



# 过压保护器件

Over Voltage Protection Components

瞬态电压抑制二极管 (TVS) 陶瓷气体放电管 (GDT) 静电抑制器 (ESD)



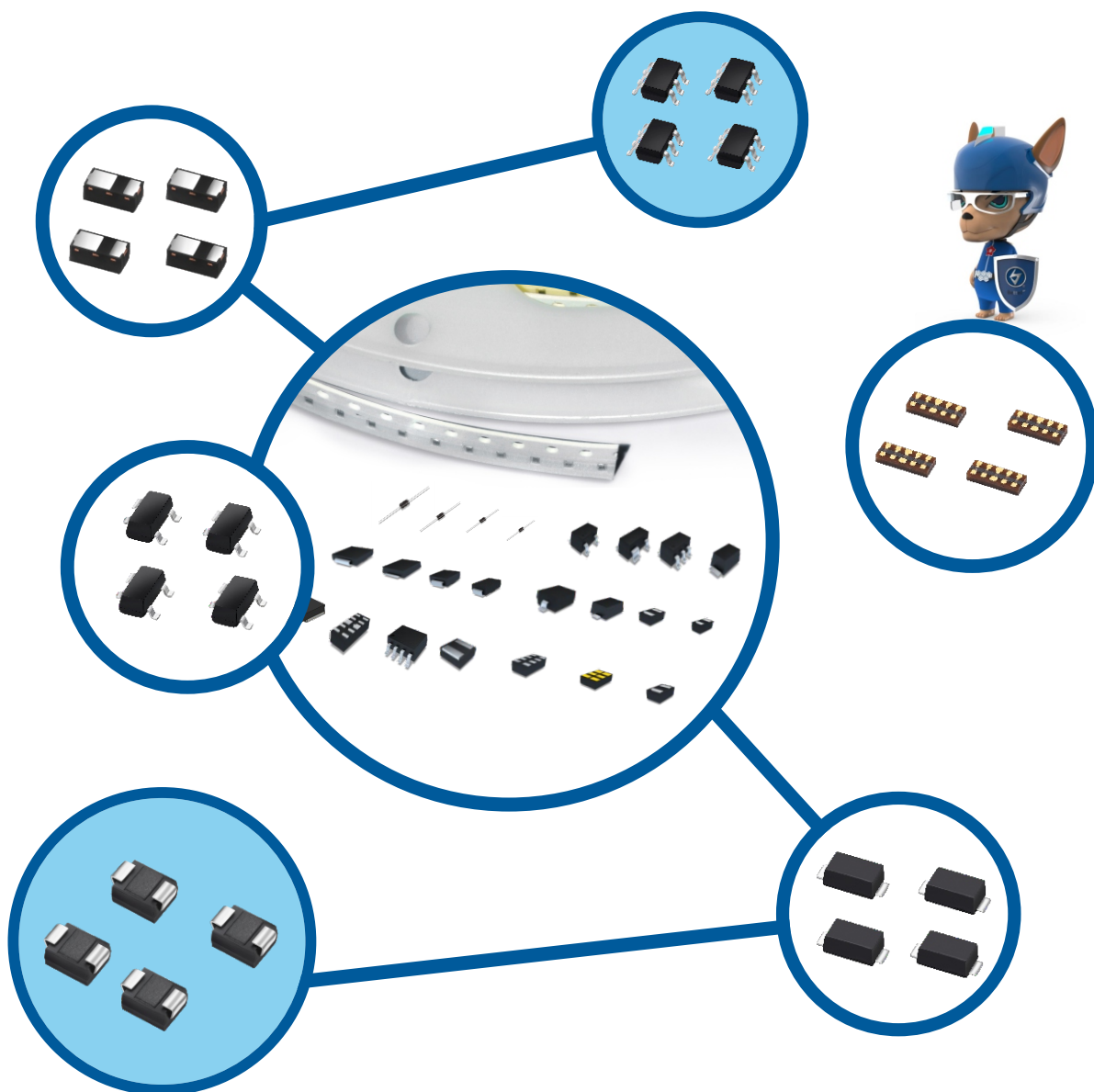
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## Summary 概述:

The overvoltage protection device is connected in parallel in the circuit. When the circuit works normally, it is in a high-impedance state and will not affect the normal operation of the circuit. Once it is impacted by transient high energy, it will have a fast respond, changing from high impedance to low impedance, which having excellent surge absorption capability, and at the same time, it can clamp the circuit voltage to a predetermined value, which is effective protection Other components in the circuit are protected from surge pulse damage. When the abnormal overvoltage disappears, it returns to a high impedance state and the circuit works normally. TVS/ESD has been widely used in Computers , Communication equipment, DC power supplies, Automobiles, and smart homes. Electrical appliances, Smart meter ,RS232/422/485, I/O, LAN, ISDN, ADSL, USB port, GPS and other fields.

过压保护器件是并联于电路中的，当电路正常工作时，它处于高阻态，不会影响线路正常工作。一旦受到瞬态高能量的冲击时，就会快速的动作，由高阻抗变为低阻抗，从而具有极好的浪涌吸收能力，同时也能使电路电压钳位在一个预定值，有效的保护电路中其它元器件免受浪涌脉冲的损坏，当异常过压消失，其恢复至高阻态，电路恢复正常工作，TVS/ESD目前已广泛应用于计算机系统、通讯设备、直流电源、汽车、智能家用电器、仪器仪表、RS232/422/485、I/O、LAN、ISDN、ADSL、USB port、GPS等各个领域。



## Features特性:

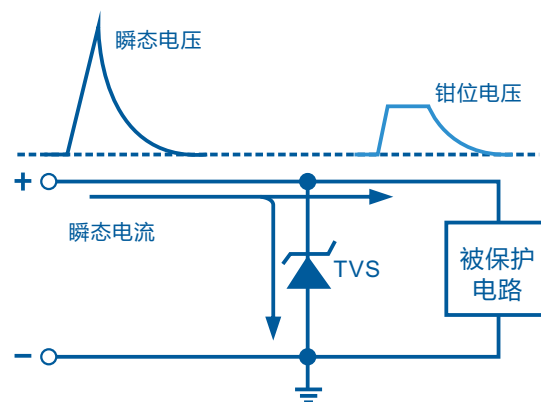
1. The internal chip of TVS is made of semiconductor silicon material, which is manufactured by semiconductor technology and has high reliability.
2. TVS has a fast response time, picosecond level.
3. TVS has high voltage accuracy,  $\pm 5\%$  tolerance.
4. TVS packages are diversified. SMD packages include SOD123, SMA (DO-214AC), SMB (DO-214AA), SMC (DO-214AB), DO-218AB, etc., and DIP packages include DO-41, DO-15, DO-201, P-600, etc., the transient pulse power of TVS can reach 200W-30000W which test in 10/1000 $\mu$ s waveform.
5. The operating voltage range is 5V~440V.

- 1、TVS 内部芯片为半导体硅材料，采用半导体工艺制造，具有较高的可靠性。
- 2、TVS具有较快的响应时间，皮秒级别。
- 3、TVS 电压精度高， $\pm 5\%$ 的公差。
- 4、TVS封装多样化，贴片封装有SOD123、SMA (DO-214AC)、SMB(DO-214AA)、SMC(DO-214AB)、DO-218AB 等，插件封装有DO-41、DO-15、DO-201、P-600 等，TVS在10/1000 $\mu$ s波形下瞬态脉冲功率可达200W-30000W。
- 5、工作电压范围5V~440V。

## Application应用:

Home appliances; Electronic instruments; smart meter, PC, Communication equipment; RS232, 485 and CAN communication ports; I/O ports; IC circuit protection; Audio and video input; AC and DC power supply; Motor, relay noise suppression and other fields.

家用电器、电子仪器、仪表、精密设备、计算机系统、通讯设备、RS232、485及 CAN等通讯端口、I/O端口、IC电路保护、音视频输入、交直流电源、电机、继电器噪声的抑制等各个领域。



TVS电路保护原理简图



DC Power DC电源



Security 安防



Smart meter 智能电表



Industrial Control 工业控制



Communication 通信

# 瞬态电压抑制二极管 (TVS)

ROHS

## Product introduction 产品介绍:

产品系列 Series	外观图片 Image	峰值脉冲功率 Peak Pulse Power 10/1000 $\mu$ s (W)	封装 Package	极性 Polar	反向截止电压 $V_{RWM(V)}$
SMAJ		400	SMA(DO-214AC)	单向、双向	5.0~440.0
P4SMA				单向、双向	5.8~467.0
P4KE			DO-41	单向、双向	5.8~467.0
SMBJ		600	SMB(DO-214AA)	单向、双向	5.0~440.0
P6SMB				单向、双向	5.8~467.0
P6KE			DO-15	单向、双向	5.8~512.0
SMCJ		1500	SMC(DO-214AB)	单向、双向	5.0~440.0
1.5KE			DO-201	单向、双向	5.8~467.0
SMDJ		3000	SMC (DO-214AB)	单向、双向	5.0~220.0
3KP			P600	单向、双向	5.0~220.0
5.0SMDJ		5000	SMC (DO-214AB)	单向、双向	11.0~170.0
5KP			P600	单向、双向	5.0~250.0
15KPA		15000	P600	单向、双向	17.0~280.0
20KPA		20000	P600	单向、双向	20.0~300.0
30KPA		30000	P600	单向、双向	28.0~400.0

## Summary 概述:

Gas discharge tubes consist of two or three electrodes spaced apart in a ceramic tube filled with an inert gas. When the voltage across its terminals is lower than the discharge voltage, the gas discharge tube is like an insulator (MΩ level). When the voltage at both ends rises to be greater than the discharge voltage, the discharge tube is turned on, and the gas ionizes and discharges from high impedance to low impedance, causing the voltage at both ends to drop rapidly and discharge the surge current. Gas discharge tubes can withstand surge currents up to tens of kiloamperes, and are used to protect electronic equipment and people from transient high voltage hazards.

Gas Discharge Tubes即陶瓷气体放电管。陶瓷气体放电管由封装在充满惰性气体的陶瓷管中相隔一定距离的两个或三个电极组成。当其两端电压低于放电电压时，气体放电管类似一个绝缘体(MΩ级)。当其两端电压升高到大于放电电压时，放电管导通，气体电离放电后由高阻抗转为低阻抗，使其两端电压迅速降低，泄放浪涌电流。气体放电管可以承受高达数十千安的浪涌电流冲击，应用于保护电子设备和人身免遭瞬态高电压的危害。

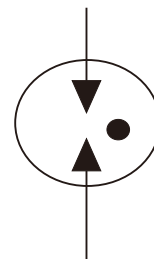
## Features特性:

1. No polarity;
2. Response speed( $\leq 100\text{nS}$ );
3. High insulation resistance;
4. Wide voltage range;
5. Low capacitance,  $C_j \leq 3\text{pF}$ ;
6. High surge capacity up to tens of kA (8 / 20 $\mu\text{S}$ )

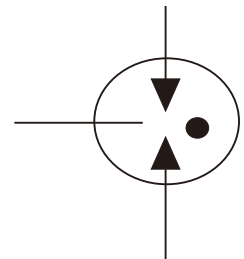
- 1、无极性;
- 2、反应速度 $\leq 100\text{nS}$ ;
- 3、绝缘阻抗高;
- 4、电压范围广;
- 5、电容值低,  $C_j \leq 3\text{pF}$ ;
- 6、突波承受能力高, 可达几十KA(8/20 $\mu\text{S}$ )



2级



3级



## Application应用:

ADSL, MODEM, CATV, IC card telephones, Ethernet switches, network cards, voice splitters, fax machines, RS485, RS232 ports, antennas, mobile base stations, etc.

ADSL、MODEM、CATV、IC、卡、电话机、以太网交换机、网卡、语音分离器、传真机、RS485、RS232 端口、天线、移动基站等。



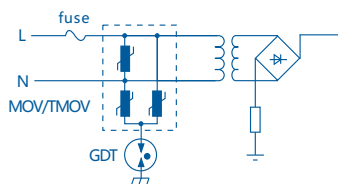
Switch 交换机



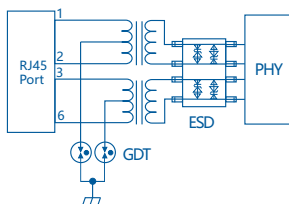
Stationsbase 5G通讯基站



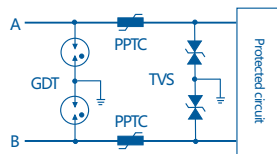
Air conditioner 空调



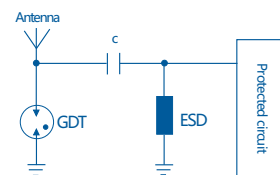
AC220V电源线护



100M以太网口保护



RS485接口保护



BNC接口保护

## Product introduction 产品介绍:

系列 Series	电压 Voltage	IPP(8/20us)	尺寸(mm)
ST3216	75V-500V	0.5KA	3.2*1.6*1.6
ST3225	75V-1000V	1KA	3.2*2.5*2.5
ST4532	75V-1000V	2KA	4.5*3.2*2.7
ST7650	75V-1000V	5KA	φ5*7.6
ST6080	75V-3600V	10KA/20KA	φ8*6
ST4062	75V-1000V	10KA	φ6.2*4
ST5050	75V-1000V	5KA	φ5*5
ST1080	75V-1000V	10KA	φ8*10
ST6055	75V-3600V	5KA	φ5.5*6.0
ST8080	75V-4500V	10KA	φ8*8

## Features特性:

1. ESD is a clamping type of over voltage protection device, which be used for electrostatic protection and some lower surge protection.
2. Operating voltage 2.8V-36V.
3. Low capacitance, up to 0.05pF minimum.
4. Diversified packages, including QFN-0201, SOD-882, DFN1006-3L, SOT-523, SOD-523, QFN-10, SOD-323, SOT-23, SOT-143, SOT-363, SOT23-6L, SOIC-8 etc.

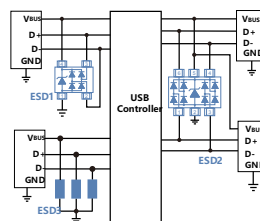
- 1、ESD 是一种钳位型过压保护器件，用于静电防护及一些较低浪涌的防护；
- 2、工作电压2.8V-36V。
- 3、电容低，最小可至0.05pF。
- 4、封装多样化，有 QFN-0201、SOD-882、DFN1006-3L、SOT-523、SOD-523、QFN-10、SOD-323、SOT-23、SOT-143、SOT-363、SOT23-6L、SOIC-8等。

## Application应用:

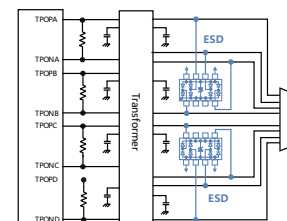
ESD is widely used in communications, security, industrial, automotive, consumer products, smart wearable devices and other electronic products such as communication lines and I/O ports for electrostatic protection.

ESD 广泛应用于通信、安防、工业、汽车、消费类产品、智能穿戴设备等电子产品的通信线及 I/O 口 等静电保护。

## Protect the case保护案例:



USB 2.0保护



以太网 (RJ45) 接口保护



Mobile phone 手机



PC电脑



UAV无人机

## Product introduction 产品介绍:

PESD (高分子聚合物ESD)



























型号 Part NO.	外观图片 Image	保护线路数 Protection Lines	极性 Polar	截止电压 $V_{RWM}(V)$	结电容 $C_j$ TYP (pF)	封装 Package
0402ESD-P		1	双向	5/12/24	0.05	0402
0603ESD-P		1	双向	5/12/24	0.05	0603
2510ESD-4P		1	单向	5	0.1	2510



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## Product introduction 产品介绍:

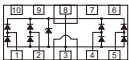












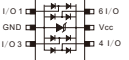











(半导体ESD)

型号 Part NO.	内部结构 Structure	保护线路数 Protection Lines	极性 Polar	封装 Package	结电容 $C_j$ TYP (pF)	截止电压 $V_{RWM(V)}$
BBC05D8SM		1	双向	DFN1006	40	5
BDC03D32UM		1	双向	SOD323	1	3.3
BWA4V5D32SM		1	双向	SOD323	1000	4.5
BDC05D32UM		1	双向	SOD323	1	5
BDC08D32UM		1	双向	SOD323	1	8
BDC12D32UM		1	双向	SOD323	1	12
BDC15D32UM		1	双向	SOD323	1	15
BDC18D32UM		1	双向	SOD323	1	18
BDC24D32UM		1	双向	SOD323	1	24
BDC36D32UM		1	双向	SOD323	1	36
BDC05D52UM		1	双向	SOD-523	0.7	5
BDC05D52SM		1	双向	SOD-523	35	5
BAC05D92LM		1	双向	SOD923	15	5
BDC05T23SM		2	双向	SOT23	65	5
BEC05T23SM		2	双向	SOT-23	140	5
BDC08T23SM		2	双向	SOT-23	35	8
BTM712		2	双向	SOT-23	60 60	7 12
BDC12T23SM		2	双向	SOT-23	45	12
BDC15T23SM		2	双向	SOT-23	40	15
BDC24T23LM		2	双向	SOT-23	18	24
BDC36T23LM		2	双向	SOT-23	15	36
BAA05T36UM		5	单向	SOT-363	0.35	5
BMSLVU2. 8-4		4	双向	SOP-8	1.5	2.8
BMSLVU2. 8-8		8	双向	SOP-8	3	2.8
BAC05D8LM		1	双向	DFN1006	17	5
BAA03Q10UM		4	单向	DFN2510-10L	0.3 0.6	3.3



## Product introduction 产品介绍:

(半导体ESD)

型号 Part NO.	内部结构 Structure	保护线路数 Protection Lines	极性 Polar	封装 Package	结电容 $C_j$ TYP (pF)	截止电压 $V_{RWM(V)}$
BAA05Q10UM		4	单向	DFN2510-10L	0.7	5
BTA4V5D22SM		1	单向	DFN2020-3L	720	4.5
BTA12D22SM		1	单向	DFN2020-3L	1500	12
BTA15D22SM		1	单向	DFN2020-3L	1100	15
BTA24D22SM		1	单向	DFN2020-3L	750	24
BDC05D32SM		1	双向	SOD323	120	5
BDC08D32SM		1	双向	SOD323	70	8
BDC12D32SM		1	双向	SOD323	40	12
BDC15D32SM		1	双向	SOD323	30	15
BDC24D32LM		1	双向	SOD323	28	24
BDC30D32SM		1	双向	SOD323	30	30
BAC05D52LM		1	双向	SOD-523	12	5
BAC03D92LM		1	双向	SOD923	18	3.3
BAA05T26UM		5	单向	SOT23-6	0.36	5
BAA05T14UM		3	单向	SOT-143	0.65	5
BAC05D8UM		1	双向	DFN1006	0.4	5
BCA03T23SM		2	单向	SOT23	135	3
BCA05T23SM		2	单向	SOT23	190	5
BDA12T23SM		2	单向	SOT23	60	12
BCA15T23LM		2	单向	SOT23	28	15
BDA24T23LM		2	单向	SOT23	12	24
BDA36T23LM		2	单向	SOT23	25	36
BAC07D8LM		1	双向	DFN1006	20	7
BBC12D8LM		1	双向	DFN1006	10	12
BBC15D8LM		1	双向	DFN1006	20	15

## Product introduction 产品介绍:

(半导体ESD)

型号 Part NO.	外观图片 Image	内部结构 Structure	保护线路数 Protection Lines	极性 Polar	封装 Package	结电容 $C_j$ TYP (pF)	截止电压 $V_{RWM(V)}$
BAA05Q10UJ			4	单向	DFN2510	0.6	5
BJSLVU2.8-4			4	单向	SOIC-8	1.6	2.8
BTJ712			2	双向	SOT23	45/75	7&12
BDCXXD32UJ			1	双向	SOD323	1~1.2	3.3/5/8/12/15/18/24/30
BDCXXD32SJ			1	双向	SOD323	35~450	3.3/5/8/12/15/18/24/36
BDAXXD32SJ			1	单向	SOD323	60~450	3.3/5/8/12/15/18/24/36
BAC05D52UJ			1	双向	SOD523	3	5
BDA05T26UJ			5	单向	SOT23-6L	0.4	5
BBA05T36UJ			5	单向	SOT363	2	5
BAA05T56UJ			5	单向	SOT563	0.7	5
BDA05T23UJ			2	单向	SOT23	1	5
BDA05T14UJ			3	单向	SOT-143	0.4/0.9	5
BAC05D8UJ			1	双向	DFN1006	0.4	5
BAC05D8LJ			1	双向	DFN1006	10	5
BBC05D8LJ			1	双向	DFN1006	15	5
BAC05Q02UJ			1	双向	DFN0603	0.35	5
BAC05Q02LJ			1	双向	DFN0603	15	5
BBC03Q02LJ			1	双向	DFN0603	30	3.3
BTA12D22SJ			1	单向	DFN2020-3	1300	12
BTA24D22SJ			1	单向	DFN2020-3	410	24

### Headquarters 总部

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