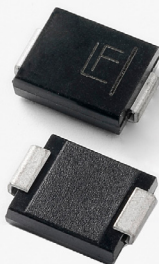


# 4.0SMDJ

## Surface Mount – 4000W



Uni-directional



### Agency Approvals

| Agency | Agency File Number |
|--------|--------------------|
|        | E230531            |

### Maximum Ratings and Thermal Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                                                                                                            | Symbol          | Value      | Unit                 |
|----------------------------------------------------------------------------------------------------------------------|-----------------|------------|----------------------|
| Peak Pulse Power Dissipation at $T_A=25^{\circ}\text{C}$ by 10/1000 $\mu\text{s}$ Waveform (Fig.2)(Note 1), (Note 2) | $P_{PPM}$       | 4000       | W                    |
| Power Dissipation on Infinite Heat Sink at $T_A=50^{\circ}\text{C}$                                                  | $P_D$           | 6.5        | W                    |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                                                     | $I_{FSM}$       | 300        | A                    |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only                                                | $V_F$           | 3.5        | V                    |
| Operating Temperature Range                                                                                          | $T_J$           | -65 to 150 | $^{\circ}\text{C}$   |
| Storage Temperature Range                                                                                            | $T_{STG}$       | -65 to 175 | $^{\circ}\text{C}$   |
| Typical Thermal Resistance Junction to Lead                                                                          | $R_{\theta JL}$ | 15         | $^{\circ}\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient                                                                       | $R_{\theta JA}$ | 75         | $^{\circ}\text{C/W}$ |

#### Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above  $T_A = 25^{\circ}\text{C}$  per Fig. 3.
2. Mounted on copper pad area of 0.31x0.31" (8.0 x 8.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.

## Description

The 4.0SMDJ is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

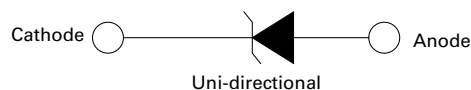
## Features and Benefits

- For surface mounted applications in order to optimize board space
- Low profile package
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- Built-in strain relief
- Glass passivated chip junction
- 4000W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Meet MSL level 1 per J-STD-020, and high temperature soldering guaranteed: 260 $^{\circ}\text{C}$ /10sec
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Plastic package is flammability rated V-0 per UL 94

## Applications

TVS devices are ideal for the protection of I/O Interfaces,  $V_{CC}$  bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

### Functional Diagram



# 4.0SMDJ

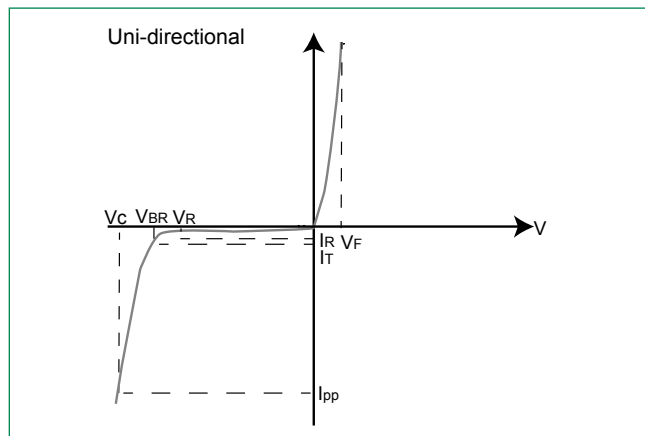
Surface Mount – 4000W

## Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Part Number | Marking | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |       | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (10/1000 $\mu$ S) (V) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (8/20 $\mu$ S) (V) | Maximum Peak Pulse Current $I_{PP}$ (10/1000 $\mu$ S) (A) | Maximum Peak Pulse Current $I_{PP}$ (8/20 $\mu$ S) (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A) | Maximum Temperature Coefficient of $V_{BR}$ (%/C) | Agency Approval  |
|-------------|---------|-----------------------------------------|--------------------------------------------|-------|-------------------------|-----------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|             |         |                                         | MIN                                        | MAX   |                         |                                                                 |                                                              |                                                           |                                                        |                                                  |                                                   |                                                                                                     |
| 4.0SMDJ10A  | 4PDX    | 10.0                                    | 11.10                                      | 12.30 | 1                       | 17.0                                                            | 29.0                                                         | 235.5                                                     | 1480.0                                                 | 5                                                | 0.071                                             | x                                                                                                   |
| 4.0SMDJ11A  | 4PDZ    | 11.0                                    | 12.20                                      | 13.50 | 1                       | 18.2                                                            | 31.0                                                         | 220.0                                                     | 1385.0                                                 | 2                                                | 0.074                                             | x                                                                                                   |
| 4.0SMDJ12A  | 4PEE    | 12.0                                    | 13.30                                      | 14.70 | 1                       | 19.9                                                            | 32.0                                                         | 201.5                                                     | 1270.0                                                 | 2                                                | 0.075                                             | x                                                                                                   |
| 4.0SMDJ13A  | 4PEG    | 13.0                                    | 14.40                                      | 15.90 | 1                       | 21.5                                                            | 34.0                                                         | 186.5                                                     | 1175.0                                                 | 2                                                | 0.076                                             | x                                                                                                   |
| 4.0SMDJ14A  | 4PEK    | 14.0                                    | 15.60                                      | 17.20 | 1                       | 23.2                                                            | 35.0                                                         | 172.5                                                     | 1085.0                                                 | 2                                                | 0.080                                             | x                                                                                                   |
| 4.0SMDJ15A  | 4PEM    | 15.0                                    | 16.70                                      | 18.50 | 1                       | 24.4                                                            | 37.0                                                         | 164.0                                                     | 1033.0                                                 | 2                                                | 0.083                                             | x                                                                                                   |
| 4.0SMDJ18A  | 4PET    | 18.0                                    | 20.00                                      | 22.10 | 1                       | 29.2                                                            | 42.0                                                         | 137.0                                                     | 860.0                                                  | 2                                                | 0.088                                             | x                                                                                                   |
| 4.0SMDJ20A  | 4PEV    | 20.0                                    | 22.20                                      | 24.50 | 1                       | 32.4                                                            | 45.0                                                         | 123.5                                                     | 780.0                                                  | 2                                                | 0.091                                             | x                                                                                                   |
| 4.0SMDJ24A  | 4PEZ    | 24.0                                    | 26.70                                      | 29.50 | 1                       | 38.9                                                            | 51.0                                                         | 103.0                                                     | 650.0                                                  | 2                                                | 0.092                                             | x                                                                                                   |

$V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha$  T: Temperature Coefficient)

## I-V Curve Characteristics



**$P_{PPM}$  Peak Pulse Power Dissipation** – Max power dissipation

**$V_R$  Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation

**$V_{BR}$  Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current ( $I_T$ )

**$V_C$  Clamping Voltage** – Peak voltage measured across the suppressor at a specified  $I_{PPM}$  (peak impulse current)

**$I_R$  Reverse Leakage Current** – Current measured at  $V_R$

**$V_F$  Forward Voltage Drop for Uni-directional**

continues on next page.

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Revised: GD. 11/25/21

# 4.0SMDJ

Surface Mount – 4000W

## Ratings and Characteristic Curves ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

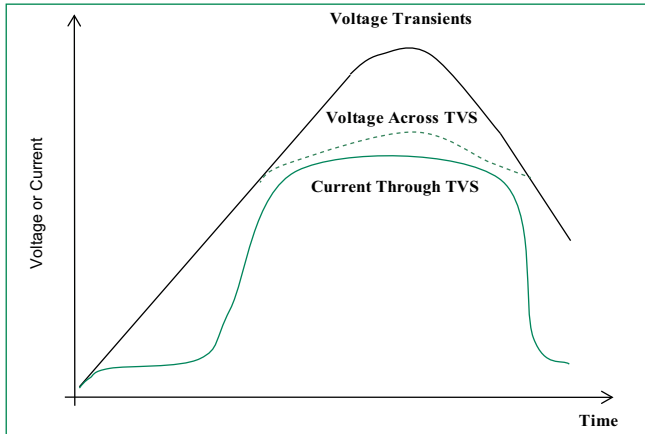


Figure 2 - Peak Pulse Power Rating

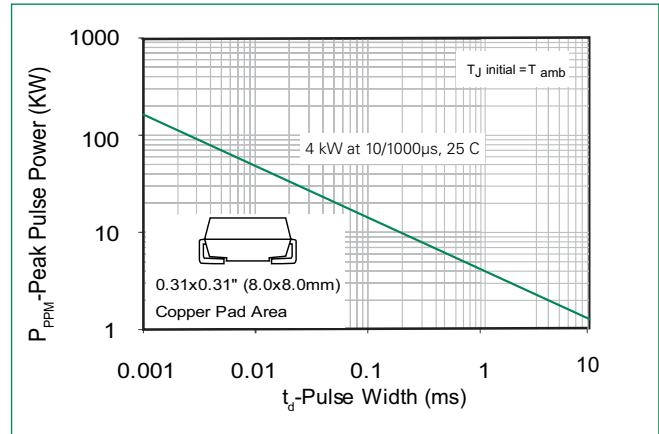


Figure 3 - Peak Pulse Power Derating Curve

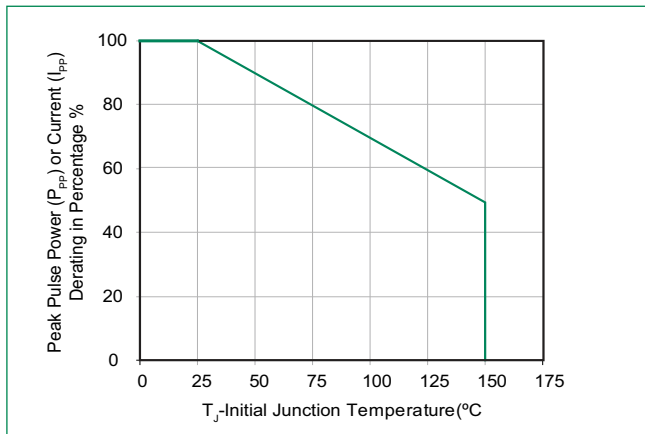


Figure 4 - Pulse Waveform

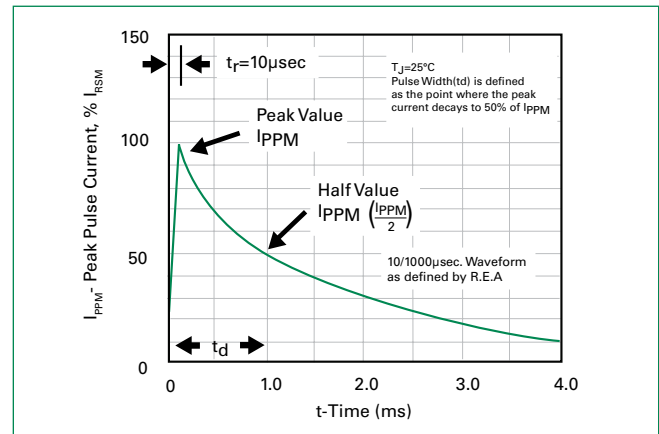


Figure 5 - Typical Transient Thermal Impedance

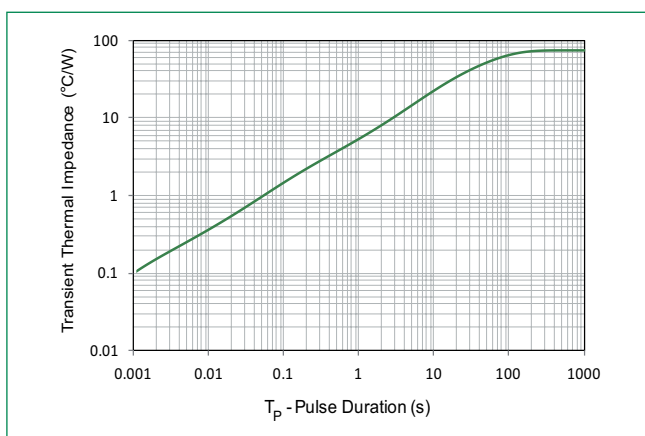
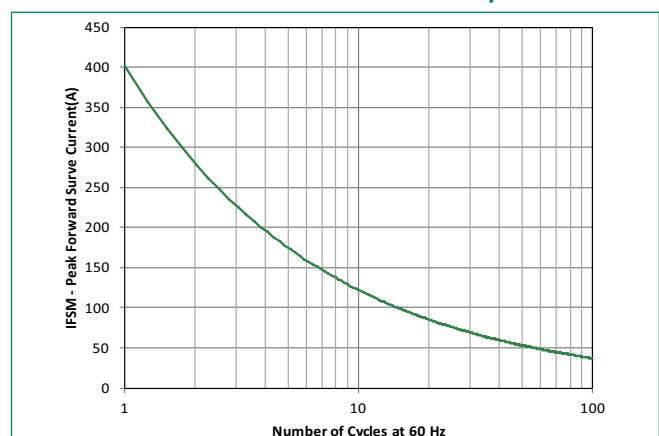


Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

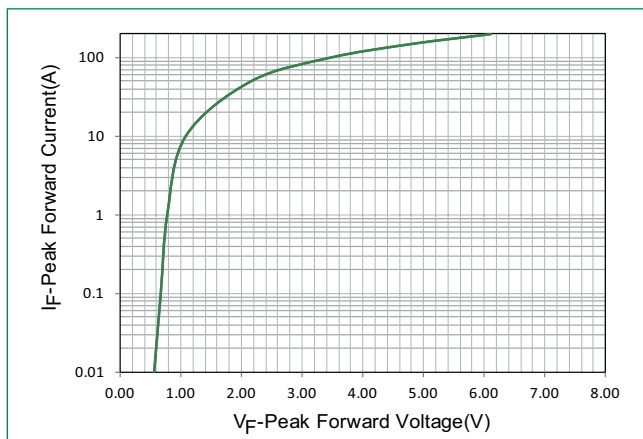


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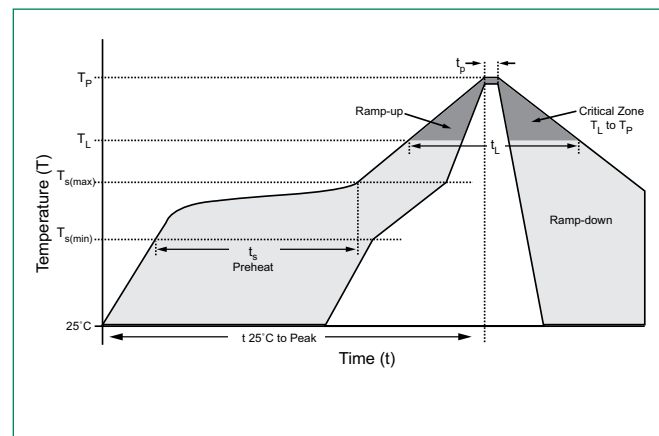
## Ratings and Characteristic Curves ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 7 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



## Soldering Parameters

| Reflow Condition                                       |                                    | Lead-free assembly |
|--------------------------------------------------------|------------------------------------|--------------------|
| Pre Heat                                               | - Temperature Min ( $T_{s(min)}$ ) | 150°C              |
|                                                        | - Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|                                                        | - Time (min to max) ( $t_s$ )      | 60 – 120 secs      |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/second max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/second max     |
| Reflow                                                 | - Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|                                                        | - Time (min to max) ( $t_s$ )      | 60 – 150 seconds   |
| Peak Temperature ( $T_p$ )                             |                                    | 260 $^{+0/-5}$ °C  |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                    | 30 seconds         |
| Ramp-down Rate                                         |                                    | 6°C/second max     |
| Time 25°C to peak Temperature ( $T_p$ )                |                                    | 8 minutes Max.     |
| Do not exceed                                          |                                    | 260°C              |



## Physical Specifications

|          |                                                                   |
|----------|-------------------------------------------------------------------|
| Weight   | 0.007 ounce, 0.21 grams                                           |
| Case     | JEDEC DO214AB. Molded plastic body over glass passivated junction |
| Polarity | Color band denotes positive end (cathode) except Bidirectional.   |
| Terminal | Matte Tin-plated leads, Solderable per JESD22-B102                |

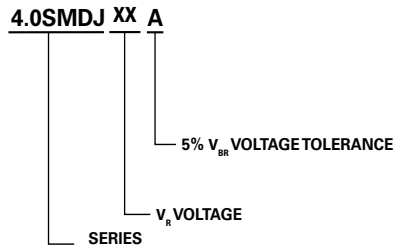
## Environmental Specifications

|                     |                          |
|---------------------|--------------------------|
| High Temp. Storage  | JESD22-A103              |
| HTRB                | JESD22-A108              |
| Temperature Cycling | JESD22-A104              |
| MSL                 | JEDEC-J-STD-020, Level 1 |
| H3TRB               | JESD22-A101              |
| RSH                 | JESD22-A111              |

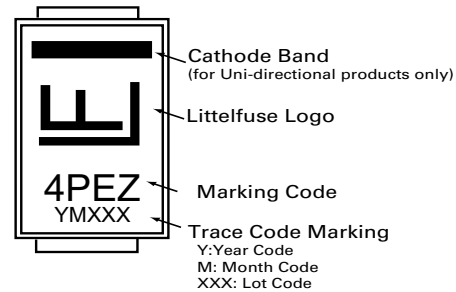
# 4.0SMDJ

## Surface Mount – 4000W

### Part Numbering System



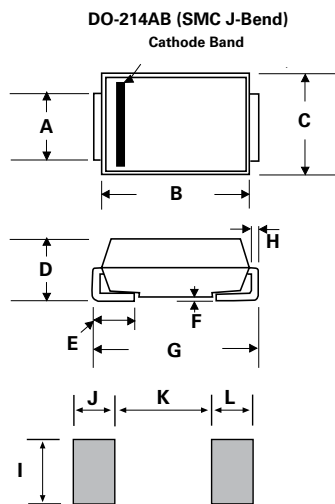
### Part Marking System



### Packaging Options

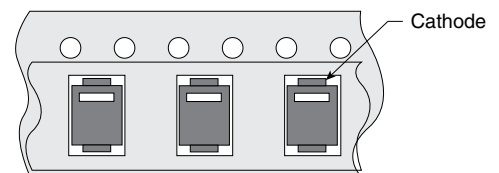
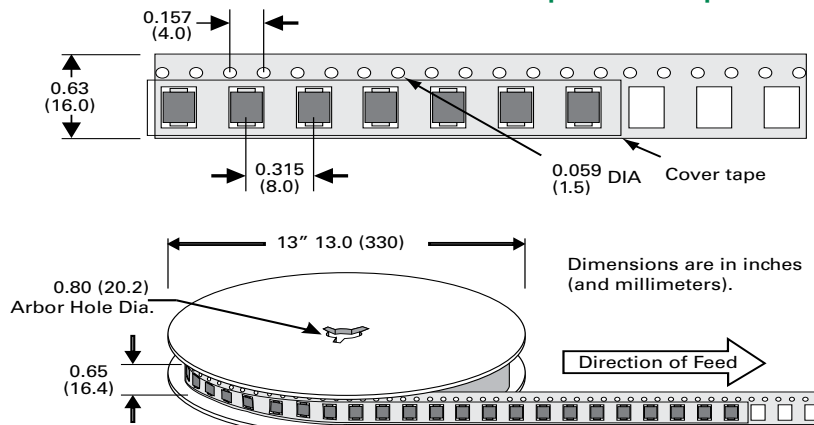
| Part number | Component Package | Quantity | Packaging Option                 | Packaging Specification |
|-------------|-------------------|----------|----------------------------------|-------------------------|
| 4.0SMDJxxA  | DO-214AB          | 3000     | Tape & Reel - 16mm tape/13" reel | EIA STD RS-481          |

### Dimensions



| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.114  | 0.126 | 2.900       | 3.200 |
| B          | 0.260  | 0.280 | 6.600       | 7.110 |
| C          | 0.220  | 0.245 | 5.590       | 6.220 |
| D          | 0.079  | 0.103 | 2.060       | 2.620 |
| E          | 0.030  | 0.060 | 0.760       | 1.520 |
| F          | -      | 0.008 | -           | 0.203 |
| G          | 0.305  | 0.320 | 7.750       | 8.130 |
| H          | 0.006  | 0.012 | 0.152       | 0.305 |
| I          | 0.129  | -     | 3.300       | -     |
| J          | 0.094  | -     | 2.400       | -     |
| K          | -      | 0.165 | -           | 4.200 |
| L          | 0.094  | -     | 2.400       | -     |

### Tape and Reel Specification



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