

## HIGH POWERED TVS ARRAY



### DESCRIPTION

The PSDxx and PSDxxC Series are transient voltage suppressor arrays designed for ESD protection of SMART phones, laptop computers and other portable electronics. These silicon based diodes offer superior clamping voltage and performance compared to other technologies such as MLVs.

The PSDxx and PSDxxC Series can be utilized as a single line protector in either a unidirectional or bidirectional configuration. The SOD-323 small package configuration offers designers the flexibility of placement on the printed circuit board for each I/O port or voltage bus. The PSDxx and PSDxxC Series meets the IEC 61000-4-2 (ESD), 61000-4-4 (EFT) and 61000-4-5 requirements.

### FEATURES

- Compatible with IEC 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- Compatible with IEC 61000-4-4 (EFT): 40A - 5/50ns
- Compatible with IEC 61000-4-5 (Surge): 24A, 8/20 $\mu$ s Level 2(Line-Gnd) & Level 3 (Line-Line)
- Unidirectional: 500 Watts Peak Pulse Power per Line ( $t_p = 8/20\mu$ s)
- Bidirectional: 400 Watts Peak Pulse Power per Line ( $t_p = 8/20\mu$ s)
- Replacement for MLV (0805)
- Unidirectional & Bidirectional Configurations
- Protects One Power or I/O Port
- ESD Protection > 25kV
- Low Clamping Voltage
- Available in Multiple Voltages Ranging From 3V to 36V
- RoHS Compliant
- REACH Compliant

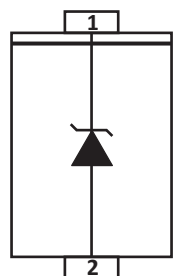
### APPLICATIONS

- Laptop Computers
- SMART Phones
- Portable Electronics

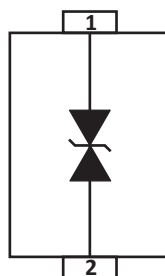
### MECHANICAL CHARACTERISTICS

- Molded JEDEC SOD-323 Package
- Approximate Weight: 5 milligrams
- Lead-Free Pure-Tin Plating (Annealed)
- Solder Reflow Temperature:  
Pure-Tin - Sn, 100: 260-270°C
- 8mm Tape and Reel Per EIA Standard 481
- Flammability Rating UL 94V-0

### PIN CONFIGURATIONS



UNIDIRECTIONAL



BIDIRECTIONAL

## TYPICAL DEVICE CHARACTERISTICS

## MAXIMUM RATINGS @ 25°C Unless Otherwise Specified

| PARAMETER                                                             | SYMBOL    | VALUE      | UNITS |
|-----------------------------------------------------------------------|-----------|------------|-------|
| Unidirectional: Peak Pulse Power ( $t_p = 8/20\mu s$ ) - See Figure 1 | $P_{PP}$  | 500        | Watts |
| Bidirectional: Peak Pulse Power ( $t_p = 8/20\mu s$ ) - See Figure 1  | $P_{PP}$  | 400        | Watts |
| Operating Temperature                                                 | $T_L$     | -55 to 150 | °C    |
| Storage Temperature                                                   | $T_{STG}$ | -55 to 150 | °C    |

## ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

| PART NUMBER<br>(Note 1) | DEVICE MARKING | RATED STAND-OFF VOLTAGE<br><br>$V_{WM}$<br>VOLTS | MINIMUM BREAKDOWN VOLTAGE<br><br>@ 1mA<br>$V_{(BR)}$<br>VOLTS | MAXIMUM CLAMPING VOLTAGE<br>(Fig. 2)<br>@ $I_P = 1A$<br>$V_C$<br>VOLTS | MAXIMUM LEAKAGE CURRENT<br><br>@ $V_{WM}$<br>$I_D$<br>$\mu A$ | TYPICAL CAPACITANCE<br><br>@ 0V, 1MHz<br>C<br>pF |
|-------------------------|----------------|--------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------|
| PSD03                   | A              | 3.3                                              | 4.0                                                           | 6.5                                                                    | 125                                                           | 500                                              |
| PSD03C                  | G              | 3.3                                              | 4.0                                                           | 7.0                                                                    | 125                                                           | 200                                              |
| PSD05                   | B              | 5.0                                              | 6.0                                                           | 9.8                                                                    | 10                                                            | 350                                              |
| PSD05C                  | H              | 5.0                                              | 6.0                                                           | 9.8                                                                    | 10                                                            | 175                                              |
| PSD08                   | C              | 8.0                                              | 8.5                                                           | 13.4                                                                   | 10                                                            | 250                                              |
| PSD08C                  | J              | 8.0                                              | 8.5                                                           | 13.4                                                                   | 10                                                            | 150                                              |
| PSD12                   | D              | 12.0                                             | 13.3                                                          | 19.0                                                                   | 1                                                             | 150                                              |
| PSD12C                  | K              | 12.0                                             | 13.3                                                          | 19.0                                                                   | 1                                                             | 50                                               |
| PSD15                   | E              | 15.0                                             | 16.7                                                          | 24.0                                                                   | 1                                                             | 100                                              |
| PSD15C                  | L              | 15.0                                             | 16.7                                                          | 24.0                                                                   | 1                                                             | 40                                               |
| PSD18                   | 18             | 18.0                                             | 20.0                                                          | 29.0                                                                   | 1                                                             | 90                                               |
| PSD18C                  | N              | 18.0                                             | 20.0                                                          | 29.0                                                                   | 1                                                             | 40                                               |
| PSD24                   | F              | 24.0                                             | 26.7                                                          | 43.0                                                                   | 1                                                             | 88                                               |
| PSD24C                  | M              | 24.0                                             | 26.7                                                          | 43.0                                                                   | 1                                                             | 40                                               |
| PSD36                   | R              | 36.0                                             | 40.0                                                          | 60.0                                                                   | 1                                                             | 75                                               |
| PSD36C                  | T              | 36.0                                             | 40.0                                                          | 60.0                                                                   | 1                                                             | 35                                               |

## NOTES

1. Part numbers with an additional "C" suffix are bidirectional devices, i.e., PSD05C.

## TYPICAL DEVICE CHARACTERISTICS

FIGURE 1  
PEAK PULSE POWER VS PULSE TIME

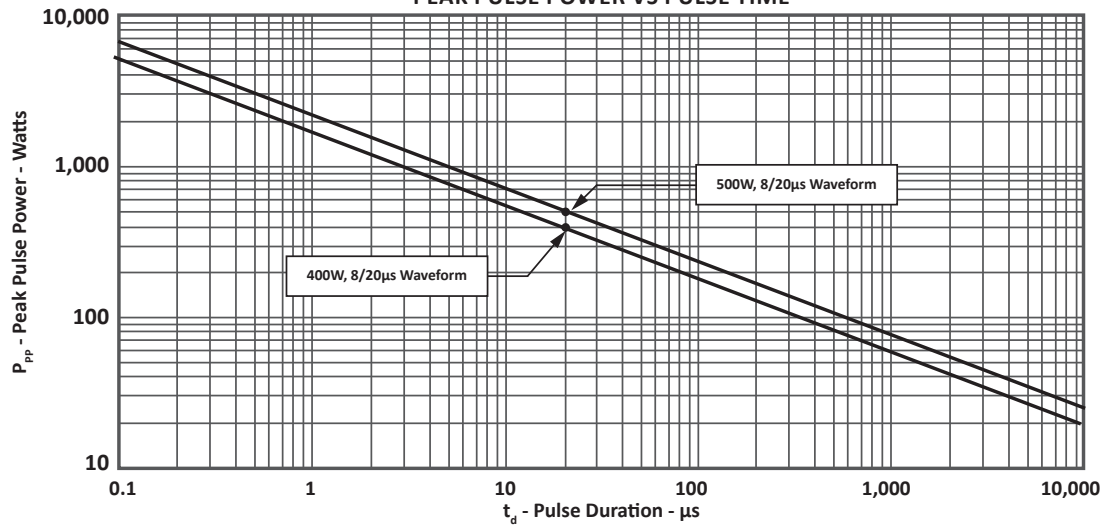


FIGURE 2  
PULSE WAVE FORM

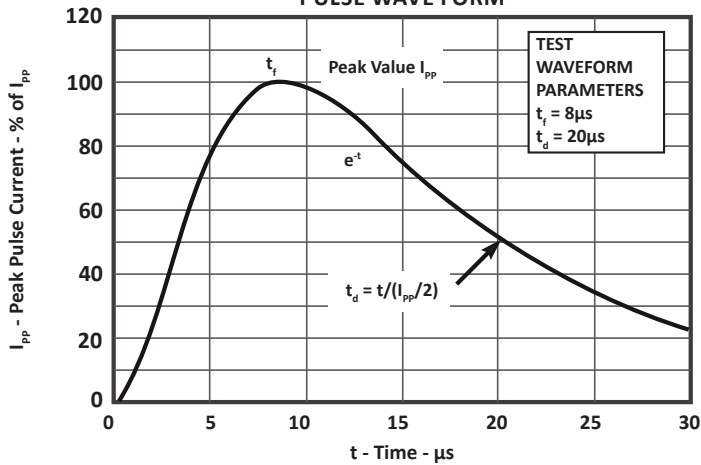
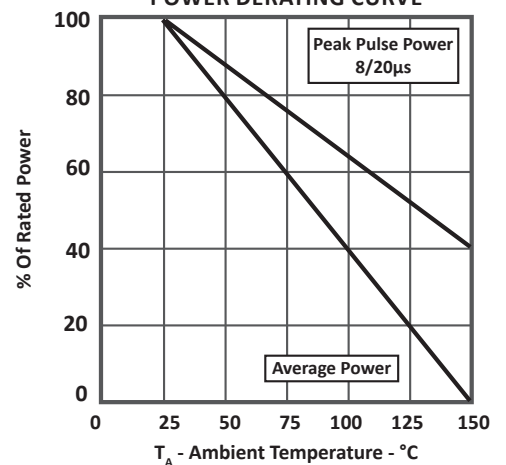
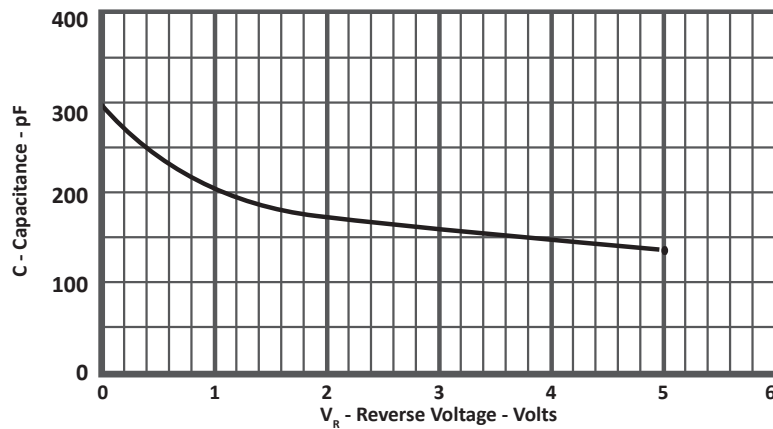
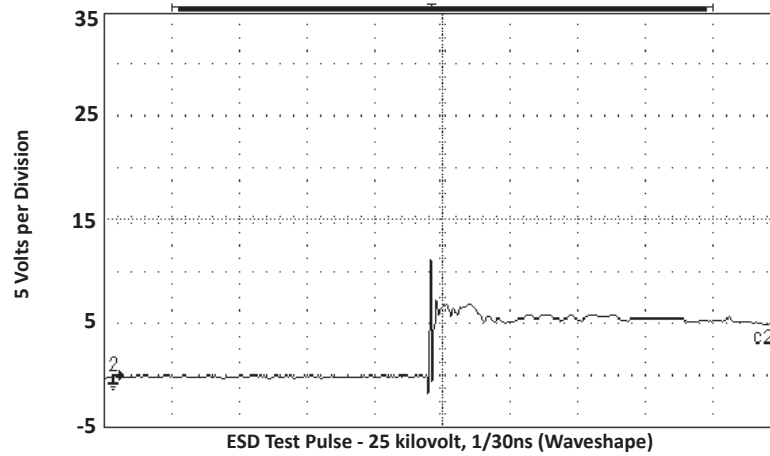


FIGURE 3  
POWER DERATING CURVE



**TYPICAL DEVICE CHARACTERISTICS**

**FIGURE 4**  
**OVERSHOOT & CLAMPING VOLTAGE FOR PSD03**



## TYPICAL DEVICE CHARACTERISTICS

FIGURE 6

## PSD03 FORWARD TLP

Leakage Current @ Pulse (I) -  $\mu\text{A}$ 

Leakage Test Voltage = 0.5V

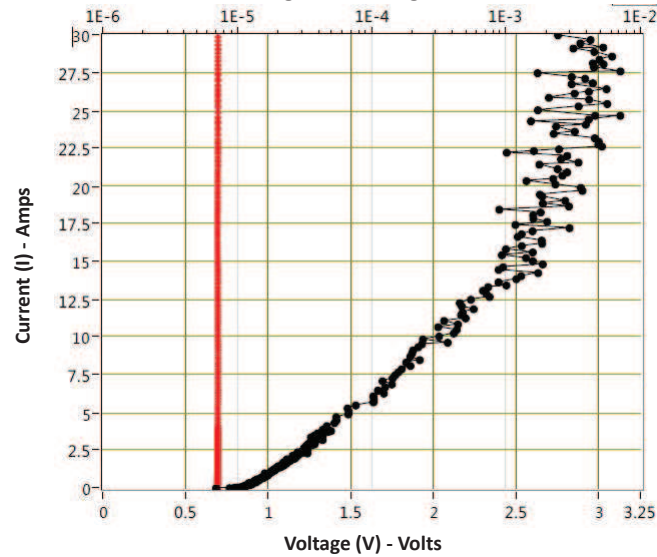
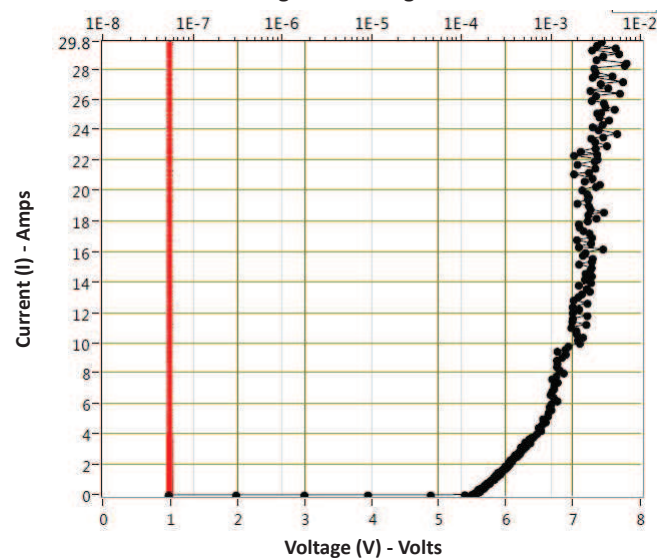


FIGURE 7

## PSD03 REVERSE TLP

Leakage Current @ Pulse (I) -  $\mu\text{A}$ 

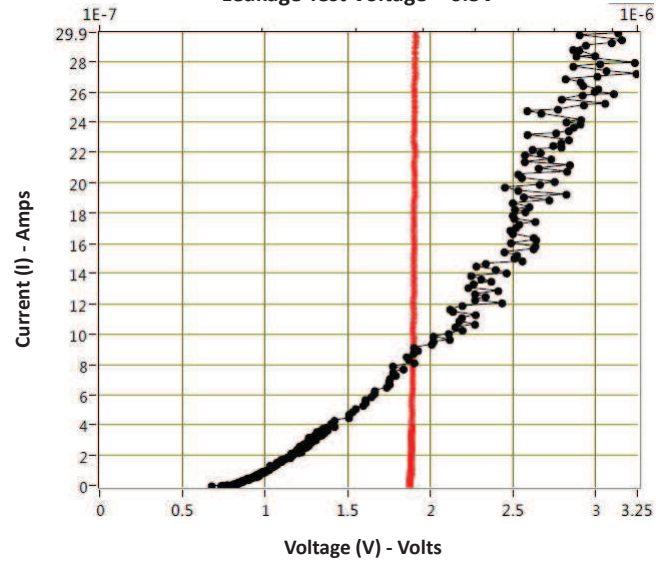
Leakage Test Voltage = 0.5V



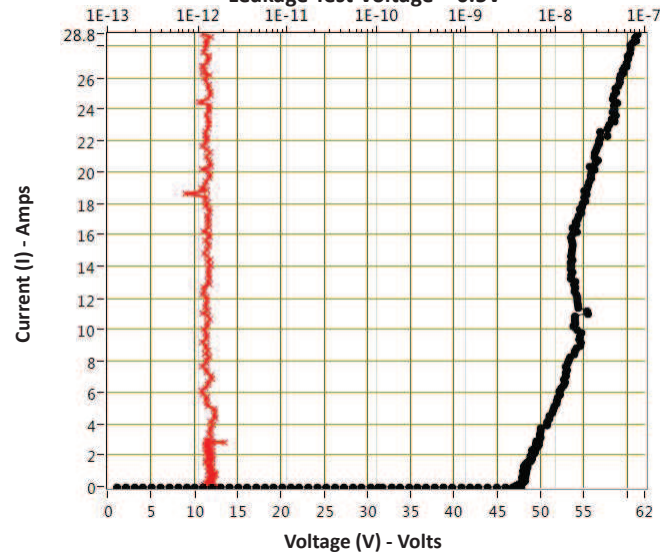
Note: Indicative TLP performance- for reference only

## TYPICAL DEVICE CHARACTERISTICS

**FIGURE 8**  
**PSD36 FORWARD TLP**  
 Leakage Current @ Pulse (I) -  $\mu\text{A}$   
 Leakage Test Voltage = 0.5V

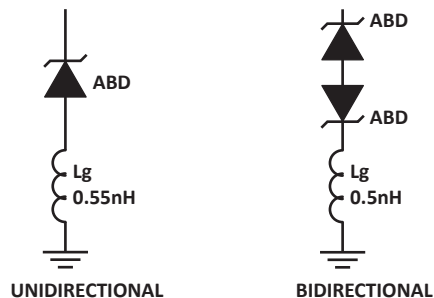


**FIGURE 9**  
**PSD36 REVERSE TLP**  
 Leakage Current @ Pulse (I) -  $\mu\text{A}$   
 Leakage Test Voltage = 0.5V



Note: Indicative TLP performance- for reference only

## SPICE MODEL

 FIGURE 1  
 SPICE MODEL FOR


ABD - Avalanche Breakdown Diode (TVS)  
 Lg - Lead Inductance

| TABLE 1 - SPICE PARAMETERS |               |             |
|----------------------------|---------------|-------------|
| PARAMETER                  | UNIT          | ABD(TVS)    |
| BV                         | V             | See Table 2 |
| IBV                        | $\mu\text{A}$ | 1           |
| $C_{jo}$                   | pF            | See Table 2 |
| $I_s$                      | A             | See Table 2 |
| Vj                         | V             | 0.6         |
| M                          | -             | 0.33        |
| N                          | -             | 1           |
| $R_s$                      | Ohms          | See Table 2 |
| TT                         | s             | 1E-8        |
| EG                         | eV            | 1.11        |

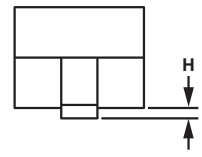
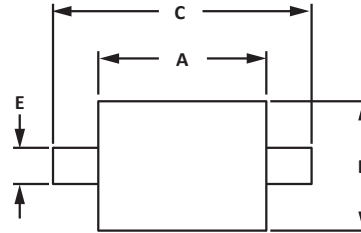
| TABLE 2 - ABD SPECIFIC SPICE PARAMETERS |               |               |              |              |
|-----------------------------------------|---------------|---------------|--------------|--------------|
| PART NUMBER                             | $B_V$ (VOLTS) | $C_{jo}$ (pF) | $I_s$ (AMPS) | $R_s$ (OHMS) |
| PSD03                                   | 4.0           | 438           | 1E-11        | 0.21         |
| PSD05                                   | 6.0           | 284           | 1E-11        | 0.14         |
| PSD08                                   | 8.5           | 146           | 1E-11        | 0.28         |
| PSD12                                   | 13.3          | 123           | 1E-13        | 0.40         |
| PSD15                                   | 16.7          | 102           | 1E-13        | 0.52         |
| PSD24                                   | 26.7          | 61            | 1E-13        | 1.54         |
| PSD03C                                  | 4.5           | 219           | 1E-11        | 0.21         |
| PSD05C                                  | 6.0           | 142           | 1E-11        | 0.14         |
| PSD08C                                  | 8.5           | 73            | 1E-11        | 0.28         |
| PSD12C                                  | 13.3          | 62            | 1E-13        | 0.40         |
| PSD15C                                  | 16.7          | 51            | 1E-13        | 0.52         |
| PSD24C                                  | 26.7          | 30            | 1E-13        | 1.54         |

**SOD-323 PACKAGE INFORMATION**
**OUTLINE DIMENSIONS**

| DIM | MILLIMETERS |      | INCHES |       |
|-----|-------------|------|--------|-------|
|     | MIN         | MAX  | MIN    | MAX   |
| A   | 1.60        | 1.90 | 0.063  | 0.075 |
| B   | 1.15        | 1.45 | 0.045  | 0.057 |
| C   | 2.39        | 2.70 | 0.094  | 0.106 |
| D   | 0.80        | 1.10 | 0.031  | 0.043 |
| E   | 0.25        | 0.40 | 0.010  | 0.016 |
| F   | 0.10        | 0.20 | 0.004  | 0.008 |
| H   | -           | 0.10 | -      | 0.004 |
| L   | 0.20        | -    | 0.008  | -     |

**NOTES**

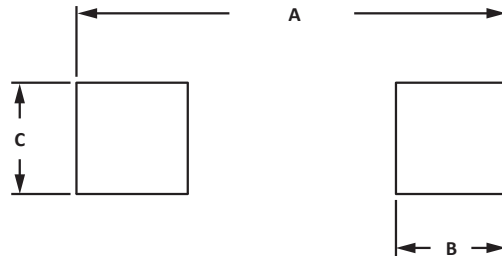
- Controlling dimension: millimeters.
- Dimensioning and tolerances per ANSI Y14.5M, 1985.
- Dimensions are exclusive of mold flash and metal burrs.


**PAD LAYOUT DIMENSIONS**

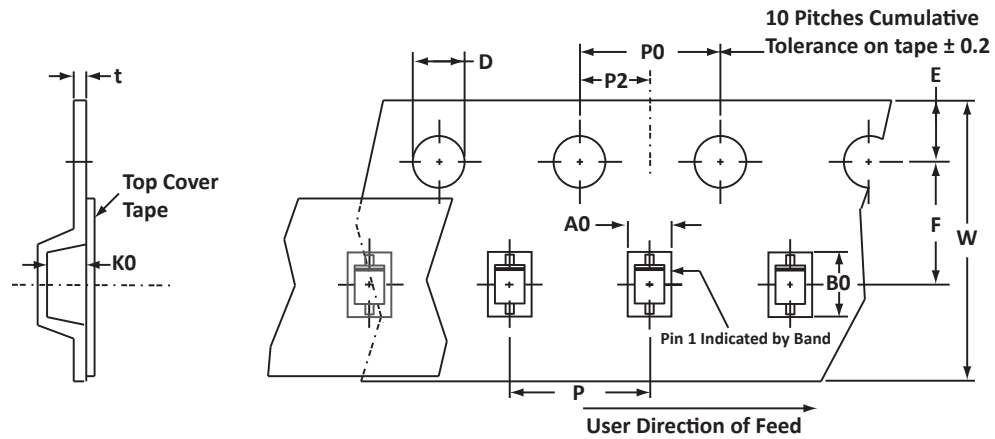
| DIM | MILLIMETERS |      | INCHES |       |
|-----|-------------|------|--------|-------|
|     | MIN         | MAX  | MIN    | MAX   |
| A   | 2.87        | 3.12 | 0.113  | 0.123 |
| B   | 0.66        | 0.91 | 0.026  | 0.036 |
| C   | 0.66        | 0.91 | 0.026  | 0.036 |

**NOTES**

- Controlling dimension: millimeters.



## TAPE AND REEL



## SPECIFICATIONS

| REEL DIA.  | TAPE WIDTH | A0          | B0          | K0          | D           | E           | F           | W           | P0          | P2          | P           | tmax |
|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------|
| 178mm (7") | 8mm        | 1.55 ± 0.10 | 2.90 ± 0.10 | 1.35 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 3.50 ± 0.05 | 8.00 ± 0.30 | 4.00 ± 0.10 | 2.00 ± 0.05 | 4.00 ± 0.10 | 0.25 |

## NOTES

1. Dimensions are in millimeters.
2. Surface mount product is taped and reeled in accordance with EIA-481.
3. Suffix - T7 = 7" Reel - 3,000 pieces per 8mm tape.
4. Marking on Part - marking code (see page 2), polarity band (Unidirectional Only).

Package outline, pad layout and tape specifications per document number 06010.R4 9/10.

## ORDERING INFORMATION

| BASE PART NUMBER<br>(xx = Voltage) | LEADFREE SUFFIX | TAPE SUFFIX | QTY/REEL | REEL SIZE | TUBE QTY |
|------------------------------------|-----------------|-------------|----------|-----------|----------|
| PSDxx/PSDxxC                       | -LF             | -T7         | 3,000    | 7"        | n/a      |

This device is only available in a Lead-Free configuration.

## COMPANY INFORMATION

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### COMPANY PROFILE

In business more than 20 years, ProTek Devices™ is a privately held semiconductor company. The company offers a product line of overvoltage protection and overcurrent protection components. These include transient voltage suppressor array (TVS arrays) avalanche breakdown diode, steering diode TVS array and electronics SMD chip fuses. These components deliver circuit protection in electronic systems from numerous overvoltage and overcurrent events. They include lightning; electrostatic discharge (ESD); nuclear electromagnetic pulses (NEMP); inductive switching; and electromagnetic interference (EMI) / radio frequency interference (RFI). ProTek Devices also offers high performance interface and linear products. They include analog switches; multiplexers; LED drivers; LED wafer die for ESD protection; audio control ICs; RF and related high frequency products.

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