Single Channel ESD Protection Device in 0402 Package

Check for Samples: TPD1E10B06

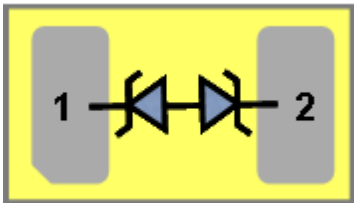
FEATURES

- **Provides System Level ESD Protection for Low-voltage IO Interface**
- **IEC 61000-4-2 Level 4**
  - **±30kV (Air Discharge),**
  - **±30kV (Contact Discharge)**
- **Low $R_{DYNAMIC}$ 0.37Ω**
- **IO Capacitance 10pF (Typ)**
- **DC Breakdown Voltage ±6V (Min)**
- **Ultra Low Leakage Current 10nA (Typ)**
- **Low ESD Clamping Voltage**
- **Industrial Temperature Range: –40°C to 125°C**
- **IEC 61000-4-5 (Surge): 6.5 A (8/20 µs Pulse)**
- **Space Saving 0402 Footprint (1mm x 0.6mm x 0.5mm)**

APPLICATIONS

- **Cell Phones**
- **eBook**
- **Portable Media Players**
- **Digital Camera**

DEVICE CONFIGURATION



DESCRIPTION

The TPD1E10B06 is a single channel ESD protection device in a small 0402 package. The device offers over ±30KV IEC air-gap, over ±30KV contact ESD protection, and has an ESD clamp circuit with a back-to-back diode for bipolar or bidirectional signal support. The 10pF line capacitance is suitable for a wide range of applications supporting data rates up to 150Mbps. Typical application areas of the TPD1E10B06 include audio lines (microphone, earphone and speakerphone), SD interfacing, keypad or other buttons, and VBUS pins of USB ports (ID).

The 0402 package is industry standard and convenient for component placement in space saving applications. The TPD1E10B06 is characterized for operation over ambient air temperature of –40°C to 125°C.

ORDERING INFORMATION

T_A	PACKAGE(1)(2)		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 125°C	3000	Tape and reel	TPD1E10B06DPY	B_

(1) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.
(2) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI Web site at www.ti.com.

PRODUCT PREVIEW

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

ABSOLUTE MAXIMUM RATINGS

		MIN	MAX	UNIT
	Operating temperature range	-40	125	°C
	Storage temperature	–65	155	°C
	IEC 61000-4-2 contact ESD		±30	kV
	IEC 61000-4-2 air-gap ESD		±30	kV
I_{PP}	Peak pulse current (tp = 8/20 µs)		6.5	A
P_{PP}	Peak pulse power (tp = 8/20 µs)		100	W

ELECTRICAL CHARACTERISTICS

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
V_{RWM}	Reverse stand-off voltage				±5	V
VClamp1,2	Clamp voltage with ESD strike on pin 1, pin 2 grounded.	I_{PP} = 1 A, tp = 8/20 µSec			10	V
		I_{PP} = 5 A, tp = 8/20 µSec			14	
VClamp2,1	Clamp voltage with ESD strike on pin 2, pin 1 grounded.	I_{PP} = 1 A, tp = 8/20 µSec			10	V
		I_{PP} = 5 A, tp = 8/20 µSec			14	
$R_{DYNAMIC}$	Dynamic resistance	Pin 1 to Pin 2 (1)		0.325		Ω
		Pin 2 to Pin 1 (1)		0.465		
C_{IO}	IO capacitance	V_{IO} = 2.5 V		10		pF
$V_{BR1,2}$	Break-down voltage, pin 1 to pin 2	I_{IO} = 1 mA	6			V
$V_{BR2,1}$	Break-down voltage, pin 2 to pin 1	I_{IO} = 1 mA	6			V

(1) Extraction of $R_{DYNAMIC}$ using least squares fit of TLP characteristics between I_{PP} = 10A and I_{PP} = 20A.

PRODUCT PREVIEW

TYPICAL CHARACTERISTICS

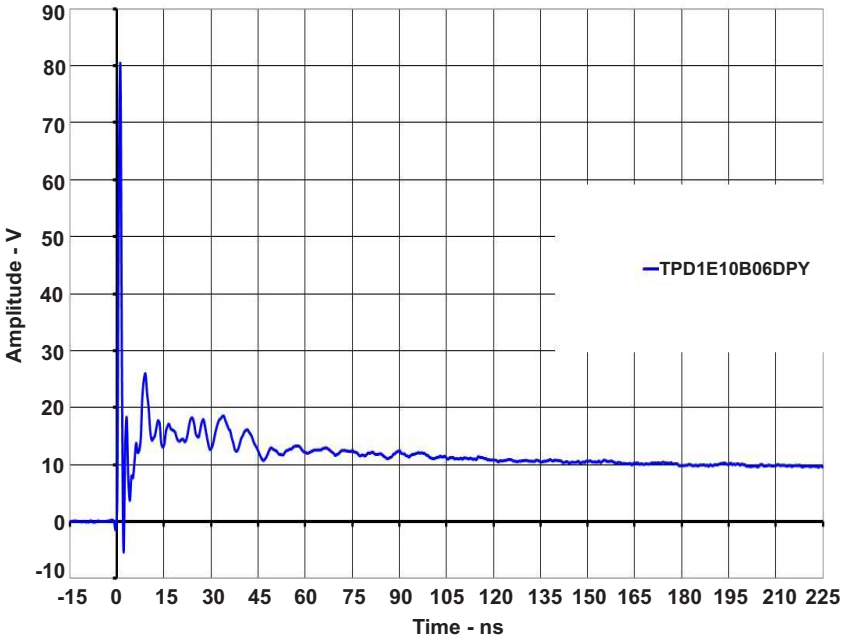


Figure 1. ESD Clamp Voltage +8KV Contact ESD

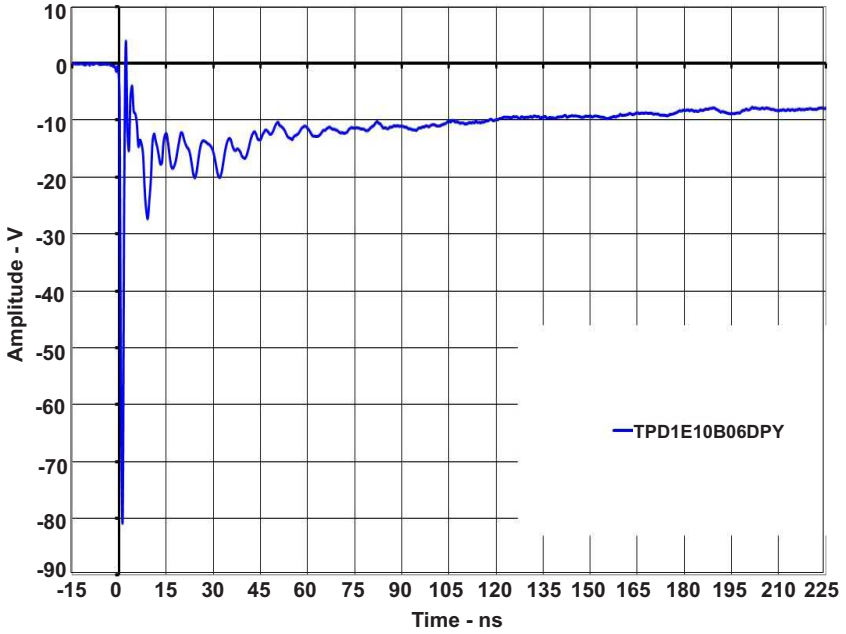


Figure 2. ESD Clamp Voltage –8KV Contact ESD

PRODUCT PREVIEW

TYPICAL CHARACTERISTICS (continued)

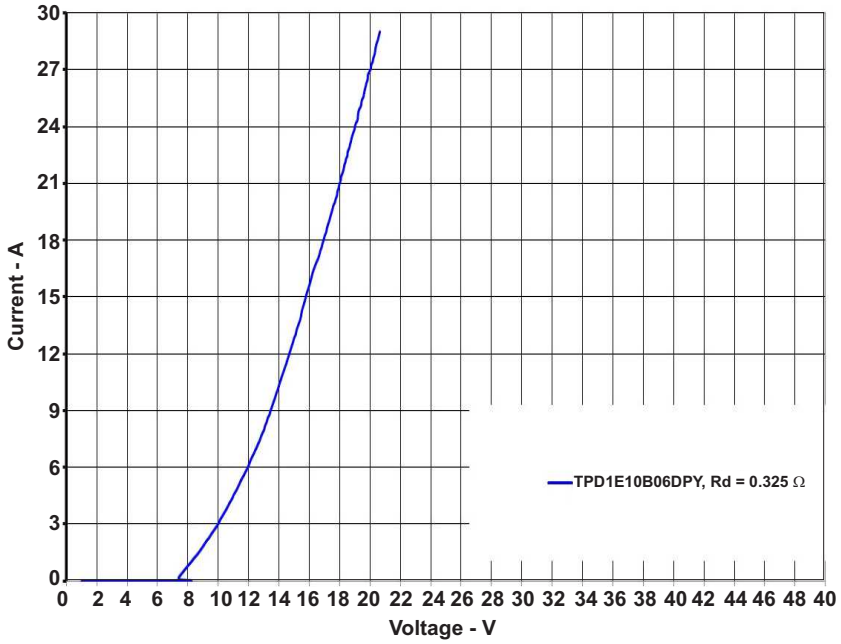


Figure 3. Clamping Voltage V_{TLP} = F(I_{TLP}), PIN1 to PIN2

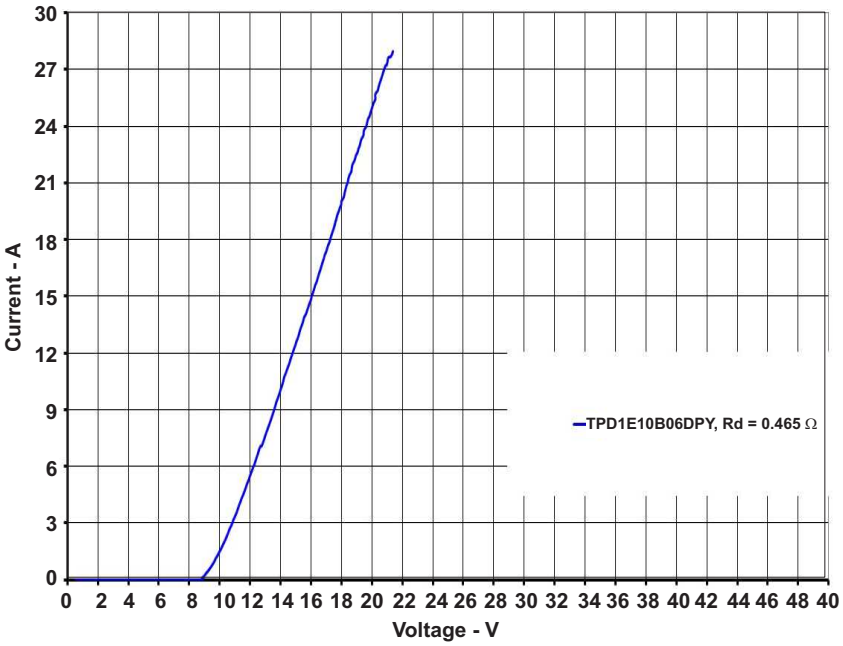


Figure 4. Clamping Voltage V_{TLP} = F(I_{TLP}), PIN2 to PIN1

PRODUCT PREVIEW

TYPICAL CHARACTERISTICS (continued)

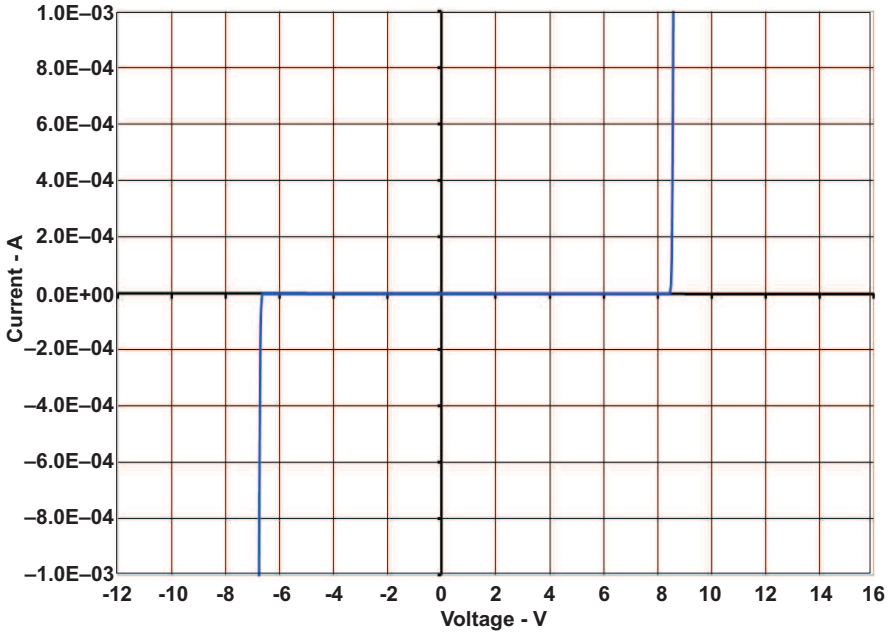


Figure 5. Breakdown Voltage Sweeping from Negative to Positive

PRODUCT PREVIEW

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/ Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
TPD1E10B06DPYR	PREVIEW	X2SON	DPY	2	10000	TBD	Call TI	Call TI	
TPD1E10B06DPYT	PREVIEW	X2SON	DPY	2	250	TBD	Call TI	Call TI	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
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Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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