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PESD5V5C1UL

Extremely low clamping unidirectional ESD protection diode



1. General description

Ultra low capacitance unidirectional ElectroStatic Discharge (ESD) protection diode, part of the TrEOS Protection family. This device is housed in a small leadless DFN1006-2 (SOD882-2) Surface-Mounted Device (SMD) plastic package. The combination of ultra low capacitance, high ESD maximum rating and ultra small package makes the device ideal for high-speed data lines protection.

2. Features and benefits

- Unidirectional ESD protection of one line
- IEC 61000-4-5 (surge): $I_{PP} = 8.7$ A peak pulse (average measured)
- Very low diode capacitance: $C_d = 0.6$ pF typical
- Extremely low clamping voltage to protect sensitive I/Os
- ESD protection up to ± 15 kV according to IEC 61000-4-2

3. Applications

- Cellular handsets and accessories
- Portable electronics
- Communication systems
- Computers and peripherals
- USB2.0, USB3.0 data lines at 5 Gbps

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25\text{ }^{\circ}\text{C}$		-	-	5.5	V
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	-	0.5	0.6	pF

[1] Measured from pin 1 to pin 2.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	Transparent top view DFN1006-2 (SOD882-2)	sym035
2	A	anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V5C1UL	DFN1006-2	Leadless ultra small plastic package; 2 terminals; body 1.0 x 0.6 x 0.47 mm	SOD882-2

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD5V5C1UL	8T

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8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
I_{PPM}	rated peak pulse current	$t_p = 8/20 \mu s$	[1]	-	6.5	A
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[2] [3]	-	15	kV
		ISO 10605: contact discharge; $C = 330 \text{ pF}$, $R = 330 \Omega$	[2] [3]	-	15	kV
		ISO 10605: contact discharge; $C = 150 \text{ pF}$, $R = 330 \Omega$	[2] [3]	-	15	kV

[1] Device stressed with $8/20 \mu s$ exponential decay waveform according to IEC 61000-4-5.

[2] Device stressed with ten non-repetitive ESD pulses.

[3] Measured from pin 1 to pin 2.

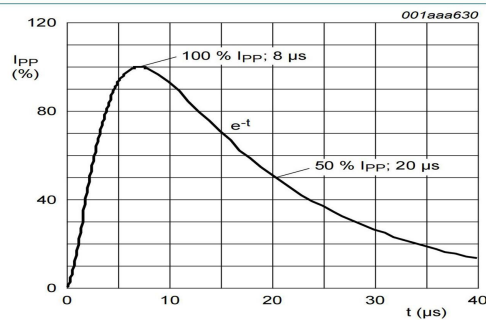


Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5

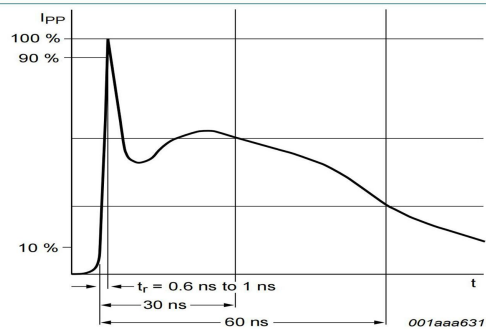


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	$T_{amb} = 25 \text{ }^{\circ}\text{C}$		-	-	5.5	V
V_{BR}	breakdown voltage	$I_R = 1 \text{ mA}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$	[1]	7	9	-	V
I_{RM}	reverse leakage current	$V_{RWM} = 5.5 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$	[1]	-	1	100	nA
C_d	diode capacitance	$f = 1 \text{ MHz}$; $V_R = 0 \text{ V}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$	[1]	-	0.5	0.6	pF
V_{CL}	clamping voltage	$I_{PP} = 8 \text{ A}$; $t_p = \text{TLP}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$	[2] [1]	-	3.5	-	V
R_{dyn}	dynamic resistance	$I_R = 10 \text{ A}$; $T_{amb} = 25 \text{ }^{\circ}\text{C}$	[2] [1]	-	0.3	-	Ω

[1] Measured from pin 1 to pin 2.

[2] Non-repetitive current pulse, Transmission Line Pulse (TLP) $t_p = 100 \text{ ns}$; square pulse; ANSI / ESD STM5.5.1-2008.

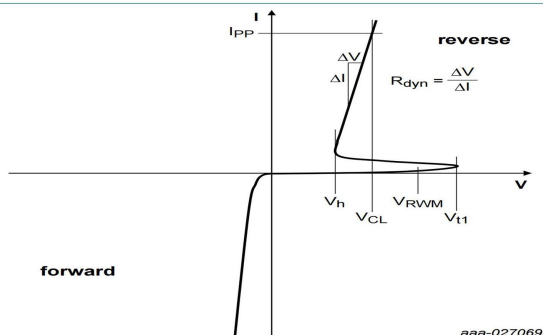


Fig. 3. Typical Transmission Line Pulse (TLP) characteristics for a unidirectional ESD protection device for data lines

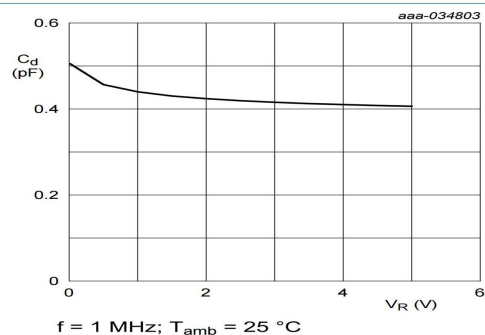
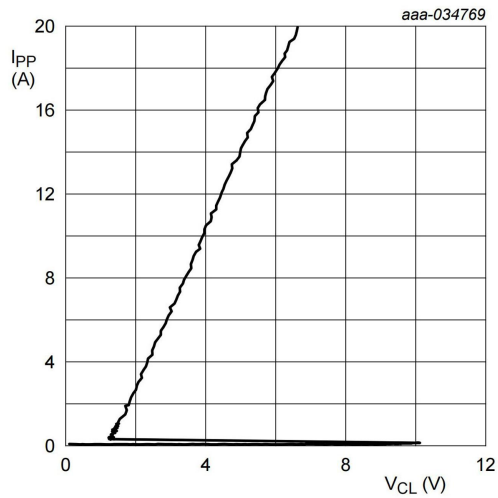


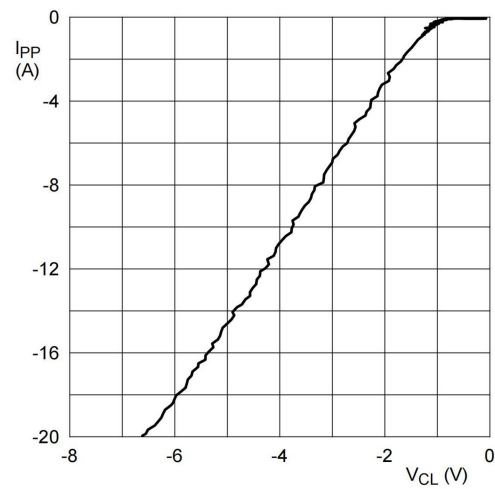
Fig. 4. Diode capacitance as a function of reverse voltage; typical values

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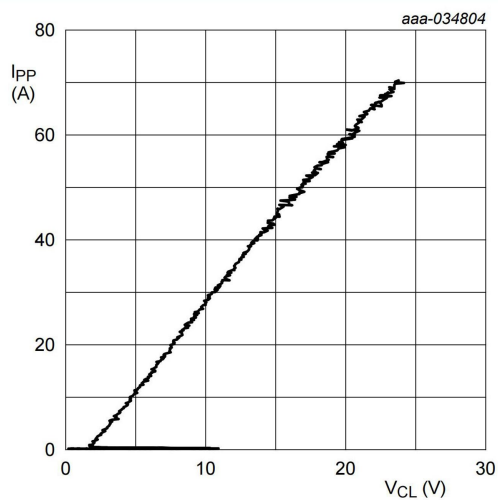
Transmission Line Pulse (TLP);
 $t_p = 100 \text{ ns}$; $t_r = 1 \text{ ns}$

Fig. 5. Dynamic resistance with positive clamping; typical values



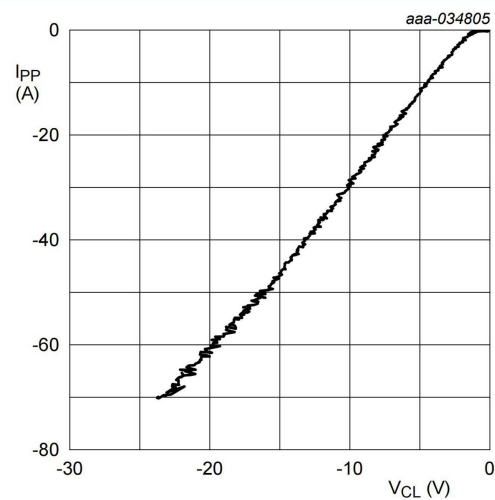
Transmission Line Pulse (TLP);
 $t_p = 100 \text{ ns}$; $t_r = 1 \text{ ns}$

Fig. 6. Dynamic resistance with negative clamping; typical values



Very-Fast Transmission Line Pulse (VF-TLP);
 $t_p = 5 \text{ ns}$; $t_r = 600 \text{ ps}$

Fig. 7. Dynamic resistance with positive clamping; typical values



Very-Fast Transmission Line Pulse (VF-TLP);
 $t_p = 5 \text{ ns}$; $t_r = 600 \text{ ps}$

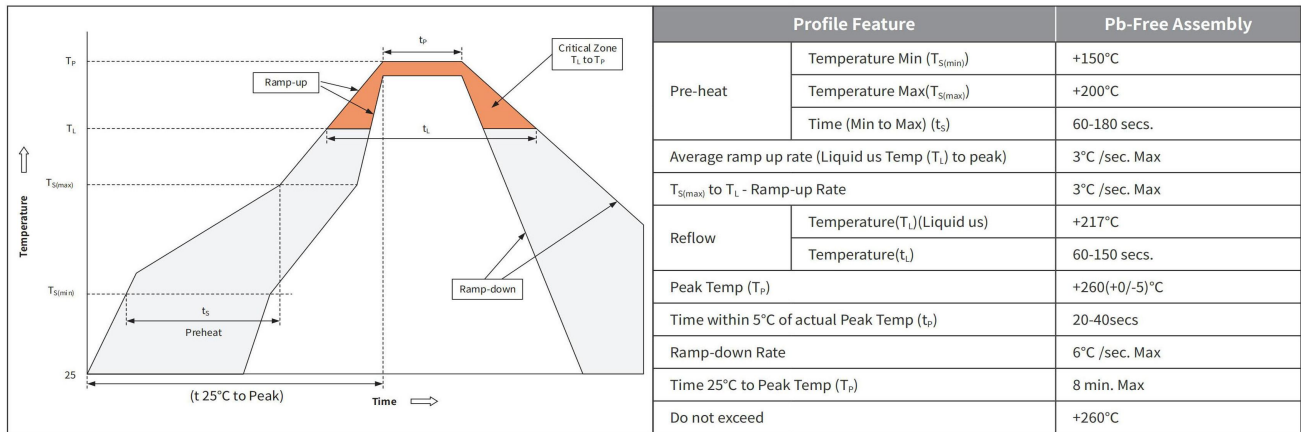
Fig. 8. Dynamic resistance with negative clamping; typical values

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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