

電子產品的幾個主要國際安規標準對雷擊測試要求

Main International Standard of Electronic Equipment Surge Requirements

Ver. 1.0

By John Lu - 2014.09.29

說明

- 舜全的主要產品壓敏電阻(MOV)/電湧保護器(SPD)作為電子/電氣商品中不可或缺的暫態過電壓(即浪湧或稱雷擊,SURGE)防護關鍵的安規部件,工程與銷售單位對各國電子/電氣商品主要安規引用的雷擊檢測標準必須要了解,才能從零件設計到銷售面等做好本職工作,此為本資料編寫目的.

各國電子/電氣商品主要安規引用的雷擊檢測標準

國家	標準號碼	最新版本	標準名稱	中國對應標準
US	UL 1449	3 rd , 2010	Surge Protective Devices	
US EN	UL 60950 IEC 60950-1	2013	Information Technology Equipment-Safety	GB 4943.1-2011
EN	IEC 60065	2011, 8 th ed	Safety for Audio & Video Equipment	GB8898-2011
EN	IEC61051-1 IEC61051-2	2007 2007	Varistors for use in electronic equipment Part 2: Sectional specification for zinc oxide surge suppression varistors	GB/T 10193:2007 GB/T 10194:2007
EN	IEC61000-4-5	2010	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	GB/T17626.5-2008
EN	IEC61643-1		Low-voltage surge protective devices - Part 1: Surge protective devices connected to low-voltage power systems - Requirements and test methods	GB18802.1-2011

UL 1449 (ANSI/US)

標準號與名稱	Surge Test Condition OCV/SCC	Intervals
UL 1449:2010(3 rd) Surge Protective Devices 電湧保護器(突波 吸收器)	Type 1: 10,20KA(PC)* Type 2: 3,5,10,20KA(PC)* Type 3: 6KV/3KA (CC/DPI)** Type 4: 0.5~20KA(CA)*** Type 5: 0.5~20KA(Componet)	15次:5+5+5 分三組每組五次 組間間隔30分鐘; 次與次間隔1分 鐘,1S內+MCOV 60S,試驗後VN變 化10%,不拉弧,不 起火,115%MCOV

*PC: Permently Connect (Listed)

**CC/DPI: Cord Connected/Direct Plug In (Listed)

***CA: Component Assembly

MCOV: Max Continue Operation Voltage

OCV: Open Circuit Voltage @1.2/50us

SCC: Short Circuit Current @8/20us

Type 5 SPD 測試項目 - Table 33.2

Testing For Type 5 and Type 4 Component Assemblies

Added Table 33.2 effective March 11,2016

Test	Section Reference	Type 5	Type 4 Component Assemblies
1. I Leakage(initial)	59B	A	A
2.Vn (before and After In)	59A	A	A
3.Nominal Discharge Current (In)	37A,37B	A	A
4.Disconnector	39A,39B,39C	N/A	A
5.Limited Current	39	N/A	A
6.Dielectric Voltage Withstand(for discrete components with foil wrapped around epoxy disc)	35	A	A

IEC/UL 60950 Annex Q

(GB 4943)

標準號與名稱	Surge Test Condition	Intervals
IEC 60950:2013 Information Technology Equipment- Safety 資訊技術設備的安全標準	According to IEC 61051-2 6KV/3KA ,10 Times (POS/NEG)	次與次間隔1分鐘

IEC/UL 60950 Annex Q

Annex Q (normative)

Voltage dependent resistors (VDRs)

(see 1.5.9.1)

A VDR used in a PRIMARY CIRCUIT shall comply with IEC 61051-2, with the following details.

a) Preferred climatic categories (2.1.1 of IEC 61051-2)

Lower category temperature: - 10 °C

Upper category temperature: + 85 °C

Duration of damp heat, steady state test: 21 days

b) Maximum continuous voltage (2.1.2 of IEC 61051-2)

The maximum continuous a.c. voltage is selected from the list of preferred voltages and shall be at least 120 % of

- the RATED VOLTAGE of the equipment or
- the upper voltage of the RATED VOLTAGE RANGE of the equipment.

c) Pulse current (Table I group 1 of IEC 61051-2)

Combination pulses of 6 kV/3 kA of alternating polarity are used, having a pulse shape of 1,2/50 µs for voltage and 8/20 µs for current.

In addition to the performance requirements of Table I group 1, the clamping voltage after the test shall not have changed by more than 10 % when measured with the manufacturer's specified current.

IEC 60065 (GB8898)

標準號與名稱	Surge Test Condition	Intervals
IEC 60065:2011 Safety for Audio & Video Equipment 音頻、視頻及 類似電子設備 安全要求	6KV/3KA 10次	次與次間隔1分鐘

IEC 61051-2 (GB/T 10194)

標準號與名稱	Surge Test Condition	Interval
IEC 61051-2:2007 Varistors for use in electronic equipment Part 2: Sectional specification for zinc oxide surge suppression varistors 電子設備用壓敏電阻： 第部分 氧化鋅壓敏電 阻規格	6KV/3KA 10次,正反各5次	次與次間隔1分鐘

IEC 61000-4-5(GB/T17626.5-2008)

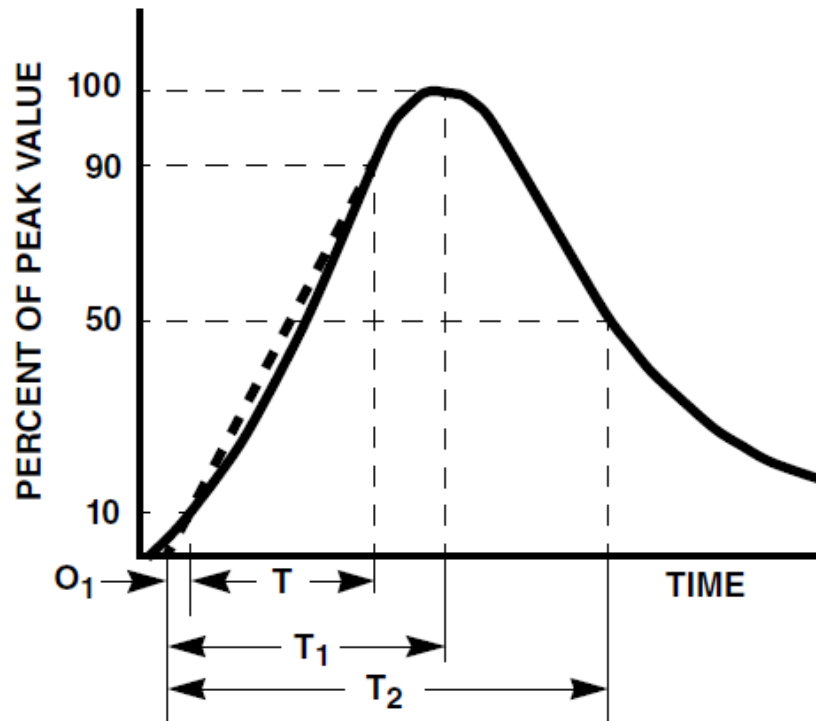
標準號與名稱	Surge Test Condition	Interval
IEC 61000-4-5:2010 Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test 電磁相容性(EMC)--第4-5部分:試驗和測量技術—浪湧抗擾性試驗	試驗浪湧電壓等級如下: 等級 開路電壓(±10%) 1 0.5KV 2 1.0KV 3 2.0KV 4 4.0KV X 特定 X: 開放等即可在產品要求中規定 (依廠商宣告 通用6KV)	依廠商選定或宣告等級在 0,90,180,270各相位角施加正反各5次,次與次間隔1分鐘

信號產生器要求: 開路電壓波形 Open Circuit Voltage @1.2/50us
 短路電流波形 Short Circuit Current @ 8/20us
 等效輸出阻抗為:2Ω(L-L/N),12Ω (L/N-PE) ,42Ω(其他)

IEC 61643-1(GB18802.1-2011)

標準號與名稱	Surge Test Condition	Interval
IEC 61643-1:2011 Low-voltage surge protective devices - Part 1: Surge protective devices connected to low-voltage power systems - Requirements and test methods 低压电涌保护器（ SPD ）第1部分：低压配电系统的电涌保护器性能要求和试验方法	I _{max} :8/20us I _n :0.5KA~40KA	15次:5+5+5 分三組每組五次 組間間隔30分鐘; 次與次間隔1分鐘

8/20 μ s 感應雷電流波



O_1 = Virtual Origin of Wave

T = Time from 10% to 90% of Peak

T_1 = Rise Time = $1.25 \times T$

T_2 = Decay Time

Example:

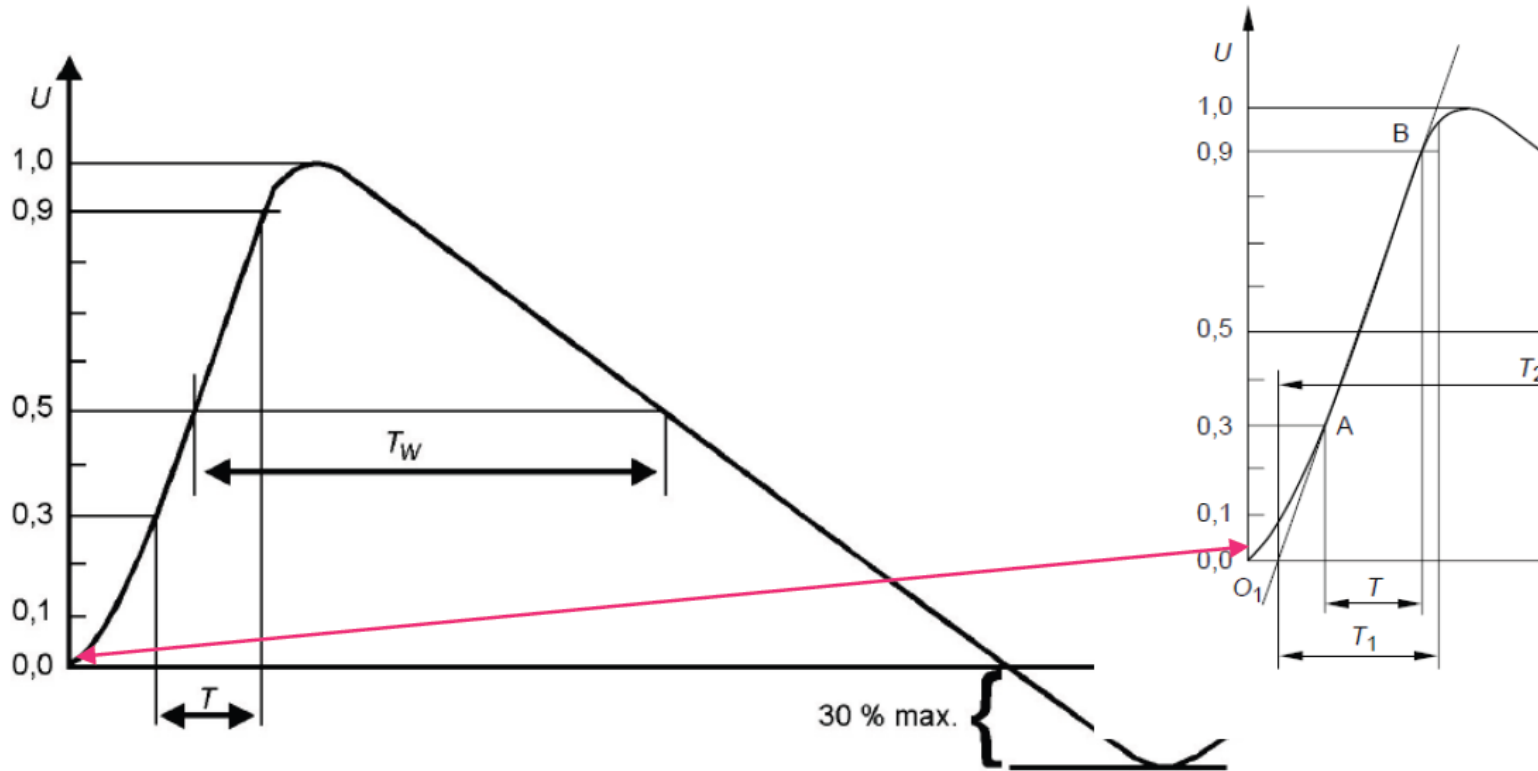
For an 8/20 μ s Current Waveform:

$8\mu\text{s} = T_1$ = Rise Time

$20\mu\text{s} = T_2$ = Decay Time

IEC 61000-4-5 Ed3

One clear Definition no longer IEC 60060 and IEC 60469



	Front time T_f μs	Duration T_d μs
Open-circuit voltage	$T_f = 1,67 \times T = 1,2 \pm 30 \%$	$T_d = T_w = 50 \pm 20 \%$
Short-circuit current	$T_f = 1,25 \times T_r = 8 \pm 20 \%$	$T_d = 1,18 \times T_w = 20 \pm 20 \%$