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TPD1E10B09DPYR



TPD1E10B09 采用 0402 封装的单通道 ESD 保护二极管

1 特性

- 可为高达 $\pm 9V$ 的 I/O 接口提供系统级 ESD 保护
- IEC 61000-4-2 4 级 :
 - $\pm 20 kV$ (空气间隙放电)
 - $\pm 20 kV$ (接触放电)
- IEC 61000-4-5 浪涌保护 :
 - $4.5A$ (8/20 μs)
- I/O 电容 $10pF$ (典型值)
- $R_{DYN} 0.5\Omega$ (典型值)
- 直流击穿电压 $\pm 9.5V$ (最小值)
- 超低泄漏电流 $100nA$ (最大值)
- $13V$ 钳位电压 ($I_{PP} = 1A$ 时的最大值)
- 工业温度范围 : $-40^{\circ}C$ 至 $125^{\circ}C$
- 节省空间的 0402 外形尺寸
($1mm \times 0.6mm \times 0.5mm$)

2 应用

- 终端设备 :
 - 平板电脑
 - 远程控制器
 - 可穿戴设备
 - 机顶盒
 - 电子销售终端 (EPOS)
 - 电子书阅读器
- 接口 :
 - 音频线路
 - 按钮
 - 通用输入/输出 (GPIO)

3 说明

TPD1E10B09 器件是一款采用小型 0402 封装的单通道 ESD 瞬态电压抑制 (TVS) 二极管。这款 ESD 保护二极管提供 $\pm 20kV$ IEC 61000-4-2 (4 级) 接触和气隙 ESD 保护。该器件提供背靠背 TVS 二极管配置以支持双极或双向信号。 $10pF$ 线路电容适用于能够支持高达 $500Mbps$ 数据速率的宽范围应用。0402 封装是一种业界通用的封装, 便于将元件安装到空间受限型应用中。

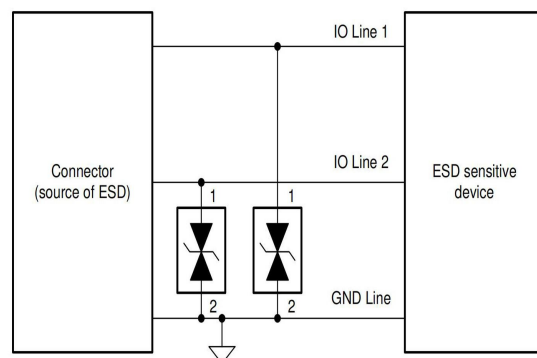
该 ESD 保护 TVS 二极管的典型应用是针对音频线路 (麦克风、耳机和扬声器)、SD 接口、键盘或其他按钮、USB 端口的 V_{BUS} 引脚和 ID 引脚以及通用 I/O 端口提供电路保护。该 ESD 钳位有利于为电子书阅读器、平板电脑、远程控制器、可穿戴设备、机顶盒以及电子销售点等终端设备提供保护。

封装信息

器件型号	封装 ⁽¹⁾	封装尺寸 ⁽²⁾
TPD1E10B09	DPY (X1SON , 2)	$1mm \times 0.6mm$

(1) 如需了解所有可用封装, 请参阅数据表末尾的可订购产品附录。

(2) 封装尺寸 (长 x 宽) 为标称值, 并包括引脚 (如适用)。



应用原理图

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6.1 Absolute Maximum Ratings

	MIN	MAX	UNIT
Operating temperature	- 40	125	°C
I_{PP} Peak pulse current ($t_p = 8/20 \mu s$)		4.5	A
P_{PP} Peak pulse power ($t_p = 8/20 \mu s$)		90	W
T_{stg} Storage temperature	- 65	155	°C

6.2 ESD Ratings

		VALUE	UNIT
$V_{(ESD)}$ Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±2500	V
	Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	±1000	
	IEC 61000-4-2 Contact Discharge	20000	
	IEC 61000-4-2 Air-Gap Discharge	20000	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

	MIN	NOM	MAX	UNIT
Operating free-air temperature, T_A	- 40		125	°C
Operating voltage	Pin 1 to 2 or pin 2 to 1		- 9	9 V

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		TPD1E10B09	UNIT
		DPY (X1SON)	
		2 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	615.5	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	404.8	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	493.3	°C/W
ψ_{JT}	Junction-to-top characterization parameter	127.7	°C/W
ψ_{JB}	Junction-to-board characterization parameter	493.3	°C/W
P	Power Dissipation ⁽²⁾	162	mW

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6.5 Electrical Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
V_{RWM}	Reverse stand-off voltage			9	V
I_{LEAK}	Leakage current			100	nA
$V_{Clamp1,2}$	Clamp voltage with ESD strike on pin 1, pin 2 grounded.	$I_{PP} = 1\text{ A}$, $t_p = 8/20\text{ }\mu\text{Sec}^{(2)}$		13	V
		$I_{PP} = 5\text{ A}$, $t_p = 8/20\text{ }\mu\text{Sec}^{(2)}$		17	
$V_{Clamp2,1}$	Clamp voltage with ESD strike on pin 2, pin 1 grounded.	$I_{PP} = 1\text{ A}$, $t_p = 8/20\text{ }\mu\text{Sec}^{(2)}$		13	V
		$I_{PP} = 4.5\text{ A}$, $t_p = 8/20\text{ }\mu\text{Sec}^{(2)}$		20	
R_{DYN}	Dynamic resistance	Pin 1 to pin 2 ⁽¹⁾	0.5		Ω
		Pin 2 to pin 1 ⁽¹⁾	0.5		
C_{IO}	I/O capacitance	$V_{IO} = 2.5\text{ V}$; $f = 1\text{ MHz}$	10		pF
$V_{BR1,2}$	Break-down voltage, pin 1 to pin 2	$I_{IO} = 1\text{ mA}$	9.5		V
$V_{BR2,1}$	Break-down voltage, pin 2 to pin 1	$I_{IO} = 1\text{ mA}$	9.5		V

6.6 Typical Characteristics

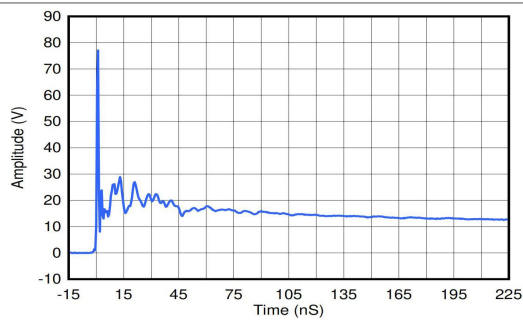


图 6-1. ESD Clamp Voltage +8 kV Contact ESD

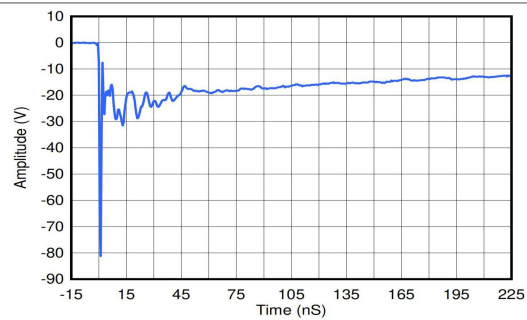


图 6-2. ESD Clamp Voltage -8 kV Contact ESD

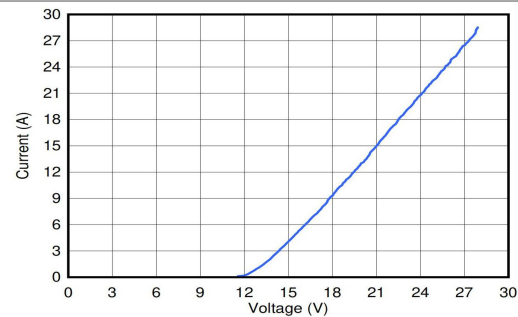


图 6-3. Transmission Line Pulse (TLP) Waveform Pin 1 to Pin 2

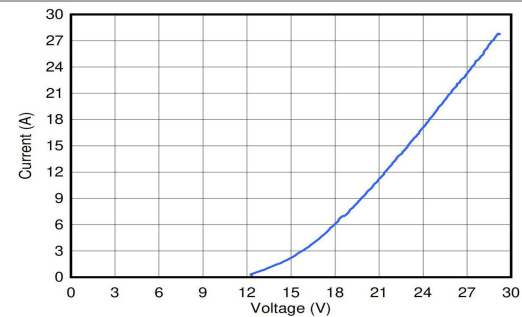


图 6-4. Transmission Line Pulse (TLP) Waveform Pin 2 to Pin 1

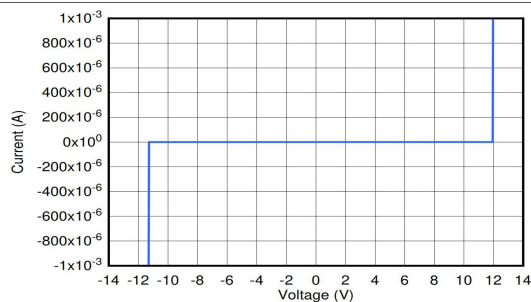


图 6-5. IV Curve

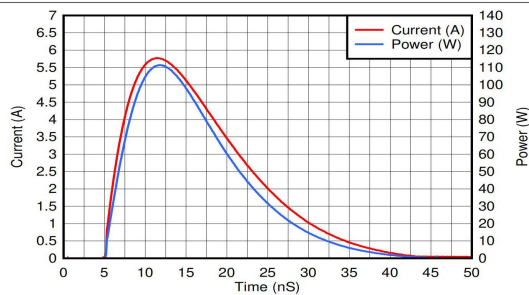
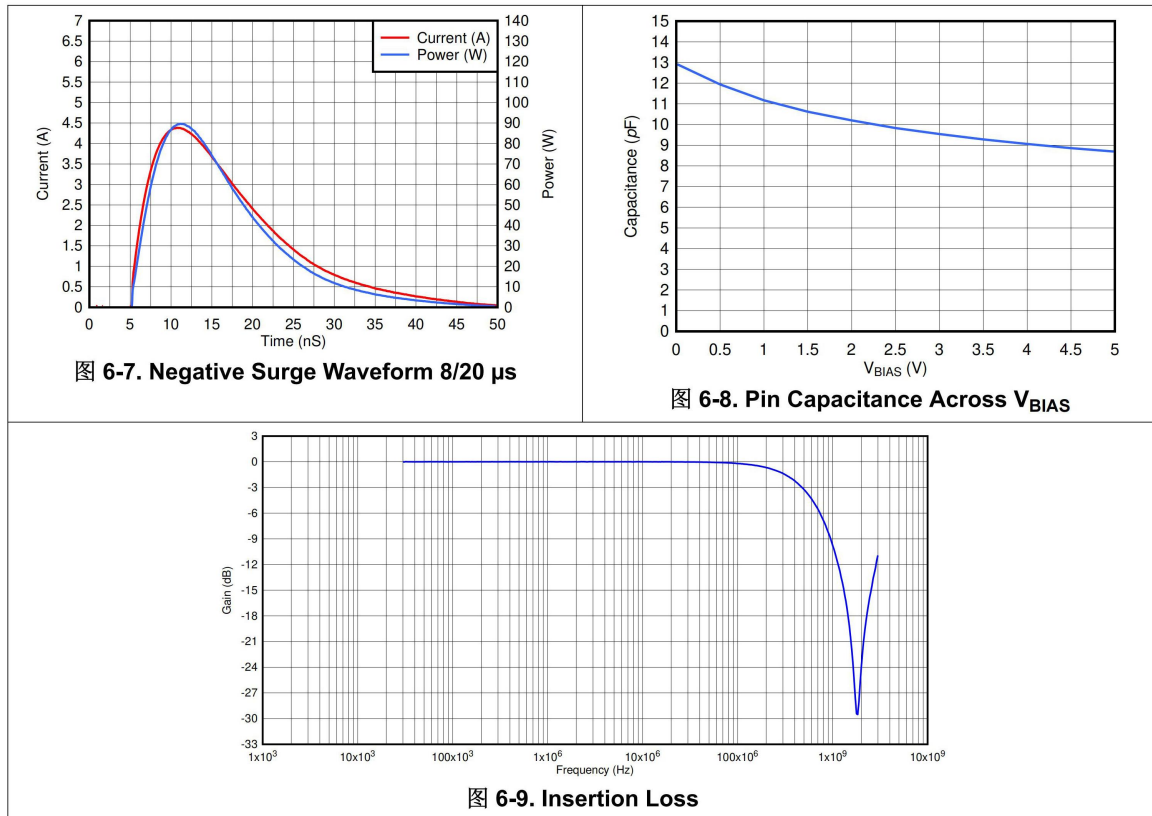


图 6-6. Positive Surge Waveform 8/20 μs

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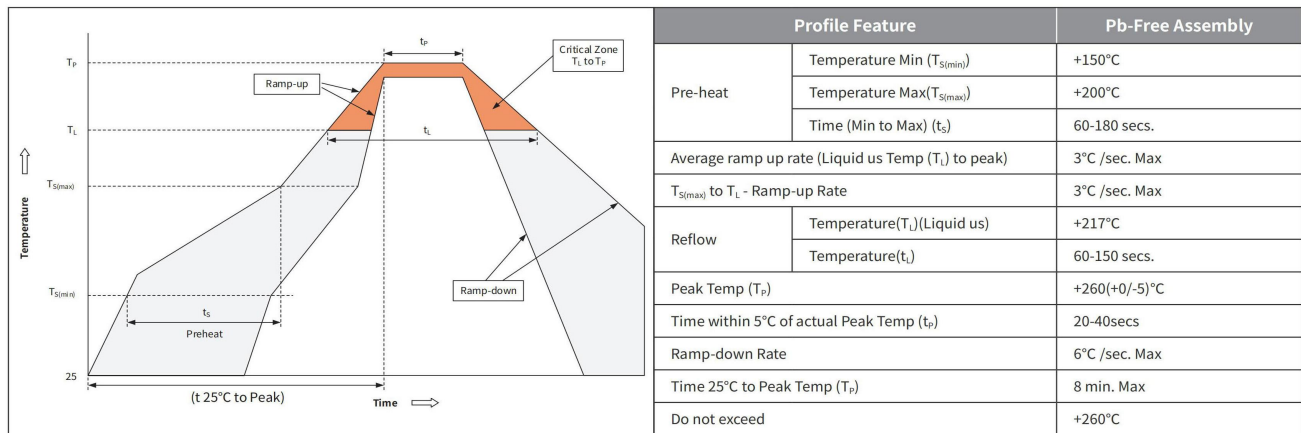


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Ordering Information

PREFERRED P/N	PACKAGE	SIZE(mm)	DELIVERY MODE	MPQ(PCS)
	DFN1006-2L	1.00×0.60×0.37	7" REEL	10,000

Recommended Soldering Conditions



Package Outline Dimensions (DFN1006-2L)

Symbol	Dimensions			
	Millimeters		Inches	
	Min	Max	Min	Max
A	0.950	1.050	0.037	0.041
B	0.550	0.650	0.022	0.026
C	0.350	0.450	0.014	0.018
D	0.550	0.650	0.022	0.026
D ₁	0.280	0.380	0.011	0.015
E	0.450	0.550	0.018	0.022
L	0.000	0.100	0.000	0.004

Suggested Pad Layout

Symbol	Dimensions			
	Millimeters		Inches	
	Min	Max	Min	Max
J	0.50	0.60	0.020	0.024
K	0.25	0.35	0.010	0.014
M	0.55	0.65	0.022	0.026