

深圳市槟城电子股份有限公司

Shenzhen Bencent Electronics Co.,Ltd.

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关注公众号 了解更多

 **Bencent® 槟城电子**

V2025



陶瓷气体放电管 / GDT  
浪涌保护器 / SPD  
瞬态抑制管 / TVS  
压敏复合气体管 / BMG  
压敏电阻 / MOV  
半导体放电管 / TSS  
静电保护器件 / ESD  
稳压管 / Zener  
TVS复合TSS / BVS  
开路失效TVS / BVO

## 企业简介 Enterprise Profile



深圳市槟城电子股份有限公司成立于1999年,是一家专注于防雷、防浪涌、防静电等防护电路设计以及防护元器件研发、生产和销售的高新技术企业,产品涵盖陶瓷气体放电管(GDT)、瞬态抑制管(TVS)、半导体放电管(TSS)、静电保护管(ESD)、稳压管(Zener)、压敏电阻(MOV)、浪涌保护器件(SPD)、复合器件(Hybrid device)等,是全球过压防护领域产品线较为齐全的厂商之一。公司产品广泛应用于通讯、安防、消费电子、工业、家电、医疗、汽车电子、新能源等行业,目前已与华为、诺基亚、三星、海康、联想、富士康、捷普、松下、格力、美的、迈瑞、英飞特、比亚迪、古瑞瓦特、华勤技术等国内外知名企业建立了稳定的业务合作关系。

As a professional manufacturer and provider and manufacturer of surge protection components and innovative solutions , Shenzhen Bencent Electronics Co., Ltd was established in1999, its product range cover GDT, TVS, TSS, ESD, Zener, MOV, SPD, Hybrid Devices and semiconductor chips, etc. Bencent components arewidely used in industries include communication, security, Consumer Electronics, industrial, medical electronics, automotive electronics andalternative energy.Bencnet electronics has taken pride in becoming preferred supplier with priority to HUAWEI, NOKIA, SAMSUNG, HIKVISION, LENOVO,FOXCONN, JABIL, PANASONIC, GREE, MIDEA, MINDRAY, INVENTRONICS ,BYD,GROWATT,HUAQIN.



深圳·槟城电子(总部)  
Bencent ShenZhen



Bencent DongGuan  
东莞·槟盛电子

GDT / SPD / MOV / Hybrid Devices  
GDT / SPD / MOV / 复合器件



Bencent MAS  
马鞍山·槟城电子

4" Wafer Fab / TVS / TSS  
4吋半导体芯片 / 封测 / TVS / TSS



Bencent MAS·Dapeng semiconductor  
马鞍山·大鹏半导体

6" Wafer Fab / ESD / ZENER  
6吋半导体芯片 / 封测 / ESD / Zener

# 新产品 What's New?

## FGDT



### BL201NH

$V_{BR} \geq 140V$   
 $V_{impulse} \leq 500V$   
 $I_{pp} > 1kA (8/20\mu s)$   
 2.9x2.1x1.9mm  
 Page 41



Circuit

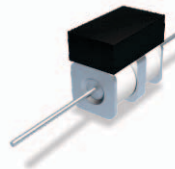


AC POWER



Adapter

## BXD



### BXD3000SA03M03-D10

$V_{BR} \geq 2400V$   $V_{impuls} \leq 2500V$   
 $I_{pp} > 3kA (8/20\mu s)$   
 $Hi\ pot \geq 2000V$   
 8.5x5.5x8.5mm  
 Page 41



Circuit



AC POWER



Adapter

## BMG



### BMG20D751K102Y

$I_{pp} = 5kA @ 8/20\mu s$   
 Low Clamping Voltage  
 $V_{BR} \geq 800V$   
 20x17x9mm  
 Page 45



Circuit

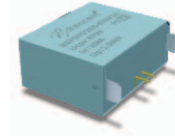


POWER



Residential Storage

## SPD For PV



### BSPDPV20K-670H1

$U_c = 670V DC$   $I_N = 10kA (8/20\mu s)$   
 No leakage current and high reliability  
 34.2x14.3x30.3mm  
 Page 43



Circuit

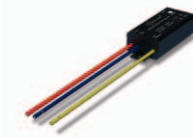


DC POWER



PV Inverter

## LED SPD



### BSPD277D05LF-01

$U_c = 277 VAC$   $I_n = 5kA (8/20\mu s)$   
 69.4x34x21.3mm  
 Page 43



Circuit



AC POWER



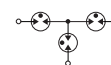
Adapter

## 板载SPD



### BSPD230C20PF-02

$U_c = 230V$   $I_N = 20kA (8/20\mu s)$   
 $U_p < 2.0kV (L \rightarrow N / L \rightarrow PE / N \rightarrow PE)$   
 38.5x16.4x24mm  
 Page 43



Circuit

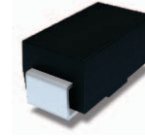


AC POWER



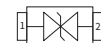
PAD Power

## SMA 600W



### BV-6SMAJ12CA

Peak pulse power 600W(10/1000 $\mu s$ )  
 Low Clamping Voltage  $\leq 19.9V$   
 5.3x2.9x2.5mm  
 Page 53



Circuit

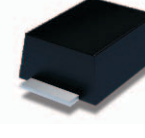


DC POWER



Access Control

## SMBF 3000W



### BV-3SMBF30CA

Peak pulse power 3000W(10/1000 $\mu s$ )  
 Low Clamping Voltage  $\leq 48.4V$   
 5.8x4.4x2.8mm  
 Page 53



Circuit

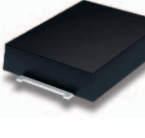


DC POWER



Access Control

## SMK 3kA



### BV-SMKJ75CA

$V_{BR} \geq 85V$   
 $V_c \leq 140V$   
 $I_{pp} > 3kA (8/20\mu s)$   
 10x8.2x2.2mm  
 Page 53



Circuit

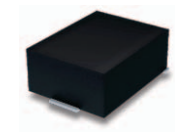


DC POWER



BMS

## TVS+TSS 10kA



### BVS-SMEJ7675CA

$V_R(TVS): 76V$   $V_{DRM}(TSS): 75V$   
 $I_{pp} > 10kA (8/20\mu s)$   
 $I_{pp} > 400A (10/350\mu s)$   
 18.3x14x7.5mm  
 Page 53



Circuit

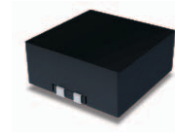


DC POWER



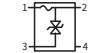
AAU

## OTVS 20kA



### BVO-SMG76CA

$I_{pp} \geq 10kA @ 8/20\mu s @ 95^\circ C$   
 $V_{DRM} \geq 76V$   
 Failsafe  
 24.0x23.5x13.8mm  
 Page 53



Circuit



DC POWER



AAU

## DFN1610 100A



### BV-FE05ZF

$V_{BR} \geq 6V$   
 $V_c \leq 11V @ 100A$   
 $V_c \leq 8.3V @ 16A TLP$   
 1.6x1.0x0.5mm  
 Page 55



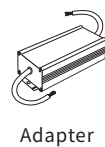
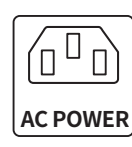
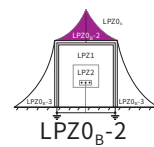
Circuit



DC POWER



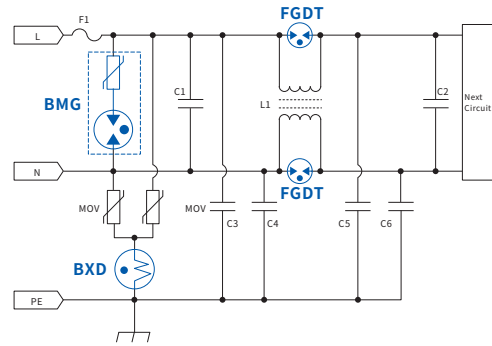
Mobile phone



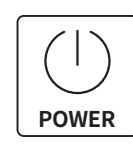
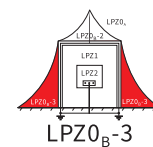
**BL封装**: 2.9x2.1x1.9mm  
**无铅**工艺, 支持背贴节省空间

VS 玻璃放电管: 浪涌**次数提升100%+**  
一致性**更好**, 响应速度**更快**  
尖峰电压**更低**, 无铅工艺**更环保**

应用: AC电源口, 并联共模电感两侧, **吸收谐振, 降低残压**



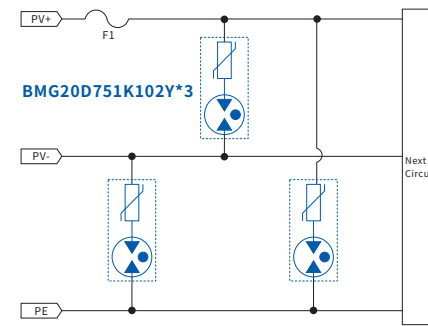
Test Level: 1.2/50μs-8/20μs: CM/DM 6kV-3kA



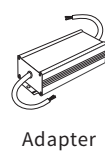
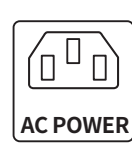
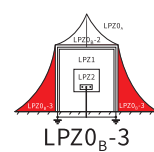
**7D~20D全系列封装**: 引脚兼容压敏封装, 实现PIN TO PIN替代

VS 内置GDT作隔离, **防止压敏老化**, 可**规避**工频过电压导致的压敏**起火故障**, 可替代常规、防爆、阻燃压敏

应用: AC电源口、DC直流口。在残压持平的条件下, 可支持**更高的工频输入电压**。适用于**电网波动较大**以及对**残压有要求**的电源端口



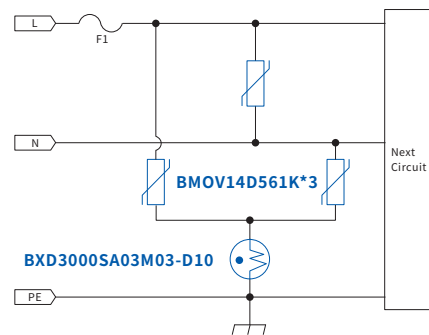
Test Level: 8/20μs: CM/DM 5kA



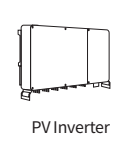
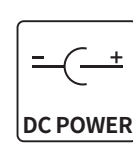
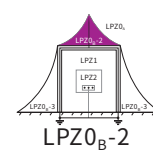
尺寸&通流: 8.5x5.5x8.5mm  
**3kA** @ 8/20μs

VS 特有触发电路, 可实现**高耐压、低残压**, 满足**AC耐压2000V, 残压<2200V**

应用: AC电源口等场景, 可适用于有**安规耐压**要求, 有雷击要求且不能拆除放电管的情况



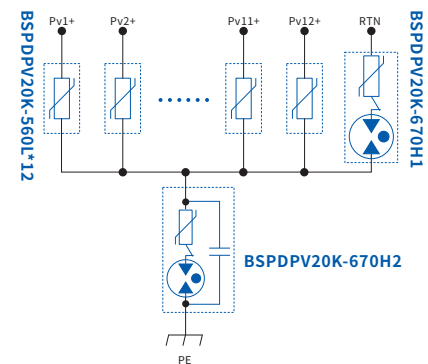
Test Level: 1.2/50μs-8/20μs: CM/DM 6kV-3kA Hipot AC2000V



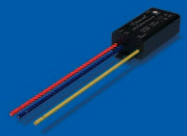
**大通流封装**: 34.2x14.3x30.3mm  
10kA @ 8/20μs

VS 传统方案: 串联GDT, **解决压敏极化问题**, **维护成本低**, 内置**脱扣装置**, 具有**故障告警功能, 安全系数高**

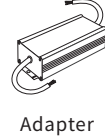
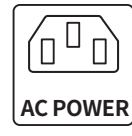
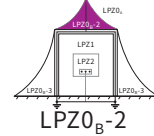
应用: 光伏逆变器场景, 可实现较传统方案**残压降30%**, **成本降本20%**, **寿命提升4倍**



Test Level: 8/20μs 10kA



**LED SPD**  
LED浪涌保护器  
BSPD277D05LF-01  
Page 43



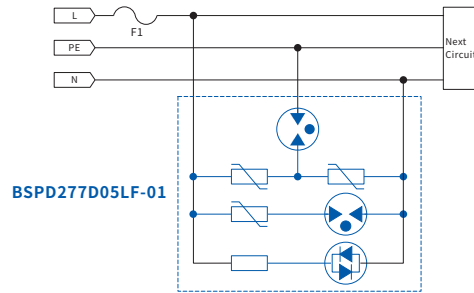
**并联型SPD**: 69.4x34x21.3mm  
**10kV-5kA** @ 1.2/50-8/20μs  
满足LED电源高量级防护需求



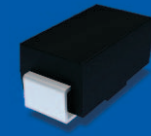
紧凑型设计, **全对称**保护模式, 保护水平  
低于**1.5kV**, 内置**脱扣失效指示**,  
**IP65** 防水防火外壳



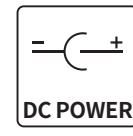
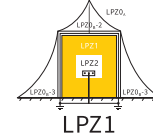
应用: LED驱动器、LED电源等场景,  
**耐压高, 安装简易**



Test Level: Contact: 8/20μs: CM/DM 5kA



**SMA 600W**  
600W SMA封装TVS  
BV-6SMAJ12CA  
Page 53



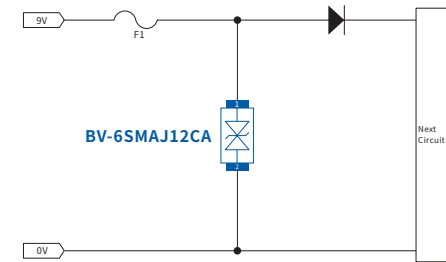
**SMA封装**: 5.3x2.9x2.5mm  
**600W** @ 10/1000μs, 采用**叠片工艺**制作



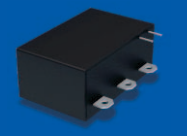
VS 常规SMA封装: **功率\*1.5倍**  
VS 常规SMB封装: **占板面积减小约30%**



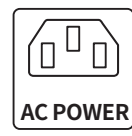
应用: 智能穿戴、手持设备等, 兼顾静电和浪涌防护



Test Level: 1.2/50-8/20μs CM/DM 500V



**板载SPD**  
板载浪涌保护器  
BSPD230C20PF-02  
Page 43



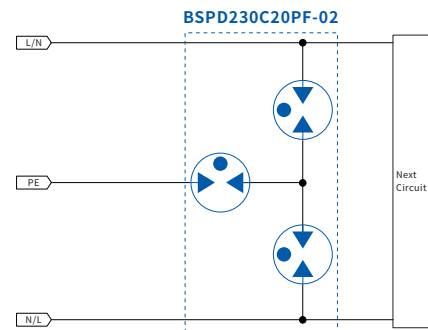
**板载式SPD**: 38.5x16.4x24mm  
**20kA** @ 8/20μs



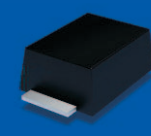
满足**AC320V@500A续流遮断**能力,  
**全对称**的防护模式, 保护水平低于**2kV**



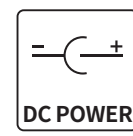
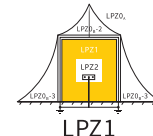
应用: 基站电源、抱杆式电源等, 较传统方案  
**占板面积减小20%**



Test Level: Contact: 8/20μs: CM/DM 20KA



**SMBF 3000W**  
3000W 宽体SMB封装TVS  
BV-3SMBF30CA  
Page 53



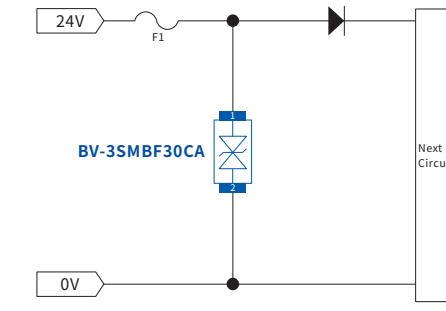
**SMB宽体封装**: 5.8x4.4x2.8mm  
**3000W** @ 10/1000μs



VS 常规SMB封装: **功率提升400%**  
VS 常规SMC封装: **占板面积减小50%**



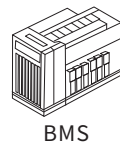
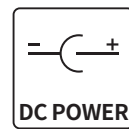
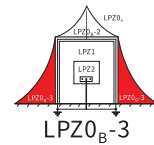
应用: 安防门禁等场景  
**小封装, 大功率**



Test Level: 1.2/50-8/20μs CM/DM 2kV-1kA



**SMK 3kA**  
3kA通流SMK封装TVS  
BV-SMKJ75CA  
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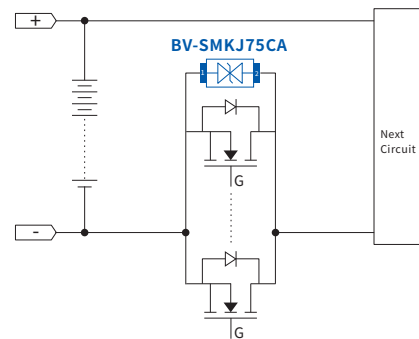
**超薄SMK封装**: 10x8.2x2.2mm  
**3kA**@8/20μs, 适用背贴



**IPP (SMK) = 5 \* IPP (5SMD)**, 较传统方案**占板面积减少60%**



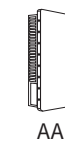
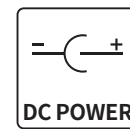
应用: DC48V系统及BMS等场景, 防护MOS管的防反/浪涌/过压等风险



Test Level: 8/20μs CM/DM 4kV-2kA



**OTVS 20kA**  
开路失效TVS  
BVO-SMG76CA  
Page 53



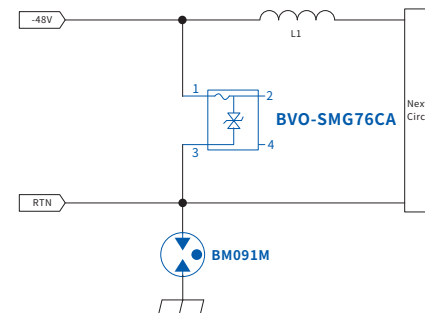
**大流通封装**: 24x23.5x13.8mm  
**20kA**@8/20μs, 满足高功率设备防护需求



一体化注塑、半导体内核、多层芯片叠片设计, 内含**机械脱扣装置 (150A@110Vdc/220Vac) 可靠失效**



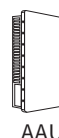
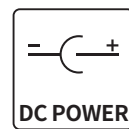
应用: **48V直流场景**, 如基站供电、48V储能系统等大电流场景;



Test Level: 8/20μs CM/DM 20kA



**TVS+TSS 10kA**  
10kA通流TVS TSS复合型器件  
BVS-SMEJ7675CA  
Page 53



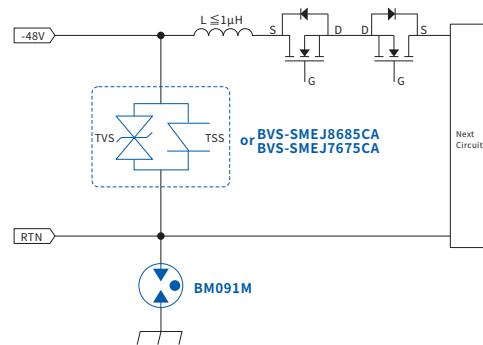
**SME封装**: 18.3x14x7.5mm  
**10kA**@8/20μs



VS PTVS方案: 反向用TSS防护降低雷击残压, 减小负向雷击浪涌时MOS管两端的应力



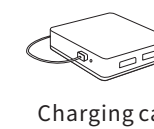
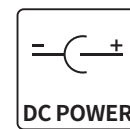
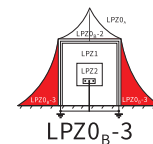
应用: 基站48VDC供电电测及电侧防护, 解决了**负向抽电**的问题



Test Level: Contact: 8/20μs DM 10kA



**DFN1610 150A**  
大流通ESD器件  
BV-FE05ZF  
Page 55



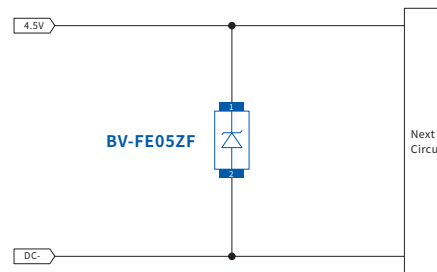
**DFN1610封装**: 1.6x1.0x0.5mm  
100A通流量, 1800W功率, 较普通器件提升**30%**



**超低负向残压Vc小于13V@150A**, 有效降低后级过压损害, **抗静电±30KV**



应用: 充电宝、手机等, 兼顾EOS和静电防护



Test Level: 1.2/50-8/20μs DM 300V-150A

### 环境分析 Environmental Analysis

- ▶ Lightning Protect Zone
  - LPZ0B-1 P1-2
  - LPZ0B-2 P1-2
  - LPZ0B-3 P1-2
  - LPZ1 P1-2
  - LPZ2 P1-2

### 标准选择 Choose Standard

- ▶ Test Standards
  - ITU-T K.20 P03
  - ITU-T K.21 P05
  - GR1089 P07
  - ISO7637 P09
  - ISO16750 P09
  - IEC61000-4-5 P10
  - IEC61000-4-4 P10
  - IEC61000-4-2 P11
  - UL60950 P11

### 方案设计 Application Guide

- ▶ Equipment V Ports P12
- ▶ Ports Circuit Design
  - AC P13-16
  - DC P16-22
  - RJ11 P22-23
  - RJ45 P24-25
  - Coaxial P25-27
  - RS485 P27-28
  - Alarm P28-28
  - USB P28-29
  - Others P29-34

### 器件选择 Select Components

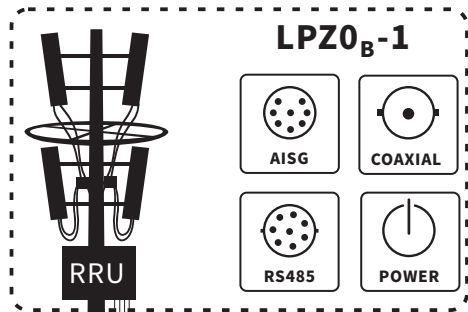
- ▶ V-I curve P37
- ▶ V-t curve P38
- ▶ Datasheet
  - GDT P41
  - SPD P43
  - BMG P45
  - MOV P45
  - TSS P51
  - TVS P53
  - ESD P55
  - Zener P57

### 方案测试 System Test

- ▶ Surge Lab P59
- ▶ Test Waveforms
  - Surge P59
  - EFT P60
  - ESD P60
  - Other P62

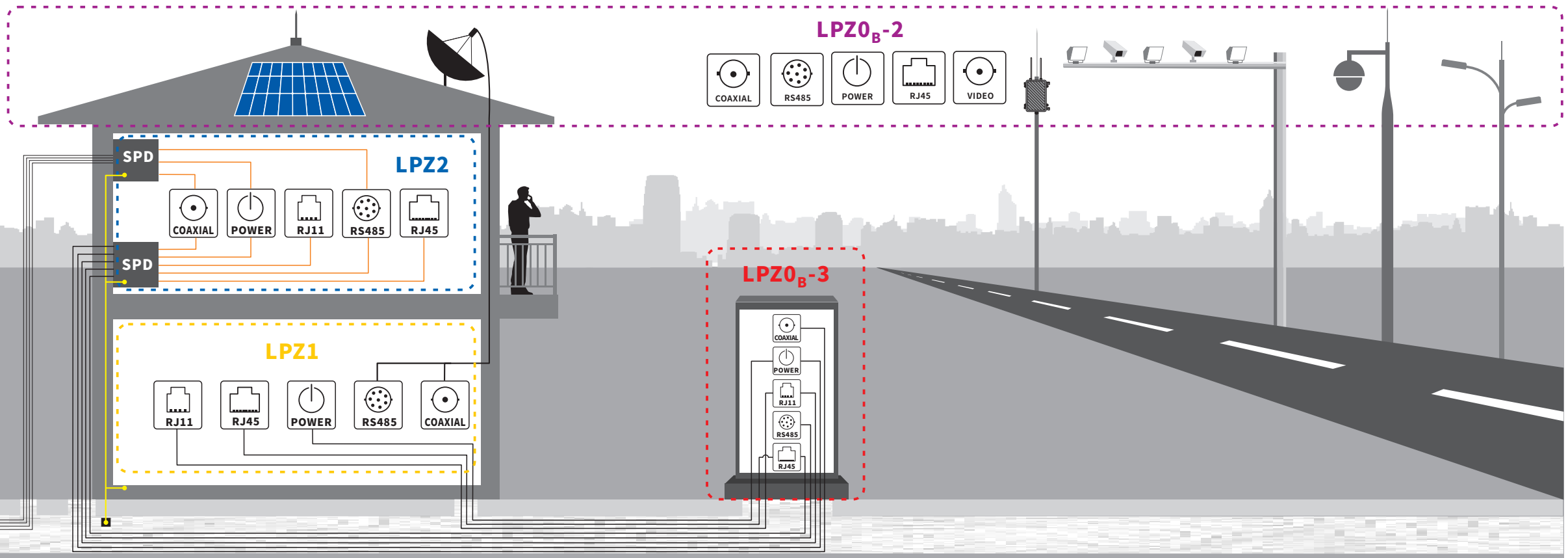
### 应用优化 Apply & Optimize

- ▶ Qualification Certificates P63
- ▶ Reliability Lab P64
- ▶ Layout Recommended
  - Trace width P65
  - Via P66



Recommended surge level

	AISG	COAXIAL	RS485	AC POWER	DC POWER	RJ45	RJ11	VIDEO
LPZ0 <sub>B</sub> -1	8/20μs 5kA	8/20μs 5kA	8/20μs 5kA	8/20μs 20kA/40kA	8/20μs 10kA/20kA			
LPZ0 <sub>B</sub> -2	1.2/50-8/20μs 6kV-3kA	1.2/50-8/20μs 6kV-3kA	1.2/50-8/20μs 6kV-3kA	8/20μs 10kA/20kA	8/20μs 5kA/10kA			
LPZ0 <sub>B</sub> -3	10/700μs 4kV, 6kV	10/700μs 4kV, 6kV	10/700μs 4kV, 6kV	1.2/50-8/20μs 6kV-3kA	1.2/50-8/20μs 6kV-3kA	10/700μs 4kV, 6kV	10/700μs 4kV, 6kV	1.2/50μs 4kV, 6kV
LPZ1		1.2/50μs 2kV, 4kV	1.2/50μs 2kV, 4kV	1.2/50μs 2kV, 4kV	1.2/50μs 2kV, 4kV	1.2/50μs 2kV, 4kV	10/700μs 2kV, 4kV	1.2/50μs 2kV, 4kV
LPZ2		1.2/50μs 1kV	1.2/50μs 1kV	1.2/50μs 1kV, 2kV	1.2/50μs 0.5kV, 1kV	1.2/50μs 1kV	1.2/50μs 1kV	1.2/50μs 1kV



**LPZ0<sub>B</sub>-1** Application environment on telecom transmission tower

**LPZ0<sub>B</sub>-2** Outdoor cabinet on rooftops (high speed aerial included)

**LPZ0<sub>B</sub>-3** General outdoors, walls, hanging bars

**LPZ1** Other areas inside building except LPZ0<sub>B</sub> classification defined, e.g. passageway, weak current wells, switching room, basement, inside room

**LPZ2** To be provided with good line-to-ground connection system and the specific room with primary protection, e.g. inside building, generator room or outdoor container-style mini generator room etc.

ITU-T K.20 (NOV 2022) Resistibility of telecommunication equipment installed in a telecommunication centre voltages and overcurrents

Table 1a – Applicable tests for external ports

Test type	No. of pairs simultaneously tested	Test connections	Primary protection	Port type							
				Symmetric port		Coaxial port		Dedicated power feed port		Mains power port	
				Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])
Single	Transverse/differential	No	10/700µs 15+25Ω 1kV A.6.1-1 (a and b)	10/700µs 15+25Ω 1.5kV A.6.1-1 (a and b)	1.2/50 – 8/20µs 2Ω 1kV A.6.2-1	1.2/50 – 8/20µs 2Ω 1.5kV A.6.2-1	10/700µs 15+25Ω 1.0kV A.6.3-1 (a and b)	10/700µs 15+25Ω 1.5kV A.6.3-1 (a and b)	1.2/50µs 2Ω 2.5kV A.6.4-1	1.2/50µs 2Ω 6kV A.6.4-1	
		Port to earth	No	10/700µs 15+25Ω 1.0kV A.6.1-2	10/700µs 15+25Ω 1.0kV A.6.1-2	n/a	n/a	10/700µs 15+25Ω 1.0kV A.6.3-2	10/700µs 15+25Ω 6kV A.6.3-2	1.2/50µs 2Ω 2.5kV A.6.4-2	1.2/50µs 2Ω 6kV A.6.4-2
	Port to external port	No	n/a		n/a		n/a		1.2/50µs 2Ω 2.5kV A.6.4-3	1.2/50µs 2Ω 6kV A.6.4-3	
	Coordination/Transverse/differential	Yes	10/700µs 15+25Ω 4kV A.6.1-1 (a and b)	10/700µs 15+25Ω 4kV A.6.1-1 (a and b)	11.2/50 – 8/20µs 2Ω 4kV A.6.2-1	11.2/50 – 8/20µs 2Ω 6kV A.6.2-1	10/700µs 15+25Ω 4kV A.6.3-1 (a and b)	10/700µs 15+25Ω 4kV A.6.3-1 (a and b)	1.2/50µs 2Ω 6kV A.6.4-1	1.2/50µs 2Ω 10kV A.6.4-1	
	Coordination/Port to earth	Yes	10/700µs 15+25Ω 4kV A.6.1-2	10/700µs 15+25Ω 4kV A.6.1-2	n/a		10/700µs 15+25Ω 4kV A.6.3-2	10/700µs 15+25Ω 4kV A.6.3-2	1.2/50µs 2Ω 6kV A.6.4-2	1.2/50µs 2Ω 10kV A.6.4-2	
	Coordination/Port to external port	Yes	n/a		n/a		n/a		1.2/50µs 2Ω 6kV A.6.4-3	1.2/50µs 2Ω 10kV A.6.4-3	
	Lightning/voltage	Multiple	Port to earth	No	10/700µs 15+25Ω 1.5kV A.6.1-4	10/700µs 15+25Ω 1.5kV A.6.1-4	n/a		n/a		n/a
Port to external port			No	n/a		n/a		n/a		n/a	
Port to earth			Yes	10/700µs 15+25Ω 4kV A.6.1-4	10/700µs 15+25Ω 6kV A.6.1-4	n/a		n/a		n/a	
Port to external port			Yes	n/a		n/a		n/a		n/a	
Ethernet unshielded twisted pair (UTP <sub>E</sub> )	Port to earth	No	1.2/50µs 2+10Ω 2.5kV A.6.7-4	1.2/50µs 2+10Ω 6kV A.6.7-4	n/a		n/a		n/a		
		Transverse	No	1.2/50µs 2+10Ω+10Ω 0.6kV A.6.7-5	1.2/50µs 2+10Ω+10Ω 1.5kV A.6.7-5	n/a		n/a		n/a	
		Voltage impulse test	No	1.2/50µs 2+5Ω 2.5kV A.6.7-3a	1.2/50µs 2+5Ω 6kV A.6.7-3a	n/a		n/a		n/a	
Ethernet shielded twisted pair (STP <sub>E</sub> )	Port to earth	No	1.2/50µs 2+10Ω+10Ω 0.6kV A.6.7-2	1.2/50µs 2+10Ω+10Ω 1.5kV A.6.7-2	n/a		n/a		n/a		
		Shield to earth	No	1.2/50µs 2+5Ω 2.5kV A.6.7-6	1.2/50µs 2+5Ω 6kV A.6.7-6	n/a		n/a		n/a	
Lightning current	Single	Port to earth	No	8/20µs A.6.1-2 1 kA/wire	8/20µs A.6.1-2 5 kA/wire	n/a		8/20µs A.6.3-2 1 kA/wire	8/20µs A.6.3-2 5 kA/wire	n/a	
		Port to external port	No	n/a		n/a		n/a		n/a	
		Differential	n/a	n/a		8/20µs A.6.2-1 1 kA	8/20µs A.6.2-1 5 kA	n/a		n/a	
Lightning current	Multiple	Shield to earth	n/a	n/a		8/20µs A.6.2-2 Mounted on a tower 4kA Others 2kA	8/20µs A.6.2-2 Mounted on a tower 20kA Others 5kA	n/a		n/a	
		Ethernet longitudinal common mode withstand test	No	11.2/50-8/20µs 2Ω+ 50.2.5kV A.6.7-3a				1.2/50-8/20µs 2Ω+ 50.2.5kV A.6.7-3a	11.2/50-8/20µs 2Ω+ 50.2.5kV A.6.7-3a	1.2/50-8/20µs 2Ω+ 50.2.5kV A.6.7-3a	

Table 1b – Lightning test conditions for ports connected to internal cables

No. of pairs simultaneously tested	Test connection	Primary protection	Unshielded cable			Shielded cable			PoE feed			DC powered equipment		DC power source	
			Basic test levels (also see clause 7 of [ITU-T K.44])	Intermediate test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Intermediate test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Intermediate test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])		
			Shielded cable to earth	No				1.2/50-8/20µs 2Ω 1kV A.6.5-2		1.2/50-8/20µs 2Ω 1.5kV A.6.5-2					
Single	Universal serial bus (USB) shielded cable to earth	No				1.2/50-8/20µs 2Ω 100V A.6.5-2		1.2/50-8/20µs 2Ω 150V A.6.5-2							
	Screen/shield connection high current test	No				1.2/50-8/20µs 2Ω+ 50.2.5kV A.6.7-6		1.2/50-8/20µs 2Ω+ 50.2.5kV A.6.7-6							
	Ethernet transverse	No	1.2/50-8/20µs 2Ω 2.5kV A.6.7-5	1.2/50-8/20µs 2Ω 4kV A.6.7-5	1.2/50-8/20µs 2Ω 6kV A.6.7-5	1.2/50-8/20µs 2Ω 2.5kV A.6.7-5	1.2/50-8/20µs 2Ω 4kV A.6.7-5	1.2/50-8/20µs 2Ω 6kV A.6.7-5							
	Twisted pair port transverse/differential	No	1.2/50-8/20µs 2Ω 0.5kV A.6.7-5		1.2/50-8/20µs 2Ω 1.5kV A.6.7-5	1.2/50-8/20µs 2Ω 0.5kV A.6.7-5		1.2/50-8/20µs 2Ω 1.5kV A.6.7-5							
	DC powered equipment port	No									1.2/50-8/20µs 20+100+9µ FlkV A.6.6-1a	1.2/50-8/20µs 20+100+9µ 1.5kV A.6.6-1a			
Multiple	DC power source port	No											1.2/50-8/20µs 20+100+9µ FlkV A.6.6-1b	1.2/50-8/20µs 20+100+9µ 1.5kV A.6.6-1b	
	Unshielded cable with symmetric pairs	No	1.2/50-8/20µs 2Ω+ 100.1kV A.6.5-1		1.2/50-8/20µs 2Ω+ 100.1.5kV A.6.5-1										
	PoE Mode A and Mode B transverse testing	No							1.2/50-8/20µs 2Ω+ 100+100.5kV A.6.7-2	11.2/50-8/20µs 20+100+10 0.4kV A.6.7-2	1.2/50-8/20µs 2Ω+ 100+100.6kV A.6.7-2				

ITU-T K.21 (AUG 2022) Resistibility of telecommunication equipment installed in customer premises to voltages and overcurrents

Table 1a – Applicable tests for external ports

Test type	No. of pairs simultaneously tested	Test connections	Primary protection	Port type							
				Symmetric port		Coaxial port		Dedicated power feed port		Mains power port	
				Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])
Lightning/voltage	Single	Transverse/differential	No	10/700µs 15+25Ω 1.5kV A.6.1-1 (a and b)	10/700µs 15+25Ω 1.5kV A.6.1-1 (a and b)	1.2/50 – 8/20µs 2Ω 1kV A.6.2-1	1.2/50 – 8/20µs 2Ω 1.5kV A.6.2-1	10/700µs 15+25Ω 1.5kV A.6.3-1 (a and b)	10/700µs 15+25Ω 1.5kV A.6.3-1 (a and b)	1.2/50µs 2Ω 2.5kV A.6.4-1	1.2/50µs 2Ω 6kV A.6.4-1
		Port to earth	No	10/700µs 15+25Ω 1.5kV A.6.1-2	10/700µs 15+25Ω 6kV A.6.1-2	n/a		10/700µs 15+25Ω 1.5kV A.6.3-2	10/700µs 15+25Ω 6kV A.6.3-2	1.2/50µs 2Ω 2.5kV A.6.4-2	1.2/50µs 2Ω 6kV A.6.4-2
		Port to external port	No	10/700µs 15+25Ω 1.5kV A.6.1-3	10/700µs 15+25Ω 6kV A.6.1-3	n/a		10/700µs 15+25Ω 1.5kV A.6.3-3	10/700µs 15+25Ω 6kV A.6.3-3	1.2/50µs 2Ω 2.5kV A.6.4-3	1.2/50µs 2Ω 6kV A.6.4-3
		Coordination/Transverse/differential	Yes	10/700µs 15+25Ω 4kV A.6.1-1 (a and b)	10/700µs 15+25Ω (a and b)	1.2/50 – 8/20µs 2Ω 4kV A.6.2-1	1.2/50 – 8/20µs 2Ω 6kV A.6.2-1	10/700µs 15+25Ω 4kV A.6.3-1 (a and b)	10/700µs 15+25Ω 6kV A.6.3-1 (a and b)	1.2/50µs 2Ω 6kV A.6.4-1	1.2/50µs 2Ω 10kV A.6.4-1
		Coordination/Port to earth	Yes	10/700µs 15+25Ω 4kV A.6.1-2	10/700µs 15+25Ω 6kV A.6.1-2	n/a		10/700µs 15+25Ω 4kV A.6.3-2	10/700µs 15+25Ω 6kV A.6.3-2	1.2/50µs 2Ω 6kV A.6.4-2	1.2/50µs 2Ω 10kV A.6.4-2
		Coordination/Port to external port	Yes	10/700µs 15+25Ω 4kV A.6.1-3	10/700µs 15+25Ω 6kV A.6.1-3	n/a		10/700µs 15+25Ω 4kV A.6.3-3	10/700µs 15+25Ω 6kV A.6.3-3	1.2/50µs 2Ω 6kV A.6.4-3	1.2/50µs 2Ω 10kV A.6.4-3
	Multiple	Port to earth	No	10/700µs 15+25Ω 1.5kV A.6.1-4	10/700µs 15+25Ω 1.5kV A.6.1-4	n/a		n/a		n/a	
		Port to external port	No	10/700µs 15+25Ω 1.5kV A.6.1-5	10/700µs 15+25Ω 1.5kV A.6.1-5	n/a		n/a		n/a	
		Port to earth	Yes	10/700µs 15+25Ω 4kV A.6.1-4	10/700µs 15+25Ω 6kV A.6.1-4	n/a		n/a		n/a	
		Port to external port	Yes	10/700µs 15+25Ω 4kV A.6.1-5	10/700µs 15+25Ω 6kV A.6.1-5	n/a		n/a		n/a	
	Ethernet unshielded twisted pair (UTP <sub>e</sub> )	Port to earth	No	1.2/50µs 2+10Ω 2.5kV A.6.7-4	1.2/50µs 2+10Ω 6kV A.6.7-4	n/a		n/a		n/a	
		Transverse/differential	No	1.2/50µs 2+10Ω+10Ω 2.5kV A.6.7-5	1.2/50µs 2+10Ω+10Ω 6kV A.6.7-5	n/a		n/a		n/a	
Voltage impulse test		No	1.2/50µs 2+5Ω 2.5kV A.6.7-3a	1.2/50µs 2+5Ω 6kV A.6.7-3a	n/a		n/a		n/a		
Ethernet shielded twisted pair (STP <sub>e</sub> )	Power over Ethernet (PoE)	No	1.2/50µs 2+10Ω+10Ω 2.5kV A.6.7-2	1.2/50µs 2+10Ω+10Ω 6kV A.6.7-2	n/a		n/a		n/a		
	Shield to earth	No	1.2/50µs 2+5Ω 2.5kV A.6.7-6	1.2/50µs 2+5Ω 6kV A.6.7-6	n/a		n/a		n/a		
Lightning current	Single	Port to earth	No	1.2/50µs 2+10Ω 2.5kV A.6.7-4	1.2/50µs 2+10Ω 6kV A.6.7-4	n/a		n/a		n/a	
		Port to external port	No	8/20µs A.6.1-2 1 kA/wire	8/20µs A.6.1-2 5 kA/wire	n/a		8/20µs A.6.3-2 1 kA/wire	8/20µs A.6.3-2 5 kA/wire	n/a	
	Multiple	Port to earth	No	8/20µs A.6.1-3 1 kA/wire	8/20µs A.6.1-3 5 kA/wire	n/a		8/20µs A.6.3-3 1 kA/wire	8/20µs A.6.3-3 5 kA/wire	n/a	
		Port to external port	No	8/20µs A.6.1-4 1 kA/wire limited 6kA	8/20µs A.6.1-4 5 kA/wire limited 30kA	n/a		n/a		n/a	
		Port to earth	No	1.2/50µs 2+5Ω 2.5kV A.6.7-3a	1.2/50µs 2+5Ω 6kV A.6.7-3a	n/a		n/a		n/a	
		Port to external port	No	8/20µs A.6.1-5 1 kA/wire limited 6kA	8/20µs A.6.1-5 5 kA/wire limited 30kA	n/a		n/a		n/a	
Transverse/differential	n/a	n/a		8/20µs A.6.2-1 1 kA	8/20µs A.6.2-1 1.5 kA	n/a		n/a			

Test type	No. of pairs simultaneously tested	Test connections	Primary protection	Port type							
				Symmetric port		Coaxial port		Dedicated power feed port		Mains power port	
				Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])
Lightning current	Multiple	Shield to earth	n/a	n/a		8/20µs A.6.2-2 Mounted on a tower 4kA Others 2kA	8/20µs A.6.2-2 Mounted on a tower 20kA Others 5kA	n/a		n/a	
		Shield to external port	n/a	n/a		8/20µs A.6.2-3 Mounted on a tower 4kA Others 2kA	8/20µs A.6.2-3 Mounted on a tower 20kA Others 5kA	n/a		n/a	
Power induction and earth potential rise	Single	Transverse/differential	No	AC600V600Ω A.6.1-1(a and b) t=0.2s		Understudy		AC600V600Ω A.6.3-1(a and b) t=0.2s		n/a	
		Port to earth	No	AC600V600Ω A.6.1-2 t=0.2s		n/a		AC600V600Ω A.6.3-2 t=0.2s		5.2.1 under study	
		Port to external port	No	AC600V600Ω A.6.1-3 t=0.2s		n/a		AC600V600Ω A.6.3-3 t=0.2s		5.2.1 under study	
		Coordination Transverse/differential	Yes	AC600V600Ω A.6.1-1(a and b) t=1s	AC1500V200Ω A.6.1-1(a and b) t=2s	Understudy		AC600V600Ω A.6.3-1(a and b) t=1s	AC1500V200Ω A.6.3-1(a and b) t=2s	n/a	
		Coordination port to earth	Yes	AC600V600Ω A.6.1-2 t=1s	AC1500V200Ω A.6.1-2 t=2s	n/a		AC600V600Ω A.6.3-2 t=1s	AC1500V200Ω A.6.3-2 t=2s	n/a	
		Coordination port to external port	Yes	AC600V600Ω A.6.1-3 t=1s	AC1500V200Ω A.6.1-3 t=2s	n/a		AC600V600Ω A.6.3-3 t=1s	AC1500V200Ω A.6.3-3 t=2s	n/a	
Neutral potential rise	Single	Port to earth	No	n/a		n/a		n/a		AC600V600Ω A.6.4-2 t=1s	AC1500V200Ω A.6.4-2 t=1s
		Port to external port	No	n/a		n/a		n/a		AC600V600Ω A.6.4-3 t=1s	AC1500V200Ω A.6.4-3 t=1s
Mains power contact	Single	Transverse/differential	No	AC230V10/20/40/80/160/300/600/1000Ω A.6.1-1(a and b) t=15min		n/a		AC230V10/20/40/80/160/300/600/1000Ω A.6.3-1(a and b) t=15min		n/a	
		Port to earth	No	AC230V10/20/40/80/160/300/600/1000Ω A.6.1-2 t=15min		n/a		AC230V10/20/40/80/160/300/600/1000Ω A.6.3-2 t=15min		n/a	
		Port to external port	No	AC230V10/20/40/80/160/300/600/1000Ω A.6.1-3 t=15min		n/a		AC230V10/20/40/80/160/300/600/1000Ω A.6.3-3 t=15min		n/a	
		Ethernet port	No	A.6.7-3 500V DC 大于2MΩ							

Table 1b – Lightning test conditions for ports connected to internal cables

No. of pairs simultaneously tested	Test connection	Primary protection	Unshielded cable			Shielded cable			PoE feed			DC powered equipment		DC power source	
			Basic test levels (also see clause 7 of [ITU-T K.44])	Intermediate test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Intermediate test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Intermediate test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])	Basic test levels (also see clause 7 of [ITU-T K.44])	Enhanced test levels (also see clauses 5 and 7 of [ITU-T K.44])		
			Single	Shielded cable to earth	No				1.2/50-8/20µs 2Ω 1kV A.6.5-2		1.2/50-8/20µs 2Ω 1.5kV A.6.5-2				
USB shielded cable to earth	No					1.2/50-8/20µs 2Ω 100V A.6.5-2		1.2/50-8/20µs 2Ω 150V A.6.5-2							
Screen/shield connection high current test	No					1.2/50-8/20µs 2Ω+5Ω 2.5kV A.6.7-6	1.2/50-8/20µs 2Ω+5Ω 4kV A.6.7-6	1.2/50-8/20µs 2Ω+5Ω 6kV A.6.7-6							
Ethernet transverse/differential	No	1.2/50-8/20µs 2Ω 2.5kV A.6.7-5		1.2/50-8/20µs 2Ω 4kV A.6.7-5	1.2/50-8/20µs 2Ω 6kV A.6.7-5	1.2/50-8/20µs 2Ω 2.5kV A.6.7-5	1.2/50-8/20µs 2Ω 4kV A.6.7-5	1.2/50-8/20µs 2Ω 6kV A.6.7-5							
Twisted pair port transverse/differential	No	1.2/50-8/20µs 2Ω 1kV A.6.7-5			1.2/50-8/20µs 2Ω 1.5kV A.6.7-5	1.2/50-8/20µs 2Ω 1kV A.6.7-5		1.2/50-8/20µs 2Ω 1.5kV A.6.7-5							
DC powered equipment port	No										1.2/50-8/20µs 2Ω+10Ω+9µF 1kV A.6.6-1a	1.2/50-8/20µs 2Ω+10Ω+9µF 1.5kV A.6.6-1a			
Multiple	DC power source port	No											1.2/50-8/20µs 2Ω+10Ω+9µF 1kV A.6.6-1b	1.2/50-8/20µs 2Ω+10Ω+9µF 1.5kV A.6.6-1b	
	Unshielded cable with symmetric pairs	No	1.2/50-8/20µs 2Ω+10Ω 1kV A.6.5-1		1.2/50-8/20µs 2Ω+10Ω 1.5kV A.6.5-1										
	PoE Mode A and Mode B transverse/differential testing	No								B1.2/50-8/20µs 2Ω+10Ω+100kV A.6.7-2	1.2/50-8/20µs 2Ω+10Ω+100kV A.6.7-2	1.2/50-8/20µs 2Ω+10Ω+100kV A.6.7-2			
Ethernet longitudinal common mode withstand test	No	1.2/50-8/20µs 2Ω+5Ω 2.5kV A.6.7-3a	1.2/50-8/20µs 2Ω+5Ω 4kV A.6.7-3a	1.2/50-8/20µs 2Ω+5Ω 6kV A.6.7-3a											

### GR1089-2:(2017) Electromagnetic Compatibility (EMC) and Electrical Safety - Generic Criteria for Network Telecommunications Equipment

First-Level Lightning Surge								
Surge Test Number	Port Types	Test Description	Min.Peak Open-Circuit Voltage (Volts)	Min. Peak Short-Circuit Current per Conductor (Amperes)	Surge Maximum Rise/Minimum Decay Timefor Voltage and Current(μs)	Value of External Non-Inductive Resistors	Repetitions Each Polarity	Test Connections
1	1,3,3b/5b,5	Multiport OSP Test	±1000	25	10/360	N/A	5	Up to 24conductors
1.1	3b/5b	Short Loop OSP Interface	±1000	25	10/360	N/A	5	A
1.2	3b/5b	Short Loop OSP Interface - with Secondary Protectors	±Vs	25(at 1000 V)	10/360	N/A	5	A
1.3	3b/5b	Multi-port Short Loop OSP Interface w/o Primary Protection						
2	1,3,5	OSP Interface	±100 to ±1000	10(at 100 V) to 100(at 1000 V)	10/1000	N/A	5 at each voltage increment	A
2.1	1,3,5	Extended OSP Interface	±100 to ±2000	10(at 100 V) to 100(at 2000 V)	10/1000	N/A	5 at each voltage increment	A
2.2	1,3,5	OSP Interface-with SecondaryProtectors	±Vs	100(at 1000 V)	10/1000	N/A	5	A
3	1,3,5,3a/5a,3b/5b,	Gas Tube Interaction Test	±4000	SeeFigure 4-6	10/700 voltage 5/320 current	25	5	(A5 and A6) or B
4	1,3,5	Inductive Kick Test for OSP Interfaces	±1500	300	2/10	N/A	10	See Figure 4-1
5	3,3b/5b,5	Fast Rise Time Test for Remote OSP Interfaces	±1000	200	2/10	N/A	5	A
6	3,5	Higher Ground Resistancefor Remote OSP Interfaces-Longitudinal	±1000	100	10/1000	N/A	5	A5, A6
7	3,5	High Lightning ExposureTest for Remote OSP Inter faces	±400 to ±4000	50 (at 400 V) to 500(at 4000 V)	10/250	N/A	5 at each voltage increment	B
8	2,3a/5a,4,4a	Intra-Building with up to2 Pairs per Port (Metallic)	±800	100	2/10	N/A	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	A1, A2, A3,A4
8.1	2,3a/5a,4,4a	Intra-Building with Secondary Protectors up to 2 Pairs per Port (Metallic)	±Vs	100 (at 800 V)	2/10	N/A	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	A1, A2, A3,A4
9	2,4,4a	Intra-Building with up to2 Pairs per Port (Longitudinal)	±1500	100	2/10	N/A	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B
9.1	2,4,4a	Intra-building with Secondary Protectors up to 2 Pairs per Port (Longitudinal)	±Vs	100 (at 1500 V)	2/10	N/A	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B
10	2,3a/5a,4,4a	Alternative Intra-Building for up to 2 Pairs per Port (Metallic)	±800	400	1.2/50-8/20	6	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	A1, A2, A3,A4
10.1	2,3a/5a,4,4a	Alternative Intra-Building with Secondary Protectors up to 2 Pairs per Port (Metallic)	±Vs	Vs/2	1.2/50-8/20	6	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	A1, A2, A3,A4
11	2,4,4a	Alternative Intra-Building up to 2 Pairs per Port (Longitudinal)	±1500	750	1.2/50-8/20	10	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B
11.1	2,4,4a	Alternative Intra-Building Undervoltage up to 2 Pairs per Port(Longitudinal)	±Vs	Vs/2	1.2/50-8/20	10	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B
12	2,3a/5a,4,4a	Intra-Building for 3 or 4 Pairs per Port (Metallic)	±800	400	1.2/50-8/20	6	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	Test per Figure 4-10
12.1	2,3a/5a,4,4a	Intra-Building with Secondary Protectors, 3 or 4 Pairs per Port (Metallic)	±Vs	Vs/2	1.2/50-8/20	6	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	Test per Figure 4-10
13	2,4,4a	Intra-Building 3 or 4 Pairs per Port (Longitudinal)	±1500	750	1.2/50-8/20	20	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B

Surge Test Number	Port Types	Test Description	Min.Peak Open-Circuit Voltage (Volts)	Min. Peak Short-Circuit Current per Conductor (Amperes)	Surge Maximum Rise/Minimum Decay Timefor Voltage and Current(μs)	Value of External Non-Inductive Resistors	Repetitions Each Polarity	Test Connections
13.1	2,4,4a	Intra-Building Undervoltage 3 or 4 Pairs per Port (Longitudinal)	±Vs	Vs/2	1.2/50-8/20	20	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B
14	2,3a/5a,4,4a	Intra-Building for > 4 Pairs per Port(Metallic)	±800	400	1.2/50-8/20	6	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	Test per Figure 4-10
14.1	2,3a/5a,4,4a	Intra-Building with Secondary Protectors, > 4 Pairs per Port (Metallic)	±Vs	Vs/2	1.2/50-8/20	6	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	Test per Figure 4-10
15	2,4,4a	Intra-Building for > 4 Pairs per Port(Longitudinal)	±1500	750	1.2/50-8/20	40	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B
15.1	2,4,4a	Intra-Building with Secondary Protectors for > 4 Pairs per Port(Longitudinal)	±Vs	Vs/2	1.2/50-8/20	40	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	B
16	2,3a/5a,4,4a	Intra-Building for Paired Shielded Cables	±1500	750	1.2/50-8/20	2	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	See Figure 4-12
17	2,3a/5a,4,4a	Intra-Building for Coaxial	±1500	750	1.2/50-8/20	3	Repetitions each polarity may be 5 on 1 sample, or 1 on 3 samples.	See Figure 4-13
18	4a	Customer Side ONT Interfaces	±1000	100	10/1000	N/A	5	A5, A6
18.1	4a	Customer Side ONT Interfaces	±6000	3000	1.2/50-8/20	N/A	5	B
19	6	Antenna Port Test	±600	300	1.2/50-8/20	N/A	5	Center conductor to shield
19.1	6	Antenna Port with Secondary Protector Test	±Vs	300(at 600 V)	1.2/50-8/20	N/A	5	Center conductor to shield
20	7	AC Power Port Test with External SPD	±2000	1000	1.2/50-8/20	N/A	5	Phase to neutral, phase to ground, neutral to ground
21	7	AC Power Port Test with External SPD	±6000	3000	1.2/50-8/20	N/A	5	Phase to neutral, phase to ground, neutral to ground
22	8a	Tower Mounted Transceiver Fed with Remote DC Power Test (Longitudinal)	±6000	Minimum peak short-circuit current per port is 3000 A.	1.2/50-8/20	N/A	5	See Figure 4-15. Feed and return to shield simultaneously
23	8,8b	DC Power port	±2500	Minimum peak short-circuit current per port is 5000 A.	1.2/50-8/20	N/A	5	B

1=CO OSP Cable Ports, 2=CO Intra-building Cable Ports, 3=Customer Location OSP Cable Ports, 3a/5a=Intra-Cell Site Cable Ports, 3b/5b=Short Reach OSP Cable Ports, 4=Non-CO Intra-Building Ports, 4a=Customer-Side Optical Network Terminals (ONTs) and Intelligent Network Interface Devices (iNIDs) Cable Ports, 5=OSP Site OSP Cable Ports, 6=Antenna Ports, 7=AC Power Ports, 8=DC Power Ports, 8a=DC Power to Antenna, 8b=Intra-Cell Site DC Power

Second-Level Lightning Surge								
Surge Test Number	Port Types	Test Description	Min.Peak Open -Circuit Voltage(Volts)	Min. Peak Short-Circuit Current per Conductor (Amperes)	Surge Maximum Rise/Minimum Decay Timefor Voltageand Current(μs)	Repetitions Each Polarity	Test Connections	
1	1,3,5	Inductive Kick Test for OSP Interfaces	±5000	500	2/10	1	See Figure 4-2	
2	7	Lightning to AC Power Port	±6000	3000	1.2/50-8/20	1	Phase conductors to neutral, phase conductors to ground, neutral conductor to ground	

1=CO OSP Cable Ports, 3=CO Intra-building Cable Ports, 5=OSP Site OSP Cable Ports, 7=AC Power Ports,

**ISO7637-2:2011 Road vehicles --Electrical disturbances from conduction and coupling--Part 2: Electrical transient conduction along supply lines only**

Examples of test pulse severity levels for nominal 12V and 24V system										
Test pulse <sup>a</sup>	Selected test level <sup>b</sup>	Test pulse severity level, Us <sup>c,d</sup> (V)						Min.number of pulses or test time	Burst cycle/pulse repetition tim <sup>e</sup>	
		IV		III		I/II			min.	max.
		12	24	12	24	12	24			
1		-150	-600	-112	-450	-75	-300	500Pulses	0.5s	e
2a		+112	+112	+55	+55	+37	+37	500Pulses	0.2s	5s
2b		+10	+20	+10	+20	+10	+20	10Pulses	0.5s	5s
3a		-220	-300	-165	-220	-112	-150	1h	90ms	100ms
3b		+150	+300	+112	+220	+75	+150	1h	90ms	100ms

a: Test pulses as in 5.6  
 b: Values agreed between vehicle manufacturer and equipment supplier.  
 c: The amplitudes are the values of Us as defined for each test pulse in 5.6.  
 d: The former levels I and II are revised because they did not ensure sufficient immunity in subsequent road vehicles' design.  
 e: The maximum pulse repetition time shall be chosen such that it is the minimum time for the DUT to be correctly initialized before the application of the next pulse and shall be  $\geq 0.5S$ .

**ISO16750-2:2023 Road vehicles -- Environmental conditions and testing for electrical and electronic equipment -- part 2: electrical loads**

Starting profile values for systems with 12V and 24V nominal voltage								
Parameter		Level						
		I		II		III		IV
		12V	24V	12V	24V	12V	24V	12V
Voltage V	U <sub>s6</sub>	8(-0.2)	10(-0.2)	4.5(-0.2)	8(-0.2)	3(-0.2)	6(-0.2)	6(-0.2)
	U <sub>s</sub>	9.5(-0.2)	20(-0.2)	6.5(-0.2)	15(-0.2)	5(-0.2)	10(-0.2)	6.5(-0.2)
Duration ms	t <sub>f</sub>	5(±0.5)	10(±1)	5(±0.5)	10(±1)	5(±0.5)	10(±1)	5(±0.5)
	t <sub>1</sub>	15(±1.5)	50(±5)	15(±1.5)	50(±5)	15(±1.5)	50(±5)	15(±1.5)
	t <sub>2</sub>	50(±5)	50(±5)	50(±5)	50(±5)	50(±5)	50(±5)	50(±5)
	t <sub>3</sub>	1000(±100)	1000(±100)	10000(±1000)	1000(±100)	1000(±100)	1000(±100)	10000(±1000)
	t <sub>r</sub>	40(±4)	40(±4)	100(±10)	100(±10)	100(±10)	40(±10)	100(±10)
Minimum functional status	A <sup>a</sup>	A <sup>e</sup>	B <sup>a</sup>	B <sup>e</sup>	B <sup>a</sup>	B <sup>e</sup>	A <sup>a</sup>	
	A <sup>b</sup>	B <sup>f</sup>	B <sup>b</sup>	C <sup>f</sup>	C <sup>b</sup>	C <sup>f</sup>	B <sup>b</sup>	
	B <sup>c</sup>	B <sup>g</sup>	C <sup>c</sup>	C <sup>g</sup>	C <sup>c</sup>	C <sup>g</sup>	C <sup>c</sup>	
	B <sup>d</sup>	B <sup>h</sup>	C <sup>d</sup>	C <sup>h</sup>	C <sup>d</sup>	C <sup>h</sup>	C <sup>d</sup>	

a: U<sub>s</sub> min = 6 V; U<sub>s</sub> max = 16 V (see Table 1, Code A).  
 b: U<sub>s</sub> min = 8 V; U<sub>s</sub> max = 16 V (see Table 1, Code B).  
 c: U<sub>s</sub> min = 9 V; U<sub>s</sub> max = 16 V (see Table 1, Code C).  
 d: U<sub>s</sub> min = 10.5 V; U<sub>s</sub> max = 16 V (see Table 1, Code D).  
 e: U<sub>s</sub> min = 10 V; U<sub>s</sub> max = 32 V (see Table 2, Code E).  
 f: U<sub>s</sub> min = 16 V; U<sub>s</sub> max = 32 V (see Table 2, Code F).  
 g: U<sub>s</sub> min = 22 V; U<sub>s</sub> max = 32 V (see Table 2, Code G).  
 h: U<sub>s</sub> min = 18 V; U<sub>s</sub> max = 32 V (see Table 2, Code H).

Pulse for test A in systems with 12 V and 24 V nominal voltage			
Parameter	Type of system		Minimum test requirements
	U <sub>N</sub> =12V	U <sub>N</sub> =24V	
U <sub>s</sub> <sup>a</sup> (V)	79 ≤ U <sub>s</sub> ≤ 101	151 ≤ U <sub>s</sub> ≤ 202	10 pulses at 1 min intervals
R <sub>i</sub> <sup>a</sup> (Ω)	0.5 ≤ R <sub>i</sub> ≤ 4	1 ≤ R <sub>i</sub> ≤ 8	
t <sub>d</sub> (ms)	40 ≤ t <sub>d</sub> ≤ 400	100 ≤ t <sub>d</sub> ≤ 350	
t <sub>d</sub> (ms)	10( $\frac{0}{5}$ )	10( $\frac{0}{5}$ )	

a: If not otherwise agreed, use the higher voltage level with the higher value for internal resistance, or use the lower voltage level with the lower value for internal resistance.

**IEC61000-4-5:2014 Electromagnetic compatibility (EMC) –Part 4-5: Testing and measurement techniques – Surge immunity test**

Installation class	Test levels (kV)																			
	AC power supply and a.c. I/O				DC power supply and d.c. I/O				Unsymmetrical operated circuits/lines <sup>a,d,e</sup>				Symmetrical operated circuits/lines <sup>a,d,e</sup>				Shielded circuits/lines <sup>a,d,f</sup>			
	External ports <sup>a</sup>		Internal ports <sup>a,d</sup>		External ports <sup>a</sup>		Internal ports <sup>a,d</sup>		External port		Internal port		External port		Internal port		External port	Internal port	External port	Internal port
	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground	Line to line	Line to ground
0	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
1	/	0.5	/	/	/	/	/	/	/	/	/	0.5	/	/	/	0.5	/	/	/	/
2	0.5	1.0	/	/	/	/	/	/	/	/	0.5	1.0	/	/	/	1.0	/	/	/	0.5
3	1.0	2.0	1.0	2.0	/	/	/	/	/	/	1.0	2.0	/	/	/	2.0	/	/	/	2.0
4	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>
5	<sup>c,b</sup>	<sup>c,b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	2.0 <sup>b</sup>	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>	/	4.0 <sup>b</sup>

a: No test is advised if the cable length is shorter than or equal to 10 m.  
 b: Where the port is always intended to be used with specified primary protection, testing is performed with the primary protection in place to ensure coordination with the protection elements. If primary protection is required to protect the interface but not provided, testing is also performed at the maximum let through level of the specified primary protection and with a typical primary protector.  
 c: Depends on the class of the local power supply system.  
 d: The testing of intra-system ports is generally not required.  
 e: Line-to-line surges (transverse) may occur in networks where SPDs (surge protective devices) with connection to ground are used for protection. Such surges are outside the scope of this standard. This phenomenon can however be simulated by applying common mode surges through the defined primary protection elements.  
 f: The testing of ports connecting to antennas is outside the scope of this standard.

**IEC61000-4-4:2012 Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test**

Open circuit output test voltage and repetition frequency of the impulses				
Level	Power ports, earth port (PE)		Signal and control ports	
	Voltage peak kV	Repetition frequency kHz	Voltage peak kV	Repetition frequency kHz
1	0.5	5 or 100	0.25	5 or 100
2	1	5 or 100	0.25	5 or 100
3	2	5 or 100	1	5 or 100
4	4	5 or 100	2	5 or 100
X <sup>a</sup>	Special	Special	Special	Special

The use of 5 kHz repetition frequency is traditional, however, 100 kHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types.  
 With some products, there may be no clear distinction between power ports and signal ports, in which case it is up to product committees to make this determination for test purposes.  
 a: "X" can be any level, above, below or in between the others. The level shall be specified in the dedicated equipment specification.

IEC61000-4-2:2008 Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test

Contact discharge		Air discharge	
Level	Test voltage kV	Level	Test voltage kV
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
x <sup>a</sup>	Special	x <sup>a</sup>	Special

a: "x" can be any level, above, below or in between the others. The level shall be specified in the dedicated equipment specification. If higher voltages than those shown are specified, special test equipment may be needed.

UL60950-1:2019 Information Technology Equipment – Safety – Part 1: General Requirements

Test voltages for electric strength tests based on peak working voltages part 1							
Grade of insulation	Points of application (as appropriate)						
	PRIMARY CIRCUIT to BODY PRIMARY CIRCUIT to SECONDARY CIRCUIT between Parts in PRIMARY CIRCUIT					SECONDARY CIRCUIT to BODY between independent SECONDARY CIRCUITS	
	WORKING VOLTAGE V <sub>PEAK</sub> OR DC					WORKING VOLTAGE V	
	U ≤ 210V <sub>peak</sub> or d.c. <sup>2)</sup>	210V < U ≤ 420V peak or d.c.3)	420 < U ≤ 1.41kV <sub>peak</sub> or d.c.	1.41kV < U ≤ 10kV <sub>peak</sub> or d.c. <sup>4)</sup>	10kV < U ≤ 50kV <sub>peak</sub> or d.c.	U ≤ 42.4V <sub>peak</sub> or 60V d.c.	42.4V <sub>peak</sub> or 60Vd.c. < U ≤ 10kV <sub>peak</sub> or d.c. <sup>5)</sup>
Test voltage, volts r.m.s.1)							
FUNCTIONAL	1000	1500	See Va in table 5B, Part2	See Va in table 5B, Part2	1.06U	500	See Va in table 5B, Part2
BASIC, SUPPLEMENTARY	1000	1500	See Va in table 5B, Part2	See Va in table 5B, Part2	1.06U	no test	See Va in table 5B, Part2
REINFORCED	2000	3000	3000	See Vb in table 5B, Part2	1.06U	no test	See Vb in table 5B, Part2

1) For WORKING VOLTAGES exceeding 10kV peak or d.c. in SECONDARY CIRCUITS, the same test voltage as for PRIMARY CIRCUITS apply.  
 2) Use this column for unearthed DC MAINS SUPPLIES up to and including 210V d.c..  
 3) Use this column for unearthed DC MAINS SUPPLIES over 210V d.c. up to and including 420V d.c..  
 4) Use this column for unearthed DC MAINS SUPPLIES over 420V d.c..  
 5) Use these columns for d.c. derived within the equipment from an AC MAINS SUPPLIES, or for DC MAINS SUPPLIES that are earthed within the same building.

Equipment V Ports

Trade	Equipment	Port									
		RJ11	RJ45	RS485	AC	DC	HDMI	USB	Coaxial	ECGcable	
Telecommunication	xDSL modem	●	●			●					
	Cable modem		●			●			●		
	Telephone	●									
	Splitter	●									
	Router		●			●					
	RRU		●	●	●	●					
	Corded Phone	●									
	Cordless Phone	●				●					
	IP Phone	●				●					
	Micro Power Cell Base Station	●	●			●	●				
	VoIP Telephone Adapter	●									
	Wireless LAN Access Point		●			●	●				
	BBU		●	●	●	●					
	Telephone switchboard	●				●					
	Network switch		●			●					
	NXU IAD VOIP PSTN	●	●			●	●				
	Television		●					●	●	●	
	Consumer Electronics	Personal computer		●		●	●	●	●	●	
Printer		●	●		●			●	●		
Set top box			●				●	●	●	●	
Digital Multimedia Broadcast Receiver					●	●	●	●	●	●	
Digital Still and Video Camera					●	●	●	●	●		
DVD Player and Recorder					●	●	●	●	●		
LCD Projector			●		●	●	●	●	●		
LCD TV			●		●	●	●	●	●		
LED driver					●	●					
POS		●	●		●	●					
Industrial	Parking management		●	●	●	●					
	Outdoor LED Lighting		●		●	●					
	Power Line Network			●	●	●					
	Power Supply				●	●					
	Satellite Radio				●	●					
	SMPS Embedded				●	●					
	SMPS External				●	●					
	Clothes Dryer				●	●					
	Dishwasher				●	●					
	Electric Inductive Cooktop				●	●					
	Electric Range Oven				●	●					
	Electric Resistive Cooktop				●	●					
	Gas Cooktop				●	●					
	Gas Range Oven				●	●					
	Microwave Oven				●	●					
	Range Hood				●	●					
	Refrigerator				●	●					
	Room AC				●	●					
	Solar Power System (Residential)				●	●					
	Washing Machine				●	●					
Security	Camera		●	●	●	●	●	●	●		
	NVR/DVR		●	●	●	●	●	●	●		
Medical	ECG monitor				●						●
	Navigator					●		●			
Automobile	Body control system					●					
	Audio and video entertainment system					●	●				
	Automobile air-condition					●					
	Display instrument					●					

### AC 380V For SPD

AC POWER

LPZO<sub>B</sub>-1

SPD

Test Level: 8/20μs CM/DM 20kA

**BUB801M**  
Φ16x4.6mm  
Page 41

### AC 380V PV

AC POWER

LPZO<sub>B</sub>-3

PV Inverter

Test Level: 8/20μs CM/DM 5kA

**BMG20D751K102Y\*3**  
Φ23.0x12.8mm  
Page 45

**B8G800M**  
Φ8.0x6.0mm  
Page 41

### AC 90-264V

AC POWER

LPZO<sub>B</sub>-2

Adapter

Test Level: 1.2/50μs-8/20μs CM/DM10kV-5kA

**B8G1500M**  
Φ8.0x6.0mm  
Page 41

**BMOV14D561K\*3**  
Φ23.0x12.8mm  
Page 45

### AC 90-264V **NEW**

AC POWER

LPZO<sub>B</sub>-2

Adapter

Test Level: 1.2/50-8/20μs CM/DM 10kV-5kA **Failsafe**

**BMOV20D561K\*3**  
26x23x6.5mm  
Page 45

**BGO6000A05-LC2**  
Φ8.0x7.0mm  
Page 41

### AC 90-305V **NEW**

AC POWER

LPZO<sub>B</sub>-2

Adapter

Test Level: 1.2/50-8/20μs DM/10kV-5kA CM/10kV-850A

**BMG20D471K102Y**  
Φ23x25x10mm  
Page 45

**BMOV14D511K\*2**  
Φ18x13.5mm  
Page 45

**B5G3600**  
Φ5.5x6mm  
Page 41

**BL201NH**  
2.9x2.1x1.9mm  
Page 41

### AC 90-264V **NEW**

AC POWER

LPZO<sub>B</sub>-1

PAD Power

Test Level: 8/20μs CM/DM 20kA

**BSPD230C20PF-02**  
38.5x16.4x24mm  
Page 43

### AC 90-264V **NEW**

AC POWER

LPZO<sub>B</sub>-2

Street lamp

Test Level: 1.2/50-8/20μs CM/DM10kV-5kA

**BSPD277D05LF-01**  
69.4x34x21mm  
Page 43

### AC 90-264V **NEW**

AC POWER

LPZO<sub>B</sub>-2

LED driver power supply

Test Level: 1.2/50-8/20μs CM/DM 6kV-3kA Hipot AC1875V

**BMG14D471K102Y**  
Φ18x13.5mm  
Page 45

**BMOV14D391K**  
Φ18x13.5mm  
Page 45

**BN362M**  
5.5x4x4mm  
Page 41

**BL201NH\*2**  
2.9x2.1x1.9mm  
Page 41

**BS1500N**  
5.5x3.8x2.6mm  
Page 51

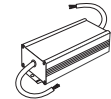
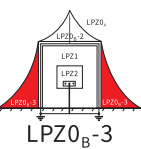
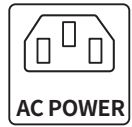
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

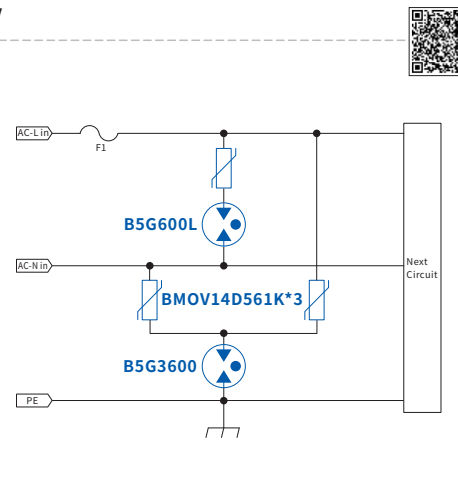
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

### AC 90-264V



Adapter



Test Level: 1.2/50-8/20μs CM/DM 6kV-3kA Hipot AC1875V



BMOV14D561K\*3  
Φ18.0x13.5mm  
Page 45

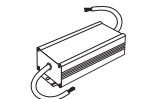
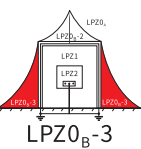
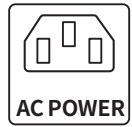


B5G600L  
Φ5.5x6.0mm  
Page 41

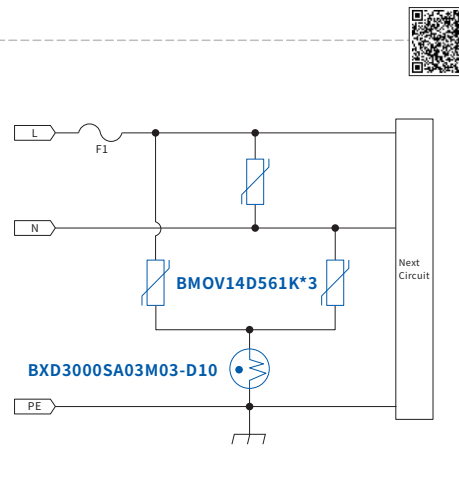


B5G3600  
Φ5.5x6.0mm  
Page 41

### AC 90-264V



Adapter



Test Level: 1.2/50-8/20μs CM/DM 6kV-3kA Hipot AC2000V

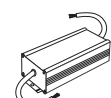
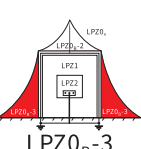
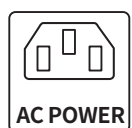


BMOV14D561K\*3  
Φ18.0x13.5mm  
Page 45

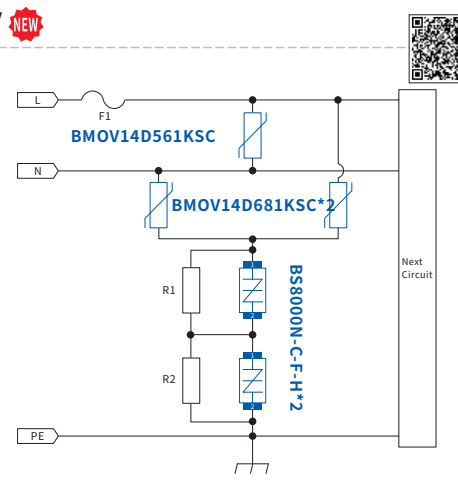


BXD3000SA03M03-D10  
8.5x7.5x8.5mm  
Page 41

### AC 90-264V



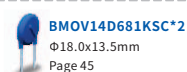
LED Power



Test Level: 1.2/50-8/20μs CM 6kV 500A DM 6kV 3kA Hipot AC1600V



BMOV14D561KSC  
Φ18.0x13.5mm  
Page 45

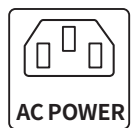


BMOV14D681KSC\*2  
Φ18.0x13.5mm  
Page 45

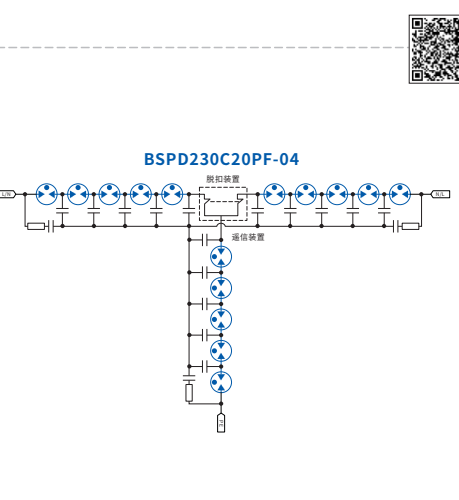


BS8000N-C-F-H\*2  
5.8x4.4x2.8mm  
Page 51

### AC 90-230V



PAD Power

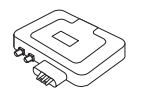
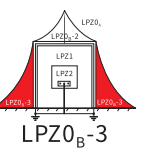


Test Level: 8/20μs CM/DM 20kA

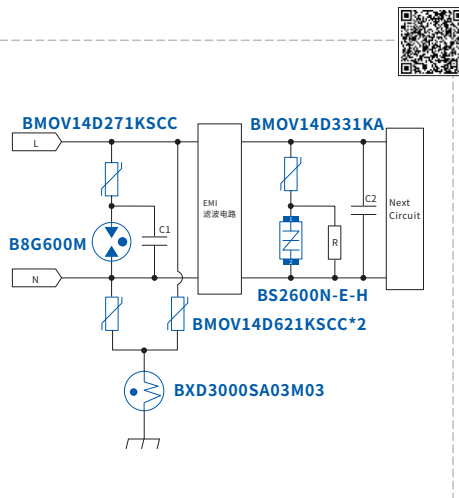


BSPD230C20PF-04  
40.8x38x24mm  
Page 43

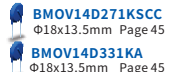
### AC 220V



Microinverter



Test Level: 1.2/50μs-8/20μs CM 6kV-500A DM 6kV-3kA



BMOV14D271KSCC  
Φ18x13.5mm Page 45



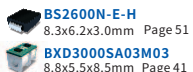
BMOV14D331KA  
Φ18x13.5mm Page 45



BMOV14D621KSCC\*2  
Φ18x13.5mm Page 45



B8G600M  
Φ8x6mm Page 41

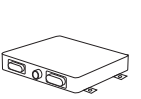
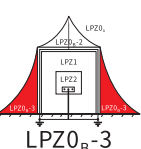
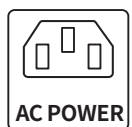


BS2600N-E-H  
8.3x6.2x3.0mm Page 51

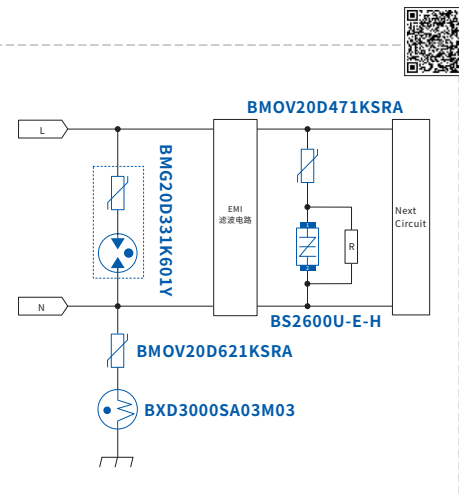


BXD3000SA03M03  
8.8x5.5x8.5mm Page 41

### AC 220V



OBC



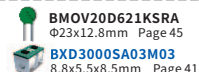
Test Level: 1.2/50μs-8/20μs DM 6kV-3kA



BMOV20D471KSRA  
Φ23x12.8mm Page 45



BS2600U-E-H  
8.3x6.2x3.0mm Page 51



BMOV20D621KSRA  
Φ23x12.8mm Page 45

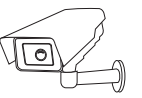
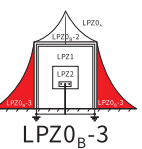
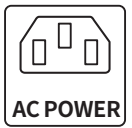


BMG20D331K601Y  
Φ23x12.8mm Page 45

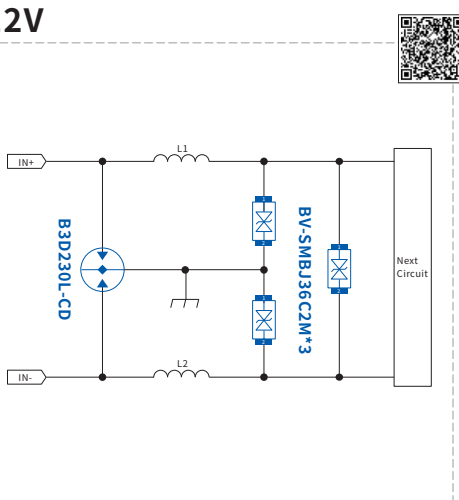


BXD3000SA03M03  
8.8x5.5x8.5mm Page 41

### AC 24V/DC12V



Camera



Test Level: 1.2/50-8/20μs CM 6kV-500A DM 4kV-2kA

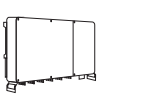
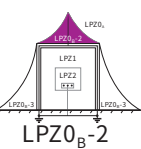
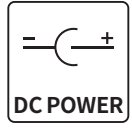


B3D230L-CD  
7.8x5.0x6.0mm  
Page 41

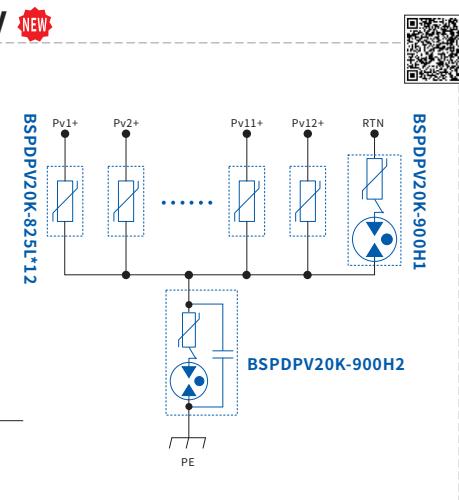


BV-SMBJ36C2M\*3  
5.5x3.8x2.6mm  
Page 53

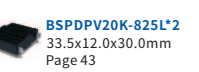
### DC 1500V PV



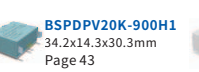
PV Inverter



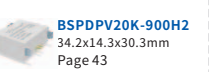
Test Level: 8/20μs 10kA



BSPDPV20K-825L\*12  
33.5x12.0x30.0mm  
Page 43



BSPDPV20K-900H1  
34.2x14.3x30.3mm  
Page 43



BSPDPV20K-900H2  
34.2x14.3x30.3mm  
Page 43

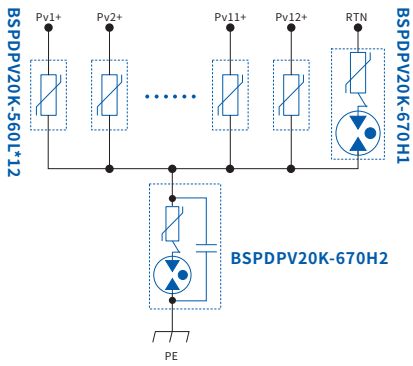
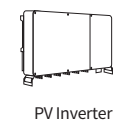
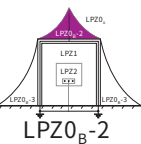
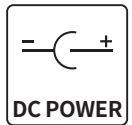
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

### DC 1100V PV NEW



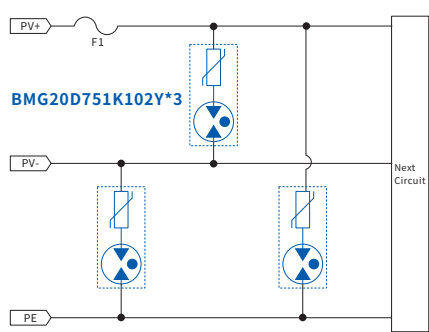
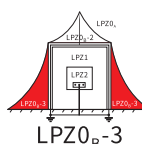
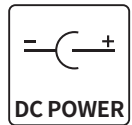
Test Level: 8/20μs 10kA

**BSPDPV20K-560L**  
33.5x12.0x30.0mm  
Page 43

**BSPDPV20K-670H1**  
34.2x14.3x30.3mm  
Page 43

**BSPDPV20K-670H2**  
34.2x14.3x30.3mm  
Page 43

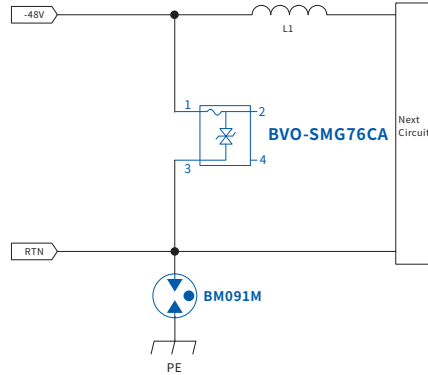
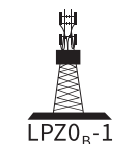
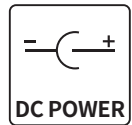
### DC 680V PV NEW



Test Level: 8/20μs CM/DM 5kA

**BMG20D751K102Y\*3**  
Φ23.0x12.8mm  
Page 45

### DC 48V

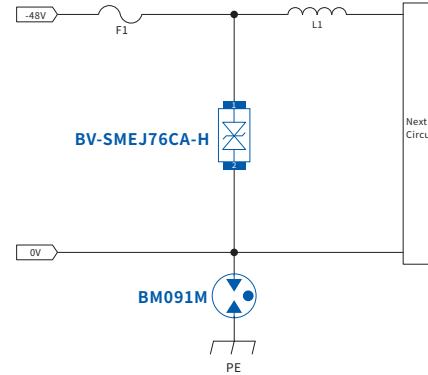
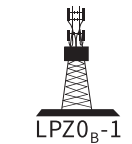
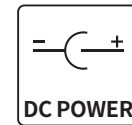


Test Level: 8/20μs CM/DM 20kA

**BVO-SMG76CA**  
24.0x23.5x13.8mm  
Page 53

**BM091M**  
8.3x8.3x6.0mm  
Page 41

### DC 48V

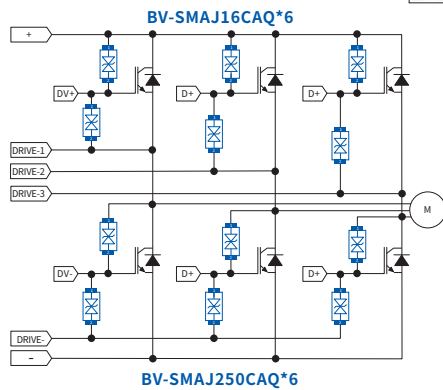
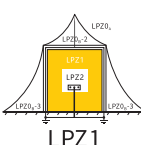
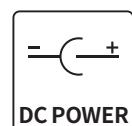


Test Level: 8/20μs CM/DM 10kA

**BV-SMEJ76CA-H**  
18.3x14.0x7.0mm  
Page 53

**BM091M**  
8.3x8.3x6.0mm  
Page 41

### DC 200V

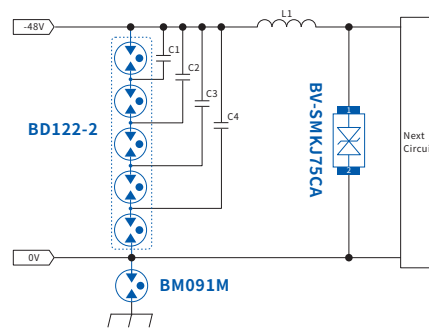
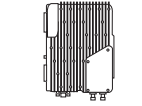
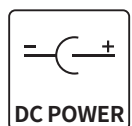


Test Level: P1 P2a P2b P3a P3b

**BV-SMAJ250CAQ\*6**  
5.3x2.9x2.5mm  
Page 53

**BV-SMAJ16CAQ\*6**  
5.3x2.9x2.5mm  
Page 53

### DC 48V



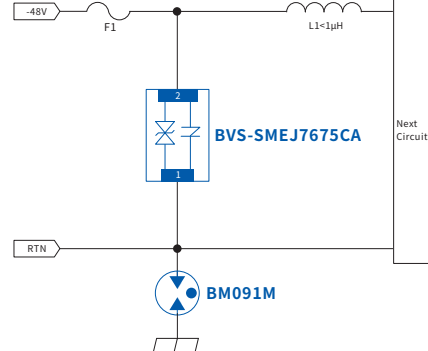
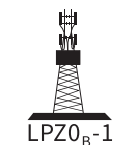
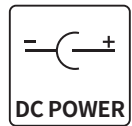
Test Level: 8/20μs CM/DM 20kA

**BD122-2**  
16.5x8.3x9.5mm  
Page 41

**BM091M**  
8.3x8.3x6.0mm  
Page 41

**BV-SMKJ75CA**  
10.6x8.3x2.3mm  
Page 53

### DC 48V NEW

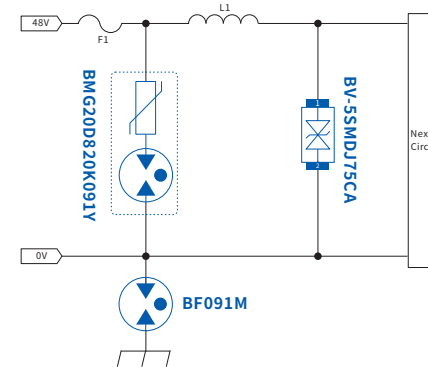
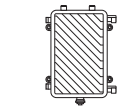
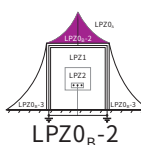
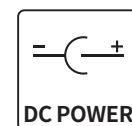


Test Level: 8/20μs CM/DM 10kA

**BVS-SMEJ7675CA**  
18.3x14.0x7.0mm  
Page 53

**BM091M**  
8.3x8.3x6.0mm  
Page 41

### DC 48V NEW



Test Level: 8/20μs CM/DM 5kA

**BMG20D820K091Y**  
Φ23x25x10mm  
Page 45

**BV-5SMDJ75CA**  
8.3x6.2x3.0mm  
Page 53

**BF091M**  
5.0x5.0x4.2mm  
Page 41

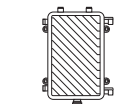
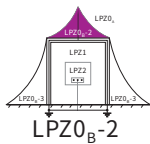
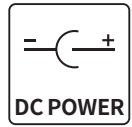
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

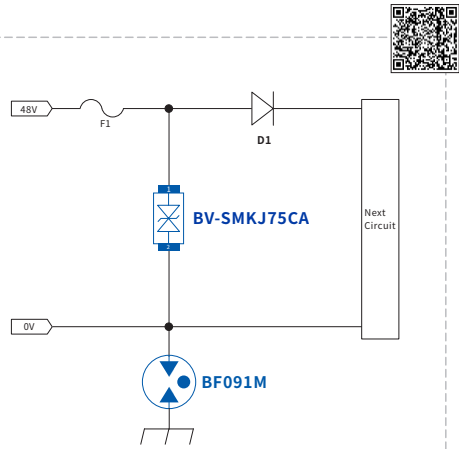
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

### DC 48V



Outdoor AP



Test Level: 8/20μs CM/DM 3kA

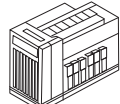
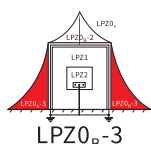
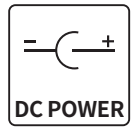


**BV-SMKJ75CA**  
10.6x8.3x2.3mm  
Page 53

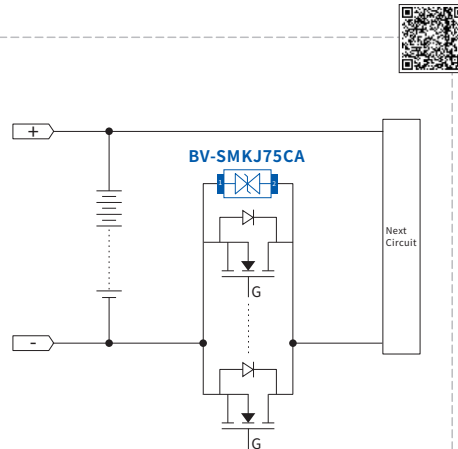


**BF091M**  
5.0x5.0x4.2mm  
Page 41

### DC 48V NEW



BMS

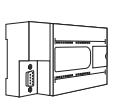
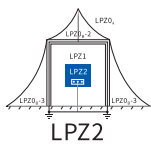
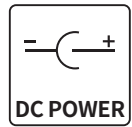


Test Level: 1.2/50-8/20μs CM/DM 4kV-2kA

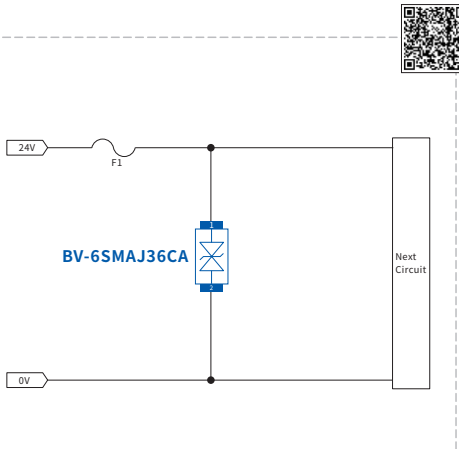


**BV-SMKJ75CA**  
10.6x8.3x2.3mm  
Page 53

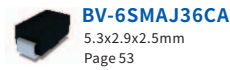
### DC 24V



PLC

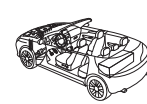
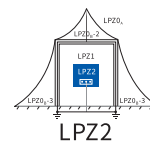
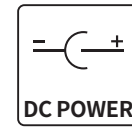


Test Level: 1.2/50-8/20μs DM 1kV-500A

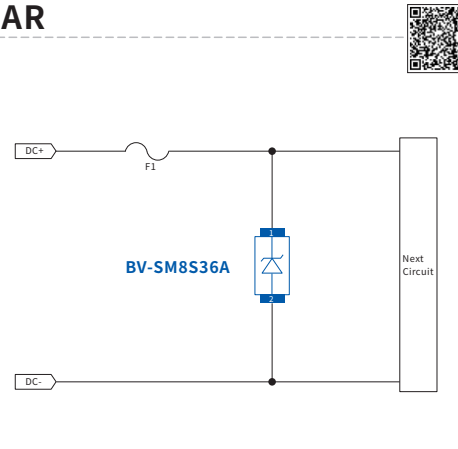


**BV-6SMAJ36CA**  
5.3x2.9x2.5mm  
Page 53

### DC 24V IN CAR



Vehicle

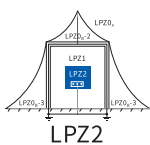
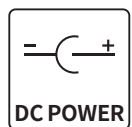


Test Level: P5a 101V 4Ω 400ms

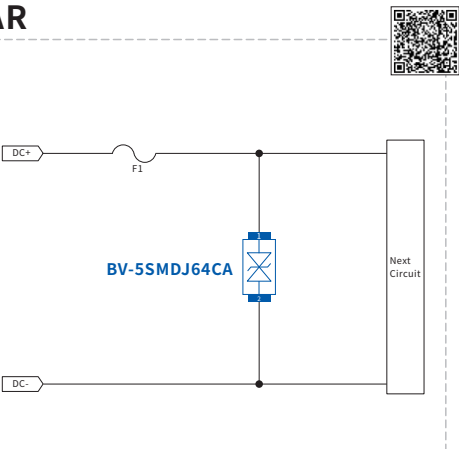


**BV-SM8S36A**  
15.5x10x4.9mm  
Page 53

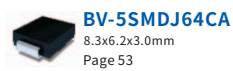
### DC 48V IN CAR



Vehicle

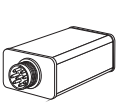
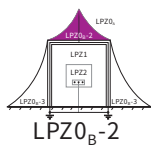
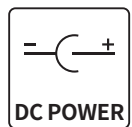


Test Level: ISO21780 Test-03 70V 40ms

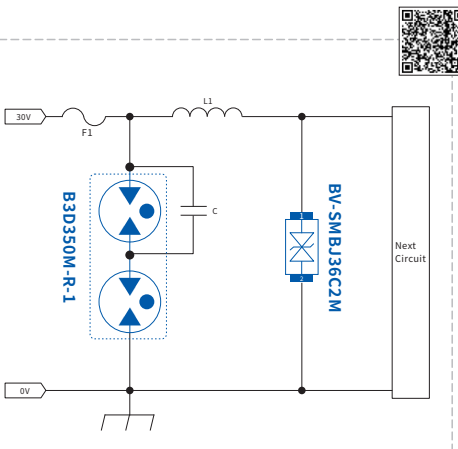


**BV-5SMDJ64CA**  
8.3x6.2x3.0mm  
Page 53

### DC 30V



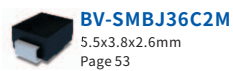
AISG



Test Level: 8/20μs CM/DM 3kA

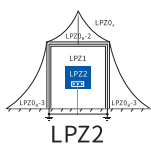
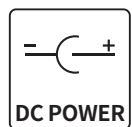


**B3D350M-R-1**  
7.8x5.0x6.0mm  
Page 41

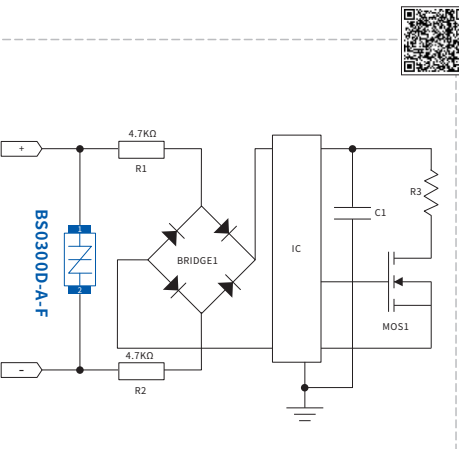


**BV-SMBJ36C2M**  
5.5x3.8x2.6mm  
Page 53

### DC 24V



Electronic detonator

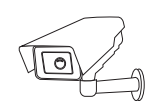
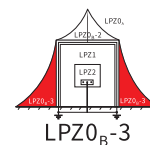
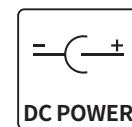


Test Level: DC 48V 10s AC220V 10s

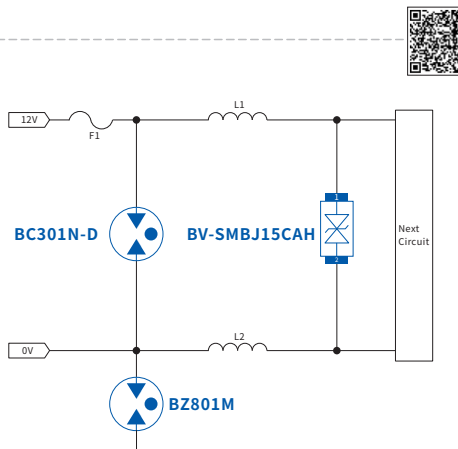


**BS0300D-A-F**  
3.8x1.8x1.35mm  
Page 51

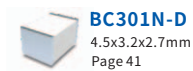
### DC 12V



Camera



Test Level: 1.2/50-8/20μs CM/DM 4kV-2kA Hipot DC 500V



**BC301N-D**  
4.5x3.2x2.7mm  
Page 41



**BV-SMBJ15CAH**  
5.5x3.8x2.6mm  
Page 53



**BZ801M**  
3.2x2.5x2.5mm  
Page 41

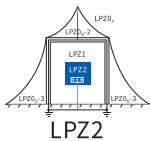
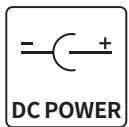
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

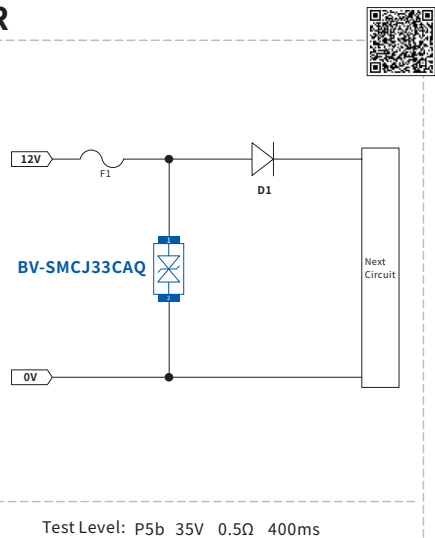
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

### DC 12V IN CAR



Vehicle

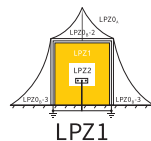
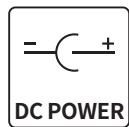


Test Level: P5b 35V 0.5Ω 400ms

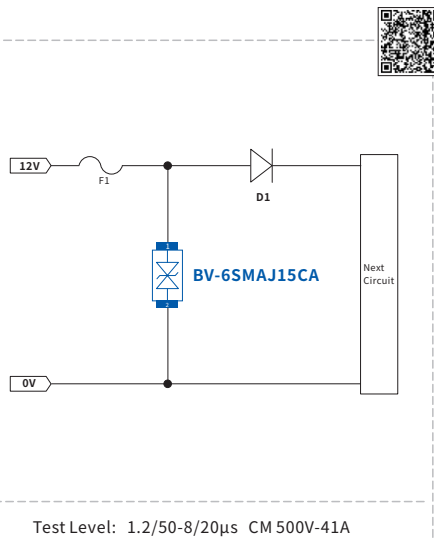


**BV-SMCJ33CAQ**  
8.3x6.2x3.0mm  
Page 53

### DC 12V NEW



Access Control

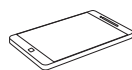
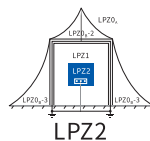
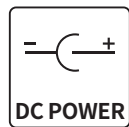


Test Level: 1.2/50-8/20μs CM 500V-41A

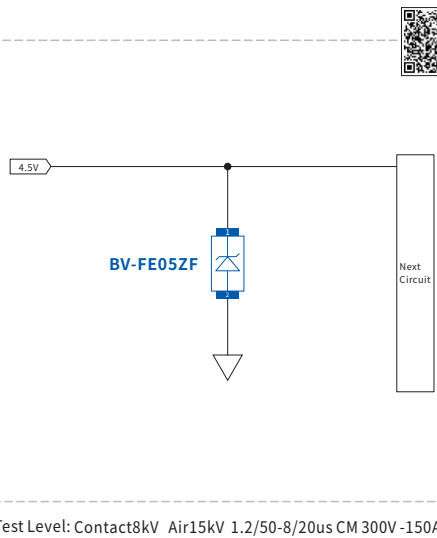


**BV-6SMAJ15CA**  
5.3x2.9x2.5mm  
Page 53

### DC 4.5V NEW



Mobile phone

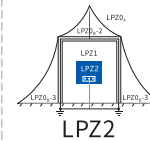
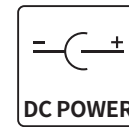


Test Level: Contact8kV Air15kV 1.2/50-8/20us CM 300V-150A

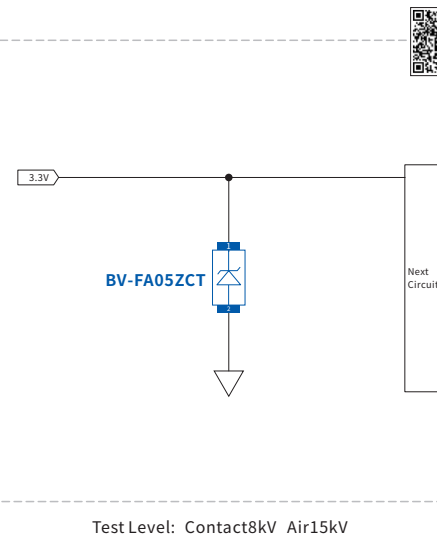


**BV-FE05ZF**  
1.6x1.0x0.5mm  
Page 55

### DC 3.3V



Laptop

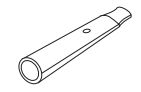
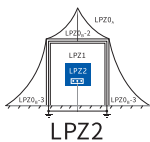
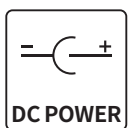


Test Level: Contact8kV Air15kV

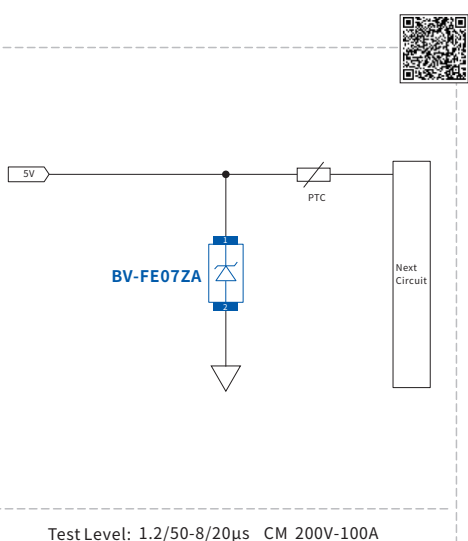


**BV-FA05ZCT**  
1.0x0.6x0.5mm  
Page 55

### DC 5V



Vape

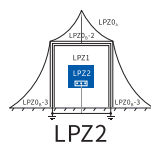
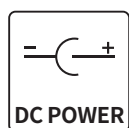


Test Level: 1.2/50-8/20μs CM 200V-100A

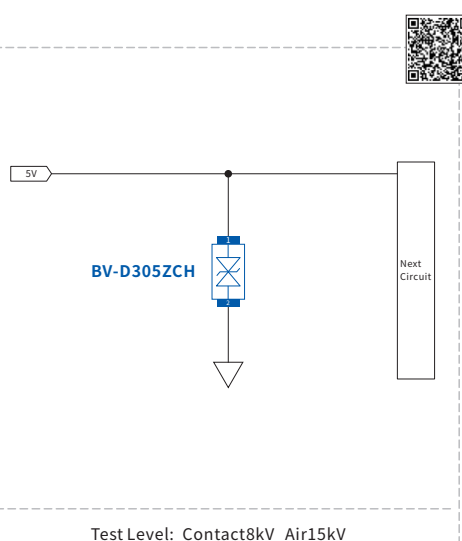


**BV-FE07ZA**  
1.6x1.0x0.5mm  
Page 55

### DC 5V



Electric toothbrush

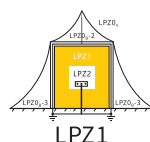
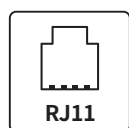


Test Level: Contact8kV Air15kV

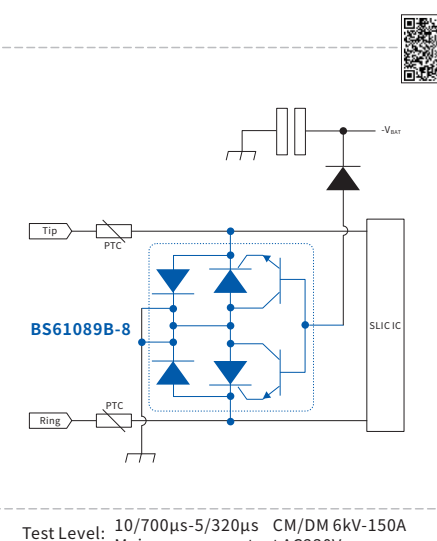


**BV-D305ZCH**  
2.5x1.3x1.0mm  
Page 55

### RJ11 SLIC



PBX

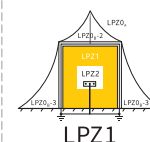
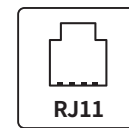


Test Level: 10/700μs-5/320μs CM/DM 6kV-150A  
Mains power contact AC230V

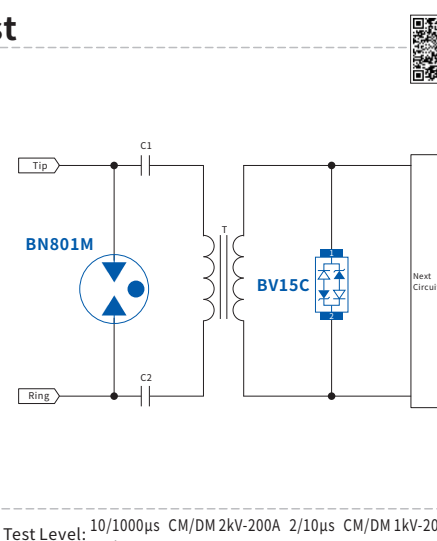


**BS61089B-8**  
4.9x6.0x1.7mm  
Page 55

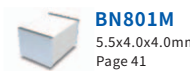
### RJ11 G.Fast



PBX



Test Level: 10/1000μs CM/DM 2kV-200A 2/10μs CM/DM 1kV-200A  
Mains power contact AC425V



**BN801M**  
5.5x4.0x4.0mm  
Page 41



**BV15C**  
2.5x1.3x1.0mm  
Page 45

Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

### RJ11 xDSL

**RJ11**

**LPZ1**

**VDSL**

Test Level: 10/700-5/320μs CM/DM 6kV-150A  
Mains power contact AC230V

**BC401M**  
4.5x3.2x2.7mm  
Page 41

**BS0x0S23-5**  
3.0x2.8x1.3mm  
Page 51

### RJ11

**RJ11**

**LPZ1**

**PSTN**

Test Level: 10/700-5/320μs CM/DM 6kV-150A  
Mains power contact AC230V

**B3Y471M**  
6.2x3.2x2.3mm  
Page 41

**BS0x0S23-5**  
3.0x2.8x1.25mm  
Page 51

### RJ45

**RJ45**

**LPZ0<sub>B</sub>-3**

**Outdoor AP**

Test Level: 10/700-5/320μs CM 6kV-150A DM 4kV-150A

**BV-FA03UCE\*4**  
1.0x0.6x0.5mm  
Page 55

**BV-5SMDJ64CA\*6**  
8.0x5.9x2.6mm  
Page 53

**BF801M**  
5.0x5.0x4.2mm  
Page 41

### RJ45 <sup>NEW</sup>

**RJ45**

**LPZ0<sub>B</sub>-3**

**Outdoor AP**

Test Level: 10/700-5/320μs CM 6kV-150A

**BV-FE03U2M-H\*4**  
1.6x1.0x0.55mm  
Page 55

**BZ401M\*4**  
3.2x2.5x2.5mm  
Page 41

### RJ11

**RJ11**

**LPZ1**

**Portection Unit**

Test Level: 10/700-5/320μs CM/DM 6kV-150A  
Mains power contact AC230V

**B3D470L-C**  
7.8x5.0x6.0mm  
Page 41

### RJ11

**RJ11**

**LPZ1**

**PSTN**

Test Level: 10/700-5/320μs CM/DM 6kV-150A  
Mains power contact AC230V

**B3A420**  
4.2x2.7x3.9mm  
Page 41

**BV12C\*3**  
2.5x1.3x1.0mm  
Page 55

### RJ45 <sup>NEW</sup>

**RJ45**

**LPZ0<sub>B</sub>-3**

**Outdoor AP**

Test Level: CM 1.2/50-8/20μs 6kV 42Ω 10/700-5/320μs 6kV 40Ω  
DM 1.2/50-8/20μs 2.5kV 10Ω 10/700-5/320μs 1.5kV 40Ω

**BV03C-H\*4**  
2.5x1.28x1.17mm  
Page 55

**BV-3SMBF30CA\*3**  
5.4x3.3x2mm  
Page 53

**BF801M**  
5.0x5.0x4.2mm  
Page 41

### RJ45

**RJ45**

**LPZ1**

**Laptop**

Test Level: 10/700-5/320μs CM 6kV 40Ω

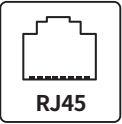
**BV-FK03U4CK\*2**  
2.5x1x0.5mm  
Page 55

**BS4200N-C-F**  
5.8x4.4x2.8mm  
Page 51

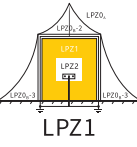
Notes: CM=Common Mode / DM=Differential Mode  
Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

Notes: CM=Common Mode / DM=Differential Mode  
Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.


### RJ45-1G



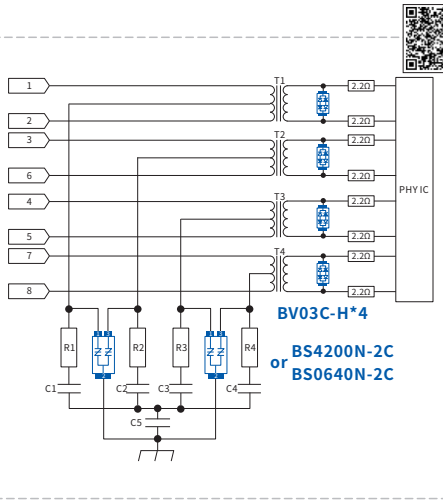
RJ45



LPZ1



Outdoor IPC



PHY IC

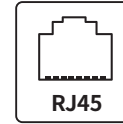
**BV03C-H\*4**  
**BS4200N-2C**  
or **BS0640N-2C**

Test Level: 10/700-5/320μs CM 6kV-330A DM 2kV

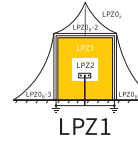
**BV03C-H**  
1.6x1.3x1.0mm  
Page 55

**BS4200N-2C/BS0640N-2C**  
5.4x3.3x2.0mm  
Page 51

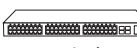
### RJ45-1G



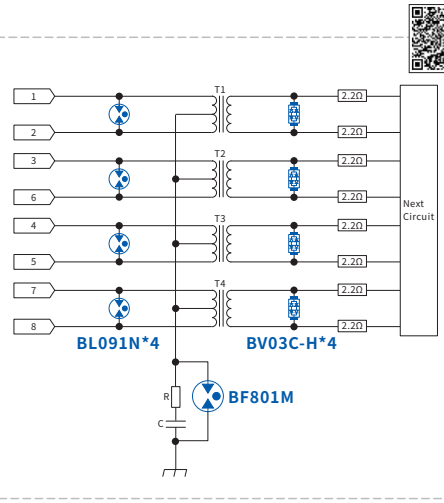
RJ45



LPZ1



Switch



Next Circuit

**BL091N\*4**  
**BV03C-H\*4**  
**BF801M**


Test Level: 10/700-5/320μs CM/DM 6kV-150A Hi-pot DC500V

**BL091N\*4**  
2.9x2.1x1.9mm  
Page 41

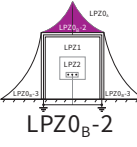
**BF801M**  
5.0x5.0x4.2mm  
Page 41

**BV03C-H\*4**  
1.6x1.3x1.0mm  
Page 55

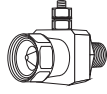
### Coaxial



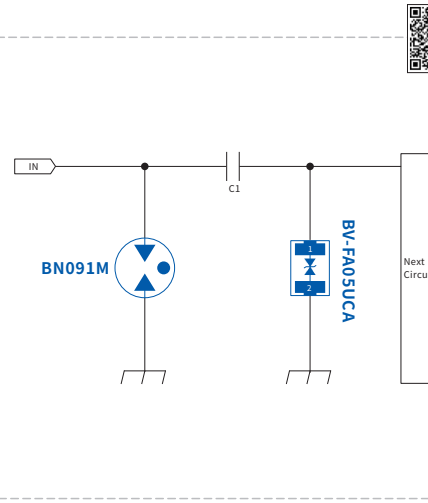
COAXIAL



LPZ0<sub>B</sub>-2



LNB



IN

**BN091M**  
**BV-FA05UCA**


Next Circuit

Test Level: 8/20μs CM 5kA

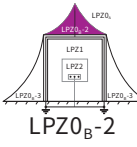
**BN091M**  
5.5x4.0x4.0mm  
Page 41

**BV-FA05UCA**  
1.0x0.6x0.5mm  
Page 55


### Coaxial



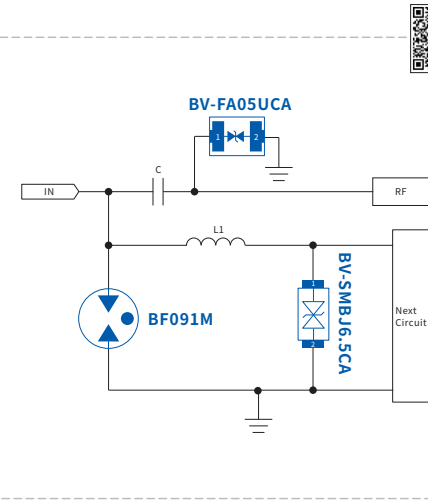
COAXIAL



LPZ0<sub>B</sub>-2



GPS



IN

**BV-FA05UCA**  
**BF091M**  
**BV-SMBJ6.5CA**

Next Circuit

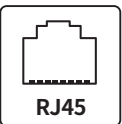
Test Level: 8/20μs CM 5kA

**BV-FA05UCA**  
1.0x0.6x0.5mm  
Page 55

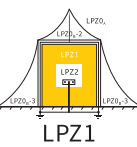
**BF091M**  
5.0x5.0x4.2mm  
Page 41

**BV-SMBJ6.5CA**  
5.5x3.8x2.6mm  
Page 53

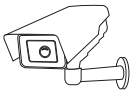
### RJ45-100M PD



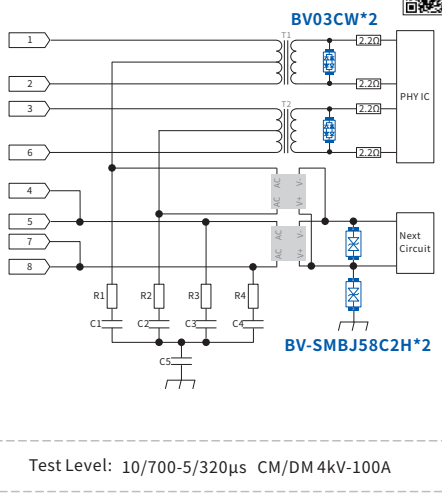
RJ45



LPZ1



Camera



PHY IC

**BV03CW\*2**  
**BV-SMBJ58C2H\*2**


Next Circuit

Test Level: 10/700-5/320μs CM/DM 4kV-100A

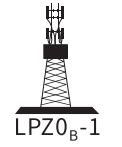
**BV03CW\*2**  
1.6x1.3x1.0mm  
Page 55

**BV-SMBJ58C2H\*2**  
5.5x3.8x2.6mm  
Page 53

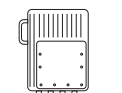
### Coaxial



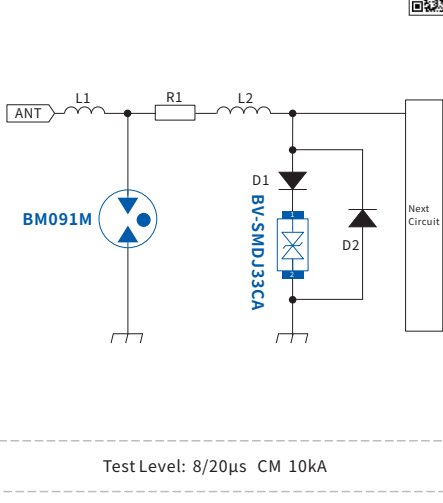
COAXIAL



LPZ0<sub>B</sub>-1



Active duplexer



ANT

**BM091M**  
**BV-SMDJ33CA**  
**D2**


Next Circuit

Test Level: 8/20μs CM 10kA

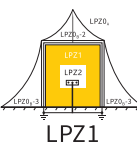
**BM091M**  
5.0x5.0x4.2mm  
Page 41

**BV-SMDJ33CA**  
8.2x6.1x2.9mm  
Page 53

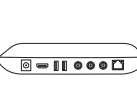
### Coaxial



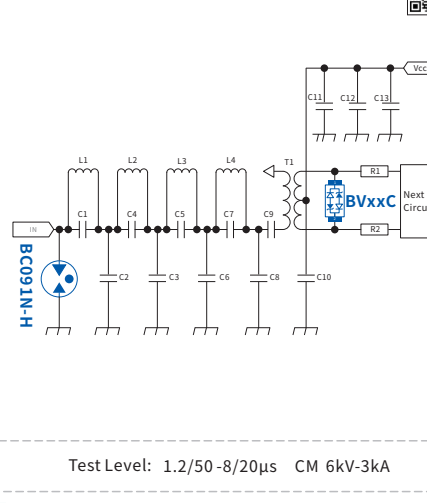
COAXIAL



LPZ1



Set-Top Box



IN

**BC091N-H**  
**BVxxC**


Next Circuit

Test Level: 1.2/50-8/20μs CM 6kV-3kA

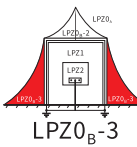
**BC091N-H**  
4.5x3.2x2.7mm  
Page 41

**BVxxC**  
2.5x1.3x1.0mm  
Page 55


### HD-Analog



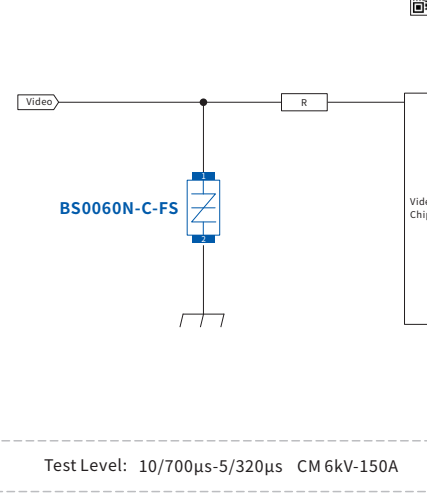
COAXIAL



LPZ0<sub>B</sub>-3



Camera



Video

**BS0060N-C-FS**

Video Chip

Test Level: 10/700μs-5/320μs CM 6kV-150A

**BS0060N-C-FS**  
5.4x3.3x2.0mm  
Page 51


Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

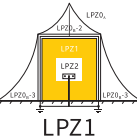
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

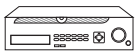
### HD-Analog



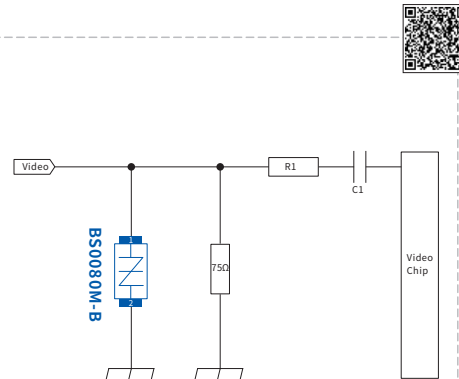
**COAXIAL**



**LPZ1**




**NVR/DVR**



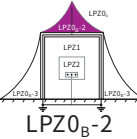
**BS0080M-B**  
5.3x2.9x2.5mm  
Page 51

Test Level: 10/700-5/320μs CM/DM 4kV-100A


### RS485



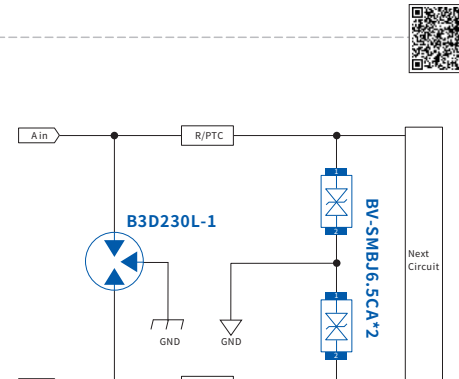
**RS485**



**LPZ0<sub>B</sub>-2**



**AISG**




**B3D230L-1**  
7.8x5.0x6.0mm  
Page 41

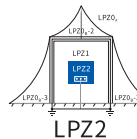
**BV-SMBJ6.5CA\*2**  
5.5x3.8x2.6mm  
Page 53

Test Level: 8/20μs CM/DM 5kA


### RS485



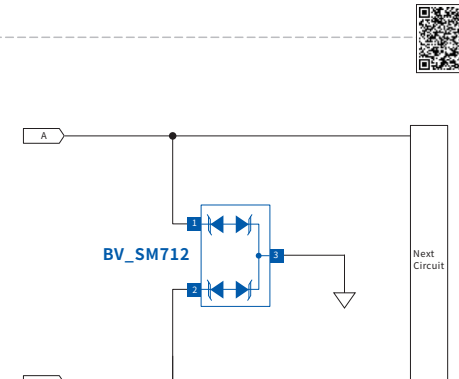
**RS485**



**LPZ2**



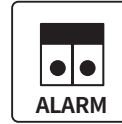
**RS485 Converter**



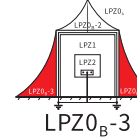
**BV\_SM712**  
2.9x2.4x1.0mm  
Page 55

Test Level: Contact 8kV Air 15kV


### ALARM



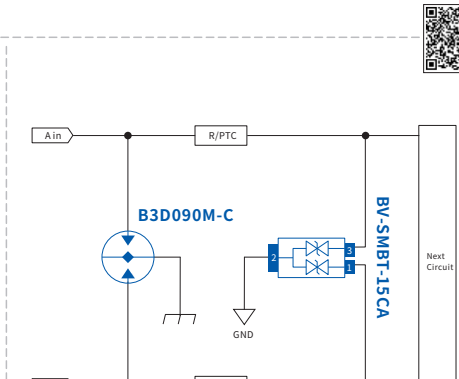
**ALARM**



**LPZ0<sub>B</sub>-3**



**Camera**




**B3D090M-C**  
7.8x5.0x6.0mm  
Page 41

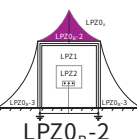
**BV-SMBT-15CA**  
5.4x3.3x2.0mm  
Page 53

Test Level: 8/20μs CM/DM 3kA


### RS485



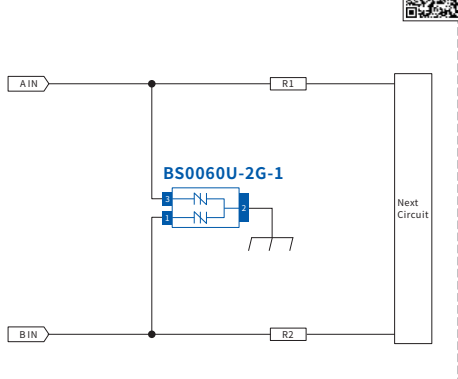
**RS485**



**LPZ0<sub>B</sub>-2**




**AISG**



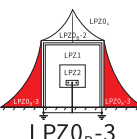
**BS0060U-2G-1**  
8.0x5.9x2.0mm  
Page 51

Test Level: 8/20μs CM/DM 3kA


### RS485



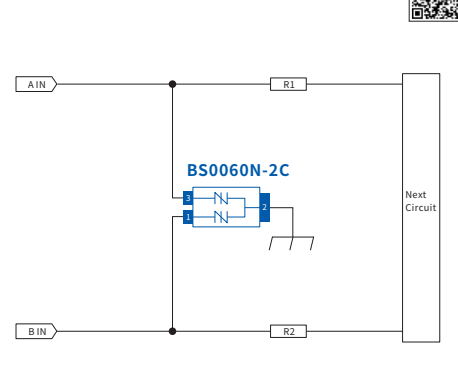
**RS485**



**LPZ0<sub>B</sub>-3**




**RS485 Converter**




**BS0060N-2C**  
5.4x3.3x2.0mm  
Page 51

Test Level: 10/700-5/320μs CM/DM 6kV-150A


### ALARM



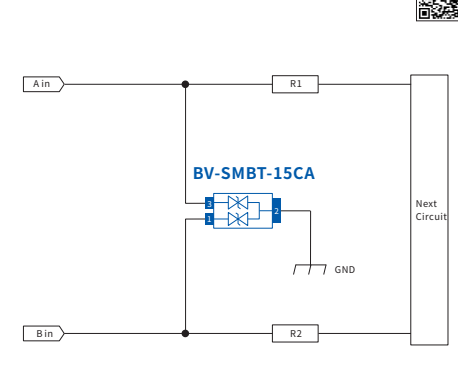
**ALARM**



**LPZ1**



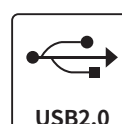
**Camera**



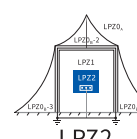
**BV-SMBT-15CA**  
5.4x3.3x2.0mm  
Page 53

Test Level: 1.2/50-8/20μs CM 1kV-500A


### USB2.0 2in1



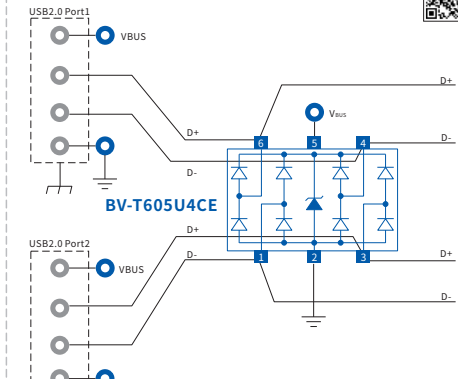
**USB2.0**



**LPZ2**



**Laptop**



**BV-T605U4CE**  
3.0x2.8x1.3mm  
Page 55

Test Level: Contact 8kV Air 15kV

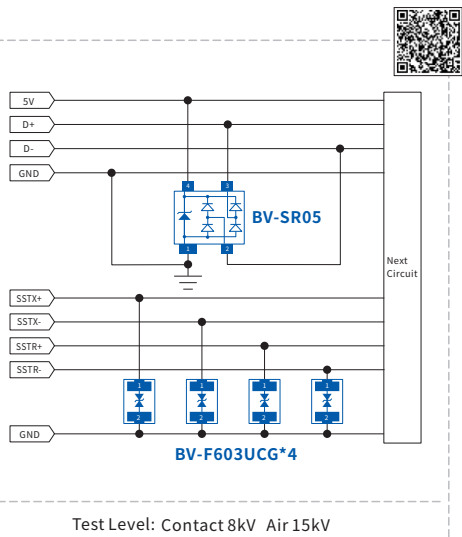
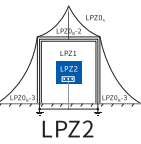
Notes: CM=Common Mode / DM=Differential Mode

Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

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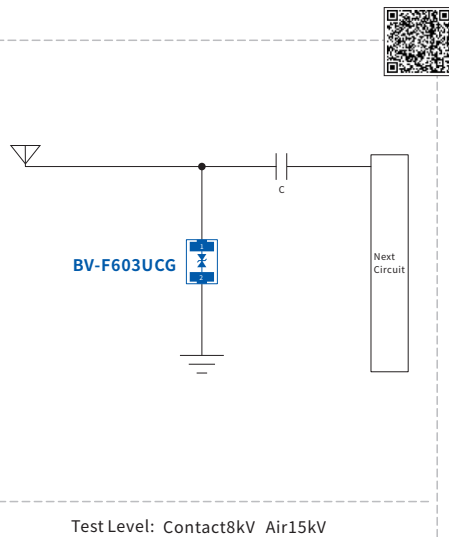
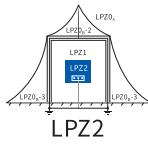
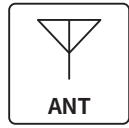
### USB3.0



**BV-SR05**  
2.9x2.4x1.0mm  
Page 55

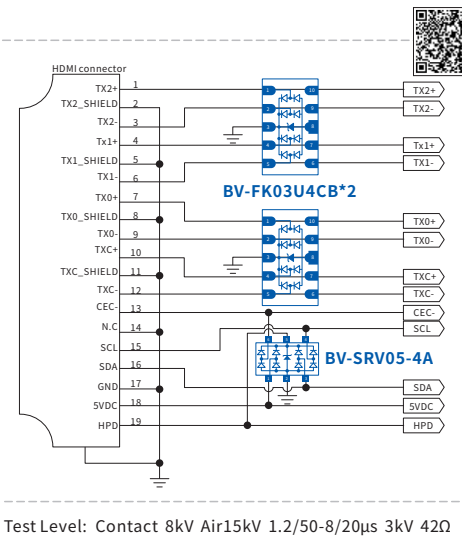
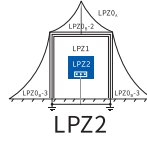
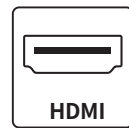
**BV-F603UCG\*4**  
0.6x0.3x0.3mm  
Page 55

### RF PORT



**BV-F603UCG**  
0.6x0.3x0.3mm  
Page 55

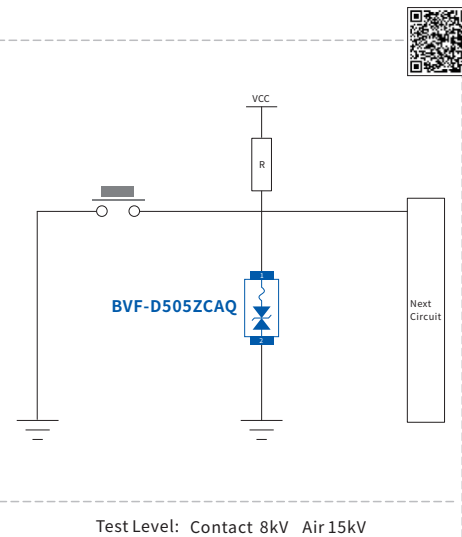
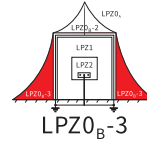
### HDMI



**BV-FK03U4CB\*2**  
2.5x1.0x0.58mm  
Page 55

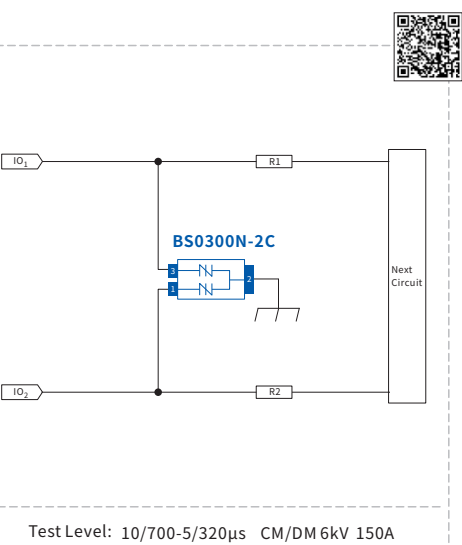
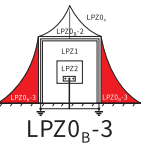
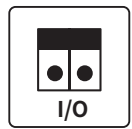
**BV-SRV05-4A**  
3.0x2.8x1.3mm  
Page 55

### KEY



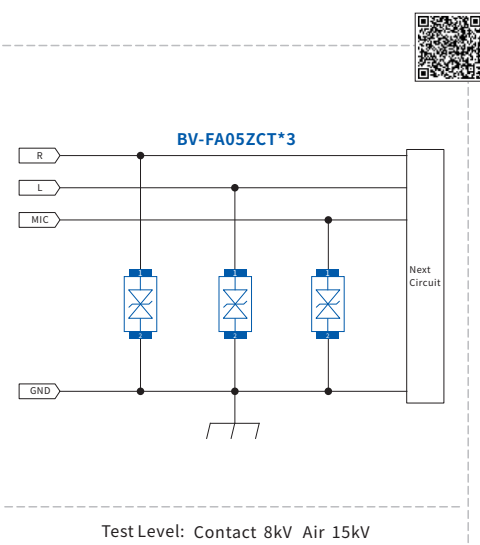
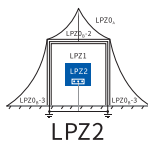
**BV-F505ZCAQ**  
1.6x0.8x0.6mm  
Page 55

### I/O



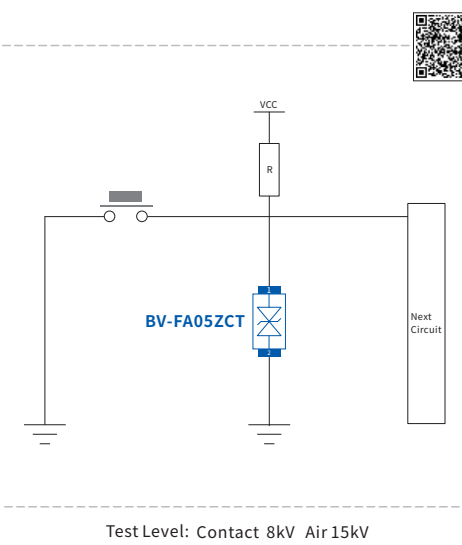
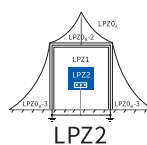
**BS0300N-2C**  
5.4x3.3x2.0mm  
Page 51

### AUDIO



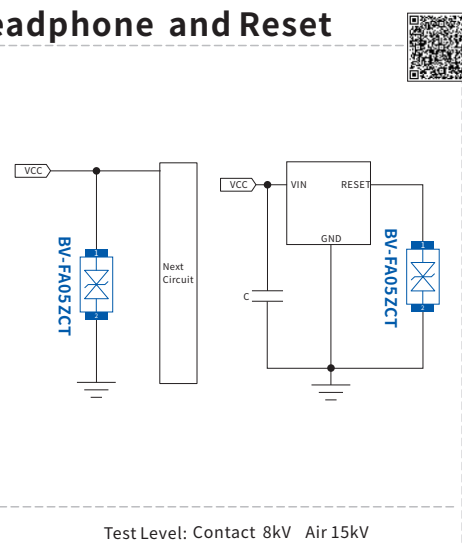
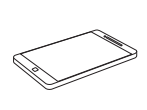
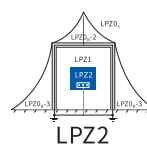
**BV-FA05ZCT\*3**  
1.0x0.6x0.5mm  
Page 55

### KEY



**BV-FA05ZCT**  
1.0x0.6x0.5mm  
Page 55

### Speaker Headphone and Reset



**BV-FA05ZCT**  
1.0x0.6x0.5mm  
Page 55

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### AC to DC

**DC POWER**

LPZ2

Charging

**BW-D1D5V1T1G-2**  
2.7x1.8x1.0mm  
Page 57

### DC to DC

**DC POWER**

LPZ2

Laptop

**BW-D1D13V1T1G-6**  
2.7x1.8x1.0mm  
Page 57

### Horn Overload protection

**Drive**

LPZ2

Sound

**BW-D1D5V1T1G-2\*2**  
2.7x1.8x1.0mm  
Page 57

### CEMF Absorption circuit

**Drive**

LPZ2

Sweepers

**BW-D3A12V1T1G-6**  
2.5x1.3x1.0mm  
Page 57

### Overvoltage Control

**Drive**

LPZ2

TV

**BW-D1D15V1T1G-2**  
2.7x1.8x1.0mm  
Page 57

### Relay Coil Control

**Drive**

LPZ2

PLC

**BW-D3A12V1T1G-6**  
2.5x1.3x1.0mm  
Page 57

### Temperature Compensation circuit NEW

**Drive**

LPZ2

BMS

**BW-D3A12V1T1G-6**  
2.5x1.3x1.0mm  
Page 57

### Limit Circuit

**Drive**

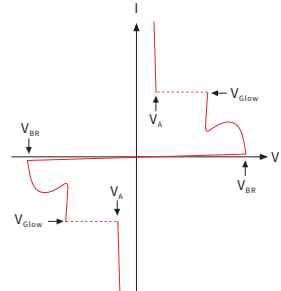
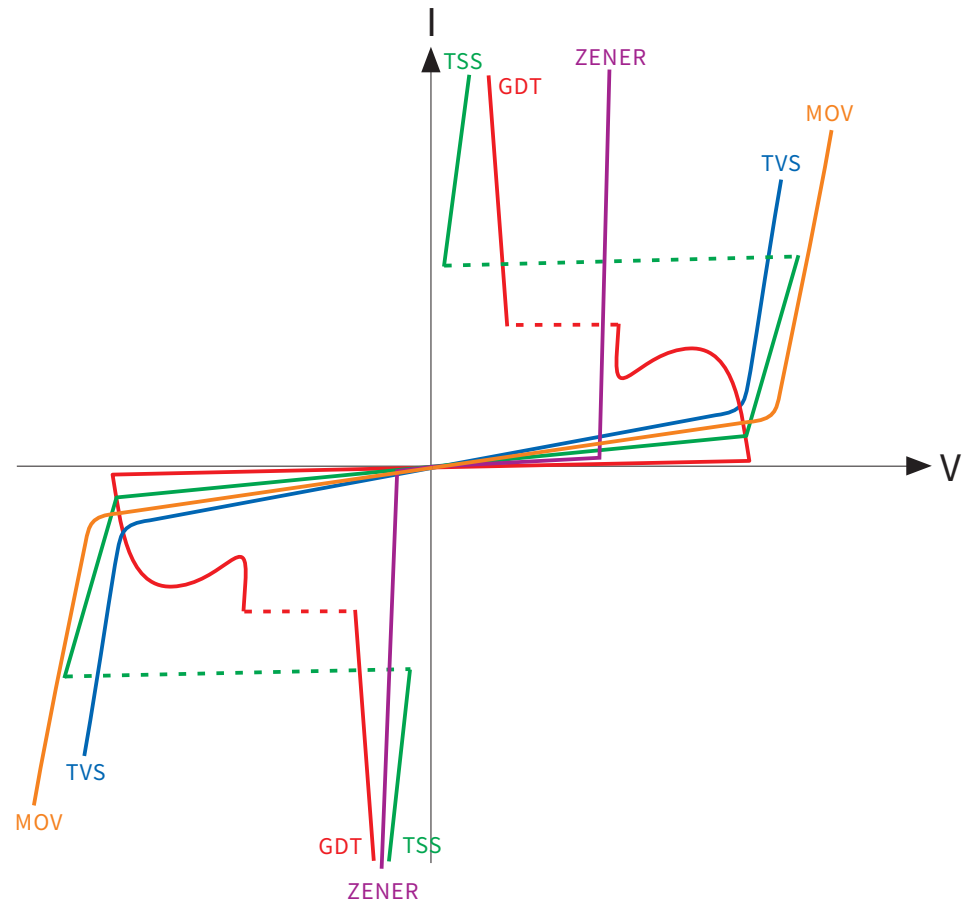
LPZ2

BMS

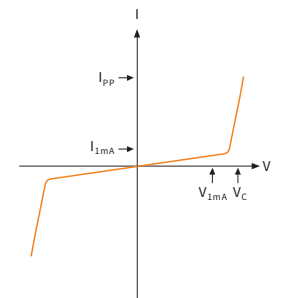
**BW-D1D3V3T1G-6**  
2.7x1.8x1.0mm  
Page 57

Notes: CM=Common Mode / DM=Differential Mode  
Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.

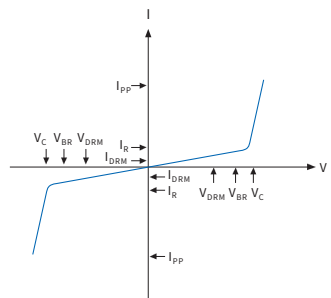
Notes: CM=Common Mode / DM=Differential Mode  
Statement: This solution is only for reference, the final solution will be based on the actual test results. Shenzhen Bencent Electronics Co.,Ltd reserves the right of final explanation.



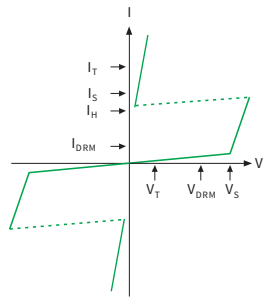
— GDT



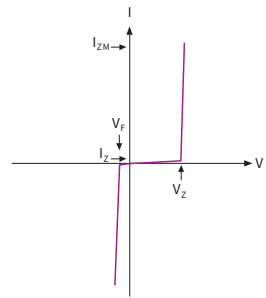
— MOV



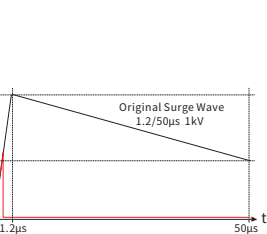
— TVS



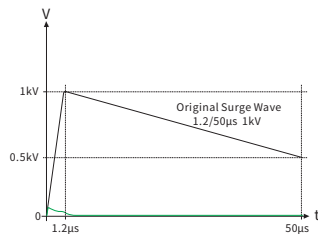
— TSS



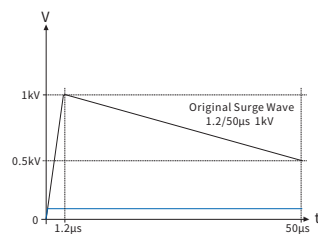
— Zener



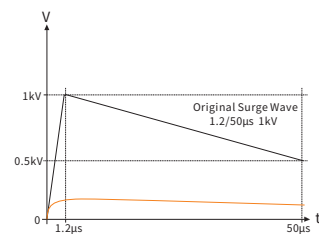
— GDT  
V<sub>DRM</sub>=90V



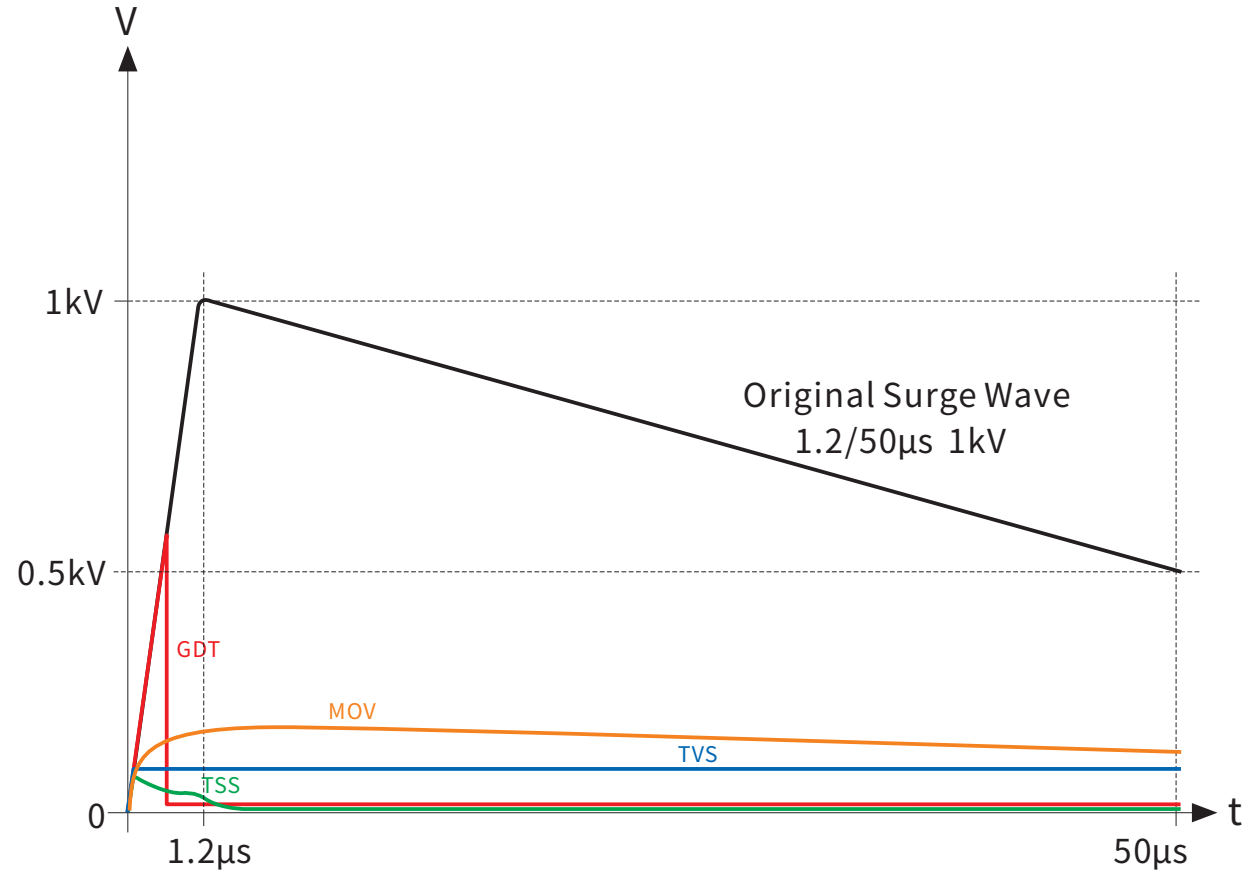
— TSS  
V<sub>DRM</sub>=58V



— TVS  
V<sub>DRM</sub>=58V



— MOV  
V<sub>DRM</sub>=82V



陶瓷气体放电管/GDT

□尺寸(mm) ○电压范围 △流通能力

**BS**  
 □ 3.2x1.6x1.6  
 ○ 90V~470V  
 △ 500A@8/20μs

**BL/BG**  
 □ 2.9x2.1x1.9  
 ○ 90V~400V  
 △ 0.5~1kA@8/20μs

**BZ**  
 □ 3.2x2.5x2.5  
 ○ 90V~800V  
 △ 1kA@8/20μs

**BA/BC**  
 □ 4.5x3.2x2.7  
 ○ 75V~600V  
 △ 1kA~3kA@8/20μs

**BX**  
 □ 4.2x3.5x3.5  
 ○ 90V~2000V  
 △ 1kA~3kA@8/20μs

**BN**  
 □ 5.5x4x4  
 ○ 75V~3600V  
 △ 3kA~5kA@8/20μs

**BF**  
 □ 4.2x5x5.5  
 ○ 150~1200V  
 △ 5kA@8/20μs

**BJ**  
 □ 5.5x5x5.5  
 ○ 90V  
 △ 5kA~10kA@8/20μs

**B3Q**  
 □ 6.8x3.5x3.5  
 ○ 90V~420V  
 △ 2kA~6kA@8/20μs

**B3D**  
 □ 7.8x5x6  
 ○ 75V~650V  
 △ 5kA~10kA@8/20μs

**BXD**  
 □ 8.8x5.5x8.5  
 ○ 3000V  
 △ 3kA@8/20μs

**BE-MTW**  
 □ 10.5x8x2.3  
 ○ 90V~600V  
 △ 10kA@8/20μs

**BM**  
 □ 6x8.3x8.3  
 ○ 90V~3600V  
 △ 5kA~20kA@8/20μs

**B3R**  
 □ Φ8x10  
 ○ 90~500V  
 △ 5kA~10kA@8/20μs

**BGO-LB2**  
 □ Φ5.5x6  
 ○ 600V  
 △ 3kA~5kA@8/20μs

**BGO-LC2**  
 □ Φ8x7  
 ○ 600V~1000V  
 △ 5kA~10kA@8/20μs

**B5G**  
 □ Φ5.5x6  
 ○ 70V~3600V  
 △ 3kA~5kA@8/20μs

**B8G**  
 □ Φ8x6  
 ○ 90V~4000V  
 △ 5kA~20kA@8/20μs

**BD**  
 □ 16.5x8.3x9.5  
 ○ 1200V  
 △ 20kA@8/20μs

浪涌保护器/SPD

□尺寸(mm) ○最大持续运行电压Uc △标称放电电流 ☆电压保护水平

**BSPDPV20K-670H1A**  
 □ 34.2×14.3×30.3  
 ○ 670VDC  
 △ 10kA  
 ☆ ≤1.65kV

**BSPDPV20K-670H2A**  
 □ 41.6x31x38.2  
 ○ 670VDC  
 △ 20kA  
 ☆ L-N/L-PE/N-PE:1.5kV

**BSPDPV20K-560L**  
 □ 33.5x12x30  
 ○ 560VDC  
 △ 10kA  
 ☆ ≤1.7kV

**BSPD277D05LF-01**  
 □ 69.4x34x21  
 ○ 560VDC  
 △ 5kA  
 ☆ 1.5kV

**BSPD230C20PF-02**  
 □ 38.8x16.7x24  
 ○ L-N/L-PE/N-PE:320VAC  
 △ 20kA  
 ☆ L-PE/N-PE/L-N:2.0kV

**BSPD230C20PF-01/04**  
 □ 40.8x38x18.8  
 ○ L-N/L-PE/N-PE:320VAC  
 △ 20kA  
 ☆ L-PE/N-PE/L-N:2.0kV

压敏复合气体管/BMG

□尺寸(mm) ○电压范围 △流通能力

**BMG7D**  
 □ Φ9.5x10x10  
 ○ AC 55V~560V  
 △ 1kA@8/20μs

**BMG10D**  
 □ Φ13x15x10  
 ○ AC 55V~560V  
 △ 2kA@8/20μs

**BMG14D**  
 □ Φ17.5x20x10  
 ○ AC 55V~560V  
 △ 3kA@8/20μs

**BMG20D**  
 □ Φ23x25x10  
 ○ AC 55V~560V  
 △ 5kA@8/20μs

压敏电阻/MOV

□尺寸(mm) ○电压范围 △流通能力

**BMOV-7D**  
 □ Φ10x9  
 ○ 18V~820V  
 △ 0.25kA~1.75kA@8/20μs

**BMOV-10D**  
 □ Φ14x9.8  
 ○ 18V~1100V  
 △ 0.5kA~3.5kA@8/20μs

**BMOV-14D**  
 □ Φ18x13.5  
 ○ 18V~1800V  
 △ 1kA~5kA@8/20μs ±15T

**BMOV-20D**  
 □ Φ23x12.8  
 ○ 18V~1800V  
 △ 2kA~10kA@8/20μs ±15T

### GDT



贴片型

**B S 151 N/M**



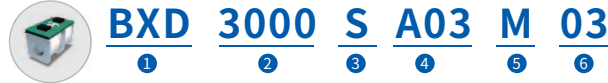
插件/三极型

**B 5G 600 L/M**

- 1 Bencent 檳城标志
- 2 封装类型 (具体型号见右表)
- 3 直流击穿电压:  
贴片型GDT:  $151=15 \times 10^1 = 150V$   
插件/三极GDT:  $600=600V \pm 20\%$
- 4 贴片型GDT:  
电压公差范围:  $N = \pm 30\%$ ;  $M = \pm 20\%$   
插件/三极GDT:  
通流能力:  $L = 5kA$ ;  $M = 10kA$

S	3.2*1.6*1.6 mm	J	5.5*5.5*5 mm
G	2.9*2.1*1.9 mm	M	8.3*8.3*6 mm
L	2.9*2.1*1.9 mm	5G	$\phi 5.5*6$ mm
Z	3.2*2.5*2.5 mm	8G	$\phi 8*6$ mm
A	3.2*2.5*2.5 mm	3D	7.8*5*6 mm
C	4.5*3.2*2.7 mm	UB	$\phi 16$ mm
X	4.2*3.5*3.5 mm	UF	$\phi 30$ mm
N	5.5*4*4 mm	GO	$\phi 8*7$ mm
F	4.2*5*5 mm	3R	$\phi 8*10$ mm

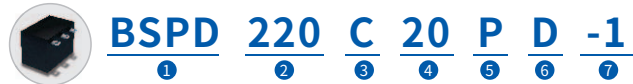
### BXD



**BXD 3000 S A03 M 03**

- 1 Bencent BXD系列
- 2 直流击穿电压:  $3000=3000V$
- 3 封装类型: S=SMD
- 4 通流能力: 两位字数代表浪涌等级--A03表示3kA
- 5 电压公差:  $M = \pm 20\%$ ;  $K=10\%$
- 6 后缀: 表示此类产品的特殊结构或客户的特殊要求

### BSPD



**BSPD 220 C 20 P D -1**

- 1 Bencent SPD系列
- 2 额定工作电压: 220代表220VAC
- 3 防护等级: B代表 I 类; C代表 II 类; D代表 III 类
- 4 额定通流容量: 40代表40kA; 20代表20 kA; 10代表10 kA; 05代表5kA
- 5 产品类型: P代表板载, M代表可拔插模块, L代表路灯
- 6 保护模式: D 差模; F全模保护; C共模; E不对称全模
- 7 后缀: 产品扩展位

### BSPD For PV



**BSPD PV 20K - 670 H1 W**

- 1 Bencent SPD系列
- 2 PV: 光伏组件
- 3 通流容量: 20K:最大放电电流
- 4 最大连续工作电压: 670:光伏应用Ucpv670V
- 5 标识: L:带防爆的压敏; H1:(GDT+MOV)平台 $\leq 1.8kV$ ; H1A:(GDT+MOV)平台 $\leq 1.5kV$
- 6 后缀: W:开窗; F:pin宽4mm

### BMOV



**BMOV 07 D 681 K S C H 01**

- 1 Bencent MOV系列
- 2 元件直径: 07= $\phi 7mm$ ; 10= $\phi 10mm$ ; 14= $\phi 14mm$ ; 20= $\phi 20mm$
- 3 类型: D=Disk (圆形)
- 4 压敏电压:  $681 = 68 \times 10^1 = 680V$
- 5 电压公差:  $K = \pm 10\%$ ;  $L = \pm 15\%$ ;  $M = \pm 20\%$
- 6 引线类型: S=直引线; F=F扭结引线; O=外弯; Y=高低脚; P=塑壳防爆型; C:陶瓷壳防爆型压敏; B=外弯, 套管; A=金属板防爆压敏
- 7 包装: C=Bulk (散装); T=Tape&Box (编带盒装); R=Tape&Reel (编带卷装); P=PETBOX (塑料盒装)...
- 8 客户指定浪涌温度等级: 空白=普通105°C; H=高能105°C; Z=(组合波多次产品)105°C; A=普通125°C; B=高能(高焦耳)125°C; C=(组合波多次产品)125°C....
- 9 客户其他特殊要求字母或数字代码: 35=默认剪角型引脚长度 $3.5 \pm 0.5mm$ ....

### BMG



**BMG 07 D 471 K 601 Y 01**

- 1 Bencent BMG系列
- 2 元件直径: 07= $\phi 7mm$ ; 10= $\phi 10mm$ ; 14= $\phi 14mm$ ; 20= $\phi 20mm$
- 3 类型: D=Disk (圆形)
- 4 压敏电压:  $471 = 47 \times 10^1 = 470V$
- 5 电压公差范围:  $K = \pm 10\%$   $M = \pm 20\%$
- 6 GDT电压:  $601 = 60 \times 10^1 = 600V$
- 7 引线类型: Y=直引线; F=F扭结引线; O=外部压接引线
- 8 内部代码后缀: 01~99 (无后缀为标准型)

产品型号 Part Number	标称电压 DC Breakdown Voltage(V <sub>BR</sub> ) 100V/s (V)	电压范围 Tolerance of V <sub>BR</sub> (V)	冲击击穿电压 Impulse Spark-over Voltage 1kV/μs (V)	弧光压 Arc Voltage (V <sub>a</sub> ) (V)@1A	通流能力 Impulse Discharge Current 8/20μs (kA)	绝缘阻抗 Insulation Resistance (GΩ)	绝缘阻抗 测试电压 @ DC (V)	结电容 Capacitance Co(pF) 0.5VDC@1MHz	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
													UL497B	UL1449	TUV	CQC
BC401M	400	360-560	≤950	~15	2	≥1	100	≤1	4.5x3.2x2.7	xDSL			●	○	●	○
BC091N-H	90	63-117	≤650	~8	3	≥1	50	≤0.5	4.5x3.2x2.7	COAXIAL			●	○	●	○
BC301N-D	300	210-390	≤750	~15	2	≥1	100	≤1	4.5x3.2x2.7	DC12V/AC24V			●	○	●	○
BF091M	90	72-108	≤600	~8	5	≥1	50	≤0.8	4.2x5.0x5.0	RS485/232/422			●	○	○	○
BF801M	800	640-960	≤1600	~15	3	≥1	100	≤1.0	4.2x5.0x5.0	AC Power/xDSL			●	○	○	○
BL091N	90	63-117	≤650	~10	1	≥1	50	≤0.5	2.9x2.1x1.9	RS485/232/422			●	○	○	○
BL201NH	200	140-260	≤600	~10	1	≥1	100	≤0.5	2.9x2.1x1.9	RS485/232/422			●	○	○	○
BM091M	90	72-108	≤600	~8	20	≥1	50	≤1.5	8.3x8.3x6.0	DC Power			○	●	○	○
BN091M	90	72-108	≤600	~8	5	≥1	50	≤0.5	5.5x4.0x4.0	RS485/232/422			○	○	●	○
BN362M	3600	2880-4320	≤4800	~35	3	≥1	100	≤0.6	5.5x4.0x4.0	AC Power			○	●	●	○
BN801M	800	640-960	≤1400	~15	5	≥1	100	≤0.5	5.5x4.0x4.0	AC Power			○	○	●	○
BZ401M	400	360-580	≤950	~10	1	≥1	100	≤0.5	3.2x2.5x2.5	Ethernet			●	○	○	○
BZ801M	800	640-960	≤1400	~10	1	≥1	100	≤1.0	3.2x2.5x2.5	Ethernet			○	●	○	○
B3A420	470	360-560	≤950	~10	2	≥1	100	≤1.0	4.2x2.7x3.9	xDSL			●	○	○	○
B3Y471M	470	360-540	≤1000	~8	1	≥1	100	≤1.5	6.2x3.2x2.3	xDSL			●	○	○	○
B3D090M-C	90	72-108	≤600	~10	10	≥1	50	≤1.5	7.8x5.0x6.0	RS485/232/422			●	○	○	○
B3D230L-1	230	184-276	≤650	~8	10	≥1	100	≤1.5	7.6x5.0x5.0	xDSL			●	○	○	○
B3D230L-CD	230	200-380	≤800	~15	5	≥1	100	≤1.5	7.8x5.0x6.0	DC12V/AC24V			●	○	○	○
B3D350M-R-1	600	420-780	≤1200	≥33	5	≥1	100	≤1.5	7.8x5.0x5.0	AC Power			○	○	○	○
B3D470L-C	470	360-560	≤950	~8	5	≥1	100	≤1.5	7.8x5.0x6.0	xDSL			●	○	○	○
BXD3000SA03M03	3000	2400-3600	≤2700	~35	3	≥1	100	≤500	9.0x5.5x7.0	AC Power			○	●	○	○
BXD3000SA03M03-D10	3000	2400-3600	≤2000	~100	3	≥1	100	≤500	8.5x5.5x8.5	AC Power			○	●	○	○
B5G3600	3600	2880-4680	≤4700	~15	3	≥1	100	≤1	φ5.5x6.0	AC Power			○	●	●	○
B5G600L	600	480-720	≤950	~15	5	≥1	100	≤1	φ5.5x6.0	AC Power			●	○	●	○
B8G600M	600	580-720	≤1400	~15	10	≥1	100	≤1.5	φ8.0x6.0	AC Power			●	○	●	○
B8G800M	800	640-960	≤1600	~15	10	≥1	100	≤1.5	φ8.0x6.0	AC Power			●	○	●	○
B8G1500M	1500	1200-1800	≤2750	~15	10	≥1	100	≤1.5	φ8.0x6.0	AC Power			○	●	●	○
BGO6000A05-LC2	600	≥480	≤1500	/	5	/	/	≤1.5	Φ8.0x7.0	AC Power			●	○	○	○
BUB801M	800	640-960	≤1300	~24	20	≥1	255	≤4.0	Φ16.0x5.1	AC Power			○	●	○	○
BD122-2	1200	700-1200	≤900(@1.2/50μs 6kV)	≥60	20	≥1	100	≤1.5	8.3x9.5x16.5	DC Power			○	○	○	○

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产品型号 Part Number	安装类别 Classification	保护模式 modes of protection	额定 工作电压 Un (VAC)	最大持续工作电压 UcMAX (VAC)	额定 通流能力 In (kA)	保护水平 Up	防水等级 IP code	阻燃等级 Flame Rating	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certisate			
													UL497B	UL1449	TUV	CQC
BSPD230C20PF-04	T2	L-N,L-PE,N-PE	230	320	20	L-N:2kV,L-PE:2kV,N-PE:2kV	Ip20	UL94 V-0	40.8x38.0x24.0	AC Power			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BSPD230C20PF-02	T2	L-N,L-PE,N-PE	230	320	20	L-N:2.5kV,L-PE:2.5kV,N-PE:2.5kV	Ip20	UL94 V-0	38.5x16.7x24.0	AC Power			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BSPD277D05LF-01	T3	L-N,L-PE,N-PE	220	277	5	1.5kV/all model	Ip65	UL94 V-0	69.4x34.0x21.3	AC Power			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

产品型号 Part Number	最大工作电压 Maximum Allowable Voltage		1mA压敏电压 Varistor Voltage V <sub>1mA</sub> (V)			通流能力 Withstanding Surge Current		防水等级 IP code	阻燃等级 Flame Rating	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	备注 Remarks			
	AC.rms	DC	Min	Max	Ave	I <sub>n</sub>	I <sub>max</sub>							UL497B	UL1449	TUV	CQC
BSPDPV20K-560L	420	560	612	748	680	10	20	IP20	UL94 V-0	33.5x12.0x30.0	AC/DC Power			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BSPDPV20K-825L	625	825	900	1100	1000	10	20	IP20	UL94 V-0	33.5x12.0x30.0	AC/DC Power			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

产品型号 Part Number	最大工作电压 Maximum Allowable Voltage		1mA压敏电压 Varistor Voltage V <sub>1mA</sub> (V)			GDT标称电压 DC Breakdown Voltage(V <sub>BR</sub> ) 100V/s (V)	配置电容 Capacitance Co(pF)	保护水平 Up	通流能力 Withstanding Surge Current		防水等级 IP code	阻燃等级 Flame Rating	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certisate			
	AC.rms	DC	Min	Ave	Max				I <sub>n</sub>	I <sub>max</sub>							UL497B	UL1449	TUV	CQC
BSPDPV20K-900H1	680	900	900	1000	1100	1900V±20%	/	1.5	10	20	IP20	UL94 V-0	34.2x14.3x30.3	AC/DC Power			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BSPDPV20K-670H1A	510	670	533	560	644	1680V±20%	/	1.5	10	20	IP20	UL94 V-0	34.2x14.3x30.3	AC/DC Power			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

产品型号 Part Number	推荐最大 工作电压 Recommended MCOV VAC(V)		UI认证最大 工作电压 UL MCOV VAC(V)		分立器件特性 Split Components Parameters		平台电压 Platform voltage V1000V/μs(V)	尖峰电压 Peak voltage V1000V/μs(V)	通流能力 Withstanding Surge Current	最大能量 Maximum Energy 10/1000μs(J)	结电容 Typical Capacitance (Reference) @1kHz (pf)	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
	MOV Voltage V1mA(V)	气体放电管 GDT Voltage V100V/S(V)	UL497B	UL1449	TUV	CQC													
BMG14D471K102Y	360	390	470(423~517)	1000(800~1200)	≤830	≤1800	40@1.2/50-8/20μs 6kV-3kA	175	5	20.0x16.0x9.0	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
BMG20D331K601Y	250	280	330(297~363)	600(480~720)	≤580	≤1320	8/20μs ±5T/5kA	228	5	25.0x23.0x8.5	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
BMG20D471K102Y	360	390	470(423~517)	1000(800~1200)	≤830	≤1800	20@8/20μs 5kA	350	5	25.0x23.0x9.0	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
BMG20D751K102Y	560	600	750(675~825)	1000(800~1200)	≤1320	≤1800	20@8/20μs 5kA	420	5	25.0x23.0x10.0	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
BMG20D820K091Y	55	70	82(74~90)	90(72~108)	≤150	≤710	20@8/20μs 5kA	56	5	25.0x23.0x7.5	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		

产品型号 Part Number		最大允许应用电压 Maximum Allowable Voltage		1mA压敏电压 Varistor Voltage V1mA (V)	最大钳位电压 Maximum Clamping Voltage		通流能力 Withstanding Surge Current		焦耳值 Maximum Energy (10/1000μs)		额定功率 Rated Power (W)	典型电容值 Typical Capacitance (Reference) @1kHz (pf)	工作温度范围 Operating Temperature	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
常规 Normal Energy	高能 High Energy	VAc (V)	VDC (V)		Ip (A)	Vc (V)	I (A) Standard	I (A) High Surge	(J) Standard	(J) High Surge								UL497B	UL1449	TUV	CQC
BMOV14D391K	BMOV14D391KH	250	320	390(351~429)	50	650	4500	6000	100	140	0.6	510	-40°C~+105°C	16.5x14.0x6.9	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV14D561K	BMOV14D561KH	350	460	560(504~616)	50	925	4500	6000	125	185	0.6	360	-40°C~+105°C	16.5x14.0x8.0	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV20D561K	BMOV20D561KH	350	460	560(504~616)	100	925	6500	10000	215	380	1	710	-40°C~+105°C	26.0x23.0x6.5	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV14D561KSC		350	460	560(504~616)	50	925	4500	6000	125	185	0.6	360	-40°C~+105°C	16.5x14.0x8.0	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV14D681KSC	BMOV14D681KH	420	560	680(612~748)	50	1120	4500	6000	130	200	0.6	290	-40°C~+105°C	16.5x14.0x8.7	AC Power			<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV14D621KSCC		380	505	620(558-682)	50	1025	4500	6000	130	200	0.6	320	-40°C~+105°C	16.5x14.0x8.3	AC Power			<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV14D511KA	BMOV14D511KB	320	415	510(459~561)	50	845	4500	6000	121	180	0.6	390	-40°C~+125°C	16.5x14.0x7.6	AC Power			<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV14D271KSCC		175	225	270(243-297)	50	455	4500	6000	70	99	0.6	740	-40°C~+125°C	16.5x14.0x6.6	AC Power			<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV14D331KA	BMOV14D331KB	210	275	330(297~363)	50	550	4500	6000	85	115	0.6	610	-40°C~+125°C	16.5x14.0x6.6	AC Power			<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV20D471KSRA		300	385	470(423-517)	100	775	6500	10000	204	350	1	8500	-40°C~+125°C	26.0x23.0x6.0	AC Power			<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
BMOV20D621KSRA		385	505	620(558-682)	100	1025	6500	10000	224	390	1	650	-40°C~+125°C	26.0x23.0x6.8	AC Power			<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>

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半导体放电管/TSS  瞬态抑制二极管/TVS 

□ 尺寸(mm) ○ 电压范围 △ 通流能力



**BVF-D5**  
□ 1.6x0.8x0.6  
○ 5V  
△ 12A@8/20μs



**SOD123**  
□ 2.7x1.8x1.0  
○ 6V  
△ 36A@8/20μs



**SOT23-5**  
□ 3x2.8x1.25  
○ 8V~24V  
△ 50A@8/20μs



**SMA**  
□ 5.3x2.9x2.5  
○ 5V~440V  
△ 400W



**6SMA**  
□ 5.3x2.9x2.5  
○ 5V~440V  
△ 600W



**SMAF**  
□ 4.7x2.6x1.1  
○ 5V~440V  
△ 400W



**6SMAF**  
□ 4.7x2.6x1.1  
○ 5V~440V  
△ 600W



**SMB**  
□ 5.5x3.8x2.6  
○ 5V~480V  
△ 600W



**8SMB**  
□ 5.5x3.8x2.6  
○ 5V~480V  
△ 800W



**SMBF**  
□ 5.8x4.4x2.8  
○ 5V~200V  
△ 1500W



**3SMBF**  
□ 5.8x4.4x2.8  
○ 20V~200V  
△ 3000W



**5SMBF**  
□ 5.8x4.4x2.8  
○ 30V~200V  
△ 5000W



**SMB-T**  
□ 5.4x3.3x2  
○ 6V~400V  
△ 200A~1000A  
@8/20μs



**BVF-MD2**  
□ 5.4x3.3x2  
○ 15V~28V  
△ 250A~500A  
@8/20μs



**SOP-8**  
□ 6.0x4.9x1.5  
○ 3.3V~58V  
△ 450W~2700W  
@8/20μs



**SMC**  
□ 8.3x6.2x3.0  
○ 5V~440V  
△ 1500W



**SMC-T**  
□ 8x5.9x2  
○ 8V~58V  
△ 3000W



**SMD**  
□ 8.3x6.2x3.0  
○ 5V~170V  
△ 3000W



**5SMD**  
□ 8.3x6.2x3.0  
○ 15V~85V  
△ 5000W



**SMK**  
□ 10.6x8.3x2.3  
○ 15V~400V  
△ 1kA~3kA@8/20μs



**SM8S**  
□ 15.5x10x4.9  
○ 10V~43V  
△ 6600W



**BVS-SME**  
□ 18.3x14x7  
○ 66V~86V  
△ 10kA@8/20μs



**BVO-SMG**  
□ 24.0x23.5x13.8  
○ 76V  
△ 10kA@8/20μs

静电保护器件/ESD  稳压管/Zener 

□ 尺寸(mm) ○ 电压范围 △ 通流能力



**DFN0603**  
□ 0.6x0.3x0.3  
○ 3.3V~12V  
△ 42W~120W@8/20μs



**DFN1006**  
□ 1.0x0.6x0.5  
○ 2.5V~36V  
△ 20W~600W@8/20μs



**SOD523**  
□ 1.6x0.8x0.6  
○ 5V~24V  
△ 30W~300W@8/20μs



**DFN1610**  
□ 1.6x1x0.5  
○ 3.3V~15V  
△ 100W~1800W@8/20μs



**DFN2010**  
□ 2x1x0.4  
○ 3V~5V  
△ 75W~200W@8/20μs



**DFN2020**  
□ 2x2x0.5  
○ 4.5V~24V  
△ 2900W~6000W@8/20μs



**DFN2510**  
□ 2.5x1x0.5  
○ 3.3V~5V  
△ 45W~100W@8/20μs



**SOT523**  
□ 1.6x1.6x0.75  
○ 5V  
△ 60W~100W@8/20μs



**SOD323**  
□ 2.5x1.3x1.0  
○ 2.5V~36V  
△ 150W~2200W@8/20μs



**SOT23-6**  
□ 3.0x2.8x1.3  
○ 3.3V~5V  
△ 75W@8/20μs



**SOT23-3**  
□ 3.0x2.8x1.3  
○ 3.3V~36V  
△ 60W~400W@8/20μs



**SOT143**  
□ 2.9x2.4x1  
○ 5V  
△ 125W@8/20μs

车规级TVS (符合AEC-Q 101规范)

□ 尺寸(mm) ○ 电压范围 △ 通流能力



**DFN1006**  
□ 1.0x0.6x0.5  
○ 5V  
△ 60W



**SOD323**  
□ 2.5x1.3x1.0  
○ 2.5~36V  
△ 150W~352W



**DFN2510**  
□ 2.5x1.0x0.58  
○ 5V  
△ 45W



**SOD523**  
□ 1.6x0.8x0.6  
○ 5V  
△ 150W



**SOT23-3**  
□ 3.0x2.8x1.3  
○ 3.3~36V  
△ 225W~380W



**SMA**  
□ 5.3x2.9x2.5  
○ 5V~110V  
△ 400W



**SMB**  
□ 5.5x3.8x2.6  
○ 5V~110V  
△ 600W



**SMC**  
□ 8.3x6.2x3.0  
○ 5V~110V  
△ 1500W

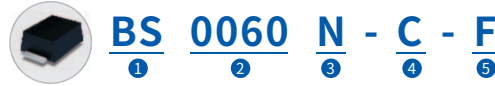


**5SMD**  
□ 8.0x5.9x2.6  
○ 11V~110V  
△ 5000W



**SM8S**  
□ 15.5x10x4.9  
○ 10~43V  
△ 6600W

### TSS



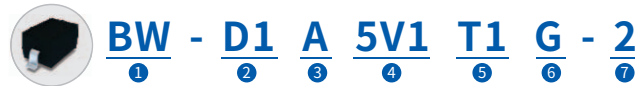
- 1 Bencent TSS系列
- 2 TSS关断电压: 0060=6x10<sup>0</sup>=6V
- 3 封装形式: M=SMA; N=SMB; N-2=SMB-T; U-2=SMC-T; L=DO-15; K=DO-41; Q=DFN; D=SOD123/SOD123-F
- 4 雷击等级: A=2kV; B=4kV; C=6kV; D=8kV; E=10kV
- 5 Flat feet: 扁(平)脚, 如N-XX-F为SMB-F封装

### BVO



- 1 BVO为模城TVS开路保护器件
- 2 封装类型SMD类贴片封装
- 3 TVS关断电压: 76=76V
- 4 极性: C为双向TVS; 无C为单向TVS
- 5 后缀: “A”表示5%的容差

### Zener



- 1 Bencent Zener
- 2 封装类型(具体型号见右表)
- 3 产品功率: Z=150mW; A=200mW; B=250mW; C=300mW; D=350mW; G=500mW
- 4 产品稳压中心值: 5V1=稳压中心值为5.1V
- 5 包装类型: 编带, 3K/R
- 6 符合绿色环保标准
- 7 产品工作电压范围: 2= ±2%; 5= ±5%; 6= ±6%

D1	SOD123
D3	SOD323
D5	SOD523
TA	SOT23

### TVS



- 1 BV: Bencent TVS系列
- 2 封装类型(具体型号见右表)
- 3 TVS关断电压: 28=28V
- 4 极性: C为双向TVS; 无C为单向TVS
- 5 后缀: “A”表示5%的容差
- 6 特殊产品: Q为车规产品; I、M、H、L、K为不同需求通流能力; 2M、2H、2D等为2芯片工艺
- 7 Bencent内部代码

SMAJ	SMA 400W	5.3x2.9x2.5 mm
6SMAF	SMA-F 600W	4.8x2.7x1.2 mm
SMBJ	SMB 600W	5.5x3.8x2.6 mm
8SMBJ	SMB 800W	5.5x3.8x2.6 mm
1KSMB	SMB 1000W	5.5x3.8x2.6 mm
SMBF	SMB-F 1500W	5.9x4.4x2.8 mm
3SMBF	SMB-F 3000W	5.9x4.4x2.8 mm
5SMBF	SMB-F 5000W	5.9x4.4x2.8 mm
SMCJ	SMC 1500W	8.3x6.2x3.0 mm
SMDJ	SMC 3000W	8.3x6.2x3.0mm
5SMDJ	SMC 5000W	8.3x6.2x3.0 mm
SMKJ	SMK	10.0x8.2x2.2 mm
SMEJ	SME	18.3x14.0x7.5 mm
SMG	SMG	24.0x23.5x13.8 mm

### ESD



- 1 Bencent TVS
- 2 封装类型(具体型号见右表)
- 3 TVS电压: 24=24V
- 4 电容等级: Z=常规电容; U=低电容
- 5 保护线路: 6=6线保护; 4=4线保护; 2=2线保护; 空白为常规1线保护
- 6 极性: C为双向ESD; 无C为单向ESD
- 7 Bencent内部代码
- 8 AEC-Q101合格认证

D1	SOD123	E3	SOT-323	FG	DFN2010
D3	SOD323	E5	SOT523	FK	DFN2510
D5	SOD523	E7	SOT723	FN	DFN3020
D9	SOD923	S5	SOT-553	FV	DFN5515
T4	SOT143	S6	SOT-563	FD	DFN1608-2L
T3	SOT23-3	F4	DFN0402	FM	DFN2020-3L
T5	SOT23-5	F6	DFN0603	FS	DFN3.4x2.4-4L
T6	SOT23-6	FA	DFN1006	FW	DFN4120-10L
TS	SOT23	FE	DFN1610	FR	DFN2626-10L

产品型号 Part Number	不动作电压 Off state Voltage V <sub>DRM</sub> (V)		转折电压 Switching Voltage V <sub>s</sub> (V) I <sub>s</sub> (mA) Max		通态电压 On state Voltage V <sub>r</sub> (V) I <sub>r</sub> (A) Max		最小维持电流 Holding Current I <sub>H</sub> (mA)	结电容 Capacitance C <sub>o</sub> (pF) 2V@1MHZ Max	测试波形 Surge Waveform (μs)	通流能力 Surge Peak (kV)	封装 Package	印字 Mark	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
	I <sub>D</sub> (μA) Max	V <sub>s</sub> (V) Max	V <sub>r</sub> (V) Max	I <sub>r</sub> (A) Max	UL497B	UL1449											TUV	CQC		
BS0060M-BH	6	5	25	800	4	2.2	≥10	20	10/700	4	SMA	B006M	5.3x2.9x2.5	Video			○	○	○	○
BS0080M-B	6	5	25	800	4	2.2	≥50	100	10/700	4	SMA	B006U2G1	5.3x2.9x2.5	Video			○	○	○	○
BS1500N	140	5	180	800	4	2.2	≥150	150	10/700	4	SMB	B15NB	5.5x3.8x2.6	Ethernet			●	○	○	○
BS2600N-E-H	220	5	300	800	4	2.2	≥5	120	8/20	900A	SMB	B26NH	5.5x3.8x2.6	AC Power			●	○	○	○
BS0060N-2C	6	5	25	800	4	2.2	≥15	120	10/700	6	SMB-T	B006N2C	5.4x3.3x2.0	Video			●	○	○	○
BS0060N-C-FS	6	5	25	800	4	2.2	≥15	25	10/700	6	SMB-F	6NCS	5.4x3.3x2.0	Video			○	○	○	○
BS0060U-2G-1	6	5	25	800	4	2.2	≥50	700	8/20	3	SMC-T	B006U2G1	8.0x5.9x2.0	RS485/232/422			○	○	○	○
BS0300N-2C	25	5	40	800	4	2.2	≥50	100	10/700	6	SMB-T	B03N2C	5.4x3.3x2.0	RS485/232/422			●	○	○	○
BS0640N-2C	58	5	77	800	4	2.2	≥150	100	10/700	6	SMB-T	B06N2C	5.4x3.3x2.0	Ethernet			●	○	○	○
BS4200N-2C	400	5	520	800	4	2.2	≤50	35	10/700	6	SMB-T	B422NC	5.4x3.3x2.0	Ethernet			●	○	○	○
BS4200N-C-F	400	5	520	800	4	2.2	≤50	35	10/700	6	SMB-F	B42NC	5.8x4.4x2.8	Ethernet			●	○	○	○
BS8000N-C-F-H	800	5	1200	800	4	2.2	≤50	50	10/700	6	SMB-F	B80NH	5.8x4.4x2.8	Ethernet			●	○	●	○
BS3100N-C-F	275	5	350	800	4	2.2	≥120	80	10/700	6	SMB-F	B31NC	5.8x4.4x2.8	RJ45			●	○	○	○
BS2600U-E-H	225	5	300	800	4	2.2	≥5	120	8/20	1500A	SMC	B26UH	8.3x6.2x3.0	AC Power			●	○	○	○
BS0080S23-5	8	5	15	500	4	1	≥50	10	8/20	50A	SOT23-5	B008S23-5	3.0x2.8x1.3	xDSL			○	○	○	○
BS0120S23-5	12	5	20	500	4	1	≥20	10	8/20	50A	SOT23-5	B012S23-5	3.0x2.8x1.3	xDSL			○	○	○	○
BS0180S23-5	18	5	25	500	4	1	≥20	10	8/20	50A	SOT23-5	B018S23-5	3.0x2.8x1.3	xDSL			○	○	○	○
BS0240S23-5	24	5	35	500	4	1	≥20	10	8/20	50A	SOT23-5	B024S23-5	3.0x2.8x1.3	xDSL			○	○	○	○
BS0300D-A-F	25	1	38	800	4	2.2	≥40	40	10/700	2	SOD123-F	B0300	3.5x1.7x0.8	RS485/232/422			●	○	○	○

产品型号 Part Number	最大反向恢复时间 Maximum reverse recovery time TRR (ns)	最大瞬时正向电压 Maximum instantaneous forward voltage drop per diode VF (V)	最大峰值反向电压 Maximum Repetitive Peak Reverse Voltage VBR (V)	最大峰值反向电流 Maximum Repetitive Peak Reverse Voltage IR (μA)	封装 Package	印字 Mark	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
											UL497B	UL1449	TUV	CQC
BVA-GS3300G	>1000	<1.3V	>3300V	<5	SMC	S330G	8.3X6.2X3.0	PV			○	○	○	○
BVA-GS4500G	>1000	<1.3V	>4500V	<5	SMC	S450G	8.3X6.2X3.0	PV			○	○	○	○

产品型号 Part Number		不动作电压 Off state Voltage		击穿电压 Breakdown Voltage			最大钳位电压 Clamp Voltage		测试波形 Surge Waveform	峰值功率 P <sub>PP</sub> (W)	封装 Package	尺寸 Size LxWxH(mm)	印字 Mark		应用 Application	电路符号 Circuit		产品外观 Outline	认证 Certifisate			
双向 BI	单向 UNI	V <sub>DRM</sub> (V)	I <sub>DRM</sub> 25°C(μA) Max	V <sub>BR</sub> (V)	I <sub>R</sub> (mA)	Min	Max	V <sub>C</sub> (V) Max	@ I <sub>PP</sub> (A)				双向 BI	单向 UNI		双向 BI	单向 UNI		UL497B	UL1449	TUV	CQC
BV-6SMAJ15CA	BV-6SMAJ15A	15	1	13.3	14.7	1		19.9	30.2	10/1000	600	SMA	5.3x2.9x2.5	6A12C	6A12	DC Power						
BV-6SMAJ36CA	BV-SMAJ36A	36	1	40	44.2	1		58.1	6.9	10/1000	400	SMA	5.3x2.9x2.5	A36C	A36	DC Power						
BV-SMAJ16CAQ	BV-SMAJ16AQ	16	1	17.8	19.7	1		26	15.4	10/1000	400	SMA	5.3x2.9x2.5	A16C	A16	DC Power						
BV-SMAJ250CAQ	BV-SMAJ250AQ	250	1	279	309	1		405	1	10/1000	400	SMA	5.3x2.9x2.5	A250C	A250	DC Power						
BV-SMBJ6.5CA	BV-SMBJ6.5A	6.5	500	7.22	7.98	10		11.2	53.6	10/1000	600	SMB	5.5x3.8x2.6	B6.5C	B6.5	DC Power						
BV-SMBJ15CAH		15	1	16.7	18.5	1		24.4	40.8	10/1000	1000	SMB	5.5x3.8x2.6	SB15CH		DC Power						
BV-SMBJ36C2M		36	1	38	44.2	1		50	30	10/1000	1500	SMB	5.5x3.8x2.6	B36C2M		DC Power						
BV-SMBJ58C2H		58	1	62.4	71.2	1		85	150	10/700	4(KV)	SMB	5.5x3.8x2.6	B58C2		POE						
BV-SMBT-15CA		15	1	16.7	18.5	1		24.4	40.8	10/1000	1000 (Pin1,3to 2)	SMB-T	5.4x3.3x2.0	B15CT		DC Power						
BV-3SMBF30CA	BV-3SMBJ30A	30	1	33.3	36.8	1		48.4	62	10/1000	3000	SMBF	5.8x4.4x2.8	3BF30C	3BF30	DC Power						
BV-SMCJ33CAQ	BV-SMCJ33AQ	33	1	36.7	40.6	1		53.3	28.2	10/1000	1500	SMC	8.3x6.2x3.0	C33C	C33	DC Power						
BV-SMDJ33CA	BV-SMDJ33A	33	1	36.7	40.6	1		53.3	56.3	10/1000	3000	SMC	8.3x6.2x3.0	D33C	D33	DC Power						
BV-5SMDJ75CA	BV-5SMDJ75A	75	2	83.3	92.1	1		121	41.4	10/1000	5000	SMC	8.3x6.2x3.0	5D75C	5D75	DC Power						
BV-5SMDJ64CA	BV-5SMDJ64A	64	2	71.1	78.6	1		103	48.6	10/1000	5000	SMC	8.3x6.2x3.0	5D64C	5D64	DC Power						
BV-SMEJ76CA-H		76	10	85	95	10		140	10000	8/20	/	SME	18.3x14.0x7.5	/		DC Power						
BV-SMKJ75CA		75	10	85	94	10		140	3000	8/20	/	SMK	10.6x8.3x2.3	K75C		DC Power						
BV-SM8S36CA	BV-SM8S36A	36	10	40	44.2	5		58.1	114	10/1000	6600	DO-218AB	15.5x10.0x4.9	SM8S36CA	SM8S36A	DC Power						

产品型号 Part Number	测试方向 Test Direction	不动作电压 Off state Voltage		转折/开启电压 Switching Voltage		通态电压 On state Voltage		最大钳位电压 Clamp Voltage			封装 Package	尺寸 Size LxWxH(mm)	印字 Mark	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
		V <sub>DRM</sub> (V)	I <sub>D</sub> (μA) Max	V <sub>S</sub> /V <sub>BR</sub> (V) Max	I <sub>S</sub> /I <sub>R</sub> (mA) Max	V <sub>T</sub> (V) Max	I <sub>T</sub> (A) Max	V <sub>CP</sub> (V) Max	V <sub>CL</sub> (V) Max	@I <sub>PP</sub> (kA) 8/20μs							UL497B	UL1449	TUV	CQC
BVS-SMEJ7675CA	Pin1-Pin2	76	10	95	10	/	/	140	68.4	10		18.3x14.0x7.5	10-7675 BVSYM	DC Power						
	Pin2-Pin1	75	10	88	800	4	2.2	140	/	10										
BVS-SMEJ8685CA-H	Pin1-Pin2	86	10	105	10	/	/	157	77.4	10		18.3x14.0x7.5	10-8685 BVSYM	DC Power						
	Pin2-Pin1	85	10	100	800	4	2.2	150	/	10										

产品型号 Part Number	不动作电压 Off state Voltage		击穿电压 Breakdown Voltage			钳位电压 Clamp Voltage			峰值脉冲电流 Peak pulse current		分断能力 Interrupting Rating		尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
双向 BI	V <sub>DRM</sub> (V)	I <sub>DRM</sub> 25°C(μA) Max	V <sub>BR</sub> (V) Min	I <sub>R</sub> (mA) Max	V <sub>CP</sub> (V) Max	V <sub>CL</sub> (V) Max	@I <sub>PP</sub> (kA) 8/20μs	测试波形	(kA)	(A)	(V)				双向 BI		UL497B	UL1449	TUV	CQC
BVO-SMG76CA	76	20	85	95	1	160	/	10	8/20μs 40/100μs	20@25°C 3@25°C	150A 300A 150A	110 DC 48 DC 220 AC	24.0x23.5x13.8	DC Power						

产品型号 Part Number	不动作电压 Off state Voltage		击穿电压 Breakdown Voltage		钳位电压 Clamp Voltage		最大钳位电压 Clamp Voltage		结电容 Capacitance Co (pF) 0V@1MHZ Max	测试波形 Surge Waveform (μs)	功率 PPp (W)	封装 Package	印字 Mark	尺寸 Size LxWxH(mm)	应用 Application	电路符号 Circuit	产品外观 Outline	认证 Certifisate			
	VDRM (V)	IDRM 25°C(μA) Max	VBR (V) Min	IR (mA)	Vc (V) Max	@ IPP (A)	Vc (V) Max	@ IPP (A)										UL497B	UL1449	TUV	CQC
BV03CW	3	0.5	3.5	1	5.8	1	15	10	1.5	8/20	150	SOD-323	CA1	2.5x1.3x1.0	Ethernet			○	○	○	○
BV03C-H	3.3	1	3.8	1	7	1	18.5	19	1.5	8/20	350	SOD-323	CC	2.5x1.3x1.0	Ethernet			○	○	○	○
BV05C	5	5	6	1	9.8	1	18.3	8	1.5	8/20	150	SOD-323	AC	2.5x1.3x1.0	xDSL			○	○	○	○
BV08C	8	2	8.5	1	13.4	1	18.5	8	1.5	8/20	150	SOD-323	BC	2.5x1.3x1.0	xDSL			○	○	○	○
BV12C	12	1	13.3	1	19	1	28.6	6	1.5	8/20	150	SOD-323	DC	2.5x1.3x1.0	xDSL			○	○	○	○
BV15C	15	1	16.7	1	24	1	31.8	5	1.5	8/20	150	SOD-323	EC	2.5x1.3x1.0	xDSL			○	○	○	○
BV24C	24	1	26.7	1	43	1	56	3	1.5	8/20	150	SOD-323	HC	2.5x1.3x1.0	xDSL			○	○	○	○
BV-D305ZCH	5	1	5.6	1	/	/	19	120	550	8/20	2280	SOD-323	5H	2.5x1.3x1.0	DC power			○	○	○	○
BV-D324ZCBQ	24	1	26.7	1	45	1	50	5.5	50	8/20	275	SOD-323	2H	1.6x1.3x1.2	DC power			○	○	○	○
BVF-D505ZCAQ	5	1	6	1	11	5	13	12	50	8/20	156	SOD-523	FZB	1.5x0.7x0.5	Navigator			○	○	○	○
BV-SM712	PIN3to1,2 PIN1,2to3	7	10	7.5	/	/	17	22	55	8/20	450	SOT23	M72	2.9x2.4x1.0	RS485			○	○	○	○
		12	2	13.3	/	/	12	26	55												
BV-SR05	5	1	6	1	15	1	25	5	1.2	8/20	125	SOT143	R05	2.9x1.3x1.0	Video			○	○	○	○
BV-T324Z2CGQ	24	0.5	26.7	1	/	/	43	8	25	8/20	344	SOT23-3	CB2H	3.0x2.8x1.3	DC power			○	○	○	○
BV-SRV05-4A	5	1	6	1	/	/	17	12	3	8/20	200	SOT23-6	V05A	3.0x2.8x1.3	USB			○	○	○	○
BV-T605U4CE	pin1346topin2 pin5topin2	5	0.1	7	12	6	/	/	1.6	8/20	72	SOT23-6	1208 5U	3.0x2.8x1.3	USB2.0			○	○	○	○
		6	1	6.5	12	9	/	/	0.8												
BV-D124ZB	24	1	25	1	29	100	33	185	1500	8/20	5500	SOD123F	B24	2.7x1.8x1.0	DC power			○	○	○	○
BV-F603UCG	3.3	0.1	5	1	/	/	7	6	0.35 0.25	8/20	42	DFN0603-2	C9	0.6x0.3x0.3	Cell phone			○	○	○	○
BV-FA03UCE	3.3	0.1	5	1	2	0.05	7	6	0.35 0.25	8/20	42	DFN1006-3	T3	1.0x0.6x0.5	Cell phone			○	○	○	○
BV-FA05UCA	5	0.1	6	1	16	2	24	4	0.4	8/20	96	DFN1006-2	5BU	1.0x0.6x0.5	HDMI			○	○	○	○
BV-FA05ZCT	5	1.5	5.3	1	9	1	12.5	6	15	8/20	75	DFN1006-2	5A	1.0x0.6x0.5	Cell phone			○	○	○	○
BV-FE03U2M-H	3.3	0.05	6	10	/	/	12	10	0.35	8/20	120	DFN1610-6L	GA	1.6x1.0x0.5	10G Ethernet			○	○	○	○
BV-FE05ZF	5	1	6	1	11	100	13	150	2000	8/20	1800	DFN1610-2L	U5Z	1.6x1.0x0.5	Mobil phone			○	○	○	○
BV-FE07ZA	7	1	7.5	1	12	80	13	100	1000	8/20	1300	DFN1610-2L	Z07A	1.6x1.0x0.5	DC power			○	○	○	○
BV-FK03U4CB	3.3	1	4	1	/	/	10	5	0.65	8/20	50	DFN-2510-10L	T6XXXX	2.5x1.0x0.5	HDMI			○	○	○	○
BV-FK03U4CK	3.3	0.1	3.6	1	/	/	5	7	0.5	8/20	35	DFN-2510-10L	.03CK	2.5x1.0x0.5	HDMI			○	○	○	○
BV-FK05U4CA	5	0.5	6	1	/	/	15	3	0.6	8/20	45	DFN-2510-10L	0524P	2.5x1.0x0.5	HDMI			○	○	○	○
BV-FM24ZS	24	1	25	1	/	/	50	135	770	8/20	6750	DFN2020	U24Z	2.0x2.0x0.5	DC power			○	○	○	○

产品型号 Part Number	断态电压 Off state Voltage		触发转折电压 Switching Trigger		门极反向漏电流 Gate reverse current		正向通态电压 forward voltage		门极触发电压 Gate trigger		结电容 Capacitance Co (pF) 2V@1MHZ Max	测试波形 Surge Waveform (μs)	通流能力 Surge Peak (kV)	封装 Package	尺寸 Size L*W*H (mm)	印字 Mark	应用 Application	电路符号 Circuit	产品外观 Outline	体系认证 Remarks			
	VDRM (V)	ID (μA) Max	VS (V) Max	Waveform	VGK (V)	IGAS (μA) Max	Vf (V) Max	If (A)	VGT (V) Max	IGT (mA) Max										UL497B	UL1449	TUV	CQC
BS61089B-8	-170	5	-112	2/10μs	-167	5	3	5	2.5	5	100	10/700	1.6	SOP8	4.9x6.0x1.7	B61089B	SLIC			○	○	○	○



Surge Lab

模拟雷击发生器

IEC61643-1  
Surge Test

8/20 $\mu$ s  
0-160kA

10/350 $\mu$ s  
0-50kA



TLP测试系统

ANSI/ESD  
SMT5.1.1

0.2-10nS上升沿  
10~1000nS脉宽  
0-100A



雷击浪涌发生器

ITU-T K Series  
Surge Test

10/700 $\mu$ s  
0-6000V  
0-400A

1.2/50 $\mu$ s-8/20 $\mu$ s  
0-6000V  
0-3000A



汽车电子7637

ISO7637-2:2011  
& ISO16750:2010  
Surge Test

P1/P2a/P2b/P3a/  
P3b/P4a/P5a/P5b



雷击浪涌发生器

IEC61000-4-5  
Surge Test

1.2/50 $\mu$ s-8/20 $\mu$ s  
0-10kV  
0-5000A

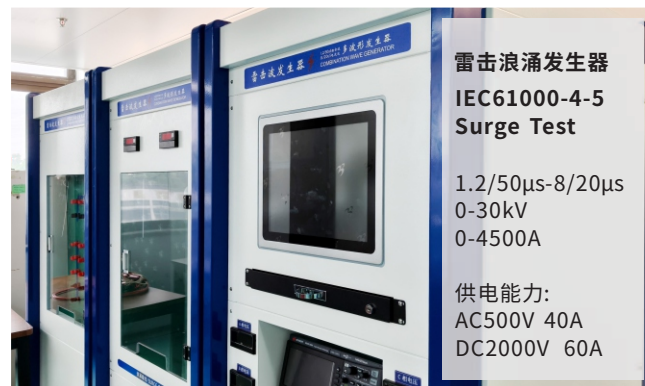


雷击浪涌发生器

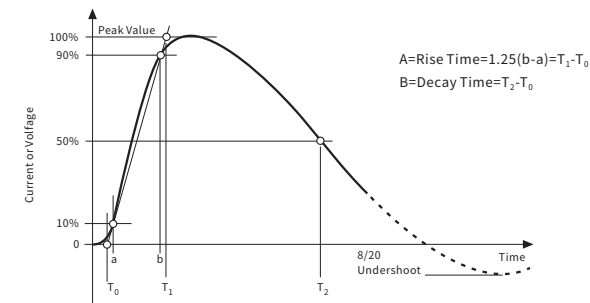
IEC61000-4-5  
Surge Test

1.2/50 $\mu$ s-8/20 $\mu$ s  
0-30kV  
0-4500A

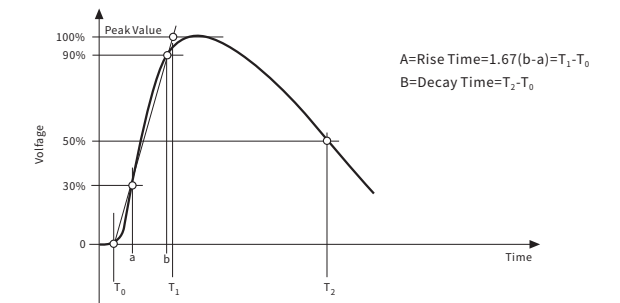
供电能力:  
AC500V 40A  
DC2000V 60A



GR1089-2:2010 Exponential Voltage/Current Waveform of A/B



GR1089-2:2010 Double Exponential Voltage/Current Waveform of A/B for 1.2/50 and 10/700 Surges



Designation	Condition	Edge	Time and Tolerance	Amplitude
2/10	Open-Circuit Voltage	Rise	2 $\mu$ s+0 $\mu$ s to -1 $\mu$ s	0% to+20%
		Decay	2 $\mu$ s+7 $\mu$ s to -0 $\mu$ s	
	Short-Circuit Current	Rise	2 $\mu$ s+0 $\mu$ s to -1 $\mu$ s	0% to+20%
		Decay	2 $\mu$ s+7 $\mu$ s to -0 $\mu$ s	
1.2/50-8/20 (See Note 1)	Open-Circuit Voltage	Rise	1.2 $\mu$ s $\pm$ 0.36 $\mu$ s	$\pm$ 10%
		Decay	50 $\mu$ s $\pm$ 1.6 $\mu$ s	
	Short-Circuit Current	Rise	8 $\mu$ s $\pm$ 1.6 $\mu$ s	$\pm$ 10% (See Note 2)
		Decay	20 $\mu$ s $\pm$ 4 $\mu$ s	
8/20	Open-Circuit Voltage	Rise	(See Note 3)	(See Note 4)
		Decay	(See Note 3)	
	Short-Circuit Current	Rise	8 $\mu$ s $\pm$ 1.6 $\mu$ s	$\pm$ 10% (See Note 2)
		Decay	20 $\mu$ s $\pm$ 4 $\mu$ s	
10/250	Open-Circuit Voltage	Rise	10 $\mu$ s+0 $\mu$ s to -6.0 $\mu$ s	0% to+16%
		Decay	250 $\mu$ s+150 $\mu$ s to -0 $\mu$ s	
	Short-Circuit Current	Rise	10 $\mu$ s+0 $\mu$ s to -3.0 $\mu$ s	0% to+16%
		Decay	250 $\mu$ s+50 $\mu$ s to -0 $\mu$ s	
10/360	Open-Circuit Voltage	Rise	10 $\mu$ s+0 $\mu$ s to -2.5 $\mu$ s	0% to+15%
		Decay	250 $\mu$ s+108 $\mu$ s to -0 $\mu$ s	
	Short-Circuit Current	Rise	10 $\mu$ s+0 $\mu$ s to -2.5 $\mu$ s	0% to+15%
		Decay	250 $\mu$ s+108 $\mu$ s to -0 $\mu$ s	
10/700 Dual Output Version	Open-Circuit Voltage - Both terminals open	Rise	10 $\mu$ s $\pm$ 3 $\mu$ s	$\pm$ 10%
		Decay	700 $\mu$ s $\pm$ 140 $\mu$ s	
	Open-Circuit Voltage - Other terminal shorted	Rise	5 $\mu$ s $\pm$ 1.5 $\mu$ s	$\pm$ 10%
		Decay	320 $\mu$ s $\pm$ 64 $\mu$ s	
Short-Circuit Current - Other terminal open	Rise	5 $\mu$ s $\pm$ 1.5 $\mu$ s	$\pm$ 10%	
	Decay	320 $\mu$ s $\pm$ 64 $\mu$ s		
Short-Circuit Current - Both terminals shorted	Rise	4 $\mu$ s $\pm$ 1.2 $\mu$ s	$\pm$ 10%	
	Decay	250 $\mu$ s $\pm$ 50 $\mu$ s		
10/1000	Open-Circuit Voltage	Rise	10 $\mu$ s+0 $\mu$ s to -4.0 $\mu$ s	0% to+15%
		Decay	1000 $\mu$ s+500 $\mu$ s to -0 $\mu$ s	
	Short-Circuit Current	Rise	10 $\mu$ s+0 $\mu$ s to -4.0 $\mu$ s	0% to+15%
		Decay	1000 $\mu$ s+500 $\mu$ s to -0 $\mu$ s	

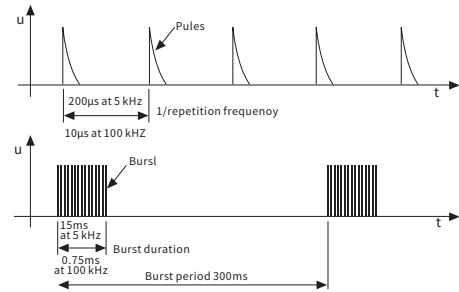
Note 1: Fictive impedance (open-circuit peak voltage value/short-circuit peak current value) 2 $\Omega$

Note 2: Undershoot < 30% of the peak short-circuit value.

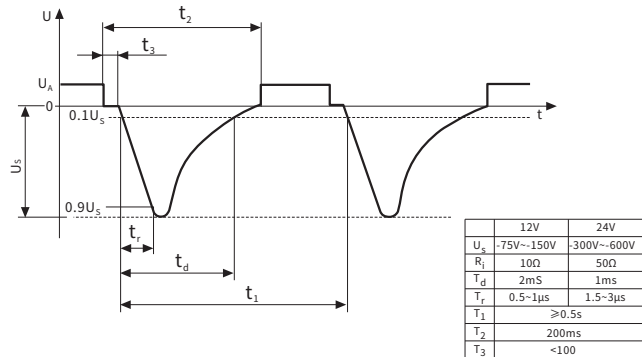
Note 3: Voltage waveshape not defined.

Note 4: Minimum peak open-circuit voltage defined in test conditions.

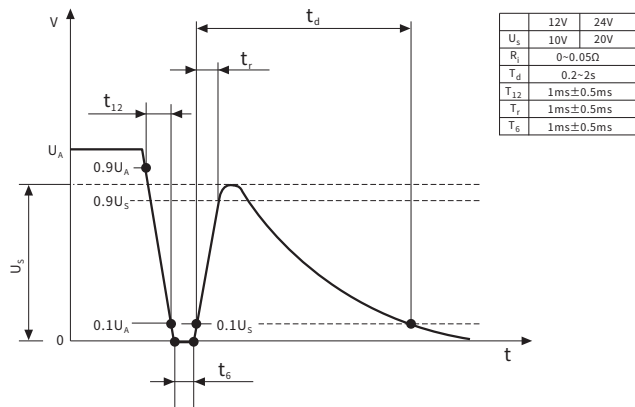
IEC61000-4-4:2012 Representation of an electrical fast transient / burst



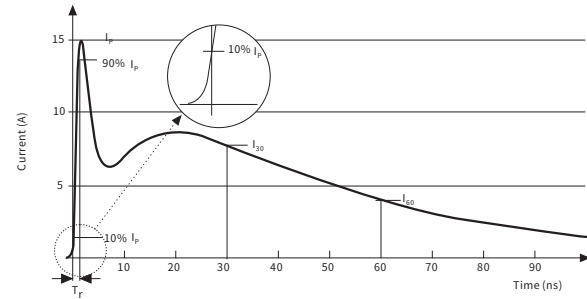
ISO7637-2:2011 Test pulse generator for immunity testing—Test pulse 1



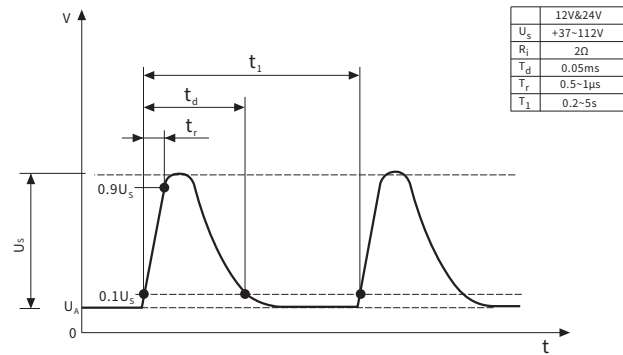
ISO7637-2:2011 Test pulse generator for immunity testing—Test pulse 2b



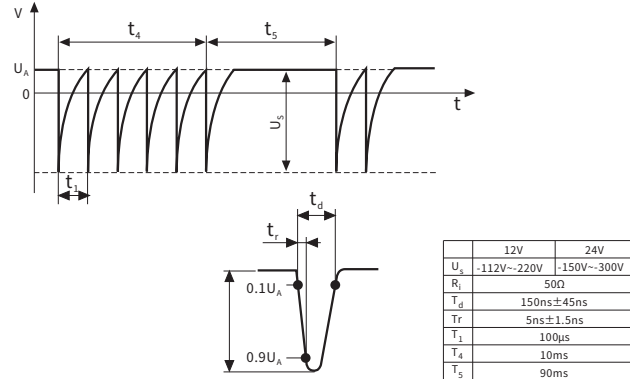
IEC61000-4-2:2008 Ideal contact discharge current waveform at 4 kV



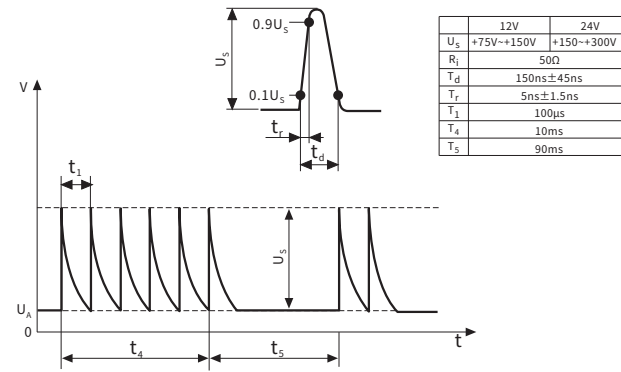
ISO7637-2:2011 Test pulse generator for immunity testing—Test pulse 2a



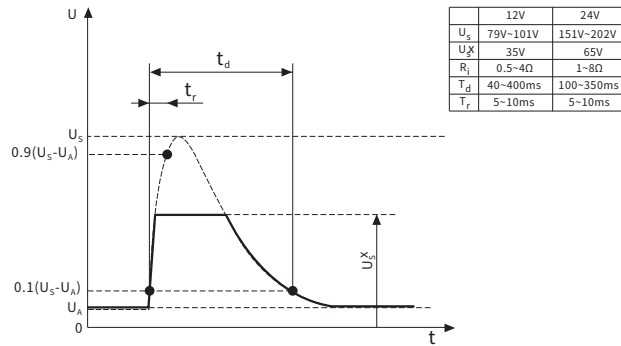
ISO7637-2:2011 Test pulse generator for immunity testing—Test pulse 3a



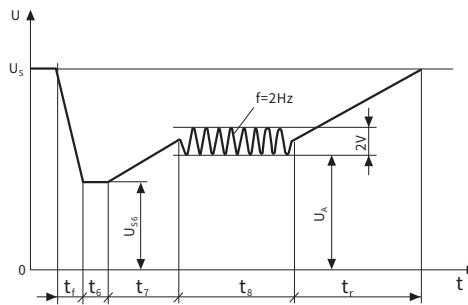
ISO7637-2:2011 Test pulse generator for immunity testing—Test pulse 3b



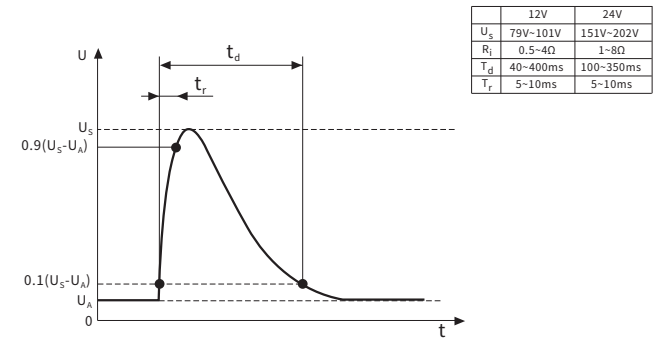
ISO16750-2:2012 Test pulse generator for immunity testing—Test pulse 5b



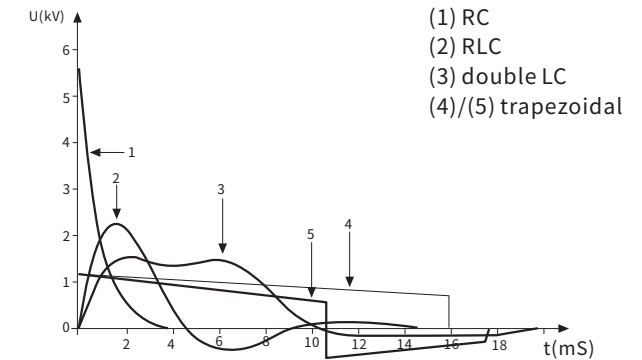
ISO16750-2:2012 Test pulse generator for immunity testing—Test pulse 4



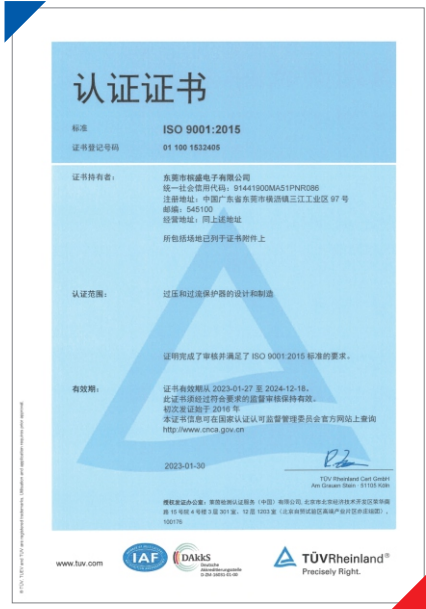
ISO16750-2:2010 Test pulse generator for immunity testing—Test pulse 5a



IEC60601:2008 Response of defibrillator circuits



	I		II		III		IV
	12V	24V	12V	24V	12V	24V	12V
Us6(V)	8(-0.2)	10(-0.2)	4.5(-0.2)	8(-0.2)	3(-0.2)	6(-0.2)	6(-0.2)
Us(V)	9.5(-0.2)	20(-0.2)	6.5(-0.2)	15(-0.2)	5(-0.2)	10(-0.2)	6.5(-0.2)
ti(ms)	5(±0.5)	10(±1)	5(±0.5)	10(±1)	5(±0.5)	10(±1)	5(±0.5)
td(ms)	15(±1.5)	50(±5)	15(±1.5)	50(±5)	15(±1.5)	50(±5)	15(±1.5)
tr(ms)	50(±5)	50(±5)	50(±5)	50(±5)	50(±5)	50(±5)	50(±5)
ts(ms)	1000(±100)	1000(±100)	10000(±1000)	1000(±100)	1000(±100)	1000(±100)	10000(±1000)
te(ms)	40(±4)	40(±4)	100(±10)	100(±10)	100(±10)	40(±10)	100(±10)



ISO9001:2015



TS16949:2016



ISO45001:2018



ISO14001:2015

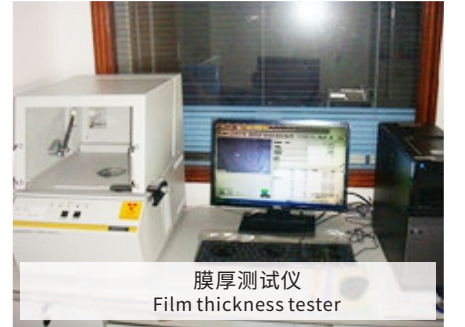
Reliability Lab



RoHS 测试仪  
RoHS Tester



快速温变试验箱  
Temperature cycle



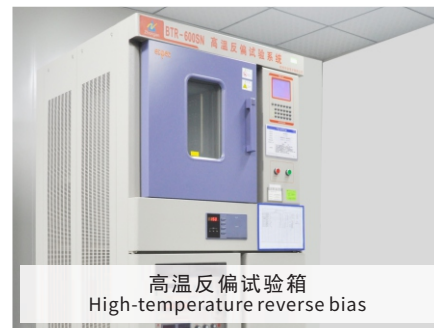
膜厚测试仪  
Film thickness tester



X-Ray  
X-RAY 透视检验设备  
X-RAY perspective detector



电子扫描显微镜  
Scanning electron microscope



高温反偏试验箱  
High-temperature reverse bias



恒温恒湿试验箱  
High temperature and humidity



高加速寿命检测设备  
Highly accelerated stress test

Layout Recommended — Trace width

10/700μs—5/320μs(40Ω) 1kV-6kV

Voltage(kV)	Copper thickness(OZ)	Trace widths@Surface( mil)	Test times
1	1	5	±30
3		8	±30
4		10	±30
5		12	±30
6		15	±30
4	2	5	±30
6		8	±30

8/20μs 0.5kA-10kA(1OZ)

Current(kA)	Trace widths @Surface( mil)	Trace widths@Inlayer( mil)	Test times
0.5	12	20	±30
1	30	40	±30
1.5	30	60	±30
2	40	80	±30
2.5	50	100	±30
3	80	100	±30
3.5	80	140	±30
4	80	180	±30
4.5	100	180	±30
5	100	200	±30
5.5	120	240	±30
6	120	250	±30
6.5	200	300	±30
7	200	300	±30
7.5	200	360	±30
8	200	360	±30
8.5	200	360	±30
9	250	360	±30
9.5	250	400	±30
10	250	400	±30

Layout Recommended — Via

8/20μs 1kA-15kA

Number of holes	Hole size:OD/ID (mm)	Allowable current range (kA)	Test times
1	1/0.3	1	±10
	1/0.4	1.5	±10
	1/0.5	2	±10
	1.2/0.6	2.5	±10
	1.4/0.7	3	±10
	1.6/0.8	3	±10
2	1/0.3	2	±10
	1/0.4	3.5	±10
	1/0.5	4	±10
	1.2/0.6	5	±10
	1.4/0.7	6	±10
4	1.6/0.8	6	±10
	1/0.3	4	±10
	1/0.4	7	±10
	1/0.5	9	±10
	1.2/0.6	11	±10
	1.4/0.7	13	±10
6	1.6/0.8	14	±10
	1/0.3	6	±10
	1/0.4	9	±10
	1/0.5	12	±10
	1.2/0.6	12	±10
	1.4/0.7	13	±10
	1.6/0.8	14	±10

