

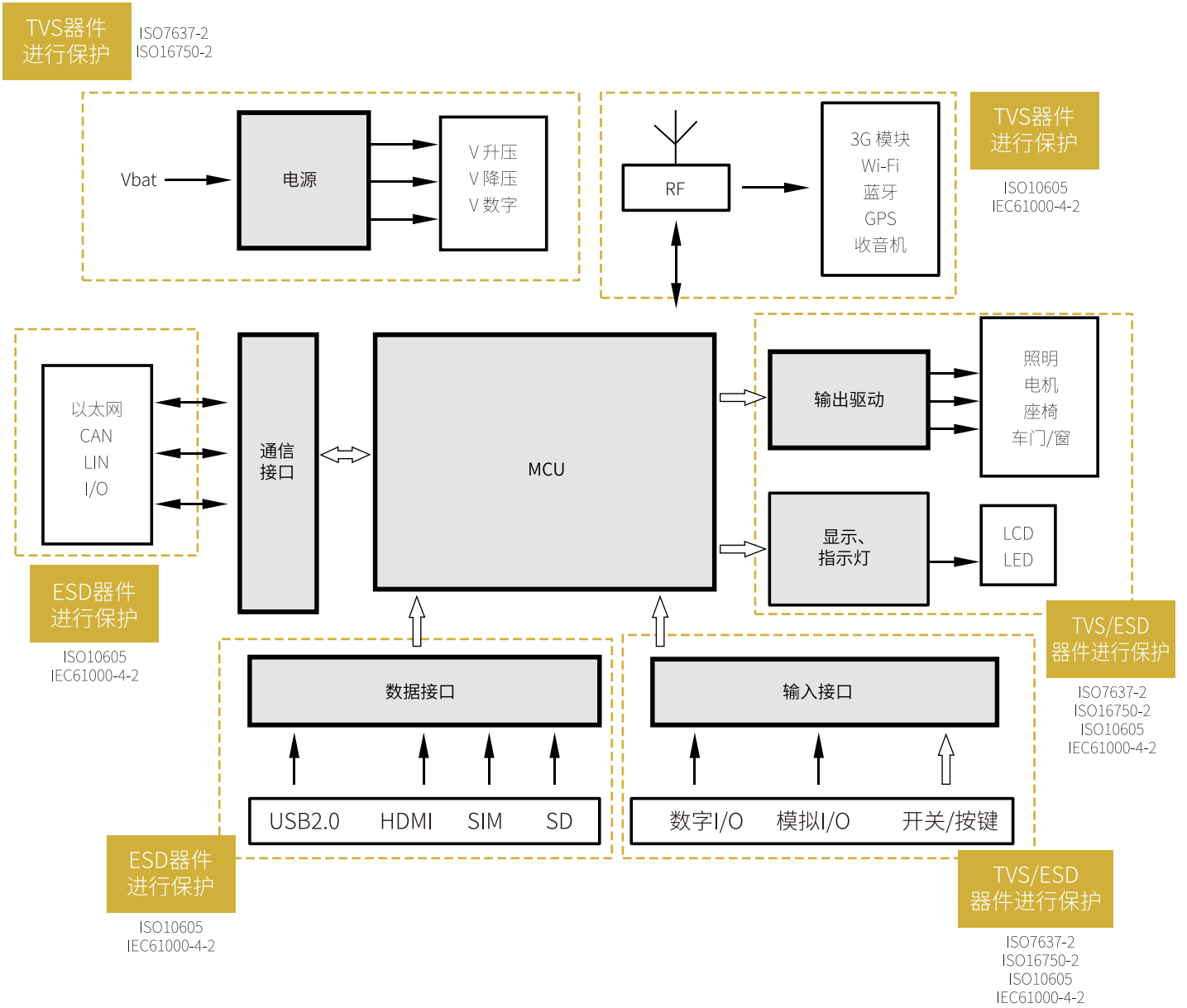
# 汽车电子瞬态干扰电压保护

Automotive Electronics Transient Voltage Protection



Build Your Design As You Will

大类	标准分类	标准编号	标准名称
沿电源线的瞬态干扰/电器负荷	ISO标准	ISO 7637-2	Road vehicles — Electrical disturbances from conduction and coupling—Part 2: Electrical transient conduction along supply lines only
	GB标准	GB/T 21437.2	道路车辆 由传导和耦合引起的点干扰—第二部分:沿电源线的瞬态传导
	ISO标准	ISO 16750-2	Road vehicles — Environmental conditions and testing for electrical and electronic equipment —Part 2: Electrical loads
	GB标准	GB/T 28046-2	道路车辆 电气及电子设备的环境条件和试验——第二部分:电气负荷
	ISO标准	ISO 21848	Road vehicles -- Electrical and electronic equipment for a supply voltage of 42 V -- Electrical loads
	GB标准	GB/T 28045	GB/T 28045
除电源线外的瞬态干扰	ISO标准	ISO7637-3	Road vehicles — Electrical disturbances from conduction and coupling — Part 3: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines
静电放电抗扰度	IEC标准	IEC61000-4-2	Electromagnetic compatibility (EMC) –Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
	GB标准	GB/T 17626.2	电磁相容 试验和测量技术 静电放电产生的电干扰试验方法
	ISO标准	ISO 10605	Road vehicles — Test methods for electrical disturbances from electrostatic discharge
	GB标准	GB/T 19951	道路车辆 静电放电产生的电干扰试验方法



应用	电路连接图	测试标准及波形	器件选型	管理体系 安规 可靠性	
12V DC电源	图1	ISO7637-2, 波形1、2a、2b 3a、3b	TPSMBJ28CA,1KSMB24CA	TS16949 ISO9001 ISO14001 QC080000 OHSAS180001	
		ISO7637-2, 波形5a、5b	SM8S24A,SM8S30A		
24V DC电源		ISO7637-2, 波形1、2a、2b、3a、3b	TPSMBJ36CA,1KSMB36CA		
		ISO7637-2, 波形5a、5b	SM8S33A,SM8S36A,SAT33CA		
RJ45	图2	ISO10605, IEC61000-4-2	SE3D15B3.3MA		TS16949 UL1449 UL497B
CAN	图3	ISO10605, IEC61000-4-2	SE23T35B24B,SE23T30U24B		
LIN	图4	ISO10605, IEC61000-4-2	SE3D15B24A		
RF	图5	ISO10605, IEC61000-4-2	SE3DXXXMA		
I/O	图6	ISO10605, IEC61000-4-2	ESD1: SE23T30U24B ESD2: SE3D15B24MA		
按键	图7	ISO10605, IEC61000-4-2	SE3DXXXMA		
SD	图8	ISO10605, IEC61000-4-2	SESRV05-4		
SIM	图9	ISO10605, IEC61000-4-2	SE3D15B5.0MA,SESRV05-4		
HDMI	图10	ISO10605, IEC61000-4-2	SE3D15B5.0MA		
USB2.0	图11	ISO10605, IEC61000-4-2	ESD1: SESR05, ESD2: SE3D15B5.0MA, ESD3: SESRV05-4		

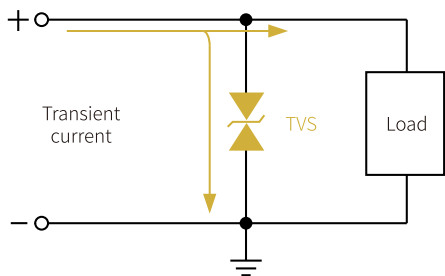


图.1 DC 电源线

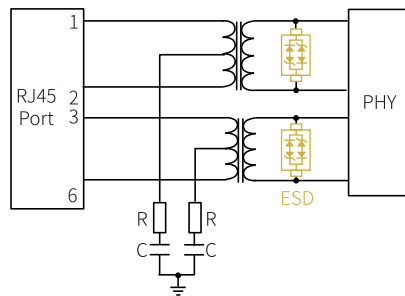


图.2 RJ45 接口

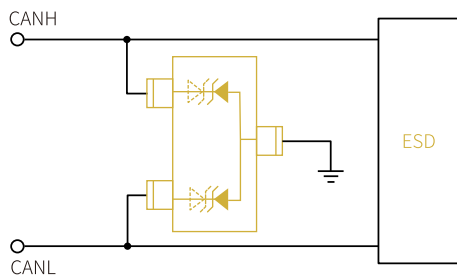


图.3 CAN 总线

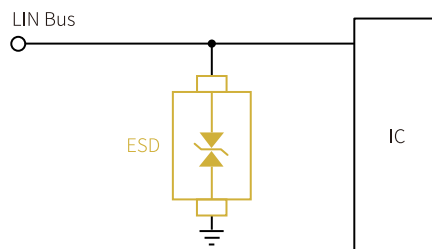


图.4 LIN 总线

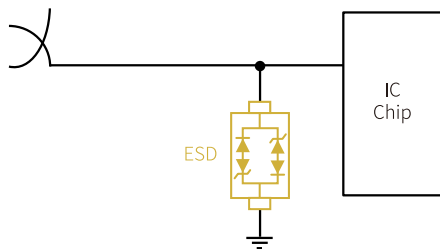


图.5 RF 端口

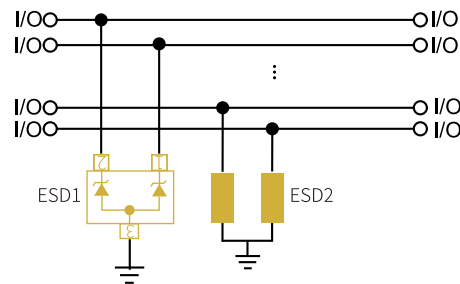


图.6 I/O 接口

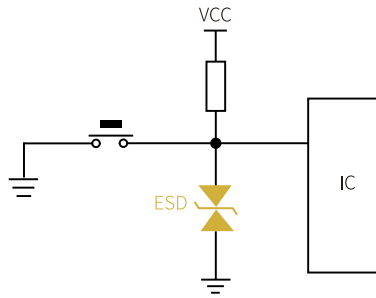


图.7 按键

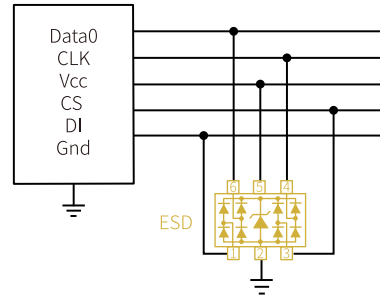


图.8 SD 卡

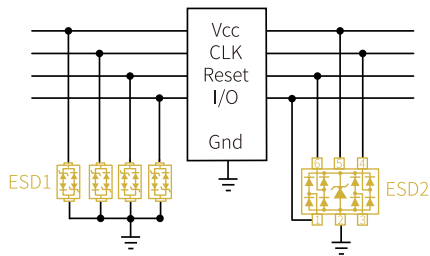


图.9 SIM 卡

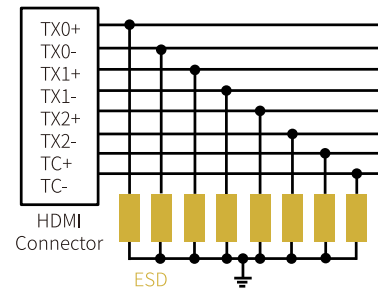


图.10 HDMI 接口

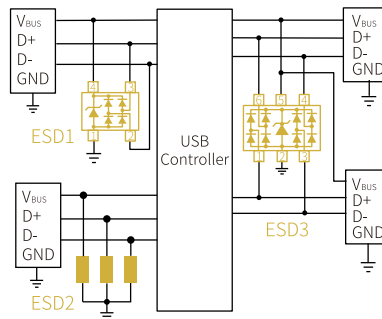
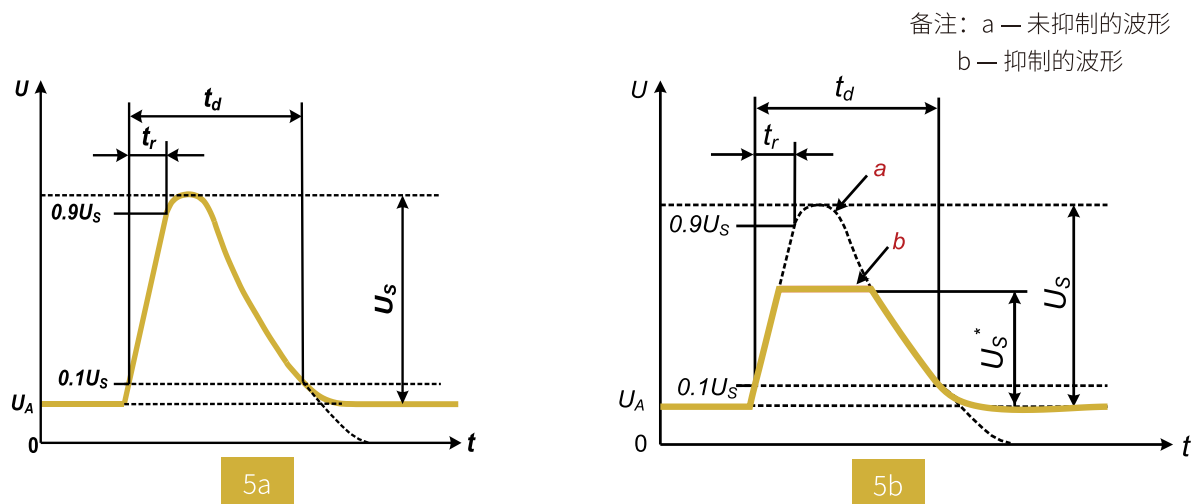


图.11 USB2.0 接口

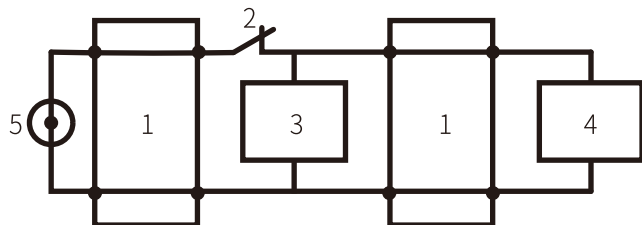
本试验是类比抛负载瞬态现象。即类比在断开电池（亏电状态）的同时，交流发电机正在产生充电电流，而发电机电路上仍有其它负载时产生的瞬态。抛负载的幅度取决于断开电池连接时，发电机的转速和发电机的励磁场强的大小。抛负载脉冲宽度主要取决于励磁电路的时间常数和脉冲幅度。大多数新型交流发电机内部，抛负载幅度由于增加限幅二极管而受到抑制（箝位）。抛负载可能产生的原因是：因电缆腐蚀、接触不良或发动机正在运转时，有意断开与电池的连接。

波形参数

参数	12V 系统	24V 系统
$U_s$	65V~87V	123V~174V
$R_i$	0.5Ω~4Ω	1Ω~8Ω
$t_d$	40ms~400ms	100ms~350ms
$U_s^*$	由客户规定	
$t_r$	$(10^{-0.5})$ ms	

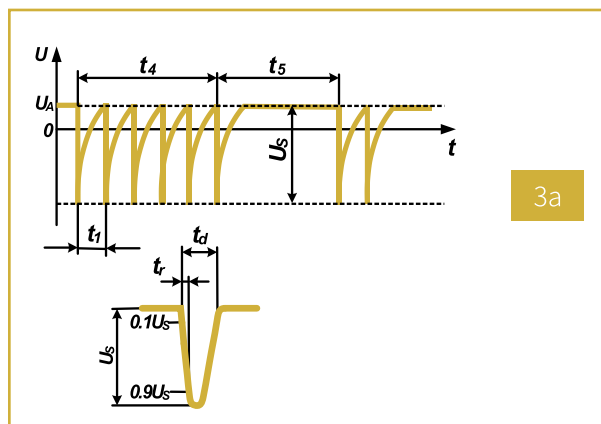


这些试验脉冲类比由开关过程引起的瞬态现象。这些瞬态现象的特性受线束的分布电容和分布电感的影响。

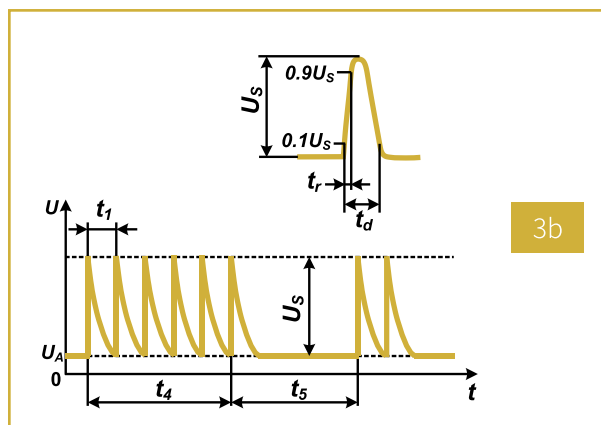


- 1—具有分布电感和分布电容的线束
- 2—开关
- 3—DUT
- 4—感性负载
- 5—电源

参数	3a		3b	
	12V系统	24V系统	12V系统	24V系统
$U_s$	-112V~ -220V	-150V~ -300V	+75V~ +150V	+150V~ +300V
$R_i$	50Ω			
$t_d$	150ns±45ns			
$t_r$	5ns±1.5ns			
$t_1$	100μs			
$t_4$	10ms			
$t_5$	90ms			



3a

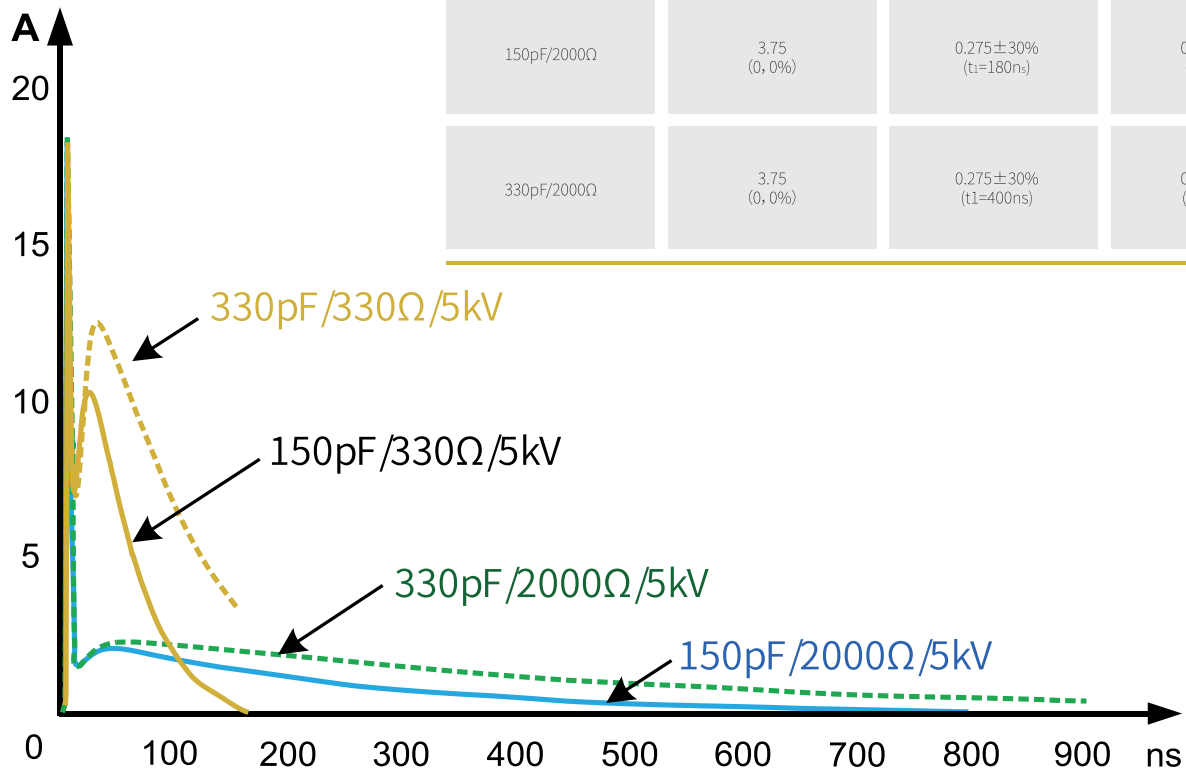


3b

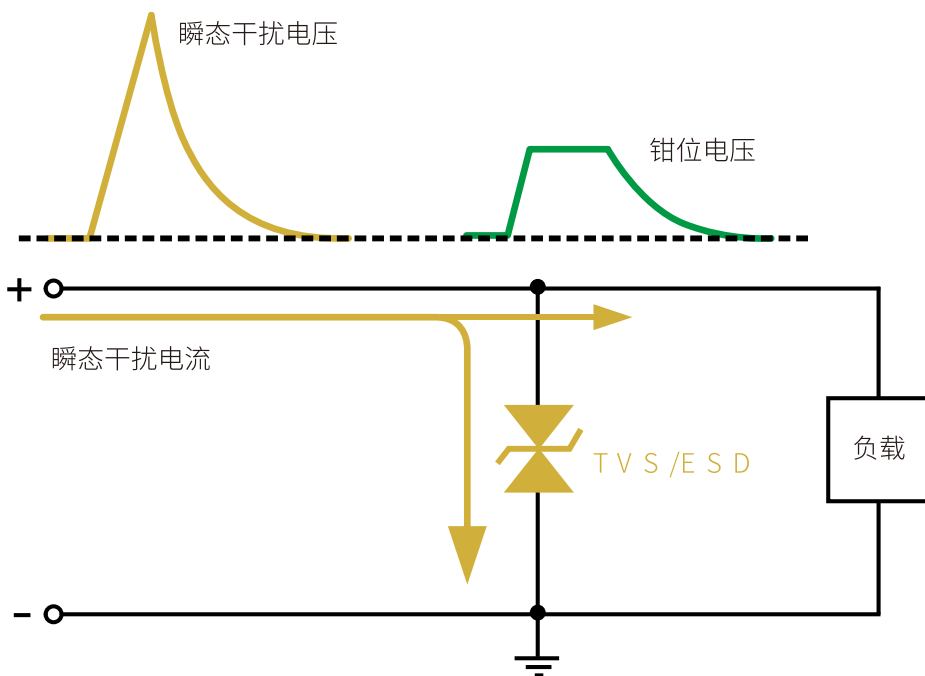


HBM 接触放电电流波形参数

模型参数	峰值电流/ 放电电压 (A/kV)	峰值电流/ 放电电压@ t <sub>1</sub> (A/kV)	峰值电流/ 放电电压@t <sub>2</sub> (A/kV)
150pF/330Ω	3.75 ±10%	2±30% (t <sub>1</sub> =30ns)	1±30% (t <sub>2</sub> =60ns)
330pF/330Ω	3.75 ±10%	2±30% (t <sub>1</sub> =65ns)	1±30% (t <sub>2</sub> =130ns)
150pF/2000Ω	3.75 (0, 0%)	0.275±30% (t <sub>1</sub> =180ns)	0.15±50% (t <sub>2</sub> =360ns)
330pF/2000Ω	3.75 (0, 0%)	0.275±30% (t <sub>1</sub> =400ns)	0.15±50% (t <sub>2</sub> =800ns)



# 怎样保护一个敏感的电子设备？



用TVS或ESD等保护器件将瞬态干扰电压钳制在一个安全水准是一种有效的解决方法。

TPSMBJ TVS Diode



Defends electrical systems from transient voltages

SE23T35B24B Diode Array



Safeguards Auto CAN bus from ESD damage

SESR05 Diode Array



Up to 70% better protection for USB 2.0

SAT TVS Diode



Protects auto electronics against load dump

SM8S TVS Diode



Protects auto electronics against load dump

SE3D Diode Arrays



Protects auto electronics against esd damage





**SEMIWARE**

Semiware Semiconductor (Shanghai) Co.,Ltd.

Address: No.3387 Shendu Road Pujiang I&E Park Minhang Shanghai

Tel: 86-21-34637345

Fax: 86-21-34637458

Email: fae03@semiware.com.cn

Web: semiware.com.cn