



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 μs pulse)
- Rated peak pulse power: $P_{PPM} = 1900 \text{ W}$ (8/20 μs 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

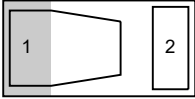
[1] In accordance with IEC 61000-4-5 (8/20 μs current waveform).

[2] Measured from pin 1 to pin 2.

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 Transparent top view DSN1608-2 (SOD964)	 1 2 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

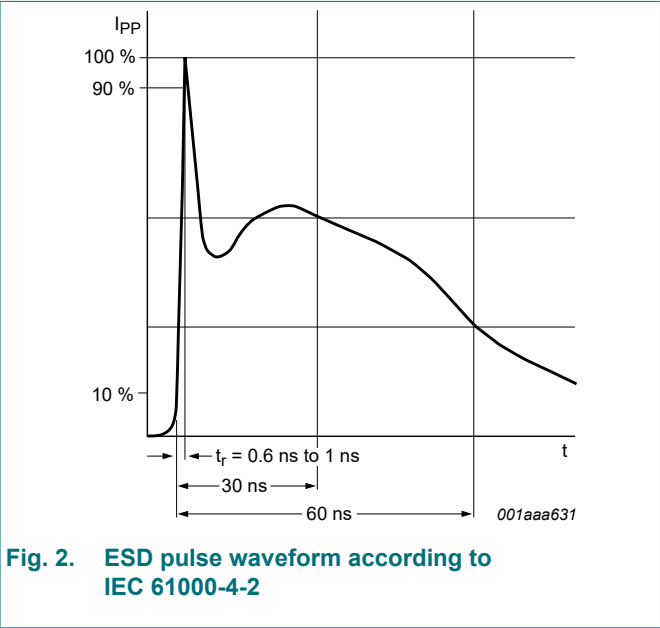
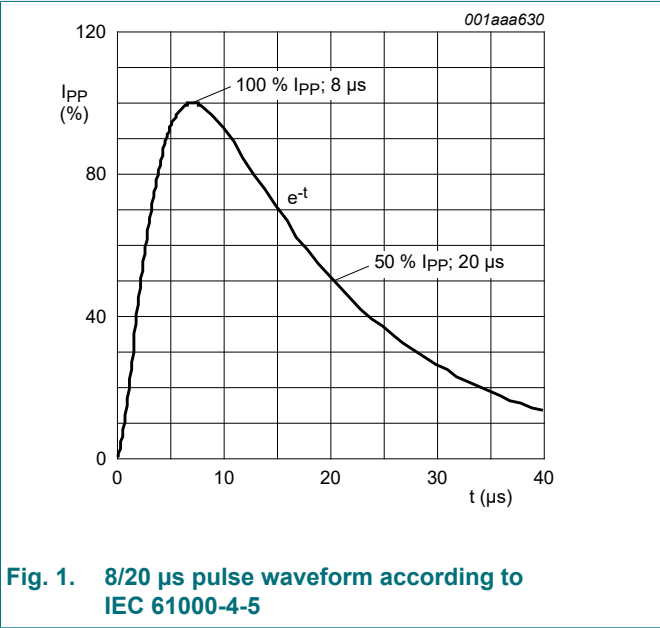
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
P _{PPM}	rated peak pulse power	t _p = 8/20 μs	[1] [2]	-	1900	W
		t _p = 10/1000 μs	[3] [2]	-	230	W
I _{PPM}	rated peak pulse current	t _p = 8/20 μs	[1] [2]	-	65	A
		t _p = 10/1000 μs	[3] [2]	-	10.5	A
T _j	junction temperature			-	150	°C
T _{amb}	ambient temperature			-40	125	°C
T _{stg}	storage temperature			-65	150	°C
ESD maximum ratings						
V _{ESD}	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.



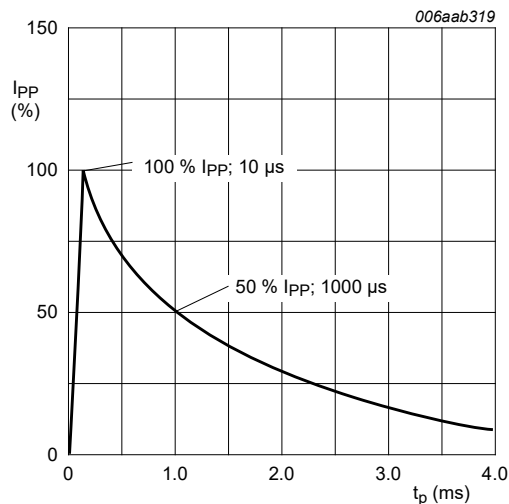


Fig. 3. 10/1000 μ s pulse waveform according to IEC 61643-321

9. Characteristics

Table 6. Characteristics

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

[1] Measured from pin 1 to 2.

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

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

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

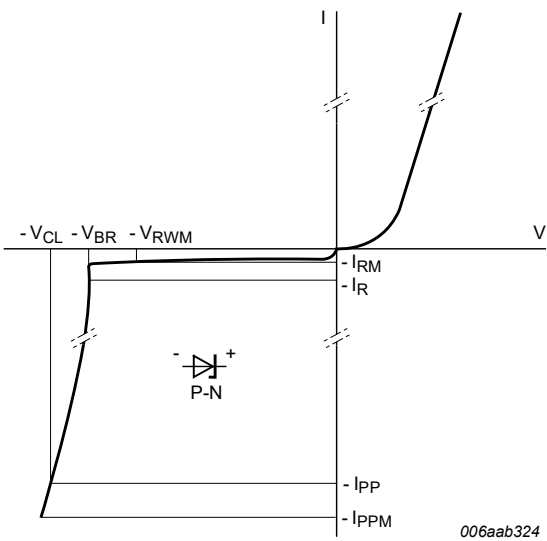


Fig. 4. V-I characteristics for a unidirectional TVS protection diode

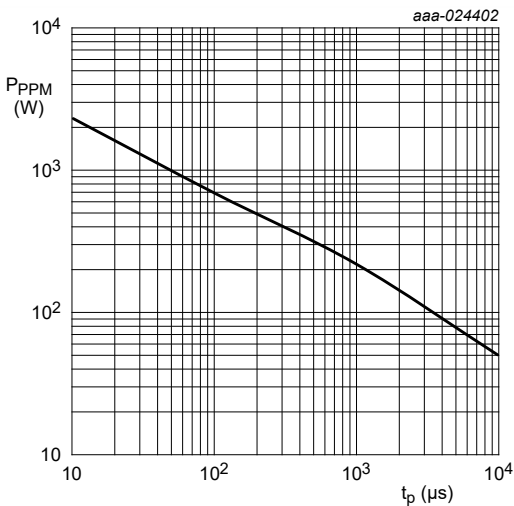


Fig. 5. Rated peak pulse power as a function of square pulse duration; typical values

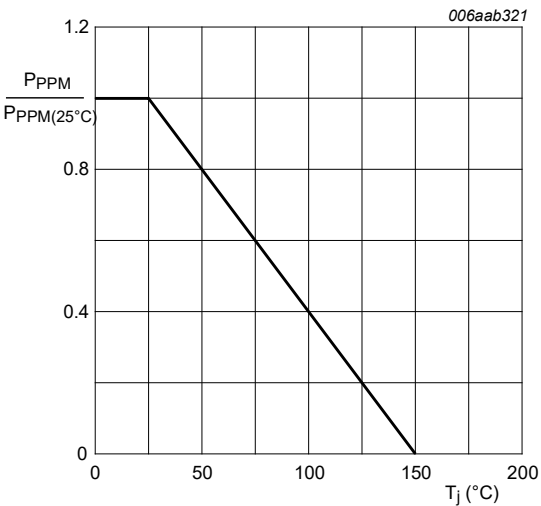
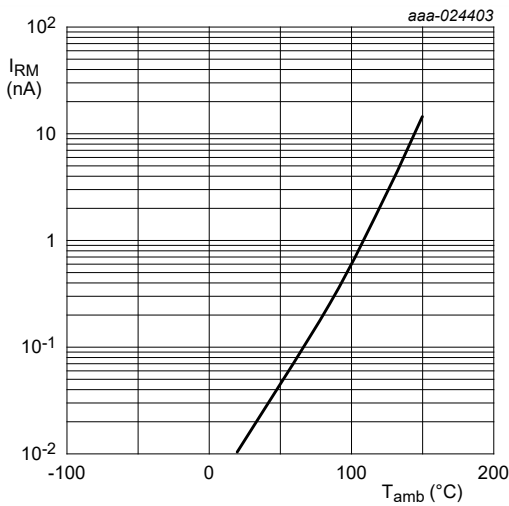


Fig. 6. Relative variation of rated peak pulse power as a function of junction temperature; typical values



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

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

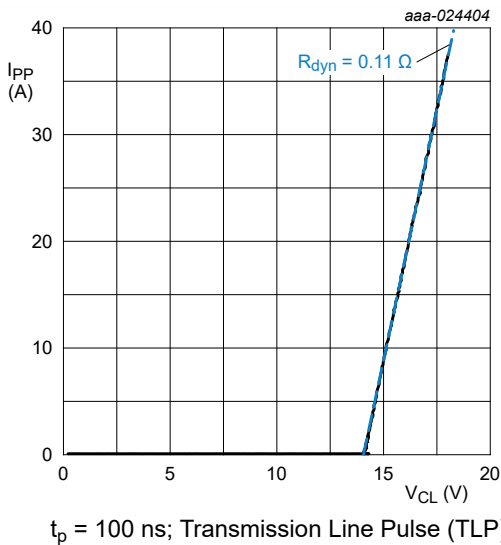


Fig. 8. Positive clamping voltage (TLP); typical values

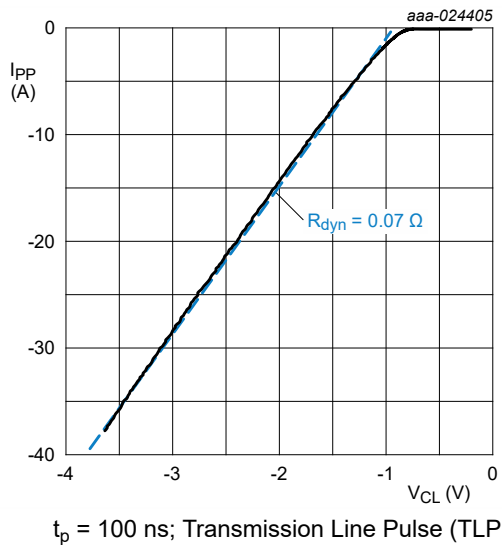


Fig. 9. Negative clamping voltage (TLP); typical values

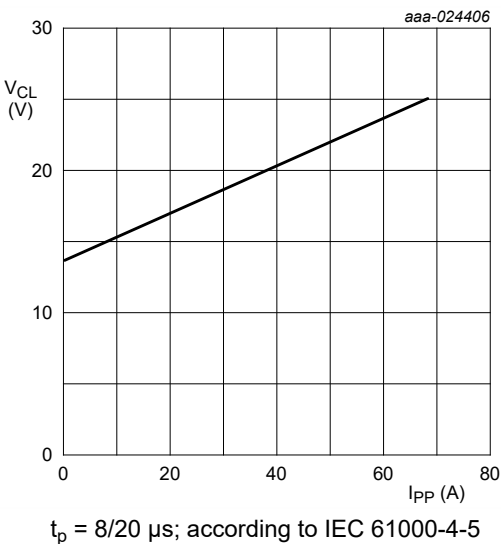


Fig. 10. Positive clamping voltage (8/20 μs pulse); typical values

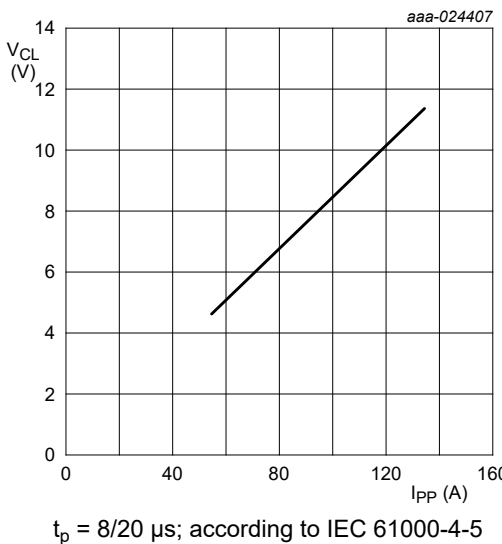


Fig. 11. Negative clamping voltage (8/20 μs pulse); typical values

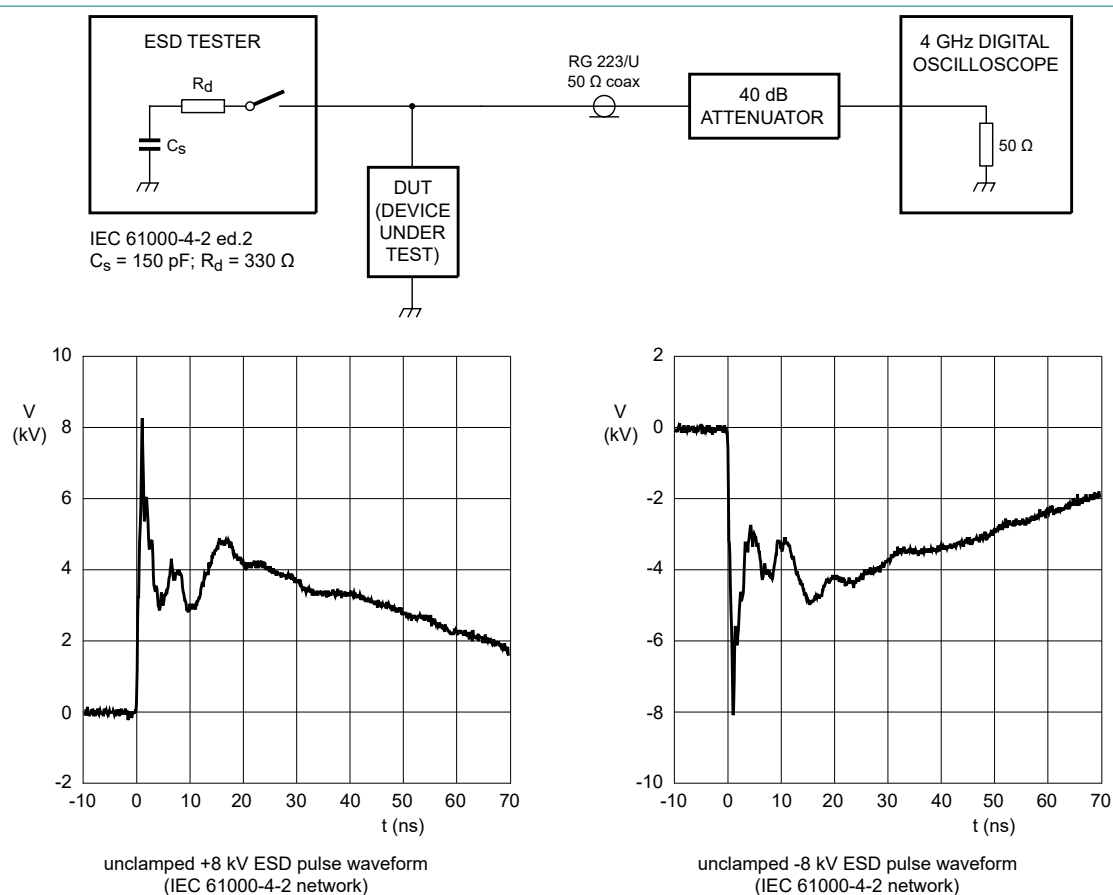


Fig. 12. ESD clamping test setup and waveforms

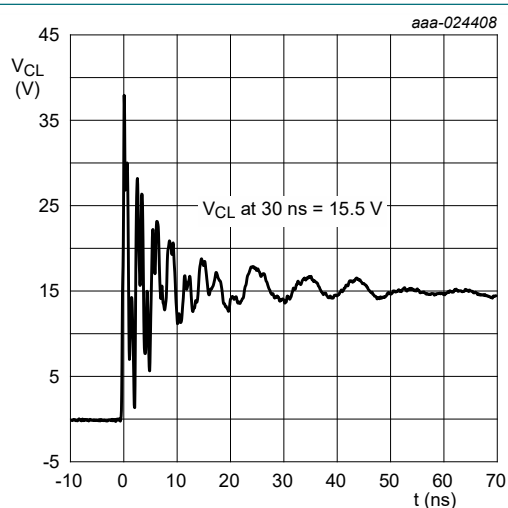


Fig. 13. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

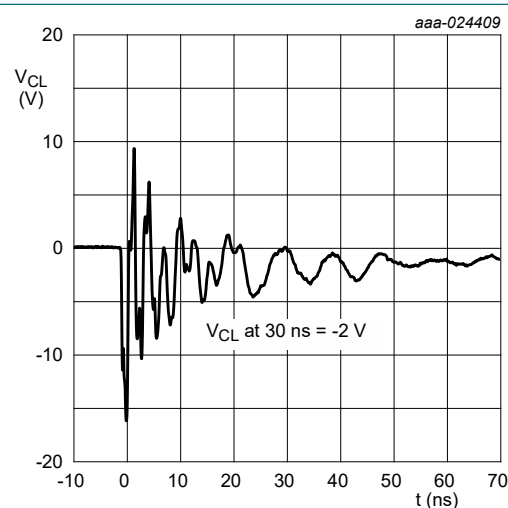


Fig. 14. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

10. Application information

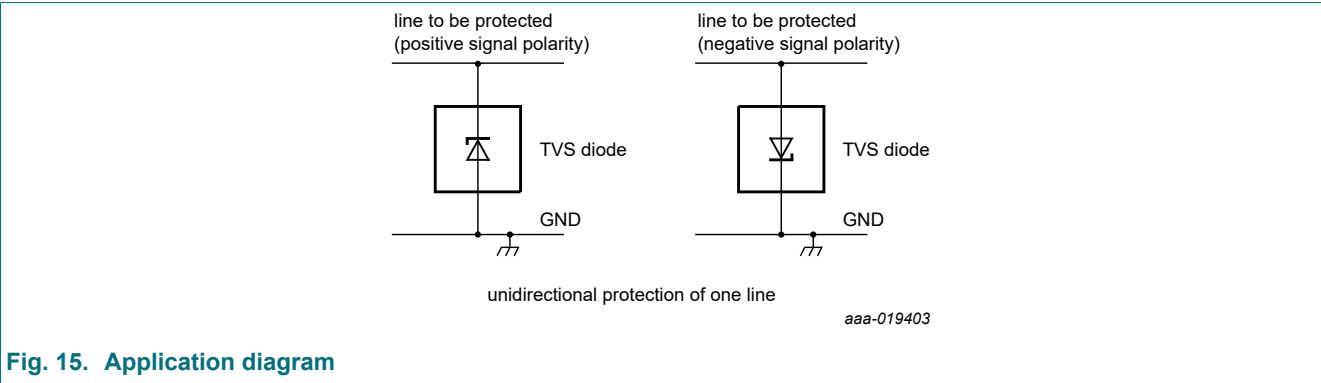
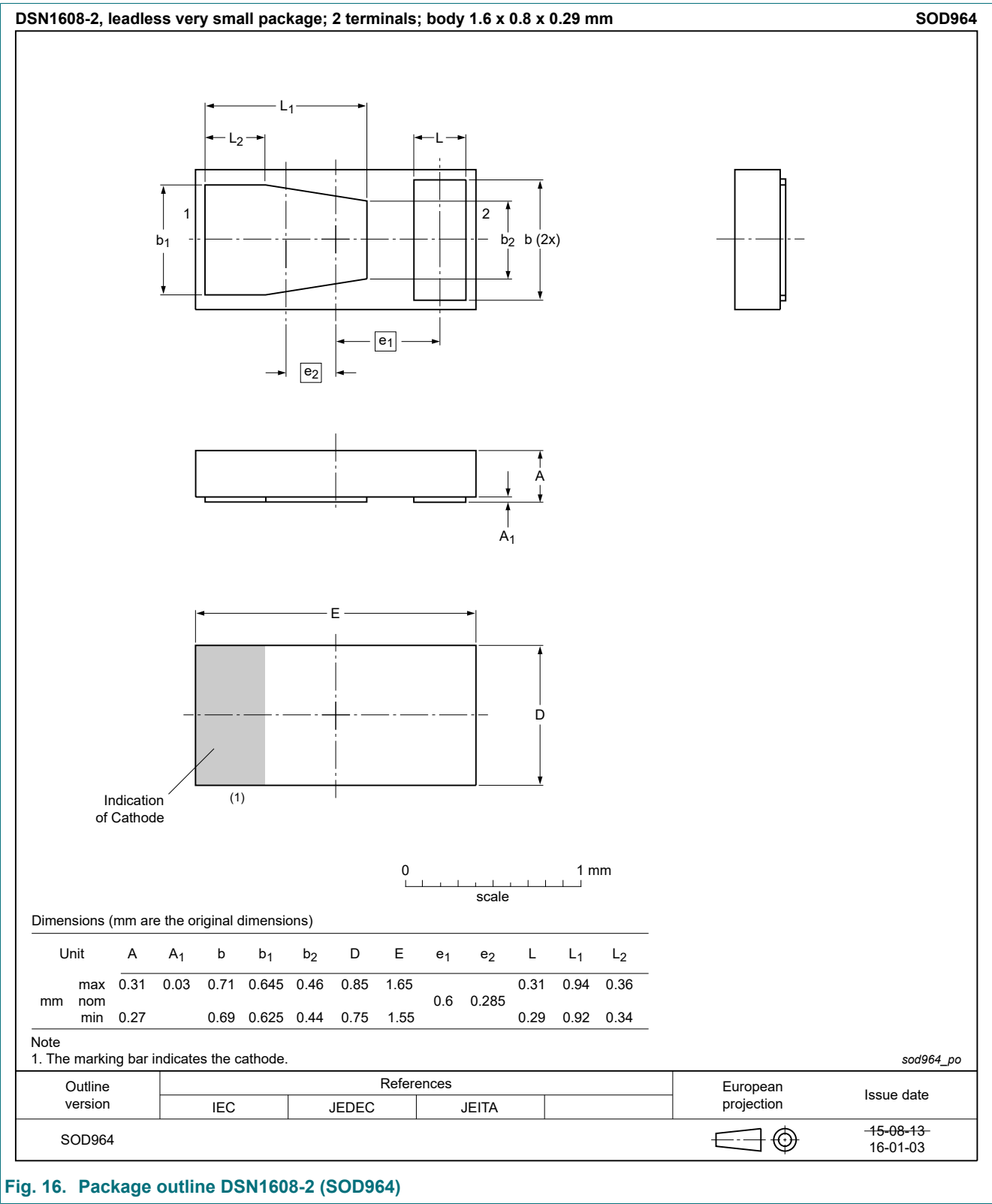
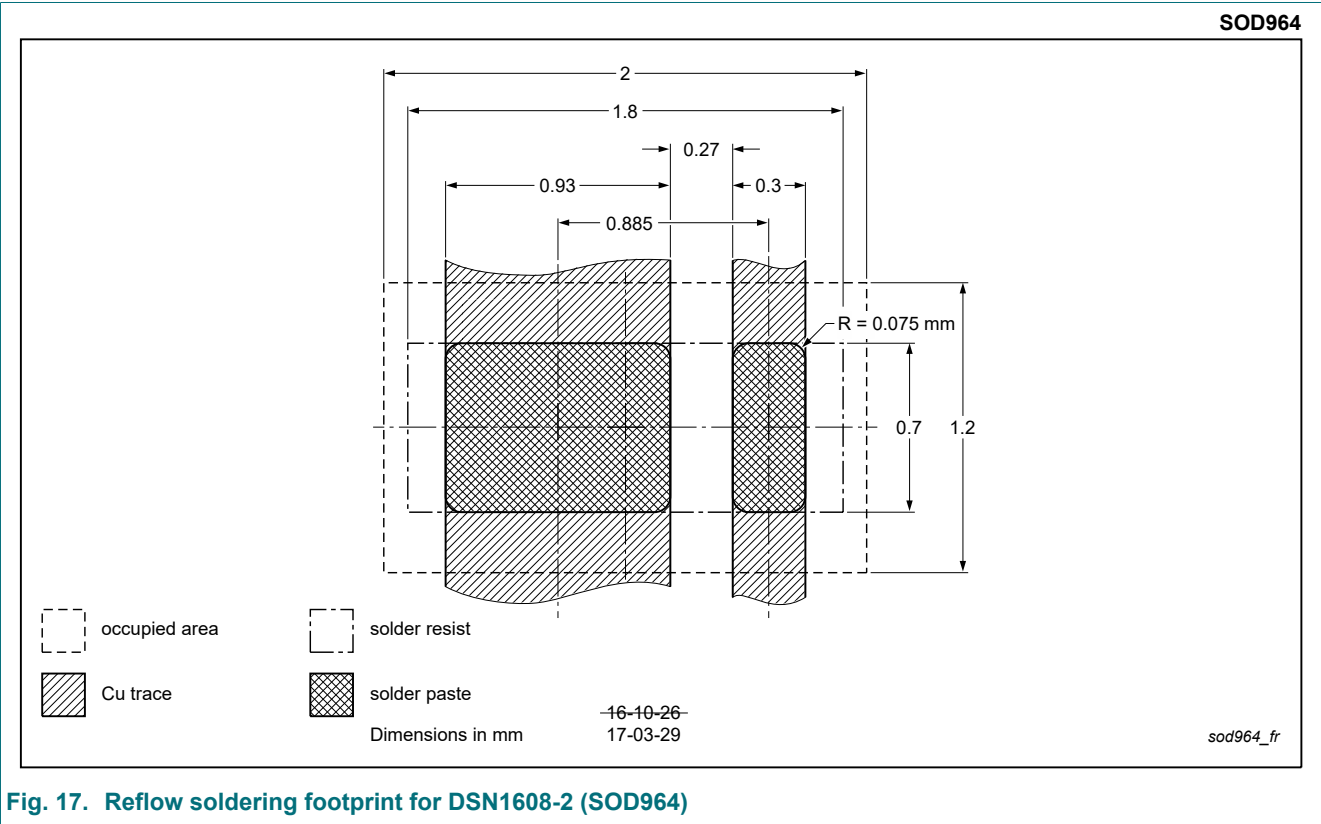


Fig. 15. Application diagram

11. Package outline



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:	- 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. - Chapter "Soldering": Figure for reflow soldering footprint updated.			
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.

- [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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