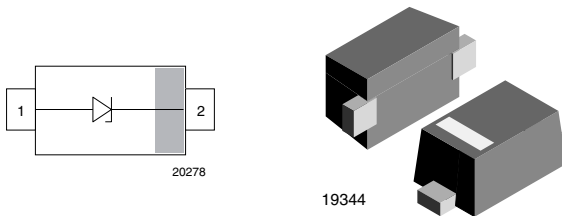


Single-Line ESD-Protection Diode in SOD-523



MARKING (example only)



Bar = cathode marking
 X = date code
 Y = type code (see table below)

FEATURES

- Compact SOD-523 package
- Low package height < 0.7 mm
- 1-line unidirectional ESD-protection
- AEC-Q101 qualified available
- Working range 1 V to 33 V
- ESD immunity acc. IEC 61000-4-2
 ±15 kV to ±30 kV contact discharge
 ±15 kV to ±30 kV air discharge
- Lead plating: Sn (e3)
 - soldering can be checked by standard vision inspection
 - AOI = automated optical inspection
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



LINKS TO ADDITIONAL RESOURCES



| ORDERING INFORMATION | | | | | |
|-----------------------|--------------------|--|------------|----------------------------|-------------------------|
| PART NUMBER (EXAMPLE) | AEC-Q101 QUALIFIED | ENVIRONMENTAL AND QUALITY CODE | | | ORDERING CODE (EXAMPLE) |
| | | RoHS COMPLIANT + LEAD (Pb)-FREE TERMINATIONS | TIN PLATED | 8K PER 7" REEL (8 mm TAPE) | |
| | | GREEN | | MOQ = 8K/BOX | |
| VESD05C1-02V | - | G | 3 | -08 | VESD05C1-02V-G3-08 |
| VESD05C1-02V | H | G | 3 | -08 | VESD05C1-02VHG3-08 |

| PACKAGE DATA | | | | | | |
|--------------|--------------|-----------|---------|--------------------------------------|-----------------------------------|------------------------------|
| DEVICE NAME | PACKAGE NAME | TYPE CODE | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
| VESD01C1-02V | SOD-523 | . V | 1.32 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | Peak temperature max. 260 °C |
| VESD03C1-02V | | . B | | | | |
| VESD05C1-02V | | . C | | | | |
| VESD08C1-02V | | . D | | | | |
| VESD12C1-02V | | . E | | | | |
| VESD16C1-02V | | . F | | | | |
| VESD26C1-02V | | . X | | | | |
| VESD33C1-02V | | A | | | | |



| ABSOLUTE MAXIMUM RATINGS VESD01C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 11 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 70 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 30 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |

| ABSOLUTE MAXIMUM RATINGS VESD03C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 11.6 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 100 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 30 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |

| ABSOLUTE MAXIMUM RATINGS VESD05C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 8.7 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 100 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 30 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |

| ABSOLUTE MAXIMUM RATINGS VESD08C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 6.60 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 100 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 30 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |



| ABSOLUTE MAXIMUM RATINGS VESD12C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 4.4 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 100 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 30 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |

| ABSOLUTE MAXIMUM RATINGS VESD16C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 3.6 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 100 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 30 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 30 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |

| ABSOLUTE MAXIMUM RATINGS VESD26C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 2.1 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 100 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 20 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 20 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |

| ABSOLUTE MAXIMUM RATINGS VESD33C1-02V (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|--|---|------------------|-------------|------|
| PARAMETER | TEST CONDITIONS | SYMBOL | VALUE | UNIT |
| Peak pulse current | Acc. IEC 61000-4-5, 8/20 µs/single shot | I _{PPM} | 1.6 | A |
| Peak pulse power | Acc. IEC 61000-4-5, 8/20 µs/single shot | P _{PP} | 100 | W |
| ESD immunity | Contact discharge acc. IEC 61000-4-2; 10 pulses | V _{ESD} | 15 | kV |
| | Air discharge acc. IEC 61000-4-2; 10 pulses | | 15 | kV |
| Operating temperature | Junction temperature | T _J | -55 to +150 | °C |
| Storage temperature | | T _{stg} | -55 to +150 | °C |

**ELECTRICAL CHARACTERISTICS VESD01C1-02V**(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|--|----------------------|------|------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 1 | V |
| Reverse voltage | at I _R = 100 μA | V _R | 1 | 1.2 | - | V |
| Reverse current | at V _R = 1 V | I _R | - | 20 | 100 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 1.5 | - | - | V |
| | at I _R = 20 mA | V _{BR} | 2.5 | 2.65 | 2.8 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 11 A, t _p = 8/20 μs | V _C | - | 5.6 | 6.4 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 11 A, t _p = 8/20 μs | V _F | - | 2.5 | 3.2 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 0.13 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 153 | 192 | 230 | pF |

ELECTRICAL CHARACTERISTICS VESD03C1-02V(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|--|----------------------|------|------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 3 | V |
| Reverse voltage | at I _R = 20 μA | V _R | 3 | - | - | V |
| Reverse current | at V _R = 3 V | I _R | - | 8 | 20 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 4.4 | 4.65 | 4.9 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 11.6 A, t _p = 8/20 μs | V _C | - | 7.8 | 8.70 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 11.6 A, t _p = 8/20 μs | V _F | - | 2.6 | 3.32 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 0.19 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 89 | 112 | 135 | pF |

ELECTRICAL CHARACTERISTICS VESD05C1-02V(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|---|----------------------|------|------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 5 | V |
| Reverse voltage | at I _R = 1 μA | V _R | 5 | - | - | V |
| Reverse current | at V _R = 5 V | I _R | - | 0.01 | 0.1 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 6.85 | 7.26 | 7.65 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 8.7 A, t _p = 8/20 μs | V _C | - | 10.3 | 11.5 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 8.7 A, t _p = 8/20 μs | V _F | - | 2.2 | 2.74 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 0.2 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 53 | 67 | 81 | pF |

**ELECTRICAL CHARACTERISTICS VESD08C1-02V**(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|---|----------------------|------|------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 8 | V |
| Reverse voltage | at I _R = 0.1 μA | V _R | 8 | - | - | V |
| Reverse current | at V _R = 8 V | I _R | - | 0.01 | 0.1 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 9.5 | 10 | 10.5 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 6.6 A, t _p = 8/20 μs | V _C | - | 13.7 | 15.3 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 6.6 A, t _p = 8/20 μs | V _F | - | 1.9 | 2.32 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 0.23 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 37 | 47 | 57 | pF |

ELECTRICAL CHARACTERISTICS VESD12C1-02V(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|---|----------------------|------|------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 12 | V |
| Reverse voltage | at I _R = 0.1 μA | V _R | 12 | - | - | V |
| Reverse current | at V _R = 12 V | I _R | - | 0.01 | 0.1 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 13.9 | 14.7 | 15.5 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 4.4 A, t _p = 8/20 μs | V _C | - | 20.5 | 22.7 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 4.4 A, t _p = 8/20 μs | V _F | - | 1.6 | 1.88 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 0.4 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 26 | 33 | 40 | pF |

ELECTRICAL CHARACTERISTICS VESD16C1-02V(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|---|----------------------|------|------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 16 | V |
| Reverse voltage | at I _R = 0.1 μA | V _R | 16 | - | - | V |
| Reverse current | at V _R = 16 V | I _R | - | 0.01 | 0.1 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 17 | 17.9 | 18.8 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 3.6 A, t _p = 8/20 μs | V _C | - | 25.3 | 28 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 3.6 A, t _p = 8/20 μs | V _F | - | 1.5 | 1.72 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 0.53 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 21 | 27 | 33 | pF |

**ELECTRICAL CHARACTERISTICS VESD26C1-02V**(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|---|----------------------|------|--------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 26 | V |
| Reverse voltage | at I _R = 0.1 μA | V _R | 26 | - | - | V |
| Reverse current | at V _R = 26 V | I _R | - | < 0.01 | 0.1 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 27.6 | 29.1 | 30.6 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 2.1 A, t _p = 8/20 μs | V _C | - | 43 | 48 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 2.1 A, t _p = 8/20 μs | V _F | - | 1.3 | 1.42 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 1.9 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 14 | 17.5 | 21 | pF |

ELECTRICAL CHARACTERISTICS VESD33C1-02V(T_{amb} = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITIONS / REMARKS | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|---|----------------------|------|--------|------|-------|
| Protection paths | Number of lines which can be protected | N _{channel} | - | - | 1 | lines |
| Reverse stand off voltage | Max. reverse working voltage | V _{RWM} | - | - | 33 | V |
| Reverse voltage | at I _R = 0.1 μA | V _R | 33 | - | - | V |
| Reverse current | at V _R = 33 V | I _R | - | < 0.01 | 0.1 | μA |
| Reverse breakdown voltage | at I _R = 1 mA | V _{BR} | 35.5 | 37.4 | 39.3 | V |
| Reverse clamping voltage | at I _{PP} = I _{PPM} = 1.6 A, t _p = 8/20 μs | V _C | - | 56 | 62.5 | V |
| Forward clamping voltage | at I _{PP} = 1 A, t _p = 300 μs | V _F | 0.9 | 1.1 | 1.2 | V |
| | at I _{PP} = I _{PPM} = 1.6 A, t _p = 8/20 μs | V _F | - | 1.22 | 1.32 | V |
| Dynamic resistance | t _p = 100 ns (TLP; pin 2-1) | r _{dyn} | - | 3.6 | - | Ω |
| Capacitance | at V _R = 0 V; f = 1 MHz | C _D | 12 | 15 | 18 | pF |

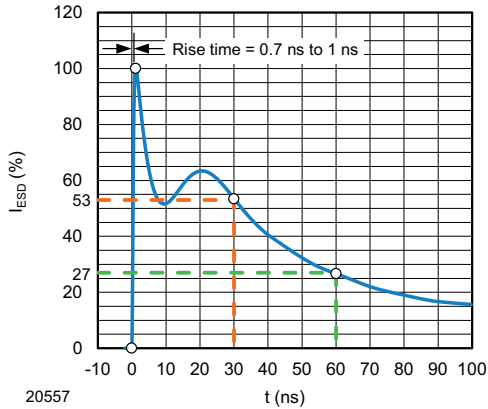


Fig. 1 - ESD Discharge Current Wave Form acc. IEC 61000-4-2 (330 Ω / 150 pF)

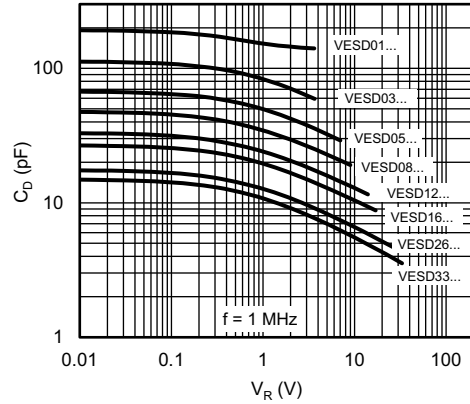


Fig. 4 - Typical Capacitance vs. Reverse Voltage

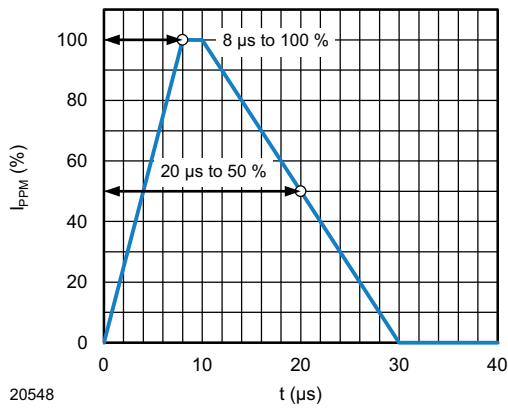


Fig. 2 - 8/20 μs Peak Pulse Current Wave Form acc. IEC 61000-4-5

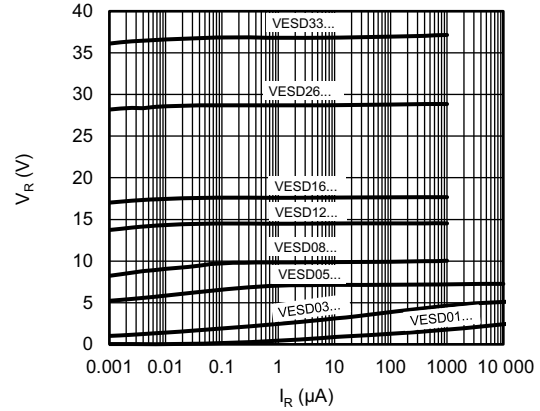


Fig. 5 - Typical Reverse Voltage vs. Reverse Current

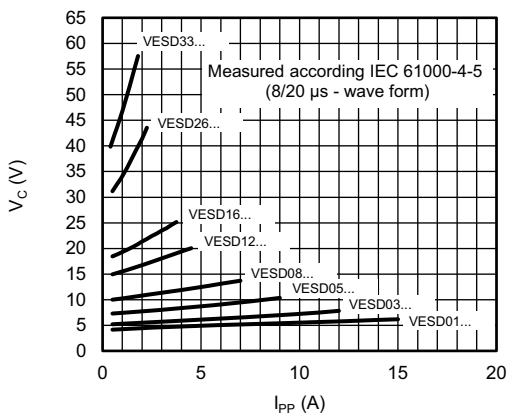


Fig. 3 - Typical Peak Clamping Voltage vs. Peak Pulse Current

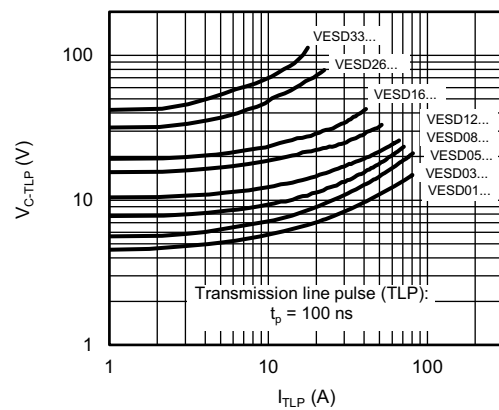


Fig. 6 - Typical Clamping Voltage vs. Peak Pulse Current

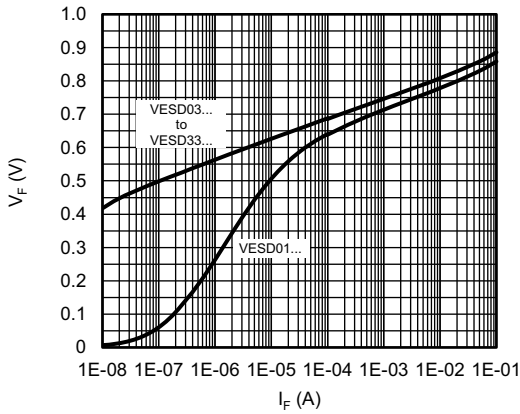


Fig. 7 - Typical Forward Voltage vs. Forward Current

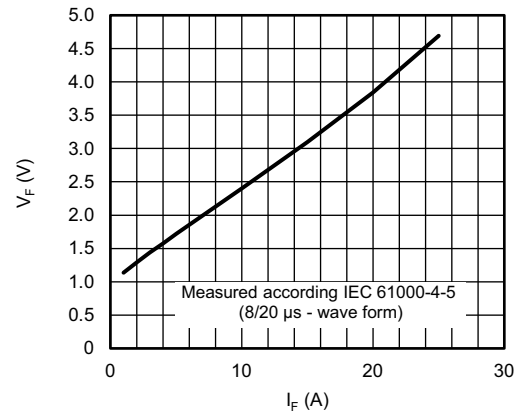
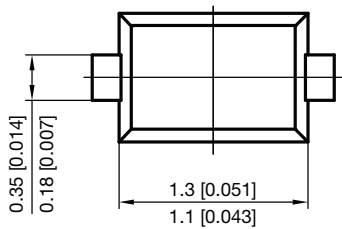
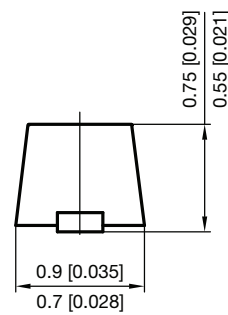
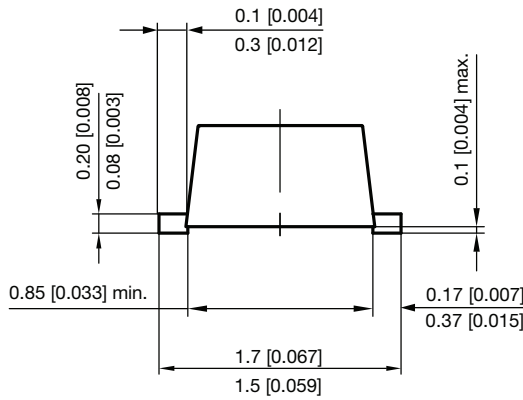
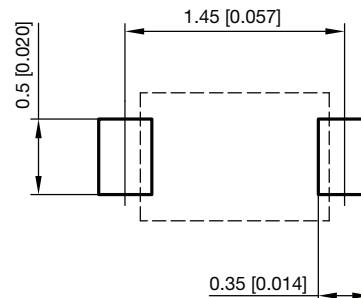


Fig. 8 - Typical Forward Voltage vs. Forward Current

PACKAGE DIMENSIONS in millimeters [inches]: **SOD-523**



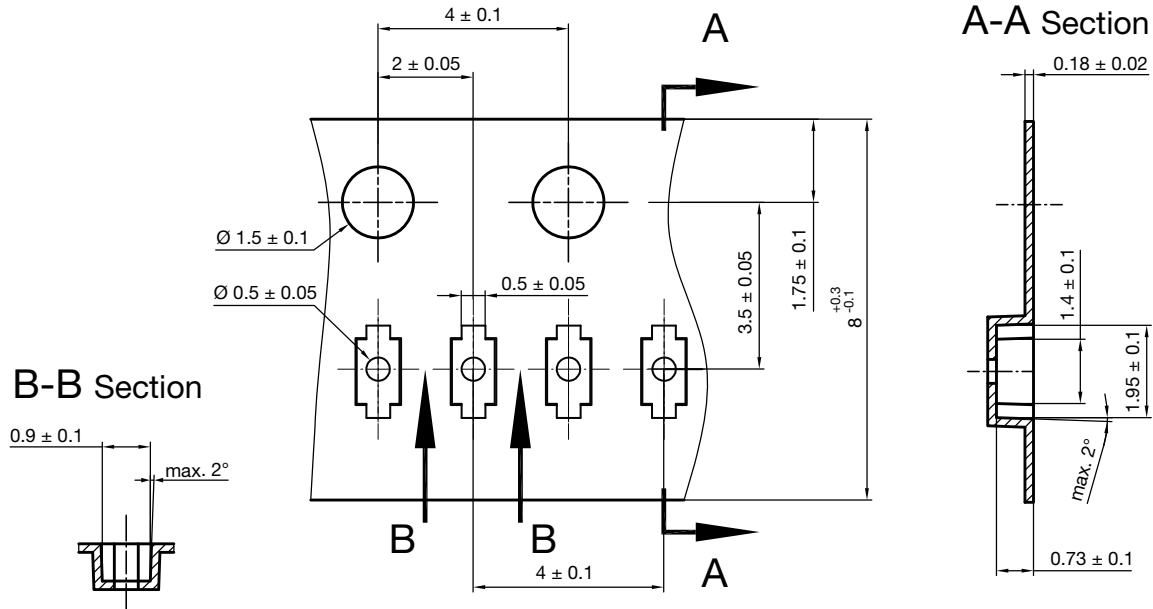
Footprint recommendation:



Document no.: S8-V-3880.02-003 (4)
 Created - Date: 04. April 2017
 Rev. 4 - Date: 03. Aug. 2020
 23093

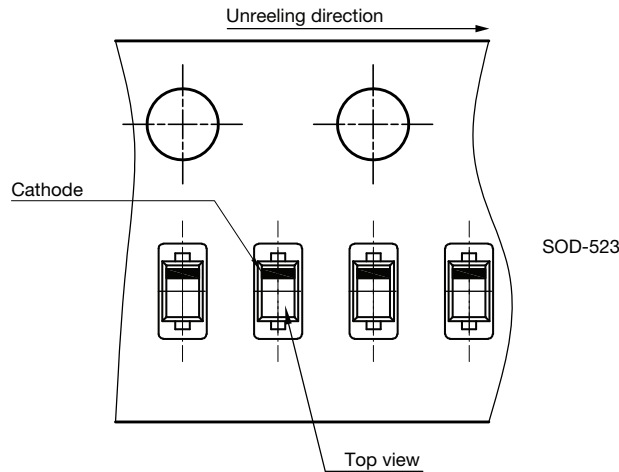


CARRIER TAPE SOD-523



S8-V-3717.03-005 (4)
05.07.2018
22959

ORIENTATION IN CARRIER TAPE SOD-523



S8-V-3717.03-006 (4)
05.07.2018
22958



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