

PESD5V0L1USF

Low capacitance unidirectional ESD protection diode

Rev. 1 — 12 July 2012 Product data sheet

1. Product profile

1.1 General description

Low capacitance unidirectional ElectroStatic Discharge (ESD) protection diode designed to protect one signal line from the damage caused by ESD and other transients. The device is encapsulated in a leadless super small DSN0603-2 (SOD962) Surface-Mounted Device (SMD) package.

1.2 Features and benefits

- ESD protection of one line
- Low diode capacitance C_d = 12 pF
- Super small SMD package
- Ultra low leakage current I_{RM} < 1 nA
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61643-321 (surge); I_{PPM} = 1.2 A

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics

1.4 Quick reference data

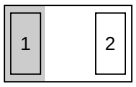
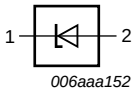
Table 1. Quick reference data

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage		-	-	5	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V	9	12	15	pF

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode [1]	 Transparent top view	 006aaa152
2	anode		

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0L1USF	DSN0603-2	leadless ultra small package; 2 terminals; body 0.6 × 0.3 × 0.3 mm	SOD962

4. Marking

Table 4. Marking codes

Type number	Marking code
PESD5V0L1USF	2

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5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
P_{PPM}	rated peak pulse power	t_p = 8/20 µs	[1][2]	-	11	W
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1][2]	-	1.2	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−55	+150	°C
T_{stg}	storage temperature			−65	+150	°C

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321.

[2] Measured from pin 1 to pin 2.

Table 6. ESD maximum ratings

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Max	Unit
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1][2]	-	30	kV
		IEC 61000-4-2 (air discharge)	[1][2]	-	30	kV
		machine model	[2]	-	400	V
		MIL-STD-883 (human body model)		-	10	kV

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

[2] Measured from pin 1 to pin 2.

Table 7. ESD standards compliance

Standard	Conditions
IEC 61000-4-2; level 4 (ESD)	> 15 kV (air); > 8 kV (contact)
MIL-STD-883; class 3B (human body model)	> 8 kV

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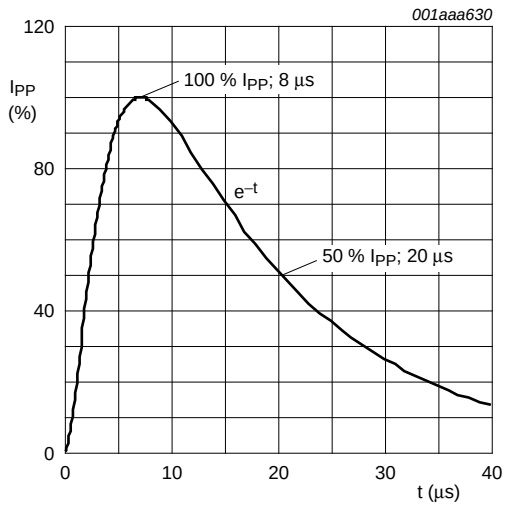


Fig 1. 8/20 µs pulse waveform according to IEC 61000-4-5 and IEC 61643-321

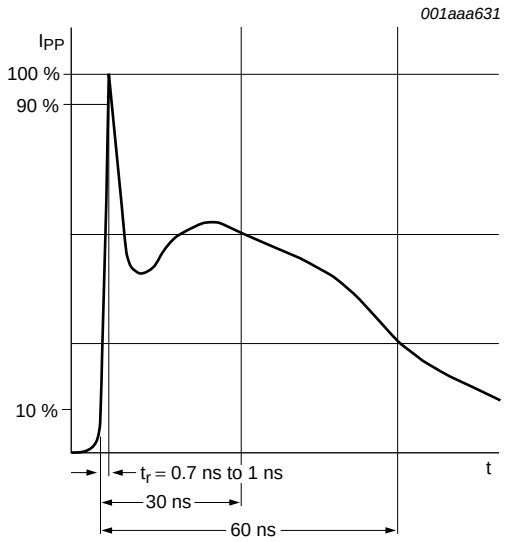


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

Table 8. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage			-	-	5	V
I_{RM}	reverse leakage current	V_{RWM} = 5 V		-	1	100	nA
V_{BR}	breakdown voltage	I_R = 1 mA		6	7	8	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V		9	12	15	pF
V_{CL}	clamping voltage	I_{PP} = 1 A	[1][2]	-	-	10.5	V
r_{dyn}	dynamic resistance	I_R = 10 A	[3]	-	1.2	-	Ω

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321.

[2] Measured from pin 1 to pin 2.

[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) t_p = 100 ns; square pulse; ANS/IESD STM5-1-2008.

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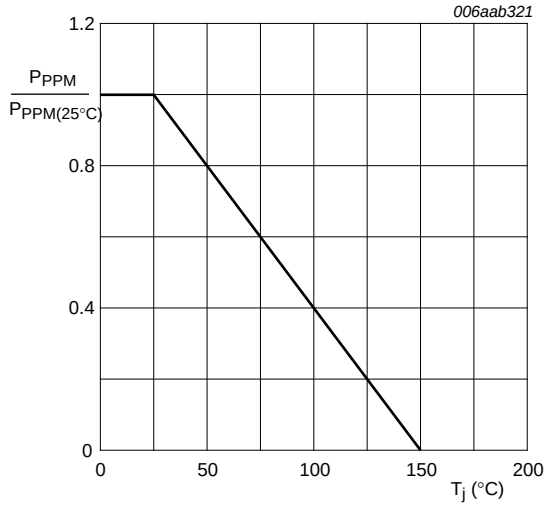
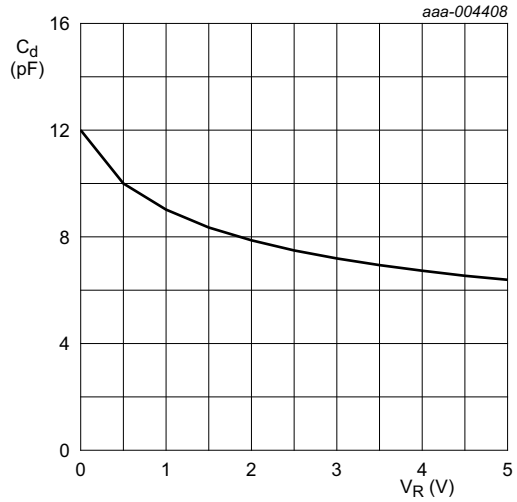


Fig 3. Relative variation of rated peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

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

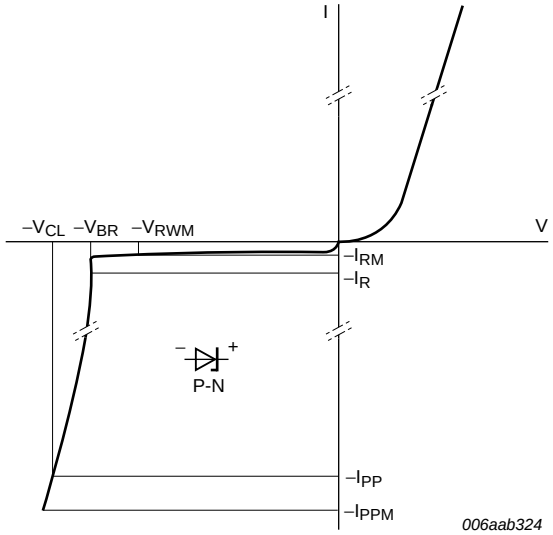


Fig 5. V-I characteristics for a unidirectional ESD protection diode

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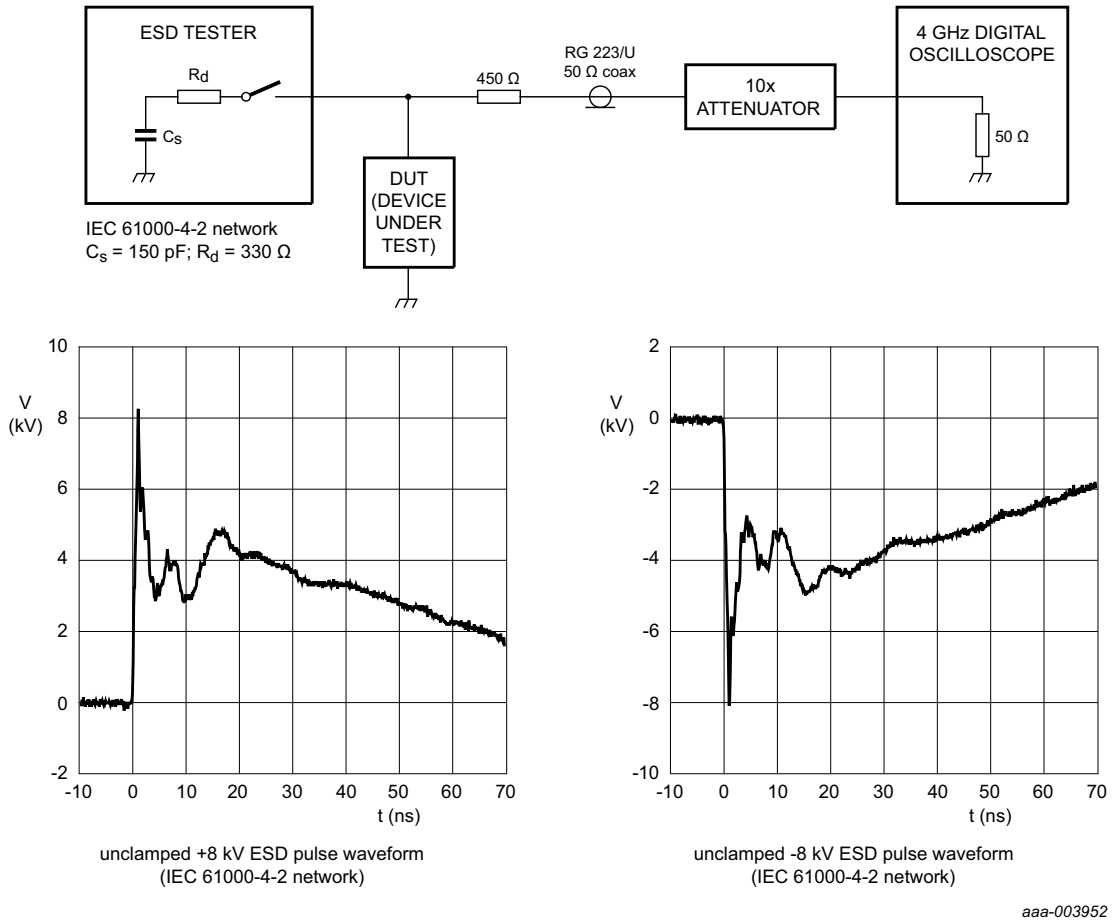


Fig 6. ESD clamping test setup

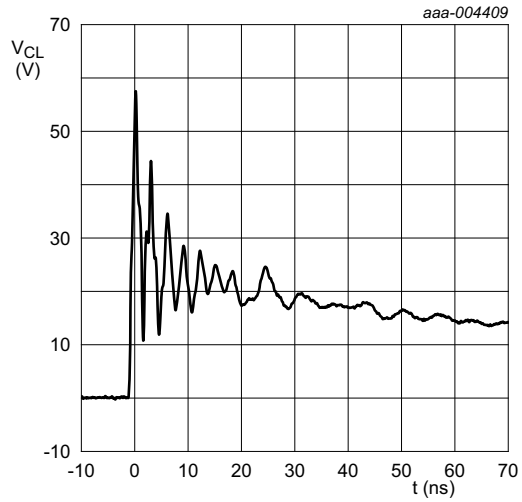


Fig 7. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

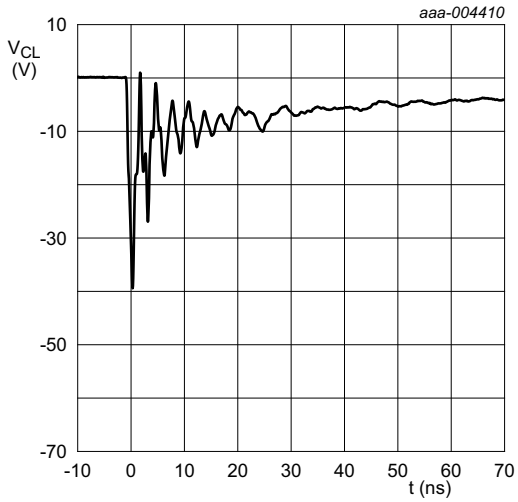


Fig 8. Clamped –8 kV pulse waveform (IEC 61000-4-2 network)

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7. Application information

The device is designed for the protection of one unidirectional data or signal line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are either positive or negative with respect to ground.

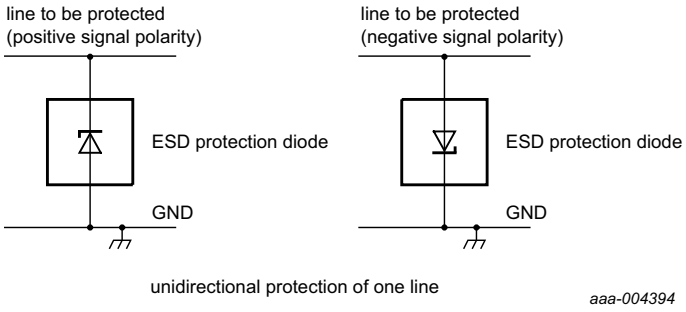


Fig 9. Application diagram

Circuit board layout and protection device placement

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

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8. Package outline

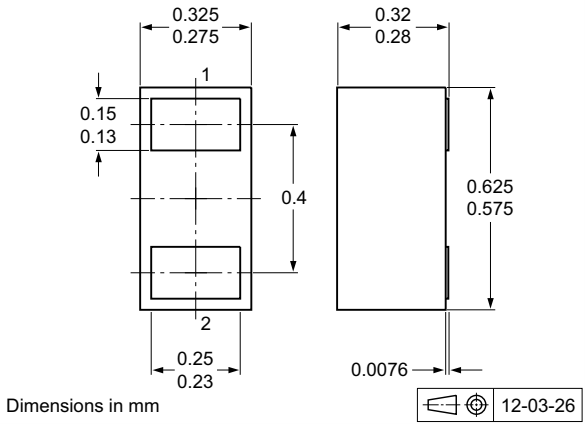


Fig 10. Package outline DSN0603-2 (SOD962)

9. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity
			9000
PESD5V0L1USF	DSN0603-2 (SOD962)	2 mm pitch, 8 mm tape and reel	-315

[1] For further information and the availability of packing methods, see Section 13.

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10. Soldering

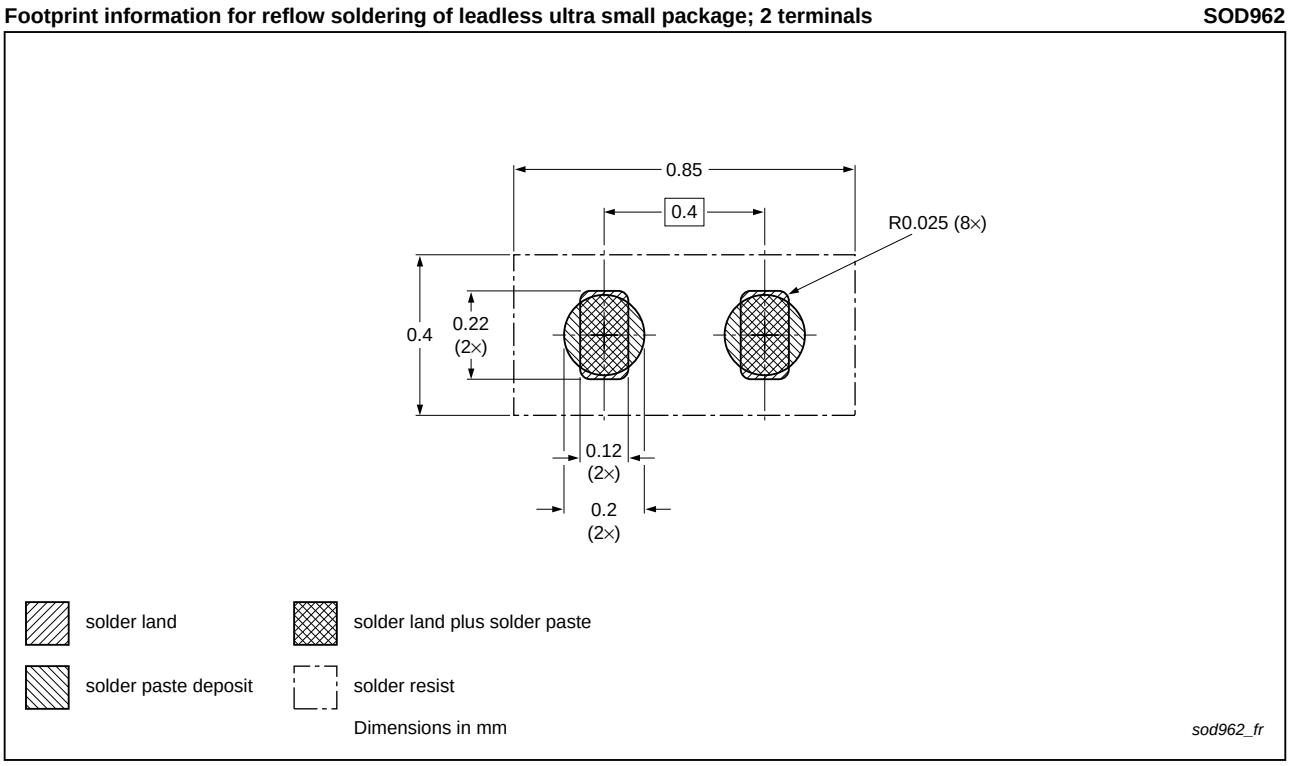


Fig 11. Reflow soldering footprint DSN0603-2 (SOD962)

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11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0L1USF v.1	20120712	Product data sheet	-	-

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Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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