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Team Nexperia



PTVS12VZ1USKN

Transient voltage suppressor in DSN1608-2 for mobile applications

20 November 2015

Product data sheet

1. General description

Unidirectional Transient Voltage Suppressor (TVS) in an ultra small leadless DSN1608-2 (SOD963) package, designed for transient overvoltage protection.

2. Features and benefits

- Rated peak pulse current: $I_{PPM} = 65 \text{ A}$ (8/20 μs pulse)
- Rated peak pulse power: $P_{PPM} = 2100 \text{ W}$ (8/20 μs pulse)
- Dynamic resistance $R_{dyn} = 0.1 \Omega$
- Reverse current: $I_{RM} = 1 \text{ nA}$
- Very low package height: 0.25 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
I_{PPM}	peak pulse current	$t_p = 8/20 \mu\text{s}$	[1][2]	-	-	65	A
		$t_p = 10/1000 \mu\text{s}$	[3][2]	-	-	10.1	A
V_{RWM}	reverse standoff voltage	$T_{amb} = 25 \text{ }^\circ\text{C}$		-	-	12	V

[1] In accordance with IEC 61000-4-5 and IEC 61643-321 (8/20 μs current waveform).

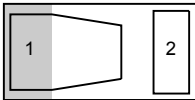

[2] Measured from pin 1 to pin 2.

[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	 <p>Transparent top view DSN1608-2 (SOD963)</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
PTVS12VZ1USKN	DSN1608-2	leadless ultra small package; 2 terminals; body 1.6 x 0.8 x 0.25 mm	SOD963

7. Marking

Table 4. Marking codes

Type number	Marking code
PTVS12VZ1USKN	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}	peak pulse power	t _p = 8/20 μs	[1][2]	-	2100	W
		t _p = 10/1000 μs	[3][2]	-	180	W
I _{PPM}	peak pulse current	t _p = 8/20 μs	[1][2]	-	65	A
		t _p = 10/1000 μs	[3][2]	-	10.1	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 and IEC 61643-321 (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.

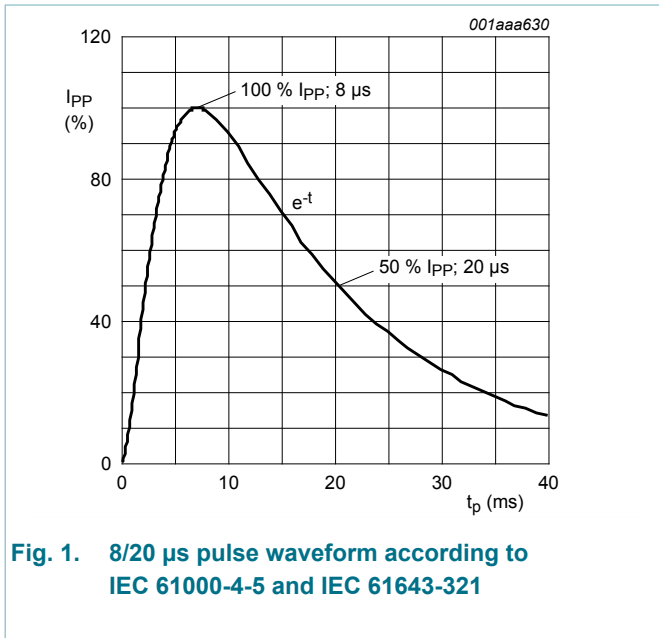


Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5 and IEC 61643-321

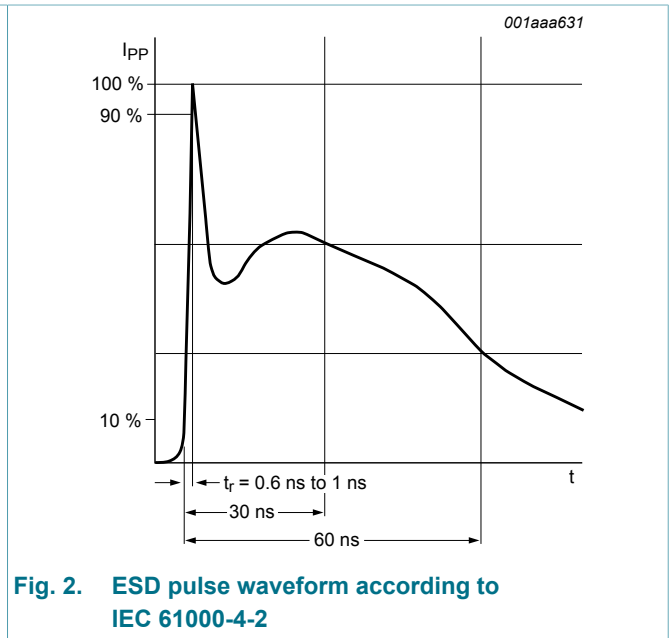


Fig. 2. ESD pulse waveform according to IEC 61000-4-2

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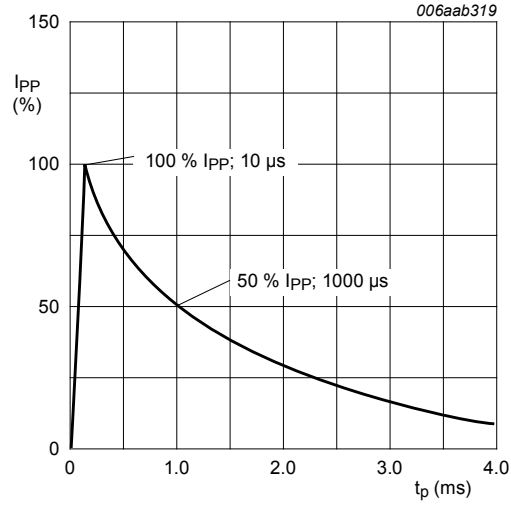


Fig. 3. 10/1000 μ s pulse waveform according to IEC 61643-321

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	
I_{RM}	reverse leakage current	$V_{RWM} = 12\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	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_{BR}	breakdown voltage	$I_R = 10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[1]	13.3	15.4	V	
V_{CL}	clamping voltage	$I_{PPM} = 65\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}; t_p = 8/20\text{ }\mu\text{s}$	[2][1]	-	25.9	32	V
		$I_{PPM} = 10.1\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}; t_p = 10/1000\text{ }\mu\text{s}$	[3][1]	-	16.6	19.9	V
R_{dyn}	dynamic resistance	$I_R = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$	[4][1]	0.1	-	Ω	

- [1] Measured from pin 1 to 2.
- [2] In accordance with IEC 61000-4-5 and IEC 61643-321 (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.

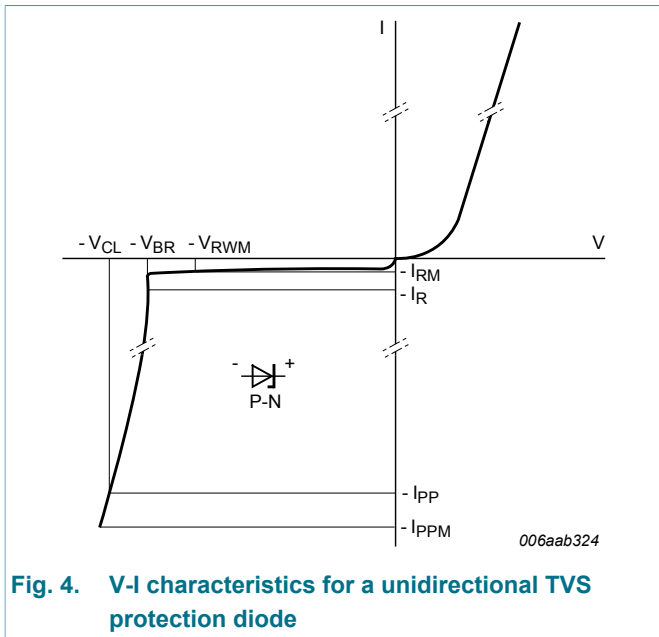


Fig. 4. V-I characteristics for a unidirectional TVS protection diode

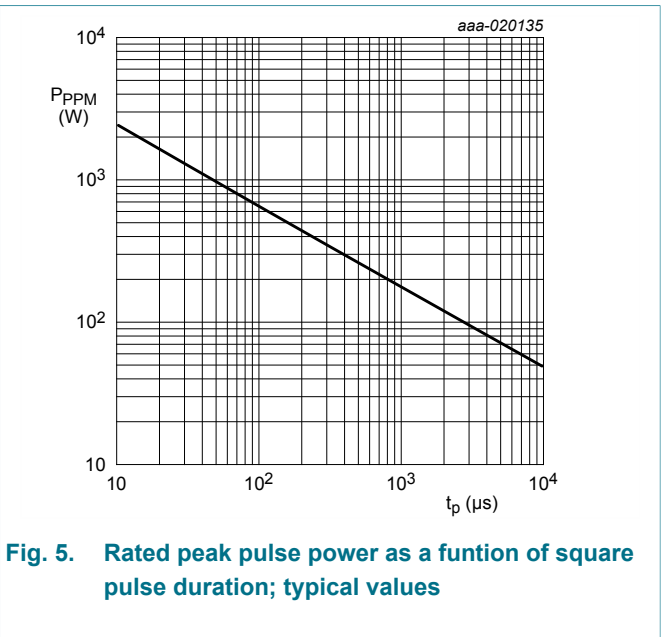


Fig. 5. Rated peak pulse power as a function of square pulse duration; typical values

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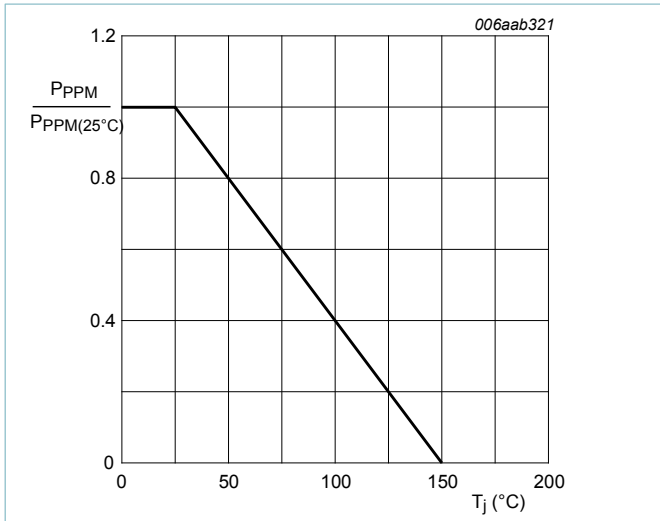


Fig. 6. Relative variation of rated peak pulse power as a function of junction temperature; typical values

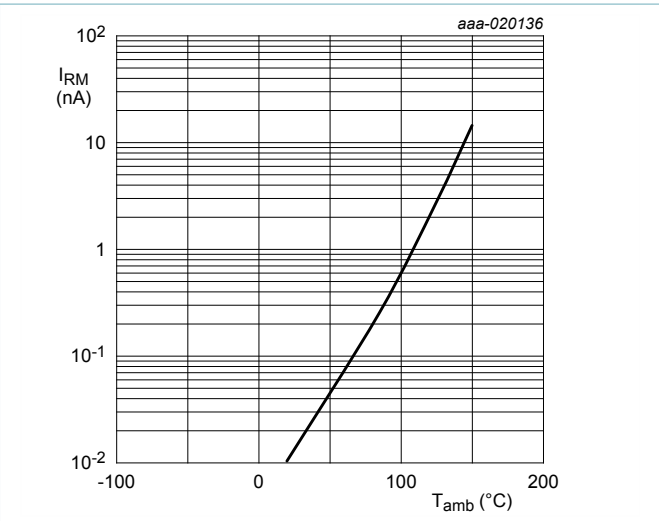
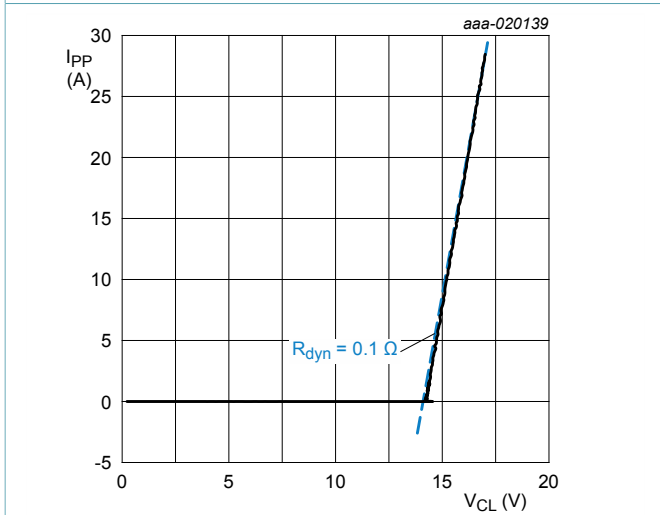
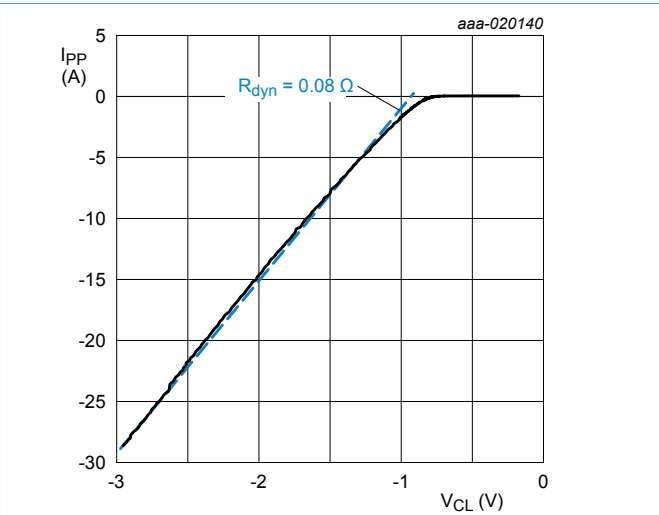


Fig. 7. Relative variation of reverse leakage current as a function of junction temperature; typical values



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

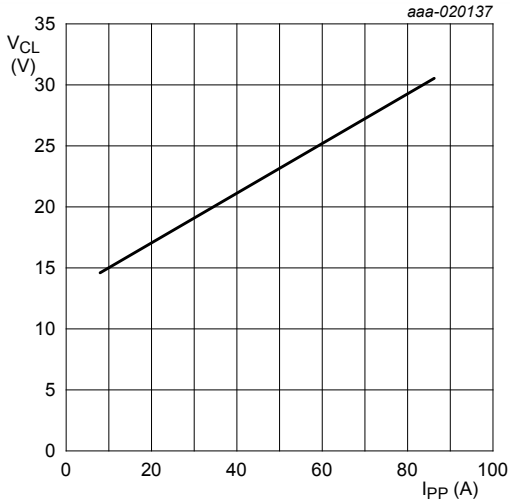
Fig. 8. Dynamic resistance with positive clamping voltage; typical values



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

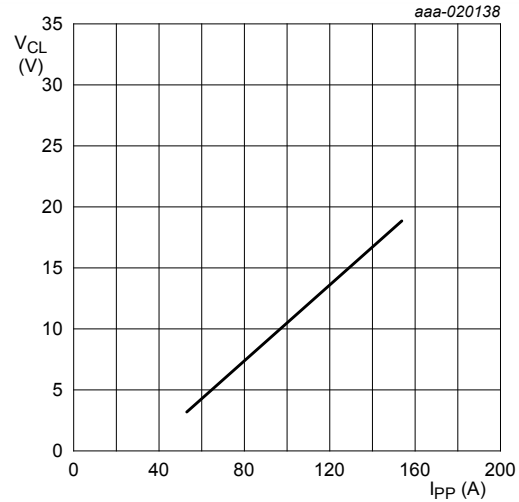
Fig. 9. Dynamic resistance with negative clamping voltage; typical values

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$t_p = 8/20 \mu s$; according to IEC 61000-4-5 and IEC 61643-321

Fig. 10. Dynamic resistance with positive clamping voltage; typical values



$t_p = 8/20 \mu s$; according to IEC 61000-4-5 and IEC 61643-321

Fig. 11. Dynamic resistance with negative clamping voltage; typical values

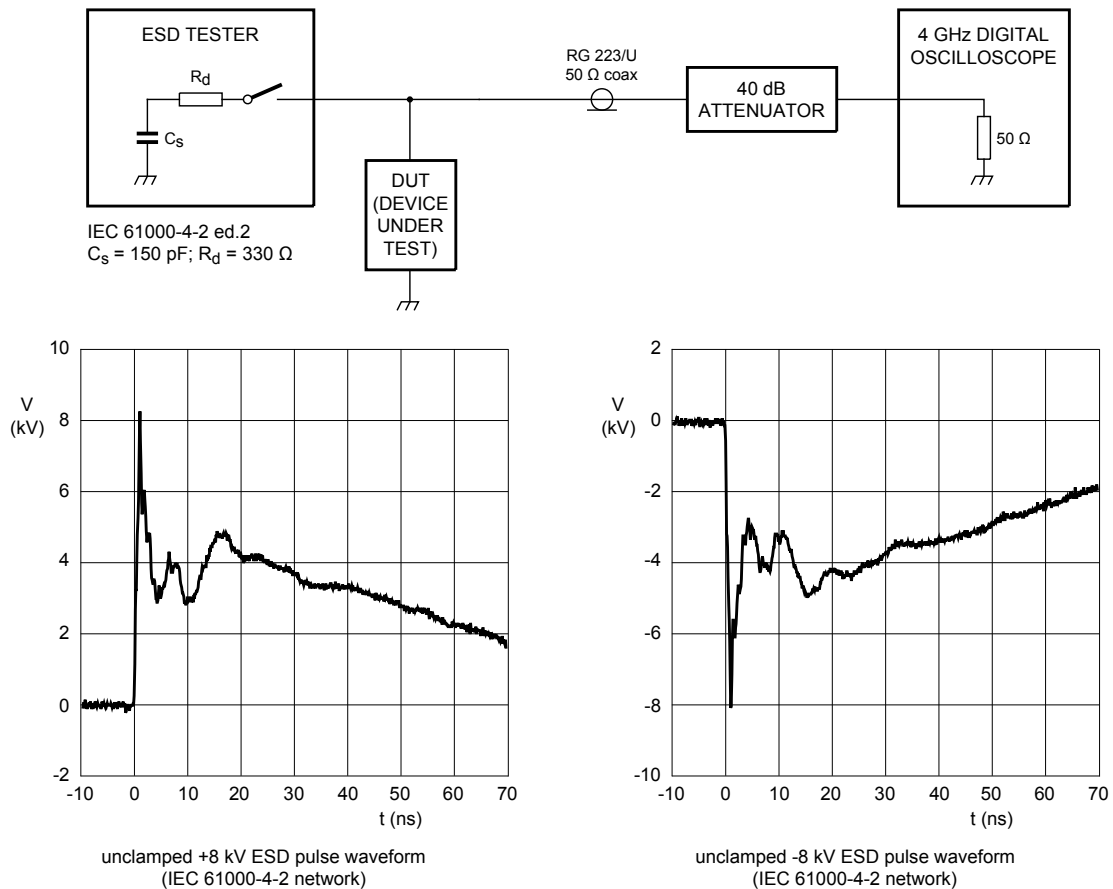


Fig. 12. ESD clamping test setup and waveforms

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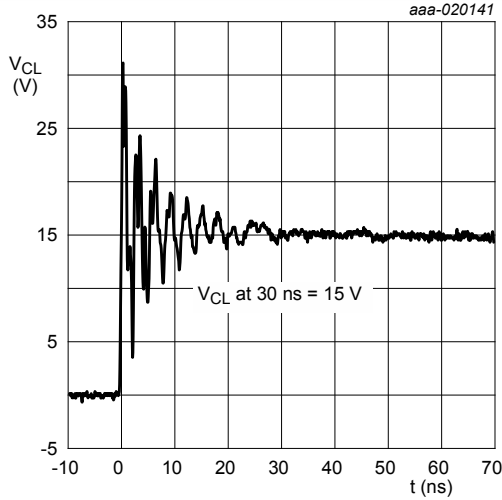


Fig. 13. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

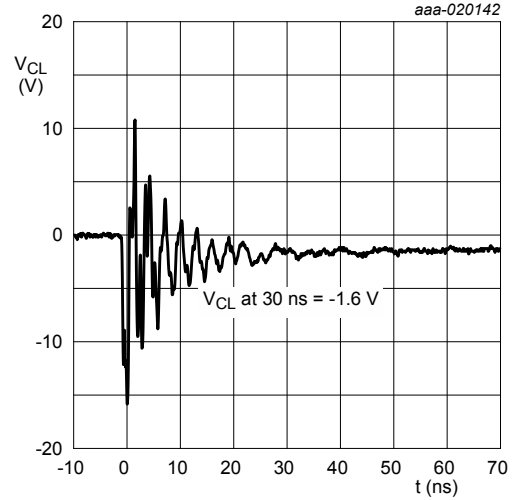


Fig. 14. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

10. Application information

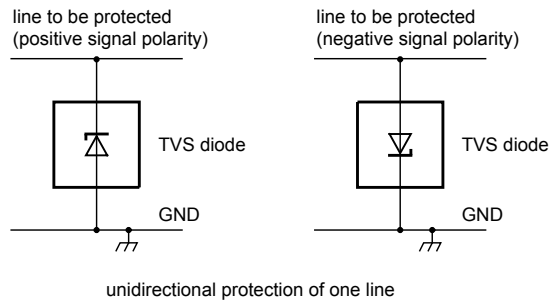


Fig. 15. Application diagram

11. Package outline

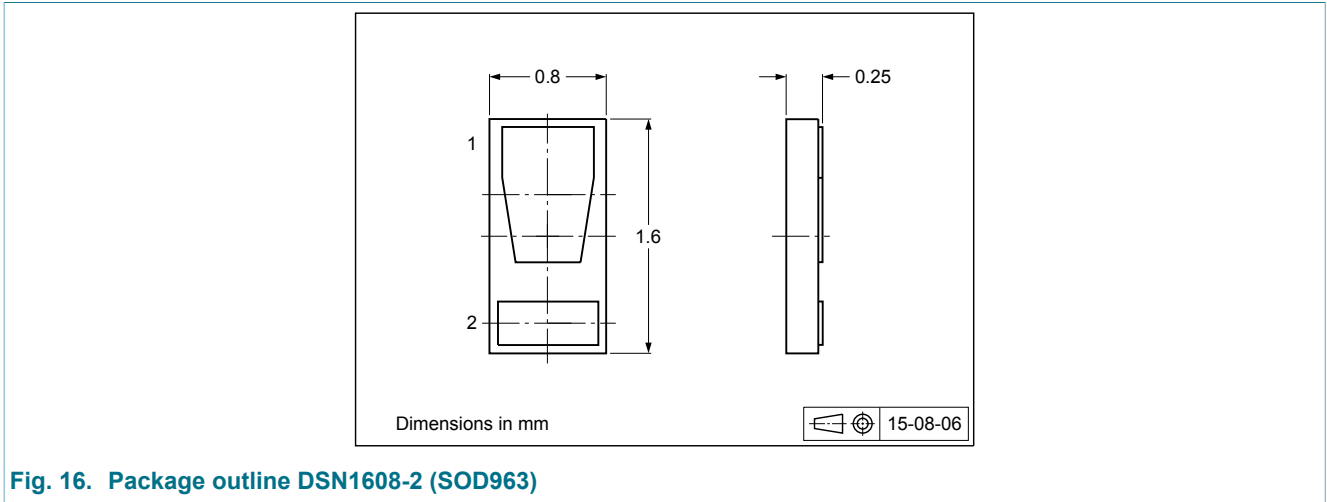


Fig. 16. Package outline DSN1608-2 (SOD963)

12. Soldering

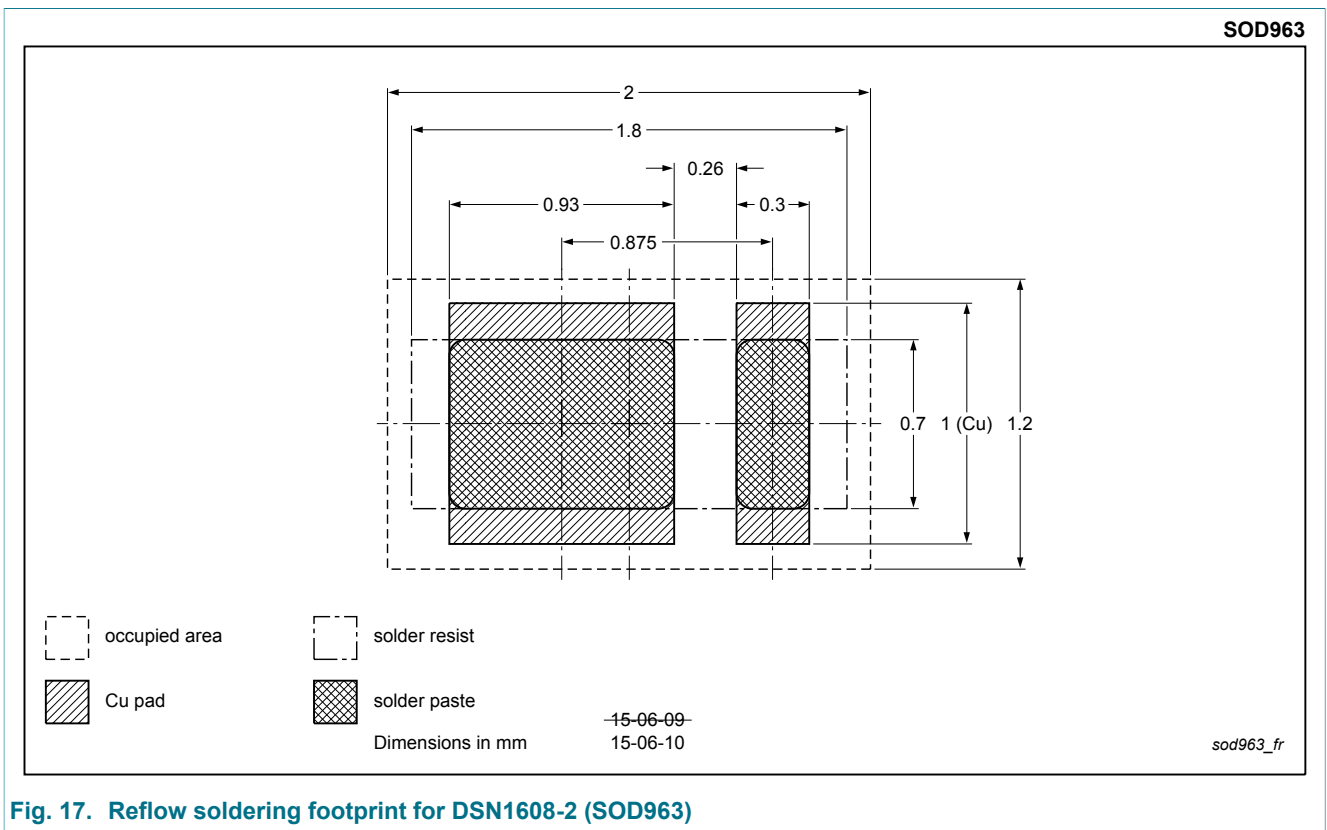


Fig. 17. Reflow soldering footprint for DSN1608-2 (SOD963)

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PTVS12VZ1USKN v.1	20151022	Preliminary data sheet	-	-
Modifications:	<ul style="list-style-type: none">Product status changed			
PTVS12VZ1USKN v.2	20151120	Product data sheet	-	PTVS12VZ1USKN v.1

14. Legal information

14.1 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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