



# PTVS12VZ1USK

Transient voltage suppressor in DSN1608-2 for mobile applications

22 August 2016

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
$I_{PPM}$	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

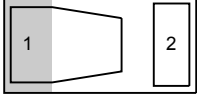

[1] In accordance with IEC 61000-4-5 (8/20  $\mu\text{s}$  current waveform).

[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 <b>DSN1608-2 (SOD964)</b></p>	<p>1  2</p> <p><i>sym035</i></p>
2	A	anode		

## 6. Ordering information

Table 3. Ordering information

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

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PTVS12VZ1USK	Z5

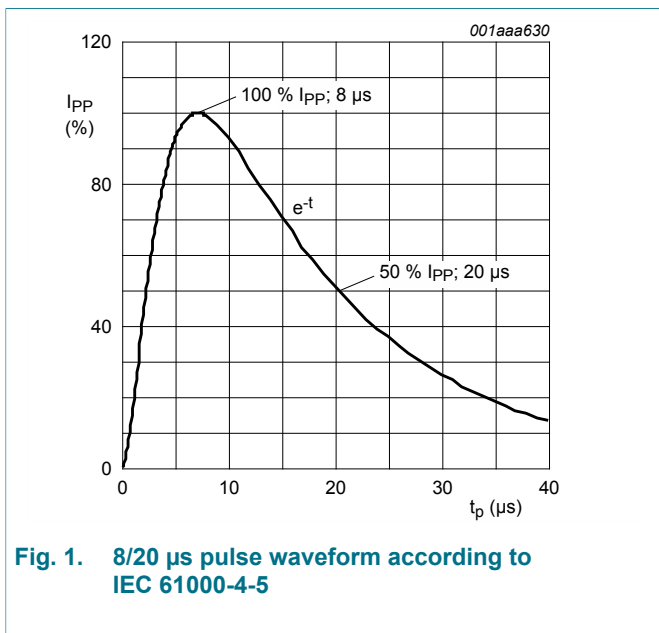
## 8. Limiting values

**Table 5. Limiting values**

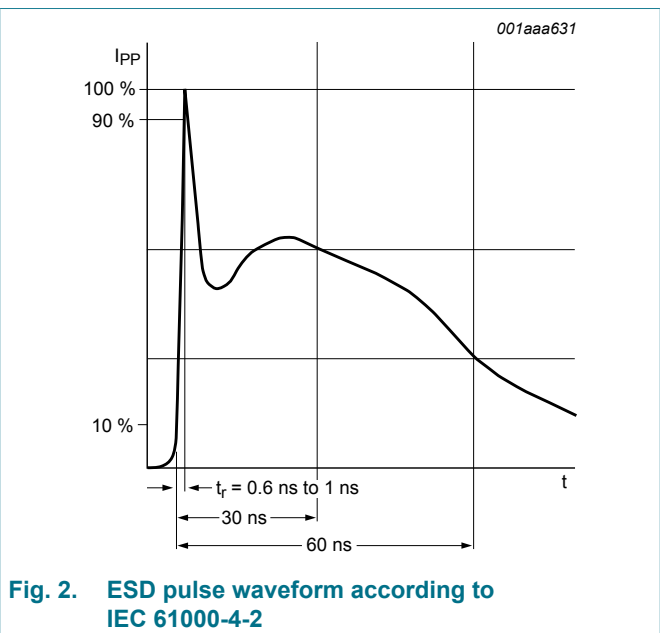
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P <sub>PPM</sub>	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>	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**

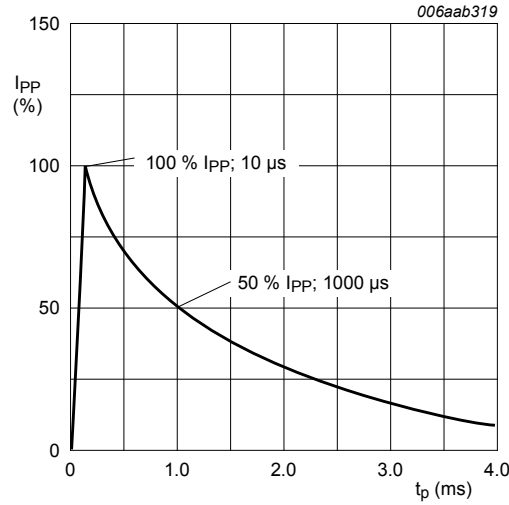


Fig. 3. 10/1000 μs pulse waveform according to IEC 61643-321

## 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	$I_{PPM} = 65\text{ A}; T_{amb} = 25\text{ °C}; t_p = 8/20\text{ μs}$	[2][1]	-	24.9	29	V
		$I_{PPM} = 10.5\text{ A}; T_{amb} = 25\text{ °C}; t_p = 10/1000\text{ μs}$	[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

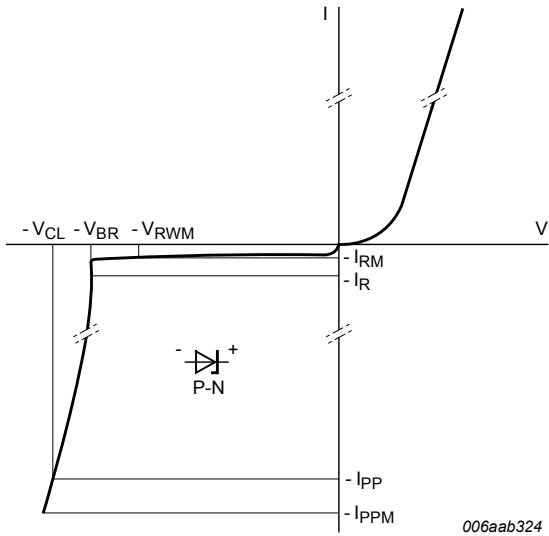
[1] Measured from pin 1 to 2.

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

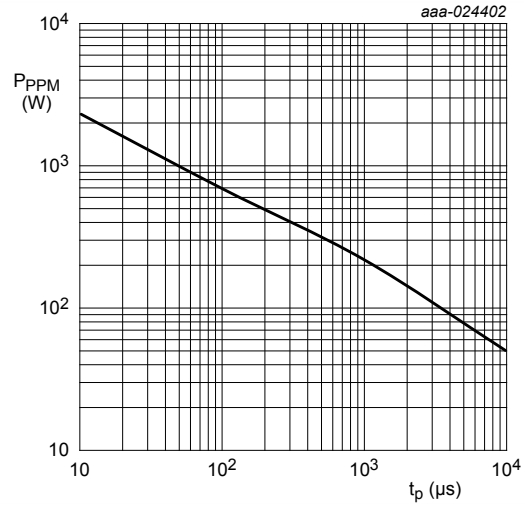
[3] In accordance with IEC 61643-321 (10/1000 μs current waveform).

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

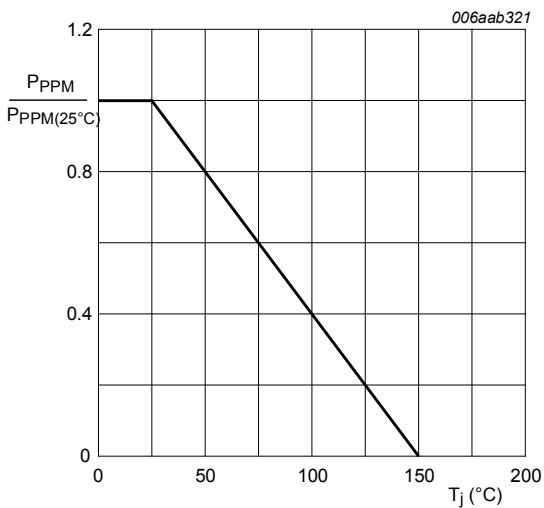
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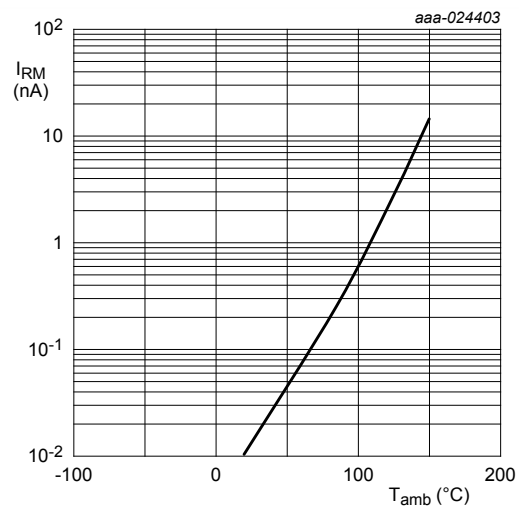
**Fig. 4. V-I characteristics for a unidirectional TVS protection diode**



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



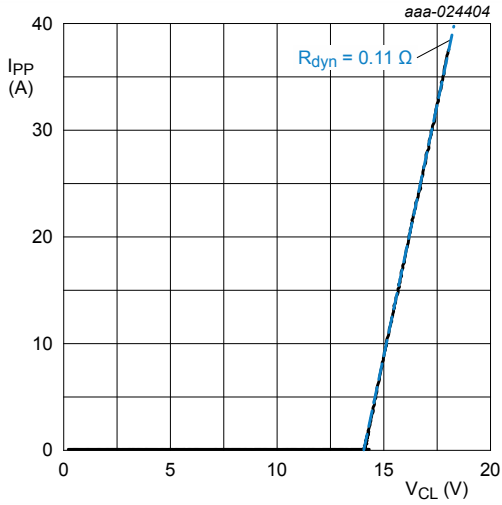
**Fig. 6. Relative variation of rated peak pulse power as a function of junction temperature; typical values**



$V_{RWM} = 12\text{ V}$

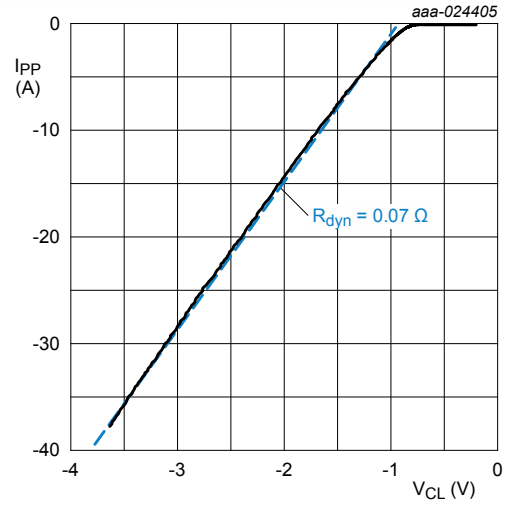
**Fig. 7. Relative variation of reverse leakage current as a function of ambient temperature; typical values**

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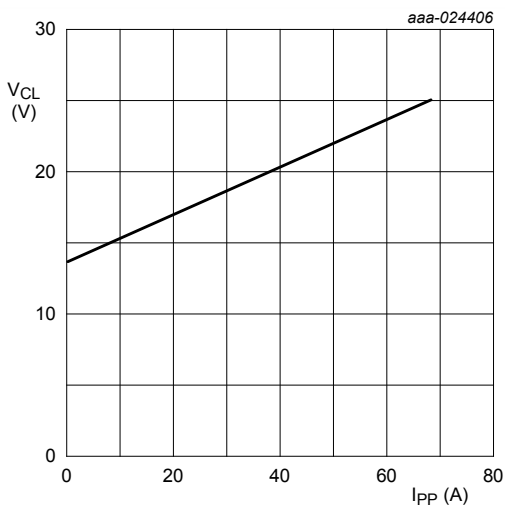
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

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



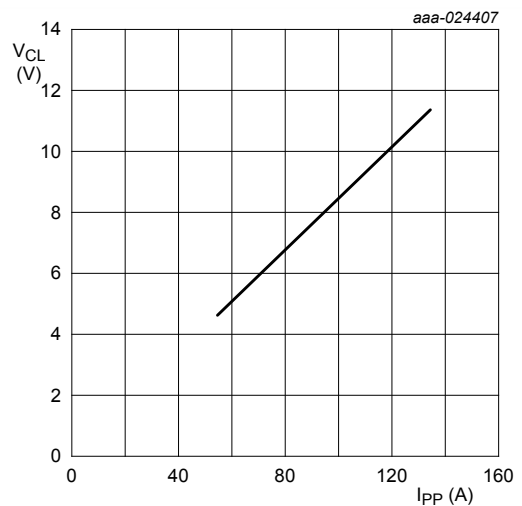
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

**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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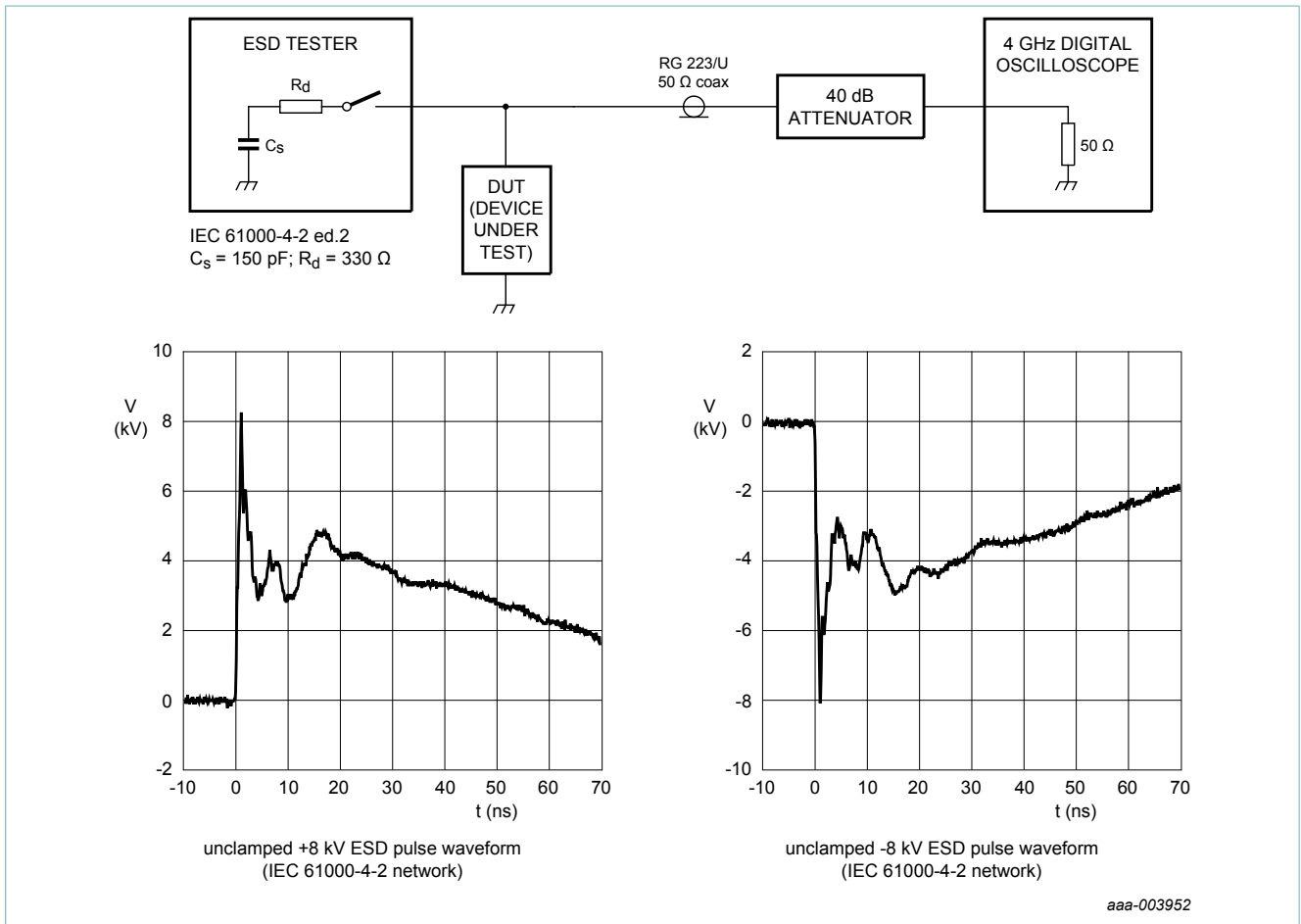


Fig. 12. ESD clamping test setup and waveforms

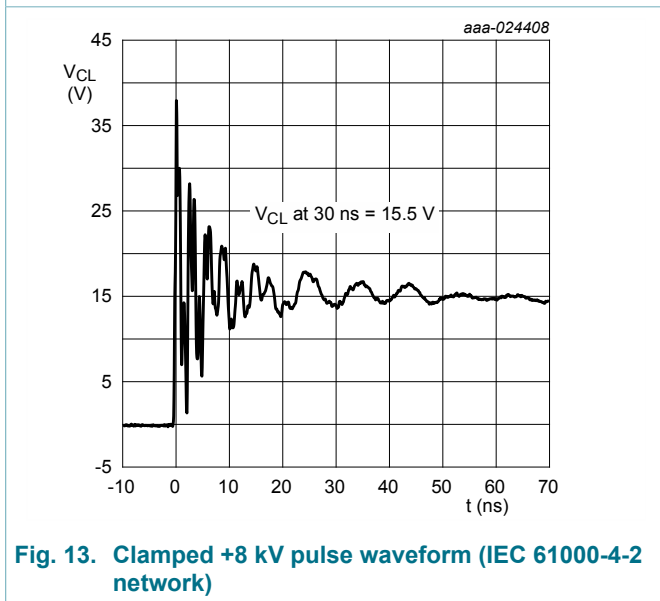


Fig. 13. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

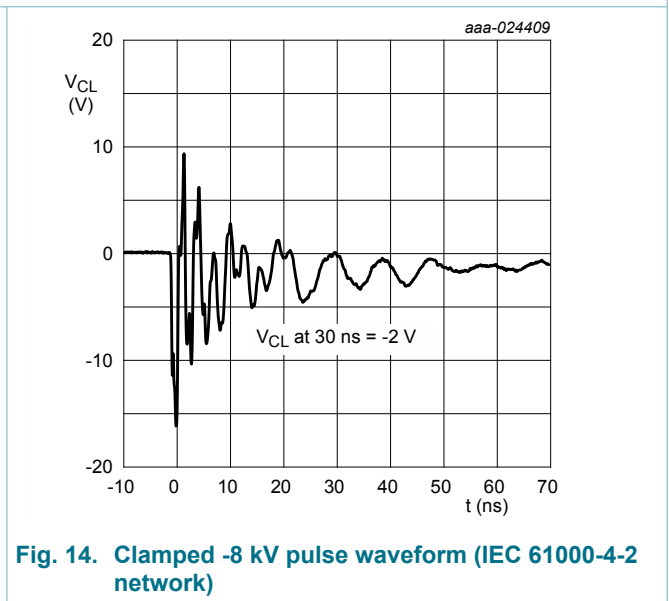


Fig. 14. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

### 10. Application information

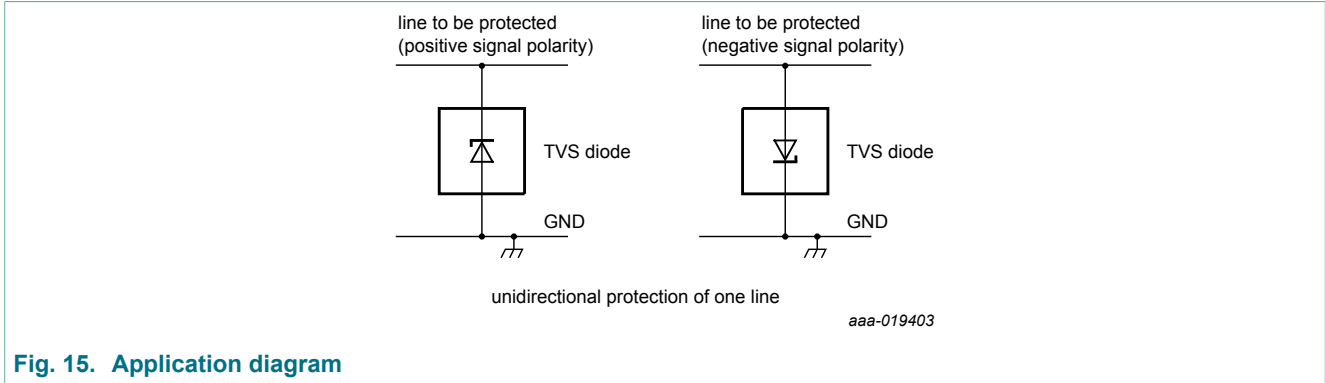
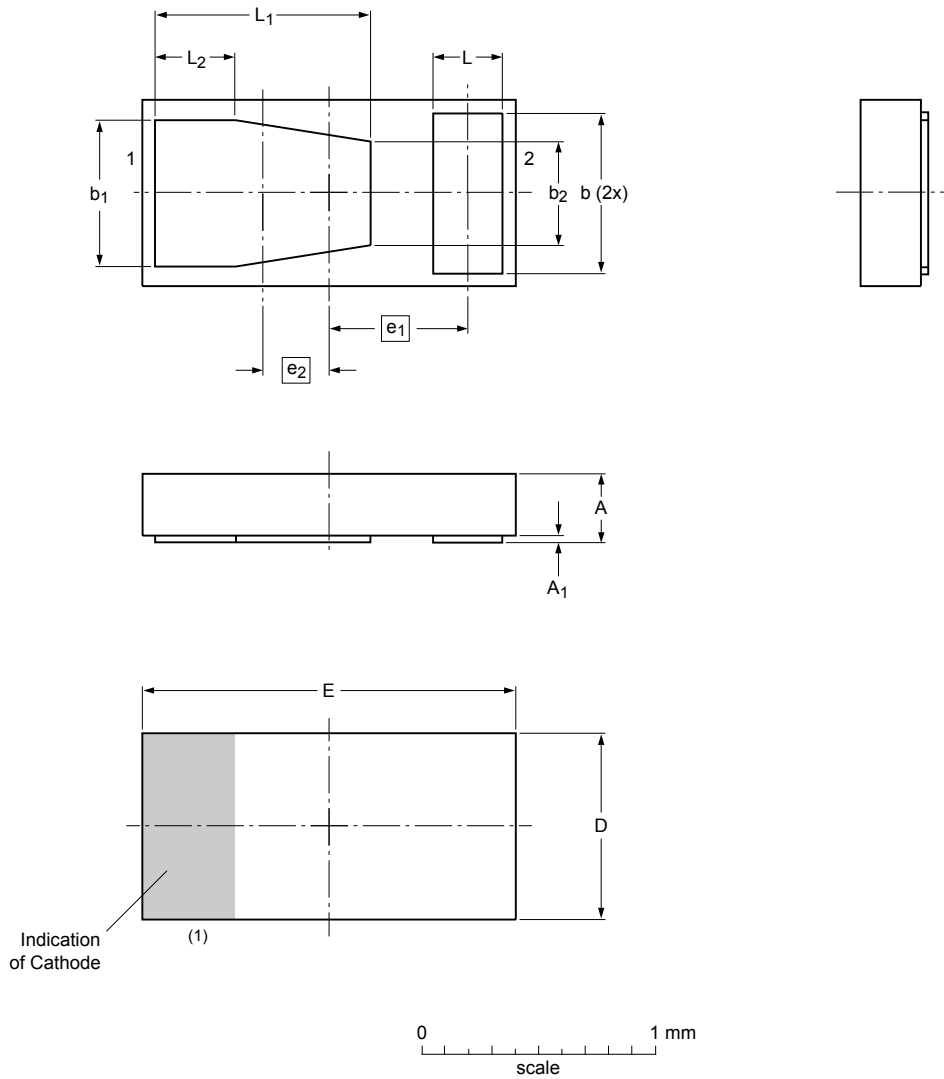


Fig. 15. Application diagram



### 11. Package outline

DSN1608-2, leadless very small package; 2 terminals; body 1.6 x 0.8 x 0.29 mm SOD964



Dimensions (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	D	E	e <sub>1</sub>	e <sub>2</sub>	L	L <sub>1</sub>	L <sub>2</sub>
mm	max	0.31	0.71	0.645	0.46	0.85	1.65			0.31	0.94	0.36
	nom							0.6	0.285			
	min	0.27	0.69	0.625	0.44	0.75	1.55			0.29	0.92	0.34

Note

1. The marking bar indicates the cathode.

sod964\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOD964					-15-08-13- 16-01-03

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

## 12. Soldering

SOD964

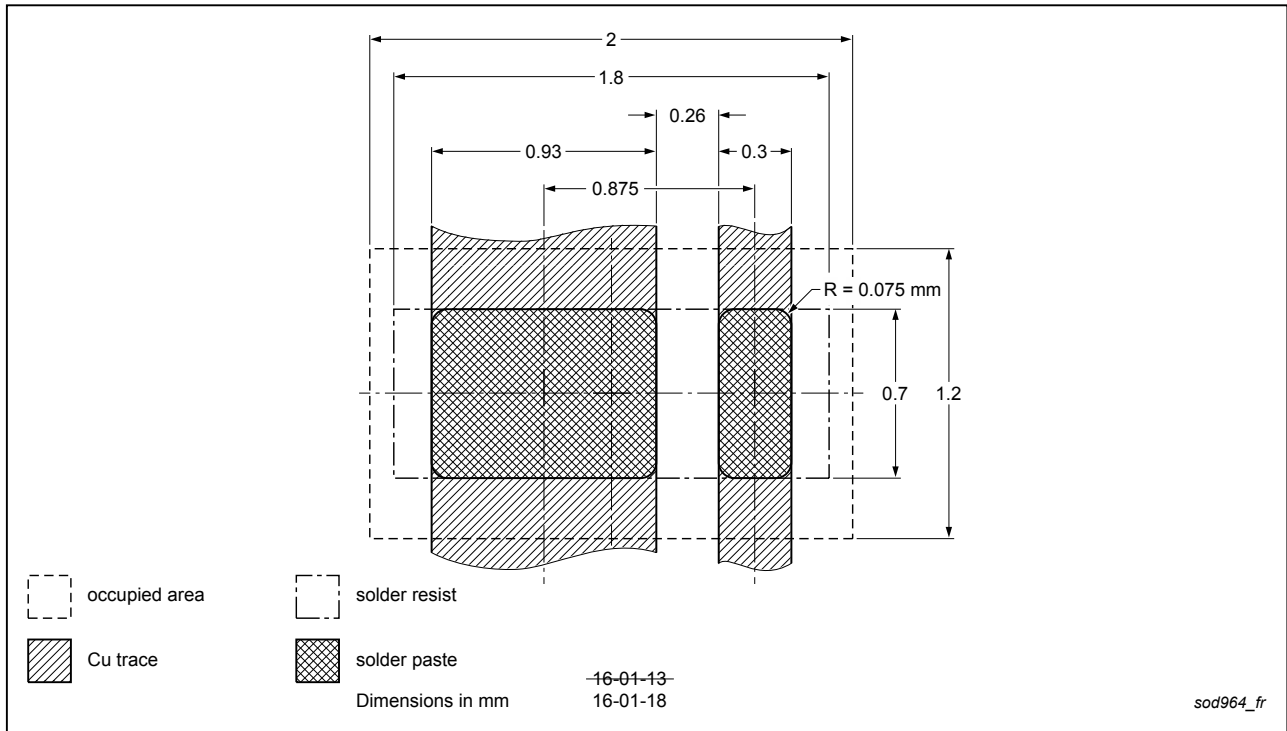


Fig. 17. Reflow soldering footprint for DSN1608-2 (SOD964)

## 13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PTVS12VZ1USK v.2	20160822	Product data sheet	-	PTVS12VZ1USK v.1
Modifications:	<ul style="list-style-type: none"><li>Updated data sheet according to the latest measurements</li></ul>			
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.
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