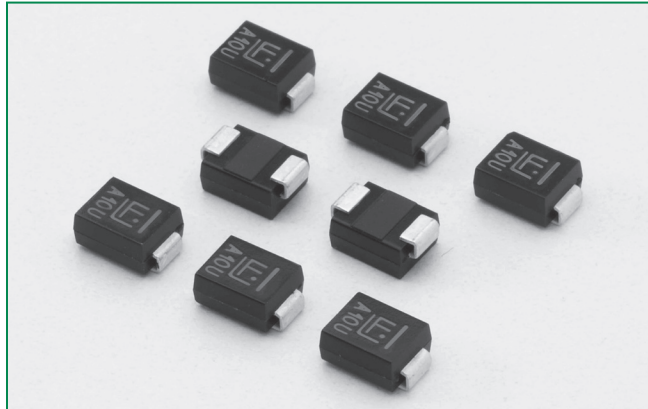


HF RoHS

## 1KSMB Series



### Agency Approvals

| AGENCY | AGENCY FILE NUMBER |
|--------|--------------------|
|        | E128662            |

### Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                                                                                            | Symbol                            | Value      | Unit |
|------------------------------------------------------------------------------------------------------|-----------------------------------|------------|------|
| Peak Pulse Power Dissipation at T <sub>A</sub> =25°C by 10x1000µs waveform (Fig.1)(Note 1), (Note 2) | P <sub>PPM</sub>                  | 1000       | W    |
| Power Dissipation on infinite heat sink at T <sub>A</sub> =50°C                                      | P <sub>MAV</sub>                  | 5.0        | W    |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)                                     | I <sub>FSM</sub>                  | 100        | A    |
| Maximum Instantaneous Forward Voltage at 50A for Unidirectional only (Note 4)                        | V <sub>F</sub>                    | 3.5V/5.0   | V    |
| Operating Junction and Storage Temperature Range                                                     | T <sub>J</sub> , T <sub>STG</sub> | -65 to 150 | °C   |
| Typical Thermal Resistance Junction to Lead                                                          | R <sub>uJL</sub>                  | 20         | °C/W |
| Typical Thermal Resistance Junction to Ambient                                                       | R <sub>uJA</sub>                  | 100        | °C/W |

#### Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above T<sub>A</sub> = 25°C per Fig. 2.
2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) 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.
4. V<sub>F</sub><3.5V for V<sub>BR</sub> ≤ 50V and V<sub>F</sub><5.0V for V<sub>BR</sub> ≥ 51V.

### Description

The 1KSMB series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features

- Halogen-Free
- RoHS compliant
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR} @ 25^\circ\text{C} \times \Delta T$
- Glass passivated chip junction
- 1000W peak pulse power capability at 10x1000µs 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
- Typical I<sub>R</sub> less than 1µA above 12V
- High Temperature soldering guaranteed: 260°C/40 seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-0
- Matte Tin Lead-free Plated
- Available in breakdown Voltage from 6.8V to 160V specially designed for automotive applications
- Offers High-Surge rating in compact package: bridges the gap between 600W and 1.5KW

### Applications

TVS devices are ideal for the protection of I/O Interfaces, V<sub>CC</sub> bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

### Electrical Characteristics

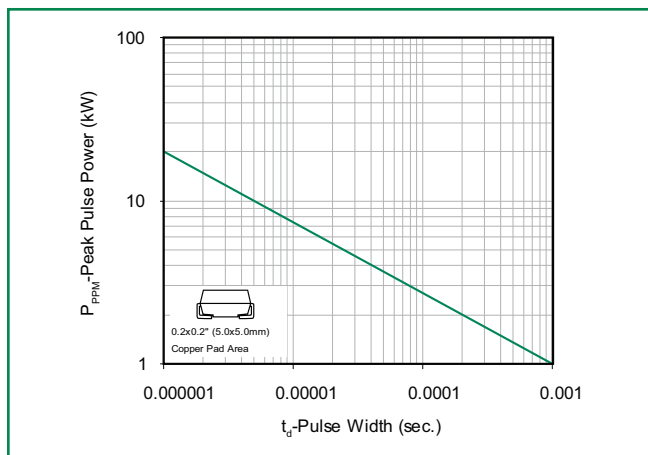
| Part Number (Uni) | Part Number (Bi) | Marking |      | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |        | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (V) | Maximum Peak Pulse Current $I_{PP}$ (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu A$ ) | Agency Approval  |
|-------------------|------------------|---------|------|-----------------------------------------|--------------------------------------------|--------|-------------------------|-----------------------------------------------|-----------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|                   |                  | UNI     | BI   |                                         | MIN                                        | MAX    |                         |                                               |                                         |                                                   |                                                                                                     |
| 1KSMB6.8A         | 1KSMB6.8CA       | A10A    | N10A | 5.80                                    | 6.45                                       | 7.14   | 10                      | 10.5                                          | 95.2                                    | 900                                               | x                                                                                                   |
| 1KSMB7.5A         | 1KSMB7.5CA       | A10B    | N10B | 6.40                                    | 7.13                                       | 7.88   | 10                      | 11.3                                          | 88.5                                    | 400                                               | x                                                                                                   |
| 1KSMB8.2A         | 1KSMB8.2CA       | A10C    | N10C | 7.02                                    | 7.79                                       | 8.61   | 10                      | 12.1                                          | 82.6                                    | 180                                               | x                                                                                                   |
| 1KSMB9.1A         | 1KSMB9.1CA       | A10D    | N10D | 7.78                                    | 8.65                                       | 9.55   | 1                       | 13.4                                          | 74.6                                    | 45                                                | x                                                                                                   |
| 1KSMB10A          | 1KSMB10CA        | A10E    | N10E | 8.55                                    | 9.50                                       | 10.50  | 1                       | 14.5                                          | 69.0                                    | 8                                                 | x                                                                                                   |
| 1KSMB11A          | 1KSMB11CA        | A10F    | N10F | 9.40                                    | 10.50                                      | 11.60  | 1                       | 15.6                                          | 64.1                                    | 4                                                 | x                                                                                                   |
| 1KSMB12A          | 1KSMB12CA        | A10G    | N10G | 10.20                                   | 11.40                                      | 12.60  | 1                       | 16.7                                          | 59.9                                    | 1                                                 | x                                                                                                   |
| 1KSMB13A          | 1KSMB13CA        | A10H    | N10H | 11.10                                   | 12.40                                      | 13.70  | 1                       | 18.2                                          | 54.9                                    | 1                                                 | x                                                                                                   |
| 1KSMB15A          | 1KSMB15CA        | A10I    | N10I | 12.80                                   | 14.30                                      | 15.80  | 1                       | 21.2                                          | 47.2                                    | 1                                                 | x                                                                                                   |
| 1KSMB16A          | 1KSMB16CA        | A10J    | N10J | 13.60                                   | 15.20                                      | 16.80  | 1                       | 22.5                                          | 44.4                                    | 1                                                 | x                                                                                                   |
| 1KSMB18A          | 1KSMB18CA        | A10K    | N10K | 15.30                                   | 17.10                                      | 18.90  | 1                       | 25.5                                          | 39.2                                    | 1                                                 | x                                                                                                   |
| 1KSMB20A          | 1KSMB20CA        | A10L    | N10L | 17.10                                   | 19.00                                      | 21.00  | 1                       | 27.7                                          | 36.1                                    | 1                                                 | x                                                                                                   |
| 1KSMB22A          | 1KSMB22CA        | A10M    | N10M | 18.80                                   | 20.90                                      | 23.10  | 1                       | 30.6                                          | 32.7                                    | 1                                                 | x                                                                                                   |
| 1KSMB24A          | 1KSMB24CA        | A10N    | N10N | 20.50                                   | 22.80                                      | 25.20  | 1                       | 33.2                                          | 30.1                                    | 1                                                 | x                                                                                                   |
| 1KSMB27A          | 1KSMB27CA        | A10O    | N10O | 23.10                                   | 25.70                                      | 28.40  | 1                       | 37.5                                          | 26.7                                    | 1                                                 | x                                                                                                   |
| 1KSMB30A          | 1KSMB30CA        | A10P    | N10P | 25.60                                   | 28.50                                      | 31.50  | 1                       | 41.4                                          | 24.2                                    | 1                                                 | x                                                                                                   |
| 1KSMB33A          | 1KSMB33CA        | A10Q    | N10Q | 28.20                                   | 31.40                                      | 34.70  | 1                       | 45.7                                          | 21.9                                    | 1                                                 | x                                                                                                   |
| 1KSMB36A          | 1KSMB36CA        | A10R    | N10R | 30.80                                   | 34.20                                      | 37.80  | 1                       | 49.9                                          | 20.0                                    | 1                                                 | x                                                                                                   |
| 1KSMB39A          | 1KSMB39CA        | A10S    | N10S | 33.30                                   | 37.10                                      | 41.00  | 1                       | 53.9                                          | 18.6                                    | 1                                                 | x                                                                                                   |
| 1KSMB43A          | 1KSMB43CA        | A10T    | N10T | 36.80                                   | 40.90                                      | 45.20  | 1                       | 59.3                                          | 16.9                                    | 1                                                 | x                                                                                                   |
| 1KSMB47A          | 1KSMB47CA        | A10U    | N10U | 40.20                                   | 44.70                                      | 49.40  | 1                       | 64.8                                          | 15.4                                    | 1                                                 | x                                                                                                   |
| 1KSMB51A          | 1KSMB51CA        | A10V    | N10V | 43.60                                   | 48.50                                      | 53.60  | 1                       | 70.1                                          | 14.3                                    | 1                                                 | x                                                                                                   |
| 1KSMB56A          | 1KSMB56CA        | A10W    | N10W | 47.80                                   | 53.20                                      | 58.80  | 1                       | 77.0                                          | 13.0                                    | 1                                                 | x                                                                                                   |
| 1KSMB62A          | 1KSMB62CA        | A10X    | N10X | 53.00                                   | 58.90                                      | 65.10  | 1                       | 85.0                                          | 11.8                                    | 1                                                 | x                                                                                                   |
| 1KSMB68A          | 1KSMB68CA        | A10Y    | N10Y | 58.10                                   | 64.60                                      | 71.40  | 1                       | 92.0                                          | 10.9                                    | 1                                                 | x                                                                                                   |
| 1KSMB75A          | 1KSMB75CA        | A10Z    | N10Z | 64.10                                   | 71.30                                      | 78.80  | 1                       | 103.0                                         | 9.7                                     | 1                                                 | x                                                                                                   |
| 1KSMB82A          | 1KSMB82CA        | B10A    | O10A | 70.10                                   | 77.90                                      | 86.10  | 1                       | 113.0                                         | 8.8                                     | 1                                                 | x                                                                                                   |
| 1KSMB91A          | 1KSMB91CA        | B10B    | O10B | 77.80                                   | 86.50                                      | 95.50  | 1                       | 125.0                                         | 8.0                                     | 1                                                 | x                                                                                                   |
| 1KSMB100A         | 1KSMB100CA       | B10C    | O10C | 85.50                                   | 95.00                                      | 105.00 | 1                       | 137.0                                         | 7.3                                     | 1                                                 | x                                                                                                   |
| 1KSMB110A         | 1KSMB110CA       | B10D    | O10D | 94.00                                   | 105.00                                     | 116.00 | 1                       | 152.0                                         | 6.6                                     | 1                                                 |                                                                                                     |
| 1KSMB120A         | 1KSMB120CA       | B10E    | O10E | 102.00                                  | 114.00                                     | 126.00 | 1                       | 165.0                                         | 6.1                                     | 1                                                 |                                                                                                     |
| 1KSMB130A         | 1KSMB130CA       | B10F    | O10F | 111.00                                  | 124.00                                     | 137.00 | 1                       | 179.0                                         | 5.6                                     | 1                                                 |                                                                                                     |
| 1KSMB150A         | 1KSMB150CA       | B10G    | O10G | 128.00                                  | 143.00                                     | 158.00 | 1                       | 207.0                                         | 4.8                                     | 1                                                 |                                                                                                     |
| 1KSMB160A         | 1KSMB160CA       | B10H    | O10H | 136.00                                  | 152.00                                     | 168.00 | 1                       | 219.0                                         | 4.6                                     | 1                                                 |                                                                                                     |

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

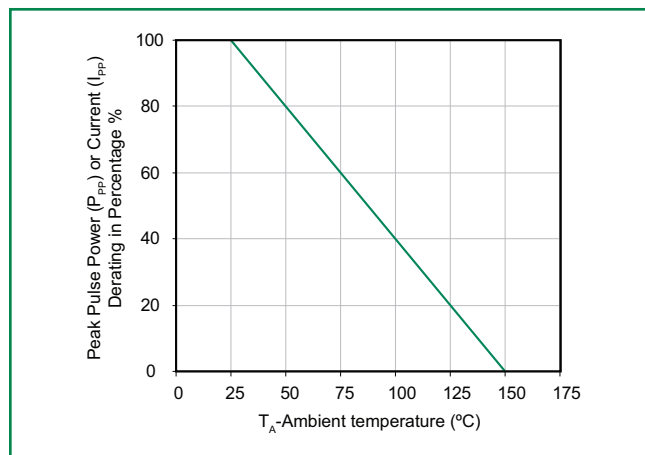
For parts without A, the  $V_{BR}$  is  $\pm 10\%$

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

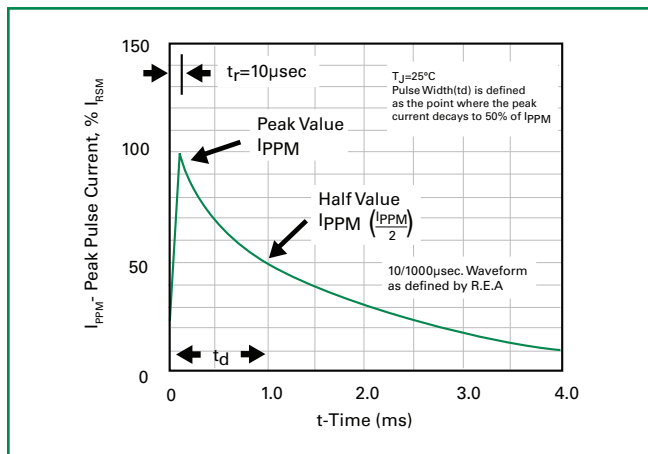
**Figure 1 - Peak Pulse Power Rating Curve**



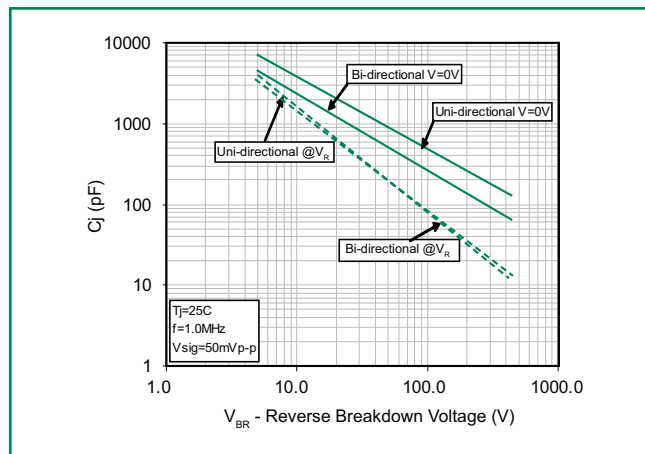
**Figure 2 - Pulse Derating Curve**



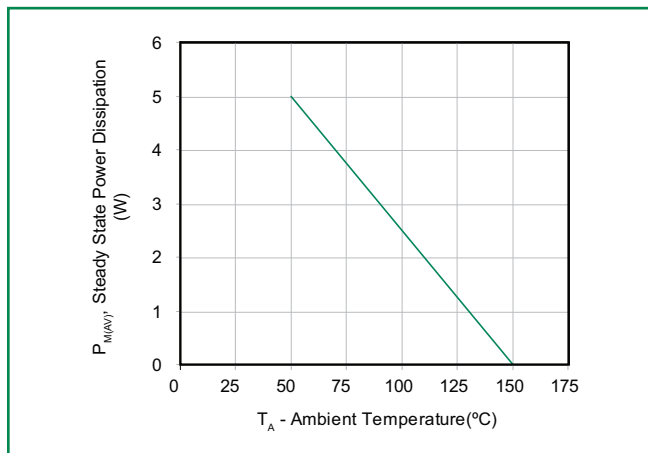
**Figure 3 - Pulse Waveform**



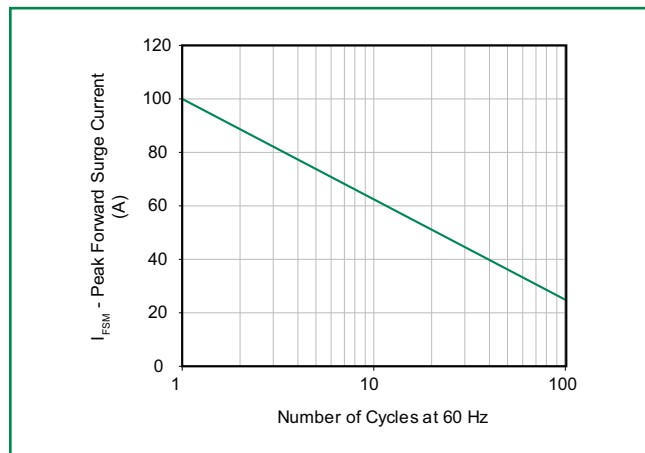
**Figure 4 - Typical Junction Capacitance**



**Figure 5 - Steady State Power Dissipation Derating Curve**

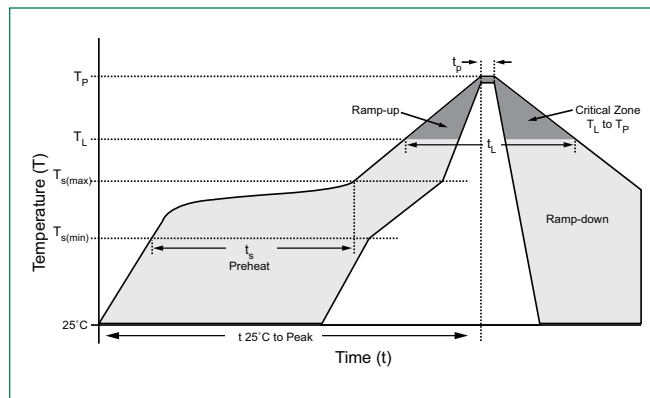


**Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**



### 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 – 180 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 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )  |                                    | 20 – 40 seconds         |
| Ramp-down Rate                                        |                                    | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )               |                                    | 8 minutes Max.          |
| Do not exceed                                         |                                    | 280°C                   |



### Physical Specifications

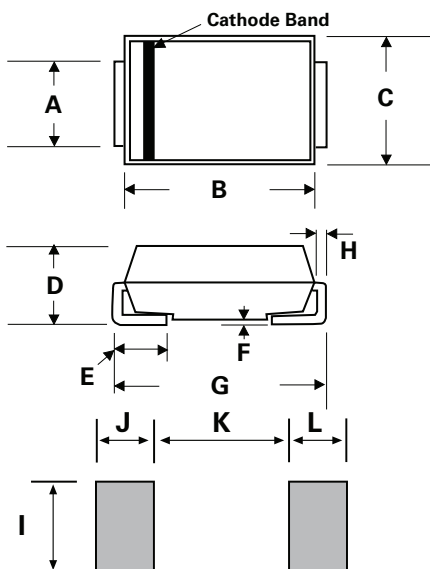
|          |                                                                   |
|----------|-------------------------------------------------------------------|
| Weight   | 0.003 ounce, 0.093 grams                                          |
| Case     | JEDEC DO214AA. Molded plastic body over glass passivated junction |
| Polarity | Color band denotes cathode except Bidirectional.                  |
| Terminal | Matte Tin-plated leads, Solderable per JESD22-B102D               |

### Environmental Specifications

|                    |              |
|--------------------|--------------|
| Temperature Cycle  | JESD22-A104  |
| Pressure Cooker    | JESD 22-A102 |
| High Temp. Storage | JESD22-A103  |
| HTRB               | JESD22-A108  |
| Thermal Shock      | JESD22-A106  |

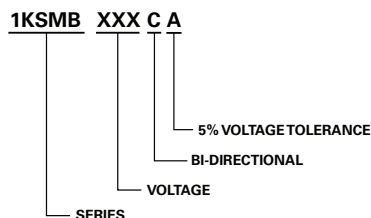
### Dimensions

DO-214AA (SMB J-Bend)

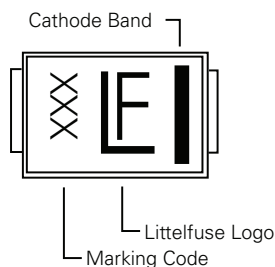


| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.077  | 0.086 | 1.950       | 2.200 |
| B          | 0.160  | 0.180 | 4.060       | 4.570 |
| C          | 0.130  | 0.155 | 3.300       | 3.940 |
| D          | 0.084  | 0.096 | 2.130       | 2.440 |
| E          | 0.030  | 0.060 | 0.760       | 1.520 |
| F          | -      | 0.008 | -           | 0.203 |
| G          | 0.205  | 0.220 | 5.210       | 5.590 |
| H          | 0.006  | 0.012 | 0.152       | 0.305 |
| I          | 0.089  | -     | 2.260       | -     |
| J          | 0.085  | -     | 2.160       | -     |
| K          | -      | 0.107 | -           | 2.740 |
| L          | 0.085  | -     | 2.160       | -     |

### Part Numbering System



### Part Marking System



### Packaging

| Part number | Component Package | Quantity | Packaging Option            | Packaging Specification |
|-------------|-------------------|----------|-----------------------------|-------------------------|
| 1KSMBxxxXX  | DO-214AA          | 3000     | Tape & Reel – 12mm/13" tape | EIA STD RS-481          |