PTVS4V5D1BL-Q

Ultra compact Transient Voltage Supressor

5 June 2023 **Product data sheet**

1. General description

Transient voltage supressor in a DFN1006-2 (SOD882) ultra small and leadless Surface-Mounted Device (SMD) package designed to protect one line against high surge currents and other transients.

2. Features and benefits

- Bidirectional ESD protection of one line
- Very high surge robustness; I_{PP} = 38.3 A for 8/20 µs pulse (average measured)
- Very low clamping voltage: V_{CL}= 10.3 V typ. for 34 A, 8/20 µs pulse
- ESD protection up to 30 kV
- Very low dynamical resistance R_{dyn} = 0.1 Ohm (TLP)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

Surge protection for:

- supply and battery lines
- audio interfaces

in portable communication, consumer and computing devices.

4. Quick reference data

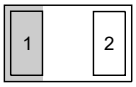
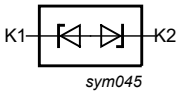
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{PPM}	rated peak pulse current	t_p = 8/20 µs	[1]	-	-	34	A
V_{CL}	clamping voltage	I_{PPM} = 34 A; t_p = 8/20 µs; T_{amb} = 25 °C	[1]	-	10.3	13.2	V
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	4.5	V

[1] In accordance with IEC 61000-4-5 (8/20 µs current waveform).

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 Transparent top view **DFN1006-2 (SOD882)**	
2	K2	cathode (diode 2)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PTVS4V5D1BL-Q	DFN1006-2	plastic, leadless ultra small package; 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.48 mm body	SOD882

7. Marking

Table 4. Marking codes

Type number	Marking code
PTVS4V5D1BL-Q	J5

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 µs	[1]	-	34	A
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
		IEC 61000-4-2; air discharge	[2]	-	30	kV

[1] In accordance with IEC 61000-4-5 (8/20 µs current waveform).
[2] Device stressed with ten non-repetitive ESD pulses.

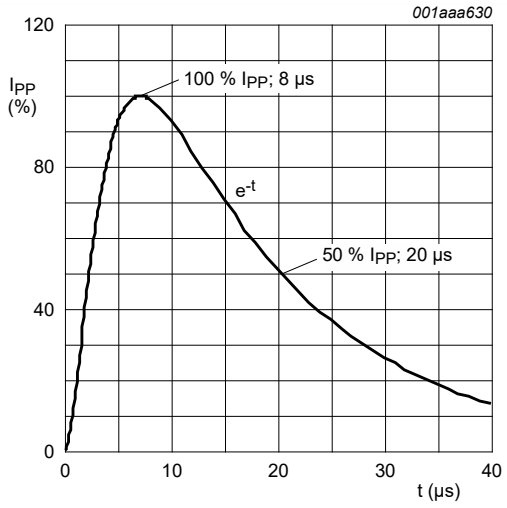


Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5

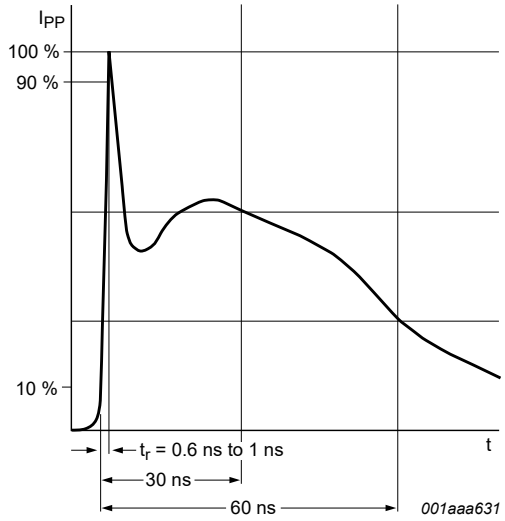


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage	T_{amb} = 25 °C		-	-	4.5	V
V_{BR}	breakdown voltage	I_R = 1 mA; T_{amb} = 25 °C		4.7	-	-	V
I_{RM}	reverse leakage current	V_R = 4.5 V; T_{amb} = 25 °C		-	0.1	50	nA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C		-	65	78	pF
V_{CL}	clamping voltage	I_{PP} = 1 A; t_p = 8/20 µs; T_{amb} = 25 °C	[1]	-	5.8	9.2	V
		I_{PPM} = 34 A; t_p = 8/20 µs; T_{amb} = 25 °C	[1]	-	10.3	13.2	V
		I_{PP} = 16 A; t_p = 100 ns; T_{amb} = 25 °C	[2]	-	7.5	-	V
R_{dyn}	dynamic resistance	I_R = 10 A; t_p = 100 ns; T_{amb} = 25 °C	[2]	-	0.1	-	Ω

[1] In accordance with IEC 61000-4-5 (8/20 µs current waveform).
[2] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI/ESD STM5.5.1-2008

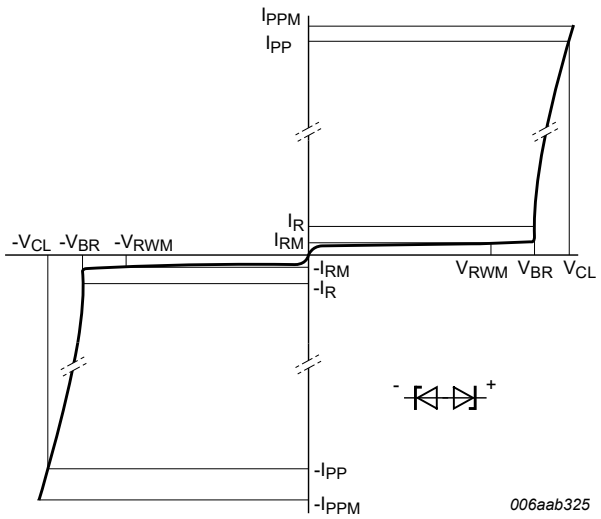
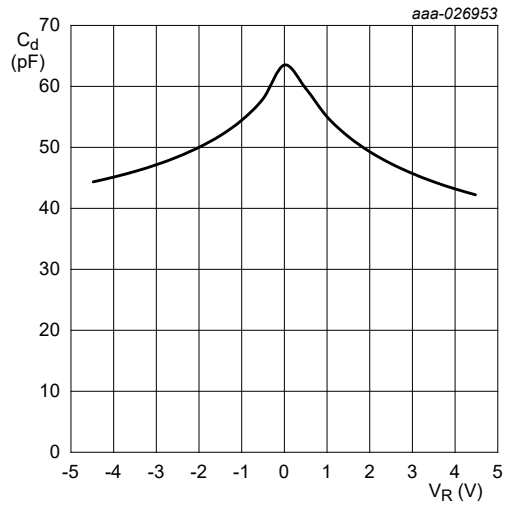
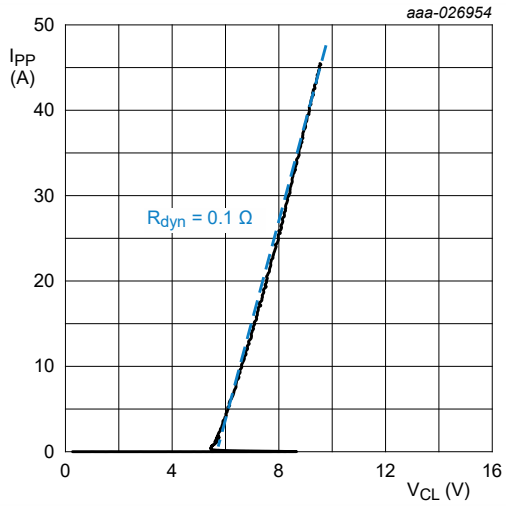


Fig. 3. V-I characteristics for a bidirectional ESD protection diode



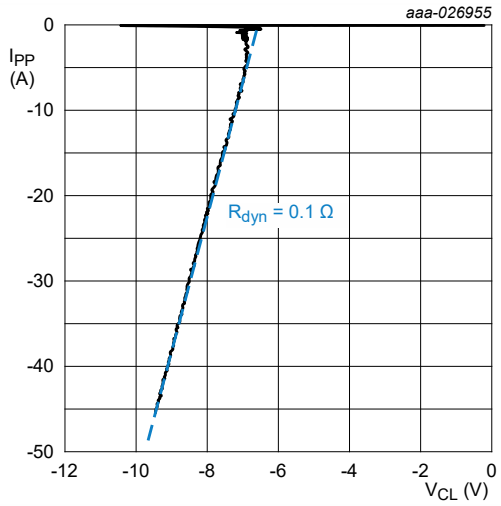
f = 1 MHz; T_{amb} = 25 °C

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



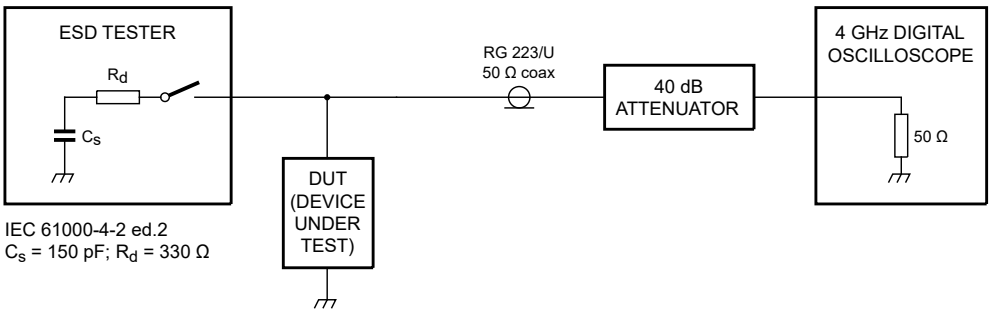
Transmission Line Pulse (TLP);
tp = 100 ns; tr = 1 ns

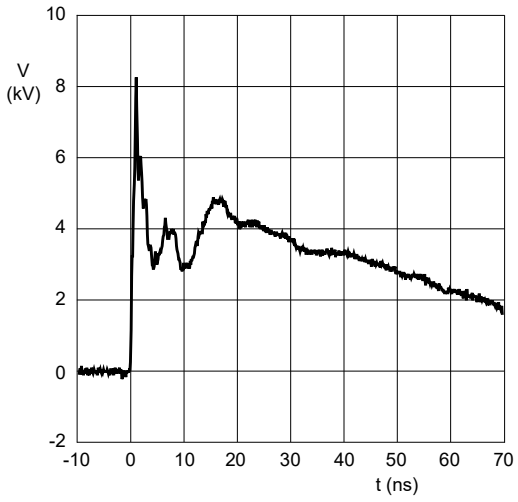
Fig. 5. Positive clamping voltage (TLP); typical values



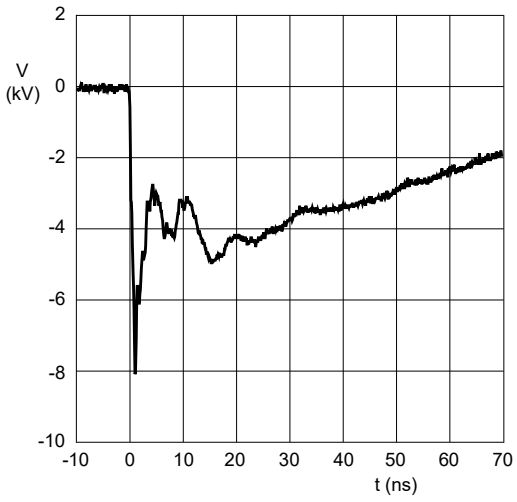
Transmission Line Pulse (TLP);
tp = 100 ns; tr = 1 ns

Fig. 6. Negative clamping voltage (TLP); typical values





unclamped +8 kV ESD pulse waveform
(IEC 61000-4-2 network)



unclamped -8 kV ESD pulse waveform
(IEC 61000-4-2 network)

aaa-003952

Fig. 7. ESD clamping test setup and waveforms

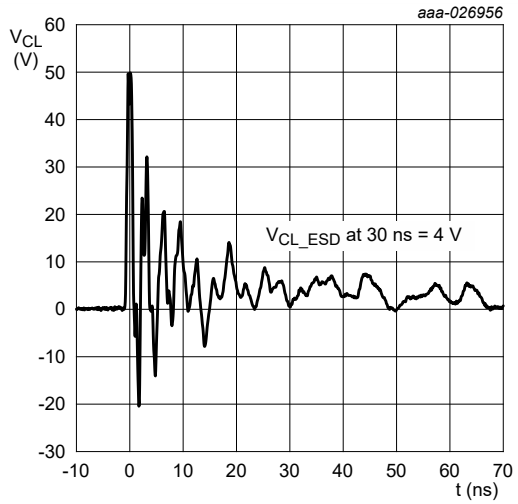


Fig. 8. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

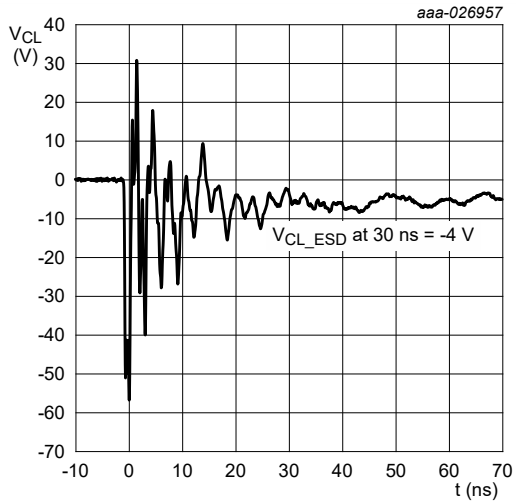


Fig. 9. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

10. Application information

The device is designed for the protection of one bidirectional 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.

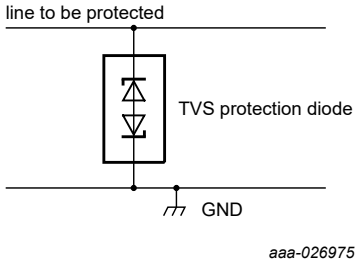


Fig. 10. Application diagram

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.

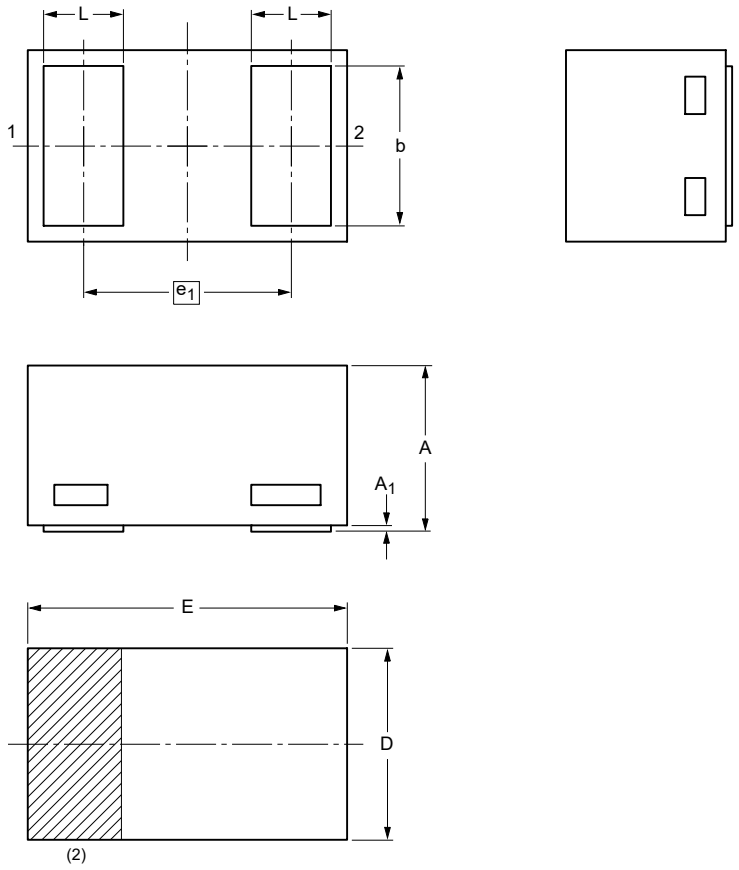
11. Test information

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

DFN1006-2: Plastic, leadless ultra small package; 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.48 mm body **SOD882**



Dimensions (mm are the original dimensions)

Unit		A(1)	A_1	b	D	E	e_1	L
mm	max	0.50	0.03	0.55	0.62	1.02		0.30
	nom						0.65	
	min	0.46		0.47	0.55	0.95		0.22

Note
1. Including plating thickness
2. The marking bar indicates the cathode (if applicable)

sod882_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD882						~~14-08-27~~ 19-10-21

Fig. 11. Package outline DFN1006-2 (SOD882)

13. Soldering

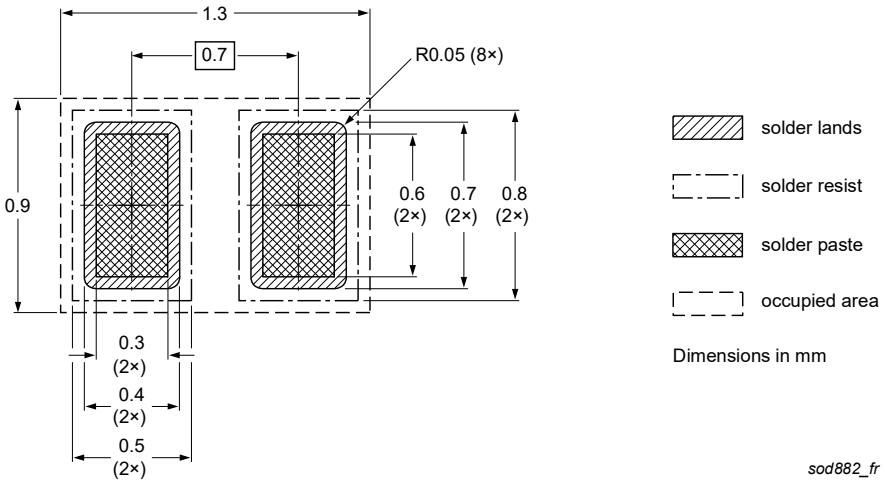


Fig. 12. Reflow soldering footprint for DFN1006-2 (SOD882)

14. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PTVS4V5D1BL-Q v.1	20230605	Product data sheet	-	-

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 June 2023

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