# THE DATASHEET OF

# PTVS12VZ1USKNYL


# 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 A (8/20 µs pulse)
- Rated peak pulse power: $P_{PPM}$ = 2100 W (8/20 µs pulse)
- Dynamic resistance $R_{dyn}$ = 0.1 Ω
- Reverse current: $I_{RM}$ = 1 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 µs | [1][2] | - | - | 65 | A |
| | | $t_p$ = 10/1000 µs | [3][2] | - | - | 10.1 | A |
| $V_{RWM}$ | reverse standoff voltage | $T_{amb}$ = 25 °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).

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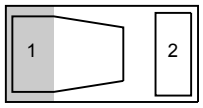
## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | K | cathode |  Transparent top view **DSN1608-2 (SOD963)** |  *sym035* |
| 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.

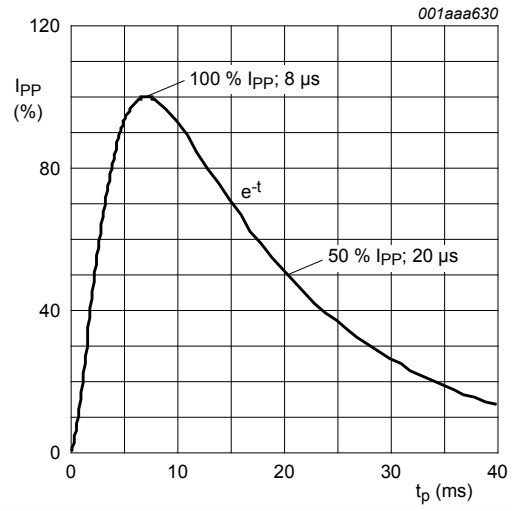



**Fig. 1. 8/20 µs pulse waveform according to IEC 61000-4-5 and IEC 61643-321**

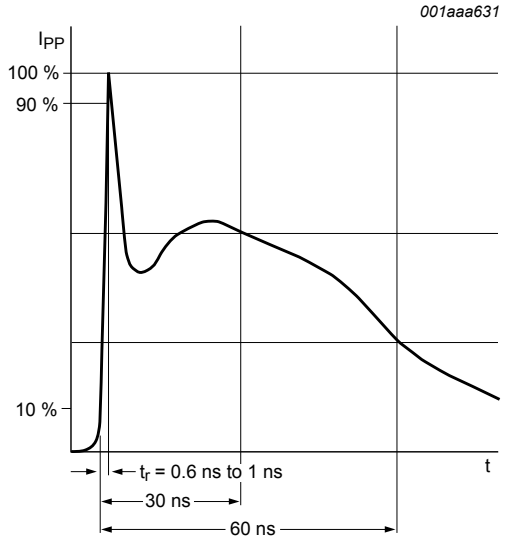



**Fig. 2. ESD pulse waveform according to IEC 61000-4-2**

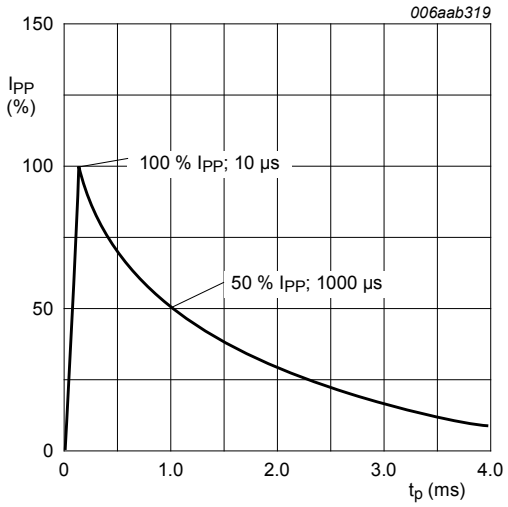



**Fig. 3. 10/1000 µs pulse waveform according to IEC 61643-321**

# 9. Characteristics

**Table 6. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb}$ = 25 °C | | - | - | 12 | V |
| $I_{RM}$ | reverse leakage current | $V_{RWM}$ = 12 V; $T_{amb}$ = 25 °C | [1] | - | 1 | 200 | nA |
| $C_d$ | diode capacitance | f = 1 MHz; $V_R$ = 0 V; $T_{amb}$ = 25 °C | | - | 430 | - | pF |
| $V_{BR}$ | breakdown voltage | $I_R$ = 10 mA; $T_{amb}$ = 25 °C | [1] | 13.3 | 14.4 | 15.4 | V |
| $V_{CL}$ | clamping voltage | $I_{PPM}$ = 65 A; $T_{amb}$ = 25 °C; $t_p$ = 8/20 µs | [2][1] | - | 25.9 | 32 | V |
| | | $I_{PPM}$ = 10.1 A; $T_{amb}$ = 25 °C; $t_p$ = 10/1000 µs | [3][1] | - | 16.6 | 19.9 | V |
| $R_{dyn}$ | dynamic resistance | $I_R$ = 10 A; $T_{amb}$ = 25 °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 ns; square pulse; ANSI / ESD STM5.5.1-2008.

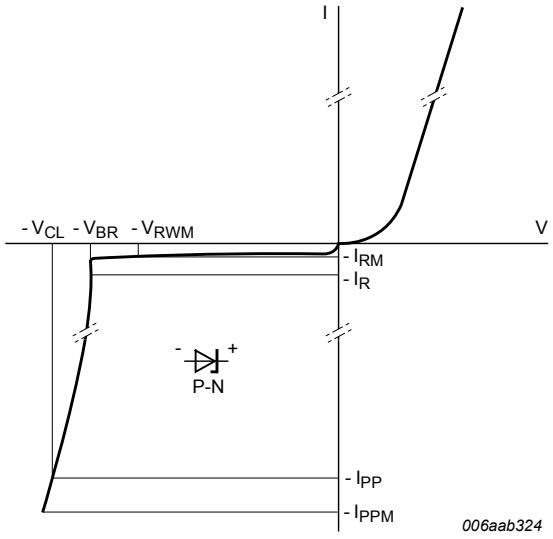



**Fig. 4. V-I characteristics for a unidirectional TVS protection diode**

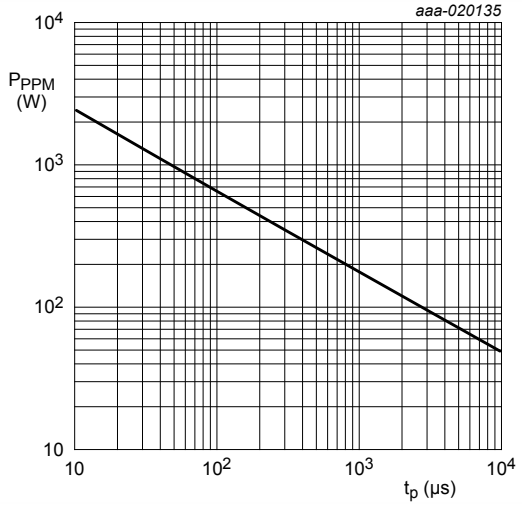



**Fig. 5. Rated peak pulse power as a funtion of square pulse duration; typical values**

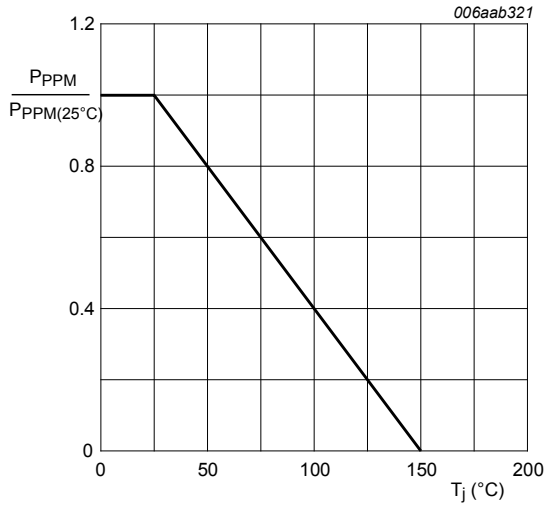



**Fig. 6. Relative variation of rated peak pulse power as a function of junction temperature; typical values**

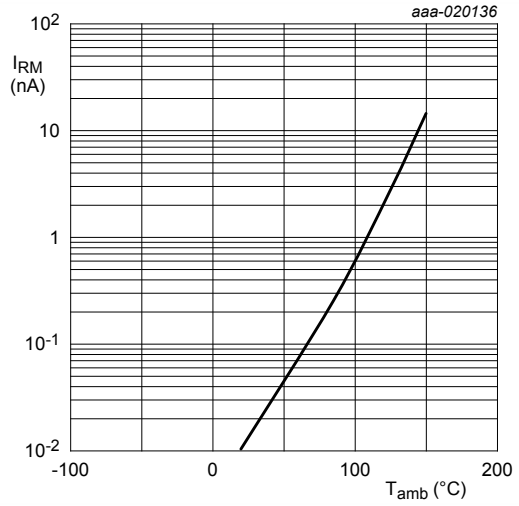
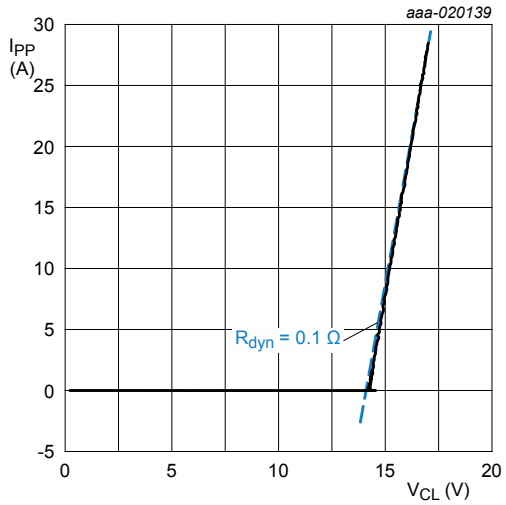
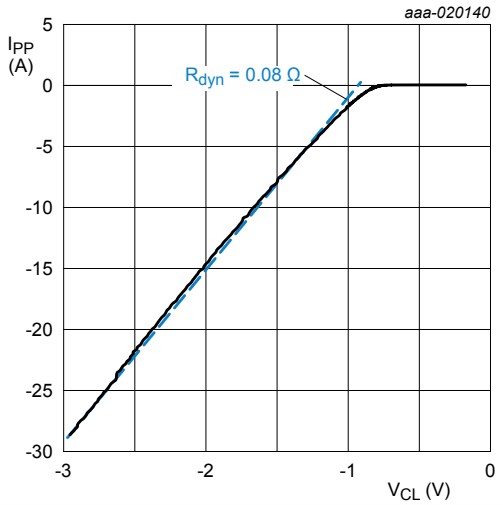



**Fig. 7. Relative variation of reverse leakage current as a function of junction temperature; typical values**



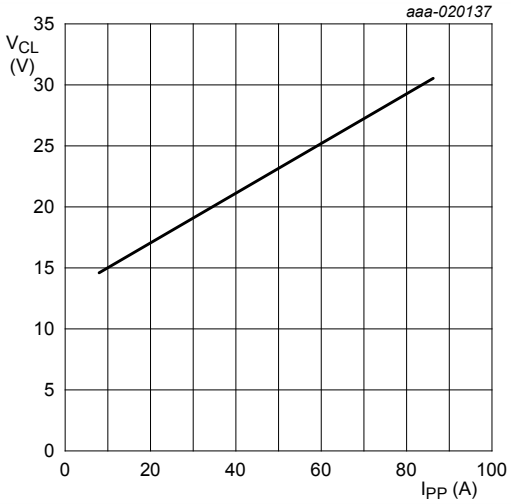

$t_p$ = 100 ns; Transmission Line Pulse (TLP)

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



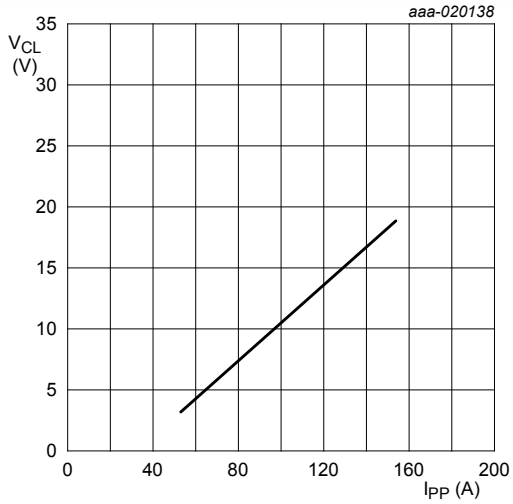

$t_p$ = 100 ns; Transmission Line Pulse (TLP)

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




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

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




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

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

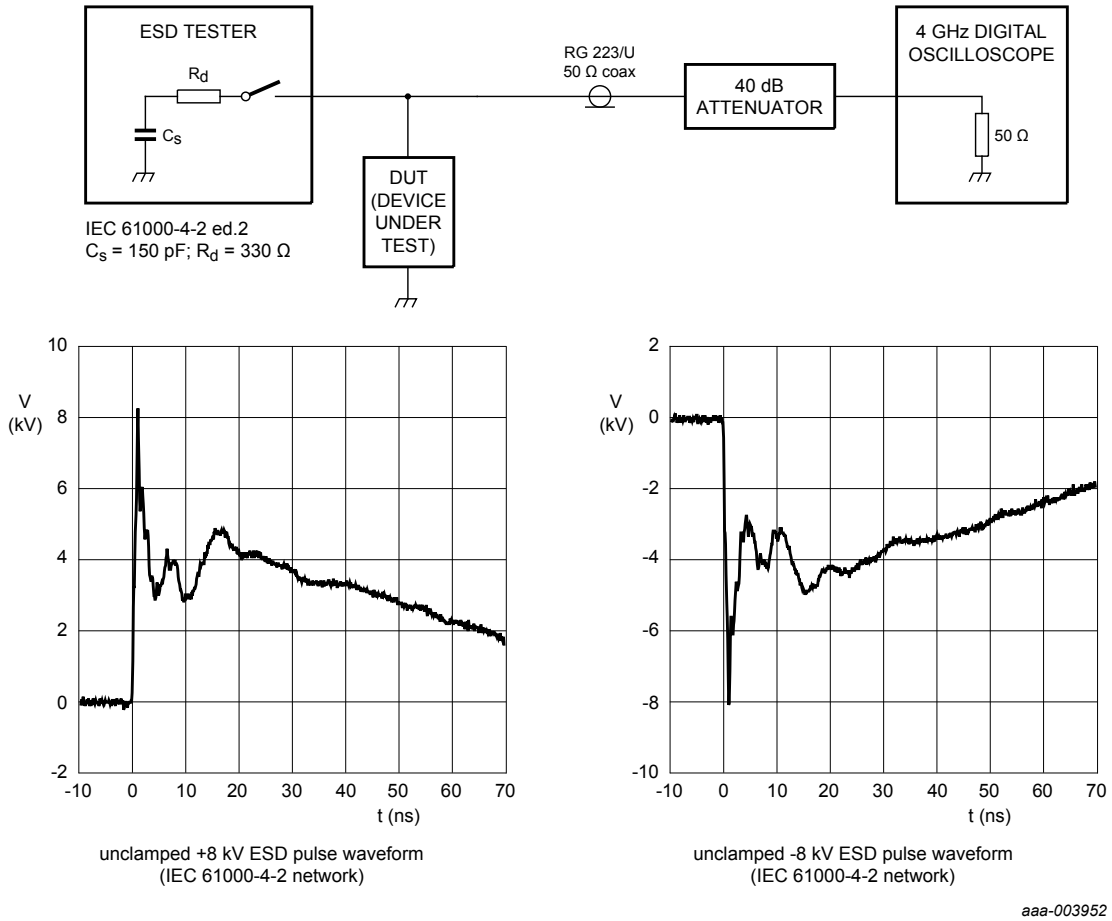



**Fig. 12. ESD clamping test setup and waveforms**

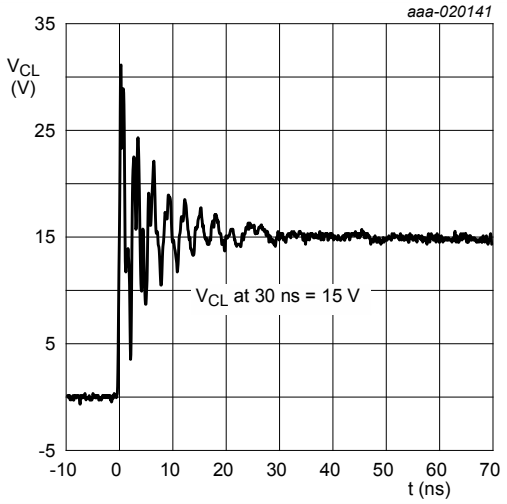



Fig. 13. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

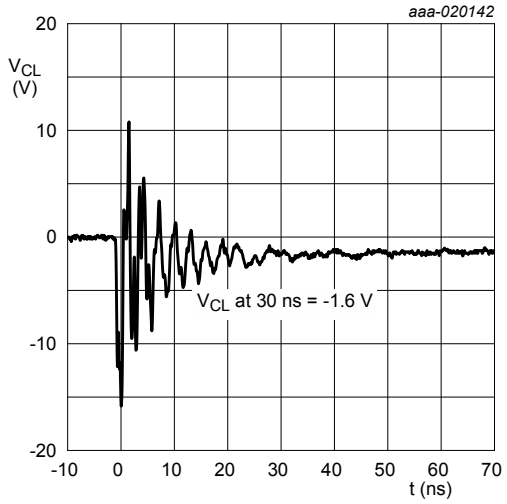



Fig. 14. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)

## 10. Application information

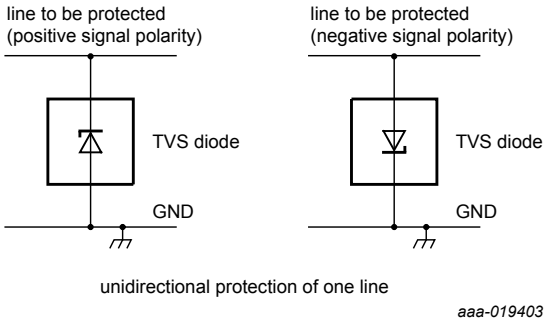



Fig. 15. Application diagram

## 11. Package outline

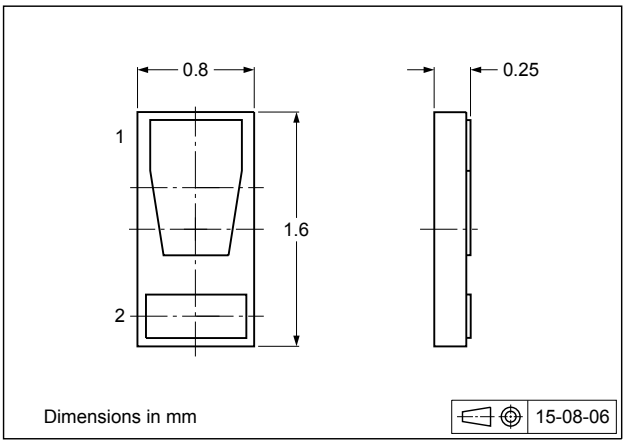



**Fig. 16. Package outline DSN1608-2 (SOD963)**

## 12. Soldering

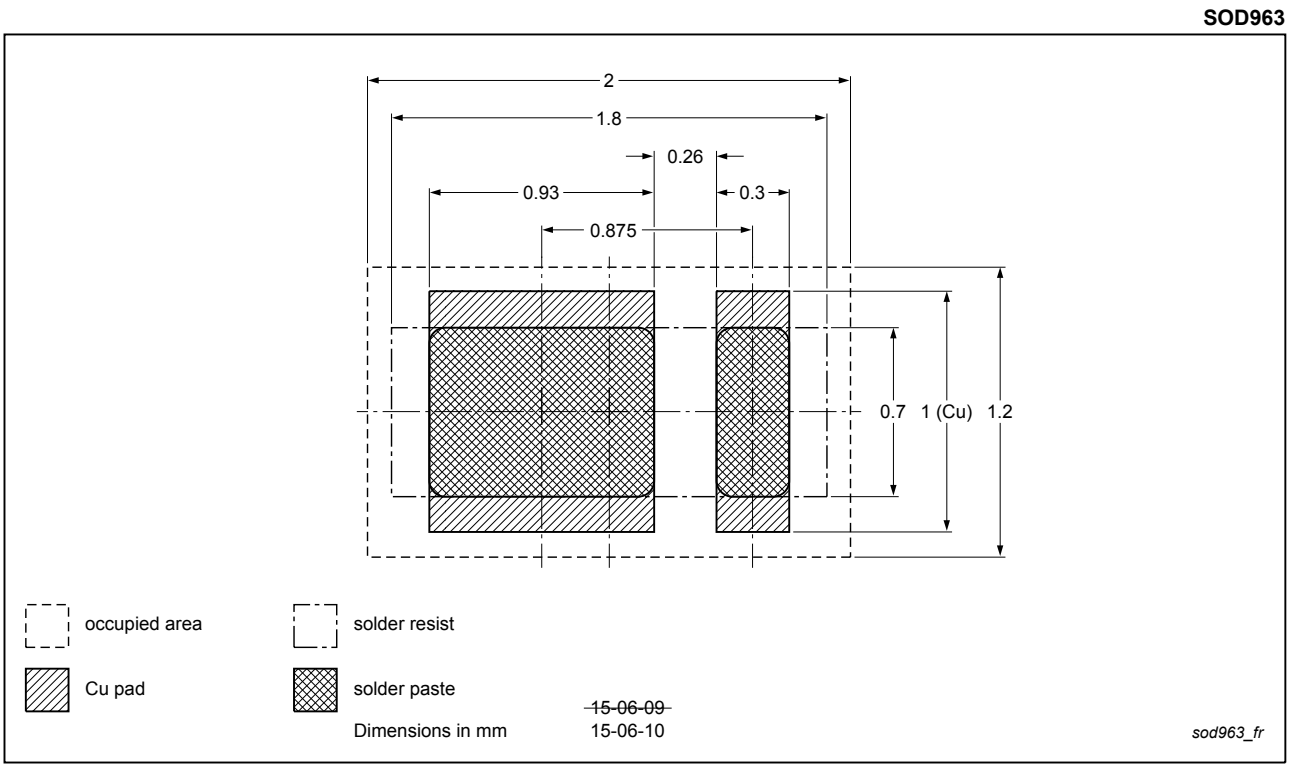



**Fig. 17. Reflow soldering footprint for DSN1608-2 (SOD963)**

# 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: | • Product status changed | | | |
| PTVS12VZ1USKN v.2 | 20151120 | Product data sheet | - | PTVS12VZ1USKN v.1 |

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| Document status [1][2] | Product status [3] | Definition |
|---|---|---|
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| Product [short] data sheet | Production | This document contains the product specification. |

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