



# PTVS12VZ1USK

Transient voltage suppressor in DSN1608-2 for mobile applications

11 September 2020

Product data sheet

## 1. General description

Unidirectional Transient Voltage Suppressor (TVS) in a very small leadless DSN1608-2 (SOD964) package.

## 2. Features and benefits

- Rated peak pulse current:  $I_{PPM} = 65 \text{ A}$  (8/20  $\mu\text{s}$  pulse)
- Rated peak pulse power:  $P_{PPM} = 1900 \text{ W}$  (8/20  $\mu\text{s}$  pulse)
- Dynamic resistance  $R_{dyn} = 0.11 \Omega$
- Reverse current:  $I_{RM} = 0.1 \text{ nA}$
- Very low package height: 0.29 mm

## 3. Applications

- Power supply protection
- Industrial application
- Power management

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25 \text{ }^\circ\text{C}$		-	-	12	V
$I_{PPM}$	rated peak pulse current	$t_p = 8/20 \text{ } \mu\text{s}$	[1] [2]	-	-	65	A
		$t_p = 10/1000 \text{ } \mu\text{s}$	[3] [2]	-	-	10.5	A

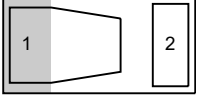

[1] In accordance with IEC 61000-4-5 (8/20  $\mu\text{s}$  current waveform).

[2] Measured from pin 1 to pin 2.

[3] In accordance with IEC 61643-321 (10/1000  $\mu\text{s}$  current waveform).

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>Transparent top view DSN1608-2 (SOD964)</p>	 sym035
2	A	anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PTVS12VZ1USK	DSN1608-2	silicon, leadless very small package; 2 terminals; 0.6 mm pitch; 1.6 mm x 0.8 mm x 0.29 mm body	SOD964

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PTVS12VZ1USK	Z5

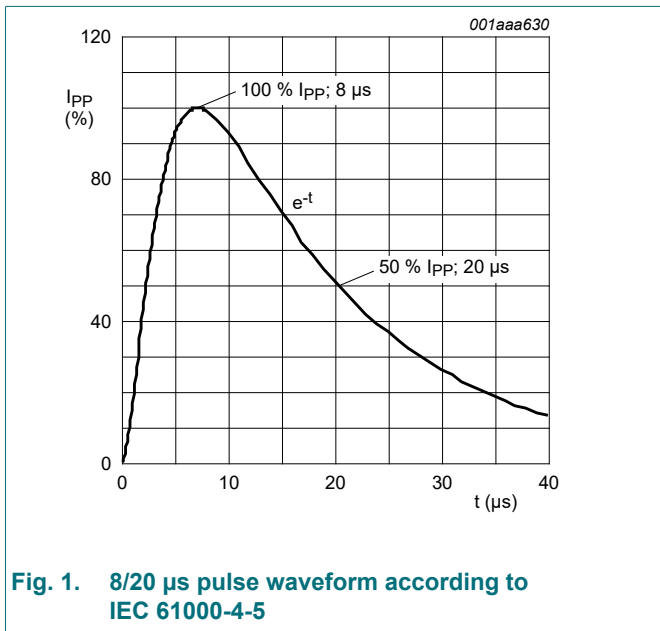
## 8. Limiting values

**Table 5. Limiting values**

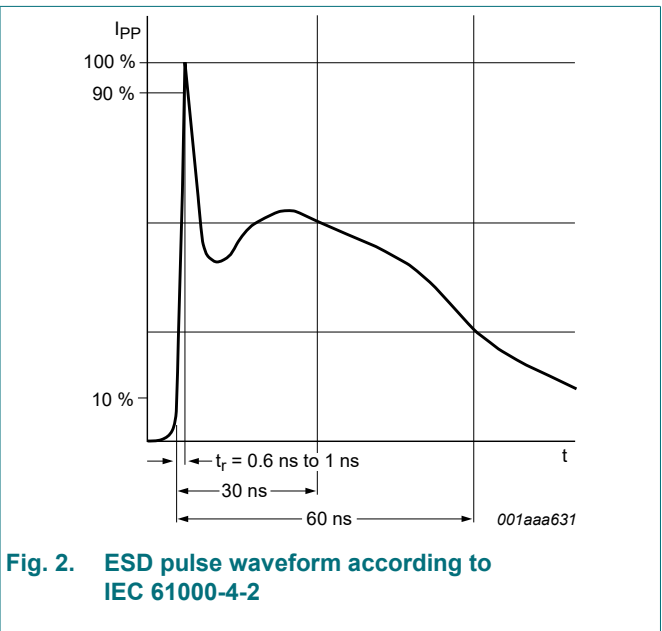
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P <sub>PPM</sub>	rated peak pulse power	t <sub>p</sub> = 8/20 μs	[1] [2]	-	1900	W
		t <sub>p</sub> = 10/1000 μs	[3] [2]	-	230	W
I <sub>PPM</sub>	rated peak pulse current	t <sub>p</sub> = 8/20 μs	[1] [2]	-	65	A
		t <sub>p</sub> = 10/1000 μs	[3] [2]	-	10.5	A
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-40	125	°C
T <sub>stg</sub>	storage temperature			-65	150	°C
<b>ESD maximum ratings</b>						
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2; contact discharge	[4] [2]	-	30	kV
		IEC 61000-4-2; air discharge	[4] [2]	-	30	kV

- [1] In accordance with IEC 61000-4-5 (8/20 μs current waveform).
- [2] Measured from pin 1 to pin 2.
- [3] In accordance with IEC 61643-321 (10/1000 μs current waveform).
- [4] 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**

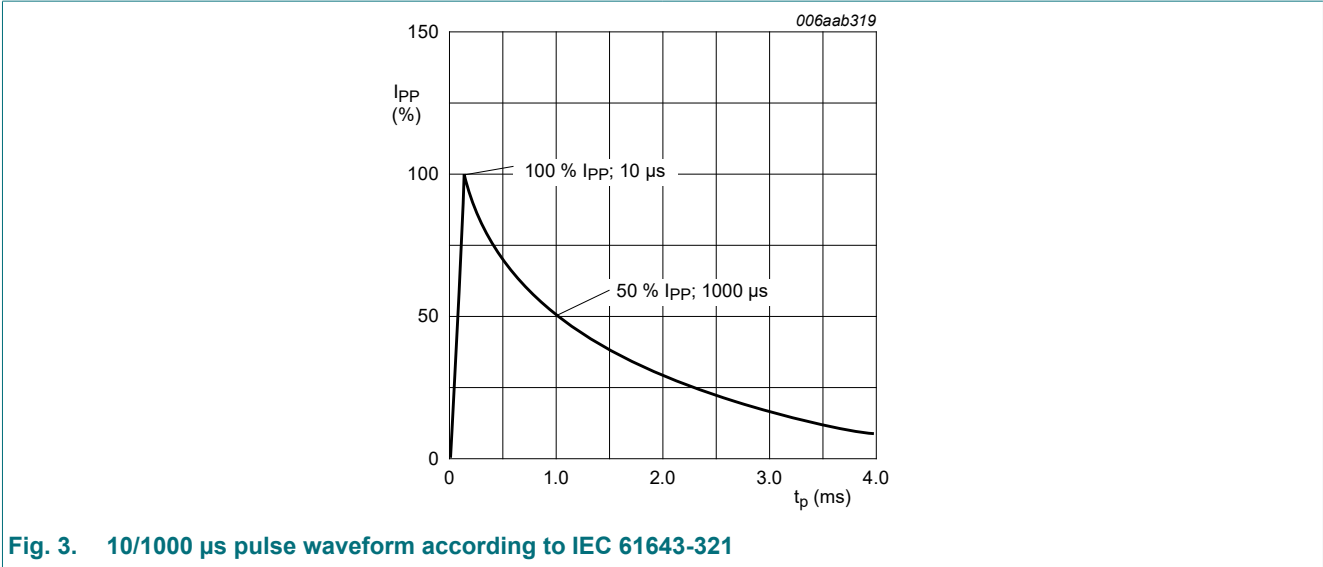


Fig. 3. 10/1000 μs pulse waveform according to IEC 61643-321

## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{RWM}$	reverse standoff voltage	$T_{amb} = 25\text{ °C}$		-	-	12	V
$V_{BR}$	breakdown voltage	$I_R = 10\text{ mA}; T_{amb} = 25\text{ °C}$	[1]	13.3	14.4	15.4	V
$I_{RM}$	reverse leakage current	$V_{RWM} = 12\text{ V}; T_{amb} = 25\text{ °C}$	[1]	-	0.1	200	nA
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$		-	430	-	pF
$V_{CL}$	clamping voltage	$I_{PPM} = 65\text{ A}; t_p = 8/20\text{ μs}; T_{amb} = 25\text{ °C}$	[2] [1]	-	24.9	29	V
		$I_{PPM} = 10.5\text{ A}; t_p = 10/1000\text{ μs}; T_{amb} = 25\text{ °C}$	[3] [1]	-	18	21.8	V
$R_{dyn}$	dynamic resistance	$I_R = 10\text{ A}; T_{amb} = 25\text{ °C}$	[4] [1]	-	0.11	-	Ω

[1] Measured from pin 1 to 2.

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

[3] In accordance with IEC 61643-321 (10/1000 μs current waveform).

[4] Non-repetitive current pulse, Transmission Line Pulse (TLP)  $t_p = 100\text{ ns}$ ; square pulse; ANSI / ESD STM5.5.1-2008.

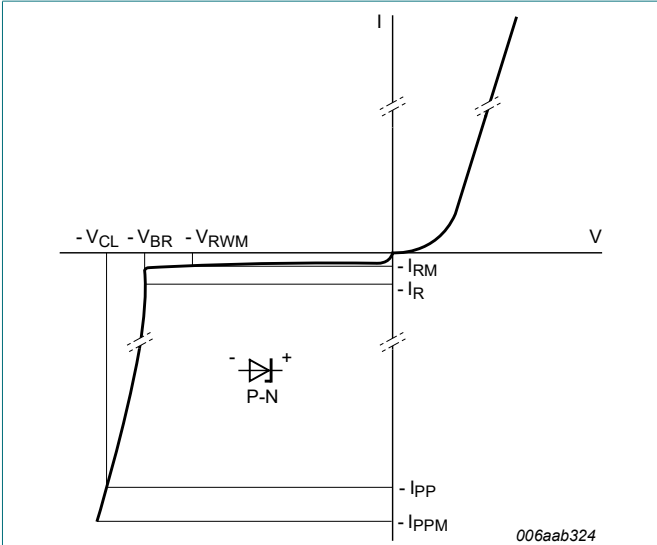


Fig. 4. V-I characteristics for a unidirectional TVS protection diode

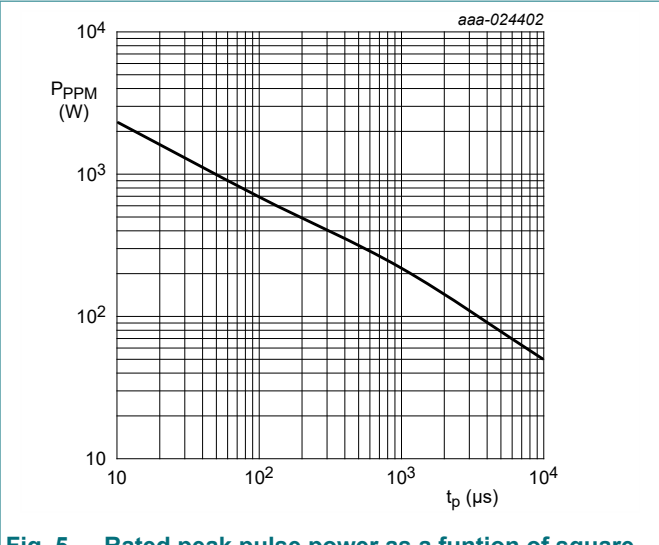


Fig. 5. Rated peak pulse power as a function of square pulse duration; typical values

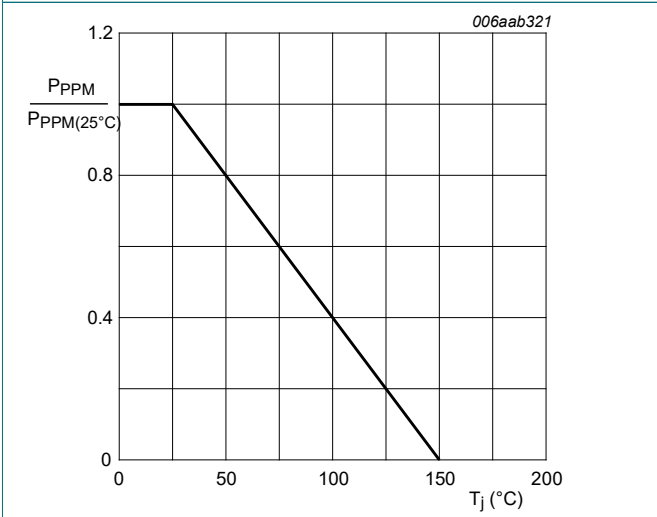


Fig. 6. Relative variation of rated peak pulse power as a function of junction temperature; typical values

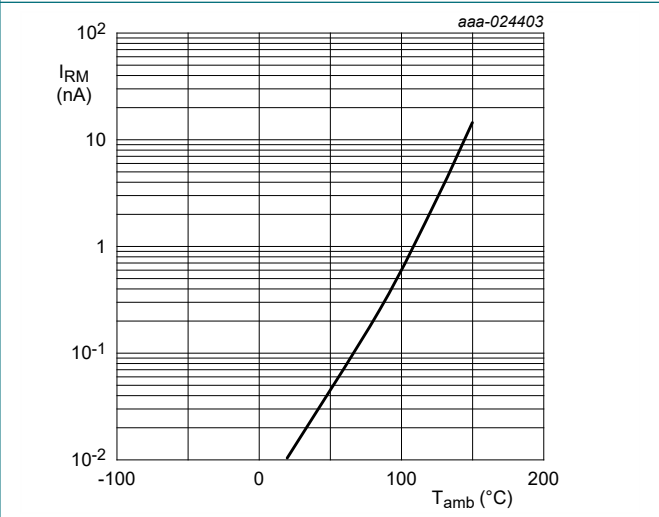
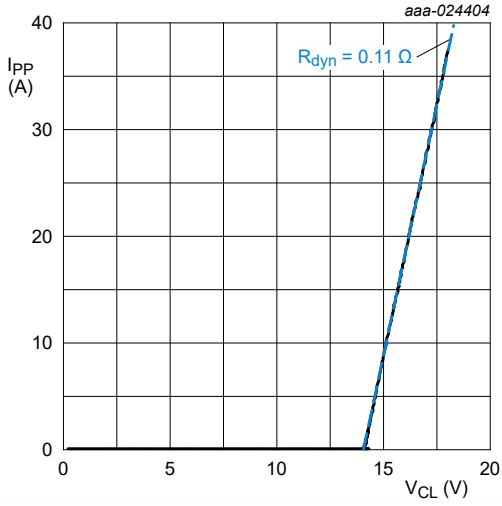


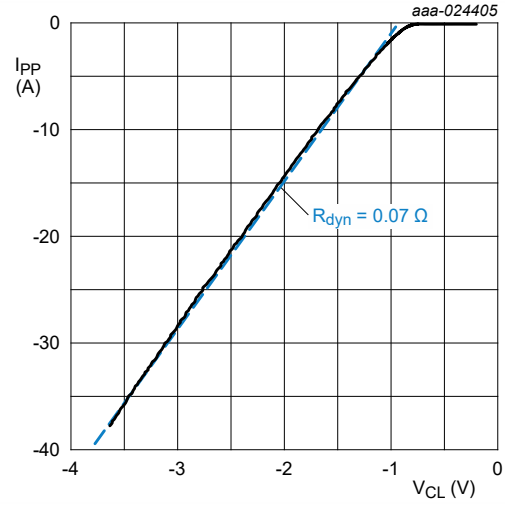
Fig. 7. Relative variation of reverse leakage current as a function of ambient temperature; typical values  
 $V_{RWM} = 12 \text{ V}$

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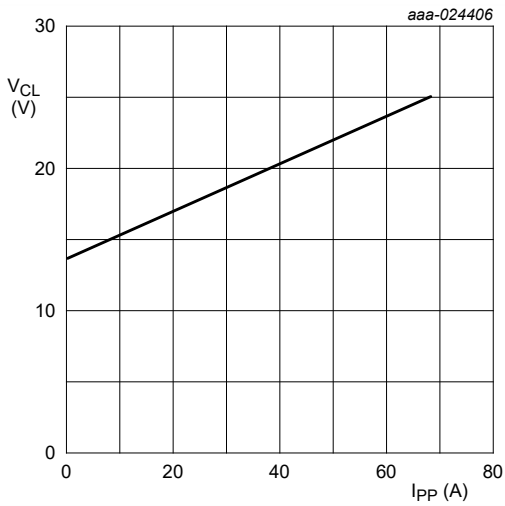
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

**Fig. 8. Positive clamping voltage (TLP); typical values**



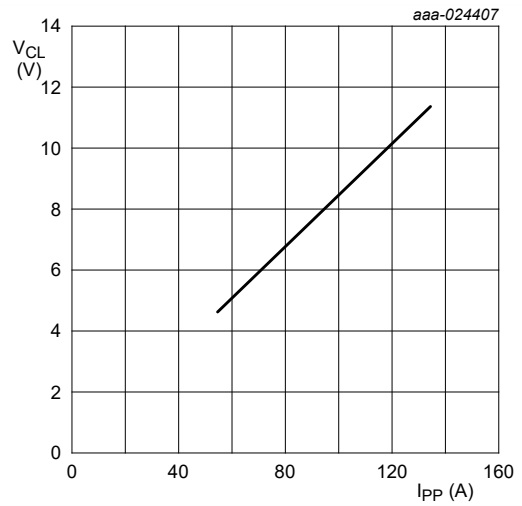
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

**Fig. 9. Negative clamping voltage (TLP); typical values**



$t_p = 8/20 \text{ }\mu\text{s}$ ; according to IEC 61000-4-5

**Fig. 10. Positive clamping voltage (8/20  $\mu\text{s}$  pulse); typical values**



$t_p = 8/20 \text{ }\mu\text{s}$ ; according to IEC 61000-4-5

**Fig. 11. Negative clamping voltage (8/20  $\mu\text{s}$  pulse); typical values**

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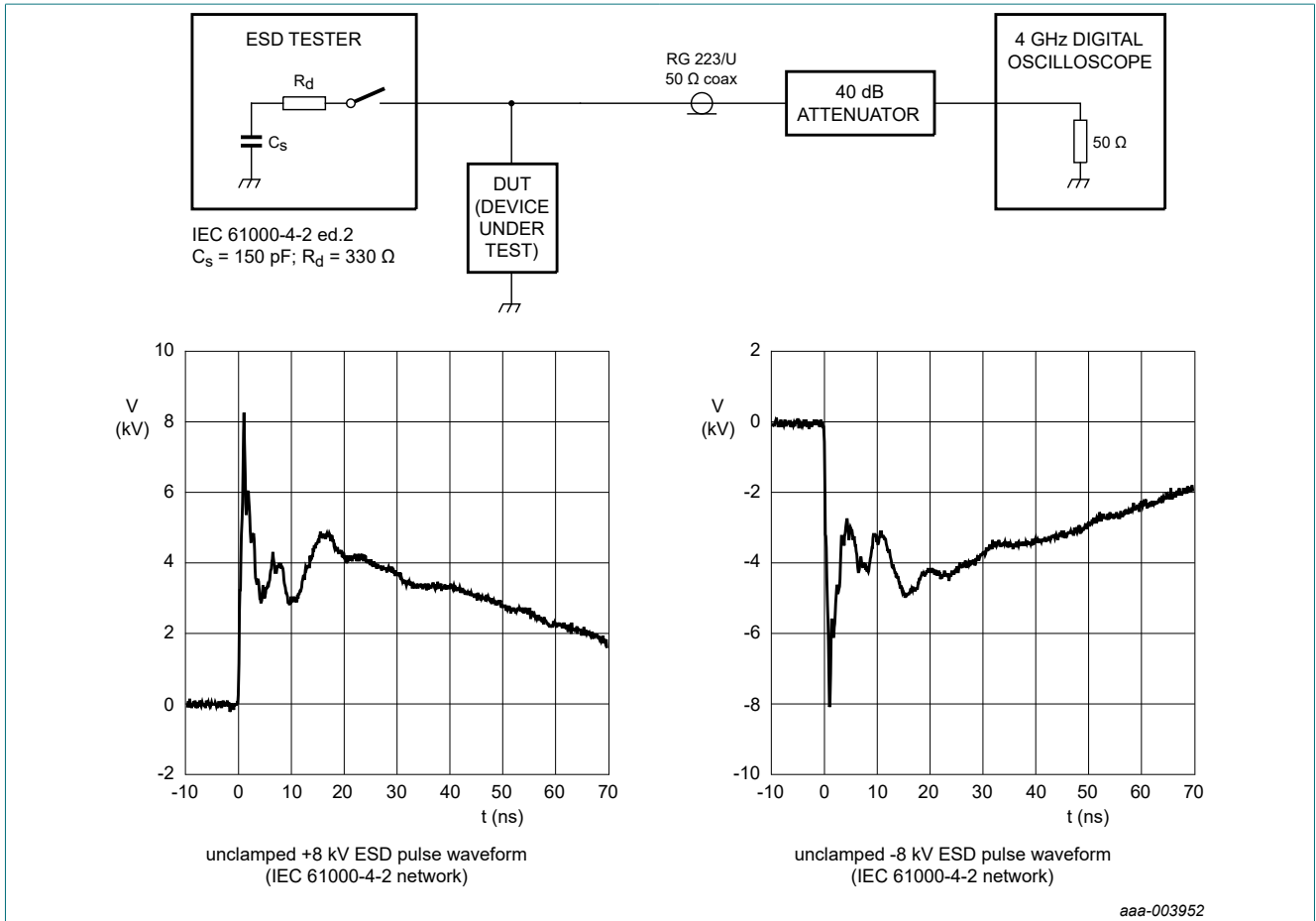


Fig. 12. ESD clamping test setup and waveforms

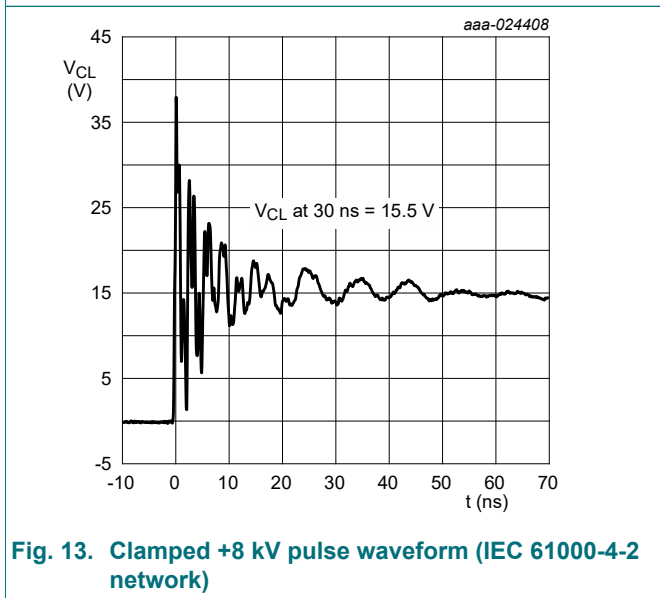


Fig. 13. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

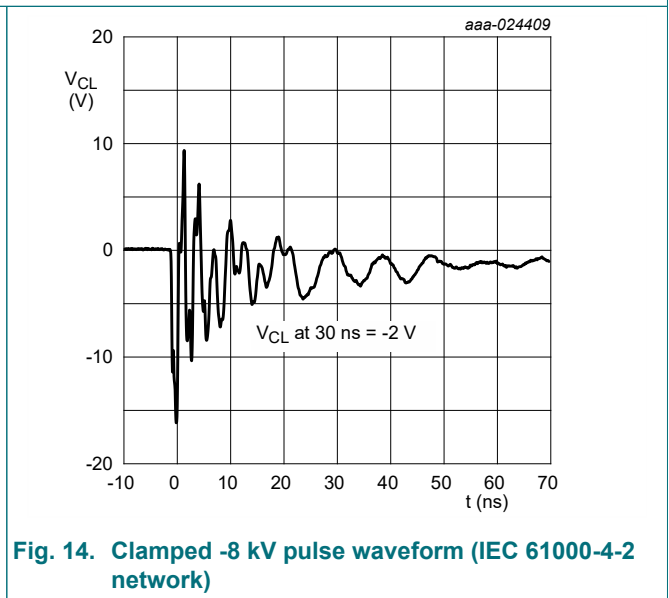


Fig. 14. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

## 10. Application information

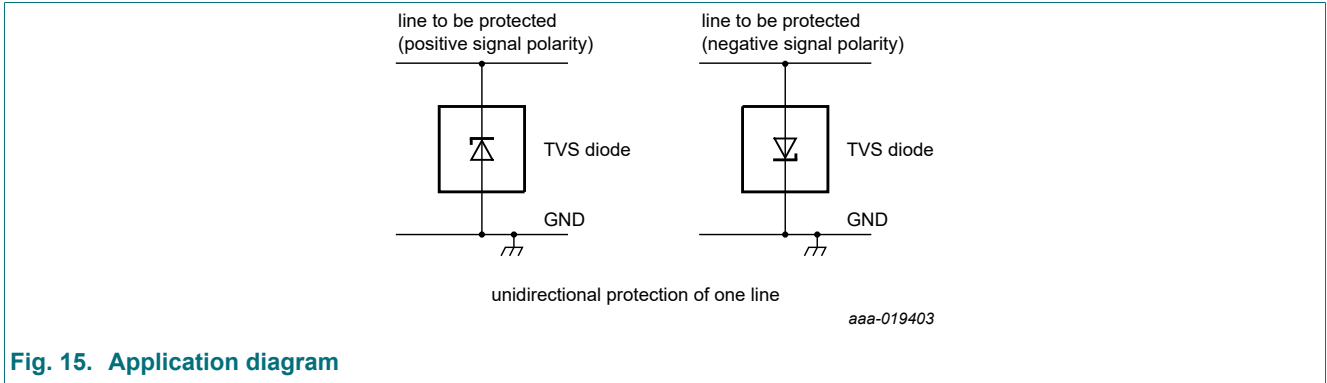
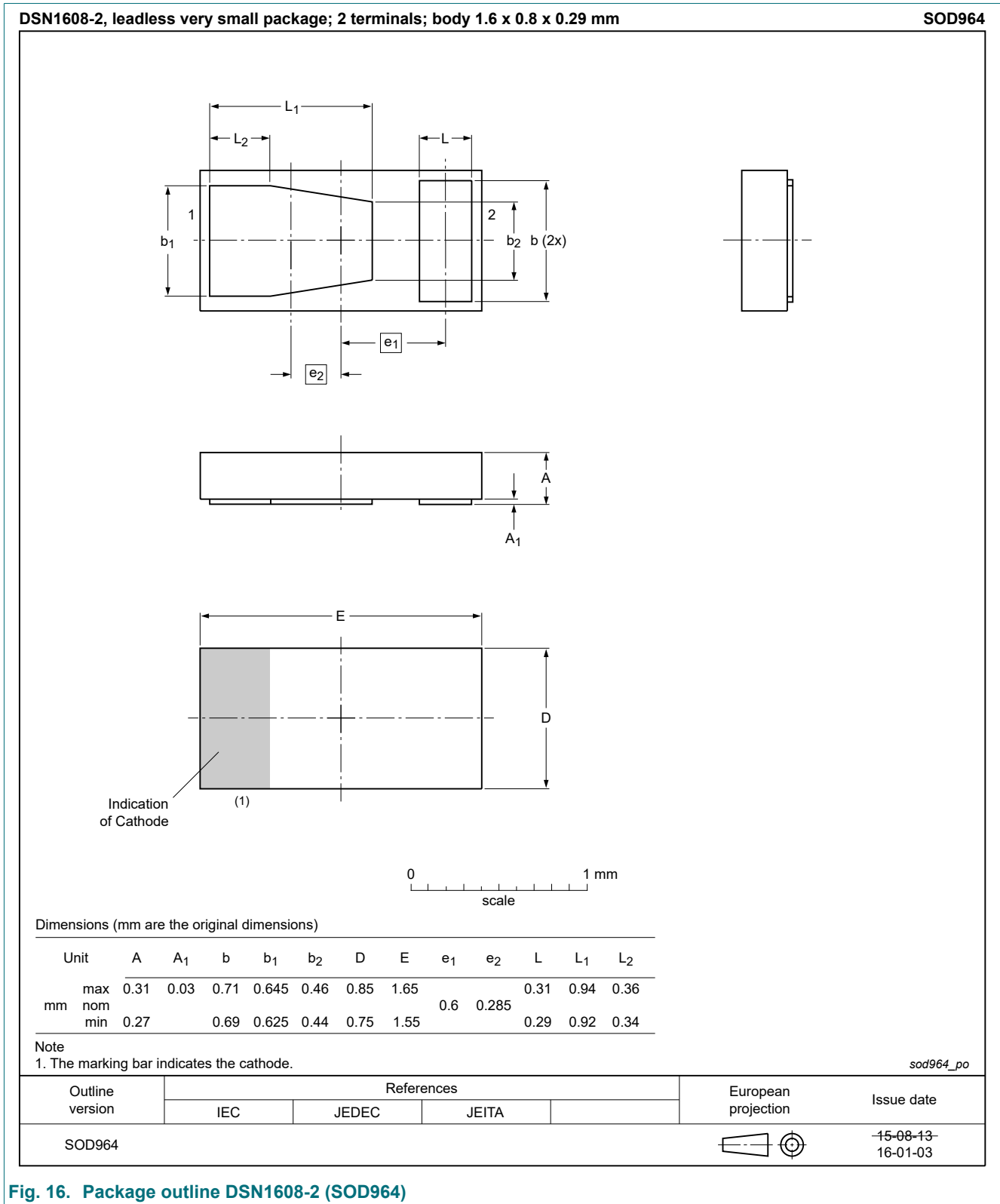


Fig. 15. Application diagram

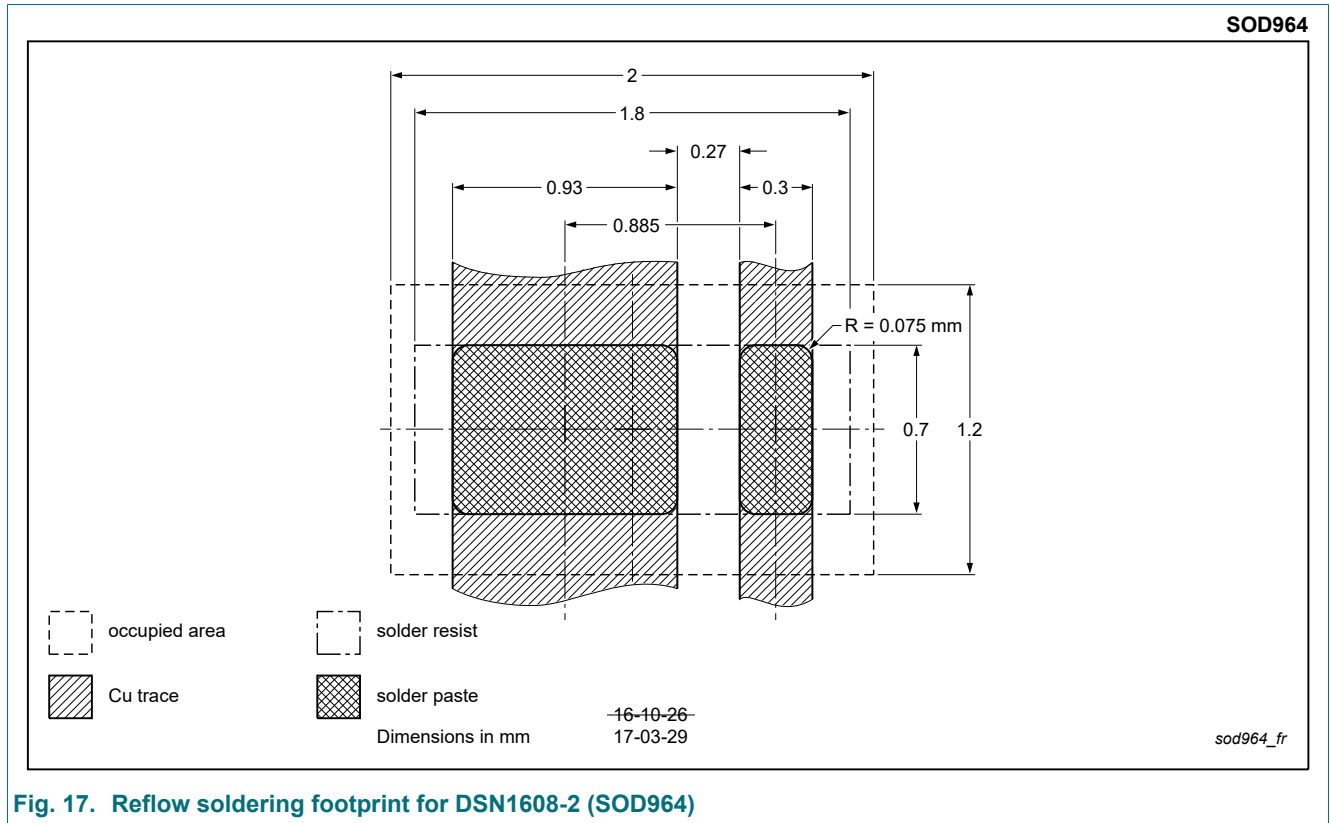


### 11. Package outline



**Fig. 16. Package outline DSN1608-2 (SOD964)**

## 12. Soldering



## 13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PTVS12VZ1USK v.3	20200911	Product data sheet	-	PTVS12VZ1USK v.2
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Chapter "Soldering": Figure for reflow soldering footprint updated.</li> </ul>			
PTVS12VZ1USK v.2	20160822	Product data sheet	-	PTVS12VZ1USK v.1
PTVS12VZ1USK v.1	20160212	Preliminary 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.

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## Contents

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Characteristics.....	4
10. Application information.....	8
11. Package outline.....	9
12. Soldering.....	10
13. Revision history.....	11
14. Legal information.....	12

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