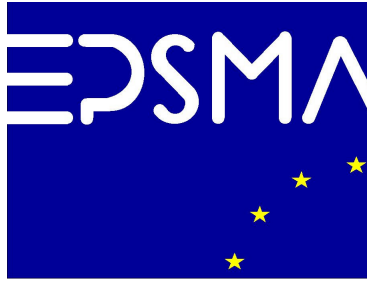


available to buy -  
contact EPSMA Secretariat



## EUROPEAN POWER SUPPLY MANUFACTURERS ASSOCIATION

### Safety Approvals Guideline for Telecom Power Supplies

#### Guidelines to the Standards:

- IEC60950-1 amendment 1
- EN60950-1
- UL60950-1 Second edition

Document Revision: Final  
3<sup>rd</sup> September 2012

This Guideline gives an overview of design issues, definitions and useable standards currently used in AC/DC and DC/DC power supplies for telecom applications. It should give a common understanding what safety rules and certifications should be used depending on the final application of the product.

Furthermore this paper gives a general interpretation how different standard requirements are applied to power supplies.

**This paper does NOT intend to be a standard.**

Paper prepared by the EPSMA Technical Committee. Special thanks and acknowledgements to the report champion Andreas Stiedl (Emerson Network Power), and Christian Augesky (Siemens), Paul Conway (Murata Power Solutions) and Mathias Emsermann (Delta Energy Systems) for their contribution to this document.

The European Power Supply Manufacturers Association was established in 1995, to represent the European power supply industry. More information regarding the organisation can be found on the EPSMA website ([www.epsma.org](http://www.epsma.org)).

*Disclaimer: No responsibility or liability can be accepted by the EPSMA or any of its officers or members for the content of this guidance document, and the information contained herein should not be used as a substitute for taking appropriate advice.*

*Published by EPSMA © 2012*

## Table of Contents

*Disclaimer: No responsibility or liability can be accepted by the EPSMA or any of its officers or members for the content of this guidance document, and the information contained herein should not be used as a substitute for taking appropriate advice*

1.	Introduction.....	<b>Error! Bookmark not defined.</b>
2.	Summary.....	<b>Error! Bookmark not defined.</b>
2.1.	Enclosure.....	<b>Error! Bookmark not defined.</b>
3.	Electrical Safety.....	<b>Error! Bookmark not defined.</b>
3.1.	Voltage potential description .....	<b>Error! Bookmark not defined.</b>
3.2.	Insulation type.....	<b>Error! Bookmark not defined.</b>
3.3.	Protection class.....	<b>Error! Bookmark not defined.</b>
3.4.	Pollution degree.....	<b>Error! Bookmark not defined.</b>
3.5.	Connection to supply voltage .....	<b>Error! Bookmark not defined.</b>
3.6.	AC mains transient voltages .....	<b>Error! Bookmark not defined.</b>
3.7.	Insulation material.....	<b>Error! Bookmark not defined.</b>
3.7.1.	Material with specified voltage rating.....	<b>Error! Bookmark not defined.</b>
3.7.2.	Material requiring minimum thickness.....	<b>Error! Bookmark not defined.</b>
3.7.3.	Printed circuit boards.....	<b>Error! Bookmark not defined.</b>
3.7.4.	Material groups .....	<b>Error! Bookmark not defined.</b>
3.8.	Electrical safety hazards .....	<b>Error! Bookmark not defined.</b>
3.8.1.	ELV circuit.....	<b>Error! Bookmark not defined.</b>
3.8.2.	SELV circuit.....	<b>Error! Bookmark not defined.</b>
3.8.3.	TNV circuit .....	<b>Error! Bookmark not defined.</b>
3.8.3.1.	TNV voltages.....	<b>Error! Bookmark not defined.</b>
3.9.	Safety relevant components.....	<b>Error! Bookmark not defined.</b>
3.9.1.	Optocoupler.....	<b>Error! Bookmark not defined.</b>
3.9.2.	Transformer.....	<b>Error! Bookmark not defined.</b>
3.9.2.1.	Electrical Insulation system .....	<b>Error! Bookmark not defined.</b>
3.9.3.	X-capacitor.....	<b>Error! Bookmark not defined.</b>
3.9.4.	Y-capacitor.....	<b>Error! Bookmark not defined.</b>
3.9.5.	Cables, wires, copper foils.....	<b>Error! Bookmark not defined.</b>
3.9.6.	Insulating tape, insulation foil .....	<b>Error! Bookmark not defined.</b>
3.9.7.	Bobbin.....	<b>Error! Bookmark not defined.</b>
3.9.8.	Fuse.....	<b>Error! Bookmark not defined.</b>
3.9.9.	Switches, AC connectors EMI filters, Relays ...	<b>Error! Bookmark not defined.</b>
3.9.10.	Potting compounds.....	<b>Error! Bookmark not defined.</b>
3.9.11.	Surge suppressors .....	<b>Error! Bookmark not defined.</b>
3.9.11.1.	VDR (MOV), ABD .....	<b>Error! Bookmark not defined.</b>
3.9.11.2.	GDT.....	<b>Error! Bookmark not defined.</b>
3.9.12.	PCB .....	<b>Error! Bookmark not defined.</b>
3.10.	Safety area diagram.....	<b>Error! Bookmark not defined.</b>
3.11.	Calculation of safety relevant voltages .....	<b>Error! Bookmark not defined.</b>
3.11.1.	The working voltage .....	<b>Error! Bookmark not defined.</b>
3.11.2.	Determining the working voltage .....	<b>Error! Bookmark not defined.</b>
3.12.	Creepage distance.....	<b>Error! Bookmark not defined.</b>
3.13.	Clearance distance .....	<b>Error! Bookmark not defined.</b>
3.14.	Creepage and clearance distances on a printed circuit board (PCB).....	<b>Error! Bookmark not defined.</b>
	<b>Bookmark not defined.</b>	
3.14.1.	Isolation between conducting traces on the same layer..	<b>Error! Bookmark not defined.</b>
	<b>defined.</b>	
3.14.2.	Isolation between conducting traces on different layers..	<b>Error! Bookmark not defined.</b>
	<b>defined.</b>	
3.15.	Operating altitude.....	<b>Error! Bookmark not defined.</b>
3.16.	Electric strength test .....	<b>Error! Bookmark not defined.</b>
3.17.	Touch current.....	<b>Error! Bookmark not defined.</b>

3.18.	Ground continuity.....	<b>Error! Bookmark not defined.</b>
3.19.	Type label .....	<b>Error! Bookmark not defined.</b>
3.20.	Thermal measurements .....	<b>Error! Bookmark not defined.</b>
4.	Fire Protection .....	<b>Error! Bookmark not defined.</b>
4.1.	Fire enclosure .....	<b>Error! Bookmark not defined.</b>
4.2.	Materials to be used.....	<b>Error! Bookmark not defined.</b>
5.	Mechanical Safety .....	<b>Error! Bookmark not defined.</b>
5.1.	Impact test .....	<b>Error! Bookmark not defined.</b>
5.2.	Steady force test.....	<b>Error! Bookmark not defined.</b>
5.3.	Drop test .....	<b>Error! Bookmark not defined.</b>
5.4.	Touch protection .....	<b>Error! Bookmark not defined.</b>
5.4.1.	Test finger .....	<b>Error! Bookmark not defined.</b>
5.4.2.	Test pin .....	<b>Error! Bookmark not defined.</b>
6.	Other Safety Hazards .....	<b>Error! Bookmark not defined.</b>
6.1.	Heat related hazards.....	<b>Error! Bookmark not defined.</b>
6.2.	Chemical hazards .....	<b>Error! Bookmark not defined.</b>
6.3.	Radiation.....	<b>Error! Bookmark not defined.</b>
7.	Accessibility .....	<b>Error! Bookmark not defined.</b>
8.	Conditions of Acceptability.....	<b>Error! Bookmark not defined.</b>
9.	Alternative approval methods .....	<b>Error! Bookmark not defined.</b>
9.1.	IEC-62368 evolution .....	<b>Error! Bookmark not defined.</b>
10.	References .....	<b>Error! Bookmark not defined.</b>