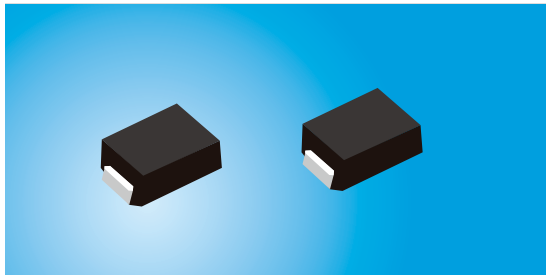


## TVS Diodes Surface Mount-1500W KWSMCJ Series



### Description

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

### Features

- For surface mounted applications in order to optimize board space
- Reliable low cost construction utilizing molded plastic technique
- Plastic material has UL flammability classification 94V-0
- Typical  $I_R$  less than 1 $\mu$ A above 12V
- Fast response time: typically less than 1.0ps from 0 Volts to  $V_{BR}$  min

### 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 10x1000 $\mu$ s waveform (Fig.2)(Note 1), (Note 2) | PPPM           | 1500       | W                  |
| Power Dissipation on infinite heat sink at $T_A=50^\circ\text{C}$  | $P_{M(AV)}$    | 6.5        | W                  |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)   | $I_{FSM}$      | 200        | A                  |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional only(Note 4)                                | $V_F$          | 3.5/5.0    | V                  |
| Operating Junction and Storage Temperature Range   | $T_J, T_{STG}$ | -55 to 150 | $^\circ\text{C}$   |
| Typical Thermal Resistance Junction to Lead  | $R_{UJL}$      | 15         | $^\circ\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient   | $R_{UJA}$      | 75         | $^\circ\text{C/W}$ |

### Notes:

- Non-repetitive current pulse, per Fig.4. and derated above  $T_A=25^\circ\text{C}$  per Fig. 3.
- Mounted on 8.0x8.0mm copper pad to each terminal.
- Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only.

### Electrical Characteristics

| Part Number | 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 $V_C$ @ $I_{pp}$ (V) | Maximum Peak Pulse Current $I_{pp}$ (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A) | $I_{pp}$ 8X20us Amps |
|-------------|-------------|---------|-----|---|--|-------|-------------------------|---|---|--|----------------------|
|             |             | UNI     | BI  |   | MIN  | MAX   |                         |   |   |  |                      |
| KWSMCJ5.0A  | KWSMCJ5.0CA | GDE     | BDE | 5.0                                     | 6.40                                       | 7.00  | 10                      | 9.2   | 163.0                                   | 800  | 500                  |
| KWSMCJ6.0A  | KWSMCJ6.0CA | GDG     | BDG | 6.0                                     | 6.67                                       | 7.37  | 10                      | 10.3  | 145.7                                   | 800  | 500                  |
| KWSMCJ6.5A  | KWSMCJ6.5CA | GDK     | BDK | 6.5                                     | 7.22                                       | 7.98  | 10                      | 11.2  | 134.0                                   | 500  | 500                  |
| KWSMCJ7.0A  | KWSMCJ7.0CA | GDM     | BDM | 7.0                                     | 7.78                                       | 8.60  | 10                      | 12.0  | 125.0                                   | 200  | 500                  |
| KWSMCJ7.5A  | KWSMCJ7.5CA | GDP     | BDP | 7.5                                     | 8.33                                       | 9.21  | 1                       | 12.9  | 116.3                                   | 100  | 500                  |
| KWSMCJ8.0A  | KWSMCJ8.0CA | GDR     | BDR | 8.0                                     | 8.89                                       | 9.83  | 1                       | 13.6  | 110.3                                   | 50   | 500                  |
| KWSMCJ8.5A  | KWSMCJ8.5CA | GDT     | BDT | 8.5                                     | 9.44                                       | 10.40 | 1                       | 14.4  | 104.2                                   | 20   | 500                  |

## TVS Diodes Surface Mount-1500W KWSMCJ Series

### Electrical Characteristics

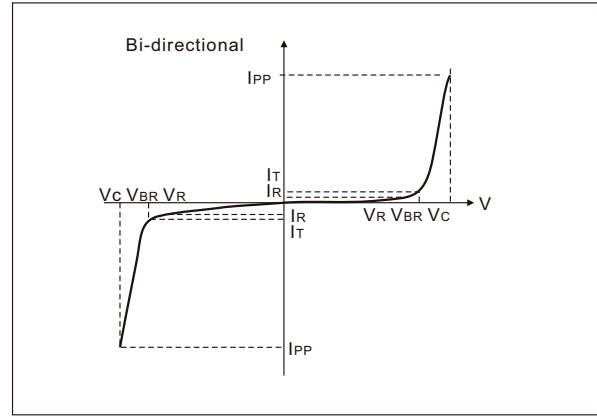
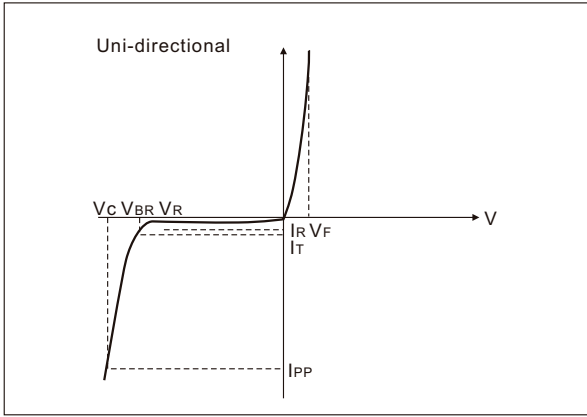
| Part Number<br>(Uni) | Part Number<br>(Bi) | Marking |     | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |       | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$ @ $I_{pp}$ (V) | Maximum Peak Pulse Current $I_{pp}$ (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A) | $I_{pp}$ 8X20us Amps |
|----------------------|---------------------|---------|-----|---|--|-------|-------------------------|---|---|--|----------------------|
|                      |                     | UNI     | BI  |   | MIN  | MAX   |                         |   |   |  |                      |
| KWSMCJ9.0A           | KWSMCJ9.0CA         | GDV     | BDV | 9.0                                     | 10.00                                      | 11.10 | 1                       | 15.4  | 97.4                                    | 10   | 500                  |
| KWSMCJ10A            | KWSMCJ10CA          | GDX     | BDX | 10.0                                    | 11.10                                      | 12.30 | 1                       | 17.0  | 88.3                                    | 5  | 500                  |
| KWSMCJ11A            | KWSMCJ11CA          | GDZ     | BDZ | 11.0                                    | 12.20                                      | 13.50 | 1                       | 18.2  | 82.5                                    | 1  | 500                  |
| KWSMCJ12A            | KWSMCJ12CA          | GEE     | BEE | 12.0                                    | 13.30                                      | 14.70 | 1                       | 19.9  | 75.4                                    | 1  | 500                  |
| KWSMCJ13A            | KWSMCJ13CA          | GEG     | BEG | 13.0                                    | 14.40                                      | 15.90 | 1                       | 21.5  | 69.8                                    | 1  | 500                  |
| KWSMCJ14A            | KWSMCJ14CA          | GEK     | BEK | 14.0                                    | 15.60                                      | 17.20 | 1                       | 23.2  | 64.7                                    | 1  | 500                  |
| KWSMCJ15A            | KWSMCJ15CA          | GEM     | BEM | 15.0                                    | 16.70                                      | 18.50 | 1                       | 24.4  | 61.5                                    | 1  | 500                  |
| KWSMCJ16A            | KWSMCJ16CA          | GEP     | BEP | 16.0                                    | 17.80                                      | 19.70 | 1                       | 26.0  | 57.7                                    | 1  | 500                  |
| KWSMCJ17A            | KWSMCJ17CA          | GER     | BER | 17.0                                    | 18.90                                      | 20.90 | 1                       | 27.6  | 54.4                                    | 1  | 500                  |
| KWSMCJ18A            | KWSMCJ18CA          | GET     | BET | 18.0                                    | 20.00                                      | 22.10 | 1                       | 29.2  | 51.4                                    | 1  | 500                  |
| KWSMCJ20A            | KWSMCJ20CA          | GEV     | BEV | 20.0                                    | 22.20                                      | 24.50 | 1                       | 32.4  | 46.3                                    | 1  | 500                  |
| KWSMCJ22A            | KWSMCJ22CA          | GEX     | BEX | 22.0                                    | 24.40                                      | 26.90 | 1                       | 35.5  | 42.3                                    | 1  | 500                  |
| KWSMCJ24A            | KWSMCJ24CA          | GEZ     | BEZ | 24.0                                    | 26.70                                      | 29.50 | 1                       | 38.9  | 38.6                                    | 1  | 500                  |
| KWSMCJ26A            | KWSMCJ26CA          | GFE     | BFE | 26.0                                    | 28.90                                      | 31.90 | 1                       | 42.1  | 35.7                                    | 1  | 500                  |
| KWSMCJ28A            | KWSMCJ28CA          | GFG     | BFG | 28.0                                    | 31.10                                      | 34.40 | 1                       | 45.4  | 33.1                                    | 1  | 500                  |
| KWSMCJ30A            | KWSMCJ30CA          | GFK     | BFK | 30.0                                    | 33.30                                      | 36.80 | 1                       | 48.4  | 31.0                                    | 1  | 500                  |
| KWSMCJ33A            | KWSMCJ33CA          | GFM     | BFM | 33.0                                    | 36.70                                      | 40.60 | 1                       | 53.3  | 28.2                                    | 1  | 500                  |
| KWSMCJ36A            | KWSMCJ36CA          | GFP     | BFP | 36.0                                    | 40.00                                      | 44.20 | 1                       | 58.1  | 25.9                                    | 1  | 500                  |
| KWSMCJ40A            | KWSMCJ40CA          | GFR     | BFR | 40.0                                    | 44.40                                      | 49.10 | 1                       | 64.5  | 23.3                                    | 1  | 500                  |
| KWSMCJ43A            | KWSMCJ43CA          | GFT     | BFT | 43.0                                    | 47.80                                      | 52.80 | 1                       | 69.4  | 21.7                                    | 1  | 500                  |
| KWSMCJ45A            | KWSMCJ45CA          | GFV     | BFV | 45.0                                    | 50.00                                      | 55.30 | 1                       | 72.7  | 20.6                                    | 1  | 500                  |
| KWSMCJ48A            | KWSMCJ48CA          | GFX     | BFX | 48.0                                    | 53.30                                      | 58.90 | 1                       | 77.4  | 19.4                                    | 1  | 500                  |
| KWSMCJ51A            | KWSMCJ51CA          | GFZ     | BFZ | 51.0                                    | 56.70                                      | 62.70 | 1                       | 82.4  | 18.2                                    | 1  | 500                  |
| KWSMCJ54A            | KWSMCJ54CA          | GGE     | BGE | 54.0                                    | 60.00                                      | 66.30 | 1                       | 87.1  | 17.3                                    | 1  | 500                  |
| KWSMCJ58A            | KWSMCJ58CA          | GGG     | BGG | 58.0                                    | 64.40                                      | 71.20 | 1                       | 93.6  | 16.1                                    | 1  | 500                  |
| KWSMCJ60A            | KWSMCJ60CA          | GGK     | BGK | 60.0                                    | 66.70                                      | 73.70 | 1                       | 96.8  | 15.5                                    | 1  | 500                  |
| KWSMCJ64A            | KWSMCJ64CA          | GGM     | BGM | 64.0                                    | 71.10                                      | 78.60 | 1                       | 103.0   | 14.6                                    | 1  | 500                  |
| KWSMCJ70A            | KWSMCJ70CA          | GGP     | BGP | 70.0                                    | 77.80                                      | 86.00 | 1                       | 113.0   | 13.3                                    | 1  | 500                  |
| KWSMCJ75A            | KWSMCJ75CA          | GGR     | BGR | 75.0                                    | 83.30                                      | 92.10 | 1                       | 121.0   | 12.4                                    | 1  | 500                  |
| KWSMCJ78A            | KWSMCJ78CA          | GGT     | BGT | 78.0                                    | 86.70                                      | 95.80 | 1                       | 126.0   | 11.9                                    | 1  | 500                  |
| KWSMCJ85A            | KWSMCJ85CA          | GGV     | BGV | 85.0                                    | 94.40                                      | 104.0 | 1                       | 137.0   | 11.0                                    | 1  | 500                  |
| KWSMCJ90A            | KWSMCJ90CA          | GGX     | BGX | 90.0                                    | 100.0                                      | 111.0 | 1                       | 146.0   | 10.3                                    | 1  | 500                  |
| KWSMCJ100A           | KWSMCJ100CA         | GGZ     | BGZ | 100.0                                   | 111.0                                      | 123.0 | 1                       | 162.0   | 9.3                                     | 1  | 500                  |
| KWSMCJ110A           | KWSMCJ110CA         | GHE     | BHE | 110.0                                   | 122.0                                      | 135.0 | 1                       | 177.0   | 8.5                                     | 1  | 500                  |
| KWSMCJ120A           | KWSMCJ120CA         | GHG     | BHG | 120.0                                   | 133.0                                      | 147.0 | 1                       | 193.0   | 7.8                                     | 1  | 500                  |
| KWSMCJ130A           | KWSMCJ130CA         | GHK     | BHK | 130.0                                   | 144.0                                      | 159.0 | 1                       | 209.0   | 7.2                                     | 1  | 500                  |
| KWSMCJ150A           | KWSMCJ150CA         | GHM     | BHM | 150.0                                   | 167.0                                      | 185.0 | 1                       | 243.0   | 6.2                                     | 1  | 500                  |
| KWSMCJ160A           | KWSMCJ160CA         | GHP     | BHP | 160.0                                   | 178.0                                      | 197.0 | 1                       | 259.0   | 5.8                                     | 1  | 500                  |
| KWSMCJ170A           | KWSMCJ170CA         | GHR     | BHR | 170.0                                   | 189.0                                      | 209.0 | 1                       | 275.0   | 5.5                                     | 1  | 500                  |
| KWSMCJ180A           | KWSMCJ180CA         | GHT     | BHT | 180.0                                   | 201.0                                      | 222.0 | 1                       | 292.0   | 5.1                                     | 1  | 500                  |
| KWSMCJ200A           | KWSMCJ200CA         | GHV     | BHV | 200.0                                   | 224.0                                      | 247.0 | 1                       | 324.0   | 4.6                                     | 1  | 500                  |
| KWSMCJ220A           | KWSMCJ220CA         | GHX     | BHX | 220.0                                   | 246.0                                      | 272.0 | 1                       | 356.0   | 4.2                                     | 1  | 500                  |
| KWSMCJ250A           | KWSMCJ250CA         | GHZ     | BHZ | 250.0                                   | 279.0                                      | 309.0 | 1                       | 405.0   | 3.7                                     | 1  | 500                  |
| KWSMCJ300A           | KWSMCJ300CA         | GJE     | BJE | 300.0                                   | 335.0                                      | 371.0 | 1                       | 486.0   | 3.1                                     | 1  | 500                  |
| KWSMCJ350A           | KWSMCJ350CA         | GJG     | BJG | 350.0                                   | 391.0                                      | 432.0 | 1                       | 567.0   | 2.6                                     | 1  | 500                  |
| KWSMCJ400A           | KWSMCJ400CA         | GJK     | BJK | 400.0                                   | 447.0                                      | 494.0 | 1                       | 648.0   | 2.3                                     | 1  | 500                  |
| KWSMCJ440A           | KWSMCJ440CA         | GJM     | BJM | 440.0                                   | 492.0                                      | 543.0 | 1                       | 713.0   | 2.1                                     | 1  | 500                  |

For parts without A , the  $V_{BR}$  is  $\pm 10\%$ , and  $V_C$  is 5% higher than A parts.

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

**TVS Diodes  
Surface Mount-1500W KWSMCJ Series**

**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 thogh 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

**Ratings and Characteristic Curves ( $T_A=25^\circ C$  unless otherwise noted)**

Fig.1-TV S Transients Clamping Waveform

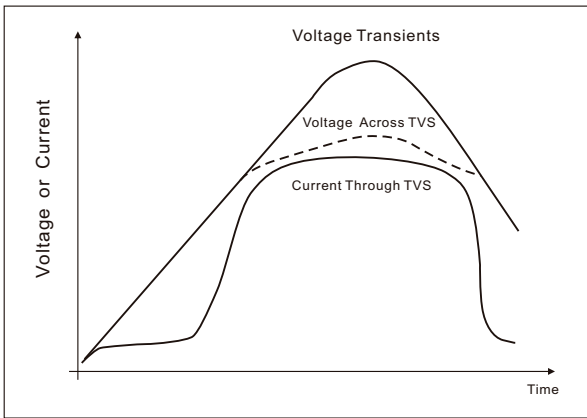
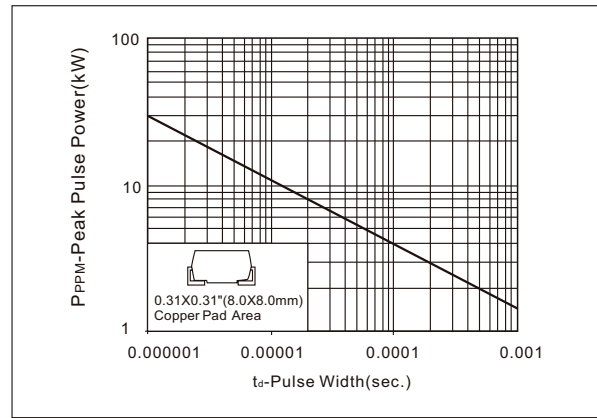
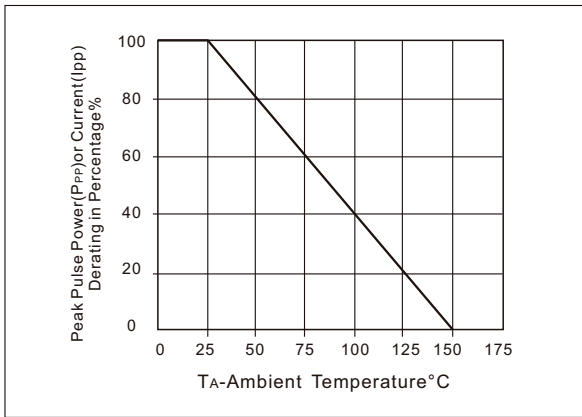


Fig.2-Peak Pulse Power Rating Curve

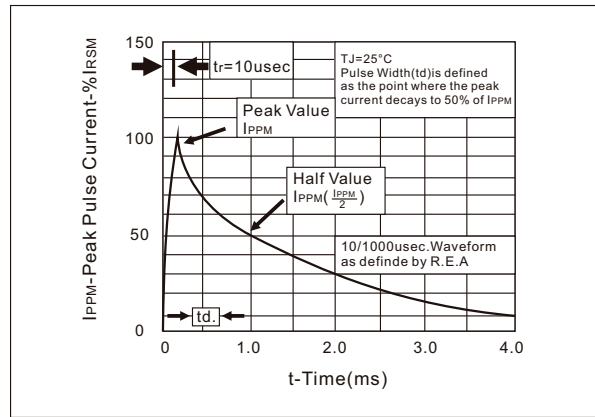


**TVS Diodes  
Surface Mount-1500W KWSMCJ Series**

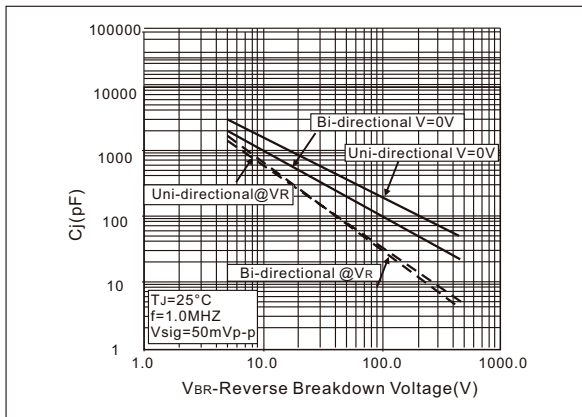
**Fig.3-Pulse Derating Curve**



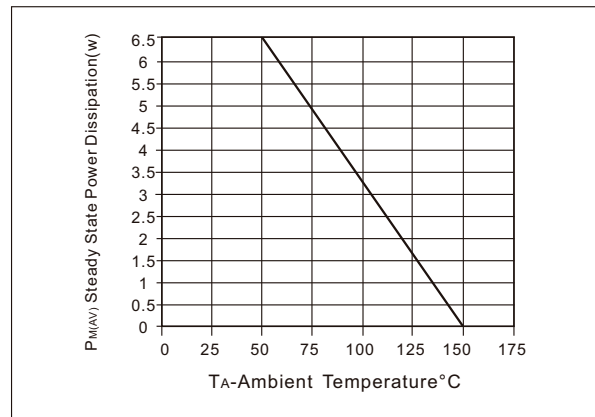
**Fig.4-Pulse Waveform**



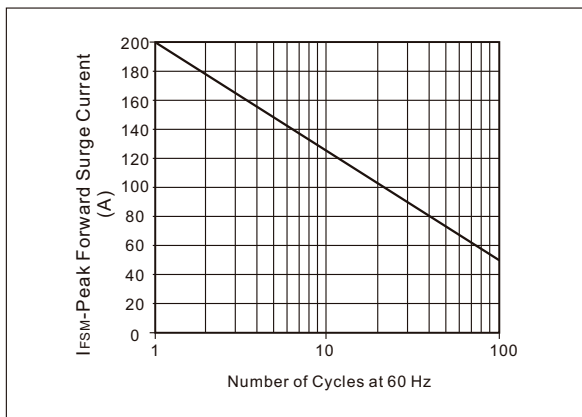
**Fig.5-Typical Junction Capacitance**



**Fig.6-Steady State Power Dissipation Surge Current Uni-Directional Only**



**Fig.7-Maximum Non-Repetitive Forward Surge Current Uni-Directional Only**

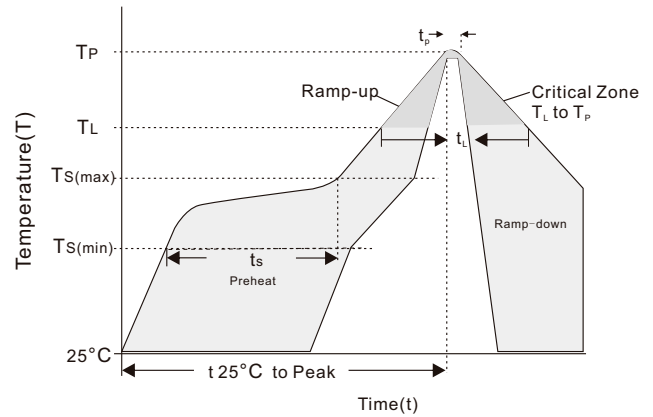


# TVS Diodes Surface Mount-1500W KWSMCJ Series

## Recommended Conditions

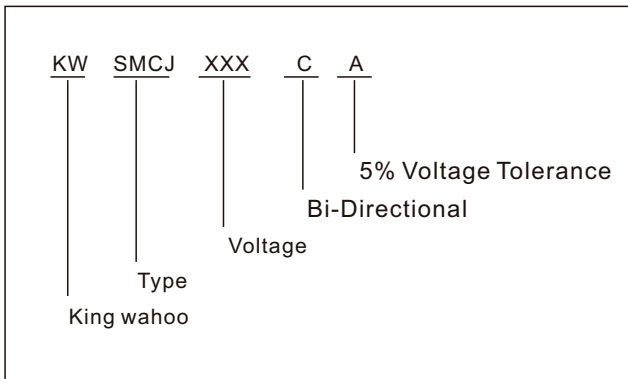
| Reflow Condition                                  |                               | Pb – Free assembly      |
|---|-------------------------------|-------------------------|
| Heat Pre  | Temperature Min (Ts)          | 150°C                   |
|   | Temperature Max (Ts)          | 200°C                   |
|   | Time (Min to Max) (ts)        | 60 – 180 secs           |
| Average ramp up rate (Liquidus Temp (TL) to peak) |                               | 3°C/second max          |
| Ts(max) to TL - Ramp-up Rate                      |                               | 3°C/second max          |
| Reflow  | - Temperature (TL) (Liquidus) | 217°C                   |
|   | Time (Min to Max) (ts)        | 60 – 150 seconds        |
| Peak Temperature (TP)                             |                               | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature (tp)   |                               | 20 – 40 seconds         |
| Ramp-down Rate                                    |                               | 6°C/second max          |
| Time 25°C to peak Temperature (TP)                |                               | 8 minutes Max.          |
| Do not exceed                                     |                               | 280°C                   |

## Recommended Soldering Conditions



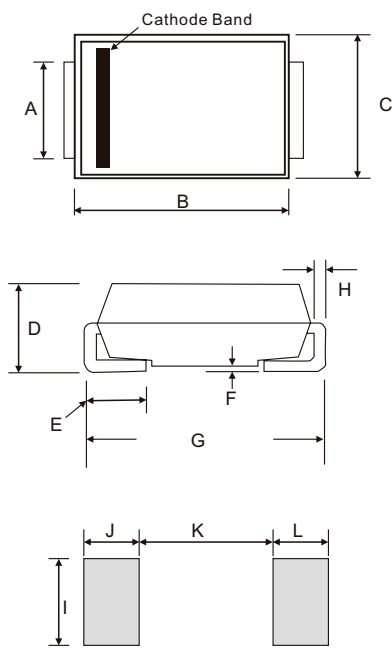
## Part Number

Construction of part number




# TVS Diodes Surface Mount-1500W KWSMCJ Series

## Dimensions



| Dimensions | Millimeters |       | Inches |       |
|------------|-------------|-------|--------|-------|
|            | Min         | Max   | Min    | Max   |
| A          | 2.900       | 3.200 | 0.114  | 0.126 |
| B          | 6.600       | 7.110 | 0.260  | 0.280 |
| C          | 5.590       | 6.220 | 0.220  | 0.245 |
| D          | 2.060       | 2.820 | 0.079  | 0.111 |
| E          | 0.760       | 1.520 | 0.030  | 0.060 |
| F          | -           | 0.203 | -      | 0.008 |
| G          | 7.750       | 8.130 | 0.305  | 0.320 |
| H          | 0.152       | 0.305 | 0.006  | 0.012 |
| I          | 3.300       | -     | 0.129  | -     |
| J          | 2.400       | -     | 0.094  | -     |
| K          | -           | 4.200 | -      | 0.165 |
| L          | 2.400       | -     | 0.094  | -     |

## Packaging Options

| Part number   | Component Package | Quantity | Parameter Option          | Packaging Specification |
|---|-------------------|----------|---------------------------|-------------------------|
| KWSMCJ<br> | DO-214AB          | 3000     | Tape & Reel-16mm/13" reel | EIA STD RS-481          |

