



# PTVS5V0Z1USKN

Transient voltage suppressor in DSN1608-2 for mobile applications

22 October 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:  $I_{PPM} = 80 \text{ A}$  (8/20  $\mu\text{s}$  pulse)
- Rated peak pulse power:  $P_{PPM} = 1200 \text{ W}$  (8/20  $\mu\text{s}$  pulse)
- Dynamic resistance  $R_{dyn} = 0.06 \Omega$
- Reverse current:  $I_{RM} = 0.025 \mu\text{A}$
- 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] | -   | -   | 80  | A    |
|           |                          | $t_p = 10/1000 \mu\text{s}$           | [3][2] | -   | -   | 20  | A    |
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25 \text{ }^\circ\text{C}$ |        | -   | -   | 5   | V    |

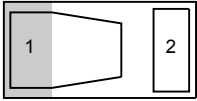

[1] In accordance with IEC 61000-4-5 and IEC 61643-321 (8/20  $\mu\text{s}$  current waveform).

[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<br/>DSN1608-2 (SOD963)</p> | <br><i>sym035</i> |
| 2   | A      | anode       |  |  |

## 6. Ordering information

Table 3. Ordering information

| Type number   | Package   |   |         |
|---------------|-----------|---|---------|
|               | Name      | Description   | Version |
| PTVS5V0Z1USKN | 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 |
|---------------|--------------|
| PTVS5V0Z1USKN | Z2           |

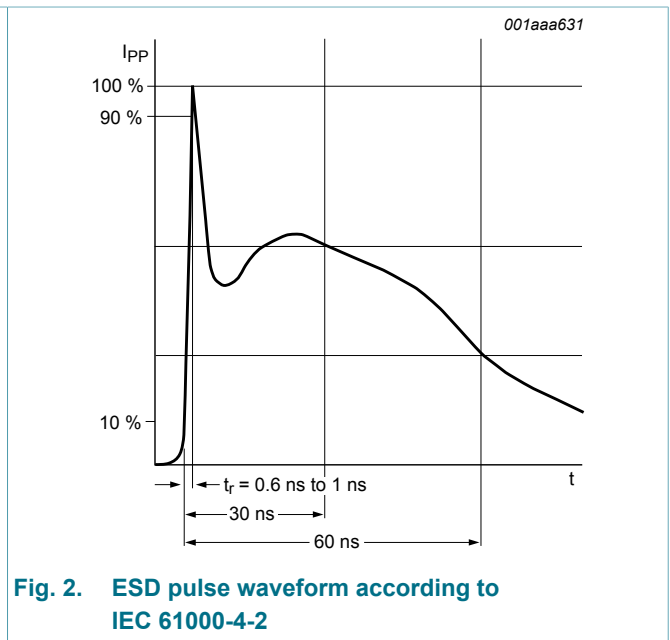
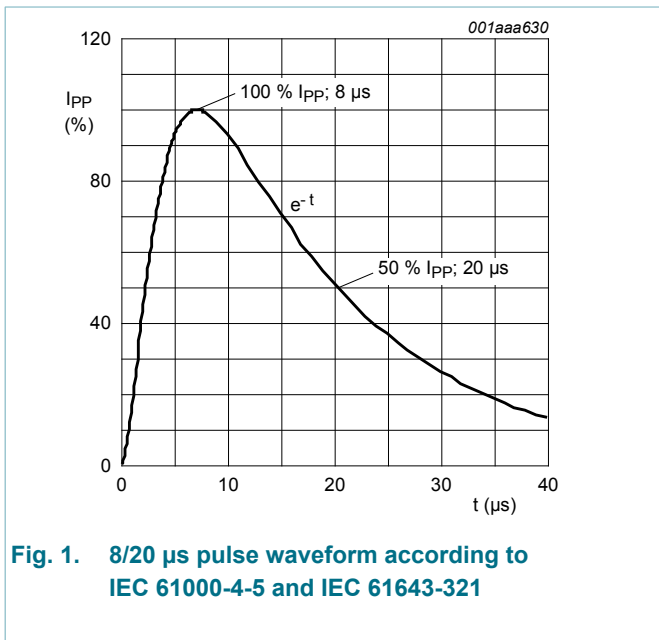
## 8. Limiting values

**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] | -   | 1200 | W    |
|                            |                                 | t <sub>p</sub> = 10/1000 μs      | [3][2] | -   | 200  | W    |
| I <sub>PPM</sub>           | peak pulse current              | t <sub>p</sub> = 8/20 μs         | [1][2] | -   | 80   | A    |
|                            |                                 | t <sub>p</sub> = 10/1000 μs      | [3][2] | -   | 20   | 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 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.



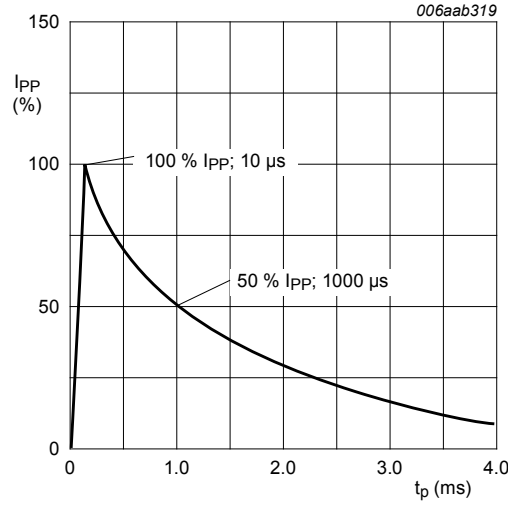


Fig. 3. 10/1000 μs pulse waveform according to IEC 61643-321

## 9. Characteristics

Table 6. Characteristics

| Symbol    | Parameter                | Conditions   | Min    | Typ   | Max | Unit |
|-----------|--------------------------|--|--------|-------|-----|------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25\text{ °C}$   | -      | -     | 5   | V    |
| $I_{RM}$  | reverse leakage current  | $V_R = 5\text{ V}; T_{amb} = 25\text{ °C}$                               | [1]    | 0.025 | 1   | μA   |
| $C_d$     | diode capacitance        | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ °C}$             | -      | 1200  | -   | pF   |
| $V_{BR}$  | breakdown voltage        | $I_R = 10\text{ mA}; T_{amb} = 25\text{ °C}$                             | [1]    | 7     | 7.8 | V    |
| $V_{CL}$  | clamping voltage         | $I_{PPM} = 80\text{ A}; T_{amb} = 25\text{ °C}; t_p = 8/20\text{ μs}$    | [2][1] | -     | 18  | V    |
|           |                          | $I_{PPM} = 20\text{ A}; T_{amb} = 25\text{ °C}; t_p = 10/1000\text{ μs}$ | [3][1] | -     | 12  | V    |
| $R_{dyn}$ | dynamic resistance       | $I_R = 10\text{ A}; T_{amb} = 25\text{ °C}$                              | [4][1] | 0.06  | -   | 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.

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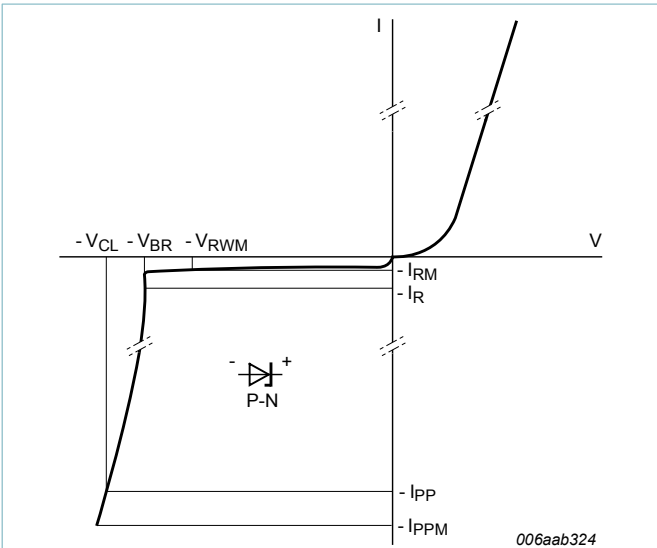


Fig. 4. V-I characteristics for a unidirectional TVS protection diode

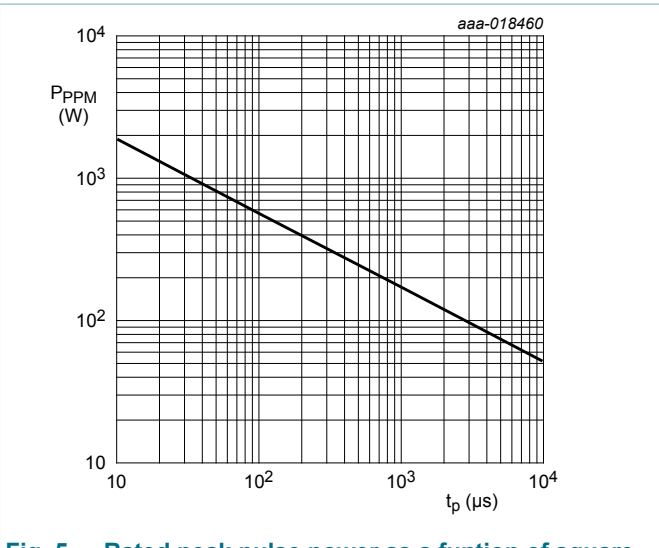


Fig. 5. Rated peak pulse power as a function of square pulse duration; typical values

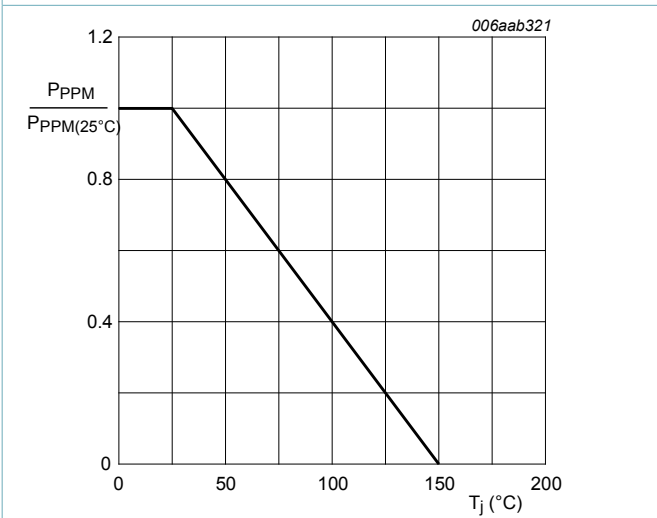


Fig. 6. Relative variation of rated peak pulse power as a function of junction temperature; typical values

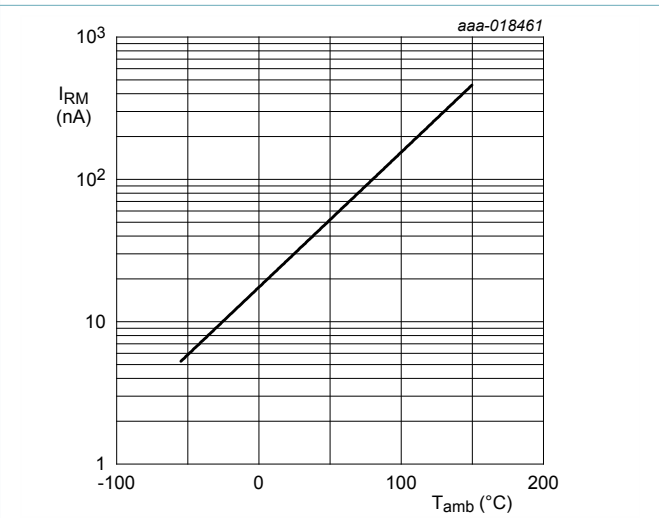
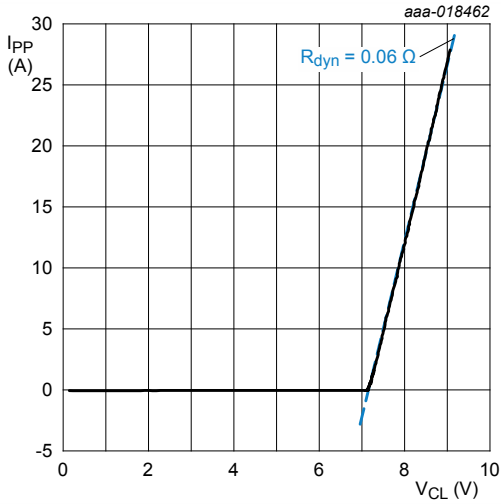


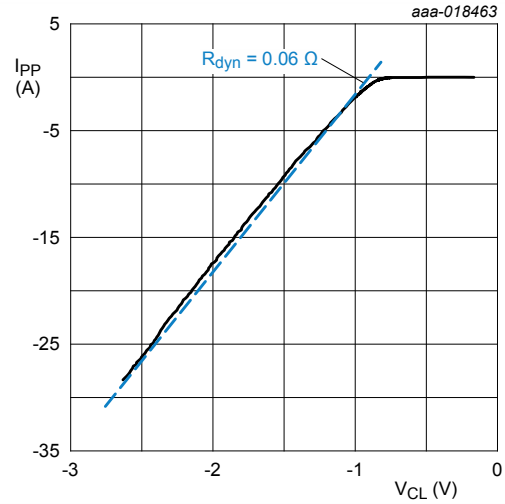
Fig. 7. Relative variation of reverse leakage current as a function of junction temperature; typical values

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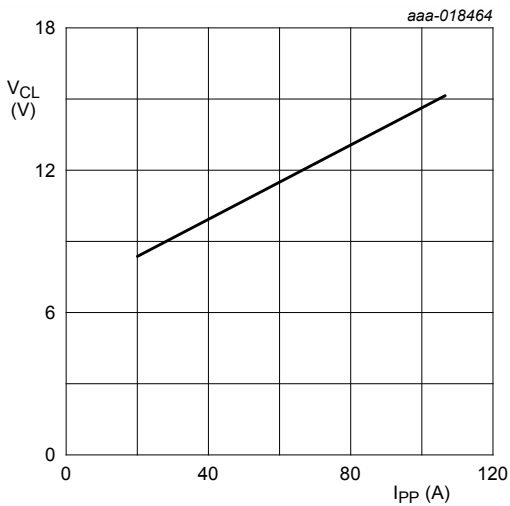
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

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



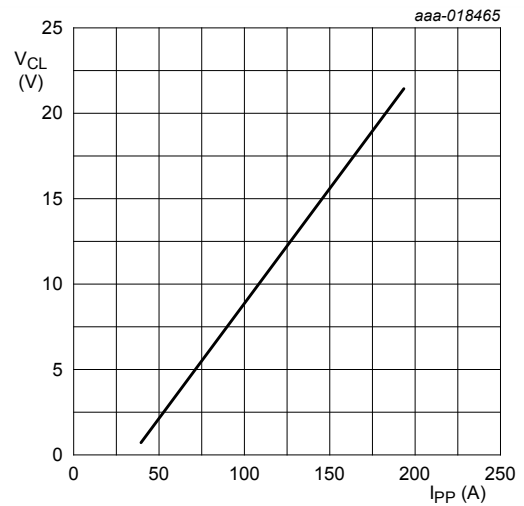
$t_p = 100 \text{ ns}$ ; Transmission Line Pulse (TLP)

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



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

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



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

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

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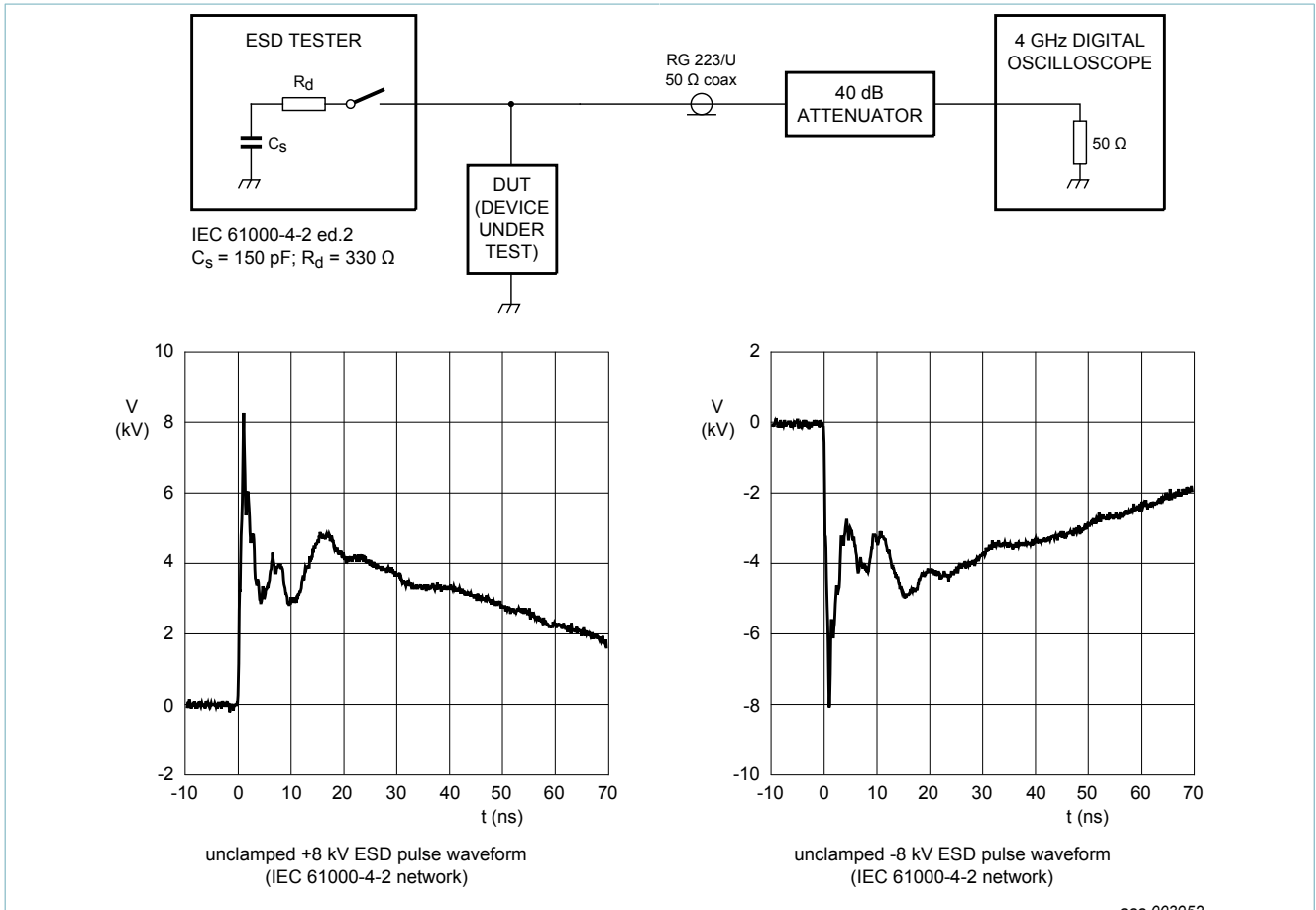


Fig. 12. ESD clamping test setup and waveforms

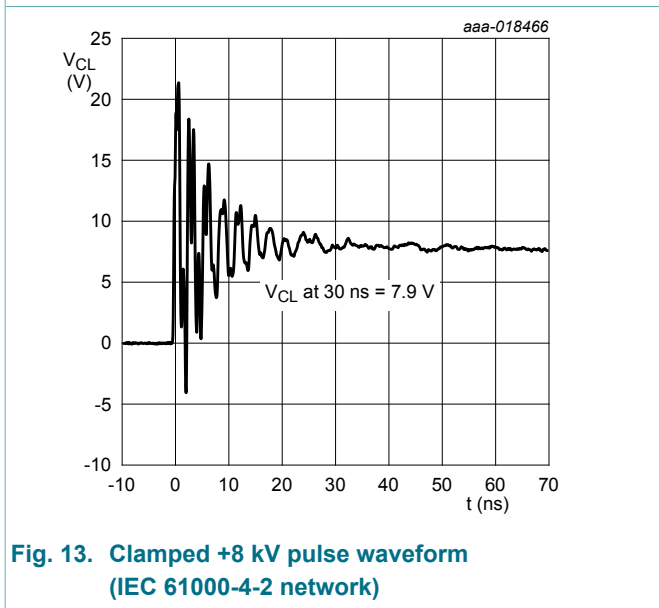


Fig. 13. Clamped +8 kV pulse waveform  
 (IEC 61000-4-2 network)

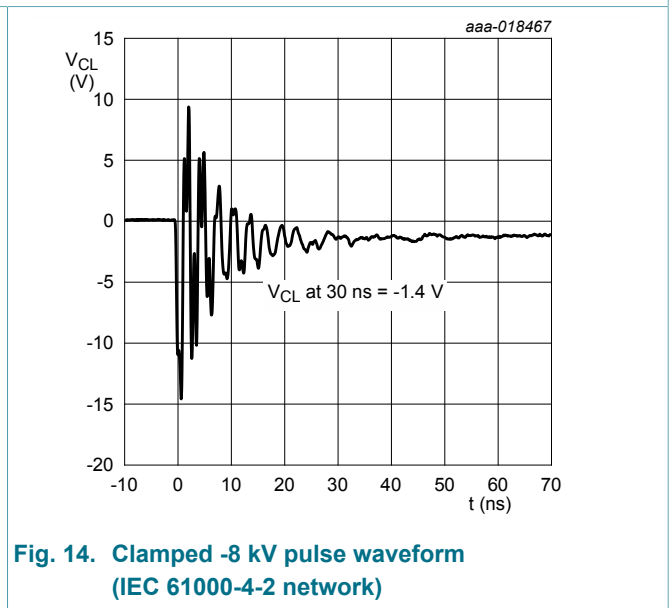


Fig. 14. Clamped -8 kV pulse waveform  
 (IEC 61000-4-2 network)

### 10. Application information

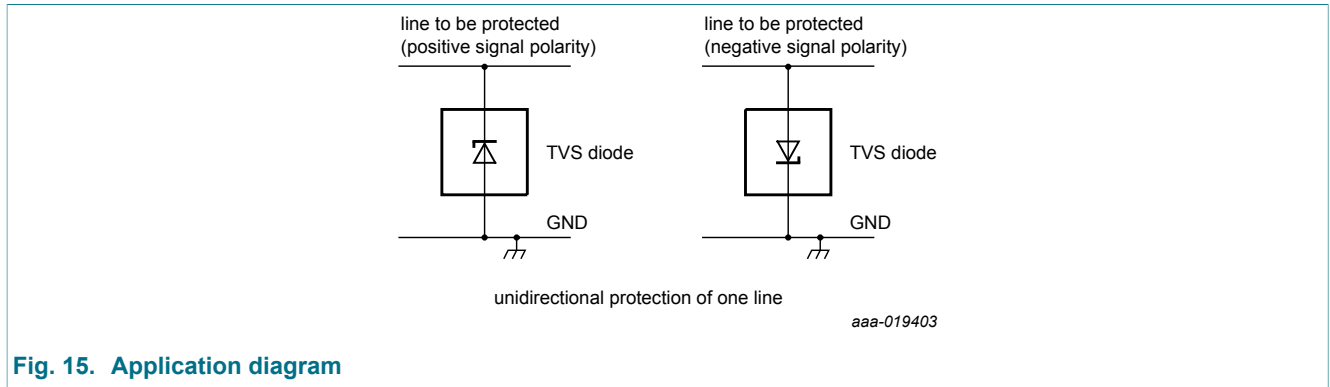


Fig. 15. Application diagram

### 11. Package outline

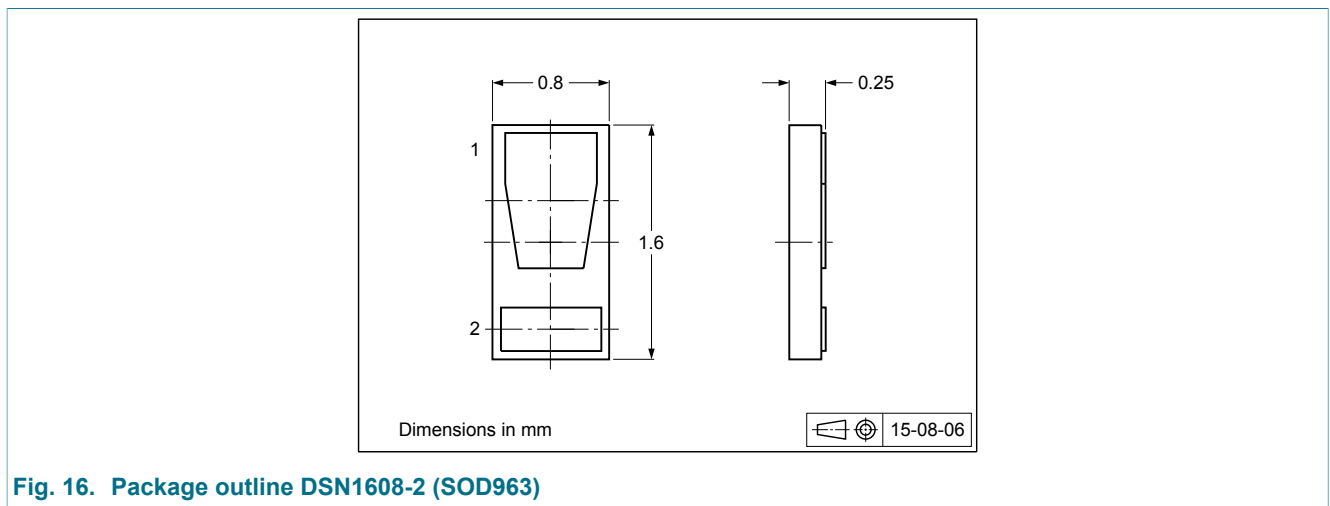


Fig. 16. Package outline DSN1608-2 (SOD963)



## 12. Soldering

SOD963

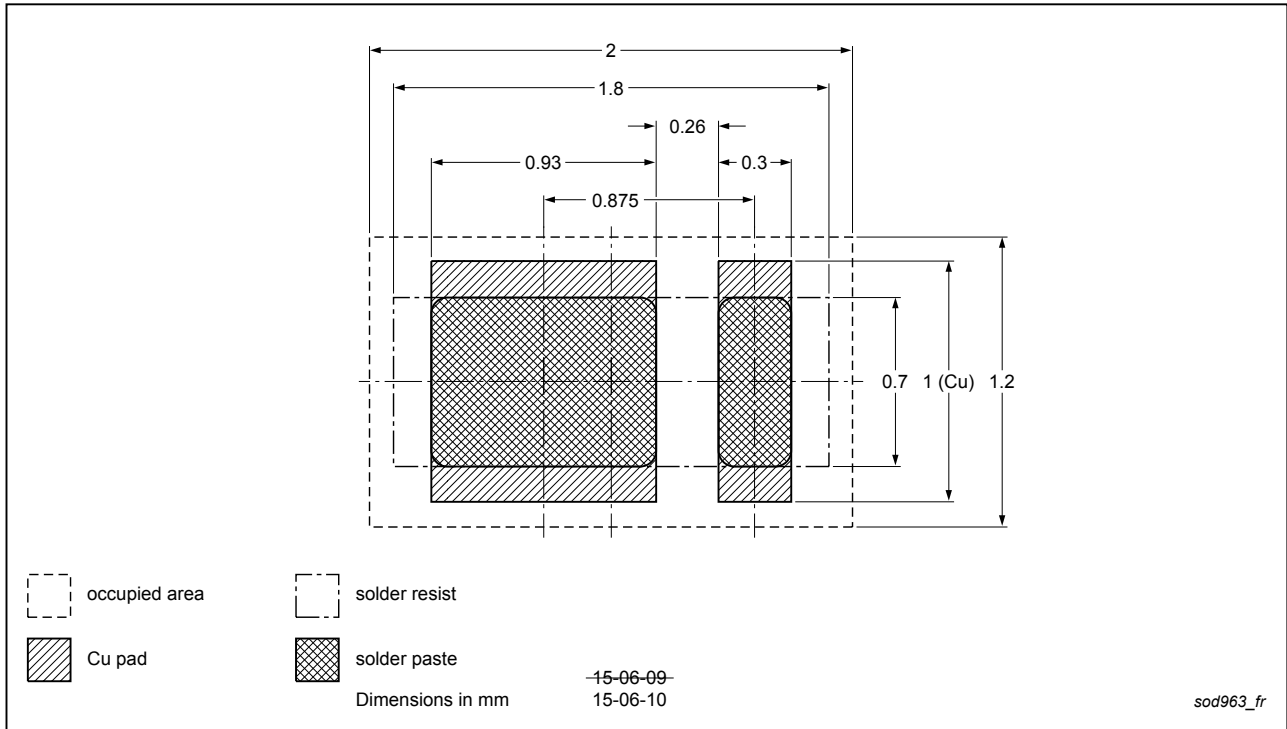


Fig. 17. Reflow soldering footprint for DSN1608-2 (SOD963)

## 13. Revision history

Table 7. Revision history

| Data sheet ID     | Release date  | Data sheet status      | Change notice | Supersedes        |
|-------------------|---|------------------------|---------------|-------------------|
| PTVS5V0Z1USKN v.2 | 20151022  | Product data sheet     | -             | PTVS5V0Z1USKN v.1 |
| Modifications:    | <ul style="list-style-type: none"><li>Section 9. Characteristics: diode capacitance <math>C_d</math> and clamping voltage <math>V_{CL}</math> updated</li></ul> |                        |               |                   |
| PTVS5V0Z1USKN v.1 | 20150604  | Preliminary data sheet | -             | -                 |

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|--------------------------------|--------------------|---|
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| 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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