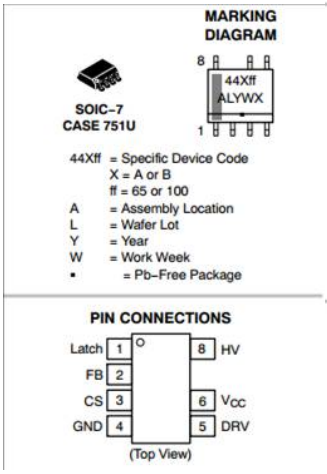
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

The following marking is located on IC carton that are the same except model name, list one model to represent others.

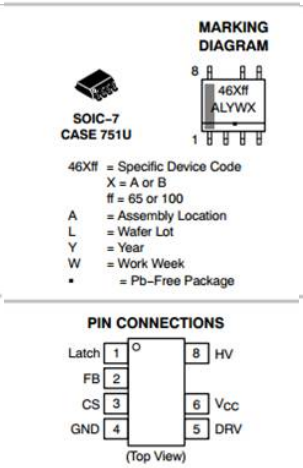


The following marking is located on IC body. Due to letter limited, only part code name located in the IC body, for example as below.

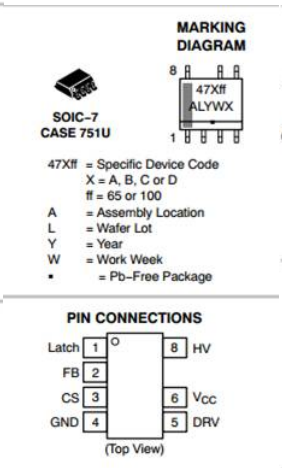
NCP1244:



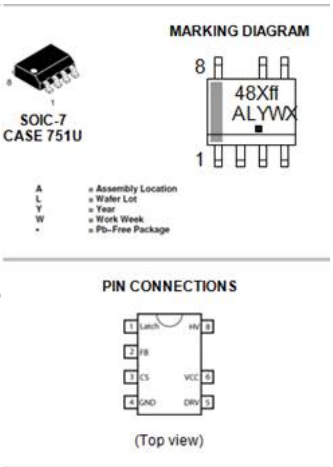
NCP1246:



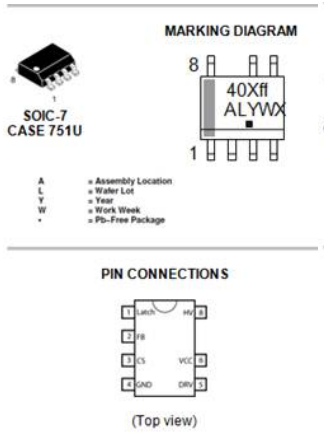
NCP1247:



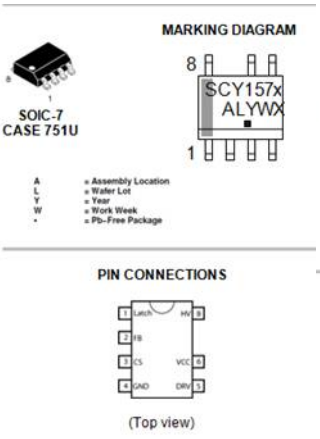
NCP1248:



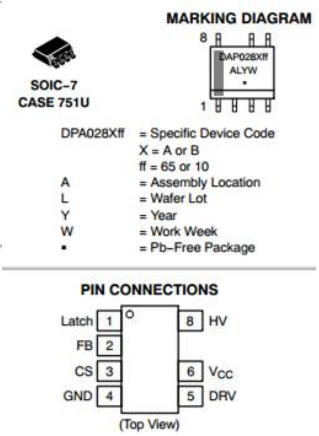
NCP1240:



SCY99157:



SCY99126:



Test item particulars.....:	
Equipment mobility.....:	[] movable [] hand-held [] transportable [] stationary [X] for building-in [] direct plug-in
Connection to the mains.....:	[] pluggable equipment [] type A [] type B [] permanent connection [] detachable power supply cord [] non-detachable power supply cord [] not directly connected to the mains [X] components for building in should be considered when installed in the end product
Operating condition.....:	[X] continuous [] rated operating / resting time:
Access location .....:	[] operator accessible [] restricted access location
Over voltage category (OVC) .....:	[] OVC I [X] OVC II [] OVC III [] OVC IV [] other:
Mains supply tolerance (%) or absolute mains supply values .....:	10% based on CTL decision sheet, DSH 1080
Tested for IT power systems .....:	[X] Yes [] No
IT testing, phase-phase voltage (V) .....:	
Class of equipment .....:	[] Class I [] Class II [] Class III [X] Not classified
Considered current rating of protective device as part of the building installation (A) .....:	
Pollution degree (PD) .....:	[] PD 1 [X] PD 2 [] PD 3
IP protection class .....:	IPX0
Altitude during operation (m) .....:	Up to 5000m
Altitude of test laboratory (m) .....:	Up to 2000m
Mass of equipment (kg) .....:	Weight: <10g Dimensions: max. 6.20 x 5.0 x 1.75mm

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 .....:	March, 2014
Date (s) of performance of tests.....:	March, 2014

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 5005 East McDowell Rd, Phoenix, AZ, 85008, U.S.A.	

General product information:

1. The subject equipment is an IC chips with SOIC-7 package, which handling discharge of capacitors in equipment to cope with environmental issues: (Limited power consumption in standby conditions)

2. All models are identical to each other except model name. All tests were conducted with model NCP1244, if nothing else mentioned.

3. The IC including capacitor discharge function (ICX) is required based on CTL decision sheet, DSH 1080 (IEC 60950-1:2005+A1:2009 & IEC 60065:2001+A1:2005+A2:2010) with following requirements and tested:

Requirements:
The ICX and it associated components critical to the discharge function of a capacitor to an accessible part (such as the mains capacitor) are not fault tested if the following condition is met:
The ICX with the associated circuitry as provided in the equipment complies with the tests below. Any impulse attenuating components (such as varistors and GDT's) that attenuate the impulse to the ICX and the associated circuitry are disconnected.

If discharge components external to the ICX are necessary, they shall not fail during the tests

Tests:

Where the ICX is tested by itself, the test set up shall be as recommended by the ICX manufacturer.
1. humidity treatment for 120 hrs at a temperature of (40±2, based on client request)°C and a relative humidity of (93±3)%.
2. 100 positive impulses and 100 negative impulses between line and neutral using a capacitor with the largest capacitance and a resistor with the smallest resistance specified by the manufacturer of the ICX; and repeated with a capacitor with the smallest capacitance and the resistor with the largest resistance. The time between any two impulses shall not be less than 1 s. The impulse shall be as specified in circuit 2 of Table N.1 (60950-1) / 1.2/50 μs with Uc equal to the transient voltage.
   - Application of an a.c. voltage that is 110 % of the rated voltage for 2.5 minutes.
3. 10 000 cycles of power on and off using a capacitor with the smallest capacitance and a resistor with the largest resistance as specified by the manufacturer of ICX. The power on and off cycles time shall not be less than 1 s.

(Note: All the IC's are using start-up current source with a dedicated control circuitry for discharging X cap and not using a resistor. So above test items 2 and 3 are not considered resistance.)

If any of the associated circuitry components other than those critical for the discharge function fails, it may be replaced with a new component.

Circuit characteristics: The equipment contains primary circuits.

Maximum recommended ambient (Tmra): -40 to 150°C

1.1.2 - Additional requirements:
Exposure to extreme temperatures, excessive dust, moisture or vibration; to flammable gases; to corrosive or explosive atmospheres:
This equipment is intended to operate in a "normal" environment (Offices and homes).
Electromedical equipment connected to the patient:
This equipment is not an electromedical equipment intended to be physically connected to a patient.
Equipment used in vehicles, ships or aircrafts, in tropical countries, or at elevations > 2000m:
This equipment is intended to be operated under altitude up to 5,000m, so the required clearance is multiplied by the altitude correction factor (1.48, linear interpolation used), specified in table A.2 of IEC 60664-1, 1992+A1: 2000

Abbreviations used in the report:

- normal conditions	**N.C.**	- single fault conditions	**S.F.C**
- functional insulation	**FI**	- basic insulation	**BI**
- double insulation	**DI**	- supplementary insulation	**SI**
- between parts of opposite polarity	**BOP**	- reinforced insulation	**RI**

Indicate used abbreviations (if any)

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict

1	**GENERAL**	**P**

1.5	**Components**		**P**
1.5.1	General	See below.	**P**
	Comply with IEC 60950-1 or relevant component standard	(see appended table 1.5.1)	**P**
1.5.2	Evaluation and testing of components	Certified components are used in accordance with their ratings, certifications and they comply with applicable parts of this standard. Components not certified are used in accordance with their ratings and they comply with applicable parts of IEC 60950-1 and the relevant component standard. Components, for which no relevant IEC-standard exists, have been tested under the conditions occurring in the equipment, using applicable parts of IEC 60950-1.	**P**
1.5.3	Thermal controls	No thermal controls.	**N/A**
1.5.4	Transformers	No isolating transformer in the equipment.	**N/A**
1.5.5	Interconnecting cables	No interconnecting cables.	**N/A**
1.5.6	Capacitors bridging insulation	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.5.7	Resistors bridging insulation	1.5.7.1 – 1.5.7.3:The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.5.7.1	Resistors bridging functional, basic or supplementary insulation		—
1.5.7.2	Resistors bridging double or reinforced insulation between a.c. mains and other circuits		—
1.5.7.3	Resistors bridging double or reinforced insulation between a.c. mains and antenna or coaxial cable		—

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.8	Components in equipment for IT power systems	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.5.9	Surge suppressors	1.5.9.1-1.5.9.5: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.5.9.1	General		—
1.5.9.2	Protection of VDRs		—
1.5.9.3	Bridging of functional insulation by a VDR		—
1.5.9.4	Bridging of basic insulation by a VDR		—
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR		—
1.6	**Power interface**		—
1.6.1	AC power distribution systems	1.6.1 – 1.6.4: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.6.2	Input current		—
1.6.3	Voltage limit of hand-held equipment		—
1.6.4	Neutral conductor		—
1.7	**Marking and instructions**		**P**
1.7.1	Power rating and identification markings	Refer to copy of marking plate.	**P**
1.7.1.1	Power rating marking	See below.	**P**
	Multiple mains supply connections.....:	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Rated voltage(s) or voltage range(s) (V) ..... :	The equipment is an integrated circuit (IC) without the marking of rated voltage, it must be considered in end of product.	—

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
	Symbol for nature of supply, for d.c. only ..... :	The equipment is for a.c. supply.	**N/A**
	Rated frequency or rated frequency range (Hz) ..... :	The equipment is an integrated circuit (IC) without the marking of rated frequency range, it must be considered in end of product.	—
	Rated current (mA or A) ..... :	The equipment is an integrated circuit (IC) without the marking of rated frequency range, it must be considered in end of product.	—
1.7.1.2	Identification markings	Refer to below:	**P**
	Manufacturer's name or trade-mark or identification mark ..... :	See page 2	—
	Model identification or type reference ..... :	See copy of marking plate for details.	—
	Symbol for Class II equipment only ..... :	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Other markings and symbols .....:	The additional marking does not give rise to misunderstandings.	**P**
1.7.1.3	Use of graphical symbols	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.7.2	Safety instructions and marking	1.7.2.1 – 1.7.2.6: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.7.2.1	General		—
1.7.2.2	Disconnect devices		—
1.7.2.3	Overcurrent protective device		—
1.7.2.4	IT power distribution systems		—

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.2.5	Operator access with a tool		—
1.7.2.6	Ozone		—
1.7.3	Short duty cycles	The equipment is intended for continuous operation.	N/A
1.7.4	Supply voltage adjustment .....:	No voltage selector.	N/A
	Methods and means of adjustment; reference to installation instructions .....:		—
1.7.5	Power outlets on the equipment .....:	No standard power outlet.	N/A
1.7.6	Fuse identification (marking, special fusing characteristics, cross-reference) .....:	No fuse.	N/A
1.7.7	Wiring terminals	No wiring.	N/A
1.7.7.1	Protective earthing and bonding terminals ....:		N/A
1.7.7.2	Terminals for a.c. mains supply conductors		N/A
1.7.7.3	Terminals for d.c. mains supply conductors	The equipment is not supplied from d.c mains.	N/A
1.7.8	Controls and indicators	Refer to below:	—
1.7.8.1	Identification, location and marking ....:	Refer below:	N/A
1.7.8.2	Colours ....:	No control.	N/A
1.7.8.3	Symbols according to IEC 60417.....:	No indicator.	N/A
1.7.8.4	Markings using figures .....:	There is no switch in the equipment.	N/A
1.7.9	Isolation of multiple power sources .....:	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.7.10	Thermostats and other regulating devices .....:	No thermostats or other regulating devices.	N/A
1.7.11	Durability	The marking withstands required tests.	P
1.7.12	Removable parts	No removable parts.	N/A
1.7.13	Replaceable batteries .....:	No battery in the equipment.	N/A
	Language(s) .....:		—
1.7.14	Equipment for restricted access locations.....:	Equipment not intended for installation in RAL.	N/A

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict

2	**PROTECTION FROM HAZARDS**		**P**
2.1	**Protection from electric shock and energy hazards**		**P**
2.1.1	Protection in operator access areas	Refer to below:	—
2.1.1.1	Access to energized parts	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Test by inspection .....:		—
	Test with test finger (Figure 2A) .....:		—
	Test with test pin (Figure 2B) .....:		—
	Test with test probe (Figure 2C) .....:		—
2.1.1.2	Battery compartments	No battery compartments in the equipment.	**N/A**
2.1.1.3	Access to ELV wiring	No wiring in the equipment.	**N/A**
	Working voltage (Vpeak or Vrms); minimum distance through insulation (mm)		—
2.1.1.4	Access to hazardous voltage circuit wiring	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.1.1.5	Energy hazards .....:	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.1.1.6	Manual controls	No shafts of knobs etc. at ELV or hazardous voltage.	**N/A**
2.1.1.7	Discharge of capacitors in equipment	The measurements were performed after treameant of humidity based on CTL decision sheet, DSH 1080 and following conditions.	**P**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
	Measured voltage (V); time-constant (s) .....:	- humidity treament for 120h at temperature of 42°C and a relative humidity of 95%, then - 100 positive impulses and 100 negative impulses between line and neutral with Uc=2500V using a capacitor with the largest capacitance (4.7µF) and a current source specified by the manufacturer of the ICX; and repeated with a capacitor with the smallest capacitance (0.001µF) and the current source, then - Application of an a.c. voltage 264V (110% of the rated voltage) for 2.5 minutes, then - 10000 cycles of power on and off using a capacitor with the smallest capacitance (0.001µF) and a current source as specified by the manufacturer of ICX. - Condition is: no load, and with following conditions: 1. Time constant were measured to: (measured 376 Vpeak, 37% Vpeak=139V, total capacitance = 4.7µF) For set 1: 254 ms ; For set 2: 236 ms; For set 3: 236 ms. 2. Time constant were measured to: (measured 374 Vpeak, 37% Vpeak=138V, total capacitance = 0.001µF) For set 1: 3.1 ms ; For set 2: 3.4 ms; For set 3: 4.4 ms.	—
2.1.1.8	Energy hazards – d.c. mains supply	Not connected to d.c. mains supply.	**N/A**
	a) Capacitor connected to the d.c. mains supply ..:		—
	b) Internal battery connected to the d.c. mains supply :		—
2.1.1.9	Audio amplifiers .....:	No audio amplifier.	**N/A**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
2.1.2	Protection in service access areas	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.1.3	Protection in restricted access locations	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.2	**SELV circuits**		—
2.2.1	General requirements	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.2.2	Voltages under normal conditions (V) ..... :		—
2.2.3	Voltages under fault conditions (V) ..... :		—
2.2.4	Connection of SELV circuits to other circuits .....:		—
2.3	**TNV circuits**		**N/A**
2.3.1	Limits	2.3.1-2.3.5: No TNV circuits.	**N/A**
	Type of TNV circuits ..... :		—
2.3.2	Separation from other circuits and from accessible parts		**N/A**
2.3.2.1	General requirements		**N/A**
2.3.2.2	Protection by basic insulation		**N/A**
2.3.2.3	Protection by earthing		**N/A**
2.3.2.4	Protection by other constructions ..... :		**N/A**
2.3.3	Separation from hazardous voltages		**N/A**
	Insulation employed..... :		—
2.3.4	Connection of TNV circuits to other circuits		**N/A**
	Insulation employed..... :		—
2.3.5	Test for operating voltages generated externally		**N/A**
2.4	**Limited current circuits**		**N/A**
2.4.1	General requirements	2.4.1-2.4.3: No limited current circuits	**N/A**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
2.4.2	Limit values		**N/A**
	Frequency (Hz).....:		—
	Measured current (mA).....:		—
	Measured voltage (V) .....:		—
	Measured circuit capacitance (nF or µF).....:		—
2.4.3	Connection of limited current circuits to other circuits		**N/A**
2.5	**Limited power sources**		**N/A**
	a) Inherently limited output	No limited power sources.	**N/A**
	b) Impedance limited output		**N/A**
	c) Regulating network or IC current limiter, limits output under normal operating and single fault condition		**N/A**
	Use of integrated circuit (IC) current limiters		**N/A**
	d) Overcurrent protective device limited output		**N/A**
	Max. output voltage (V), max. output current (A), max. apparent power (VA)..... :		—
	Current rating of overcurrent protective device (A) .:		—
2.6	**Provisions for earthing and bonding**		**N/A**
2.6.1	Protective earthing	2.6.1 – 2.6.5.8: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, not connected to the ground.	**N/A**
2.6.2	Functional earthing		**N/A**
	Use of symbol for functional earthing .....:		**N/A**
2.6.3	Protective earthing and protective bonding conductors		**N/A**
2.6.3.1	General		**N/A**
2.6.3.2	Size of protective earthing conductors		**N/A**
	Rated current (A), cross-sectional area (mm^2), AWG ..... :		—
2.6.3.3	Size of protective bonding conductors		**N/A**
	Rated current (A), cross-sectional area (mm^2), AWG ..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Protective current rating (A), cross-sectional area (mm^2), AWG ..... :		—
2.6.3.4	Resistance of earthing conductors and their terminations; resistance (Ω), voltage drop (V), test current (A), duration (min) ..... :		N/A
2.6.3.5	Colour of insulation..... :		N/A
2.6.4	Terminals		N/A
2.6.4.1	General		N/A
2.6.4.2	Protective earthing and bonding terminals		N/A
	Rated current (A), type, nominal thread diameter (mm) ..... :		—
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N/A
2.6.5	Integrity of protective earthing		N/A
2.6.5.1	Interconnection of equipment		N/A
2.6.5.2	Components in protective earthing conductors and protective bonding conductors		N/A
2.6.5.3	Disconnection of protective earth		N/A
2.6.5.4	Parts that can be removed by an operator		N/A
2.6.5.5	Parts removed during servicing		N/A
2.6.5.6	Corrosion resistance		N/A
2.6.5.7	Screws for protective bonding		N/A
2.6.5.8	Reliance on telecommunication network or cable distribution system		N/A
2.7	**Overcurrent and earth fault protection in primary circuits**		—
2.7.1	Basic requirements	2.7.1 – 2.7.6: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Instructions when protection relies on building installation		—
2.7.2	Faults not simulated in 5.3.7		—
2.7.3	Short-circuit backup protection		—
2.7.4	Number and location of protective devices ..... :		—
2.7.5	Protection by several devices		—
2.7.6	Warning to service personnel..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict

2.8	**Safety interlocks**		**N/A**
2.8.1	General principles	No safety interlock provided.	**N/A**
2.8.2	Protection requirements		**N/A**
2.8.3	Inadvertent reactivation		**N/A**
2.8.4	Fail-safe operation		**N/A**
	Protection against extreme hazard		**N/A**
2.8.5	Moving parts		**N/A**
2.8.6	Overriding		**N/A**
2.8.7	Switches, relays and their related circuits		**N/A**
2.8.7.1	Separation distances for contact gaps and their related circuits (mm) .....:		**N/A**
2.8.7.2	Overload test		**N/A**
2.8.7.3	Endurance test		**N/A**
2.8.7.4	Electric strength test		**N/A**
2.8.8	Mechanical actuators		**N/A**

2.9	**Electrical insulation**		**P**
2.9.1	Properties of insulating materials	Neither natural rubber, materials containing asbestos nor hygroscopic materials are used as insulation. No driving belts or couplings used.	**N/A**
2.9.2	Humidity conditioning	Humidity treatment performed for 120hrs.	**P**
	Relative humidity (%), temperature (°C) ..... :	95%, 42°C.	—
2.9.3	Grade of insulation	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.9.4	Separation from hazardous voltages	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Method(s) used ..... :		—

2.10	**Clearances, creepage distances and distances through insulation**	—

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Clause	Requirement + Test	Result - Remark	Verdict
2.10.1	General	2.10.1 – 2.10.12: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, only across the functional insulation, must be considered when installed in the end product.	—
2.10.1.1	Frequency .....:		—
2.10.1.2	Pollution degrees .....:		—
2.10.1.3	Reduced values for functional insulation		—
2.10.1.4	Intervening unconnected conductive parts		—
2.10.1.5	Insulation with varying dimensions		—
2.10.1.6	Special separation requirements		—
2.10.1.7	Insulation in circuits generating starting pulses		—
2.10.2	Determination of working voltage		—
2.10.2.1	General		—
2.10.2.2	RMS working voltage		—
2.10.2.3	Peak working voltage		—
2.10.3	Clearances		—
2.10.3.1	General		—
2.10.3.2	Mains transient voltages		—
	a) AC mains supply .....:		—
	b) Earthed d.c. mains supplies .....:		—
	c) Unearthed d.c. mains supplies .....:		—
	d) Battery operation .....:		—
2.10.3.3	Clearances in primary circuits		—
2.10.3.4	Clearances in secondary circuits		—
2.10.3.5	Clearances in circuits having starting pulses		—
2.10.3.6	Transients from a.c. mains supply .....:		—
2.10.3.7	Transients from d.c. mains supply .....:		—
2.10.3.8	Transients from telecommunication networks and cable distribution systems .....:		—
2.10.3.9	Measurement of transient voltage levels		—
	a) Transients from a mains supply		—
	For an a.c. mains supply .....:		—
	For a d.c. mains supply .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Transients from a telecommunication network :		—
2.10.4	Creepage distances		—
2.10.4.1	General		—
2.10.4.2	Material group and comparative tracking index		—
	CTI tests .....:		—
2.10.4.3	Minimum creepage distances		—
2.10.5	Solid insulation		—
2.10.5.1	General		—
2.10.5.2	Distances through insulation		—
2.10.5.3	Insulating compound as solid insulation		—
2.10.5.4	Semiconductor devices		—
2.10.5.5.	Cemented joints		—
2.10.5.6	Thin sheet material – General		—
2.10.5.7	Separable thin sheet material		—
	Number of layers (pcs) .....:		—
2.10.5.8	Non-separable thin sheet material		—
2.10.5.9	Thin sheet material – standard test procedure		—
	Electric strength test		—
2.10.5.10	Thin sheet material – alternative test procedure		—
	Electric strength test		—
2.10.5.11	Insulation in wound components		—
2.10.5.12	Wire in wound components		—
	Working voltage .....:		—
	a) Basic insulation not under stress .....:		—
	b) Basic, supplementary, reinforced insulation .....:		—
	c) Compliance with Annex U .....:		—
	Two wires in contact inside wound component; angle between 45° and 90° .....:		—
2.10.5.13	Wire with solvent-based enamel in wound components		—
	Electric strength test		—
	Routine test		—
2.10.5.14	Additional insulation in wound components		—
	Working voltage .....:		—
	- Basic insulation not under stress .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	- Supplementary, reinforced insulation .....:		—
2.10.6	Construction of printed boards		—
2.10.6.1	Uncoated printed boards		—
2.10.6.2	Coated printed boards		—
2.10.6.3	Insulation between conductors on the same inner surface of a printed board		—
2.10.6.4	Insulation between conductors on different layers of a printed board		—
	Distance through insulation		—
	Number of insulation layers (pcs).....:		—
2.10.7	Component external terminations		—
2.10.8	Tests on coated printed boards and coated components		—
2.10.8.1	Sample preparation and preliminary inspection		—
2.10.8.2	Thermal conditioning		—
2.10.8.3	Electric strength test		—
2.10.8.4	Abrasion resistance test		—
2.10.9	Thermal cycling		—
2.10.10	Test for Pollution Degree 1 environment and insulating compound		—
2.10.11	Tests for semiconductor devices and cemented joints		—
2.10.12	Enclosed and sealed parts		—

3	**WIRING, CONNECTIONS AND SUPPLY**		**N/A**
3.1	**General**		**N/A**
3.1.1	Current rating and overcurrent protection	3.1.1 – 3.1.10: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, no wiring.	**N/A**
3.1.2	Protection against mechanical damage		**N/A**
3.1.3	Securing of internal wiring		**N/A**
3.1.4	Insulation of conductors		**N/A**
3.1.5	Beads and ceramic insulators		**N/A**
3.1.6	Screws for electrical contact pressure		**N/A**
3.1.7	Insulating materials in electrical connections		**N/A**
3.1.8	Self-tapping and spaced thread screws		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
3.1.9	Termination of conductors		**N/A**
	10 N pull test		**N/A**
3.1.10	Sleeving on wiring		**N/A**
3.2	**Connection to a mains supply**		**—**
3.2.1	Means of connection	3.2.1-3.2.9: The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**—**
3.2.1.1	Connection to an a.c. mains supply		**—**
3.2.1.2	Connection to a d.c. mains supply		**—**
3.2.2	Multiple supply connections		**—**
3.2.3	Permanently connected equipment		**—**
	Number of conductors, diameter of cable and conduits (mm) .....:		**—**
3.2.4	Appliance inlets		**—**
3.2.5	Power supply cords		**—**
3.2.5.1	AC power supply cords		**—**
	Type .....:		**—**
	Rated current (A), cross-sectional area (mm^2), AWG .....:		**—**
3.2.5.2	DC power supply cords		**—**
3.2.6	Cord anchorages and strain relief		**—**
	Mass of equipment (kg), pull (N) .....:		**—**
	Longitudinal displacement (mm) .....:		**—**
3.2.7	Protection against mechanical damage		**—**
3.2.8	Cord guards		**—**
	Diameter or minor dimension D (mm); test mass (g) .....:		**—**
	Radius of curvature of cord (mm).....:		**—**
3.2.9	Supply wiring space		**—**
3.3	**Wiring terminals for connection of external conductors**		**—**

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Clause	Requirement + Test	Result - Remark	Verdict
3.3.1	Wiring terminals	3.3.1 – 3.3.8; The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
3.3.2	Connection of non-detachable power supply cords		—
3.3.3	Screw terminals		—
3.3.4	Conductor sizes to be connected		—
	Rated current (A), cord/cable type, cross-sectional area (mm^2).....:		—
3.3.5	Wiring terminal sizes		—
	Rated current (A), type, nominal thread diameter (mm) .....:		—
3.3.6	Wiring terminal design		—
3.3.7	Grouping of wiring terminals		—
3.3.8	Stranded wire		—
3.4	**Disconnection from the mains supply**		—
3.4.1	General requirement	3.4.1 – 3.4.11 The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
3.4.2	Disconnect devices		—
3.4.3	Permanently connected equipment		—
3.4.4	Parts which remain energized		—
3.4.5	Switches in flexible cords		—
3.4.6	Number of poles - single-phase and d.c. equipment		—
3.4.7	Number of poles - three-phase equipment		—
3.4.8	Switches as disconnect devices		—
3.4.9	Plugs as disconnect devices		—
3.4.10	Interconnected equipment		—
3.4.11	Multiple power sources		—
3.5	**Interconnection of equipment**		—

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Clause	Requirement + Test	Result - Remark	Verdict
3.5.1	General requirements	3.5.1 - 3.5.4 The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
3.5.2	Types of interconnection circuits .....:		—
3.5.3	ELV circuits as interconnection circuits		—
3.5.4	Data ports for additional equipment		—
4	**PHYSICAL REQUIREMENTS**		**P**
4.1	**Stability**		—
	Angle of 10°	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Test force (N) .....:		—
4.2	**Mechanical strength**		—
4.2.1	General	4.2.1 – 4.2.10 The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Rack-mounted equipment.		—
4.2.2	Steady force test, 10 N		—
4.2.3	Steady force test, 30 N		—
4.2.4	Steady force test, 250 N		—
4.2.5	Impact test		—
	Fall test		—
	Swing test		—
4.2.6	Drop test; height (mm) .....:		—
4.2.7	Stress relief test		—
4.2.8	Cathode ray tubes		—
	Picture tube separately certified .....:		—
4.2.9	High pressure lamps		—

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Clause	Requirement + Test	Result - Remark	Verdict
4.2.10	Wall or ceiling mounted equipment; force (N) .....:		—
4.3	**Design and construction**		**P**
4.3.1	Edges and corners	All edges and corners are rounded an The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.3.2	Handles and manual controls; force (N)..... :	No Handles and manual controls.	**N/A**
4.3.3	Adjustable controls	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.3.4	Securing of parts	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.3.5	Connection by plugs and sockets	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.3.6	Direct plug-in equipment	Not intended to plug directly into a wall socket-outlet.	**N/A**
	Torque .....:		—
	Compliance with the relevant mains plug standard .....:		—
4.3.7	Heating elements in earthed equipment	No heating elements provided.	**N/A**
4.3.8	Batteries	No batteries in the equipment.	**N/A**
	- Overcharging of a rechargeable battery		—
	- Unintentional charging of a non-rechargeable battery		—
	- Reverse charging of a rechargeable battery		—
	- Excessive discharging rate for any battery		—
4.3.9	Oil and grease	Insulation is not exposed to oil, grease etc.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.10	Dust, powders, liquids and gases	No duct, powers, liquids and gases.	**N/A**
4.3.11	Containers for liquids or gases	No containers for liquids or gases in the equipment.	**N/A**
4.3.12	Flammable liquids .....:	The equipment does not contain flammable liquid.	**N/A**
	Quantity of liquid (l) .....:		—
	Flash point (°C) .....:		—
4.3.13	Radiation	Refer to below:	**N/A**
4.3.13.1	General	Refer to below:	—
4.3.13.2	Ionizing radiation	The equipment does not generate ionizing radiation.	**N/A**
	Measured radiation (pA/kg) .....:		—
	Measured high-voltage (kV) .....:		—
	Measured focus voltage (kV) .....:		—
	CRT markings .....:		—
4.3.13.3	Effect of ultraviolet (UV) radiation on materials	The equipment does not produce significant UV radiation.	**N/A**
	Part, property, retention after test, flammability classification .....:		—
4.3.13.4	Human exposure to ultraviolet (UV) radiation .....:	The equipment does not produce significant UV radiation.	**N/A**
4.3.13.5	Lasers (including laser diodes) and LEDs	No lasers and LEDs..	**N/A**
4.3.13.5.1	Lasers (including laser diodes)		—
	Laser class .....:		—
4.3.13.5.2	Light emitting diodes (LEDs)		—
4.3.13.6	Other types .....:	The equipment does not generate other types of radiation.	**N/A**

4.4	**Protection against hazardous moving parts**		**N/A**
4.4.1	General	Cl. 4.4.1 – 4.4.5.3, no moving parts.	**N/A**
4.4.2	Protection in operator access areas ..... :		**N/A**
	Household and home/office document/media shredders		**N/A**
4.4.3	Protection in restricted access locations ..... :		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.4	Protection in service access areas		**N/A**
4.4.5	Protection against moving fan blades		**N/A**
4.4.5.1	General		**N/A**
	Not considered to cause pain or injury. a)……:		**N/A**
	Is considered to cause pain, not injury. b) ……..:		**N/A**
	Considered to cause injury. c) ……:		**N/A**
4.4.5.2	Protection for users		**N/A**
	Use of symbol or warning ……..:		**N/A**
4.4.5.3	Protection for service persons		**N/A**
	Use of symbol or warning ……..:		**N/A**
4.5	**Thermal requirements**		**N/A**
4.5.1	General	4.5.1-4.5.5 The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.5.2	Temperature tests		—
	Normal load condition per Annex L ..... :		—
4.5.3	Temperature limits for materials		—
4.5.4	Touch temperature limits		—
4.5.5	Resistance to abnormal heat ..... :		—
4.6	**Openings in enclosures**		—
4.6.1	Top and side openings	4.6.1 - 4.6.5 The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Dimensions (mm) ..... :		—
4.6.2	Bottoms of fire enclosures		—
	Construction of the bottomm, dimensions (mm) .. :		—
4.6.3	Doors or covers in fire enclosures		—
4.6.4	Openings in transportable equipment		—
4.6.4.1	Constructional design measures		—
	Dimensions (mm) ..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
4.6.4.2	Evaluation measures for larger openings		—
4.6.4.3	Use of metallized parts		—
4.6.5	Adhesives for constructional purposes		—
	Conditioning temperature (°C), time (weeks) ..... :		—
4.7	**Resistance to fire**		**P**
4.7.1	Reducing the risk of ignition and spread of flame	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Method 1, selection and application of components wiring and materials		—
	Method 2, application of all of simulated fault condition tests		—
4.7.2	Conditions for a fire enclosure	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.7.2.1	Parts requiring a fire enclosure		—
4.7.2.2	Parts not requiring a fire enclosure		—
4.7.3	Materials		**P**
4.7.3.1	General	Integrated circuit (IC body) material is flame class V-0.	**P**
4.7.3.2	Materials for fire enclosures	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.7.3.3	Materials for components and other parts outside fire enclosures	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.7.3.4	Materials for components and other parts inside fire enclosures	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product. However, the Integrated circuit material is flame class V-0.	**N/A**
4.7.3.5	Materials for air filter assemblies	No air filters in the equipment.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
4.7.3.6	Materials used in high-voltage components	No parts exceeding 4kV.	**N/A**
5	**ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS**		—
5.1	**Touch current and protective conductor current**		—
5.1.1	General	5.1.1 – 5.1.8 The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
5.1.2	Configuration of equipment under test (EUT)		—
5.1.2.1	Single connection to an a.c. mains supply		—
5.1.2.2	Redundant multiple connections to an a.c. mains supply		—
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply		—
5.1.3	Test circuit		—
5.1.4	Application of measuring instrument		—
5.1.5	Test procedure		—
5.1.6	Test measurements		—
	Supply voltage (V) .....:		—
	Measured touch current (mA) .....:		—
	Max. allowed touch current (mA) .....:		—
	Measured protective conductor current (mA) .....:		—
	Max. allowed protective conductor current (mA)...:		—
5.1.7	Equipment with touch current exceeding 3,5 mA		—
5.1.7.1	General .....:		—
5.1.7.2	Simultaneous multiple connections to the supply		—
5.1.8	Touch currents to telecommunication networks and cable distribution systems and from telecommunication networks		—
5.1.8.1	Limitation of the touch current to a telecommunication network or to a cable distribution system		—
	Supply voltage (V) .....:		—
	Measured touch current (mA) .....:		—
	Max. allowed touch current (mA) .....:		—
5.1.8.2	Summation of touch currents from telecommunication networks		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) EUT with earthed telecommunication ports .....:		—
	b) EUT whose telecommunication ports have no reference to protective earth		—
5.2	**Electric strength**		—
5.2.1	General	5.2.1 – 5.2.2 The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
5.2.2	Test procedure		—
5.3	**Abnormal operating and fault conditions**		**N/A**
5.3.1	Protection against overload and abnormal operation	Based on CTL decision sheet, DSH1080, if the ICX was following the test listed in General Product Information then no fault tests necessary.	**N/A**
5.3.2	Motors	Not motors	**N/A**
5.3.3	Transformers	No isolating transformer in the equipment.	**N/A**
5.3.4	Functional insulation.....:	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
5.3.5	Electromechanical components	No electromechanical components in secondary circuits.	**N/A**
5.3.6	Audio amplifiers in ITE .....:	No audio amplifiers inside equipment.	**N/A**
5.3.7	Simulation of faults	No test required.	**N/A**
5.3.8	Unattended equipment	No thermostats, temperature limiters or thermal cut-outs.	**N/A**
5.3.9	Compliance criteria for abnormal operating and fault conditions	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
5.3.9.1	During the tests		**N/A**
5.3.9.2	After the tests		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
6	**CONNECTION TO TELECOMMUNICATION NETWORKS**		**N/A**
6.1	**Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment**		**N/A**
6.1.1	Protection from hazardous voltages		**N/A**
6.1.2	Separation of the telecommunication network from earth		**N/A**
6.1.2.1	Requirements	No TNV circuits.	**N/A**
	Supply voltage (V) .....:		—
	Current in the test circuit (mA) .....:		—
6.1.2.2	Exclusions .....:	No TNV circuits.	**N/A**
6.2	**Protection of equipment users from overvoltages on telecommunication networks**		**N/A**
6.2.1	Separation requirements	6.2.1-6.2.2.3: No TNV circuits.	**N/A**
6.2.2	Electric strength test procedure		**N/A**
6.2.2.1	Impulse test		**N/A**
6.2.2.2	Steady-state test		**N/A**
6.2.2.3	Compliance criteria		**N/A**
6.3	**Protection of the telecommunication wiring system from overheating**		**N/A**
	Max. output current (A) .....:	No TNV circuits.	—
	Current limiting method .....:		—
7	**CONNECTION TO CABLE DISTRIBUTION SYSTEMS**		**N/A**
7.1	**General**	7.1-7.4.3: Not connected to cable distribution systems.	**N/A**
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		**N/A**
7.3	Protection of equipment users from overvoltages on the cable distribution system		**N/A**
7.4	Insulation between primary circuits and cable distribution systems		**N/A**
7.4.1	General		**N/A**
7.4.2	Voltage surge test		**N/A**
7.4.3	Impulse test		**N/A**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict

A	**ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE**		**N/A**
A.1	**Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)**	Refer b The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
A.1.1	Samples.....:		—
	Wall thickness (mm).....:		—
A.1.2	Conditioning of samples; temperature (°C) .....:		—
A.1.3	Mounting of samples .....:		—
A.1.4	Test flame (see IEC 60695-11-3)		—
	Flame A, B, C or D .....:		—
A.1.5	Test procedure		—
A.1.6	Compliance criteria		—
	Sample 1 burning time (s).....:		—
	Sample 2 burning time (s).....:		—
	Sample 3 burning time (s).....:		—
A.2	**Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)**		**N/A**
A.2.1	Samples, material.....:	Refer b The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
	Wall thickness (mm).....:		—
A.2.2	Conditioning of samples; temperature (°C) .....:		**N/A**
A.2.3	Mounting of samples .....:		**N/A**
A.2.4	Test flame (see IEC 60695-11-4)		**N/A**
	Flame A, B or C .....:		—
A.2.5	Test procedure		**N/A**
A.2.6	Compliance criteria		**N/A**
	Sample 1 burning time (s).....:		—
	Sample 2 burning time (s).....:		—
	Sample 3 burning time (s).....:		—

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
A.2.7	Alternative test acc. to IEC 60695-11-5, cl. 5 and 9		**N/A**
	Sample 1 burning time (s) .....:		—
	Sample 2 burning time (s) .....:		—
	Sample 3 burning time (s) .....:		—
A.3	**Hot flaming oil test (see 4.6.2)**		**N/A**
A.3.1	Mounting of samples		**N/A**
A.3.2	Test procedure		**N/A**
A.3.3	Compliance criterion		**N/A**
B	**ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)**		**N/A**
B.1	**General requirements**	No motors in equipment.	**N/A**
	Position .....:		—
	Manufacturer .....:		—
	Type .....:		—
	Rated values .....:		—
B.2	**Test conditions**		**N/A**
B.3	**Maximum temperatures**		**N/A**
B.4	**Running overload test**		**N/A**
B.5	**Locked-rotor overload test**		**N/A**
	Test duration (days) .....:		—
	Electric strength test: test voltage (V) .....:		—
B.6	**Running overload test for d.c. motors in secondary circuits**		**N/A**
B.6.1	General		**N/A**
B.6.2	Test procedure		**N/A**
B.6.3	Alternative test procedure		**N/A**
B.6.4	Electric strength test; test voltage (V) .....:		**N/A**
B.7	**Locked-rotor overload test for d.c. motors in secondary circuits**		**N/A**
B.7.1	General		**N/A**
B.7.2	Test procedure		**N/A**
B.7.3	Alternative test procedure		**N/A**
B.7.4	Electric strength test; test voltage (V) .....:		**N/A**
B.8	**Test for motors with capacitors**		**N/A**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
B.9	**Test for three-phase motors**		**N/A**
B.10	**Test for series motors**		**N/A**
	Operating voltage (V) .....:		—
C	**ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)**		**N/A**
	Position .....:	No isolating transformer in the equipment.	—
	Manufacturer .....:		—
	Type .....:		—
	Rated values .....:		—
	Method of protection..... :		—
C.1	**Overload test**		**N/A**
C.2	**Insulation**		**N/A**
	Protection from displacement of windings..... :		**N/A**
D	**ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS (see 5.1.4)**		**N/A**
D.1	**Measuring instrument**		**N/A**
D.2	**Alternative measuring instrument**		**N/A**
E	**ANNEX E, TEMPERATURE RISE OF A WINDING (see 1.4.13)**		**N/A**
F	**ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10 and Annex G)**		**N/A**
G	**ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES**		**N/A**
G.1	**Clearances**		**N/A**
G.1.1	General		**N/A**
G.1.2	Summary of the procedure for determining minimum clearances		**N/A**
G.2	**Determination of mains transient voltage (V)**		**N/A**
G.2.1	AC mains supply .....:		**N/A**
G.2.2	Earthed d.c. mains supplies .....:		**N/A**
G.2.3	Unearthed d.c. mains supplies .....:		**N/A**
G.2.4	Battery operation .....:		**N/A**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
G.3	**Determination of telecommunication network transient voltage (V) ..... :**		**N/A**
G.4	**Determination of required withstand voltage (V)**		**N/A**
G.4.1	Mains transients and internal repetitive peaks .....:		**N/A**
G.4.2	Transients from telecommunication networks .....:		**N/A**
G.4.3	Combination of transients		**N/A**
G.4.4	Transients from cable distribution systems		**N/A**
G.5	**Measurement of transient voltages (V)**		**N/A**
	a) Transients from a mains supply		**N/A**
	For an a.c. mains supply		**N/A**
	For a d.c. mains supply		**N/A**
	b) Transients from a telecommunication network		**N/A**
G.6	**Determination of minimum clearances ..... :**		**N/A**

H	**ANNEX H, IONIZING RADIATION (see 4.3.13)**	**N/A**

J	**ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)**		**N/A**
	Metal(s) used .....:		—

K	**ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.8)**		**N/A**
K.1	Making and breaking capacity		**N/A**
K.2	Thermostat reliability; operating voltage (V) .....:		**N/A**
K.3	Thermostat endurance test; operating voltage (V) .....:		**N/A**
K.4	Temperature limiter endurance; operating voltage (V) .....:		**N/A**
K.5	Thermal cut-out reliability		**N/A**
K.6	Stability of operation		**N/A**

L	**ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.2)**		**N/A**
L.1	Typewriters		**N/A**
L.2	Adding machines and cash registers		**N/A**
L.3	Erasers		**N/A**
L.4	Pencil sharpeners		**N/A**
L.5	Duplicators and copy machines		**N/A**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
L.6	Motor-operated files		N/A
L.7	Other business equipment		N/A
M	**ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1)**		N/A
M.1	Introduction		N/A
M.2	Method A		N/A
M.3	Method B		N/A
M.3.1	Ringing signal		N/A
M.3.1.1	Frequency (Hz) .....:		—
M.3.1.2	Voltage (V) .....:		—
M.3.1.3	Cadence; time (s), voltage (V) .....:		—
M.3.1.4	Single fault current (mA) .....:		—
M.3.2	Tripping device and monitoring voltage .....:		N/A
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
M.3.2.2	Tripping device		N/A
M.3.2.3	Monitoring voltage (V) .....:		N/A
N	**ANNEX N, IMPULSE TEST GENERATORS (see 1.5.7.2, 1.5.7.3, 2.10.3.9, 6.2.2.1, 7.3.2, 7.4.3 and Clause G.5)**		N/A
N.1	ITU-T impulse test generators		N/A
N.2	IEC 60065 impulse test generator		N/A
P	**ANNEX P, NORMATIVE REFERENCES**		—
Q	**ANNEX Q, Voltage dependent resistors (VDRs) (see 1.5.9.1)**		N/A
	- Preferred climatic categories .....:		N/A
	- Maximum continuous voltage .....:		N/A
	- Combination pulse current .....:		N/A
	Body of the VDR Test according to IEC60695-11-5.....:		N/A
	Body of the VDR. Flammability class of material (min V-1).....:		N/A

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict

R	**ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES**		**N/A**
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6.2)		**N/A**
R.2	Reduced clearances (see 2.10.3)		**N/A**

S	**ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)**		**N/A**
S.1	Test equipment		**N/A**
S.2	Test procedure		**N/A**
S.3	Examples of waveforms during impulse testing		**N/A**

T	**ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)**		**N/A**
		See separate test report	—

U	**ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.12)**		**N/A**
		See separate test report	—

V	**ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)**		**N/A**
V.1	Introduction		**N/A**
V.2	TN power distribution systems		**N/A**

W	**ANNEX W, SUMMATION OF TOUCH CURRENTS**		**N/A**
W.1	Touch current from electronic circuits		**N/A**
W.1.1	Floating circuits		**N/A**
W.1.2	Earthed circuits		**N/A**
W.2	Interconnection of several equipments		**N/A**
W.2.1	Isolation		**N/A**
W.2.2	Common return, isolated from earth		**N/A**
W.2.3	Common return, connected to protective earth		**N/A**

X	**ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS (see clause C.1)**	**N/A**

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
X.1	Determination of maximum input current		N/A
X.2	Overload test procedure		N/A
Y	**ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)**		**N/A**
Y.1	Test apparatus .....:		N/A
Y.2	Mounting of test samples .....:		N/A
Y.3	Carbon-arc light-exposure apparatus .....:		N/A
Y.4	Xenon-arc light exposure apparatus .....:		N/A
Z	**ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)**		**N/A**
AA	**ANNEX AA, MANDREL TEST (see 2.10.5.8)**		**N/A**
BB	**ANNEX BB, CHANGES IN THE SECOND EDITION**		—
CC	**ANNEX CC, Evaluation of integrated circuit (IC) current limiters**		**N/A**
CC.1	General		N/A
CC.2	Test program 1.....:		N/A
CC.3	Test program 2.....:		N/A
CC.4	Test program 3.....:		N/A
CC.5	Compliance.....:		N/A
DD	**ANNEX DD, Requirements for the mounting means of rack-mounted equipment**		**N/A**
DD.1	General		N/A
DD.2	Mechanical strength test, variable N.....:		N/A
DD.3	Mechanical strength test, 250N, including end stops.....:		N/A
DD.4	Compliance.....:		N/A
EE	**ANNEX EE, Household and home/office document/media shredders**		**N/A**
EE.1	General		N/A
EE.2	Markings and instructions		N/A

IEC 60950-1/Am2			
Clause	Requirement + Test	Result - Remark	Verdict
	Use of markings or symbols……:		**N/A**
	Information of user instructions, maintenance and/or servicing instructions……:		**N/A**
EE.3	Inadvertent reactivation test……:		**N/A**
EE.4	Disconnection of power to hazardous moving parts:		**N/A**
	Use of markings or symbols……:		**N/A**
EE.5	Protection against hazardous moving parts		**N/A**
	Test with test finger (Figure 2A) ……:		**N/A**
	Test with wedge probe (Figure EE1 and EE2) ……:		**N/A**

1.5.1	TABLE: List of critical components	P

Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity[1])
Integrated circuit housing	Interchangeable	Inter-changeable	Flame class V-0	UL 94	UL
X capacitors ***1)***	Interchangeable	Inter-changeable	Total capacitance: < 0.001µF – 4.7µF X2 type.	IEC/EN 60384-14 2 ed., incl. 21 days damp heat test, UL 1414	Verified by Nemko, UL
Diodes ***1)***	Interchangeable	Inter-changeable	--	--	Tested in the equipment
Bridge diode ***1)***	Interchangeable	Inter-changeable	--	--	Tested in the equipment
VCC CAP ***1)***	Interchangeable	Inter-changeable	--	--	Tested in the equipment

Supplementary information:
[1)] **Provided evidence ensures the agreed level of compliance. See OD-2039**.
1) These components are not provided with the ICX but should be evaluated after installed in the end product.

1.5.1	TABLE: Opto Electronic Devices	N/A

Manufacturer ..... :
Type..... :
Separately tested..... :
Bridging insulation ..... :
External creepage distance..... :

Internal creepage distance ..... :

Distance through insulation ..... :

Tested under the following conditions ..... :

Input..... :
Output..... :

supplementary information

1.6.2	TABLE: Electrical data (in normal conditions)					—
U (V)	I (A)	Irated (A)	P (W)	Fuse #	Ifuse (A)	Condition/status
Supplementary information:						

2.1.1.5 c) 1)	TABLE: max. V, A, VA test			—
Voltage (rated) (V)	Current (rated) (A)	Voltage (max.) (V)	Current (max.) (A)	VA (max.) (VA)
Supplementary information:				

2.1.1.5 c) 2)	TABLE: stored energy	—
Capacitance C (µF)	Voltage U (V)	Energy E (J)
Supplementary information:		

2.2	TABLE: evaluation of voltage limiting components in SELV circuits	—
Component (measured between)	max. voltage (V) (normal operation)	Voltage Limiting Components
	V peak / V d.c.	
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)	
supplementary information:		

2.5	TABLE: Limited power sources	N/A

Component	Uoc (V)	Isc (A)		VA	
		Meas.	Limit	Meas.	Limit
Supplementary information:					

2.10.2	Table: working voltage measurement	—

Location		Peak voltage (V)	RMS voltage (V)	Comments
From	To	--	--	

Supplementary information:

2.10.3 and 2.10.4	TABLE: Clearance and creepage distance measurements	—

Clearance (cl) and creepage distance (cr) at/of/between:	U peak (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Functional:						
Basic/supplementary:						
Reinforced:						
Supplementary information:						

2.10.5	TABLE: Distance through insulation measurements	—

Distance through insulation (DTI) at/of:	U peak (V)	U rms (V)	Test voltage (V)	Required DTI (mm)	DTI (mm)
Supplementary information:					

4.3.8	TABLE: Batteries									N/A
The tests of 4.3.8 are applicable only when appropriate battery data is not available										
Is it possible to install the battery in a reverse polarity position?										
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition										
Max. current during fault condition										
Test results:										Verdict
- Chemical leaks										
- Explosion of the battery										
- Emission of flame or expulsion of molten metal										
- Electric strength tests of equipment after completion of tests										
Supplementary information:										

4.3.8	TABLE: Batteries	N/A
Battery category.....: (Lithium, NiMh, NiCad, Lithium Ion …)		
Manufacturer.....:		
Type / model .....:		
Voltage.....:		
Capacity .....: mAh		
Tested and Certified by (incl. Ref. No.).....:		
Circuit protection diagram:		

MARKINGS AND INSTRUCTIONS (1.7.13)	
Location of replaceable battery	
Language(s) ……..:	
Close to the battery ……..:	
In the servicing instructions ……..:	
In the operating instructions ……..:	

4.5	TABLE: Thermal requirements							—
	Supply voltage (V)							—
	Ambient T_{min} (°C)							—
	Ambient T_{max} (°C)							—
Maximum measured temperature T of part/at.....:		T (°C)						Allowed T_{max} (°C)
Supplementary information:								

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:							

4.5.5	TABLE: Ball pressure test of thermoplastic parts		—
	Allowed impression diameter (mm) ..... :	≤ 2 mm	—
Part		Test temperature (°C)	Impression diameter (mm)
Supplementary information:			

4.7	TABLE: Resistance to fire					—
Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence	
Supplementary information:						

5.1	TABLE: touch current measurement			—
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions	
supplementary information:				

5.2	TABLE: Electric strength tests, impulse tests and voltage surge tests	—

Test voltage applied between:	Voltage shape (AC, DC, impulse, surge)	Test voltage (V)	Breakdown Yes / No
Basic:			
Reinforced:			
Supplementary information:			

5.3	TABLE: Fault condition tests		—
	Ambient temperature (°C) ..... :		—
	Power source for EUT: Manufacturer, model/type, output rating ..... :		—

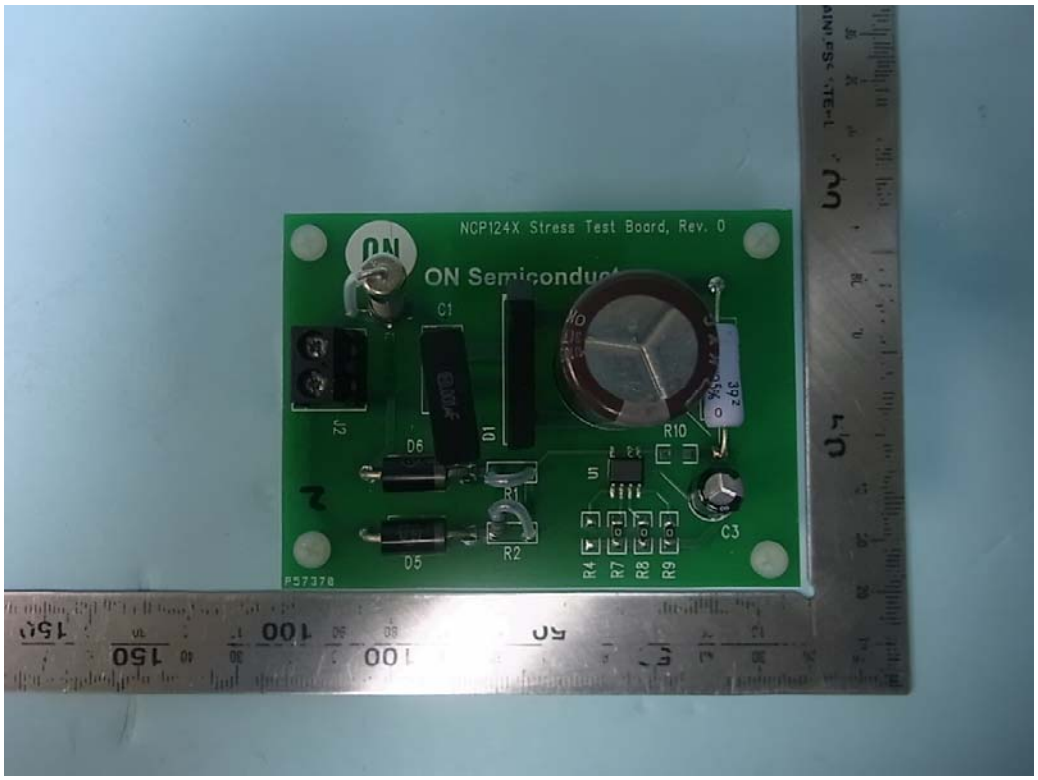
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Observation
Supplementary information: s-c=Short circuit, o-c=Open circuit, o-l=Overload						

C.2	TABLE: transformers						N/A
Loc.	Tested insulation	Working voltage peak / V (2.10.2)	Working voltage rms / V (2.10.2)	Required electric strength (5.2)	Required clearance / mm (2.10.3)	Required creepage distance / mm (2.10.4)	Required distance thr. insul. (2.10.5)
Loc.	Tested insulation			Test voltage/ V	Measured clearance / mm	Measured creepage dist./ mm	Measured distance thr. insul. / mm; number of layers
supplementary information:							

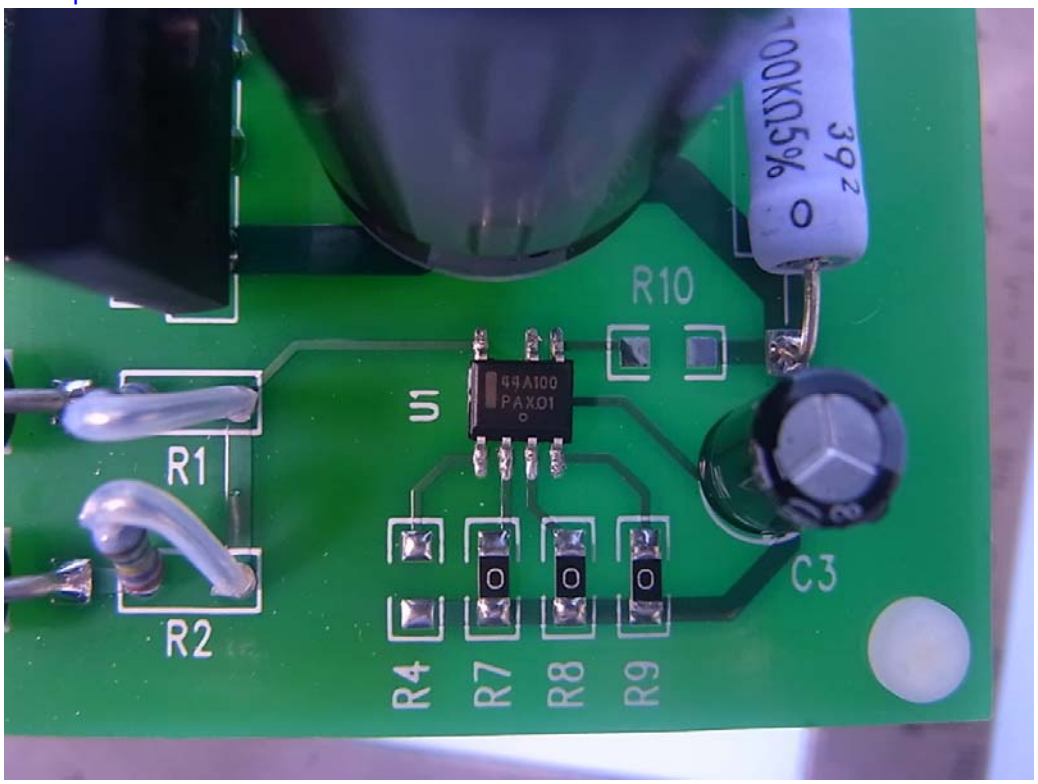
Photos

Report No. 257636

Test board



IC chip



Nemko

Unit data sheet

Report No. 257636

List unit datasheet of the model NCP1244 to represent others models.

NCP1244

Fixed Frequency Current Mode Controller for Flyback Converters

ON Semiconductor®

http://onsemi.com

The NCP1244 is a new fixed−frequency current−mode controller featuring the Dynamic Self−Supply. This function greatly simplifies the design of the auxiliary supply and the V_{CC} capacitor by activating the internal startup current source to supply the controller during start−up, transients, latch, stand−by etc. This device contains a special HV detector which detect the application unplug from the AC input line and triggers the X2 discharge current.

It features a timer−based fault detection that ensures the detection of overload and an adjustable compensation to help keep the maximum power independent of the input voltage.

Due to frequency foldback, the controller exhibits excellent efficiency in light load condition while still achieving very low standby power consumption. Internal frequency jittering, ramp compensation, and a versatile latch input make this controller an excellent candidate for the robust power supply designs.

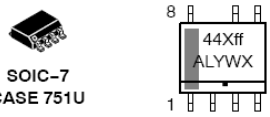
A dedicated Off mode allows to reach the extremely low no load input power consumption via "sleeping" whole device and thus minimize the power consumption of the control circuitry.

Features

- Fixed−Frequency Current−Mode Operation (65 kHz and 100 kHz frequency options)
- Frequency Foldback then Skip Mode for Maximized Performance in Light Load and Standby Conditions
- Timer−Based Overload Protection with Latched (Option A) or Auto−Recovery (Option B) Operation
- High−voltage Current Source with Dynamic Self−Supply, Simplifying the Design of the V_{CC} Circuitry
- Frequency Modulation for Softened EMI Signature
- Adjustable Overpower Protection Dependant on the Bulk Voltage
- Latch−off Input Combined with the Overpower Protection Sensing Input
- V_{CC} Operation up to 28 V, With Overvoltage Detection
- 500/800 mA Source/Sink Drive Peak Current Capability
- 10 ms Soft−Start
- Internal Thermal Shutdown
- No−Load Standby Power < 30 mW
- X2 Capacitor in EMI Filter Discharging Feature
- These Devices are Pb−Free and Halogen Free/BFR Free

Typical Applications

- AC−DC Adapters for Notebooks, LCD, and Printers
- Offline Battery Chargers
- Consumer Electronic Power Supplies
- Auxiliary/Housekeeping Power Supplies
- Offline Adapters for Notebooks

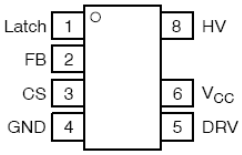


SOIC−7
CASE 751U

MARKING DIAGRAM

44Xff = Specific Device Code
X = A or B
ff = 65 or 100
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb−Free Package

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 39 of this data sheet.

Nemko

Unit data sheet

Report No. 257636

NCP1244

TYPICAL APPLICATION EXAMPLE

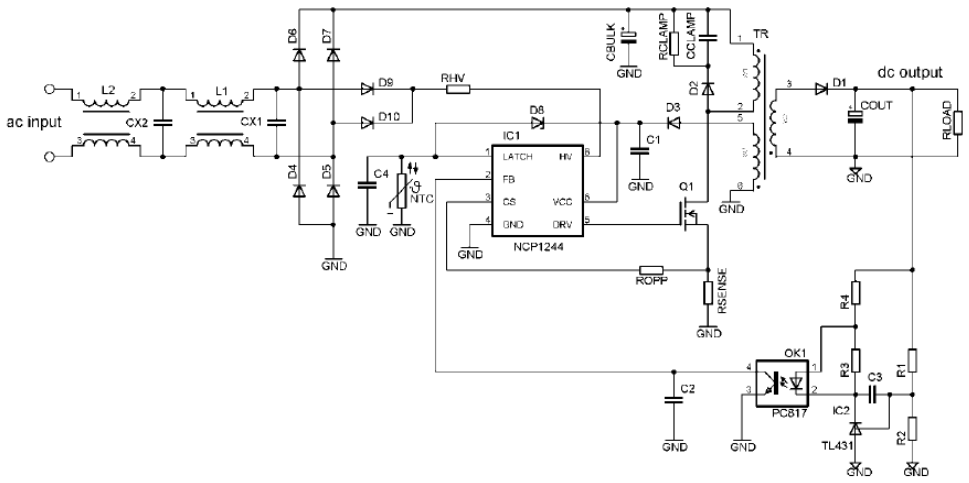


Figure 1. Flyback Converter Application Using the NCP1244

PIN FUNCTION DESCRIPTION

Pin No	Pin Name	Function	Pin Description
1	LATCH	Latch−Off Input	Pull the pin up or down to latch−off the controller. An internal current source allows the direct connection of an NTC for over temperature detection.
2	FB	Feedback + Shutdown pin	An optocoupler collector to ground controls the output regulation. The part goes to the low consumption Off mode if the FB input pin is pulled to GND.
3	CS	Current Sense	This Input senses the Primary Current for current−mode operation, and offers an overpower compensation adjustment.
4	GND	−	The controller ground
5	DRV	Drive output	Drives external MOSFET
6	VCC	VCC input	This supply pin accepts up to 28 Vdc, with overvoltage detection. The pin is connected to an external auxiliary voltage. It is not allowed to connect another circuit to this pin to keep low input power consumption.
8	HV	High−voltage pin	Connects to the rectified AC line to perform the functions of Start−up Current Source, Self−Supply and X2 capacitor discharge function and the HV sensing for the overpower protection purposes. It is not allowed to connect this pin to DC voltage.

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SIMPLIFIED INTERNAL BLOCK SCHEMATIC

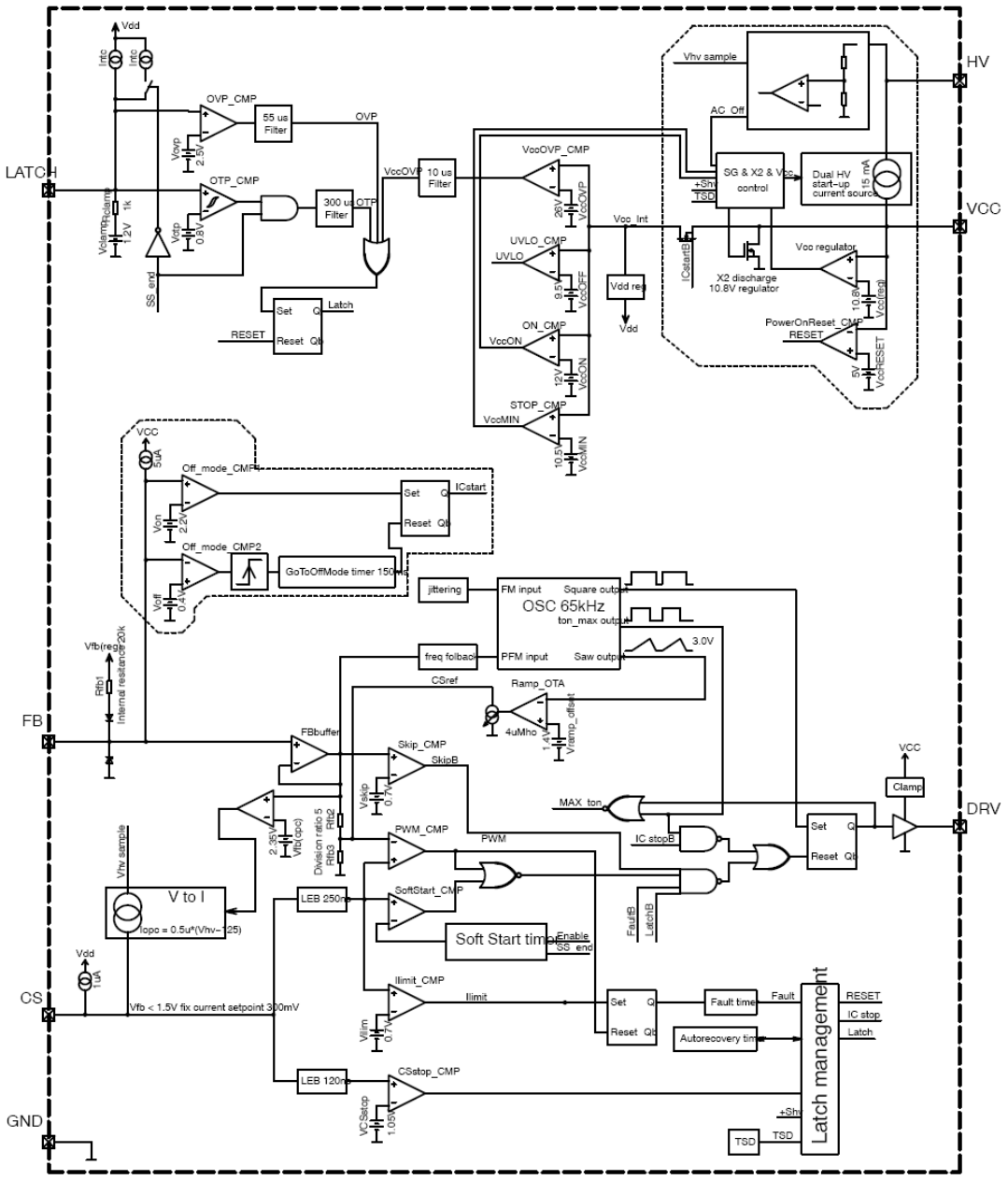

Figure 2. Simplified Internal Block Schematic

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
DRV (pin 5)	Maximum voltage on DRV pin (Dc−Current self−limited if operated within the allowed range) (Note 1)	−0.3 to 20 ±1000 (peak)	V mA
V_{CC} (pin 6)	V_{CC}Power Supply voltage, V_{CC} pin, continuous voltage Power Supply voltage, V_{CC} pin, continuous voltage (Note 1)	−0.3 to 28 ±30 (peak)	V mA
HV (pin 8)	Maximum voltage on HV pin (Dc−Current self−limited if operated within the allowed range)	−0.3 to 500 ±20	V mA
V_{max}	Maximum voltage on low power pins (except pin 5, pin 6 and pin 8) (Dc−Current self−limited if operated within the allowed range) (Note 1)	−0.3 to 10 ±10 (peak)	V mA
$R_{\theta J-A}$	Thermal Resistance SOIC−7 Junction-to-Air, low conductivity PCB (Note 2) Junction-to-Air, medium conductivity PCB (Note 3) Junction-to-Air, high conductivity PCB (Note 4)	 162 147 115	°C/W
$R_{\theta J-C}$	Thermal Resistance Junction−to−Case	73	°C/W
T_{JMAX}	Operating Junction Temperature	−40 to +150	°C
$T_{STRGMAX}$	Storage Temperature Range	−60 to +150	°C
	ESD Capability, HBM model (All pins except HV) per JEDEC Standard JESD22, Method A114E	> 2000	V
	ESD Capability, Machine Model per JEDEC Standard JESD22, Method A115A	> 200	V
	ESD Capability, Charged Device Model per JEDEC Standard JESD22, Method C101E	> 1000	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. This device contains latch-up protection and exceeds 100 mA per JEDEC Standard JESD78.
2. As mounted on a 80 x 100 x 1.5 mm FR4 substrate with a single layer of 50 mm^2 of 2 oz copper traces and heat spreading area. As specified for a JEDEC 51-1 conductivity test PCB. Test conditions were under natural convection or zero air flow.
3. As mounted on a 80 x 100 x 1.5 mm FR4 substrate with a single layer of 100 mm^2 of 2 oz copper traces and heat spreading area. As specified for a JEDEC 51-2 conductivity test PCB. Test conditions were under natural convection or zero air flow.
4. As mounted on a 80 x 100 x 1.5 mm FR4 substrate with a single layer of 650 mm^2 of 2 oz copper traces and heat spreading area. As specified for a JEDEC 51-3 conductivity test PCB. Test conditions were under natural convection or zero air flow.

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ELECTRICAL CHARACTERISTICS (For typical values T_J = 25°C, for min/max values T_J = −40°C to +125°C, V_{HV} = 125 V, V_{CC} = 11 V unless otherwise noted)

Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
HIGH VOLTAGE CURRENT SOURCE						
Minimum voltage for current source operation		$V_{HV(min)}$	–	30	40	V
Current flowing out of V_{CC} pin	V_{CC} = 0 V V_{CC} = $V_{CC(on)}$ − 0.5 V	I_{start1} I_{start2}	0.2 5	0.5 8	0.8 11	mA
Off−state leakage current	V_{HV} = 500 V, V_{CC} = 15 V	$I_{start(off)}$	10	25	50	μA
Off−mode HV supply current	V_{HV} = 141 V, V_{HV} = 325 V, V_{CC} loaded by 4.7 μF cap	$I_{HV(off)}$	– –	45 50	60 70	μA
SUPPLY						
HV current source regulation threshold		$V_{CC(reg)}$	8	11	–	V
Turn−on threshold level, V_{CC} going up HV current source stop threshold		$V_{CC(on)}$	11.0	12.0	13.0	V
HV current source restart threshold		$V_{CC(min)}$	9.5	10.5	11.5	V
Turn−off threshold		$V_{CC(off)}$	8.5	8.9	9.3	V
Overvoltage threshold		$V_{CC(ovp)}$	25	26.5	28	V
Blanking duration on $V_{CC(off)}$ and $V_{CC(ovp)}$ detection		$t_{VCC(blank)}$	–	10	–	μs
V_{CC} decreasing level at which the internal logic resets		$V_{CC(reset)}$	4.8	7.0	7.7	V
V_{CC} level for I_{START1} to I_{START2} transition		$V_{CC(inhibit)}$	0.2	0.8	1.25	V
Internal current consumption (Note 5)	DRV open, V_{FB} = 3 V, 65 kHz DRV open, V_{FB} = 3 V, 100 kHz Cdrv = 1 nF, V_{FB} = 3 V, 65 kHz Cdrv = 1 nF, V_{FB} = 3 V, 100 kHz Off mode (skip or before start−up) Fault mode (fault or latch)	I_{CC1} I_{CC1} I_{CC2} I_{CC2} I_{CC3} I_{CC4}	1.3 1.3 1.8 2.3 0.67 0.3	1.85 1.85 2.6 2.9 0.9 0.6	2.2 2.2 3.0 3.5 1.13 0.9	mA
X2 DISCHARGE						
Comparator hysteresis observed at HV pin		$V_{HV(hyst)}$	1.5	3.5	5	V
HV signal sampling period		T_{sample}	–	1.0	–	ms
Timer duration for no line detection		t_{DET}	21	32	43	ms
Discharge timer duration		t_{DIS}	21	32	43	ms
OSCILLATOR						
Oscillator frequency		f_{OSC}	58 87	65 100	72 109	kHz
Maximum on time for T_J = 25°C to +125°C only	f_{OSC} = 65 kHz f_{OSC} = 100 kHz	$t_{ONmax(65kHz)}$ $t_{ONmax(100kHz)}$	11.5 7.5	12.3 8.0	13.1 8.5	μs
Maximum on time	f_{OSC} = 65 kHz f_{OSC} = 100 kHz	$t_{ONmax(65kHz)}$ $t_{ONmax(100kHz)}$	11.3 7.4	12.3 8.0	13.1 8.5	μs
Maximum duty cycle (corresponding to maximum on time at maximum switching frequency)	f_{OSC} = 65 kHz f_{OSC} = 100 kHz	D_{MAX}	–	80	–	%

5. Internal supply current only, currents sourced via FB pin is not included (current is flowing in GND pin only).
6. Guaranteed by design.
7. CS pin source current is a sum of I_{bias} and I_{OPC}, thus at V_{HV} = 125 V is observed the I_{bias} only, because I_{OPC} is switched off.

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ELECTRICAL CHARACTERISTICS (For typical values T_J = 25°C, for min/max values T_J = −40°C to +125°C, V_{HV} = 125 V, V_{CC} = 11 V unless otherwise noted)

Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
OSCILLATOR						
Frequency jittering amplitude, in percentage of F_{OSC}		A_{jitter}	±4	±6	±8	%
Frequency jittering modulation frequency		F_{jitter}	85	125	165	Hz
FREQUENCY FOLDBACK						
Feedback voltage threshold below which frequency foldback starts		$V_{FB(foldS)}$	1.8	2.0	2.2	V
Feedback voltage threshold below which frequency foldback is complete		$V_{FB(foldE)}$	0.8	0.9	1.0	V
Minimum switching frequency	$V_{FB} = V_{skip(in)} + 0.1$	$f_{OSC(min)}$	23	27	32	kHz
OUTPUT DRIVER						
Rise time, 10 to 90% of V_{CC}	$V_{CC} = V_{CC(min)} + 0.2$ V, C_{DRV} = 1 nF	t_{rise}	–	40	70	ns
Fall time, 90 to 10% of V_{CC}	$V_{CC} = V_{CC(min)} + 0.2$ V, C_{DRV} = 1 nF	t_{fall}	–	40	70	ns
Current capability	$V_{CC} = V_{CC(min)} + 0.2$ V, C_{DRV} = 1 nF DRV high, V_{DRV} = 0 V DRV low, $V_{DRV} = V_{CC}$	 $I_{DRV(source)}$ $I_{DRV(sink)}$	 – –	 500 800	 – –	mA
Clamping voltage (maximum gate voltage)	$V_{CC} = V_{CCmax}$ – 0.2 V, DRV high, R_{DRV} = 33 kΩ, C_{load} = 220 pF	$V_{DRV(clamp)}$	11	13.5	16	V
High−state voltage drop	$V_{CC} = V_{CC(min)} + 0.2$ V, R_{DRV} = 33 kΩ, DRV high	$V_{DRV(drop)}$	–	–	1	V
CURRENT SENSE						
Input Pull−up Current	V_{CS} = 0.7 V	I_{bias}	–	1	–	μA
Maximum internal current setpoint	V_{FB} > 3.5 V	V_{ILIM}	0.66	0.70	0.74	V
Propagation delay from V_{Ilimit} detection to DRV off	$V_{CS} = V_{ILIM}$	t_{delay}	–	80	110	ns
Leading Edge Blanking Duration for V_{ILIM}		t_{LEB}	200	250	320	ns
Threshold for immediate fault protection activation		$V_{CS(stop)}$	0.95	1.05	1.15	V
Leading Edge Blanking Duration for $V_{CS(stop)}$ (Note 6)		t_{BCS}	90	120	150	ns
Soft−start duration	From 1st pulse to $V_{CS} = V_{ILIM}$	t_{SSTART}	8	11	14	ms
Frozen current setpoint		$V_{I(freeze)}$	275	300	325	mV
INTERNAL SLOPE COMPENSATION						
Slope of the compensation ramp		$S_{comp(65kHz)}$ $S_{comp(100kHz)}$	– –	−32.5 −50	– –	mV / μs
FEEDBACK						
Internal pull−up resistor	T_J = 25°C	$R_{FB(up)}$	15	20	25	kΩ
V_{FB} to internal current setpoint division ratio		K_{FB}	4.7	5	5.3	–
Internal pull−up voltage on the FB pin (Note 6)		$V_{FB(ref)}$	4.5	5	5.5	V
Feedback voltage below which the peak current is frozen		$V_{FB(freeze)}$	1.35	1.5	1.65	V

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6. Guaranteed by design.
7. CS pin source current is a sum of I_{bias} and I_{OPC}, thus at V_{HV} = 125 V is observed the I_{bias} only, because I_{OPC} is switched off.

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ELECTRICAL CHARACTERISTICS (For typical values T_J = 25°C, for min/max values T_J = −40°C to +125°C, V_{HV} = 125 V, V_{CC} = 11 V unless otherwise noted)

Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
SKIP CYCLE MODE						
Feedback voltage thresholds for skip mode	V_{FB} going down V_{FB} going up	$V_{skip(in)}$ $V_{skip(out)}$	0.63 0.72	0.70 0.80	0.77 0.88	V
REMOTE CONTROL ON FB PIN						
The voltage above which the part enters the on mode	$V_{CC} > V_{CC(off)}$, V_{HV} = 60 V	V_{ON}	–	2.2	–	V
The voltage below which the part enters the off mode	$V_{CC} > V_{CC(off)}$	V_{OFF}	0.35	0.40	0.45	V
Minimum hysteresis between the V_{ON} and V_{OFF}	$V_{CC} > V_{CC(off)}$, V_{HV} = 60 V	V_{HYST}	500	–	–	mV
Pull−up current in off mode	$V_{CC} > V_{CC(off)}$	I_{OFF}	–	5	–	μA
Go To Off mode timer	$V_{CC} > V_{CC(off)}$	t_{GTOM}	500	600	700	ms
OVERLOAD PROTECTION						
Fault timer duration		t_{fault}	108	128	178	ms
Autorecovery mode latch−off time duration		$t_{autorec}$	0.85	1.00	1.35	s
OVERPOWER PROTECTION						
V_{HV} to I_{OPC} conversion ratio		K_{OPC}	–	0.54	–	μA / V
Current flowing out of CS pin (Note 7)	V_{HV} = 125 V V_{HV} = 162 V V_{HV} = 325 V V_{HV} = 365 V	$I_{OPC(125)}$ $I_{OPC(162)}$ $I_{OPC(325)}$ $I_{OPC(365)}$	– – – 105	0 20 110 130	– – – 150	μA
FB voltage above which I_{OPC} is applied	V_{HV} = 365 V	$V_{FB(OPCF)}$	2.12	2.35	2.58	V
FB voltage below which is no I_{OPC} applied	V_{HV} = 365 V	$V_{FB(OPCE)}$	–	2.15	–	V
LATCH−OFF INPUT						
High threshold	V_{Latch} going up	V_{OVP}	2.35	2.5	2.65	V
Low threshold	V_{Latch} going down	V_{OTP}	0.76	0.8	0.84	V
Current source for direct NTC connection During normal operation During soft−start	V_{Latch} = 0 V	 I_{NTC} $I_{NTC(SSTART)}$	 65 130	 95 190	 105 210	μA
Blanking duration on high latch detection	65 kHz version 100 kHz version	$t_{Latch(OVP)}$	35 20	50 35	70 50	μs
Blanking duration on low latch detection		$t_{Latch(OTP)}$	–	350	–	μs
Clamping voltage	I_{Latch} = 0 mA I_{Latch} = 1 mA	$V_{clamp0(Latch)}$ $V_{clamp1(Latch)}$	1.0 1.8	1.2 2.4	1.4 3.0	V
TEMPERATURE SHUTDOWN						
Temperature shutdown	T_J going up	T_{TSD}	–	150	–	°C
Temperature shutdown hysteresis	T_J going down	$T_{TSD(HYS)}$	–	30	–	°C

5. Internal supply current only, currents sourced via FB pin is not included (current is flowing in GND pin only).
6. Guaranteed by design.
7. CS pin source current is a sum of I_{bias} and I_{OPC}, thus at V_{HV} = 125 V is observed the I_{bias} only, because I_{OPC} is switched off.

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TYPICAL CHARACTERISTIC

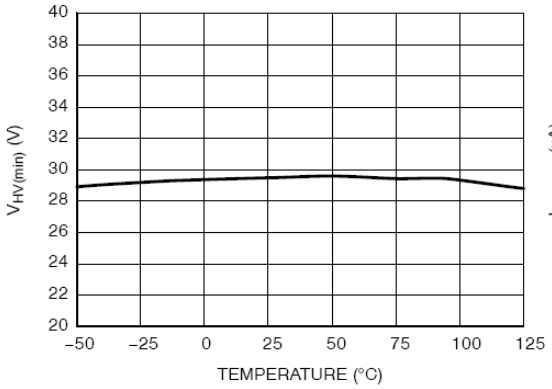

Figure 3. Minimum Current Source Operation $V_{HV(min)}$

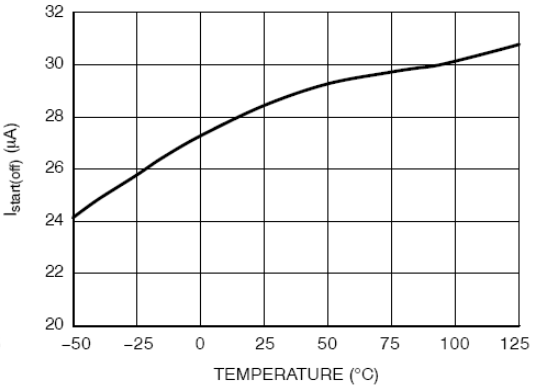

Figure 4. Off−State Leakage Current $I_{start(off)}$

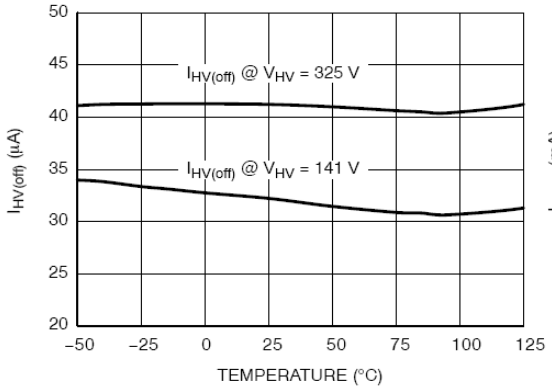

Figure 5. Off−Mode HV Supply Current $I_{HV(off)}$

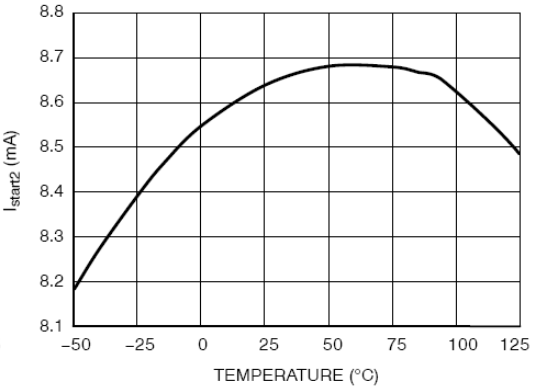

Figure 6. High Voltage Startup Current Flowing Out of V_{CC} Pin I_{start2}

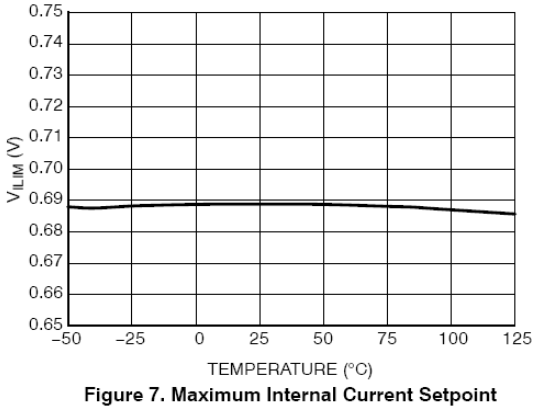

Figure 7. Maximum Internal Current Setpoint V_{ILIM}

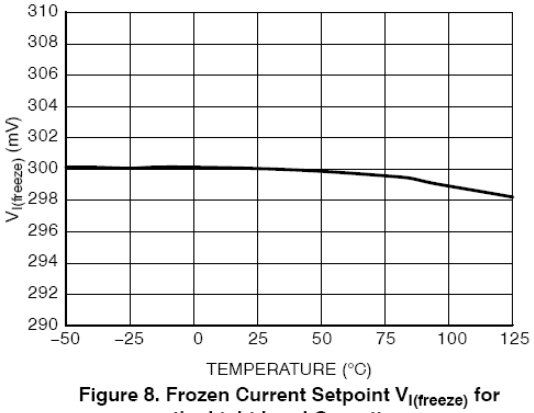

Figure 8. Frozen Current Setpoint $V_{I(freeze)}$ for the Light Load Operation

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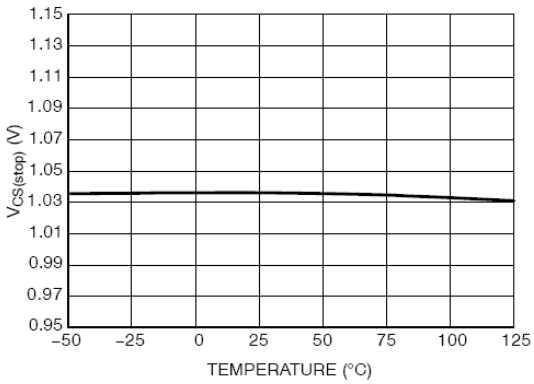

Figure 9. Threshold for Immediate Fault Protection Activation $V_{CS(stop)}$

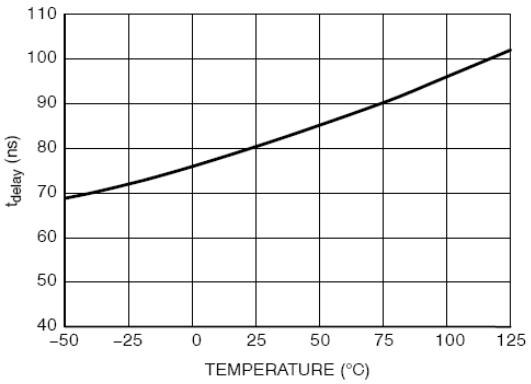

Figure 10. Propagation Delay t_{delay}

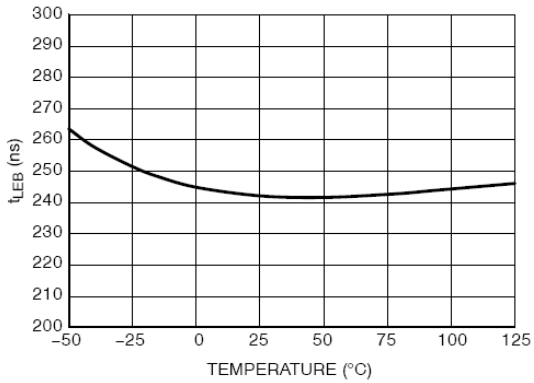

Figure 11. Leading Edge Blanking Duaration t_{LEB}

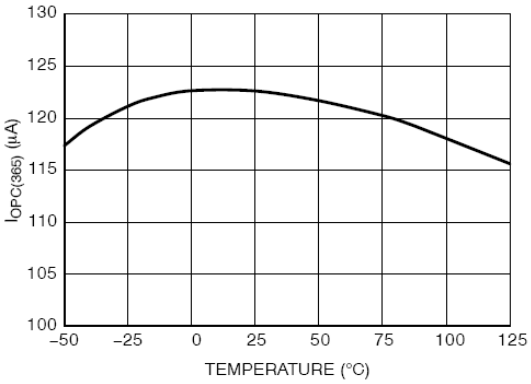

Figure 12. Maximum Overpower Compensating Current $I_{OPC(365)}$ Flowing Out of CS Pin

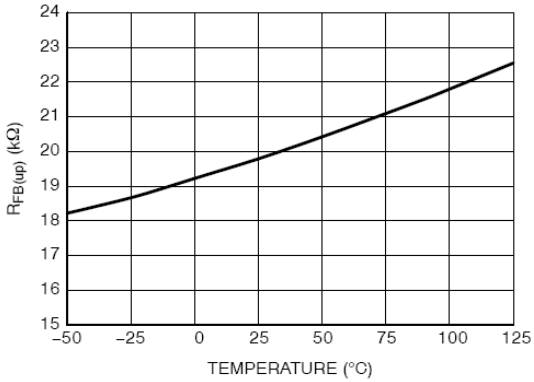

Figure 13. FB Pin Internal Pull−up Resistor $R_{FB(up)}$

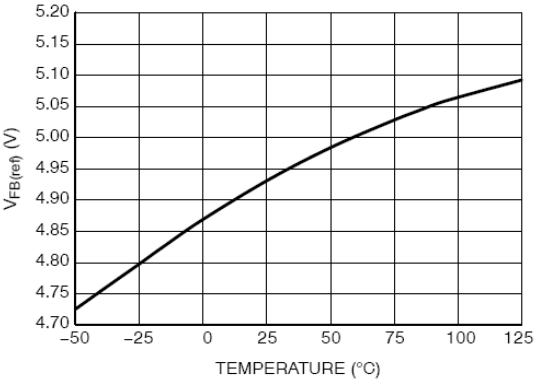

Figure 14. FB Pin Open Voltage $V_{FB(ref)}$

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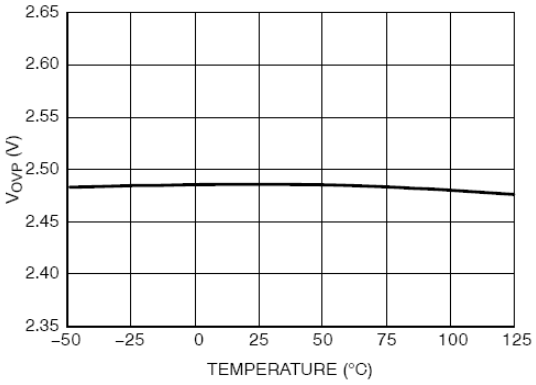

Figure 15. Latch Pin High Threshold V_{OVP}

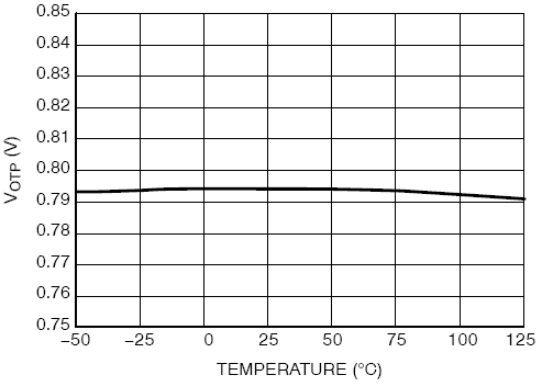

Figure 16. Latch Pin Low Threshold V_{OTP}

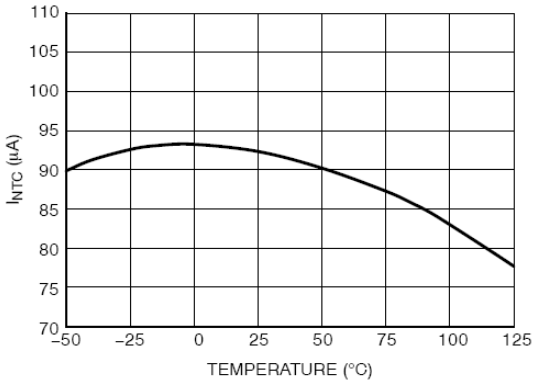

Figure 17. Current I_{NTC} Sourced from the Latch Pin, Allowing Direct NTC Connection

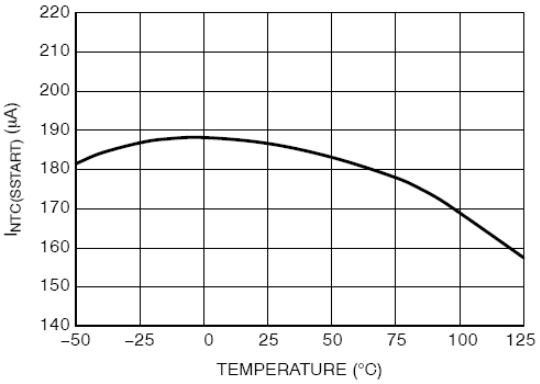

Figure 18. Current $I_{NTC(SSTART)}$ Sourced from the Latch Pin, During Soft−Start

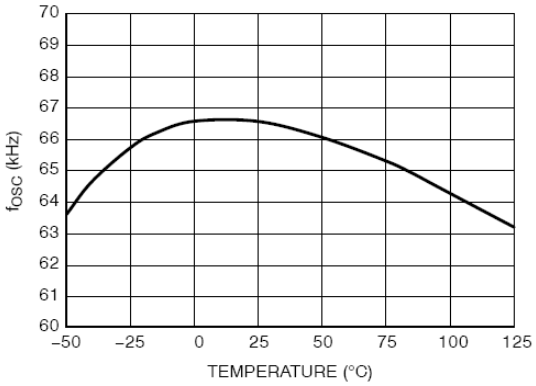

Figure 19. Oscillator f_{OSC} for the 65 kHz Version

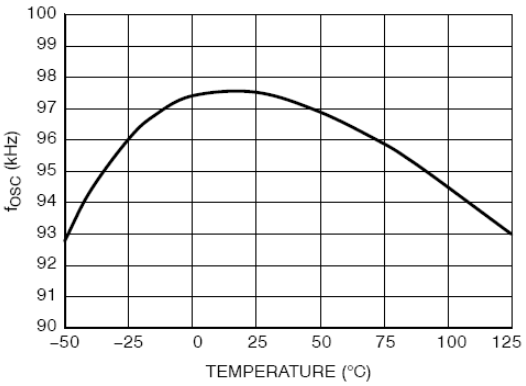

Figure 20. Oscillator f_{OSC} for the 100 kHz Version

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TYPICAL CHARACTERISTIC

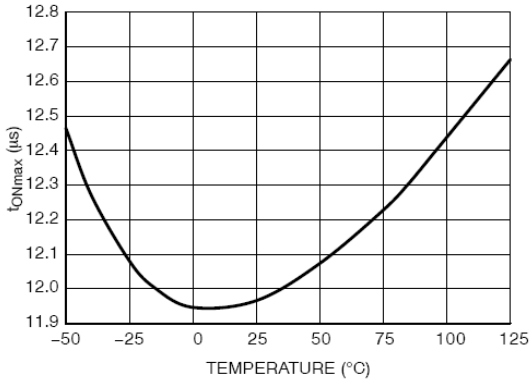

Figure 21. Maximum ON Time t_{ONmax} for the 65 kHz Version

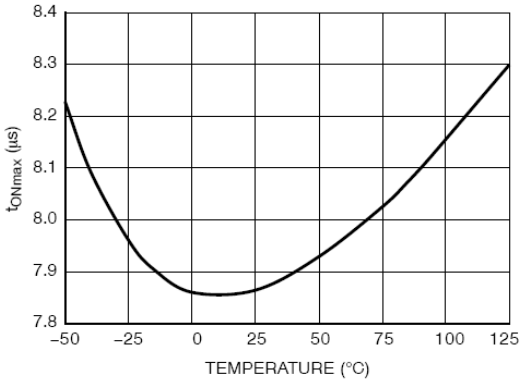

Figure 22. Maximum ON Time t_{ONmax} for the 100 kHz Version

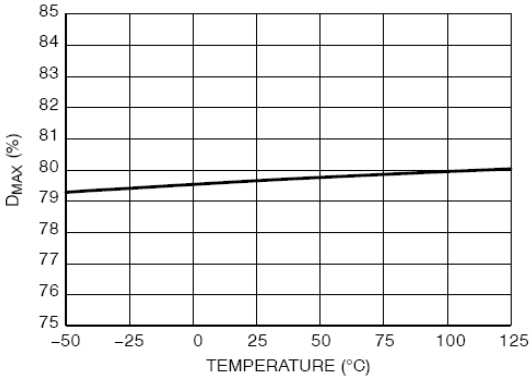

Figure 23. Maximum Duty Ratio D_{MAX}

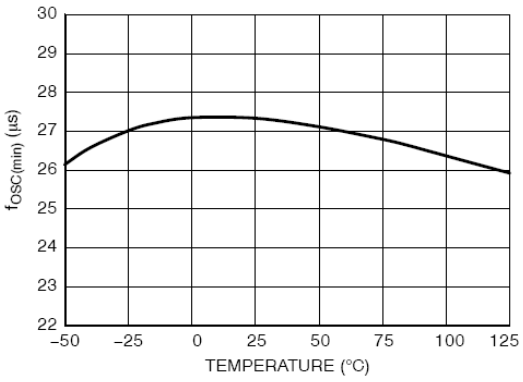

Figure 24. Minimum Switching Frequency $f_{OSC(min)}$

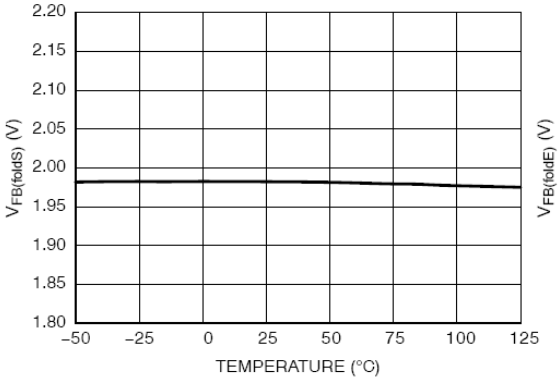

Figure 25. FB Pin Voltage Below Which Frequency Foldback Starts $V_{FB(foldS)}$

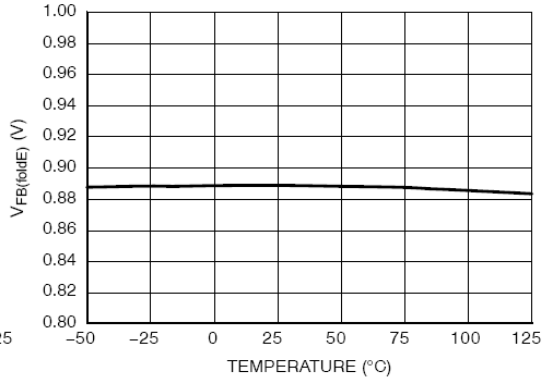

Figure 26. FB Pin Voltage Below Which Frequency Foldback Complete $V_{FB(foldE)}$

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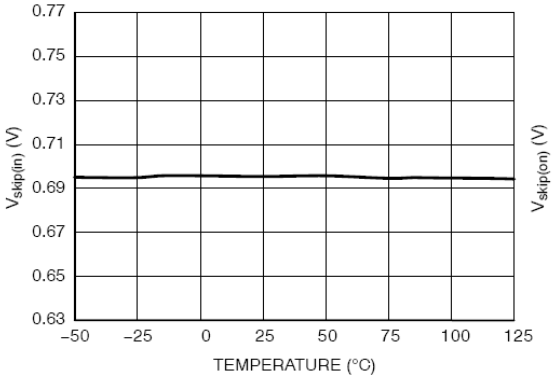

Figure 27. FB Pin Skip−In Level $V_{skip(in)}$

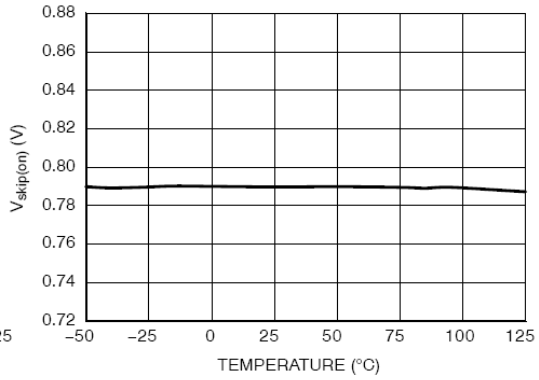

Figure 28. FB Pin Skip−Out Level $V_{skip(out)}$

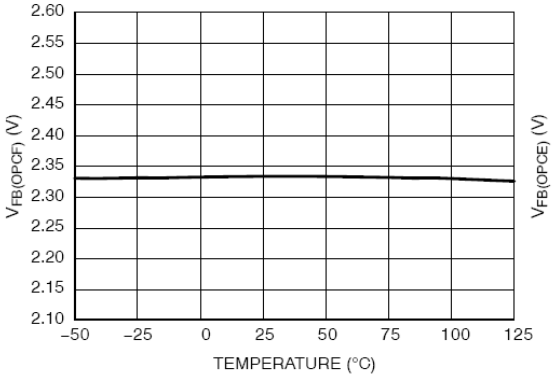

Figure 29. FB Pin Level $V_{FB(OPCF)}$ Above Which is the Overpower Compensation Applied

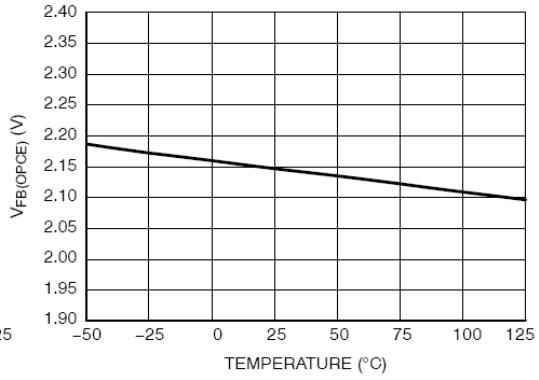

Figure 30. FB Pin Level $V_{FB(OPCE)}$ Below Which is No Overpower Compensation Applied

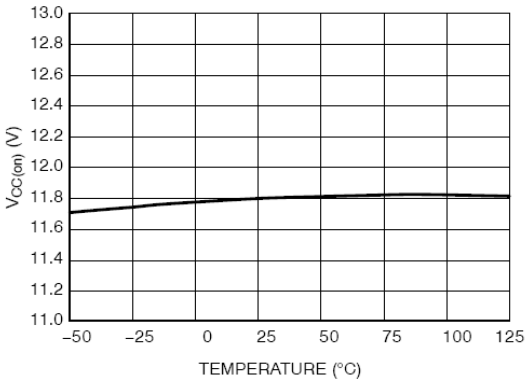

Figure 31. V_{CC} Turn−on Threshold Level, V_{CC} Going Up HV Current Source Stop Threshold $V_{CC(on)}$

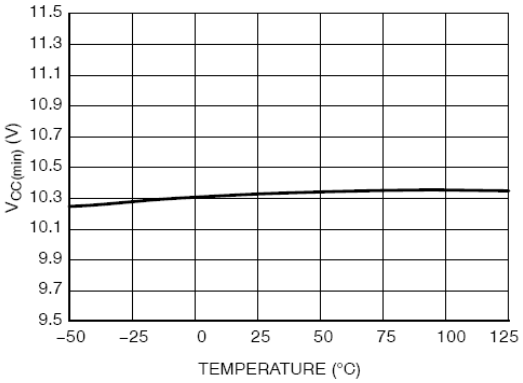

Figure 32. HV Current Source Restart Threshold $V_{CC(min)}$

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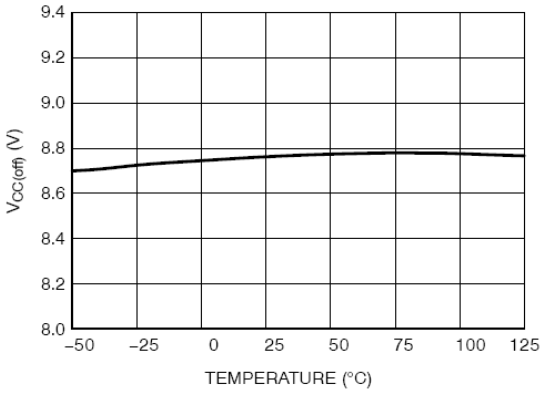

Figure 33. V_{CC} Turn−off Threshold (UVLO) $V_{CC(off)}$

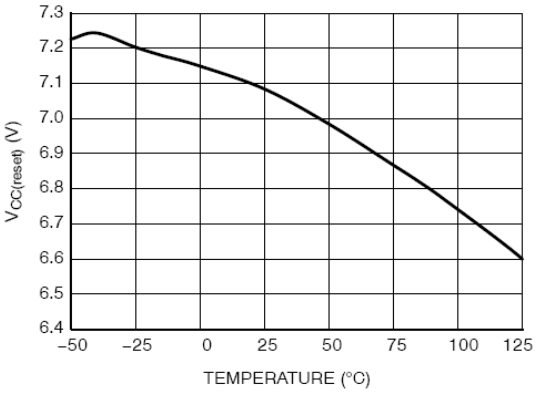

Figure 34. V_{CC} Decreasing Level at Which the Internal Logic Resets $V_{CC(reset)}$

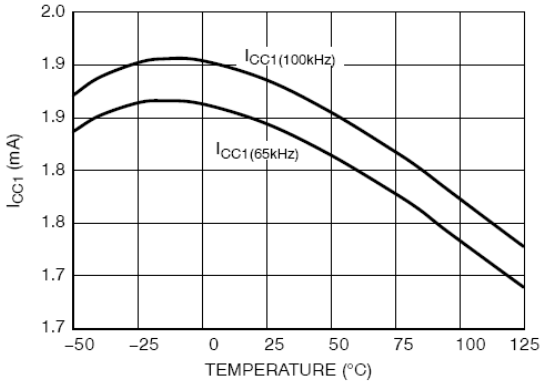

Figure 35. Internal Current Consumption when DRV Pin is Unloaded

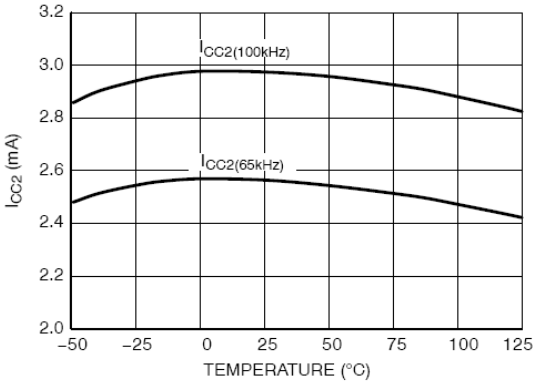

Figure 36. Internal Current Consumption when DRV Pin is Loaded by 1 nF

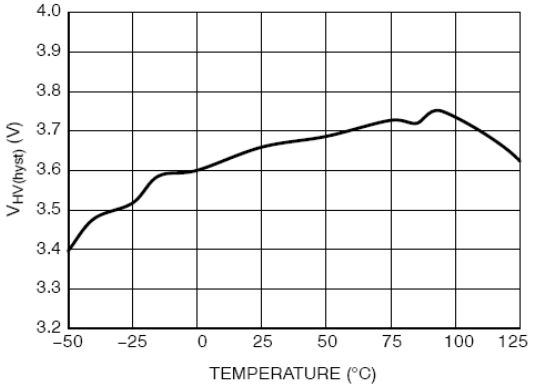

Figure 37. X2 Discharge Comparator Hysteresis Observed at HV Pin $V_{HV(hyst)}$

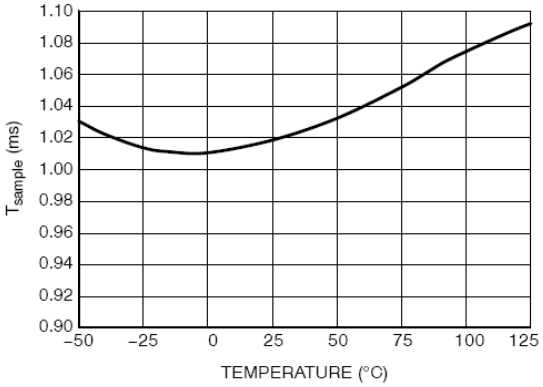

Figure 38. HV Signal Sampling Period T_{sample}

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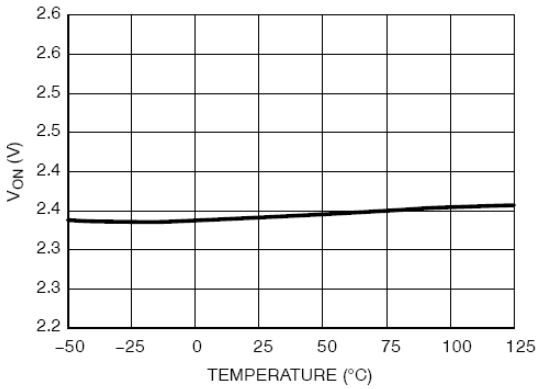

Figure 39. FB Pin Voltage Level Above Which is Entered On Mode V_{ON}

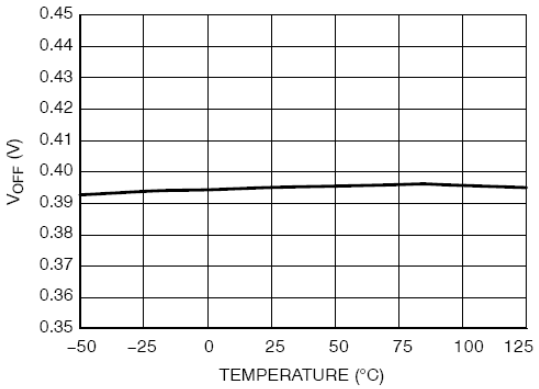

Figure 40. FB Pin Voltage Level Below Which is Entered Off Mode V_{OFF}

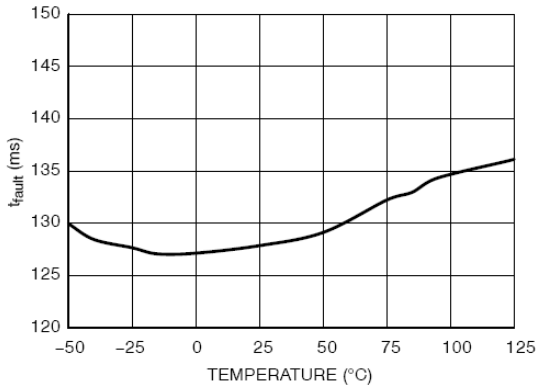

Figure 41. Fault Timer Duration t_{fault}

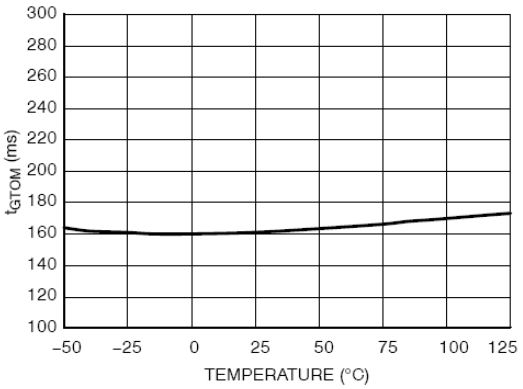

Figure 42. Go To Off Mode Timer Duration t_{GTOM}

APPLICATION INFORMATION

Functional Description

The NCP1244 includes all necessary features to build a safe and efficient power supply based on a fixed−frequency flyback converter. The NCP1244 is a multimode controller as illustrated in Figure 43. The mode of operation depends upon line and load condition. Under all modes of operation, the NCP1244 terminates the DRV signal based on the switch current. Thus, the NCP1244 always operates in current mode control so that the power MOSFET current is always limited.

Under normal operating conditions, the FB pin commands the operating mode of the NCP1244 at the voltage thresholds shown in Figure 43. At normal rated operating loads (from 100% to approximately 33% full rated power) the NCP1244 controls the converter in fixed frequency PWM mode. It can operate in the continuous conduction mode (CCM) or discontinuous conduction mode (DCM) depending upon the input voltage and loading conditions. If the controller is used in CCM with a wide input voltage range, the duty−ratio may increase up to 50%. The build−in slope compensation prevents the appearance of sub−harmonic oscillations in this operating area.

For loads that are between approximately 32% and 10% of full rated power, the converter operates in frequency foldback mode (FFM). If the feedback pin voltage is lower than 1.5 V the peak switch current is kept constant and the output voltage is regulated by modulating the switching frequency for a given and fixed input voltage V_{HV}.

Effectively, operation in FFM results in the application of constant volt−seconds to the flyback transformer each switching cycle. Voltage regulation in FFM is achieved by varying the switching frequency in the range from 65 kHz (or 100 kHz) to 27 kHz. For extremely light loads (below approximately 6% full rated power), the converter is controlled using bursts of 27 kHz pulses. This mode is called as skip mode. The FFM, keeping constant peak current and skip mode allows design of the power supplies with increased efficiency under the light loading conditions. Keep in mind that the aforementioned boundaries of steady−state operation are approximate because they are subject to converter design parameters.

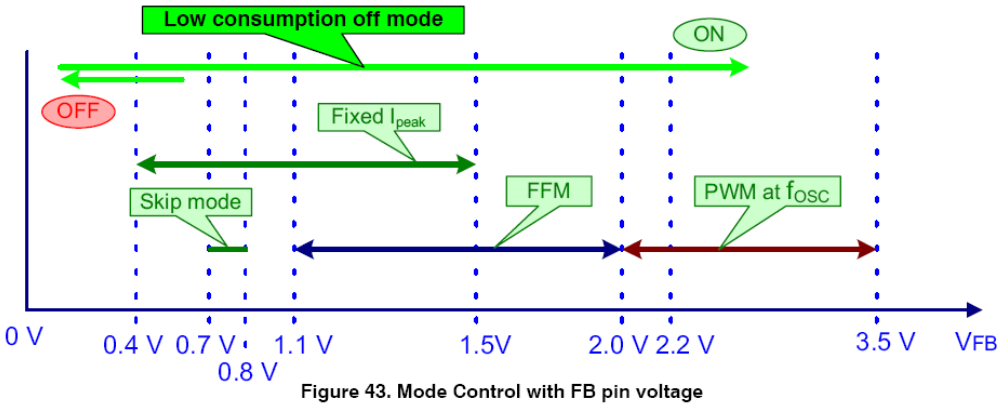

Figure 43. Mode Control with FB pin voltage

There was implemented the low consumption off mode allowing to reach extremely low no load input power. This mode is controlled by the FB pin and allows the remote control (or secondary side control) of the power supply shut−down. Most of the device internal circuitry is unbiased in the low consumption off mode. Only the FB pin control circuitry and X2 cap discharging circuitry is operating in the low consumption off mode. If the voltage at feedback pin decreases below the 0.4 V the controller will enter the low consumption off mode. The controller can start if the FB pin voltage increases above the 2.2 V level.

See the detailed status diagrams for the both versions fully latched A and the autorecovery B on the following figures. The basic status of the device after wake−up by the V_{CC} is the off mode and mode is used for the overheating protection mode if the thermal shutdown protection is activated.

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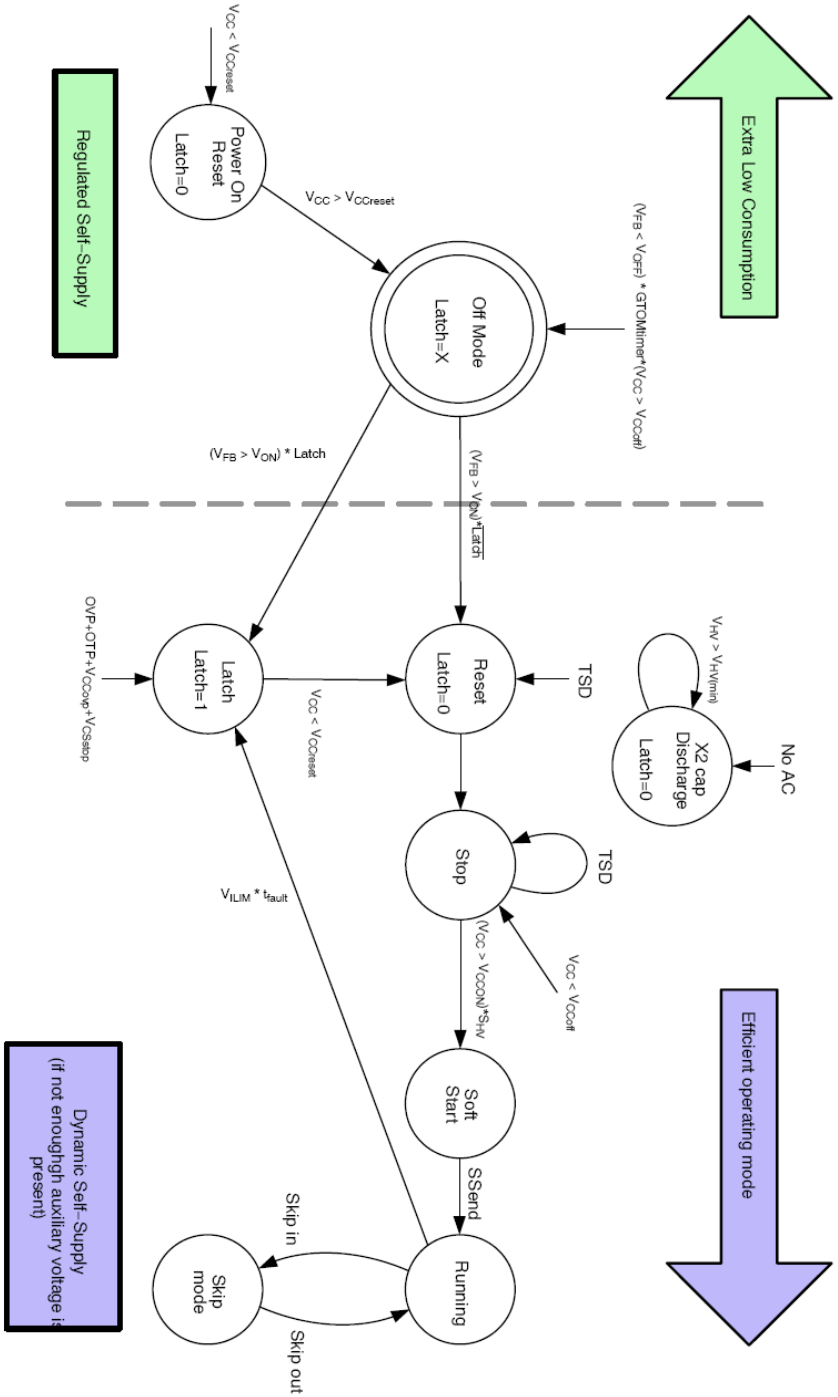

Figure 44. Operating Status Diagram for the Fully Latched Version A of the Device

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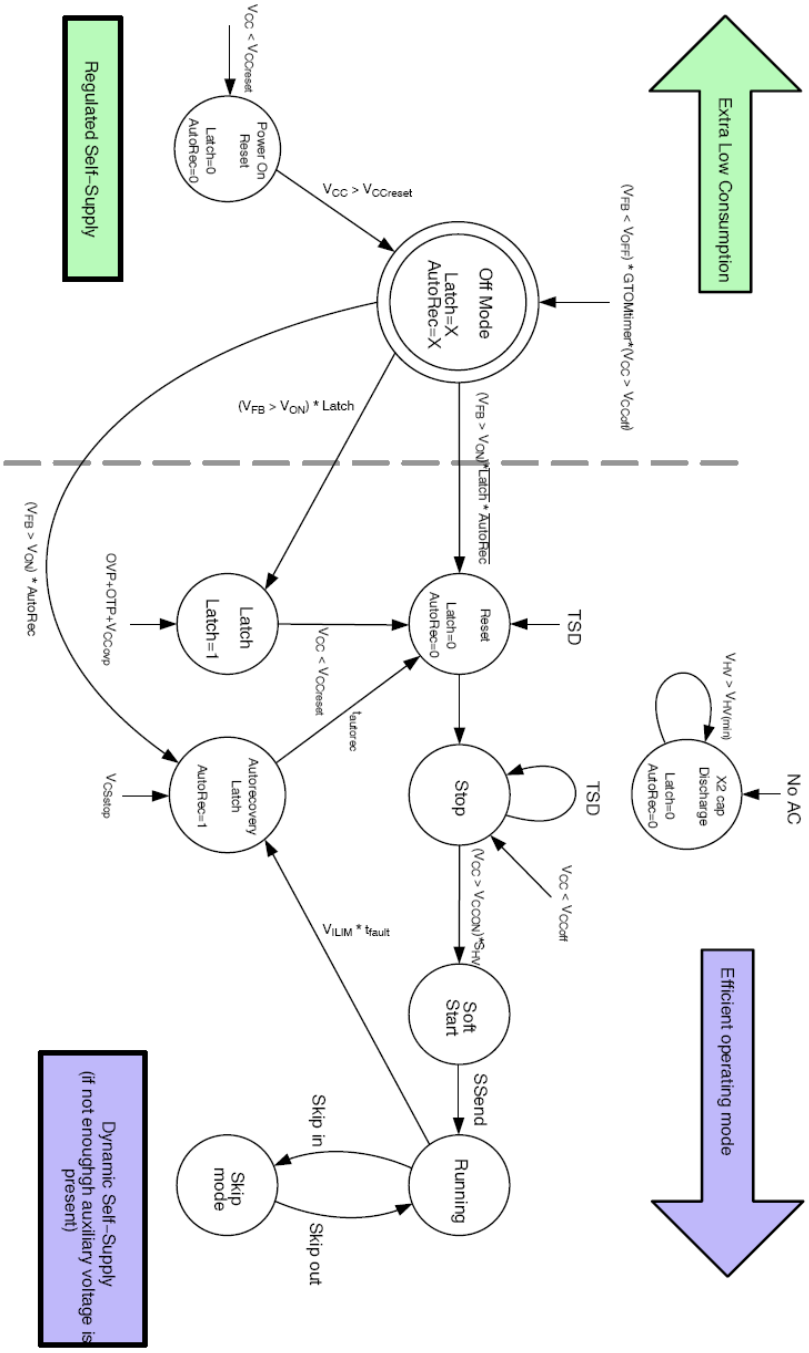

Figure 45. Operating Status Diagram for the Autorecovery Version B of the Device

The information about the fault (permanent Latch or Autorecovery) is kept during the low consumption off mode due the safety reason. The reason is not to allow unlatch the device by the remote control being in off mode.

Start−up of the Controller

At start−up, the current source turns on when the voltage on the HV pin is higher than $V_{HV(min)}$, and turns off when V_{CC} reaches $V_{CC(on)}$, then turns on again when V_{CC} reaches $V_{CC(min)}$, until V_{CC} is supplied by an external source. The controller actually starts the first time V_{CC} reaches $V_{CC(on)}$ when the slope on HV pin is positive.

Even though the Dynamic Self−Supply is able to maintain the V_{CC} voltage between $V_{CC(on)}$ and $V_{CC(min)}$ by turning the HV start−up current source on and off, it can only be used in light load condition, otherwise the power dissipation on the die would be too much. As a result, an auxiliary voltage source is needed to supply V_{CC} during normal operation.

The Dynamic Self−Supply is useful to keep the controller alive when no switching pulses are delivered, e.g. in latch or fault condition, or to prevent the controller from stopping during load transients when the V_{CC} might drop. The NCP1244 accepts a supply voltage as high as 28 V, with an overvoltage threshold $V_{CC(ovp)}$ that latches the controller off.

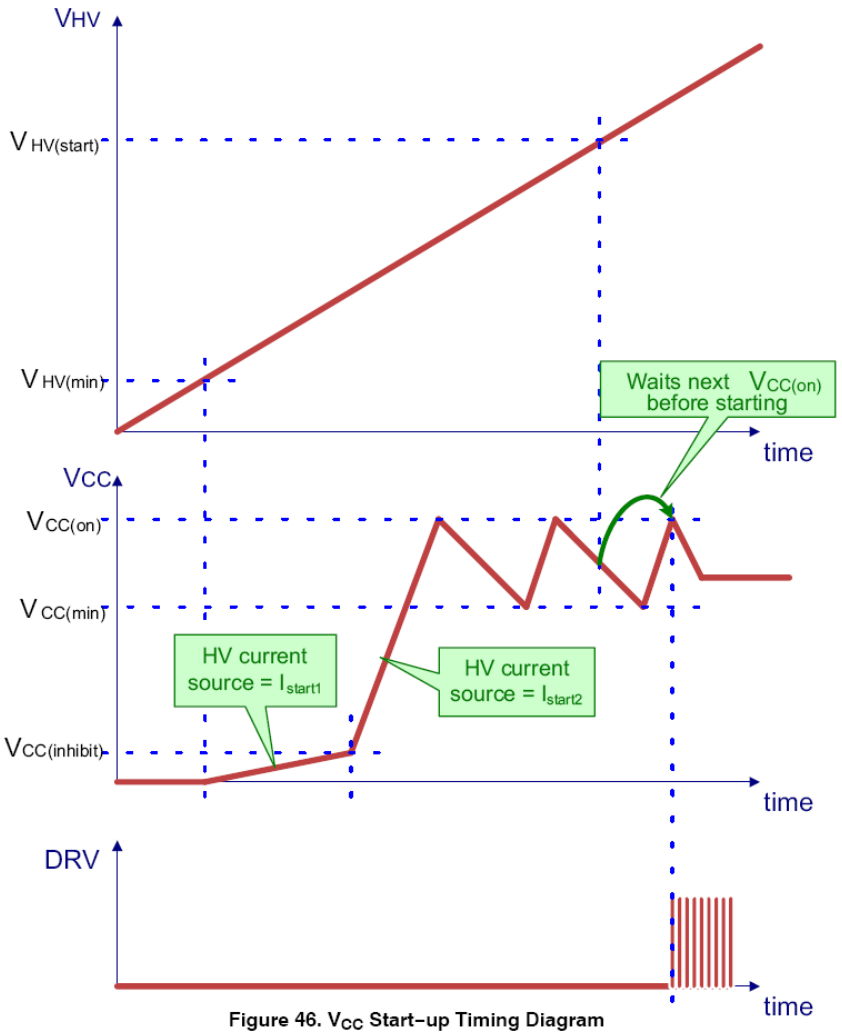

Figure 46. V_{CC} Start−up Timing Diagram

For safety reasons, the start−up current is lowered when V_{CC} is below $V_{CC(inhibit)}$, to reduce the power dissipation in case the V_{CC} pin is shorted to GND (in case of V_{CC} capacitor failure, or external pull−down on V_{CC} to disable the controller). There is only one condition for which the current source doesn't turn on when V_{CC} reaches $V_{CC(inhibit)}$: the voltage on HV pin is too low (below $V_{HV(min)}$). The controller can restart only when VCC reaches VCC(on) and when the slope on HV pin is positive during the short ac line drop−outs. This feature differentiates between the short ac line drop−outs and application plug off. The minimum positive slope is defined by the Equation 1 in following chapter.

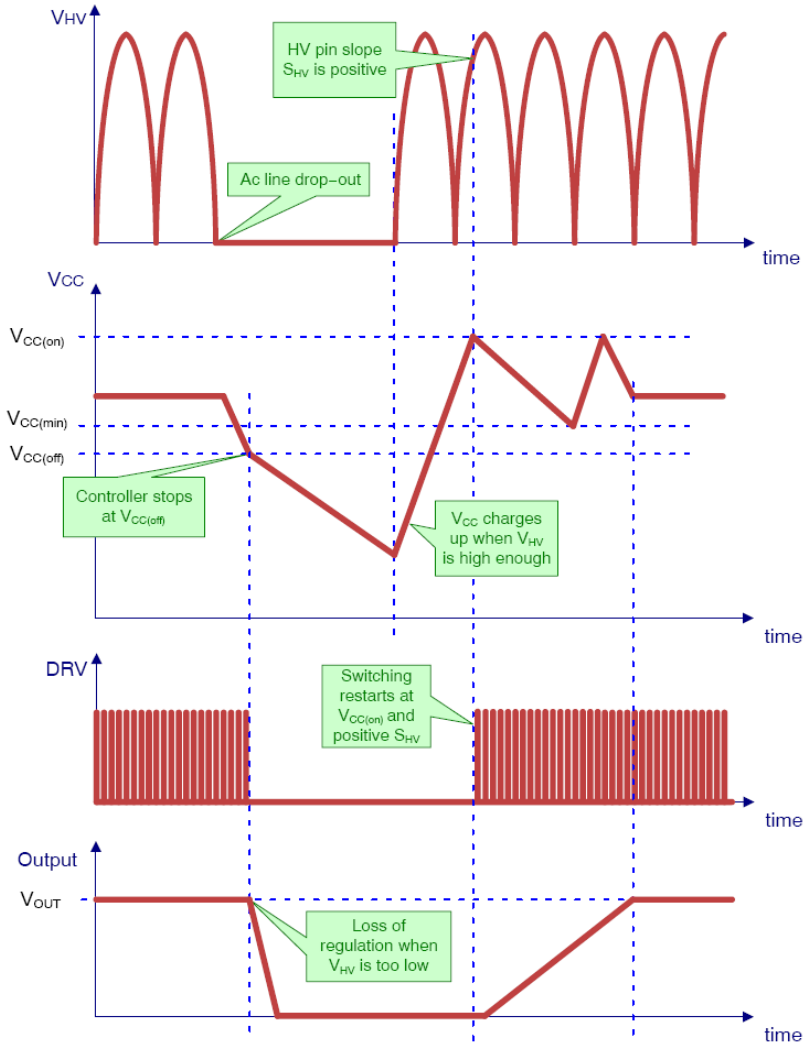

Figure 47. Ac Line Drop−out Timing Diagram

X2 Cap Discharge Feature

The X2 capacitor discharging feature is offered by usage of the NCP1244. This feature save approx. 16 mW – 25 mW input power depending on the EMI filter X2 capacitors volume and it saves the external components count as well. The discharge feature is ensured via the start–up current source with a dedicated control circuitry for this function. The X2 capacitors are being discharged by current defined as I_{start2} when this need is detected.

There is used a dedicated structure called ac line unplug detector inside the X2 capacitor discharge control circuitry. See the Figure 48 for the block diagram for this structure and Figures 49, 50 and 52 for the timing diagrams. The basic idea of ac line unplug detector lies in comparison of the direct sample of the high voltage obtained via the high voltage sensing structure with the delayed sample of the high voltage. The delayed signal is created by the sample & hold structure.

The comparator used for the comparison of these signals is without hysteresis inside. The resolution between the slopes of the ac signal and dc signal is defined by the sampling time T_{SAMPLE} and additional internal offset N_{OS}. These parameters ensure the noise immunity as well. The additional offset is added to the picture of the sampled HV signal and its analog sum is stored in the C_1 storage capacitor. If the voltage level of the HV sensing structure output crosses this level the comparator CMP output signal resets the detection timer and no dc signal is detected. The additional offset N_{OS} can be measured as the $V_{HV(hyst)}$ on the HV pin. If the comparator output produces pulses it means that the slope of input signal is higher than set resolution level and the slope is positive. If the comparator output produces the low level it means that the slope of input signal is lower than set resolution level or the slope is negative. There is used the detection timer which is reset by any edge of the comparator output. It means if no edge comes before the timer elapses there is present only dc signal or signal with the small ac ripple at the HV pin. This type of the ac detector detects only the positive slope, which fulfils the requirements for the ac line presence detection.

In case of the dc signal presence on the high voltage input, the direct sample of the high voltage obtained via the high voltage sensing structure and the delayed sample of the high voltage are equivalent and the comparator produces the low level signal during the presence of this signal. No edges are present at the output of the comparator, that's why the detection timer is not reset and dc detect signal appears.

The minimum detectable slope by this ac detector is given by the ration between the maximum hysteresis observed at HV pin $V_{HV(hyst),max}$ and the sampling time:

$$S_{min} = \frac{V_{HV(hyst),max}}{T_{sample}} \quad \text{(eq. 1)}$$

Than it can be derived the relationship between the minimum detectable slope and the amplitude and frequency of the sinusoidal input voltage:

$$V_{max} = \frac{V_{HV(hyst),max}}{2 \cdot \pi \cdot f \cdot T_{sample}} = \frac{5}{2 \cdot \pi \cdot 35 \cdot 1 \cdot 10^{-3}} \quad \text{(eq. 2)}$$

$$= 22.7\ V$$

The minimum detectable AC RMS voltage is 16 V at frequency 35 Hz, if the maximum hysteresis is 5 V and sampling time is 1 ms.

The X2 capacitor discharge feature is available in any controller operation mode to ensure this safety feature. The detection timer is reused for the time limiting of the discharge phase, to protect the device against overheating. The discharging process is cyclic and continues until the ac line is detected again or the voltage across the X2 capacitor is lower than $V_{HV(min)}$. This feature ensures to discharge quite big X2 capacitors used in the input line filter to the safe level. **It is important to note that it is not allowed to connect HV pin to any dc voltage due this feature. e.g. directly to bulk capacitor.**

During the HV sensing or X2 cap discharging the V_{CC} net is kept above the $V_{CC(off)}$ voltage by the Self–Supply in any mode of device operation to supply the control circuitry. During the discharge sequence device runs normally.

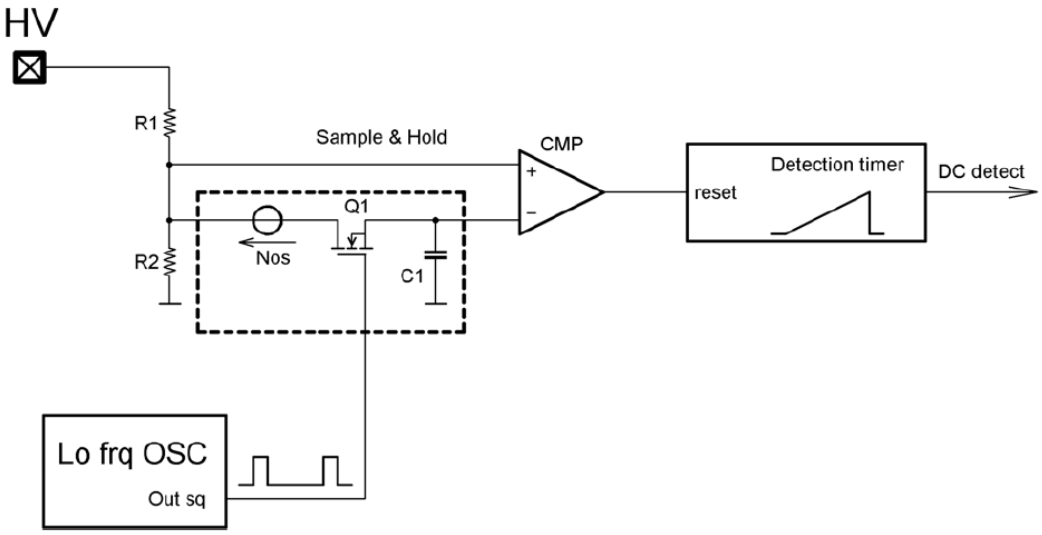

Figure 48. The ac Line Unplug Detector Structure Used for X2 Capacitor Discharge System

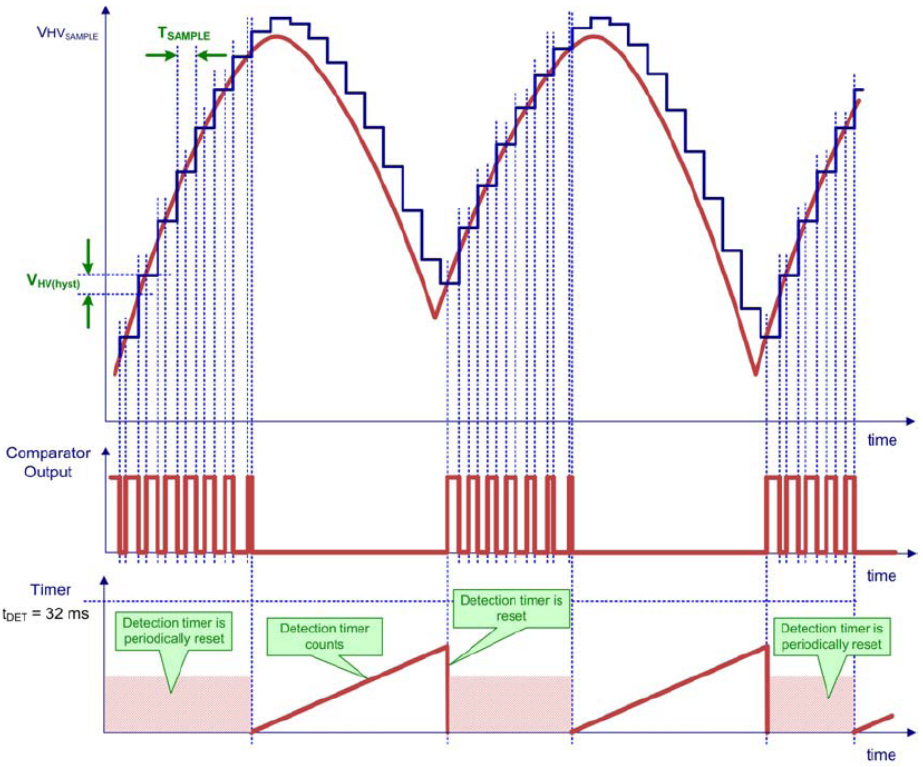

Figure 49. The ac Line Unplug Detector Timing Diagram

NCP1244

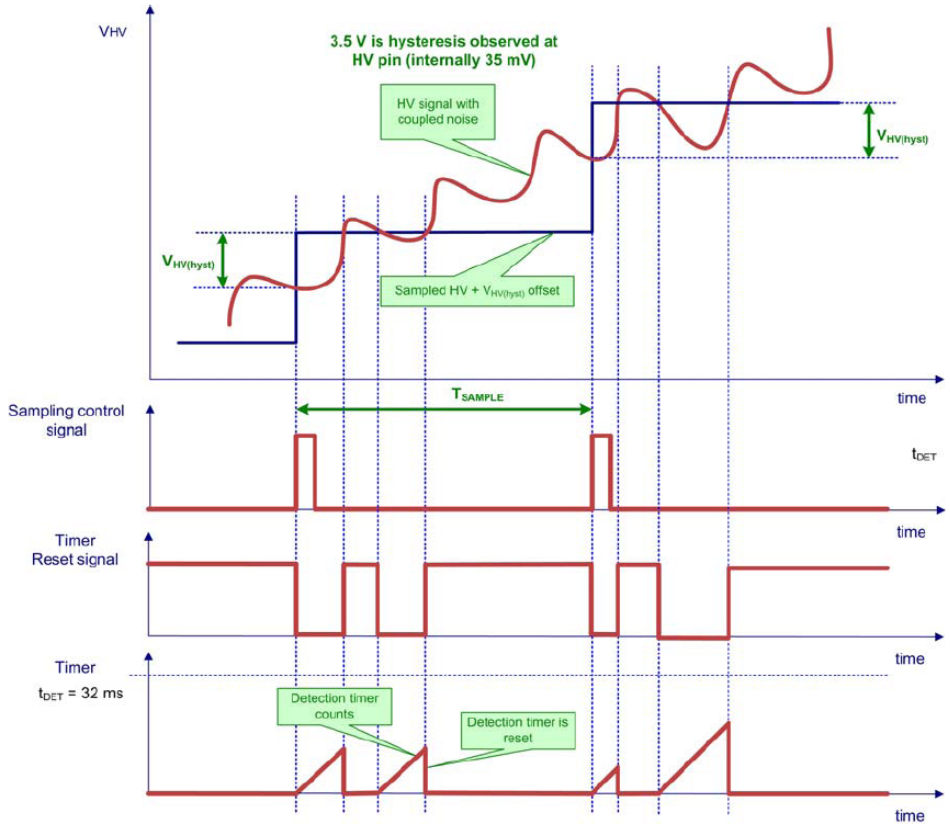

Figure 50. The ac Line Unplug Detector Timing Diagram Detail with Noise Effects

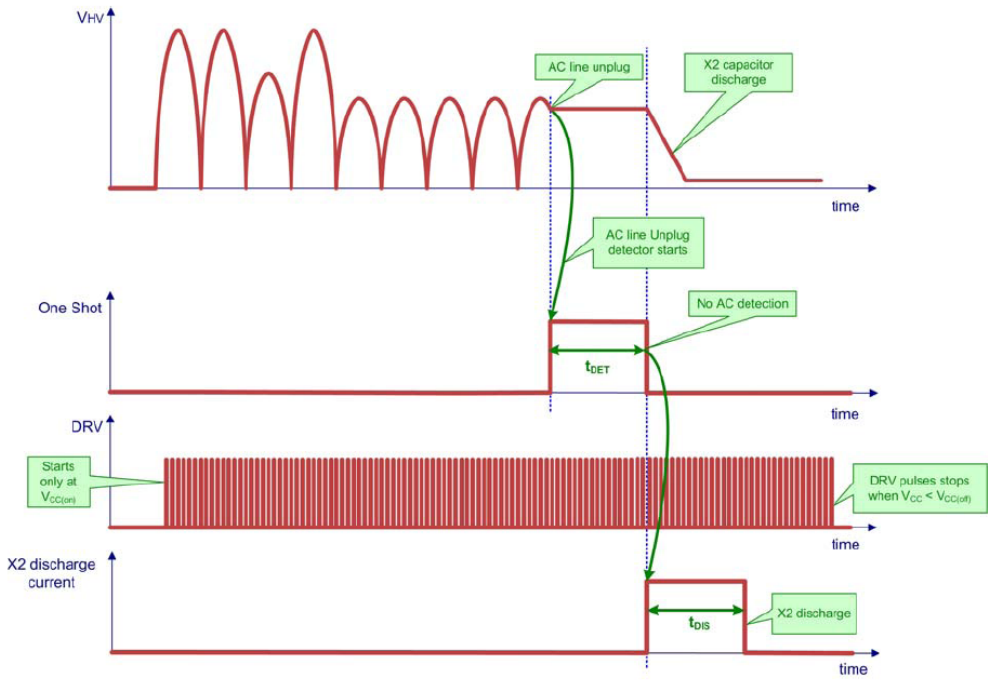

Figure 51. HV Pin ac Input Timing Diagram with X2 Capacitor Discharge Sequence when the Application is Unplugged Under Extremely Low Line Condition

NCP1244

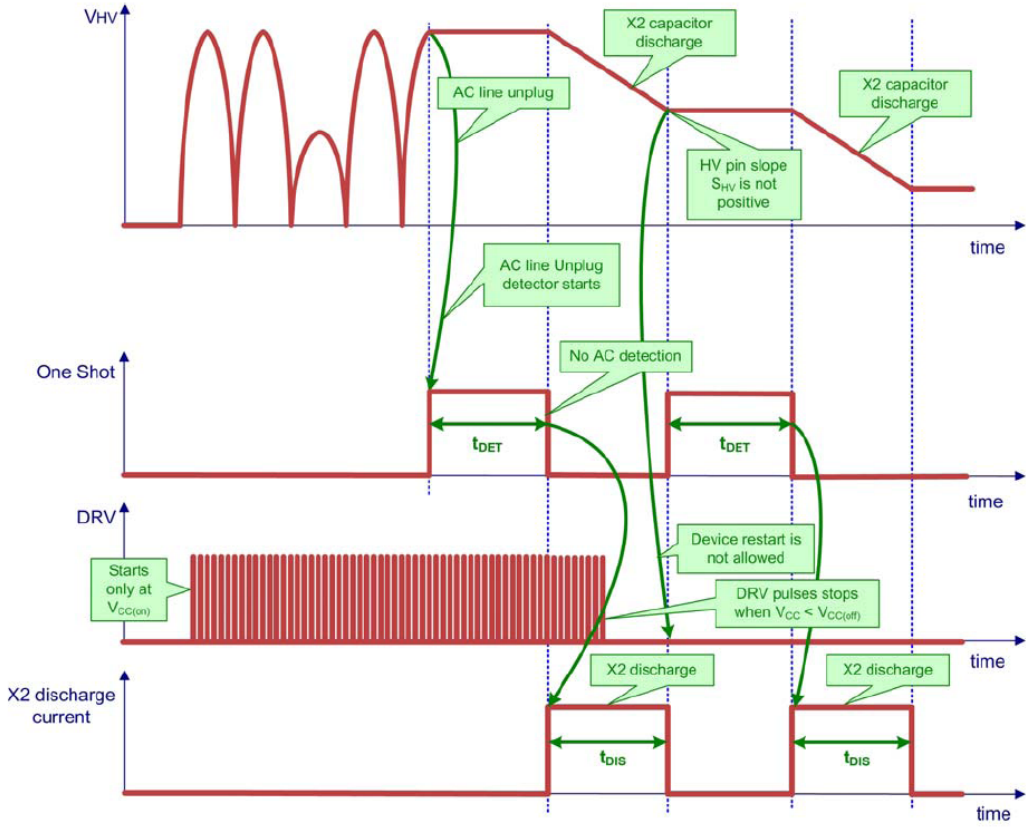

Figure 52. HV Pin ac Input Timing Diagram with X2 Capacitor Discharge Sequence When the Application is Unplugged Under High Line and Heavy Load Condition

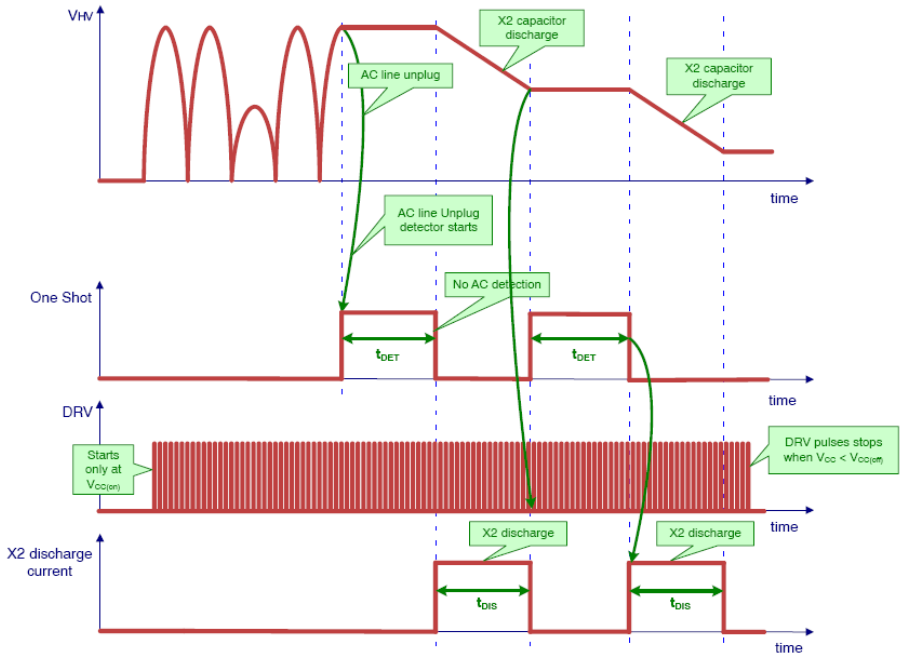

Figure 53. HV Pin ac Input Timing Diagram with X2 Capacitor Discharge Sequence When the Application is Unplugged Under High Line and Light Load Condition

The Low Consumption Off Mode

There was implemented the low consumption off mode allowing to reach extremely low no load input power as described in previous chapters. If the voltage at feedback pin decreases below the 0.4 V the controller enters the off mode. The internal V_{CC} is turned−off, the IC consumes extremely low V_{CC} current and only the voltage at external V_{CC} capacitor is maintained by the Self−Supply circuit. The Self−Supply circuit keeps the V_{CC} voltage at the $V_{CC(reg)}$ level. The supply for the FB pin watch dog circuitry and FB pin bias is provided via the low consumption current sources from the external V_{CC} capacitor. The controller can only start, if the FB pin voltage increases above the 2.2 V level. See Figure 54 for timing diagrams.

Only the X2 cap discharge and Self−Supply features is enabled in the low consumption off mode. The X2 cap discharging feature is enable due the safety reasons and the Self−Supply is enabled to keep the V_{CC} supply, but only very low V_{CC} consumption appears in this mode. Any other features are disabled in this mode.

The information about the latch status of the device is kept in the low consumption off mode and this mode is used for the TSD protection as well. The protection timer GoToOffMode t_{GTOM} is used to protect the application against the false activation of the low consumption off mode by the fast drop outs of the FB pin voltage below the 0.4 V level. E.g. in case when is present high FB pin voltage ripple during the skip mode.

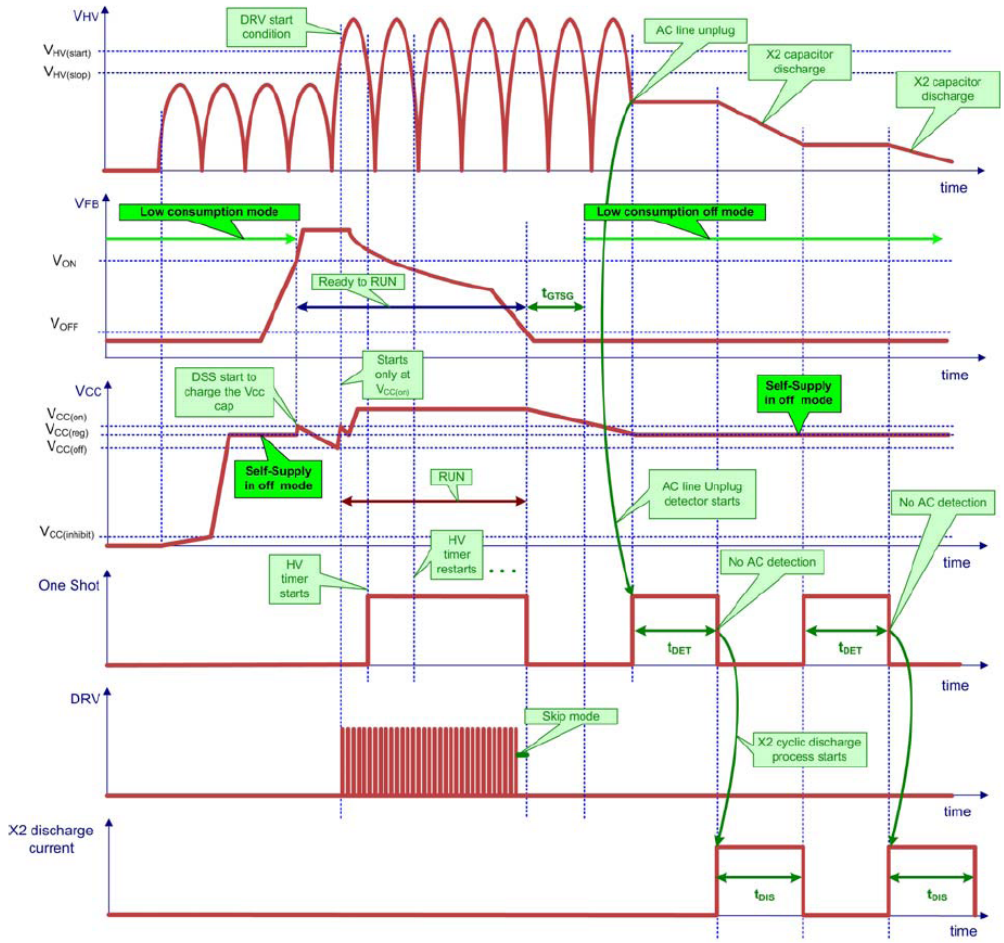

Figure 54. Start−up, Shutdown and AC Line Unplug Time Diagram

Oscillator with Maximum On Time and Frequency Jittering

The NCP1244 includes an oscillator that sets the switching frequency 65 kHz or 100 kHz depending on the version. The maximum on time is 12.3 μs (for 65 kHz version) or 8 μs (for 100 kHz version) with an accuracy of ±7%. The maximum on time corresponds to maximum duty cycle of the DRV pin is 80% at full switching frequency. In order to improve the EMI signature, the switching frequency jitters ±6 % around its nominal value, with a triangle−wave shape and at a frequency of 125 Hz. This frequency jittering is active even when the frequency is decreased to improve the efficiency in light load condition.

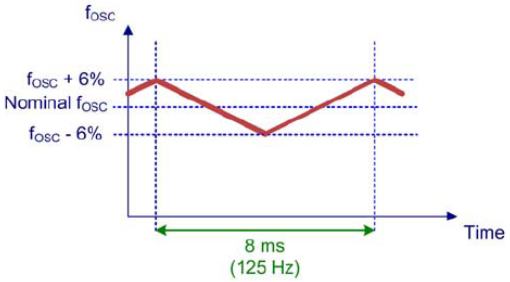

Figure 55. Frequency Modulation of the Maximum Switching Frequency

Low Load Operation Modes: Frequency Foldback Mode (FFM) and Skip Mode

In order to improve the efficiency in light load conditions, the frequency of the internal oscillator is linearly reduced from its nominal value down to $f_{OSC(min)}$. This frequency foldback starts when the voltage on FB pin goes below $V_{FB(foldS)}$, and is complete when V_{FB} reaches $V_{FB(foldE)}$. The maximum on−time duration control is kept during the frequency foldback mode to provide the natural transformer core anti−saturation protection. The frequency jittering is still active while the oscillator frequency decreases as well. The current setpoint is fixed to 300 mV in the frequency foldback mode if the feedback voltage decreases below the $V_{FB(freeze)}$ level. This feature increases efficiency under the light loads conditions as well.

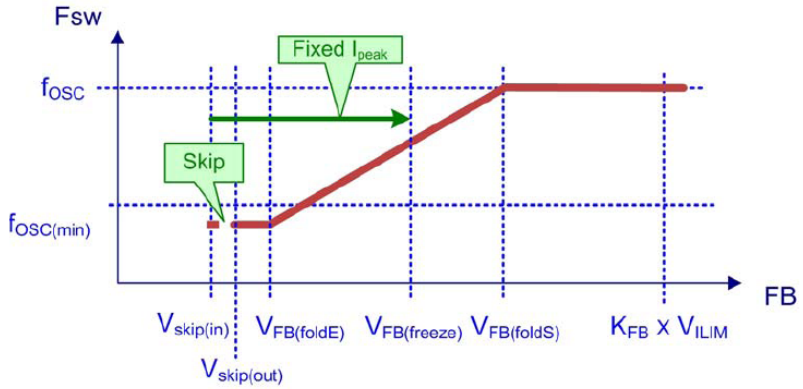

Figure 56. Frequency Foldback Mode Characteristic

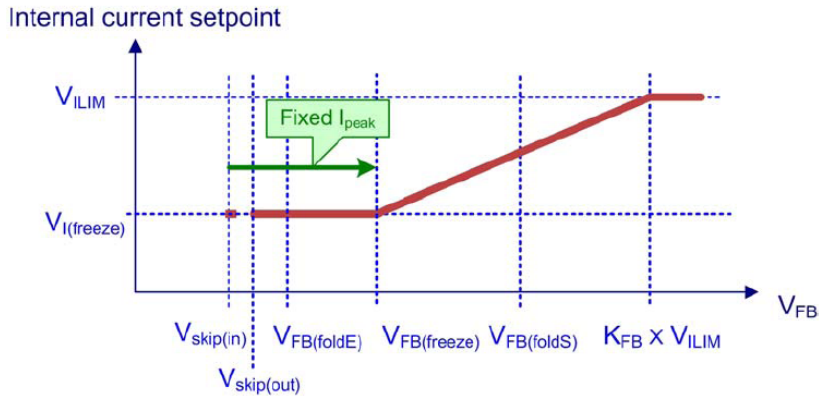

Figure 57. Current Setpoint Dependency on the Feedback Pin Voltage

When the FB voltage reaches $V_{skip(in)}$ while decreasing, skip mode is activated: the driver stops, and the internal consumption of the controller is decreased. While V_{FB} is below $V_{skip(out)}$, the controller remains in this state; but as soon as V_{FB} crosses the skip out threshold, the DRV pin starts to pulse again.

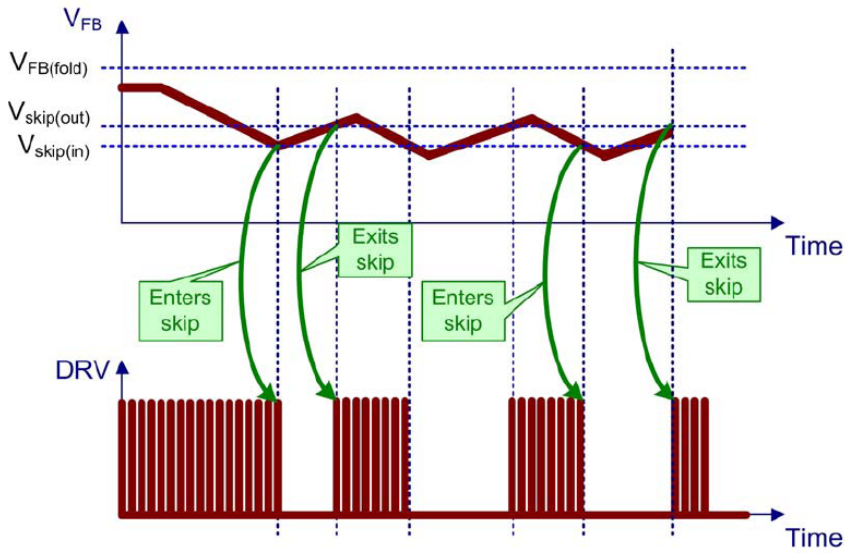

Figure 58. Skip Mode Timing Diagram

Clamped Driver

The supply voltage for the NCP1244 can be as high as 28 V, but most of the MOSFETs that will be connected to the DRV pin cannot accept more than 20 V on their gate. The driver pin is therefore clamped safely below 16 V. This driver has a typical capability of 500 mA for source current and 800 mA for sink current.

Current−Mode Control With Slope Compensation and Soft−Start

NCP1244 is a current−mode controller, which means that the FB voltage sets the peak current flowing in the inductance and the MOSFET. This is done through a PWM comparator: the current is sensed across a resistor and the resulting voltage is applied to the CS pin. It is applied to one input of the PWM comparator through a 250 ns LEB block. On the other input the FB voltage divided by 5 sets the threshold: when the voltage ramp reaches this threshold, the output driver is turned off. The maximum value for the current sense is 0.7 V, and it is set by a dedicated comparator.

Each time the controller is starting, i.e. the controller was off and starts − or restarts − when V_{CC} reaches $V_{CC(on)}$, a soft−start is applied: the current sense setpoint is increased by 15 discrete steps from 0 (the minimum level can be higher than 0 because of the LEB and propagation delay) until it reaches V_{ILIM} (after a duration of t_{SSTART}), or until the FB loop imposes a setpoint lower than the one imposed by the soft−start (the two comparators outputs are OR'ed).

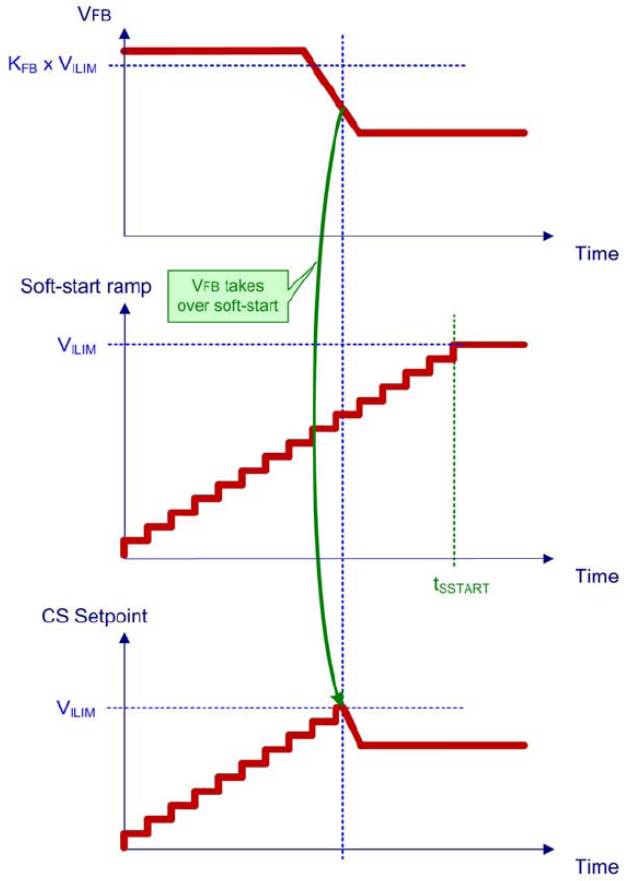

Figure 59. Soft−Start Feature

Under some conditions, like a winding short−circuit for instance, not all the energy stored during the *on* time is transferred to the output during the *off* time, even if the on time duration is at its minimum (imposed by the propagation delay of the detector added to the LEB duration). As a result, the current sense voltage keeps on increasing above V_{ILIM}, because the controller is blind during the LEB blanking time. Dangerously high current can grow in the system if nothing is done to stop the controller. That's what the additional comparator, that senses when the current sense voltage on CS pin reaches $V_{CS(stop)}$ (= 1.5 x V_{ILIM}), does: as soon as this comparator toggles, the controller immediately enters the protection mode.

In order to allow the NCP1244 to operate in CCM with a duty cycle above 50%, the fixed slope compensation is internally applied to the current−mode control. The slope appearing on the internal voltage setpoint for the PWM comparator is −32.5 mV/μs typical for the 65 kHz version, and −50 mV/μs for the 100 kHz version. The slope compensation can be observable as a value of the peak current at CS pin.

The internal slope compensation circuitry uses a sawtooth signal synchronized with the internal oscillator is subtracted from the FB voltage divided by K_{FB}.

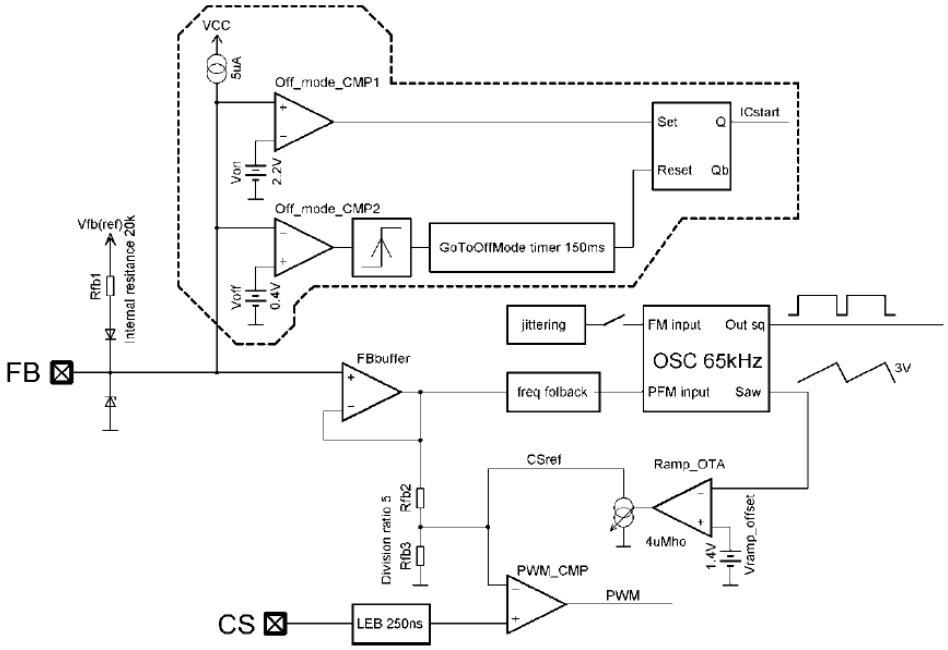

Figure 60. Slope Compensation Block Diagram

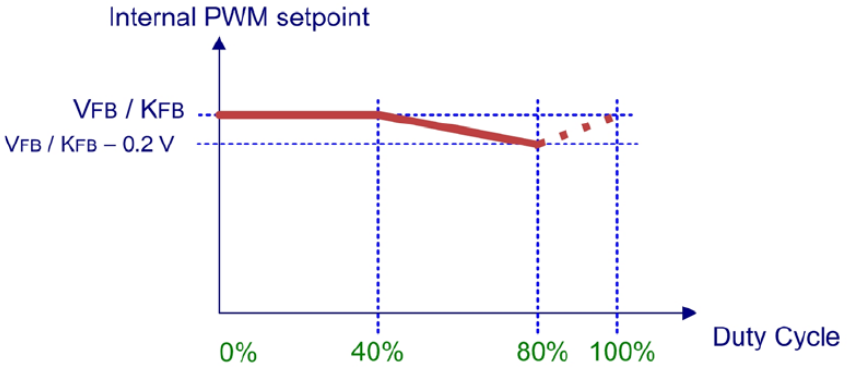

Figure 61. Slope Compensation Timing Diagram

Internal Overpower Protection

The power delivered by a flyback power supply is proportional to the square of the peak current in discontinuous conduction mode:

$$P_{OUT} = \frac{1}{2} \cdot \eta \cdot L_P \cdot F_{SW} \cdot I_P{}^2 \qquad \text{(eq. 3)}$$

Unfortunately, due to the inherent propagation delay of the logic, the actual peak current is higher at high input voltage than at low input voltage, leading to a significant difference in the maximum output power delivered by the power supply.

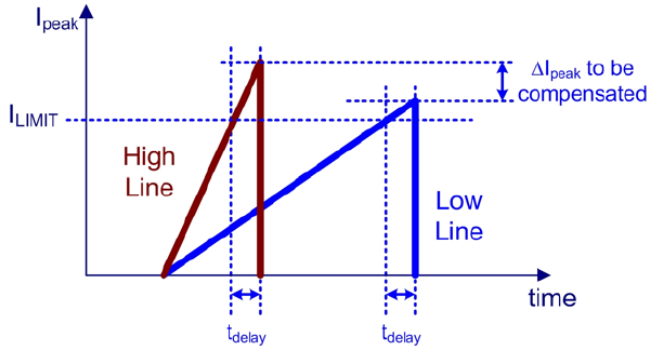

Figure 62. Needs for Line Compensation For True Overpower Protection

To compensate this and have an accurate overpower protection, an offset proportional to the input voltage is added on the CS signal by turning on an internal current source: by adding an external resistor in series between the sense resistor and the CS pin, a voltage offset is created across it by the current. The compensation can be adjusted by changing the value of the resistor.

But this offset is unwanted to appear when the current sense signal is small, i.e. in light load conditions, where it would be in the same order of magnitude. Therefore the compensation current is only added when the FB voltage is higher than $V_{FB(OPCE)}$. However, because the HV pin can be connected to an ac voltage, there is needed an additional circuitry to read or at least closely estimate the actual voltage on the bulk capacitor.

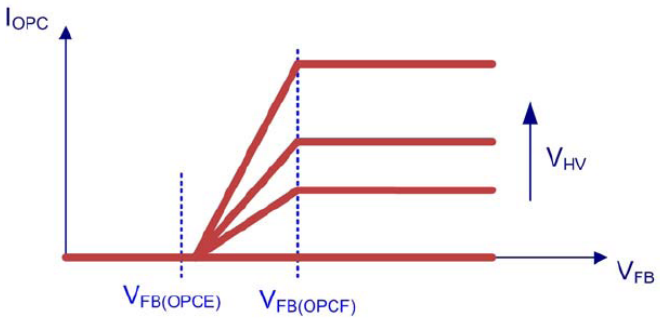

Figure 63. Overpower Protection Current Relation to Feedback Voltage

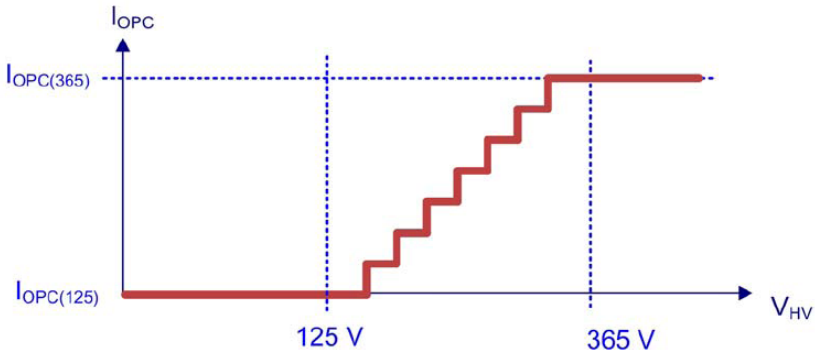

Figure 64. Overpower Protection Current Relation to Peak of Rectified Input Line AC voltage

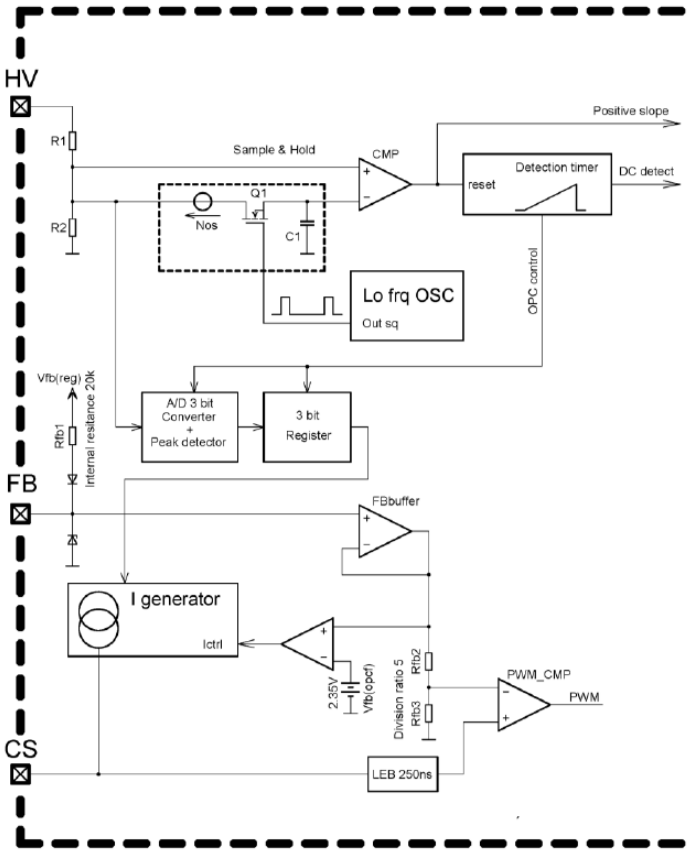

Figure 65. Block Schematic of Overpower Protection Circuit

A 3 bit A/D converter with the peak detector senses the ac input, and its output is periodically sampled and reset, in order to follow closely the input voltage variations. The sample and reset events are given by the output from the ac line unplug detector. The sensed HV pin voltage peak value is validated when no HV edges from comparator are present after last falling edge during two sample clocks. See Figure 66 for details.

Overcurrent Protection with Fault timer

The overload protection depends only on the current sensing signal, making it able to work with any transformer, even with very poor coupling or high leakage inductance.

When an overcurrent occurs on the output of the power supply, the FB loop asks for more power than the controller can deliver, and the CS setpoint reaches V_{ILIM}. When this event occurs, an internal t_{fault} timer is started: once the timer times out, DRV pulses are stopped and the controller is either latched off (latched protection, option A) or this latch can be released in autorecovery mode (option B), the controller tries to restart after $t_{autorec}$. Another possibility of the latch release is the V_{CC} power on reset or the ac line unplug event detected via ac detector. Therefore the latch can be released by the end of the 1st X2 discharge event. The timer is reset when the CS setpoint goes back below V_{ILIM} before the timer elapses. The fault timer is also started if the driver signal is reset by the max duty−ratio. The controller also enters the same protection mode if the voltage on the CS pin reaches 1.5 times the maximum internal setpoint $V_{CS(stop)}$ (allows to detect winding short−circuits) or there appears low V_{CC} supply. See Figures 67 and 68 for the timing diagram.

In autorecovery mode if the fault has gone, the supply resumes operation; if not, the system starts a new burst cycle.

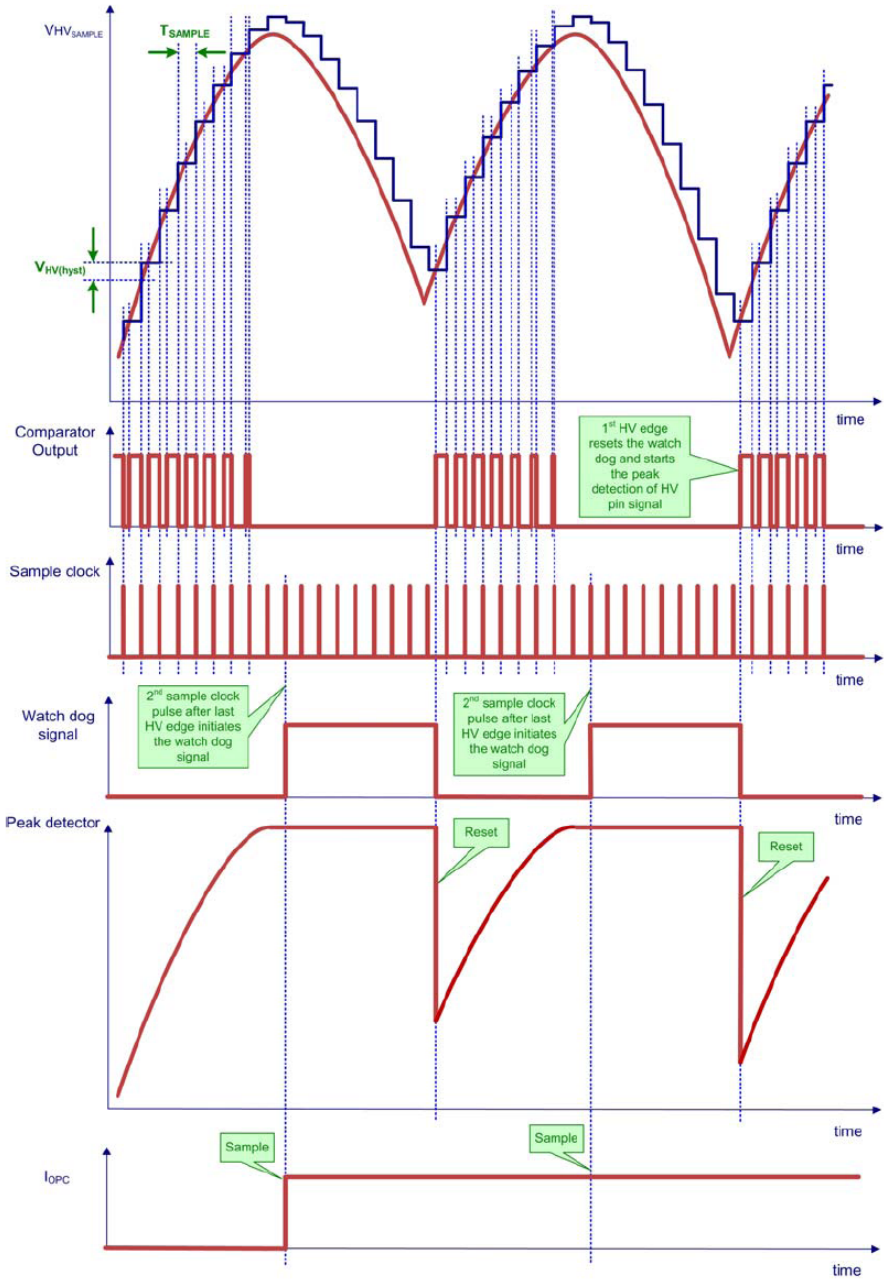

Figure 66. Overpower Compensation Timing Diagram

Nemko

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PROTECTION MODES AND THE LATCH MODE RELEASES

Event	Timer Protection	Next Device Status	Release to Normal Operation Mode
Overcurrent $V_{ILIM} > 0.7$ V	Fault timer	Latch	Autorecovery – B version 1st X2 discharge event $V_{CC} < V_{CC(reset)}$
Winding short $V_{sense} > V_{CS(stop)}$	Immediate reaction	Latch	Autorecovery – B version 1st X2 discharge event $V_{CC} < V_{CC(reset)}$
Low supply $V_{CC} < V_{CC(off)}$	10 μs timer	Latch	1st X2 discharge event $V_{CC} \geq V_{CC(reset)}$
External OTP, OVP	55 μs (35 μs at 100 kHz)	Latch	1st X2 discharge event $V_{CC} < V_{CC(on)}$
High supply $V_{CC} > V_{CC(ovp)}$	10 μs timer	Latch	1st X2 discharge event $V_{CC} < V_{CC(reset)}$
Internal TSD	10 μs timer	Device stops, HV start−up current source stops	($V_{CC} > V_{CC(on)}$) & TSDb
Off mode $V_{FB} < V_{OFF}$	600 ms timer	Device stops and internal V_{CC} is turned off	($V_{CC} > V_{CC(on)}$) & ($V_{FB} > V_{ON}$)

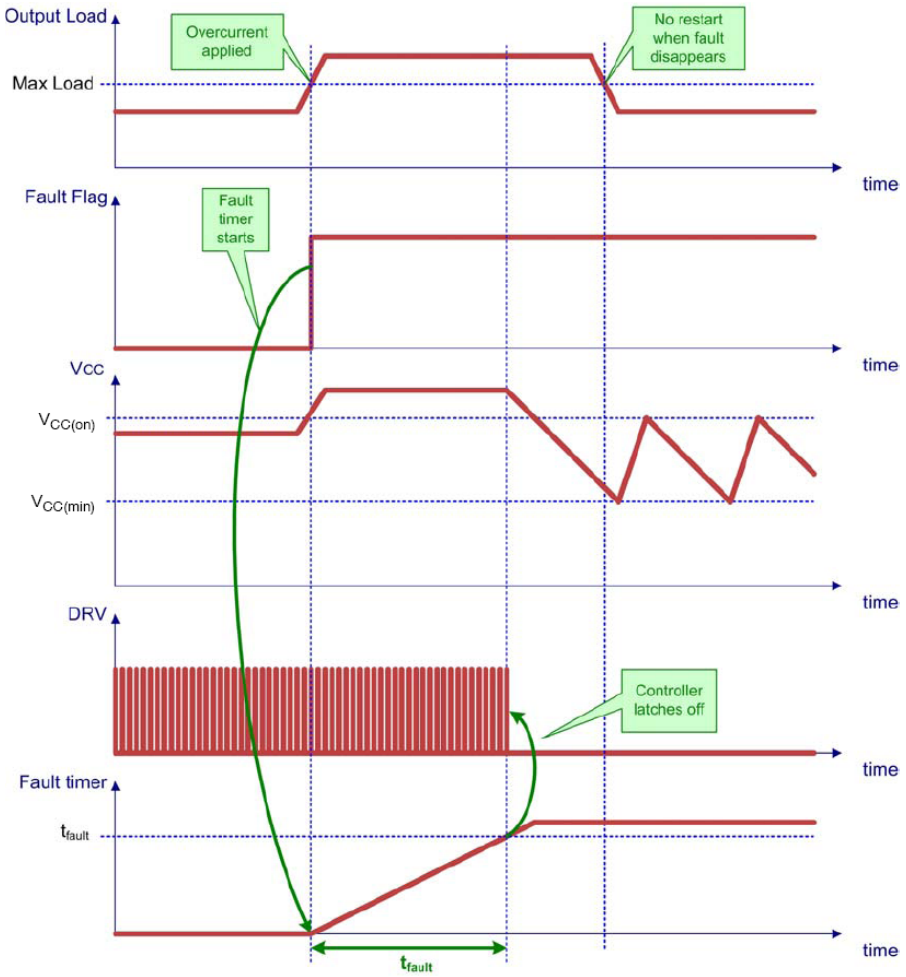

Figure 67. Latched Timer−Based Overcurrent Protection (Option A)

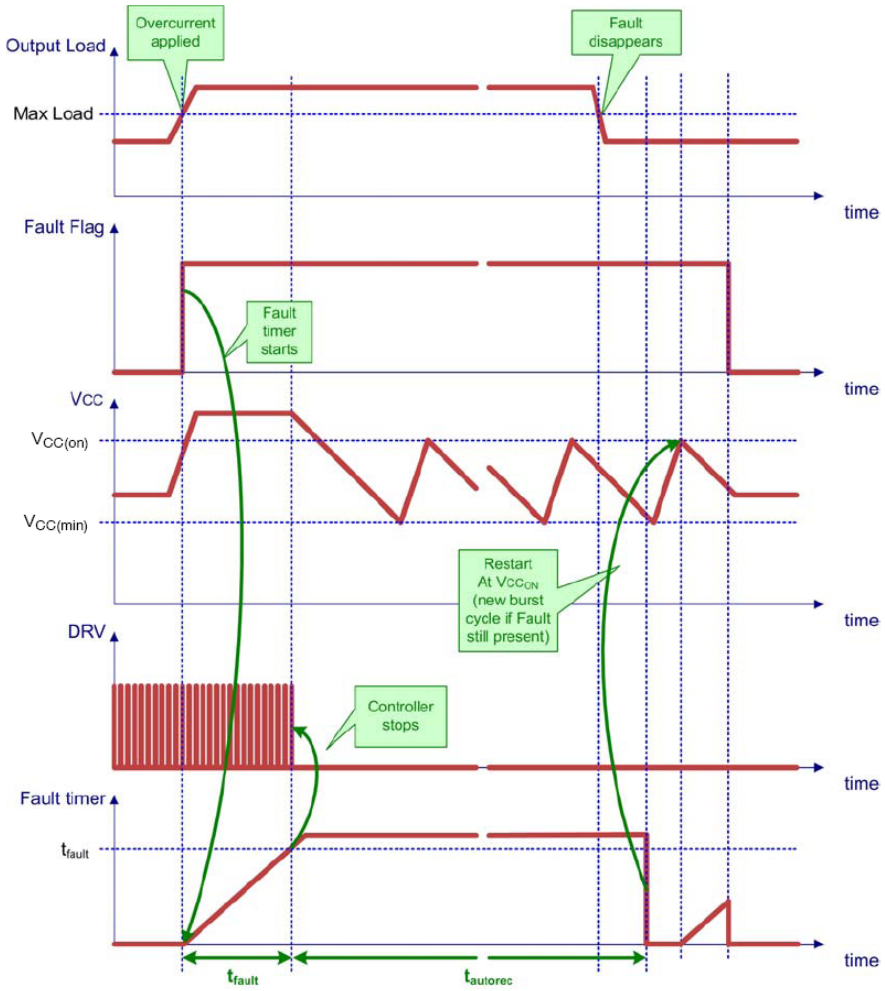

Figure 68. Timer−Based Protection Mode with Autorecovery Release from Latch−off (Option B)

Latch−Off Input

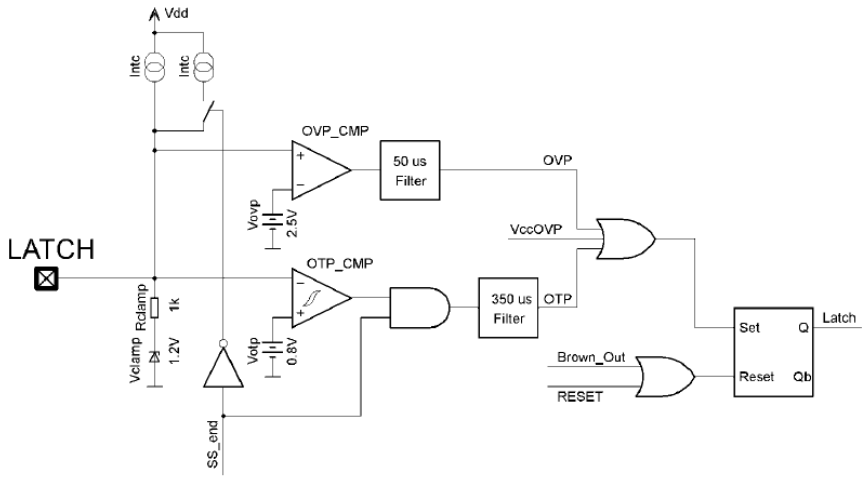

Figure 69. Latch Detection Schematic

The Latch pin is dedicated to the latch−off function: it includes two levels of detection that define a working window, between a high latch and a low latch: within these two thresholds, the controller is allowed to run, but as soon as either the low or the high threshold is crossed, the controller is latched off. The lower threshold is intended to be used with an NTC thermistor, thanks to an internal current source I_{NTC}.

An active clamp prevents the voltage from reaching the high threshold if it is only pulled up by the I_{NTC} current. To reach the high threshold, the pull−up current has to be higher than the pull−down capability of the clamp (typically 1.5 mA at V_{OVP}).

To avoid any false triggering, spikes shorter than 50 µs (for the high latch and 65 kHz version) or 350 µs (for the low latch) are blanked and only longer signals can actually latch the controller.

Reset occurs the V_{CC} is cycled down to a reset voltage, which in a real application can only happen if the power supply is unplugged from the ac line.

Upon startup, the internal references take some time before being at their nominal values; so one of the comparators could toggle even if it should not. Therefore the internal logic does not take the latch signal into account before the controller is ready to start: once V_{CC} reaches $V_{CC(on)}$, the latch pin High latch state is taken into account and the DRV switching starts only if it is allowed; whereas the Low latch (typically sensing an over temperature) is taken into account only after the soft−start is finished. In addition, the NTC current is doubled to $I_{NTC(SSTART)}$ during the soft−start period, to speed up the charging of the Latch pin capacitor. The maximum value of Latch pin capacitor is given by the following formula (The standard start−up condition is considered and the NTC current is neglected):

$$C_{LATCH\ max} = \frac{t_{SSTART\ min} \cdot I_{NTC(SSTART)\ min}}{V_{clamp0\ min}} = \frac{8.0 \cdot 10^{-3} \cdot 130 \cdot 10^{-6}}{1.0} F = 1.04\,\mu F \quad \text{(eq. 4)}$$

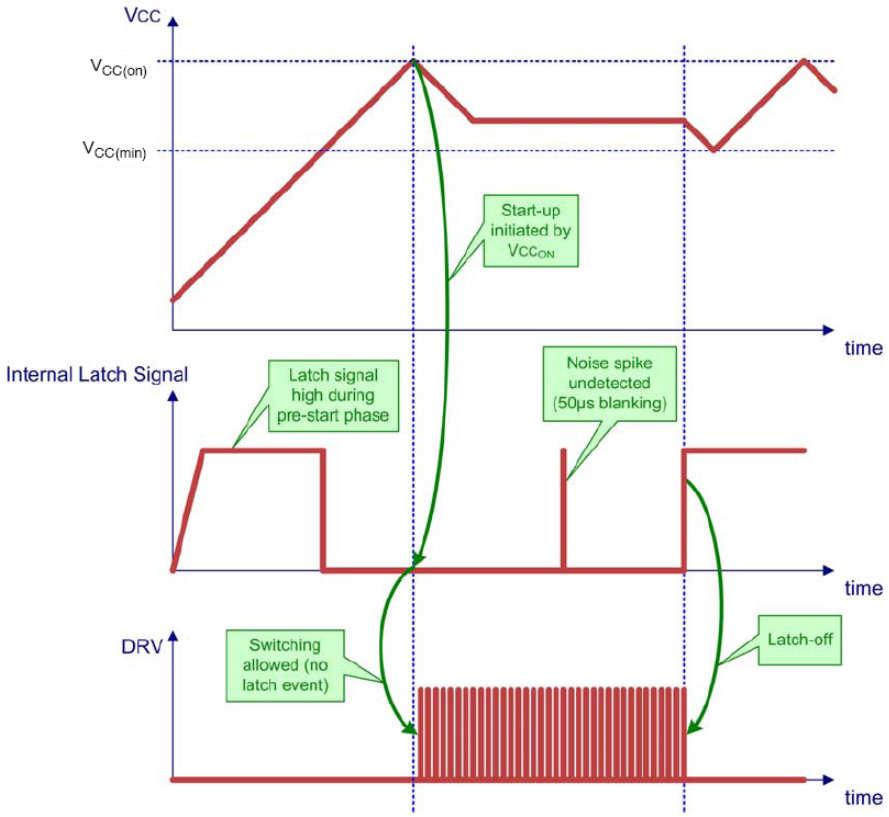

Figure 70. Latch Timing Diagram

Temperature Shutdown

The NCP1244 includes a temperature shutdown protection with a trip point typically at 150°C and the typical hysteresis of 30°C. When the temperature rises above the high threshold, the controller stops switching instantaneously, and goes to the off mode with extremely low power consumption. There is kept the V_{CC} supply to keep the TSD information. When the temperature falls below the low threshold, the start−up of the device is enabled again, and a regular start−up sequence takes place. See the status diagrams at the Figures 44 and 45.

ORDERING INFORMATION 5

Ordering Part No.	Overload Protection	Switching Frequency	Package	Shipping†
NCP1244AD065R2G	Latched	65 kHz	SOIC−7 (Pb−Free)	2500 / Tape & Reel
NCP1244BD065R2G	Autorecovery	65 kHz	SOIC−7 (Pb−Free)	2500 / Tape & Reel
NCP1244AD100R2G	Latched	100 kHz	SOIC−7 (Pb−Free)	2500 / Tape & Reel
NCP1244BD100R2G	Autorecovery	100 kHz	SOIC−7 (Pb−Free)	2500 / 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.

Unit data sheet

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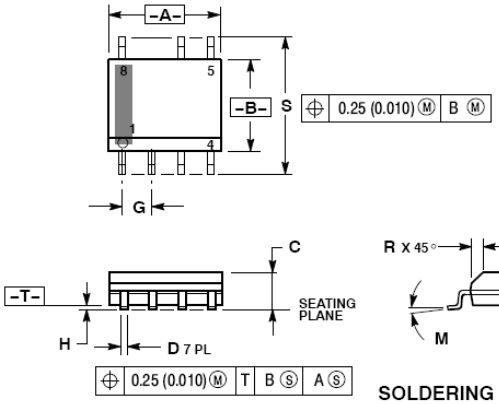
PACKAGE DIMENSIONS

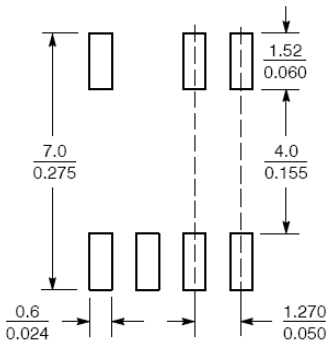
SOIC−7
CASE 751U
ISSUE E



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B ARE DATUMS AND T IS A DATUM SURFACE.
4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
5. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

SOLDERING FOOTPRINT*



SCALE 6:1 (mm / inches)

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

NCP1244/D

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60950-1
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES
Information technology equipment – Safety –
Part 1: General requirements

Differences according to.....:	EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013
Attachment Form No.....:	EU_GD_IEC60950_1F
Attachment Originator.....:	SGS Fimko Ltd
Master Attachment.....:	Date 2014-02

EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013 – CENELEC COMMON MODIFICATIONS

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	Clauses, subclauses, notes, tables and figures which are additional to those in IEC60950-1 and it´s amendmets are prefixed “Z”		**P**
Contents (A2:2013)	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZD (informative) IEC and CENELEC code designations for flexible cords		**P**
General	Delete all the “country” notes in the reference document (IEC 60950-1:2005) according to the following list: 1.4.8 Note 2 1.5.1 Note 2 & 3 1.5.7.1 Note 1.5.8 Note 2 1.5.9.4 Note 1.7.2.1 Note 4, 5 & 6 2.2.3 Note 2.2.4 Note 2.3.2 Note 2.3.2.1 Note 2 2.3.4 Note 2 2.6.3.3 Note 2 & 3 2.7.1 Note 2.10.3.2 Note 2 2.10.5.13 Note 3 3.2.1.1 Note 3.2.4 Note 3. 2.5.1 Note 2 4.3.6 Note 1 & 2 4.7 Note 4 4.7.2.2 Note 4.7.3.1 Note 2 5.1.7.1 Note 3 & 4 5.3.7 Note 1 6 Note 2 & 5 6.1.2.1 Note 2 6.1.2.2 Note 6.2.2 Note 6.2.2.1 Note 2 6.2.2.2 Note 7.1 Note 3 7.2 Note 7.3 Note 1 & 2 G.2.1 Note 2 Annex H Note 2		**P**
General (A1:2010)	Delete all the “country” notes in the reference document (IEC 60950-1:2005/A1:2010) according to the following list: 1.5.7.1 Note 6.1.2.1 Note 2 6.2.2.1 Note 2 EE.3 Note		**P**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
General (A2:2013)	Delete all the "country" notes in the reference document (IEC 60950-1:2005/A2:2013) according to the following list: 2.7.1 Note * 2.10.3.1 Note 2 6.2.2. Note * Note of secretary: Text of Common Modification remains unchanged.		**P**
1.1.1 (A1:2010)	**Replace** the text of NOTE 3 by the following. NOTE 3 The requirements of EN 60065 may also be used to meet safety requirements for multimedia equipment. See IEC Guide 112, Guide on the safety of multimedia equipment. For television sets EN 60065 applies.		**P**
1.3.Z1	Add the following subclause: 1.3.Z1 Exposure to excessive sound pressure The apparatus shall be so designed and constructed as to present no danger when used for its intended purpose, either in normal operating conditions or under fault conditions, particularly providing protection against exposure to excessive sound pressures from headphones or earphones. NOTE Z1 A new method of measurement is described in EN 50332-1, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1: General method for "one package equipment", and in EN 50332-2, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 2: Guidelines to associate sets with headphones coming from different manufacturers.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
(A12:2011)	In EN 60950-1:2006/A12:2011 Delete the addition of 1.3.Z1 / EN 60950-1:2006 Delete the definition 1.2.3.Z1 / EN 60950-1:2006 /A1:2010	Deleted.	**N/A**
1.5.1 (Added info*)	Add the following NOTE: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2002/95/EC. New Directive 2011/65/11 *	Considered.	**P**
1.7.2.1 (A1:2010)	In addition, for a PORTABLE SOUND SYSTEM, the instructions shall include a warning that excessive sound pressure from earphones and headphones can cause hearing loss.	Not a portable sound system.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.2.1 (A12.2011)	In EN 60950-1:2006/A12:2011 Delete NOTE Z1 and the addition for Portable Sound System. Add the following clause and annex to the existing standard and amendments.	Not a portable sound system.	**N/A**
	Zx Protection against excessive sound pressure from personal music players		**N/A**
	Zx.1 General This sub-clause specifies requirements for protection against excessive sound pressure from personal music players that are closely coupled to the ear. It also specifies requirements for earphones and headphones intended for use with personal music players. A personal music player is a portable equipment for personal use, that: – is designed to allow the user to listen to recorded or broadcast sound or video; and – primarily uses headphones or earphones that can be worn in or on or around the ears; and – allows the user to walk around while in use. NOTE 1 Examples are hand-held or body-worn portable CD players, MP3 audio players, mobile phones with MP3 type features, PDA's or similar equipment. A personal music player and earphones or headphones intended to be used with personal music players shall comply with the requirements of this sub-clause. The requirements in this sub-clause are valid for music or video mode only. The requirements do not apply: – while the personal music player is connected to an external amplifier; or – while the headphones or earphones are not used. NOTE 2 An external amplifier is an amplifier which is not part of the personal music player or the listening device, but which is intended to play the music as a standalone music player. The requirements do not apply to: – hearing aid equipment and professional equipment; NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment.	Not a portable equipment.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	– analogue personal music players (personal music players without any kind of digital processing of the sound signal) that are brought to the market before the end of 2015. NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies. For equipment which is clearly designed or intended for use by young children, the limits of EN 71-1 apply.	Not a Portable Sound System.	**N/A**
	Zx.2 Equipment requirements No safety provision is required for equipment that complies with the following: – equipment provided as a package (personal music player with its listening device), where the acoustic output $L_{Aeq,T}$ is ≤ 85 dBA measured while playing the fixed “programme simulation noise” as described in EN 50332-1; and – a personal music player provided with an analogue electrical output socket for a listening device, where the electrical output is ≤ 27 mV measured as described in EN 50332-2, while playing the fixed “programme simulation noise” as described in EN 50332-1. NOTE 1 Wherever the term acoustic output is used in this clause, the 30 s A-weighted equivalent sound pressure level $L_{Aeq,T}$ is meant. See also Zx.5 and Annex Zx. All other equipment shall: a) protect the user from unintentional acoustic outputs exceeding those mentioned above; and b) have a standard acoustic output level not exceeding those mentioned above, and automatically return to an output level not exceeding those mentioned above when the power is switched off; and	Not a portable equipment.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	c) provide a means to actively inform the user of the increased sound pressure when the equipment is operated with an acoustic output exceeding those mentioned above. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an acoustic output exceeding those mentioned above. The acknowledgement does not need to be repeated more than once every 20 h of cumulative listening time; and NOTE 2 Examples of means include visual or audible signals. Action from the user is always required. NOTE 3 The 20 h listening time is the accumulative listening time, independent how often and how long the personal music player has been switched off. d) have a warning as specified in Zx.3; and e) not exceed the following: 1) equipment provided as a package (player with Its listening device), the acoustic output shall be ≤ 100 dBA measured while playing the fixed “programme simulation noise” described in EN 50332-1; and 2) a personal music player provided with an analogue electrical output socket for a listening device, the electrical output shall be ≤ 150 mV measured as described in EN 50332-2, while playing the fixed “programme simulation noise” described in EN 50332-1. For music where the average sound pressure (long term $L_{Aeq,T}$) measured over the duration of the song is lower than the average produced by the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song is below the basic limit of 85 dBA. In this case T becomes the duration of the song. NOTE 4 Classical music typically has an average sound pressure (long term $L_{Aeq,T}$) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the song and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song is below the basic limit of 85 dBA. For example, if the player is set with the programme simulation noise to 85 dBA, but the average music level of the song is only 65 dBA, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dBA.	Not a portable equipment.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	Zx.3 Warning The warning shall be placed on the equipment, or on the packaging, or in the instruction manual and shall consist of the following: – the symbol of Figure 1 with a minimum height of 5 mm; and – the following wording, or similar: "To prevent possible hearing damage, do not listen at high volume levels for long periods."  **Figure 1 – Warning label (IEC 60417-6044)** Alternatively, the entire warning may be given through the equipment display during use, when the user is asked to acknowledge activation of the higher level.	Not a portable sound system.	**N/A**
	Zx.4 Requirements for listening devices (headphones and earphones)		**N/A**
	Zx.4.1 Wired listening devices with analogue input With 94 dBA sound pressure output $L_{Aeq,T}$, the input voltage of the fixed "programme simulation noise" described in EN 50332-2 shall be ≥ 75 mV. This requirement is applicable in any mode where the headphones can operate (active or passive), including any available setting (for example built-in volume level control). NOTE The values of 94 dBA – 75 mV correspond with 85dBA – 27 mV and 100 dBA – 150 mV.	Not a portable sound system.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
	Zx.4.2 Wired listening devices with digital input With any playing device playing the fixed "programme simulation noise" described in EN 50332-1 (and respecting the digital interface standards, where a digital interface standard exists that specifies the equivalent acoustic level), the acoustic output $L_{Aeq,T}$ of the listening device shall be ≤ 100 dBA. This requirement is applicable in any mode where the headphones can operate, including any available setting (for example built-in volume level control, additional sound feature like equalization, etc.). NOTE An example of a wired listening device with digital input is a USB headphone.	Not a portable sound system.	**N/A**
	Zx.4.3 Wireless listening devices In wireless mode: – with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and – respecting the wireless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and – with volume and sound settings in the listening device (for example built-in volume level control, additional sound feature like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the abovementioned programme simulation noise, the acoustic output $L_{Aeq,T}$ of the listening device shall be ≤ 100 dBA. NOTE An example of a wireless listening device is a Bluetooth headphone.	Not a portable sound system.	**N/A**
	Zx.5 Measurement methods Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable. Unless stated otherwise, the time interval T shall be 30 s. NOTE Test method for wireless equipment provided without listening device should be defined.	Not a portable sound system.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
2.7.1	Replace the subclause as follows: Basic requirements To protect against excessive current, short-circuits and earth faults in PRIMARY CIRCUITS, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of 5.3 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation;	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
	c) it is permitted for PLUGGABLE EQUIPMENT TYPE B or PERMANENTLY CONNECTED EQUIPMENT, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for PLUGGABLE EQUIPMENT TYPE A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
2.7.2	This subclause has been declared ‘void’.	Must be considered when installed in the end product.	**N/A**
3.2.3	Delete the NOTE in Table 3A, and delete also in this table the conduit sizes in parentheses.	Must be considered when installed in the end product.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.5.1	Replace "60245 IEC 53" by "H05 RR-F"; "60227 IEC 52" by "H03 VV-F or H03 VVH2-F"; "60227 IEC 53" by "H05 VV-F or H05 VVH2-F2". In Table 3B, replace the first four lines by the following: Up to and including 6 | 0,75 [a] | Over 6 up to and including 10| (0,75) [b] 1,0 | Over 10 up to and including 16| (1,0) [c] 1,5 | In the conditions applicable to Table 3B delete the words "in some countries" in condition [a]. In NOTE 1, applicable to Table 3B, delete the second sentence.	Must be considered when installed in the end product.	**N/A**
3.2.5.1 (A2:2013)	NOTE Z1The harmonised code designations corresponding to the IEC cord types are given in Annex ZD	Must be considered when installed in the end product.	**N/A**
3.3.4	In Table 3D, delete the fourth line: conductor sizes for 10 to 13 A, and replace with the following: Over 10 up to and including 16 | 1,5 to 2,5 | 1,5 to 4 | Delete the fifth line: conductor sizes for 13 to 16 A	Must be considered when installed in the end product.	**N/A**
4.3.13.6 (A1:2010)	Replace the existing NOTE by the following: NOTE Z1 Attention is drawn to: 1999/519/EC: Council Recommendation on the limitation of exposure of the general public to electromagnetic fields 0 Hz to 300 GHz, and 2006/25/EC: Directive on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artifical optical radiation).	Not applicable.	**N/A**
	Standards taking into account mentioned Recommendation and Directive which demonstrate compliance with the applicable EU Directive are indicated in the OJEC.	Not applicable.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-1, GROUP DIFFERENCES (CENELEC common modifications EN)			
Clause	Requirement + Test	Result - Remark	Verdict
Annex H	Replace the last paragraph of this annex by: At any point 10 cm from the surface of the OPERATOR ACCESS AREA, the dose rate shall not exceed 1 µSv/h (0,1 mR/h) (see NOTE). Account is taken of the background level. Replace the notes as follows: NOTE These values appear in Directive 96/29/Euratom. Delete NOTE 2.	The unit does not emit X-ray radiation.	**N/A**
Bibliography	Additional EN standards.		—

ZA	**NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS**	—

ZB ANNEX (normative) SPECIAL NATIONAL CONDITIONS (EN)			
Clause	Requirement + Test	Result - Remark	Verdict
1.2.4.1	In **Denmark**, certain types of Class I appliances (see 3.2.1.1) may be provided with a plug not establishing earthing conditions when inserted into Danish socket-outlets.	Must be considered when installed in the end product.	**N/A**
1.2.13.14 (A11:2009)	In **Norway** and **Sweden**, for requirements see 1.7.2.1 and 7.3 of this annex.	Not connected to cable distribution system.	**N/A**
1.5.7.1 (A11:2009)	In **Finland, Norway** and **Sweden**, resistors bridging BASIC INSULATION in CLASS I PLUGGABLE EQUIPMENT TYPE A must comply with the requirements in 1.5.7.1. In addition when a single resistor is used, the resistor must withstand the resistor test in 1.5.7.2.	No such parts.	**N/A**
1.5.8	In **Norway**, due to the IT power system used (see annex V, Figure V.7), capacitors are required to be rated for the applicable line-to-line voltage (230 V).	No such parts.	**N/A**
1.5.9.4	In **Finland**, **Norway** and **Sweden**, the third dashed sentence is applicable only to equipment as defined in 6.1.2.2 of this annex.	Not applicable.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.2.1	In **Finland**, **Norway** and **Sweden**, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: “Apparatet må tilkoples jordet stikkontakt” In **Sweden**: “Apparaten skall anslutas till jordat uttag”	Must be checked in the end product.	**N/A**
1.7.2.1 (A11:2009)	In **Norway** and **Sweden**, the screen of the cable distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation need to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by e.g. a retailer. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).”		

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
	NOTE In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): "Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet." Translation to Swedish: "Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet."	Must be checked in the end product.	**N/A**
1.7.2.1 (A2:2013)	In **Denmark**, CLASS I PLUGGABLE EQUIPMENT TYPE A intended for connection to other equipment or a network shall, if safety relies on connection to protective earth or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment must be connected to an earthed mains socket-outlet. The marking text in **Denmark** shall be as follows: In **Denmark**: "Apparatets stikprop skal tilsluttes en stikkontakt med jord, som giver forbindelse til stikproppens jord."	Must be checked in the end product.	**N/A**
1.7.5 1.7.5 (A11:2009)	In **Denmark**, socket-outlets for providing power to other equipment shall be in accordance with the Heavy Current Regulations, Section 107-2-D1, Standard Sheet DK 1-3a, DK 1-5a or DK 1-7a, when used on Class I equipment. For STATIONARY EQUIPMENT the socket-outlet shall be in accordance with Standard Sheet DK 1-1b or DK 1-5a. For **CLASS II EQUIPMENT** the socket outlet shall be in accordance with Standard Sheet DKA 1-4a.	No socket-outlets provided.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.5 (A2:2013)	In **Denmark**, socket-outlets for providing power to other equipment shall be in accordance with the DS 60884-2-D1:2011. For class I equipment the following Standard Sheets are applicable: DK 1-3a, DK 1-1c, DK 1-1d, DK 1-5a or DK 1-7a, with the exception for STATIONARY EQUIPMENT where the socket-outlets shall be in accordance with Standard Sheet DK 1-1b, DK 1-1c, DK 1-1d or DK 1-5a. Socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance with DS 60884-2-D1 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with by DS 60884-2-D1 Standard Sheet DKA 1-3a or DKA 1-3b. Justification the Heavy Current Regulations, 6c	No socket-outlets provided.	**N/A**
2.2.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.	No TNV circuits.	**N/A**
2.3.2	In **Finland**, **Norway** and **Sweden** there are additional requirements for the insulation. See 6.1.2.1 and 6.1.2.2 of this annex.	No TNV circuits.	**N/A**
2.3.4	In **Norway**, for requirements see 1.7.2.1, 6.1.2.1 and 6.1.2.2 of this annex.	No TNV circuits.	**N/A**
2.6.3.3	In the **United Kingdom**, the current rating of the circuit shall be taken as 13 A, not 16 A.	Must be considered when installed in the end product.	**N/A**
2.7.1	In the **United Kingdom**, to protect against excessive currents and short-circuits in the PRIMARY CIRCUIT of DIRECT PLUG-IN EQUIPMENT, tests according to 5.3 shall be conducted, using an external protective device rated 30 A or 32 A. If these tests fail, suitable protective devices shall be included as integral parts of the DIRECT PLUG-IN EQUIPMENT, so that the requirements of 5.3 are met.	Not Direct Plug-In equipment.	**N/A**
2.10.5.13	In **Finland**, **Norway** and **Sweden**, there are additional requirements for the insulation, see 6.1.2.1 and 6.1.2.2 of this annex.	No TNV circuits.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In **Switzerland**, supply cords of equipment having a RATED CURRENT not exceeding 10 A shall be provided with a plug complying with SEV 1011 or IEC 60884-1 and one of the following dimension sheets: SEV 6532-2.1991 Plug Type 15 3P+N+PE 250/400 V, 10 A SEV 6533-2.1991 Plug Type 11 L+N 250 V, 10 A SEV 6534-2.1991 Plug Type 12 L+N+PE 250 V, 10 A In general, EN 60309 applies for plugs for currents exceeding 10 A. However, a 16 A plug and socket-outlet system is being introduced in Switzerland, the plugs of which are according to the following dimension sheets, published in February 1998: SEV 5932-2.1998: Plug Type 25 , 3L+N+PE 230/400 V, 16 A SEV 5933-2.1998:Plug Type 21, L+N, 250 V, 16A SEV 5934-2.1998: Plug Type 23, L+N+PE 250 V, 16 A	Must be considered when installed in the end product.	**N/A**
3.2.1.1	In **Denmark**, supply cords of single-phase equipment having a rated current not exceeding13 A shall be provided with a plug according to the Heavy Current Regulations, Section 107-2-D1. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If poly-phase equipment and single-phase equipment having a RATED CURRENT exceeding 13 A is provided with a supply cord with a plug, this plug shall be in accordance with the Heavy Current Regulations, Section 107-2-D1 or EN 60309-2.	Must be considered when installed in the end product.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1 (A2:2013)	In **Denmark**, supply cords of single-phase equipment having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Justification the Heavy Current Regulations, 6c	Must be considered when installed in the end product.	**N/A**
3.2.1.1	In **Spain**, supply cords of single-phase equipment having a rated current not exceeding 10 A shall be provided with a plug according to UNE 20315:1994. Supply cords of single-phase equipment having a rated current not exceeding 2,5 A shall be provided with a plug according to UNE-EN 50075:1993. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules, shall be provided with a plug in accordance with standard UNE 20315:1994. If poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with UNE-EN 60309-2.	Must be considered when installed in the end product.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.1	In the **United Kingdom**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord and plug, shall be fitted with a 'standard plug' in accordance with Statutory Instrument 1768:1994 - The Plugs and Sockets etc. (Safety) Regulations 1994, unless exempted by those regulations. NOTE 'Standard plug' is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.	Must be considered when installed in the end product.	**N/A**
3.2.1.1	In **Ireland**, apparatus which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to I.S. 411 by means of that flexible cable or cord and plug, shall be fitted with a 13 A plug in accordance with Statutory Instrument 525:1997 - National Standards Authority of Ireland (section 28) (13 A Plugs and Conversion Adaptors for Domestic Use) Regulations 1997.	Must be considered when installed in the end product.	**N/A**
3.2.4	In **Switzerland**, for requirements see 3.2.1.1 of this annex.	Must be considered when installed in the end product.	**N/A**
3.2.5.1	In the **United Kingdom**, a power supply cord with conductor of 1,25 mm2 is allowed for equipment with a rated current over 10 A and up to and including 13 A.	Must be considered when installed in the end product.	**N/A**
3.3.4	In the **United Kingdom**, the range of conductor sizes of flexible cords to be accepted by terminals for equipment with a RATED CURRENT of over 10 A up to and including 13 A is: • 1,25 mm^2 to 1,5 mm^2 nominal cross-sectional area.	Must be considered when installed in the end product.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.6	In the **United Kingdom**, the torque test is performed using a socket outlet complying with BS 1363 part 1:1995, including Amendment 1:1997 and Amendment 2:2003 and the plug part of DIRECT PLUG-IN EQUIPMENT shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16 and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.	Must be considered when installed in the end product.	**N/A**
4.3.6	In **Ireland**, DIRECT PLUG-IN EQUIPMENT is known as plug similar devices. Such devices shall comply with Statutory Instrument 526:1997 - National Standards Authority of Ireland (Section 28) (Electrical plugs, plug similar devices and sockets for domestic use) Regulations, 1997.	Must be considered when installed in the end product.	**N/A**
5.1.7.1	In **Finland**, **Norway** and **Sweden** TOUCH CURRENT measurement results exceeding 3,5 mA r.m.s. are permitted only for the following equipment: • STATIONARY PLUGGABLE EQUIPMENT TYPE A that is intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, for example, in a telecommunication centre; and has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR; and is provided with instructions for the installation of that conductor by a SERVICE PERSON; • STATIONARY PLUGGABLE EQUIPMENT TYPE B; • STATIONARY PERMANENTLY CONNECTED EQUIPMENT.	Not applicable.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
6.1.2.1 (A1:2010)	In **Finland**, **Norway** and **Sweden**, add the following text between the first and second paragraph of the compliance clause: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either - two layers of thin sheet material, each of which shall pass the electric strength test below, or - one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. Alternatively for components, there is no distance through insulation requirements for the insulation consisting of an insulating compound completely filling the casing, so that CLEARANCES and CREEPAGE DISTANCES do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition - passes the tests and inspection criteria of 2.10.11 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 2.10.10 shall be performed using 1,5 kV), and - is subject to ROUTINE TESTING for electric strength during manufacturing, using a test voltage of 1,5 kV.	No TNV circuits.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ZB ANNEX (normative) **SPECIAL NATIONAL CONDITIONS (EN)**			
Clause	Requirement + Test	Result - Remark	Verdict
	It is permitted to bridge this insulation with an optocoupler complying with 2.10.5.4 b). It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in EN 60950-1:2006, 6.2.2.1; - the additional testing shall be performed on all the test specimens as described in EN 60384-14: - the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
6.1.2.2	In **Finland**, **Norway** and **Sweden**, the exclusions are applicable for PERMANENTLY CONNECTED EQUIPMENT, PLUGGABLE EQUIPMENT TYPE B and equipment intended to be used in a RESTRICTED ACCESS LOCATION where equipotential bonding has been applied, e.g. in a telecommunication centre, and which has provision for a permanently connected PROTECTIVE EARTHING CONDUCTOR and is provided with instructions for the installation of that conductor by a SERVICE PERSON.	No TNV circuits.	**N/A**
7.2	In **Finland**, **Norway** and **Sweden**, for requirements see 6.1.2.1 and 6.1.2.2 of this annex. The term TELECOMMUNICATION NETWORK in 6.1.2 being replaced by the term CABLE DISTRIBUTION SYSTEM.	Not connected to a cable distribution system.	**N/A**
7.3 (A11:2009)	In **Norway** and **Sweden**, for requirements see 1.2.13.14 and 1.7.2.1 of this annex.	Not connected to a cable distribution system.	**N/A**

IEC60950_1F - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

Annex ZD
(informative)

IEC and CENELEC code designations for flexible cords

Type of flexible cord	Code designations	
	IEC	CENELEC
PVC insulated cords		
Flat twin tinsel cord	60227 IEC 41	H03VH-Y
Light polyvinyl chloride sheathed flexible cord	60227 IEC 52	H03VV-F H03VVH2-F
Ordinary polyvinyl chloride sheathed flexible cord	60277 IEC 53	H05VV-F H05VVH2-F
Rubber insulated cords		
Braided cord	60245 IEC 51	H03RT-F
Ordinary tough rubber sheathed flexible cord	60245 IEC 53	H05RR-F
Ordinary polychloroprene sheathed flexible cord	60245 IEC 57	H05RN-F
Heavy polychloroprene sheathed flexible cord	60245 IEC 66	H07RN-F
Cords having high flexibility		
Rubber insulated and sheathed cord	60245 IEC 86	H03RR-H
Rubber insulated, crosslinked PVC sheathed cord	60245 IEC 87	H03RV4-H
Crosslinked PVC insulated and sheathed cord	60245 IEC 88	H03V4V4-H

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict

National Differences for Korea Test results according to last modification date 2010-12-16 in CB Bulletin			N/A
1.5.101	Addition Plugs for the connection of the apparatus to the supply mains shall comply with the Korean requirement (KSC 8305 and 8305).	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	N/A
8	Addition EMC The apparatus shall comply with the relevant CISPR standards.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

National Differences for Canada **Test results according to last modification date 2012-02-14 in CB Bulletin** TRF No. CSA60950-1-07A/bl070423			**P**
Canada and the United States of America have adopted a single, bi-national standard, CAN/CSA C22.2 No. 60950-1/UL60950-1, Second Edition, which is based on IEC 60950-1, Second Edition. This bi-national standard should be consulted for further details on the national conditions and differences summarized below.			
SPECIAL NATIONAL CONDITIONS The following is a summary of the key national differences based on national regulatory requirements, such as the Canadian Electrical Code (CEC) Part and the Canadian Building Code, which are referenced in legislation and which form the basis for the rules and practices followed in electrical and building installations.			
1.1.1	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 I, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2. Also, unless marked or otherwise identified, installation is allowed per the Standard for the Protection of Electronic Computer/Data-Processing Equipment, ANSI/NFPA 75.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
1.4.14	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A ..... :	Must be considered when installed in the end product.	**N/A**
1.5.5	For lengths exceeding 3.05 m, external interconnecting flexible cord and cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the CEC/NEC. ..... :	No interconnecting cables.	**N/A**
	For lengths 3.05 m or less, external interconnecting flexible cord and cable assemblies that are not types specified in the CEC/NEC are required to have special construction features and identification markings.	No interconnecting cables.	**N/A**
1.7.1	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.	Must be considered when installed in the end product.	**N/A**
	A voltage rating that exceeds an attachment plug cap rating is only permitted if it does not exceed the extreme operating conditions in Table 2 of CAN/CSA C22.2 No. 235, and if it is part of a range that extends into the Table 2 "Normal Operating Conditions." Likewise, a voltage rating shall not be lower than the specified "Normal Operating Conditions," unless it is part of a range that extends into the "Normal Operating Conditions."	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
1.7.7	Wiring terminals intended to supply Class 2 outputs in accordance with CEC Part 1 or NEC shall be marked with the voltage rating and “Class 2” or equivalent. Marking shall be located adjacent to the terminals and shall be visible during wiring.	Must be considered when installed in the end product.	**N/A**
2.5	Where a fuse is used to provide Class 2, Limited Power Source, or TNV current limiting, it shall not be operator-accessible unless it is not interchangeable.	No such parts.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
2.7.1	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. Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, require special transformer overcurrent protection.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
3.2	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains shall be in accordance with the NEC/CEC.	No such parts.	**N/A**
3.2.1	Power supply cords are required to have attachment plugs rated not less than 125 percent of the rated current of the equipment.	No such parts.	**N/A**
3.2.1.2	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.	The equipment is not for connection to a DC mains supply.	**N/A**
3.2.3	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs.	The equipment is not permanently connected to the mains.	**N/A**
3.2.5	Power supply cords are required to be no longer than 4.5 m in length. ..... Flexible power supply cords are required to be compatible with Tables 11 and 12 of the CEC and Article 400 of the NEC.	No such parts.	**N/A**
3.2.9	Permanently connected equipment is required to have a suitable wiring compartment and wire bending space.	The equipment is not permanently connected to the mains.	**N/A**
3.3	Wiring terminals and associated spacings for field wiring connections shall comply with CSA C22.2 No. 0.	No such parts.	**N/A**
3.3.3	Wire binding screws are not permitted to attach conductors larger than 10 AWG (5.3 mm2).	No such parts.	**N/A**
3.3.4	Terminals for permanent wiring, including protective earthing terminals, are required to be suitable for Canadian/US wire gauge sizes, rated 125 percent of the equipment rating, and be specially marked when specified (1.7.7).	No such parts.	**N/A**
3.4.2	Motor control devices are required for cord-connected equipment with a motor if the equipment is rated more than 12 A, or if the motor has a nominal voltage rating greater than 120 V, or is rated more than 1/3 hp (locked rotor current over 43 A).	No motor in the equipmemt.	**N/A**
3.4.8	Vertically-mounted disconnect switches and circuit breakers are required to have the "on" position indicated by the handle in the up position.	No switch used.	**N/A**
3.4.11	For computer 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 computer room remote power-off circuit.	No battery.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
	Battery system: ..... When power-off is activated:		—
4.3.12	The maximum quantity of flammable liquid stored in equipment is required to comply with NFPA 30.	No flammable liquids within the equipment.	**N/A**
	Flammable liquid material: ..... Flash point: ..... Boiling point: ..... Container material: ..... Storage container size:		—
4.3.13.5	Equipment with lasers is required to meet the Canadian Radiation Emitting Devices Act, REDR C1370 and/or Code of Federal Regulations 21 CFR 1040, as applicable.	No laser and LEDs.	**N/A**
4.7	For computer room applications, automated information storage systems with combustible media greater than 0.76 m³ (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.	The equipment has no combustible area greater than 0.76 m³.	**N/A**
4.7.3.1	For computer 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 other applications, enclosures with the same dimensions require a flame spread rating of 200 or less.	The equipment has no combustible material greater than 0.9m^2 or single dimension greater than 1.8m.	**N/A**
Annex H	Equipment that produces ionizing radiation is required to comply with the Canadian Radiation Emitting Devices Act, REDR C1370 and/or Code of Federal Regulations, 21 CFR 1020, as applicable.	The equipment does not produce ionizing radiation.	**N/A**
OTHER DIFFERENCES The following key national differences are based on requirements other than national regulatory requirements.			
1.5.1	Some components 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 (Canadian and/or U.S.) component or material standard requirements. These components include: attachment plugs, battery packs (rechargeable type, used with transportable equipment), cathode ray tubes, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), cord sets and power supply cords, direct plug-in equipment, enclosures (outdoor), flexible cords and cables, fuses (branch circuit), fuseholders, ground-fault current interrupters, industrial control equipment, insulating tape, interconnecting cables, lampholders, limit controls, printed wiring, protectors for communications circuits, receptacles, solid state controls, supplementary protectors, switches (including interlock switches), thermal cutoffs, thermostats, (multi-layer) transformer winding wire, transient voltage surge suppressors, tubing, wire connectors, and wire and cables.	Critical components are IEC certified. See list of critical components in main CB report (§1.5.1). There may be additional requirements for components in Canada.	**P**

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict
1.6.1.2	A circuit for connection to the DC Mains Supply is classified as either a SELV Circuit, TNV-2 Circuit or Hazardous Voltage Circuit depending on the maximum operating voltage of the supply. This maximum operating voltage shall include consideration of the battery charging “float voltage” associated with the intended supply system, regardless of the marked power rating of the equipment.	No connect to DC power distribution system.	**N/A**
2.3.1	For TNV-2 and TNV-3 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.	No TNV circuitry.	**N/A**
2.3.2.1	In the event of a single fault between TNV and SELV circuits, SELV Circuits and accessible conductive parts comply with the North American limits of 2.2.3.	No TNV circuitry.	**N/A**
2.6.3.4	Protective bonding conductors of non-standard protective bonding constructions (e.g., printed circuit traces) subjected to the additional limited short circuit test conditions specified, if required.	No such parts.	**N/A**
4.2.8.1	Enclosures around CRTs with a face diameter of 160 mm or more are provided with suitable enclosure to reduce the risk of injury due to the implosion of the CRT.	No CRTs in the equipment.	**N/A**
	Projected area of opening ..... : Minor dimension of projected area ..... :		—
4.2.11	For equipment intended for mounting on racks and provided with slide/rails allowing the equipment to slide away from the rack for installation, service and maintenance, additional construction, performance and marking requirements are applicable to determine the adequacy of the slide/rails.	No such part.	**N/A**
4.3.2	Equipment with handles is required to comply with special loading tests.	No such part.	**N/A**
5.1.8.3	Equipment intended to receive telecommunication ringing signals is required to comply with a special touch current measurement tests.	No TNV circuitry.	**N/A**
	Ringing ports provided: ..... Simulation provided to: ..... Measured total touch current :		—
5.3.7	Internal (e.g., card cage) SELV circuit connectors and printed wiring board connectors that are accessible to the operator and that deliver power are to be overloaded. During abnormal operating testing, if a circuit is interrupted by the opening of a component, the test shall be repeated twice (three tests total) using new components as necessary.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
6.4	Equipment intended for connection to telecommunication network outside plant cable is required to be protected against overvoltage from power line crosses in accordance with 6.4 and Annex NAC.	No TNV circuitry.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
M.2	Continuous ringing signals up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions.	No TNV circuits.	**N/A**
Annex NAD	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.	No TNV circuits.	**N/A**
Annex NAF	Document (paper) shredders likely to be used in a home or home office (Pluggable Equipment Type A plug configuration) are required to comply with additional requirements, including markings/instructions, protection against inadvertent reactivation of a safety interlock, disconnection from the mains supply (via provision of an isolating switch), and protection against operator access (accessibility determined via new accessibility probe & probe/wedge).	Not applicable.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict

Annex NAF **Household/home office Document shredders**			**N/A**
NAF1.7	Markings and Instructions	The equipment is not a shredder.	**N/A**
NAF 1.7.15	Symbols alerting the user to the following considerations are provided adjacent to the document feed opening. These symbols are explained in the instructions:		**N/A**
	Product is not intended for use by children (product is not a toy) ..... :		**N/A**
	Avoid touching the document feed opening with hands ..... :		**N/A**
	Avoid clothing touching the document feed opening :		**N/A**
	Keep aerosol products away (applicable for product with brush motor only) ..... :		**N/A**
	The ⚠ (ISO 7000-0434) symbol to alert user to important operating, maintenance and/or servicing instructions and the explanation of above symbols		**N/A**
	Marking is permanent, comprehensible and easily discernible on the equipment.		**N/A**
NAF 2.8.3	Safety interlock can not be activated by articulated accessibility probe (NAF.1)		**N/A**
NAF 3.4	Isolation switch complying with 3.4.2 is provided to disconnect power to hazardous moving parts		**N/A**
	On/off marking is provided for two position switch. :		**N/A**
	Off marking for multi-position switch ..... :		**N/A**
NAF 4.4	Protection against hazardous moving parts		**N/A**
	Accessibility probe (Fig NAF.1) is inserted without force into each opening and did not contact hazardous moving parts		**N/A**
	Operator accessible guards are removed and Accessibility wedge is inserted into each opening according without contacting mechanical hazards:		**N/A**
	Strip-cut (45N): ..... :		—
	Cross-cut (90N)..... :		—

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict
USA - Differences to IEC 60950-1, Second Edition, Amendment 1 Test results according to last modification date 2012-01-29 in CB Bulletin			**P**
1.1	Equipment able to be installed in accordance with the National Electrical Code ANSI/NFPA 70	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
1.1.1	Equipment able to be installed in accordance with ANSI/NFPA 75 and NEC Art. 645 unless intended for use outside of computer room and provided with such instructions.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
1.1.2	Equipment in wire-line communication facilities serving high-voltage electric power stations operating at greater than 1kV are excluded.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
1.1.2	Equipment intended for outdoor use	Not outdoor use equipment.	**N/A**
1.4.14	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20 A.	Must be considered when installed in the end product.	**N/A**
1.5.1	All IEC standards for components identified in Annex P.1 replaced by the relevant requirements of UL component standards in Annex P.1.	Considered, see appended table 1.5.1 in the main test report.	**P**
1.5.1	All IEC standards for components identified in Annex P.2 alternatively satisfied by the relevant requirements of UL component standards	Considered, see appended table 1.5.1 in the main test report.	**P**
1.5.5	Interconnecting cables acceptable for the application regarding voltage, current, temperature, flammability, mechanical serviceability and the like.	No interconnecting cables.	**N/A**
1.5.5	For other than limited power and TNV circuits, the type of output circuit identified for output connector.	No interconnecting cables.	**N/A**
1.5.5	External cable assemblies that exceed 3.05 m in length to be types specified in the NEC	No interconnecting cables.	**N/A**
1.5.5	Detachable external interconnecting cables 3.05 m or less in length and provided with equipment marked to identify the responsible organization and the designation for the cable	No interconnecting cables.	**N/A**
1.5.5	Building wiring and cable for use in ducts, plenums and other air handling space subject to special requirements and excluded from scope.	No interconnecting cables.	**N/A**
1.5.5	Telephone line and extension cords and the like comply with UL 1863	No TNV circuitry.	**N/A**
1.6.1.2	Equipment intended for connection to a d.c. power (mains) distribution system subjected to special circuit classification requirements (e.g., TNV-2)	No connect to DC power distribution system.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
1.6.1.2	Earthing of d.c. powered equipment provided	No connect to DC power distribution system.	**N/A**
1.7	Lamp replacement information indicated on lampholder in operator access area	No lamp provided.	**N/A**
1.7.1	Special marking format for equipment intended for use on a supply system with an earthed neutral and more than one phase conductor	Must be considered when installed in the end product.	**N/A**
1.7.1	Equipment voltage rating not higher than rating of the plug except under special conditions	Must be considered when installed in the end product.	**N/A**
1.7.6	Fuse replacement marking for operator accessible fuses	No fuse used.	**N/A**
1.7.7	Identification of terminal connection of the equipment earthing conductor	No TNV circuitry.	**N/A**
1.7.7	Connectors and field wiring terminals for external Class 2 or Class 3 circuits provided with marking indicating minimum Class of wiring to be used.	No connectors and field wiring.	**N/A**
1.7.7	Marking located adjacent to terminals and visible during wiring	No such parts.	**N/A**
2.1.1.1	Bare TNV conductive parts protected by a cover are exempt if instructions include directions for disconnection of TNV prior to removal of the cover	No TNV circuitry.	**N/A**
2.3.1.b	Other telecommunication signaling systems than described in 2.3.1(b) are subject to M.4.	No TNV circuitry.	**N/A**
2.3.1.b	For TNV-2 and TNV-3 circuits with other than ringing signals and with voltages exceeding 42.4 Vp or 60 V d.c., the max. current limit through a resistor ≥ 2000 Ohm with loads disconnected is 7.1 mA peak or 30 mA d.c. under normal conditions	No TNV circuitry.	**N/A**
2.3.1.b	Limits for measurements across 5000 Ohm resistor in the event of a single fault are replaced after 200 ms with the limits of M.3.1.4.	No TNV circuitry.	**N/A**
2.3.2.1	For a single fault, the limits of 2.2.3 apply to SELV circuits and accessible conductive parts.	No TNV circuitry.	**N/A**
2.3.2.4	Enamel coating on signal transformer winding wire allowed as an alternative to Basic insulation in specific telecommunication applications if subject to special construction requirements and testing	No TNV circuitry.	**N/A**
2.5	Overcurrent protection device required for Class 2 and Class 3 limiting according to the NEC, or for a Limited Power Source, not interchangeable with devices of higher ratings if operator replaceable	No such component provided.	**N/A**
2.6	Equipment having receptacles for output a.c. power connectors generated from an internal separately derived source have the earthed (grounded) circuit conductor suitably bonded to earth.	No such parts.	**N/A**
2.6.3.3	For Pluggable Equipment Type A, if a) b) or c) are not applicable, the current rating of the circuit is taken as 20 A	Must be considered when installed in the end product.	**N/A**
2.6.3.4	Capacity of connection between earthing terminal and parts required to be earthed subject to special	Must be considered when installed in the end product.	**N/A**

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict
	conditions based on the current rating of the circuit.		
2.6.4.1	Field wiring terminals for earthing conductors suitable for wire sizes (gauge) used in US	No such part.	**N/A**
2.7.1	Data for selection of special external branch circuit overcurrent devices marked on the equipment	No such part.	**N/A**
2.7.1	Standard supply outlets protected by overcurrent device in accordance with the NEC	No such part.	**N/A**
2.7.1	Overcurrent protection for individual transformers that distribute power to other units over branch circuit wiring	No such part.	**N/A**
2.7.1	Additional requirements for overcurrent protection apply to equipment provided with panelboards	No such part.	**N/A**
2.7.1	Non-motor-operated equipment requiring special overcurrent protective device marked with device rating.	No such part.	**N/A**
2.10.5.12	Multi-layer winding wire subject to UL component wire requirements in addition to 2.10.5.12 and Annex U.	No such part.	**N/A**
3.1.1	Permissible combinations of internal wiring/external cable sizes for overcurrent & short circuit protection	No such part.	**N/A**
3.1.1	All interconnecting cables protected against overcurrent and short circuit.	No such part.	**N/A**
3.2	Wiring methods permit connection of equipment to primary power supply in accordance with the NEC	No such part.	**N/A**
3.2.1	Permitted use for flexible cords and plugs.	No such part.	**N/A**
3.2.1	Flexible cords provided with attachment plug rated 125% of equipment current rating.	No such part.	**N/A**
3.2.1	Any Class II equipment provided with 15 or 20 A standard supply outlets, Edison-base lampholders or single pole disconnect device provided with a polarized type attachment plug.	No such part.	**N/A**
3.2.1.2	Equipment intended for connection to DC mains supply power systems complies with special wiring requirements	The equipment is not for connection to a DC mains supply.	**N/A**
3.2.1.2	Equipment with one pole of the DC mains supply connected to both the equipment mains input terminal and the main protective earthing terminal provided with special instructions and construction provisions for earthing	The equipment is not for connection to a DC mains supply.	**N/A**
3.2.1.2	Equipment with means for connecting supply to earthing electrode conductor has no switches or protective devices between supply connection and earthing electrode connection.	The equipment is not for connection to a DC. mains supply.	**N/A**
3.2.1.2	Markings and instructions for equipment with provisions to connect earthed conductor of a DC supply circuit to the equipment earthing conductor	The equipment is not for connection to a DC. mains supply.	**N/A**
3.2.1.2	Special markings and instructions for equipment with earthed conductor of a DC supply circuit connected to the equipment earthing conductor	The equipment is not for connection to a DC. mains supply.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
3.2.1.2	Terminals and leads provided for permanent connection of DC powered equipment to supply marked to indicate polarity if reverse polarity may result in a hazard.	The equipment is not for connection to a DC. mains supply.	**N/A**
3.2.3	Permanently connected equipment has provision for connecting and securing a field wiring system (i.e. conduit, or leads etc.) per the NEC	Not permanently connected equipment.	**N/A**
3.2.3	Permanently connected equipment may have terminals or leads not smaller than No. 18 AWG (0.82 mm²) and not less than 150 mm in length for connection of field installed wiring.	Not permanently connected equipment.	**N/A**
3.2.3	If supply wires exceed 60 °C, marking indicates use of 75 °C or 90 °C wiring for supply connection as appropriate.	Not permanently connected equipment.	**N/A**
3.2.3	Equipment compatible with suitable trade sizes of conduits and cables.	Not permanently connected equipment.	**N/A**
3.2.5	Length of power supply cord limited to between 1.5 and 4.5 m unless shorter length used when intended for a special installation.	No such part.	**N/A**
3.2.5	Conductors in power supply cords sized per NEC	No such part.	**N/A**
3.2.5	Power supply cords and cord sets incorporate flexible cords suitable for the particular application.	No such part.	**N/A**
3.2.6	Strain relief provided for non-detachable interconnecting cables not supplied by a limited power source.	No such part.	**N/A**
3.2.9	Adequate wire bending space and volume of field wiring compartment required to properly make the field connections.	No such part.	**N/A**
3.2.9	Equipment solely for installation in Restricted Access Locations using low voltage d.c. systems may not need provision for connecting and securing a field wiring system when wiring is protected from abuse.	Equipment not intended for installation in RAL.	**N/A**
3.3	Field wiring terminals provided for interconnection of units for other then LPS or Class 2 circuits also comply with 3.3.	No such part.	**N/A**
3.3	Interconnection of units by LPS or Class 2 conductors may have field wiring connectors other than specified in 3.3 if wiring is reliably separated	No such part.	**N/A**
3.3.1	Terminals for the connection of neutral conductor identified by a distinctive white marking or other equally effective means	No such part.	**N/A**
3.3.3	Wire binding screw terminal permitted for connection of No. 10 AWG (5.3 mm²) or smaller conductor if provided with upturned lugs, cupped washer or equivalent retention.	No such part.	**N/A**
3.3.4	Terminals accept US wire sizes (gauge)	No such part.	**N/A**
3.3.4	Terminals accept current-carrying conductors rated 125% of the equipment current rating.	No such part.	**N/A**
3.3.6	Field wiring terminals marked to indicate the material(s) of the conductor for the terminals used	No such part.	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
3.3.6	Aluminum conductors not permitted for connection to terminal for equipment earthing conductor	No such part.	**N/A**
3.3.6	Field wiring connections made through the use of suitable pressure connectors (including set screw type), solder lugs or splices to flexible leads.	No such part.	**N/A**
3.4.2	Separate motor control device(s) required for cord-connected equipment rated more than 12 A, or with motor rated more than 1/3 hp or more than 120 V.	No motors.	**N/A**
3.4.8	Vertically mounted disconnect devices oriented so up position of handle is "on".	No switch used.	**N/A**
3.4.11	For computer-room applications, equipment with battery systems capable of supplying 750 VA for 5 minutes provided with battery disconnect means	No battery.	**N/A**
4.2.8.1	Special opening restrictions for enclosures around CRTs with face dimension of 160 mm or more.	No CRTs in the equipment.	**N/A**
4.2.9	Compartment housing high-pressure lamp marked to indicate risk of explosion.	No high-pressure lamp provided.	**N/A**
4.2.11	For equipment mounted on racks and provided with slide/rails allowing the equipment to slide away from the rack for installation and maintenance, additional construction, performance and marking requirements are applicable to determine the adequacy of the slide/rails	No such part.	**N/A**
4.3.2	Loading test for equipment with handle(s) used to support more than 9 kg	No such part.	**N/A**
4.3.6	In addition to the IEC requirements, Direct Plug-in Equipment complies with UL 1310	No such part.	**N/A**
4.3.12	The max. quantity of flammable liquid stored in equipment per ANSI/NFPA 30 (Table NAE.6)	No flammable liquids within the equipment.	**N/A**
4.3.12	Equipment using replenishable liquids marked to indicate type of liquid to be used.	No flammable liquids within the equipment.	**N/A**
4.3.13.2	Equipment that produces x-radiation and does not comply with 4.3.12 under all conditions of servicing marked to indicate the presence of radiation	The equipment does not generate ionizing radiation.	**P**
4.3.13.5	Requirements contained in the applicable national codes apply to lasers (21 CFR 1040).	No laser and LEDs.	**N/A**
4.7	Automated information storage equipment intended to contain more than 0.76 m³ of combustible media requires provision for automatic sprinklers or a gaseous agent extinguishing system.	The equipment has no combustible area greater than 0.76 m³.	**N/A**
4.7.3.1	Equipment for use in environmental air space other than ducts or plenums provided with metal enclosure or with non-metallic enclosure having adequate fire-resistance and low smoke producing characteristics (according to UL 2043). Equipment for installation in space used for environmental air, described in Sec. 300-22(c) of the NEC, provided with instructions indicating suitability for installation	Equipment not used in environmental air space.	**N/A**
4.7.3.1	Flame spread rating for external surface of combustible material with exposed area greater than	The equipment has no combustible material greater	**N/A**

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict
	0.9 m² or a single dimension greater than 1.8 m; 50 or less for computer room applications or 200 or less for other applications.	than 0.9m² or single dimension greater than 1.8m.	
4.7.3.4	Wire marked "VW-1" or "FT-1" considered equivalent.	No such part.	**N/A**
5.1.8.2	Special earthing provisions and instructions for equipment with high touch current due to telecommunication network connections.	No such part.	**N/A**
5.1.8.3	Touch current due to ringing voltage for equipment containing telecommunication network leads.	No TNV circuitry.	**N/A**
5.3.7	Overloading of SELV connectors and printed wiring board receptacles accessible to the operator.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
5.3.7	Tests interrupted by opening of a component repeated two additional times.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
5.3.9.1	Test interrupted by opening of wire or trace subject to certain conditions.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
6	Specialized instructions for telephones that may be connected to a telecommunications network	No TNV circuitry.	**N/A**
6	Marking identifying function of telecommunication type connectors not used for connection to a telecommunication network.	No TNV circuitry.	**N/A**
6.3	Equipment remotely powered over telecommunication wiring systems provided with specialized markings adjacent to the connection.	No TNV circuitry.	**N/A**
6.3	Overcurrent protection incorporated into equipment to provide power over telecommunication wiring system not interchangeable with devices of higher ratings if operator replaceable.	No TNV circuitry.	**N/A**
6.4	Additional requirements for equipment connected to a telecommunication network using cable subject to overvoltage from power line failures	No TNV circuitry.	**N/A**
6.4	Where 26 AWG line cord required by Fig. 6C, either the cord is provided with the equipment or described in the safety instructions.	No TNV circuitry.	**N/A**
7	Equipment associated with the cable distribution system may need to be subjected to applicable parts of Chapter 8 of the NEC.	Not cable distribution systems.	**N/A**
H	Ionizing radiation measurements made under single	The equipment does not	**N/A**

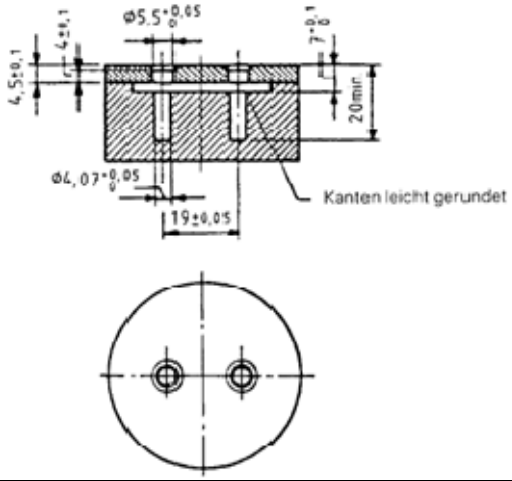
IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict
	fault conditions according to 21 CFR 1020	produce ionizing radiation.	
M.2	Continuous ringing signals evaluated to Method A subjected to special accessibility considerations.	No applicable.	**N/A**
M.4	Special requirements for message waiting and similar telecommunications signals.	Not applicable.	**N/A**
NAC	Equipment for use with a generic secondary protector marked with suitable instructions.	Not applicable.	**N/A**
NAC	Equipment marked with suitable instructions if for use with a specific primary or secondary protector	Not applicable.	**N/A**
NAD	Acoustic pressure from an ear piece for short and long duration disturbances	Not applicable.	**N/A**
NAD	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	Not applicable.	**N/A**
NAF	Household/Home Office Document Shredders		**N/A**
NAF.1.7	Markings and instructions alert the user to key safety considerations related to use of shredders, including not intended to be used by children, avoid touching document feed opening, avoid clothes and hair entanglement, and avoid aerosol products.	The equipment is not a shredder.	**N/A**
NAF.2.8.3	Safety interlock cannot be inadvertently activated by the articulated accessibility probe		**N/A**
NAF.3.4	Provided with an isolating switch complying with 3.4.2, including 3 mm contact gap, with appropriate markings associated with the switch.		**N/A**
NAF.4.4	Hazardous moving parts are not accessible, as determined using the articulated accessibility probe and the accessibility probe/wedge		**N/A**

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60950-1
GERMANY NATIONAL DIFFERENCES
Information technology equipment – Safety –
Part 1: General requirements

Differences according to.....: VDE 0805-1:2011-01

Test results according to last modification date 2014-01-09 in CB Bulletin

DIN EN 60950-1 (VDE 0805-1):2011-01: 1.5 EK1-557-13 2013-07	The moulded plug of plug-in power supplies will be considered as component and will be generally evaluated in Germany according to DIN VDE 0620-1:2010 respectively DIN VDE 0620-1:2013 and DIN VDE 0620-2-1:2013 After the test according to DIN VDE 0620-2-1:2013, sub-clause 24.2, the plug be shall still pass the test according to DIN VDE 0620-101:1992 clause 7, figure 2 “Gauge for interchangeability” It should be possible to insert the plug without applying an excessive force such that the end surface touches the surface of the gauge 	This is not plug-in power supplies.	**N/A**
Annex ZC, 1.7.2.1	According to GPSG, section 2, clause 4: If certain rules on the use, supplementation or maintenance of an item of technical work equipment or ready-to-use commodity must be observed in order to guarantee safety and health, instructions for use in German must be supplied when it is brought into circulation.	Must be considered before marketed in Germany.	—

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict

SI 60950 Part 1 (2009)			
ATTACHMENT: NATIONAL DIFFERENCES – ISRAEL **Test results according to Online CB BULLETIN (Last modified date of 2011-03-02)**			
1.7	**Marking and instructions** The clause is applicable with the following additions: - Subclause 1.7.201 shall be added at the beginning of the clause as follows:		—
1.7.201	**Marking in the Hebrew language** The marking in the Hebrew language shall be in accordance with the Consumer Protection Order (Marking of goods), 1983. In addition to the marking required by clause I.7.1, the following details shall be marked in the Hebrew language. The details shall be marked on the apparatus or on its package, or on a label properly attached to the apparatus or on the package, by bonding or sewing, in a manner that the label cannot be easily removed. 1. Name of the apparatus and it commercial designation; 2. Manufacturer's name and address. If the apparatus is imported, the importer's name and address; 3. Manufacturer's registered trademark, if any; 4. Name of the model and serial number, if any; 5. Country of manufacture.	Must be considered when marketing into Israel.	—
1.7.2	**Safety instructions and Marking** **1.7.2.1 General** The following shall be added to the clause: All the instructions and warnings related to safety shall also be written in the Hebrew language.	Must be considered when marketing into Israel.	—
2.	**Protection from Hazards** The clause is applicable with the following additions:		**P**

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict
2.9.4	Separation from hazardous voltages The following shall be added at the beginning of the clause : In Israel, according to the Electricity Law, 1954, and the Electricity Regulations (Earthing and means of protection against electricity of voltages up to 1,000V) 1991, seven means of protection against electrocution are permitted, as follows: 1) TN-S - Network system earthing; TN-C-S - Network system earthing; 2) TT - Network system earthing; 3) IT - Network Insulation Terre; 4) Isolated transformer; 5) Safety extra low voltage (SELV or ELV) ; 6) Residual current circuit breaker (30 rna =I△); 7) Reinforced insulation; Double insulation (class II) ⧈. Clause 2.201 shall be added at the end of the clause, as follows:	Class III equipment.	**N/A**
2.201	Prevention of electromagnetic interference - Prior to carrying out the tests in accordance with the clauses of this Standard, the compliance of the apparatus with the relevant requirements specified in the appropriate part of the Standard series, SI 961, shall be checked. **The apparatus shall meet the requirements in the appropriate part of the Standard series.** SI 961. - **If there are components in the apparatus for the prevention of electromagnetic interference,** these components shall not reduce the safety level of the apparatus as required by this Standard.	Considered.	**P**
3.	**Wiring, connections and supply** The clause is applicable with the following additions:		—
3.2	**Connection to a mains supply**		—
3.2.1	**Means of connection**		**N/A**
3.2.1.1	**Connection to an a.c. mains supply** After the note, the following note shall be added: Note: **In Israel, the feed plug shall comply with the requirements of Israel Standard 51 32 Part I.**	Class III equipment. The equipment does not connect to a.c. mains supply	**N/A**
3.2.1.2	**Connection to a d.c. mains supply** At the end of the first paragraph, the following note shall be added: Note: At the time of issue of this Standard, there is no Israel Standard for connection accessories to d.c.	Class III equipment. The equipment does not connect to d.c. mains supply	**N/A**

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX P

Normative references

The annex is applicable with the following national deviations:

- The following Israel Standards have been inserted in place of some of the International Standards specified in this annex of the Standard, as follows:

The referenced International Standard	The substituted Israel Standard	Comments
IEC 60065: 2001	SI 250(A) - Safety requirements for mains operated electronic and related apparatus for household and similar **general use**	The Istael Standard, excluding national **deviations in it, is identical to the** Standard of the International Electrotechnical Commission, IEC 65:1985, including its amendments
IEC 60227 (all parts)	SI 473, all parts - Cables, cords and **insulated conductors for nominal** vaItage up to 1000 volt	-
IEC 60309 (all parts)	SI 1109, all parts - Plugs, socket-outlets and couplers for industrial **purposes**	SI 1109, part I and part 2, excluding **national deviations in them, are** identical to the Standards of the International Electrotechnical Commission IEC 60309-1·1999 and IEe 60309-2-1999, respectively.
IEC 60317 (all parts)	SI 1067 Part I – Self-fluxing enamelled(B) round copper wires with high mechanical properties	The Israel Standard is identical to the Standard of the International **Electrotechnical Commission** IEC 317-1 (1980)
	SI 1067 Part 2 – Self-fluxing **enamelled(B) round copper wires**	The Israel Standard is identical to the Standard of the International **Electrotechnical Commission** IEC 317-4 (1980)
	SI 1067 Part 3 - Self-fluxing **enamelled(B) round copper wires with a** temperature index of 180°	The Israel Standard is identical to the Standard of the International **Electrotechnical Commission** IEC 317-8 (1980)
IEC 60320 (all parts)	SI 60320 Part 1 - Appliance couplers for household and similar general **purposes: General requirements**	The Israel Standard, excluding national **deviations in it,** is identical to the Standard of the International **Electrotechnical Commission,** IEC 60320-1 (2001)
	SI 60320 Part 2.1 - Appliance couplers for household and similar general **purposes: Sewing machine couplers**	The Israel Standard, excluding national **deviations in it, is identical to the** Standard of the International **Electrotechnical Commission,** IEC 60320-2.1 (2000)
IEC 60320 (all parts)	SI 60320 Part 2.2 – Appliance couplers for household and similar general **purposes: Interconnection couplers for** household and similar equipment	The Israel Standard, excluding national **deviations in it, is identical to the** Standard of the International **Electrotechnical Commission,** IEC 60320-2.2 (1998)
	SI 60320 Part 2.3 - Appliance couplers for household and similar general **purposes: Interconnection couplers for** household and similar equipment Appliance coupler for household and similar general purposes: Appliance coupler with a degree of protection higher than IPXO	The Israel Standard, excluding national **deviations in it, is identical to the** Standard of the International **Electrotechnical Commission,** IEC 60320-2.3 (1998)

IEC 60950-1:2005/Am1			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX P

Continued

IEC 60730-1: 1999	SI 60730 Part] - Automatic electrical controls for household and similar use: **General requirements**	The Israel Standard, excluding national **deviations in it, is identical to the** Standard of the International **Electrotechnical Commission,** IEC 60730-1 (1999)
IEC 60825-1	SI 60825 Part I - Safety of laser products: Equipment classification, **requirements and user's guide**	The Israel Standard, excluding national **deviations in it, is identical to the** Standard of the International **Electrotechnical Commission,** IEC 60825-1 (2001).
IEC 60947-[: 2004	SI 60947 Part 1 - Low-voltage **switchgear and controlgear: General rules**	The Israel Standard, excluding national **deviations in it, is identical to** Standard of the International **Electrotechnical Commission,** IEC 60947-[(1999)
IEC 61058-1: 2000	SI 61058 Part I – Switches for **appliances: General requirements**	The Israel Standard, excluding national **deviations in it, is identical to the** Standard of the International Electrotechnical Commission, IEC 61058-1 (2001)
ISO 3864 (all parts)	SI 3864 Part 1 -Graphical symbols – Safety colours and safety signs: Design principles for safety signs in workplaces and public areas	The Israel Standard, excluding national **deviations in it, is identical to the** Standard of the International Electrotechnical Commission IEC 3864-1 (2002)

Notes

(A) This Standard will be replaced by SI 60065 - Audio, video and similar electronic apparatus – safety requirements - that excluding the national deviations indicated is identical to the Standard of the International Electrotechnical Commission IEC 60065 (2005).

(B) Not relevant to the translation.

B. Add the following to the clause:

Israel Standards

SI 32 Part 1.1 - Plugs and socket-outlets for household and similar purposes : Plugs and socket-outlets for single phase up to l6A - Genera l requirements

SI 96 1, all parts - Electromagnetic compatibility

Israel documents

Electricity Law, 1954, its regulations and revisions

Kovetz Takanot 4465 dated 1983-02-24, Consumer Protection Order (Marking of goods), 1983

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT: AUSTRALIA / NEW ZEALAND NATIONAL DIFFERENCES
Test results according to Online CB BULLETIN (Last modified date of 2011-05-06)

ZZ.1 Introduction This Appendix sets out variations and additional requirements to cover issues which have not been addressed by the International Standard. These variations indicate national variations for purposes of the IECEE CB System and will be published in the IECEE CB Bulletin.			
ZZ.2 Variations The variations are as follows:			
1.2	Insert the following between 'person, service' and 'range, rated frequency': **POTENTIAL IGNITION SOURCE** 1.2.12	Considered.	**P**
1.2.12.201	Insert a new Clause 1.2.12.201 after Clause 1.2.12.15 as follows: **1.2.12.201** **POTENTIAL IGNITION SOURCE** Possible fault which can start a fire if the open-circuit voltage measured across an interruption or faulty contact exceeds a value of 50 V (peak) a.c. or d.c. and the product of the peak value of this voltage and the measured r.m.s. current under normal operating conditions exceeds 15 VA. Such a faulty contact or interruption in an electrical connection includes those which may occur in **CONDUCTIVE PATTERNS** on **PRINTED BOARDS.** NOTE 201 An electronic protection circuit may be used to prevent such a fault from becoming a **POTENTIAL IGNITION SOURCE.** NOTE 202 This definition is from AS/NZS 60065:2003.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
1.5.1	1. *Add* the following to the end of first paragraph: 'or the relevant Australian/New Zealand Standard'. 2. In NOTE 1, add the following after the word 'standard': 'or an Australian/New Zealand Standard'	Considered.	**P**
1.5.2	*Add* the following to the end of first and third dash items: 'or the relevant Australian/New Zealand Standard'.	Considered.	**P**

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.5.1	*Modify* Table 3B as follows: 1. *Delete* the first four rows and replace with the following: **RATED CURRENT OF EQUIPMENT A** / **Minimum conductor sizes** — **Nominal cross-sectional area mm²** / **AWG or kcmil [cross-sectional area in mm²] see note 2** Over 0.2 up to and including 3 — 0,5 [1)] — 18 [0,8] Over 3 up to and including 7.5 — 0,75 — 16 [1,3] Over 7.5 up to and including 10 — (0,75)[2)] — 1,00 — 16 [1,3] Over 10 up to and including 16 — (1,0)[3)] — 1,5 — 14 [2] *Replace* footnote 1) with the following: [1)] This nominal cross-sectional area is only allowed for Class II appliances if the length of the power supply cord, measured between the point where the cord, or cord guard, enters the appliance, and the entry to the plug does not exceed 2 m (0.5 mm² three-core supply flexible cords are not permitted; see AS/NZS 3191). *2. Delete* Note 1. 3. *Delete* Footnote a and replace with the following: [a] This nominal cross-sectional area is only allowed for Class II appliances if the length of the power supply cord, measured between the point where the cord, or cord guard, enters the appliance, and the entry to the plug does not exceed 2 m (0,5 mm2 three-core supply flexible cords are not permitted; see AS/NZS 3191).	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
4.1.201	*Insert* a new Clause 4.1.201 after Clause 4.1 as follows: **4.1.201 Display devices used for television purposes** Display devices which may be used for television purposes, with a mass of 7 kg or more, shall comply with the requirements for stability and mechanical hazards, including the additional stability requirements for television receivers, specified in AS/NZS 60065.	No such parts.	**N/A**
4.3.6	*Delete* the third paragraph and *Replace* with the following: Equipment with a plug portion, suitable for insertion into a 10 A 3-pin flat-pin socket-outlet complying with AS/NZS 3112, shall comply with the requirements in AS/NZS 3112 for equipment with integral pins for insertion into socket-outlets.	No such part.	**N/A**
4.3.13.5	*Add* the following to the end of first paragraph: 'or AS/NZS 2211.1'.	No laser and LED.	**N/A**
4.7	*Add* the following paragraph to the end of the clause: For alternative tests refer to Clause 4.7.201.	Refer to below.	**P**

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.201	*Insert* a new Clause 4.7.201 after Clause 4.7.3.6 as follows: **4.7.201 Resistance to fire – Alternative tests** **4.7.201.1 General** Parts of non-metallic material shall be resistant to ignition and spread of fire. This requirement does not apply to decorative trims, knobs and other parts unlikely to be ignited or to propagate flames originating from inside the apparatus, or the following: (a) Components that are contained in an enclosure having a flammability category of V-0 according to AS/NZS 60695.11.10 and having openings only for the connecting wires filling the openings completely, and for ventilation not exceeding 1 mm in width regardless of length. (b) The following parts which would contribute negligible fuel to a fire: - small mechanical parts, the mass of which does not exceed 4g, such as mounting parts, gears, cams, belts and bearings; - small electrical components, such as capacitors with a volume not exceeding 1,750mm^3, integrated circuits, transistors and optocoupler packages, if these components are mounted on material of flammability category V-1, or better, according to AS/NZS 60695.11.10. **NOTE** In considering how to minimize propagation of fire and what 'small parts' are, account should be taken of the cumulative effect of small parts adjacent to each other for the possible effect of propagating fire from one part to another. Compliance shall be checked by the tests of 4.7.201.2, 4.7.201.3, 4.7.201.4 and 4.7.201.5. For the base material of printed boards, compliance shall be checked by the test of 4.7.201.5. The tests shall be carried out on parts of non-metallic material which have been removed from the apparatus. When the glow-wire test is carried out, the parts shall be placed in the same orientation as they would be in normal use. These tests are not carried out on internal wiring. **4.7.201.2 Testing of non-metallic materials** Parts of non-metallic material shall be subject to the glow-wire test of AS/NZS 60695.2.11 which shall be carried out at 550°C.	All materials have suitable flame class, no testing required.	**P**

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.201	**4.7.201.3 Testing of insulating materials** Parts of insulating material supporting **POTENTIAL IGNITION SOURCES** shall be subject to the glow-wire test of AS/NZS 60695.2.11 which shall be carried out at 750°C The test shall also be carried out on other parts of insulating material which are within a distance of 3 mm of the connection. NOTE: Contacts in components such as switch contacts are considered to be connections. For parts which withstand the glow-wire test but produce a flame, other parts above the connection within the envelope of a vertical cylinder having a diameter of 20 mm and a height of 50 mm shall be subjected to the needle-flame test. However, parts shielded by a barrier which meets the needle-flame test shall not be tested. The needle-flame test shall be made in accordance with AS/NZS 60695.11.5 with the following modifications: **Clause of AS/NZS 60695.11.5** / **Change** 9 Test procedure 9.2 Application of needle-flame: *Replace* the first paragraph with: The specimen shall be arranged so that the flame can be applied to a vertical or horizontal edge as shown in the examples of figure 1. If possible the flame shall be applied at least 10 mm from a corner. *Replace* the second paragraph with: The duration of application of the test flame shall be 30 s ±1 s. 9.3 Number of test specimens: *Replace* with: The test shall be made on one specimen. If the specimen does not withstand the test, the test may be repeated on two further specimens, both of which shall withstand the test. 11 Evaluation of test results: *Replace* with: The duration of burning (t_b) shall not exceed 30 s. However, for printed circuit boards, it shall not exceed 15 s. The needle-flame test shall not be carried out on parts of material classified as V-0 or V-1 according to AS/NZS 60695.11.10, provided that the sample tested was not thicker than the relevant part.	All materials have suitable flame class, no testing required.	**P**

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.201	**4.7.201.4 Testing in the event of non-extinguishing material** If parts, other than enclosures, do not withstand the glow wire tests of 4.7.201.3, by failure to extinguish within 30 s after the removal of the glowwire tip, the needle-flame test detailed in 4.7.201.3 shall be made on all parts of non-metallic material which are within a distance of 50 mm or which are likely to be impinged upon by flame during the tests of 4.7.201.3. Parts shielded by a separate barrier which meets the needle-flame test need not be tested. NOTE 1 If the enclosure does not withstand the glow-wire test the equipment is considered to have failed to meet the requirements of Clause 4.7.201 without the need for consequential testing. NOTE 2 If other parts do not withstand the glow-wire test due to ignition of the tissue paper and if this indicates that burning or glowing particles can fall onto an external surface underneath the equipment, the equipment is considered to have failed to meet the requirements of Clause 4.7.201 without the need for consequential testing. NOTE 3 Parts likely to be impinged upon by the flame are considered to be those within the envelope of a vertical cylinder having a radius of 10 mm and a height equal to the height of the flame, positioned above the point of the material supporting, in contact with, or in close proximity to, connections.	All materials have suitable flame class, no testing required.	**P**

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.201	**4.7.201.5 Testing of printed boards** The base material of printed boards shall be subjected to the needle-flame test of Clause 4.7.201.3. The flame shall be applied to the edge of the board where the heat sink effect is lowest when the board is positioned as in normal use. The flame shall not be applied to an edge, consisting of broken perforations, unless the edge is less than 3 mm from a **POTENTIAL IGNITION SOURCE.** The test is not carried out if the – - Printed board does not carry any **POTENTIAL IGNITION SOURCE**; - Base material of printed boards, on which the available apparent power at a connection exceeds 15 VA operating at a voltage exceeding 50 V and equal or less than 400 V (peak) a.c. or d.c. under normal operating conditions, is of flammability category V-1 or better according to AS/NZS 60695.11.10, or the printed boards are protected by an enclosure meeting the flammability category V-0 according to AS/NZS 60695.11.10, or made of metal, having openings only for connecting wires which fill the openings completely; or - Base material of printed boards, on which the available apparent power at a connection exceeds 15 VA operating at a voltage exceeding 400 V (peak) a.c. or d.c. under normal operating conditions, and base material of printed boards supporting spark gaps which provides protection against overvoltages, is of flammability category V-0 according to AS/NZS 60695.11.10 or the printed boards are contained in a metal enclosure, having openings only for connecting wires which fill the openings completely. Compliance shall be determined using the smallest thickness of the material. NOTE: Available apparent power is the maximum apparent power which can be drawn from the supplying circuit through a resistive load whose value is chosen to maximise the apparent power from more than 2 min when the circuit supplied is disconnected.	All materials have suitable flame class, no testing required.	**P**
6.2.2	For Australia only, *delete* the first paragraph and Note, and replace with the following: In Australia only, compliance with 6.2.2 shall be checked by the tests of both 6.2.2.1 and 6.2.2.2.	No TNV circuits in the equipment.	**N/A**

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.1	For Australia only, *delete* the first paragraph including the Notes, and *replace* with the following: In Australia only, the electrical separation is subjected to 10 impulses of alternating polarity, using the impulse test generator reference 1 of Table N.1. The interval between successive impulses is 60 s and the initial voltage, Uc, is: (i) for 6.2.1 a): 7.0 kV for hand-held telephones and for headsets and 2.5 kV for other equipment; and (ii) for 6.2.1 b) and 6.2.1 c): 1.5 kV. NOTE 201 The 7 kV impulse simulates lightning surges on typical rural and semi-rural network lines. NOTE 202 The value of 2.5 kV for 6.2.1 a) was chosen to ensure the adequacy of the insulation concerned and does not necessarily simulate likely overvoltages.	No TNV circuits in the equipment.	**N/A**
6.2.2.2	For Australia only, *delete* the second paragraph including the Note, and *replace* with the following: In Australia only, the a.c. test voltage is: (i) for 6.2.1 a): 3 kV; and (ii) for 6.2.1 b) and 6.2.1 c): 1.5 kV. NOTE 201 Where there are capacitors across the insulation under test, it is recommended that d.c. test voltages are used. NOTE 202 The 3 kV and 1.5 kV values have been determined considering the low frequency induced voltages from the power supply distribution system.	No TNV circuits in the equipment.	**N/A**
7.3	*Add* the following before the first paragraph: Equipment providing functions that fall only within the scope of AS/NZS 60065 and that incorporate a PSTN interface, are not required to comply with this Clause where the only ports provided on the equipment, in addition to a coaxial cable connection and a PSTN interface, are audio or video ports and analogue or data ports not intended to be used for telecommunications purposes.	No such parts.	**N/A**
Annex P	*Add* the following Normative References: AS/NZS 3191, Electric flexible cords AS/NZS 3112, Approval and test specification—Plugs and socket-outlets	Considered.	**P**

IEC 60950-1: 2005			
Clause	Requirement + Test	Result - Remark	Verdict
Index	1. *Insert* the following between 'asbestos, not to be used as insulation' and 'attitude see orientation': AS/NZS 2211.1.....4.3.13.5 AS/NZS 3112.....4.3.6 AS/NZS 3191..... 3.2.5.1 (Table 3B) AS/NZS 60064.....4.1.201 AS/NZS 60695.2.11..... 4.7.201.2, 4.7.201.3 AS/NZS 60695.11.10..... 4.7.201.1, 4.7.201.5 AS/NZS 60695.11.5.....4.7.201.3 2. Insert the following between 'positive temperature coefficient (PTC) device' and 'powder': potential ignition source 1.2.201, 4.7.201.3, 4.7.201.5	Considered.	P

IEC60950-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60950-1
CHINA NATIONAL DIFFERENCES

Information technology equipment Safety – Part 1: General requirements

Differences according to.....:	GB 4943.1--2011
Attachment Form No.....:	CN_ND_IEC60950_1A
Attachment Originator .....:	CQC-TIRT
Master Attachment.....:	Date 2012-11

	China National Differences		
1.5. 2	Add a note behind the first dashed paragraph. Note: A component used shall comply with related requirements corresponding altitude of 5000m.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.7	Add a paragraph before the last paragraph: The required marking and instruction should be given in normative Chinese unless otherwise specified.	Must be checked when marketing into China.	—
1.7.1	Amend dashed paragraph at the fifth paragraph : The RATED VOLTAGE should be 220V (single phase) or 380V (three-phases) for single rated voltage, for RATED VOLTAGE RANGE, it should cover 220V or 380V (three-phases), for multiple RATED VOLTAGES, one of them should be 220V or 380V (three-phases) and set on 220V or 380V (three-phases) when manufactured. And the RATED FREQUENCY or RATED FREQUENCY RANGE should be 50Hz or include 50Hz.	The single phase input rating 100-240V, 60-50Hz is considered that cover the 220V 50Hz.	**P**

IEC60950-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.2.1	Add requirements of warning for equipment intended to be used at altitude not exceeding 2000m or at non-tropical climate regions: For equipment intended to be used at altitude not exceeding 2000m, a warning label containing the following or a similar appropriate wording, or a symbol as in annex DD shall fixed to the equipment at readily visible place. "Only used at altitude not exceeding 2000m."  For equipment intended to be used in not-tropical climate regions, a warning label containing the following or a similar appropriate wording, or a symbol as in annex DD shall fixed to the equipment at readily visible place. "Only used in not-tropical climate regions."  If only the symbol used, the explanation of the symbol shall be contained in the instruction manual. The above statements shall be given in a language acceptable to the regions where the apparatus is intended to be used.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.7.1	Amended the first paragraph as: Protection in PRIMARY CIRCUITS against overcurrent short-circuits and earth faults shall be provided as an integral part of the equipment except special provisions. And the protective device shall meet the requirement of Clause 5.3. Delete note of Clause 2.7.1.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—

IEC60950-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
2.9.2	First section of Clause 2.9.2 amended as two sections: Where required by 2.9.1, 2.10.8.3, 2.10.10 or 2.10.11, humidity conditioning is conducted for 120 h in a cabinet or room containing air with ambient temperature 40±2℃ and a relative humidity of (93±3)%. During this conditioning the component or subassembly is not energized. For equipment not to be operated at tropical climatic conditions, Where required by 2.9.1, 2.10.8.3, 2.10.10 or 2.10.11, humidity conditioning is conducted for 48 h in a cabinet or room containing air with a relative humidity of (93±3) %. The temperature of the air, at all places where samples can be located, is maintained within 2 °C of any convenient value between 20 °C and 30 °C such that condensation does not occur. Due to pretreatment of equipment operated at high altitude area is humidity conditioning withstand hot shock, specific requirements are to be considered. Add note: For equipment to be operated at 2000 m - 5000m above sea level, assessment and requirement of humidity conditioning for Insulation material properties are considered.	The humidity treatment is 120hr /42°C/95%Rh.	**P**
2.10.3.1	Amend the third paragraph of Clause 2.10.3.1 to be: These requirements apply for equipment to be operated up to 2000 m above sea level. For equipment to be operated at more than 2000 m above sea level and up to 5000m above sea level, the minimum CLEARANCE shall be multiplied by the factor 1.48 corresponding altitude of 5000m given in Table A.2 of IEC 60664-1. For equipment to be operated at more than 5000 m above sea level, the minimum CLEARANCE shall be multiplied by the factor given in Table A.2 of IEC 60664-1. Linear interpolation is permitted between the nearest two points in Table A.2. The calculated minimum CLEARANCE using this multiplication factor shall be rounded up to the next higher 0,1 mm increment.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—

IEC60950-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
2.10.3.3& 2.10.3.4	Add "(applicable for altitude up to 2000m)" in header of Table 2K、2L and 2M.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.10.3.4	Add a new section above Table 2K and in Clause 2.10.3.4: Minimum CLEARANCES determined by above rules apply for equipment to be operated up to 2000m above sea level. For equipment operated at 2000 m - 5000m above sea level, the minimum CLEARANCE shall be multiplied by the factor 1.48 corresponding altitude of 5000m given in Table A.2 of GB/T16935.1（ IEC 60664-1）. For equipment to be operated at more than 5000 m above sea level, the minimum CLEARANCE shall be multiplied by the factor given in Table A.2 of GB/T16935.1.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
3.2.1.1	Add a paragraph before the last paragraph: Plugs connected to AC mains supply shall comply with GB 1002 or GB 1003 or GB/T 11918 as applicable.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
4.2.8	Clause 4.2.8 cathode ray tubes quoted Clause 18 of GB8898-2011. Delete note of Clause 4.2.8.	No such parts.	**N/A**
Annex E	Amend last section: For comparison of winding temperatures determined by the resistance method of this annex with the temperature limits of Table 4B, 35 °C shall be added to the calculated temperature rise. Add note: for equipment not to be operated at tropical climatic conditions, 25 °C shall be added to the calculated temperature rise to compare with the temperature of Table 4B.	Not used.	**N/A**

IEC60950-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex G.6	Change the second section of Clause G.6 to be: For equipment to be operated at 2000 m - 5000m above sea level, the minimum CLEARANCE shall be multiplied by the factor 1.48 corresponding altitude of 5000m given in Table A.2 of GB/T16935.1. For equipment to be operated at more than 5000 m above sea level, the minimum CLEARANCE shall be multiplied by the factor given in Table A.2 of IEC 60664-1. Linear interpolation is permitted between the nearest two points in Table A.2. The calculated minimum CLEARANCE using this multiplication factor shall be rounded up to the next higher 0,1 mm increment.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
Annex DD (normative)	Added annex DD: Instructions for the new safety warning labels. DD.1 Altitude warning label  Meaning of the label: Evaluation for apparatus only based on altitude not exceeding 2000m, therefor it's the only operating condition applied for the equipment .There may be some potential safety hazard if the equipment is used at altitude above 2000m. DD.2 Climate warning label  Meaning of the label: Evaluation for apparatus only based on temperate climate condition, therefor it's the only operating condition applied for the equipment .There may be some potential safety hazard if the equipment is used in tropical climate region.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
Annex EE (informative)	Added annex EE: Illustration relative to safety explanation in normative Chinese、Tibetan、Mongolian、Zhuang Language and Uighur.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—

IEC60950-1 - ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
	Special national conditions		
1.1.2	GB4943.1-2011 applies to equipment used at altitudes not exceeding 5000m above sea level, primarily in regions with moderate or tropical climates. Revise the third dashed paragraph of 1.1.2 as: ——equipment intended to be used in vehicles, on board ships or aircraft, at altitudes greater than 5000m;	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.4.5	Amend the second paragraph by the following: If the equipment is intended for direct connection to an AC mains supply, the tolerances on RATED VOLTAGE shall be taken as +10% and -10%.	Test conducted at input voltage 240V with +10% tolerance.	**P**
1.4.12.1	Tma: The maximum ambient temperature permitted by the manufacturer's specification, or 35 °C, whichever is greater. Add note 1: For equipment not to be operated at tropical climatic conditions, Tma is the maximum ambient temperature permitted by the manufacturer's specification, or 25 °C, whichever is greater. Add note 2: For equipment to be operated at 2000m-5000m above sea leave, its temperature test conditions and temperature limits are under consideration.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT: SINGAPORE DIFFERENCES to IEC 60950-1 (ed.2)

No	Item	Requirement	Result - Remark	Verdict
The following is the national differences in accordance with safety authority website www.safety.org.sg/ , ref. Singapore Consumer Protection (Safety Requirements) - Information booklet - chapter 7 (page 23 - 26). Based on information by Singapore NCB – PSB Corp.				
7 SAFETY AUTHORITY'S REQUIREMENTS The Safety Authority monitors the safety of the controlled goods sold in Singapore by investigating all complaints, incidents and accidents reported to the authority. Experiences gained are translated into the Safety Authority's Requirements. These requirements are to be fulfilled in addition to the applicable safety standards.				
Applicable to all electrical products				
2	All appliances	All appliances must be tested to 230 VAC.	Considered	**P**
3	Voltage selector (voltage mis-match test)	Appliance fitted with voltage selector shall be tested as follows: Connect appliance to 230 VAC mains with voltage selector switch to settings not suitable for operation at 230 VAC.	No such parts.	**N/A**
4	Tropical condition test	All appliances (with tropical test requirements in applicable Standards) shall comply with the tropical condition test as stated in the relevant IEC Standards.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
5	Class I appliances (3-pin mains plug)	All Class I appliances must be fitted with 3-pin mains plugs complied with SS 145/SS 472 that are registered with the Safety Authority.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**
6	Class II appliances (mains plug)	a) All Class II appliances must be fitted with 2-pin mains plug (Appendix W) complied with IEC 83: 1975 (Standard C5, Version II) or EN 50075: 1991. b) Class II appliances that are fitted with 3-pin mains plugs must use	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

		plugs that are complied with SS 145 and registered with the Safety Authority.		
7	Appliances rated ≥ 3 kW or connected to fixed wiring	Electric appliance ≥ 3 kW must be connected to fixed wiring. All connection to fixed wiring must be in accordance with Code of Practice CP5.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	**N/A**

No	Item	Requirement	Result - Remark	Verdict
8	Detachable power cord set (consists of mains plug, mains cord and appliance connector)	Detachable power cord set must be listed in the test report critical component list.	Must be considered when installed in the end product.	**N/A**
9	Circuit diagrams	Circuit diagrams must be indicated with component's values for products tested to IEC 60065 and IEC 60950.	Must be considered when installed in the end product.	—
10	Circuit diagrams of electronic modules in electrical appliances	Circuit diagrams of the electronic modules in the electrical appliances must be provided.	Must be considered when installed in the end product.	—
11	Controlled goods likely to be treated as toy by children	Controlled goods, having an enclosure, which is shaped and decorated so that it is likely to be treated as a toy by children, shall not be accepted for certification and registration.	The shape and function are not considered as toy.	**N/A**
		Applicable to AC adapter		
13	3-pin AC adaptor	Test report showing that the 3-pin complied with sub-clauses 12.1 & 12.3 of SS 246 must be submitted.	The equipment is not AC Adaptor.	**N/A**
14	2-pin AC adaptor	The 2-pin (Appendix W) shall comply with IEC 83: 1975 (Standard C5, Version II) or EN 50075.	The equipment is not AC Adaptor.	**N/A**
15	Detachable power supply cord set not supplied by Registered Supplier	Registered Supplier who is not supplying the detachable power supply cord set together with the AC Adaptor must provide written instruction to its customer on the type of approved detachable power	The equipment is not AC Adaptor.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

		cord set to use.		
Applicable to computer products				
16	CD/DVD ROM (used in personal computer)	Test certificate showing that CD/DVD ROM has complied with IEC 825 must be provided.	Considered.	**P**
17	Modem Card (used in personal computer)	Modem card incorporated in the personal computer must be tested at set level (sub-clauses 5.1 & 6 of IEC 60950) or at component level.	Not such parts.	**N/A**
Applicable to plasma/LCD display monitor computer products				
35	Plasma/LCD display monitor with TV tuner	Plasma/LCD display monitor tested to IEC 60950 would require additional test to clauses 9 (related to antenna only), 10.1, 10.2, 10.3 and 12.5 of IEC 60065.	No TV tuner provided.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 60950-1
JAPAN NATIONAL DIFFERENCES
Information technology equipment – Safety – Part 1: General requirements

Differences according to.....:	J60950-1(H22)
Attachment Form No.....:	JP_ND_IEC60950_1A
Attachment Originator.....:	
Master Attachment.....:	2010-11

National Differences - Japan			
1.2.4.1	Add the following new NOTE. NOTE Even if the equipment is designed as Class I, the equipment is regarded as Class 0I equipment when a 2-pin adaptor with an earthing lead wire or a cord set having a 2-pin plug with an earthing lead wire is provided or recommended.	Must be considered before marketed in Japan.	—
1.2.4.3A	Add the following new clause. 1.2.4.3A CLASS 0I EQUIPMENT Equipment having attachment plug without earthing blade, where protection against electric shock is achieved by: - using BASIC INSULATION, and - providing externally an earth terminal or a lead wire for earthing in order to connect those conductive parts that might assume a HAZARDOUS VOLTAGES in the event of BASIC INSULATION fault to the PROTECTIVE EARTHING CONDUCTOR in the building wiring. NOTE Class 0I equipment may have a part constructed with Double Insulation or Reinforced Insulation. circuit.	Must be considered before marketed in Japan.	—

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1.3.2	Add the following notes after the first paragraph: NOTE 1 Transportable or similar equipment that is relocated frequently for intended usage should not be designed as Class I or Class 0I equipment unless it is intended to be installed by service personnel. NOTE 2 Considering wiring circumstance in Japan, equipment intended to be installed where the provision for earthling connection is unlikely should not be designed as Class I or Class 0I equipment unless it is intended to be installed by service personnel.	Must be considered before marketed in Japan.	—
1.5.1	Replace the first paragraph with the following: Where safety is involved, components shall comply either with the requirements of this standard or with the safety aspects of the relevant JIS component standard or IEC component standards in case there is no applicable JIS component standard is available. However, in case a component that falls within the scope of the METI Ministerial ordinance (No. 85:1962) is properly used in accordance with its marked ratings, the requirements of 1.5.4, 2.8.7 and 3.2.5 apply, and in addition, a cord connector of power supply cord set matching with an appliance inlet specified in the standard sheets of IEC 60320-1, shall comply with relevant standard sheet of IEC 60320-1. Replace NOTE 1 with the following: NOTE 1 A JIS or an IEC component standard is considered relevant only if the component in question clearly falls within its scope.	Considered.	P

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1.5.2	Replace the first sentence in the first dashed paragraph with the following: - a component that has been demonstrated to comply with a JIS component standard harmonized with the relevant IEC component standard, or where such JIS component standard is not available, a component that has been demonstrated to comply with the relevant IEC component standard shall be checked for correct application and use in accordance with its rating. Add a NOTE after the first dashed paragraph as follows: NOTE 1 See 1.7.5A when Type C.14 appliance coupler rated 10 A per IEC 60320-1 is used with an equipment rated not more than 125 V and rated more than 10 A. Replace the first sentence in the third dashed paragraph as follows: - where no relevant IEC component standard or JIS component standard harmonized with the relevant IEC component standard exists, or where components are used in circuits not in accordance with their specified rating, the components shall be tested under the conditions occurring in the equipment.	Considered.	**P**
1.5.6	In this sub-clause, add “JIS C 5101-14:1998 or” before the reference number, IEC 60384-14:1993.	No such parts.	**N/A**
1.5.7.2	In this sub-clause, add “JIS C 5101-14:1998 or” before the reference number, IEC 60384-14:1993.	No such parts.	**N/A**
1.5.8	In the first paragraph, add “JIS C 5101-14:1998 or” before the reference number, IEC 60384-14:1993.	No such parts.	**N/A**
1.7.1	Replace the fifth dashed paragraph with the following: - manufacturer’s or responsible company’s name or trade-mark or identification mark;	Must be considered when marketing into Japan	**—**
1.7.5	In the second paragraph, add “or JIS C 8303:2007” after the reference number, IEC/TR 60083:1997”.	No such part.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
1.7.5A	Add the following new clause after 1.7.5 1.7.5A Appliance Couplers If an appliance coupler according to IEC 60320-1, C.14(rated current: 10 A) is used in equipment whose rated voltage is less than 125 V and the rated current is over 10 A, the following instruction or equivalent shall be described in the user instruction. “ Use only designated cord set attached in this equipment”	Power supply cord is not provided.	**N/A**
1.7.12	Replace first sentence with the following: Instructions and equipment marking related to safety shall be in Japanese.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
1.7.17A	Add the following new clause after 1.7.17 1.7.17A Marking for CLASS 0I EQUIPMENT For CLASS 0I EQUIPMENT, the following instruction shall be marked on the visible place of the mains plug or the main body: 必ず接地接続を行って下さい “Provide an earthing connection” Moreover, for CLASS 0I EQUIPMENT, the following or equivalent instruction shall be indicated on the visible place of the main body or written in the operating instructions: 接地接続は必ず、電源プラグを電源につなぐ前に行って下さい。又、接地接続を外す場合は、必ず電源プラグを電源から切り離してから行って下さい。 “Provide an earthing connection before the mains plug is connected to the mains. And, when disconnecting the earthing connection, be sure to disconnect after pulling out the mains plug from the mains.”	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
2.1.1.1	In item b) of this sub-clause, replace “IEC 60083” with “JIS C 8303:2007 or Article 1 of the Ministerial Ordinance (No. 85:1962)”	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.6.3.2	Add the following after the first paragraph. This also applies to the conductor of lead wire for protective earthing of CLASS 0I EQUIPMENT.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.6.4.2	Replace the first paragraph with the following. Equipment required to have protective earthing shall have a main protective earthing terminal. For equipment with a DETACHABLE POWER SUPPLY CORD, the earthing terminal in the appliance inlet is regarded as the main protective earthing terminal except for CLASS 0I EQUIPMENT providing separate main protective earthing terminal other than appliance inlet.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.6.5.4	Replace the first sentence with the following. Protective earthing connections of CLASS I EQUIPMENT shall make earlier and break later than the supply connections in each of the following:	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.6.5.8A	Add the following new clause after 2.6.5.8 2.6.5.8A Earthing of CLASS 0I EQUIPMENT Plugs with a lead wire for earthing shall not be used for equipment having a rated voltage exceeding 150 V. For plugs with a lead wire for earthing, the lead wire shall not be earthed by a clip. CLASS 0I EQUIPMENT shall be provided with an earthing terminal or a lead wire for earthing in the external location where easily visible.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
2.10.3.1	In this sub-clause, replace IEC 60664-1 with JIS C 0664:2003.	Replaced	**N/A**
2.10.3.2	In the second paragraph, replace IEC 60664-1 with JIS C 0664:2003.	Replaced	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
3.2.3	Add the following after Table 3A: Table 3A applies when cables complying with JIS C 3662 or JIS C 3663 are used. In case of other cables, the cable entries shall be so designed that a conduit suitable for the cable used can be fitted.	The equipment is not intended for permanent connection to the mains.	**N/A**
3.2.5.1	Add the following to the last of first dashed paragraph. Or mains cords shall be of the sheathed type complying with Appendix 1 of Article 1 of the Ministerial Ordinance (No. 85:1962) on stipulating technical requirements for the Electrical Appliance**.** Add the following to the last of second dashed paragraph. Or mains cords shall be of the sheathed type complying with Appendix 1 of Article 1 of the Ministerial Ordinance (No. 85:1962) on stipulating technical requirements for the Electrical Appliance**.** Delete 1) in Table 3B.	Power supply cord is not provided.	**N/A**
3.3.4	Add the following note to Table 3D: NOTE For cables other than those complying with JIS C 3662 or JIS C 3663, terminals shall be suitable for the size of the intended cables.	Power supply cord is not provided.	**N/A**
3.3.7	Add the following after the first sentence: This requirement is not applicable to the external earting terminal of Class 0I equipment.	Power supply cord is not provided.	**N/A**
4.3.4	Add the following after the first sentence: This requirement also applies to those connections in Class 0I equipment, where CLEARANCE or CREEPAGE DISTANCES over BASIC INSULATION would be reduced to less than the values specified in 2.10.	Added.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.13.5	Replace the first paragraph with the following: Except as permitted below, equipment shall be classified and labelled according to JIS C 6802:2005, and JIS C 6803:2006 or IEC 60825-2:2000, as applicable. Replace IEC 60825-1 in the second and the last paragraph with JIS C 6802:2005.	Replaced.	**N/A**
4.5	Add the following NOTE to Table 4B, 3): NOTE: In case no data for the material is available, Appendix 4, 4. (1). b. 3 of the Interpretation on the Ministerial Ordinance stipulating Technical Specifications for Electrical Appliances (Commerce and Distribution Policy Group No. 3:2008/06/19) may apply.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—
5.1.3	Add a note after the first paragraph as follows: NOTE Attention should be drawn to that majority of three-phase power system in Japan is of delta connection, and therefore, in that case, the test is conducted using the test circuit from IEC 60990, figure 13.	The equipment is an integrated circuit (IC) including a capacitor discharge function for building-in, must be considered when installed in the end product.	—

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.6	Replace Table 5A as follows:		—

Type of equipment	Terminal A of measuring instrument connected to:	Maximum TOUCH CURRENT mA r.m.s. [1)]	Maximum PROTECTIVE CONDUCTOR CURRENT
All equipment	Accessible parts and circuits not connected to protective earth	0,25	-
HAND-HELD	Equipment main protective earthing terminal (if any) CLASS I EQUIPMENT	0,75	-
MOVABLE (other than HAND-HELD, but including TRANSPORTABLE EQUIPMENT		3,5	-
STATIONARY, PLUGGABLE TYPE A		3,5	-
All other STATIONARY EQUIPMENT - not subject to the conditions of 5.1.7 - subject to the conditions of 5.1.7		3,5 -	- 5 % of input current
HAND-HELD	Equipment main protective earthing terminal (if any) CLASS 0I EQUIPMENT	0,5	-
Others		1,0	-

[1)] If peak values of TOUCH-CURRENT are measured, the maximum values obtained by multiplying the r.m.s. values by 1,414.

6	Replace IEC 60664-1 in NOTE 4 with JIS C 0664.	No TNV circuit.	**N/A**
7	Replace IEC 60664-1 in NOTE 3 with JIS C 0664:2003.	Not connected to cable distribution systems.	**N/A**
7.2	Add the following after the paragraph: However, the separation requirements and tests of 6.2.1 a), b) and c) do not apply to a CABLE DISTRIBUTION SYSTEM if all of the following apply: - the circuit under consideration is a TNV-1 CIRCUIT; and – the common or earthed side of the circuit is connected to the screen of the coaxial cable and to all accessible parts and circuits (SELV, accessible metal parts and LIMITED CURRENT CIRCUITS, if any); and – the screen of the coaxial cable is intended to be connected to earth in the building installation.	Not connected to cable distribution systems.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
W.1	Replace the second and the third sentence in the first paragraph with the following: This distinction between earthed and unearthed (floating) circuit is not the same as between CLASS I EQUIMENT, CLASS 0I EQUIPMENT and CLASS II EQUIPMENT. Floating circuits can exist in CLASS I EQUIPMENT or CLASS 0I EQUIPMENT and earthed circuits in CLASS II EQUIPMENT.	No TNV circuit.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex JA	Add a new annex JA with the following contents. Annex JA (normative) Document shredding machines Document shredding machines shall also comply with the requirements of this annex except those of STATIONARY EQUIPMENT used by connecting directly to an AC MAINS SUPPLY of three-phase 200V or more. **JA.1 Markings and instructions** The symbol  (JIS S 0101:2000, 6.2.4) and the following precautions for use shall be marked on readily visible part adjacent to document feed opening. The marking shall be clearly legible, permanent, and easily discernible; - that use by an infants/children may cause a hazard of injury etc.; - that a hand can be drawn into the mechanical section for shredding when touching the document-slot; - that clothing can be drawn into the mechanical section for shredding when touching the document-slot; - that hairs can be drawn into the mechanical section for shredding when touching the document-slot; - in case of equipment incorporating a commutator motor, that equipment may catch fire or explode by spraying of flammable gas. **JA.2 Inadvertent reactivation** Any safety interlock that can be operated by means of the test finger, Figure JA.1, is considered to be likely to cause inadvertent reactivation of the hazard. Compliance is checked by inspection and, where necessary, by a test with the test finger, Figure JA.1 **JA.3 Disconnection from the mains supply** Document shredding machines shall incorporate an isolating switch complying with sub-clause 3.4.2 as the device disconnecting the power of hazardous moving parts. For this switch, two-position (single-use) switch or multi-position (multifunction) switch (e.g., slide switch) may be used.	The equipment is not Document shredding machines.	**N/A**

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex JA	If two-position switch, the positions for "ON" and "OFF" shall be indicated in accordance with sub-clause 1.7.8. If multi-position switch, the position for "OFF" shall be indicated in accordance with sub-clause 1.7.8 and other positions shall be indicated with proper terms or symbols. Compliance is checked by inspection **JA.4 Protection against hazardous moving parts** Any warning shall not be used instead of the structure for preventing access to hazardous moving parts. Document shredding machines shall comply with the following requirements. Insert the test finger, Figure JA.1, into all openings in MECHANICAL ENCLOSURES without applying appreciable force. It shall not be possible to touch hazardous moving parts with the test finger. This consideration applies to all sides of MECHANICAL ENCLOSURES when the equipment is mounted as intended. Before testing with the test finger, remove the parts detachable without a tool. Insert the wedge-probe, Figure JA.2, into the document-slot. And, against all directions of openings, if straight-cutting type, a force of 45 N shall apply to the probe, and 90 N if cross-cutting type. In this case, the weight of the probe is to be factored into the overall applied force. Before testing with the wedge-probe, remove the parts detachable without a tool. It shall not be possible to touch any hazardous moving parts, including the shredding roller or the mechanical section for shedding, with the probe.	The equipment is not Document shredding machines.	**N/A**

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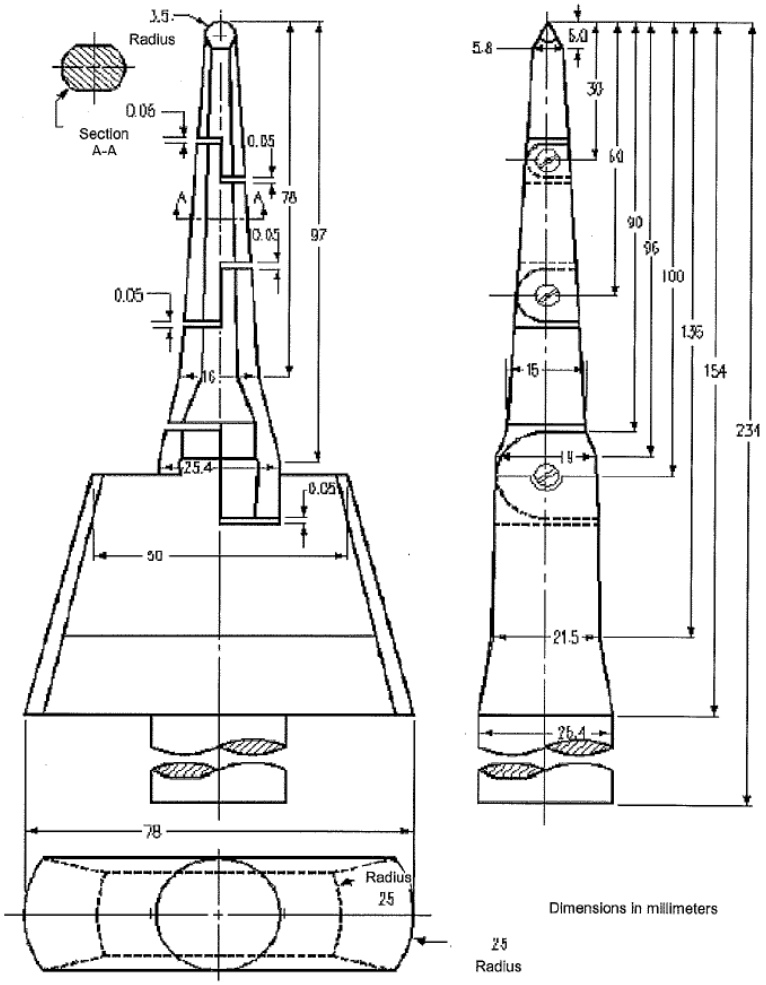
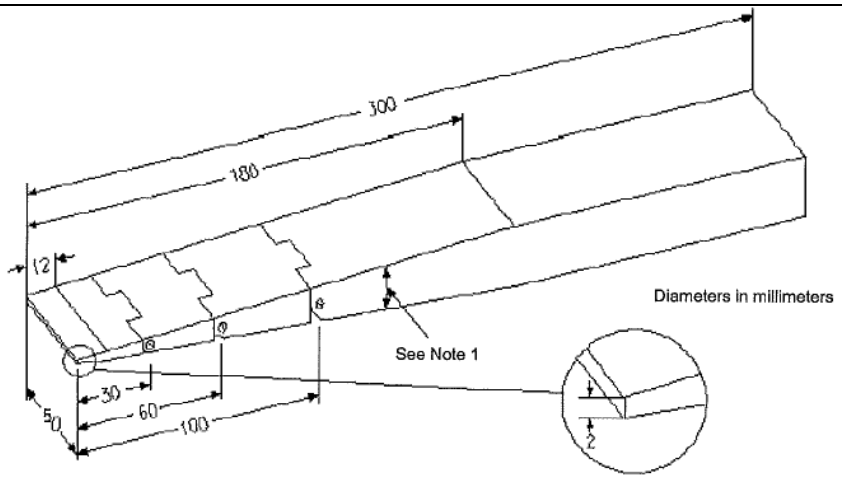
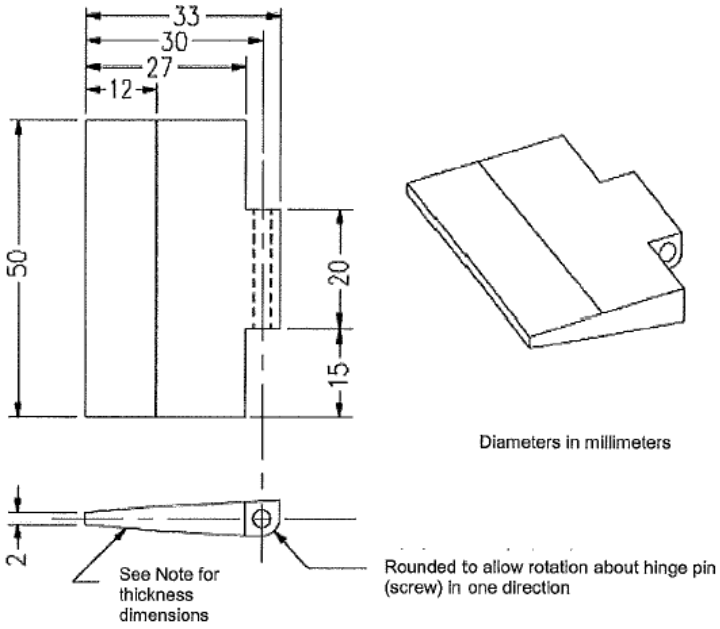
Clause	Requirement + Test	Result - Remark	Verdict
Annex JA	 Figure JA.1 Test finger		N/A

IEC 60950-1 ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
Annex JA	  Details of the tip of wedge		**N/A**

Distance from the tip (mm)	Thickness of probe (mm)
0	2
12	4
180	24

NOTE 1 The thickness of the probe varies linearly, with slope changes at the respective points shown in the table.
NOTE2 The allowable dimensional tolerance of the probe is +/- 0.127 mm.

Figure JA.2 Wedge-probe