PESD16VV1BSF

Extremely symmetrical bidirectional ESD protection diode

5 July 2018 **Product data sheet**

1. General description

Extremely symmetrical bidirectional ElectroStatic Discharge (ESD) protection diode. This device is housed in a DSN0603-2 (SOD962) leadless ultra small Surface-Mounted Device (SMD) package designed to protect one signal line from the damage caused by ESD and other transients.

2. Features and benefits

- Bidirectional ESD protection of one line
- Extremely symmetrical layout
- Very low diode capacitance C_d = 6.5 pF maximum values
- Low clamping to protect sensitive I/Os
- Low inductance protection path to ground
- ESD protection up to ±12 kV according to IEC 61000-4-2
- Ultra small SMD package

3. Applications

- Cellular handsets and accessories
- Portable electronics
- Communication systems
- Computers and peripherals

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage			-	-	16	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	5.7	6.5	pF
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1] [2]	-	-	1.3	A

[1] According to IEC 61000-4-5 and IEC 61643-321.
[2] In positive and negative direction.

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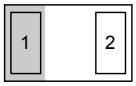
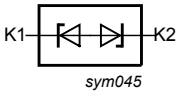
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 Transparent top view **DSN0603-2 (SOD962-2)**	
2	K2	cathode (diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD16VV1BSF	DSN0603-2	silicon, leadless ultra small package; 2 terminals; 0.4 mm pitch; 0.6 mm x 0.3 mm x 0.3 mm body	SOD962-2

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD16VV1BSF	W

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RWM}	reverse standoff voltage			-	16	V
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1] [2]	-	1.3	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-40	125	°C
T_{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[3]	-	12	kV

[1] According to IEC 61000-4-5 and IEC 61643-321.
[2] In positive and negative direction.
[3] Device stressed with ten non-repetitive ESD pulses.

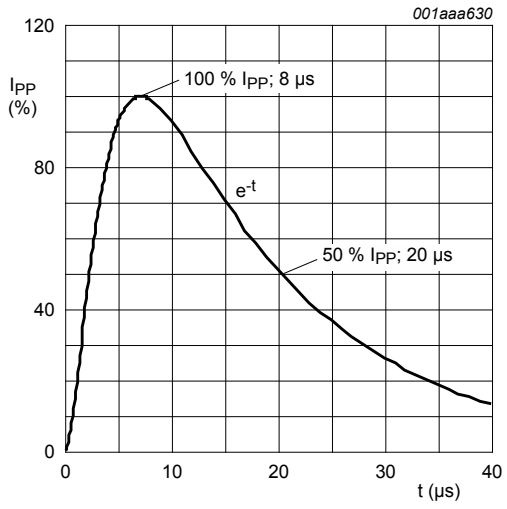


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

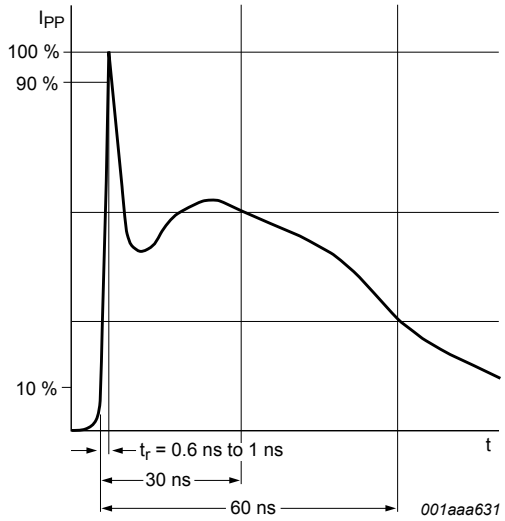


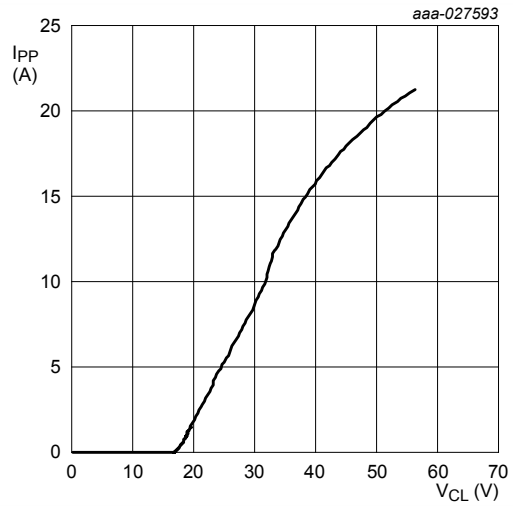
Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

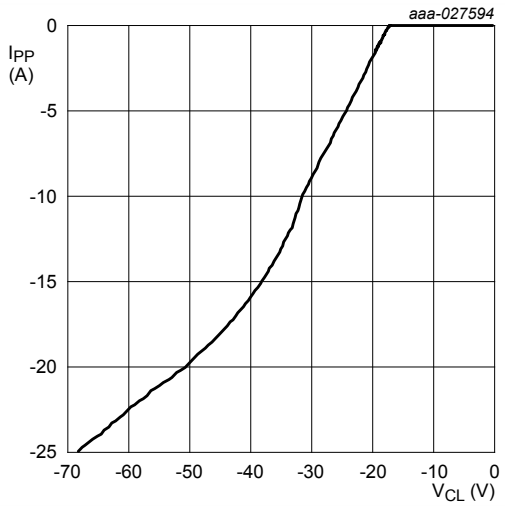
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{BR}	breakdown voltage	I_R = 1 mA; T_{amb} = 25 °C		16.2	18	-	V
I_{RM}	reverse leakage current	V_{RWM} = 16 V; T_{amb} = 25 °C		-	1	50	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	5.7	6.5	pF
V_{CL}	clamping voltage	I_{PP} = 1.3 A; t_p = 8/20 µs; T_{amb} = 25 °C	[1]	-	22.6	-	V
		I_{PP} = 8 A; t_p = TLP; T_{amb} = 25 °C	[2]	-	29	-	V
		I_{PP} = 16 A; t_p = TLP; T_{amb} = 25 °C	[2]	-	40.5	-	V
R_{dyn}	dynamic resistance	I_R = 10 A; T_{amb} = 25 °C	[2]	-	1.1	-	Ω
		I_R = -10 A; T_j = 25 °C	[2]	-	1.1	-	Ω
normalized to attenuation at 1 MHz							
f_{-3dB}	-3 dB cut-off frequency	T_{amb} = 25 °C		-	0.97	-	GHz

[1] According to IEC 61000-4-5 and IEC 61643-321.
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP) t_p = 100 ns; square pulse; ANSI / ESD STM5.5.1-2008.



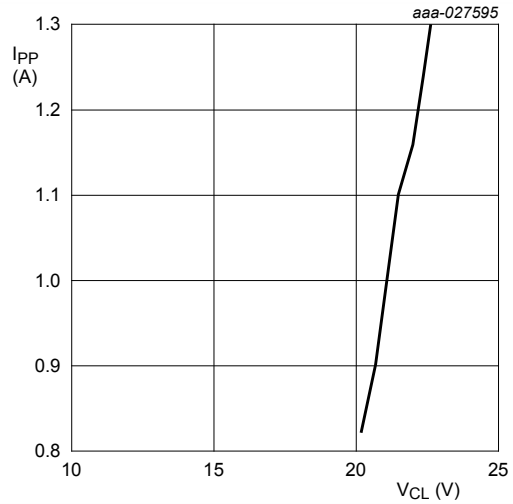
t_p = 100 ns; Transmission Line Pulse (TLP)

Fig. 3. Dynamic resistance with positive clamping; typical values



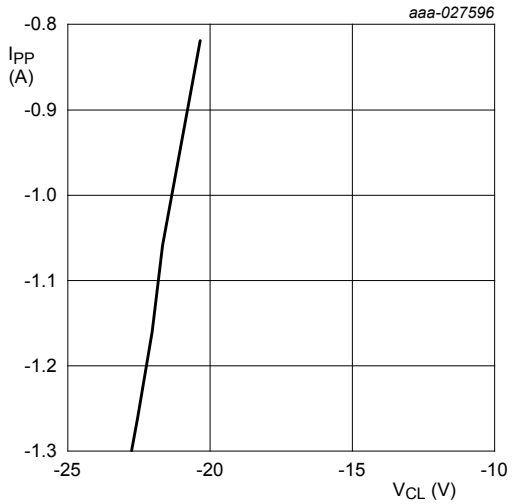
t_p = 100 ns; Transmission Line Pulse (TLP)

Fig. 4. Dynamic resistance with negative clamping; typical values



IEC 61000-4-5; t_p = 8/20 µs; positive pulse

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



IEC 61000-4-5; t_p = 8/20 µs; negative pulse

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

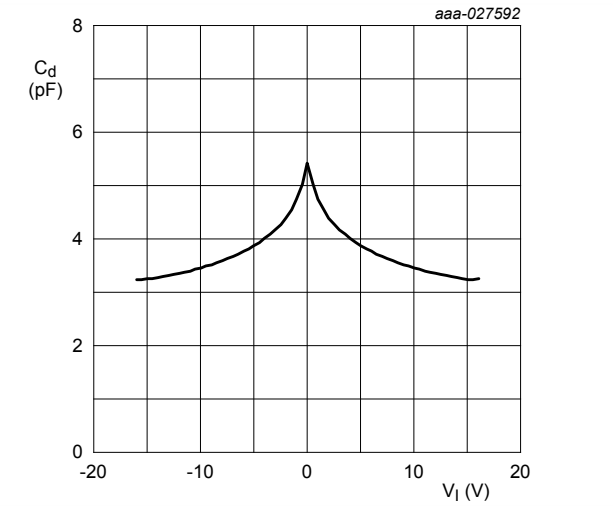


Fig. 7. Diode capacitance as a function of input voltage; typical values

10. Application information

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

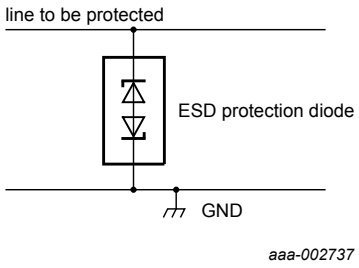


Fig. 8. Application diagram

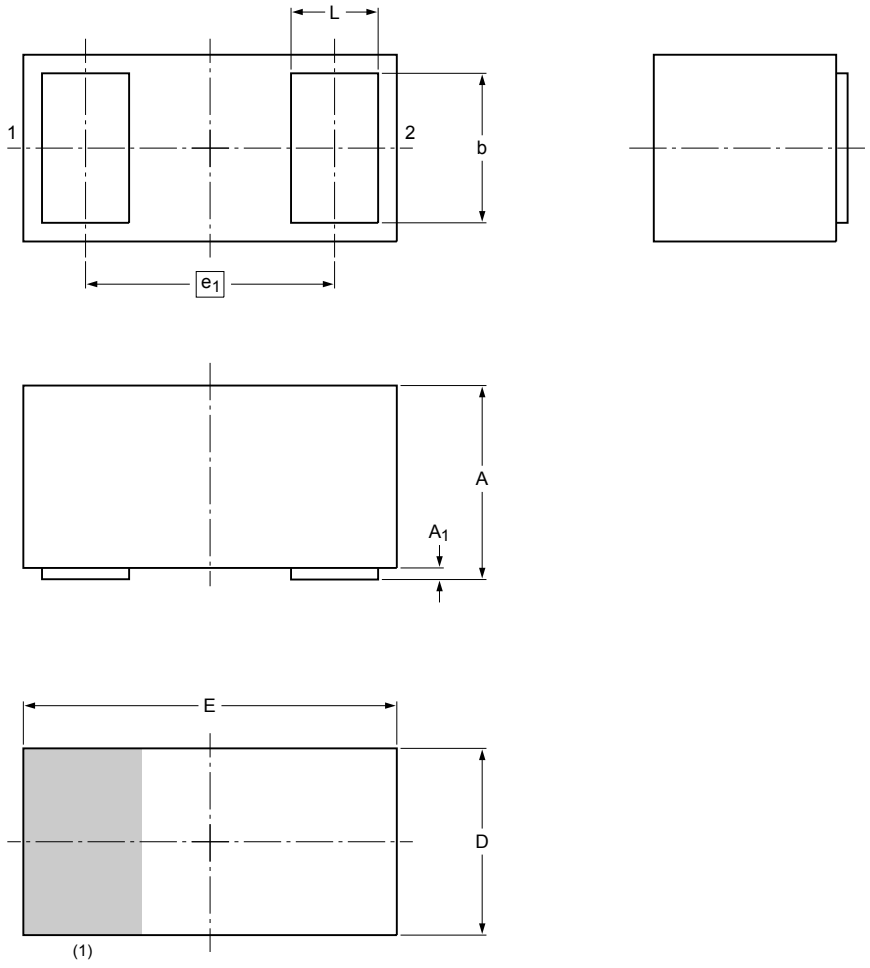
Circuit board layout and protection device placement

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.

11. Package outline

Leadless ultra small package; 2 terminals; body 0.6 x 0.3 x 0.3 mm **SOD962-2**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	D	E	e_1	L
mm	max	0.32	0.03	0.25	0.325	0.625		0.15
	nom						0.4	
	min	0.28		0.23	0.275	0.575		0.13

Note
1. The marking bar indicates the cathode.

sod962-2_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD962-2						~~13-07-12~~ 13-07-17

Fig. 9. Package outline DSN0603-2 (SOD962-2)

12. Soldering

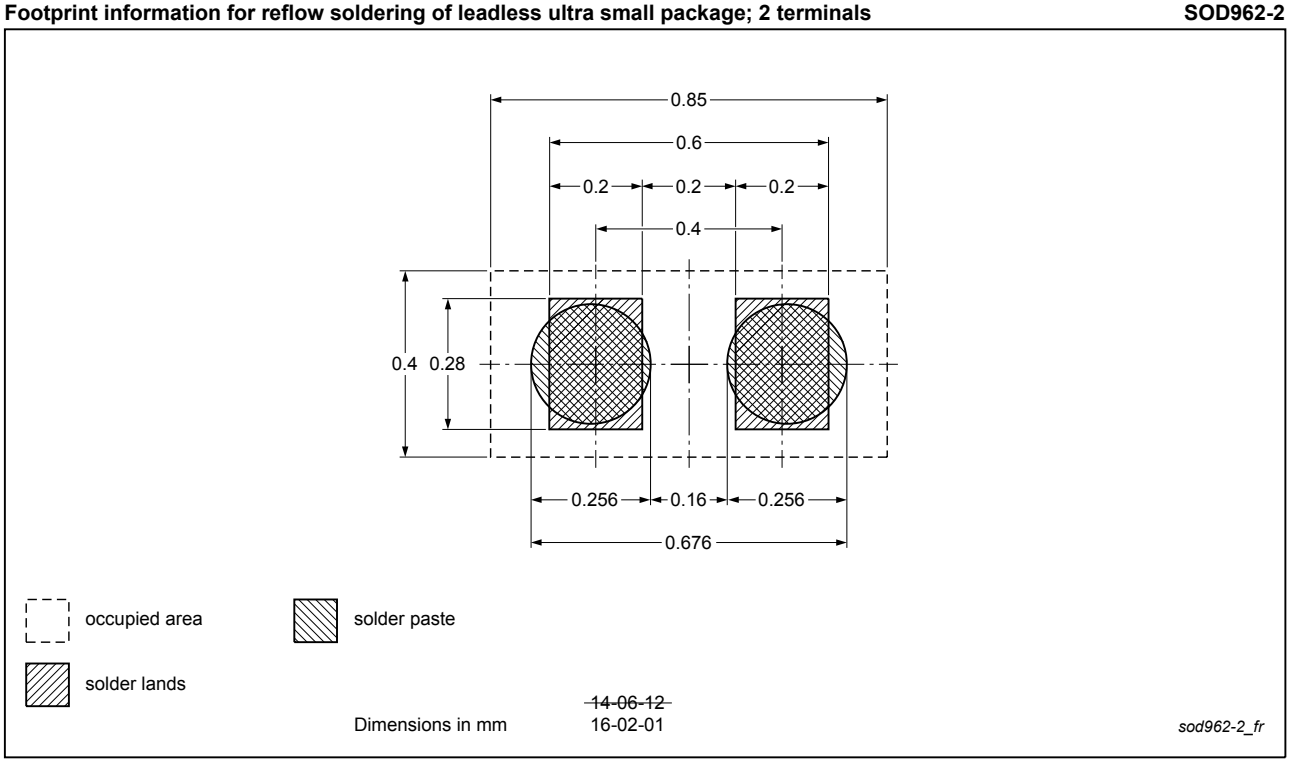


Fig. 10. Reflow soldering footprint for DSN0603-2 (SOD962-2)

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD16VV1BSF v.3	20180705	Product data sheet	-	PESD16VV1BSF v.2
Modifications:	• Characteristics: corrected V_{RWM} as a condition of I_{RM}			
PESD16VV1BSF v.2	20180420	Product data sheet	-	PESD16VV1BSF v.1
PESD16VV1BSF v.1	20180404	Product data sheet	-	-

14. Legal information

Data sheet status

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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