PESD5V0V1BB

Very low capacitance bidirectional ESD protection diode

5 July 2018 **Product data sheet**

1. General description

Very low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in an ultra-small and flat lead SOD523 Surface-Mounted Device (SMD) plastic 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
- Very low diode capacitance: C_d = 11 pF
- Max. peak pulse power: P_{PPM} = 45 W
- Low clamping voltage: V_{CL} = 12.5 V
- Ultra low leakage current: I_{RM} < 1 nA
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PPM} = 4.8 A
- AEC-Q101 qualified

3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- SIM card protection
- Communication systems
- Portable electronics
- 10/100 Mbit/s Ethernet

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	5	V
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	11	13	pF

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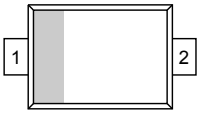
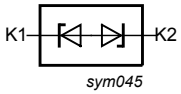
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 SOD523	 sym045
2	K2	cathode (diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0V1BB	SOD523	plastic, surface-mounted package; 2 leads; 1.2 mm x 0.8 mm x 0.6 mm body	SOD523

7. Marking

Table 4. Marking codes

Type number	Marking code
PESD5V0V1BB	Z9

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
P_{PPM}	rated peak pulse power	t_p = 8/20 µs	[1]	-	45	W
I_{PPM}	rated peak pulse current		[1]	-	4.8	A
Per device						
T_j	junction temperature			-	150	°C
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]	-	30	kV
		machine model		-	2	kV
		MIL-STD-883 (human body model)		-	16	kV

[1] Non-repetitive current pulse 8/20 µs exponentially decaying waveform according to IEC 61000-4-5
[2] Device stressed with ten non-repetitive ESD pulses.

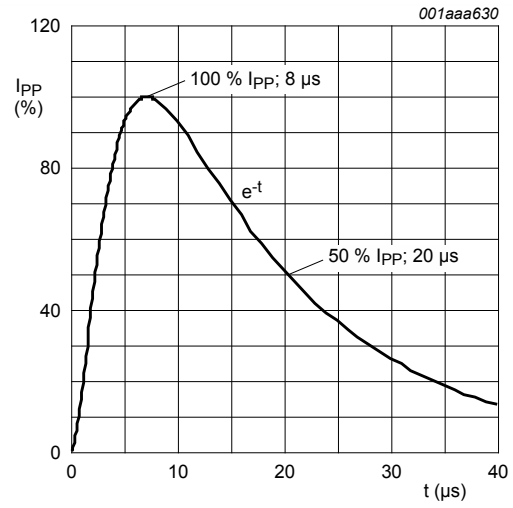


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

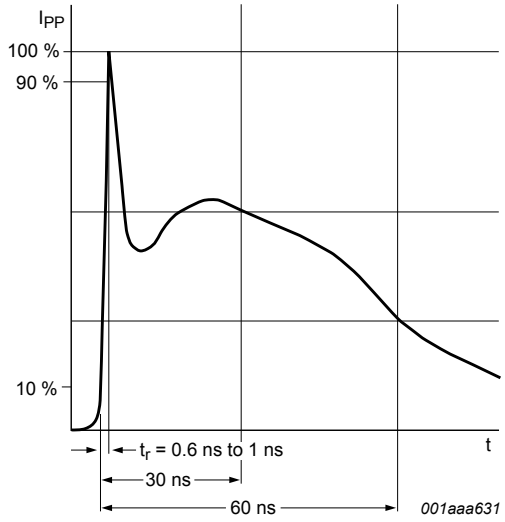


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	5	V
V_{BR}	breakdown voltage	I_R = 5 mA; T_{amb} = 25 °C		5.8	6.8	7.8	V
I_{RM}	reverse leakage current	V_{RWM} = 5 V; T_{amb} = 25 °C		-	1	10	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	11	13	pF
V_{CL}	clamping voltage	I_{PP} = 4.8 A; T_{amb} = 25 °C	[1]	-	-	12.5	V
R_{dyn}	dynamic resistance	I_R = 10 A; T_{amb} = 25 °C	[2]	-	0.2	-	Ω
r_{dif}	differential resistance	I_R = 5 mA; T_{amb} = 25 °C		-	-	35	Ω

[1] Non-repetitive current pulse 8/20 µs exponentially decaying waveform according to IEC 61000-4-5
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP) t_p = 100 ns; square pulse; ANSI/ESD STM5.5.1-2008

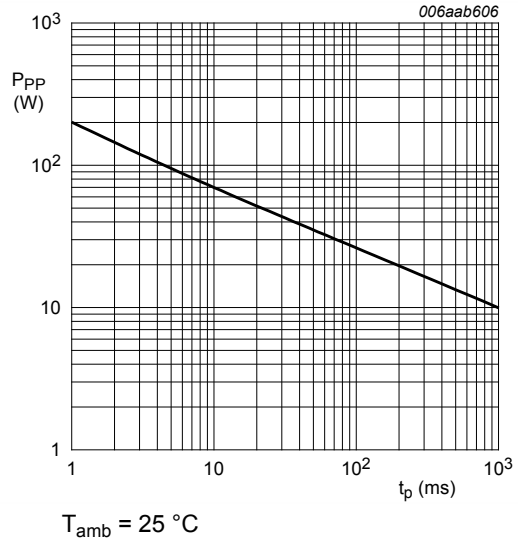


Fig. 3. Peak pulse power as a function of exponential pulse duration; typical values

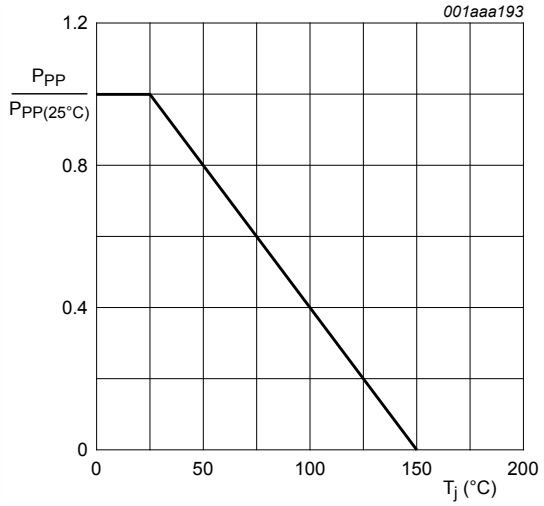
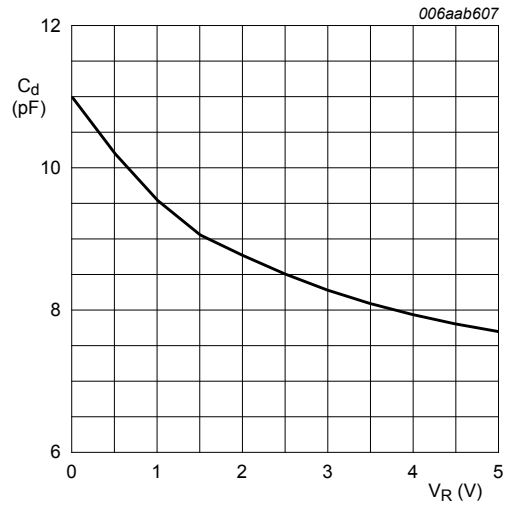


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig. 5. Diode capacitance as a function of reverse voltage; typical values

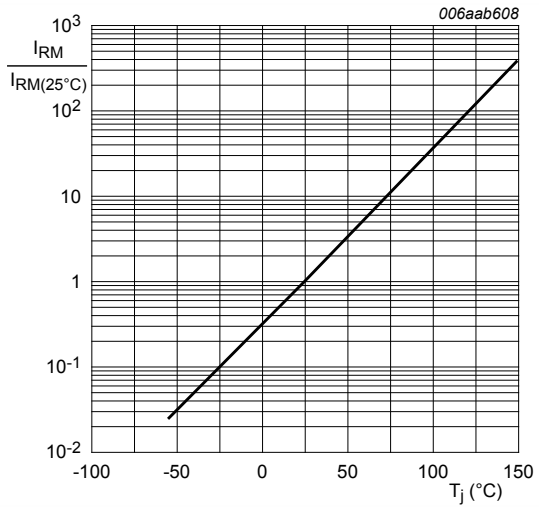


Fig. 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

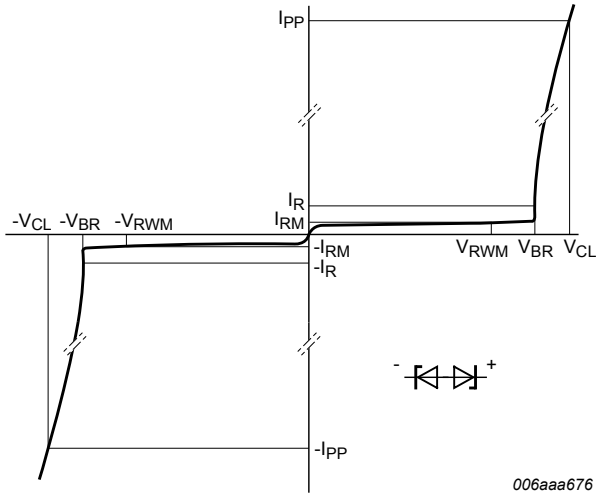


Fig. 7. V-I characteristics for a bidirectional ESD protection diode

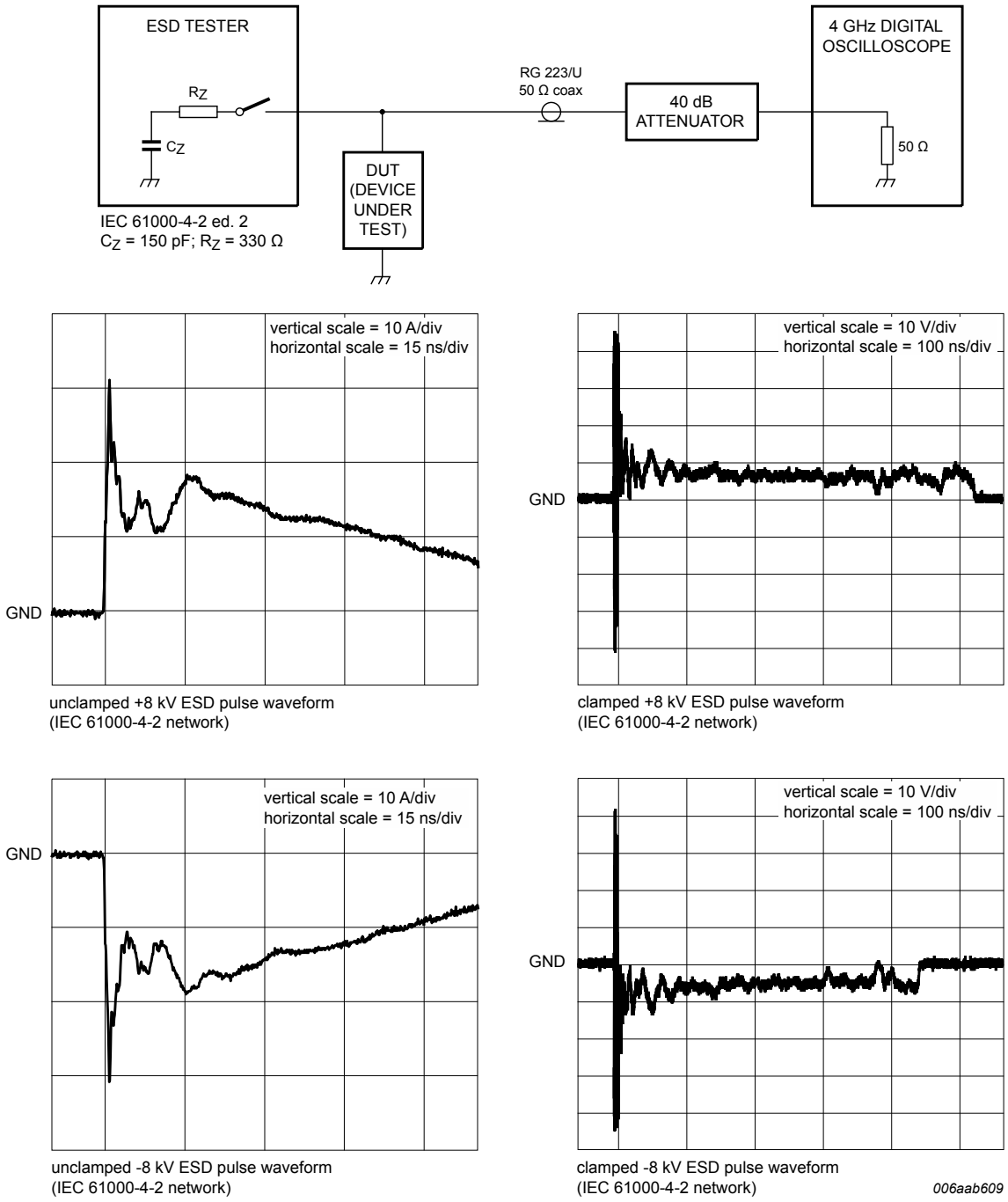


Fig. 8. ESD clamping test setup and waveforms

10. Application information

The device is designed for the protection of one bidirectional data or signal line from the damage caused by ESD and/or other surge pulses. The device may be used on lines where the signal polarities are both, positive and negative with respect to ground. It provides a surge capability of 45 W per line for an 8/20 µs waveform.

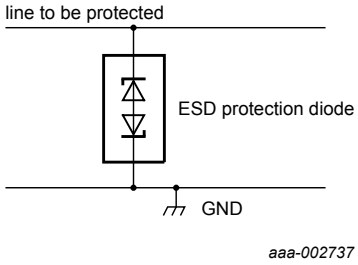


Fig. 9. Application diagram

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. Avoid running protected conductors in parallel with unprotected conductors.
4. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
5. Minimize the length of the transient return path to ground.
6. Avoid using shared transient return paths to a common ground point.
7. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

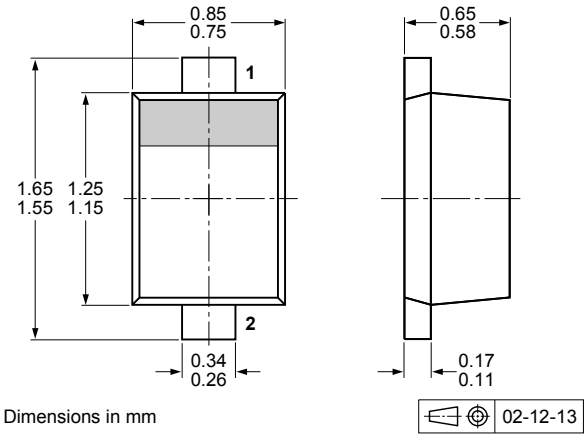


Fig. 10. Package outline SOD523

13. Soldering

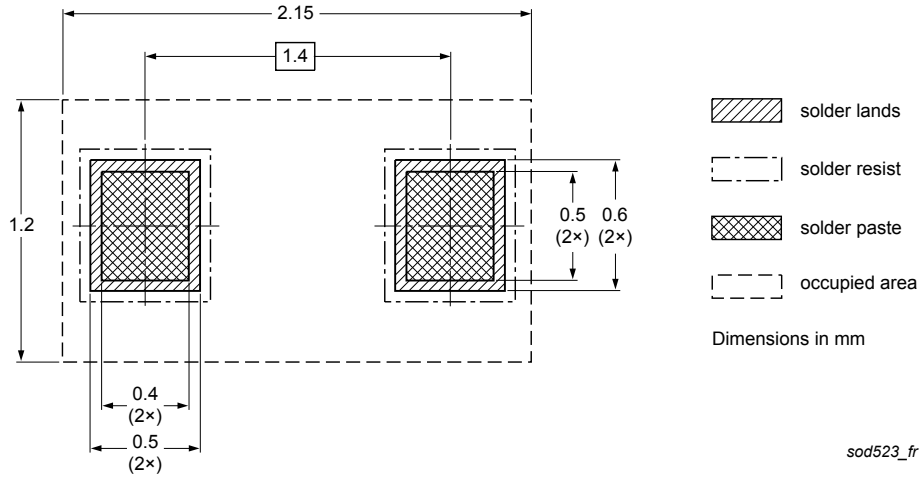


Fig. 11. Reflow soldering footprint for SOD523

14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0V1BB v.1	20180705	Product data sheet	-	PESD5V0V1BA _BB_BL v.2
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia • Legal texts have been adapted to the new company name where appropriate			

15. 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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Date of release: 5 July 2018

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