Product profile

General description

PESD1LIN in a very small SOD323 (SC-76) Surface-Mounted Device (SMD) plastic package designed to protect one automotive Local Interconnect Network (LIN) bus line from the damage caused by ElectroStatic Discharge (ESD) and other transients.

Features and benefits

- ESD protection of one automotive LIN-bus line
- Asymmetrical diode configuration ensures an optimized protection against ElectroMagnetic Interferences (EMI) of a LIN Electronic Control Unit (ECU)
- Max. peak pulse power: P_{PP} = 160 W at t_p = 8/20 μs
- Low clamping voltage: V_{CL} = 40 V at I_{PP} = 1 A
- Ultra low leakage current: I_{RM} < 1 nA
- ESD protection of up to 23 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PP} = 3 A at t_p = 8/20 μs
- AEC-Q101 qualified

Applications

- LIN-bus protection
- Automotive applications

Quick reference data

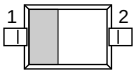
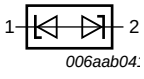
Table 1. Quick reference data

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage					
	PESD1LIN (15 V)		-	-	15	V
	PESD1LIN (24 V)		-	-	24	V
C_d	diode capacitance	V_R = 0 V; f = 1 MHz	-	13	17	pF

Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode 1 (15 V)		
2	cathode 2 (24 V)		

Limiting values

Table 3. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
P_{PP}	peak pulse power	t_p = 8/20 μs	[1]	-	160	W
I_{PP}	peak pulse current	t_p = 8/20 μs	[1]	-	3	A
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−65	+150	°C
T_{stg}	storage temperature			−65	+150	°C

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.

Table 4. ESD maximum ratings

Symbol	Parameter	Conditions		Min	Max	Unit
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1]	-	23	kV
		MIL-STD-883 (human body model)		-	10	kV

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

Table 5. ESD standards compliance

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

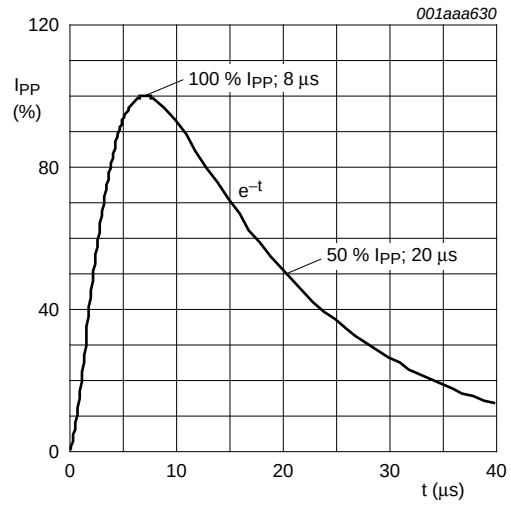


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5

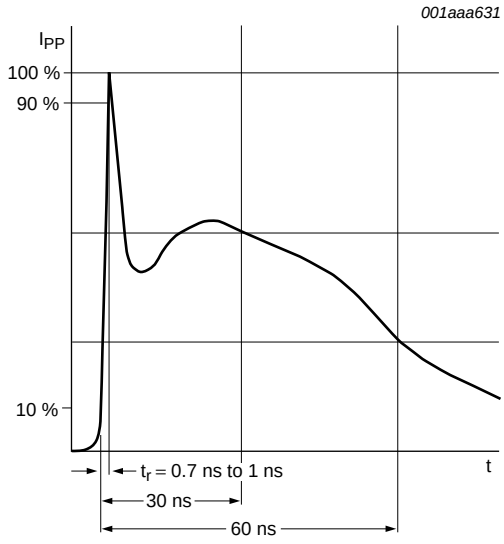


Fig 2. ESD pulse waveform according to IEC 61000-4-2

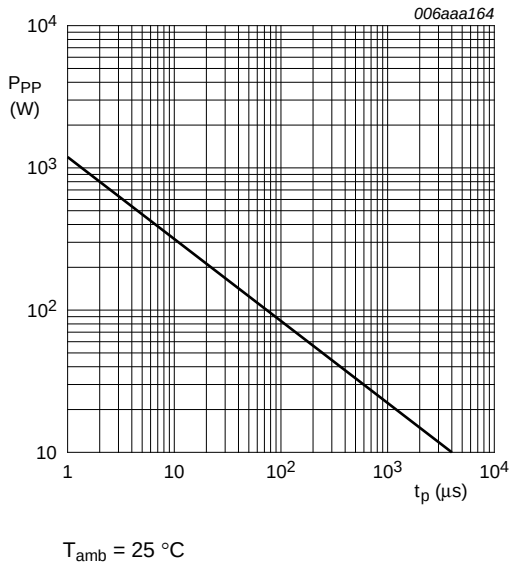
Characteristics

Table 6. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage					
	PESD1LIN (15 V)		-	-	15	V
	PESD1LIN (24 V)		-	-	24	V
I_{RM}	reverse leakage current					
	PESD1LIN (15 V)	V_{RWM} = 15 V	-	< 1	50	nA
	PESD1LIN (24 V)	V_{RWM} = 24 V	-	< 1	50	nA
V_{BR}	breakdown voltage	I_R = 5 mA				
	PESD1LIN (15 V)		17.1	18.9	20.3	V
	PESD1LIN (24 V)		25.4	27.8	30.3	V
C_d	diode capacitance	V_R = 0 V; f = 1 MHz	-	13	17	pF
V_{CL}	clamping voltage	[1]				
	PESD1LIN (15 V)	I_{PP} = 1 A	-	-	25	V
		I_{PP} = 5 A	-	-	44	V
	PESD1LIN (24 V)	I_{PP} = 1 A	-	-	40	V
		I_{PP} = 3 A	-	-	70	V
r_{dif}	differential resistance					
	PESD1LIN (15 V)	I_R = 1 mA	-	-	225	Ω
	PESD1LIN (24 V)	I_R = 1 mA	-	-	300	Ω

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.



T_{amb} = 25 °C

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

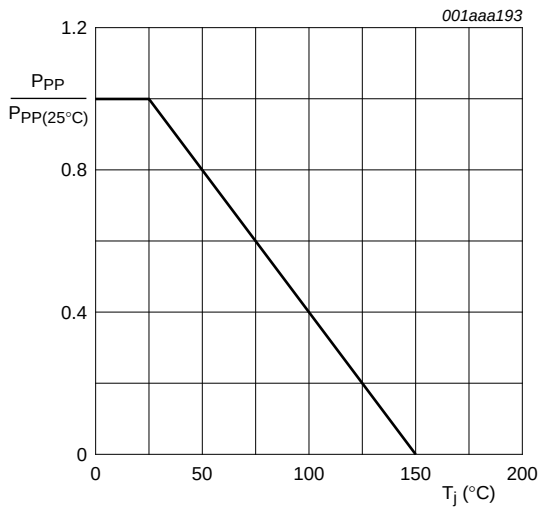


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values

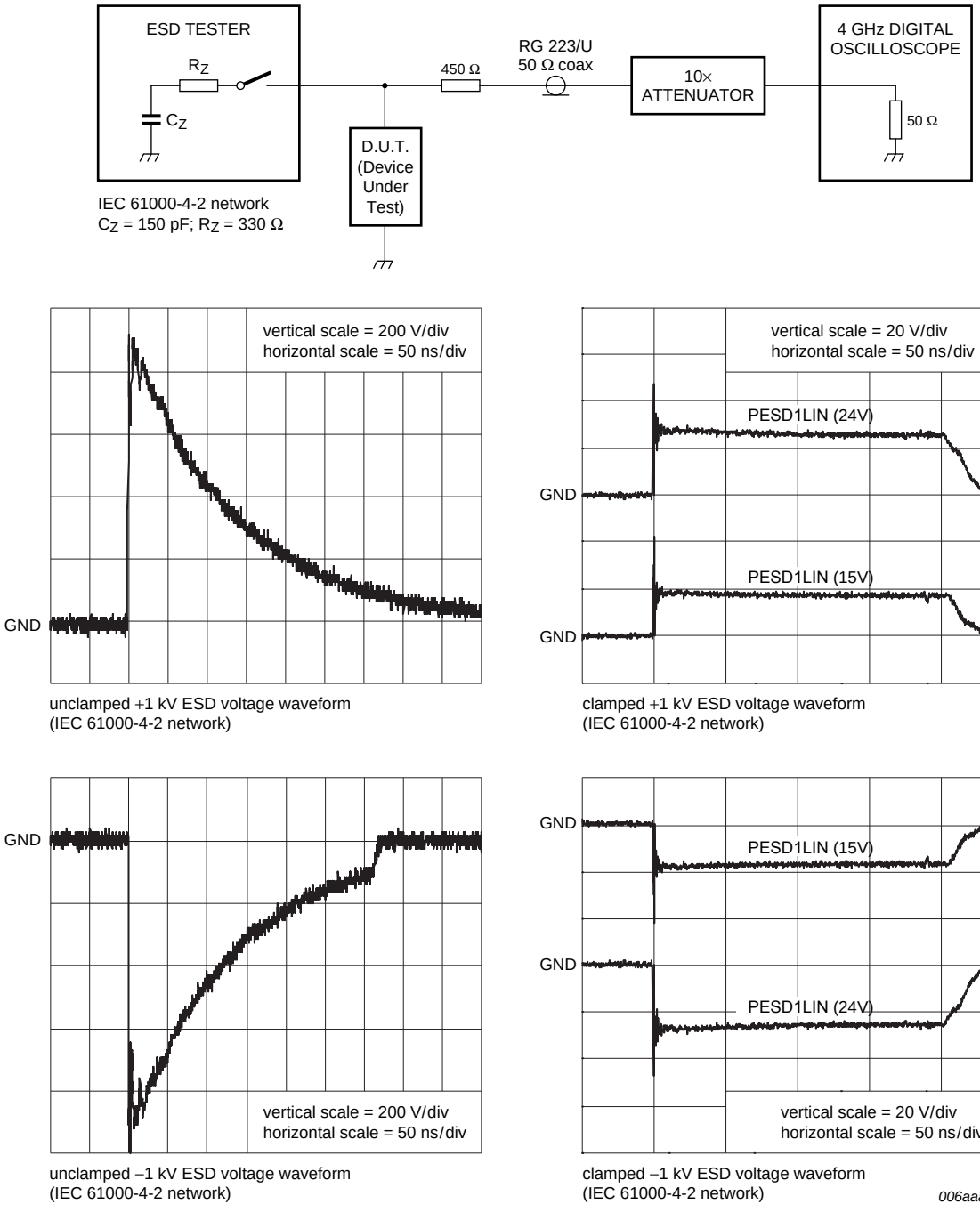


Fig 5. ESD clamping test setup and waveforms

Application information

The PESD1LIN is designed for the protection of one LIN-bus signal line from the damage caused by ESD and surge pulses. The PESD1LIN provides a surge capability of up to 160 W per line for a 8/20 μs waveform.

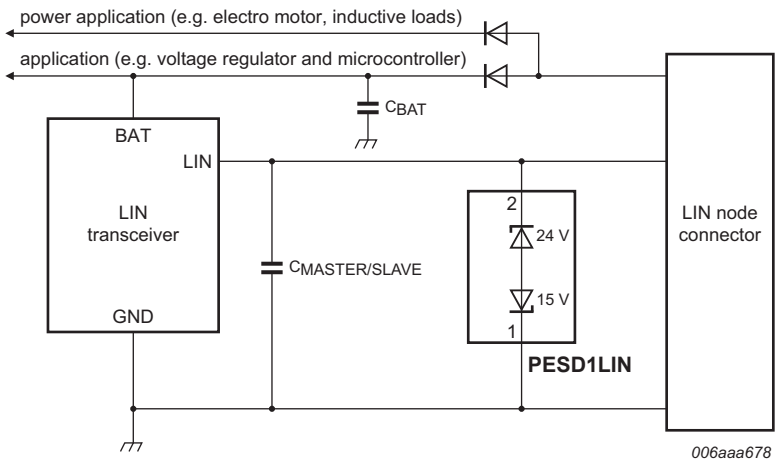


Fig 6. Typical application: ESD protection of one automotive LIN-bus line

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 PESD1LIN as close to the input terminal or connector as possible.
2. The path length between the PESD1LIN and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protection conductors in parallel with unprotected conductor.
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. Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

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.

Package outline

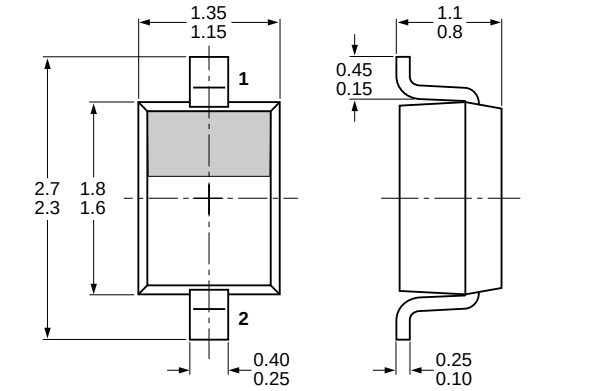


Fig 7. Package outline SOD323 (SC-76)

Soldering

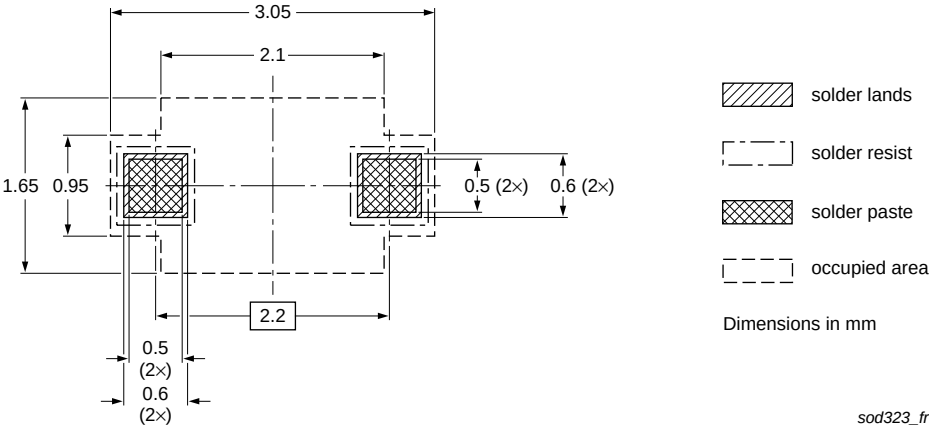


Fig 8. Reflow soldering footprint SOD323 (SC-76)

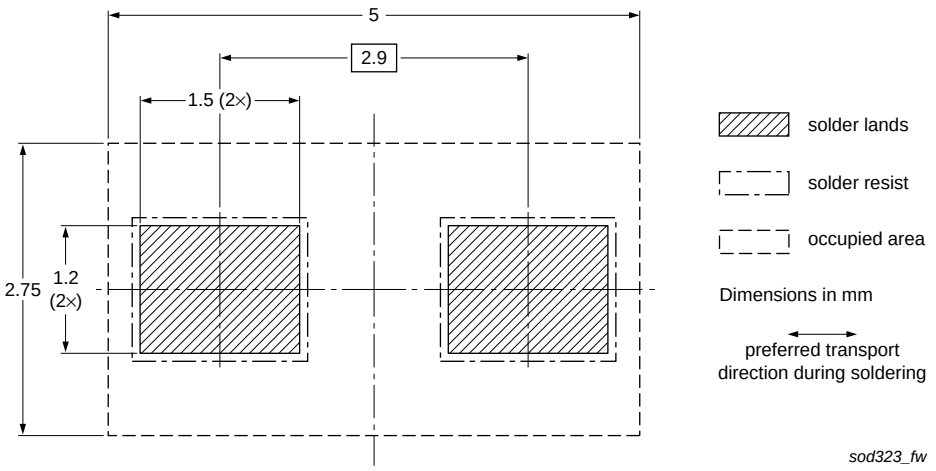


Fig 9. Wave soldering footprint SOD323 (SC-76)

Marking



Ordering information

Order code	Package	Base qty	Delivery mode
PESD1LIN(24V)	SOD-323	3000	Tape and reel