

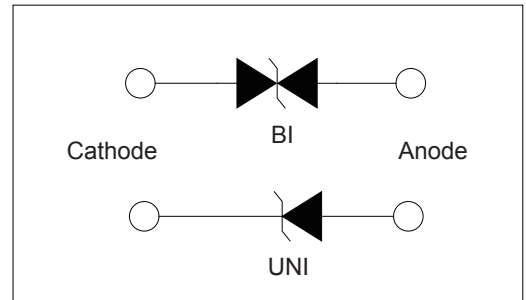
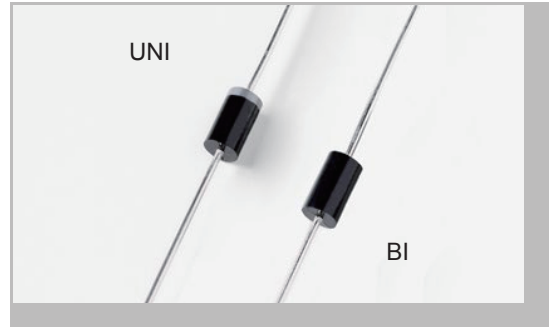
Transient Voltage Suppressors

1.5KE Series

Transient Voltage Suppressors - 1.5KE Series

Features

1. Halogen-free
2. Rohs compliant
3. Typical maximum temperature coefficient
4. $\Delta V_{BR} = 0.1\% \times V_{BR} @ 25^{\circ}C \times \Delta T$
5. Glass passivated Chip junction in DO-201 package
6. 1500W peak pulse capadility at 10x1000 μ s waveform, repetition rate (duty cycles):0.01%
7. Fast response time: typically less than 1.0ps from 0 Volts to BV min
8. Excellent clamping capability
9. Low incremental surge resistance
10. Typical IR less than 5 μ A above 11V
11. High temperature soldering guaranteed: 260 $^{\circ}$ C/40 seconds / 0.375", (9.5mm) lead length, 5lbs., (2.3kg)tension
12. Plastic package has underwriters laboratory flammability classification 94v-0
13. Matte Tin Lead-free plated



Applications

TVS devices are ideal for the protection of I/O interfaces, VCC bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

Mechanical Characteristics

| Rating | Symbol | Value | Units |
|--|-----------------|--------------------------------------|----------------|
| Peak Pulse Power Dissipation by 10x1000 μ s test waveform (Fig.1)(Note 1) | P_{PPM} | 1500 | Watts |
| Steady State Power Dissipation on infinite heat sink at TL=75 $^{\circ}$ C (Fig. 5) | P_D | 6.5 | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional only (Note 2) | I_{FSM} | 200 | Amps |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional only (Note 3) | V_F | 3.5/5.0 | V |
| Operating junction and Storage Temperature Range. | T_J, T_{STG} | -55 $^{\circ}$ C to 175 $^{\circ}$ C | $^{\circ}$ C |
| Typical Thermal Resistance Junction to Lead | $R_{\theta JL}$ | 15 | $^{\circ}$ C/W |
| Typical Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 75 | $^{\circ}$ C/W |
| Reverse current | I_F | 100 | A |

Notes:

1. Non-repetitive current pulse , per Fig. 3 and derated above $T_A = 25^{\circ}C$ per Fig. 2.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 perminute maximum.
3. $V_F < 3.5V$ for devices of $V_{BR} < 200V$ and $V_F < 5.0V$ for devices of $V_{BR} > 201V$.

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Electrical Characteristics

| Type Number | | Reverse Stand-Off Voltage VRWM(V) | Breakdown Voltage Min.@IT | | Test Current IT(mA) | Maximum Clamping Voltage@IPP VC(V) | Peak Pulse Current IPP(A) | Reverse Leakage @VRWM IR(μA) |
|-------------|------------|--------------------------------------|---------------------------|-------------|------------------------|---------------------------------------|------------------------------|---------------------------------|
| (UNI) | (BI) | | VBR MIN.(V) | VBR.MAX.(V) | | | | |
| 1.5KE6.8A | 1.5KE6.8CA | 5.80 | 6.45 | 7.14 | 10 | 10.5 | 144.8 | 1000 |
| 1.5KE7.5A | 1.5KE7.5CA | 6.40 | 7.13 | 7.88 | 10 | 11.3 | 134.5 | 500 |
| 1.5KE8.2A | 1.5KE8.2CA | 7.02 | 7.79 | 8.61 | 10 | 12.1 | 125.6 | 200 |
| 1.5KE9.1A | 1.5KE9.1CA | 7.78 | 8.65 | 9.50 | 1 | 13.4 | 113.4 | 50 |
| 1.5KE10A | 1.5KE10CA | 8.55 | 9.50 | 10.50 | 1 | 14.5 | 104.8 | 10 |
| 1.5KE11A | 1.5KE11CA | 9.40 | 10.50 | 11.60 | 1 | 15.6 | 97.4 | 5 |
| 1.5KE12A | 1.5KE12CA | 10.20 | 11.40 | 12.60 | 1 | 16.7 | 91.0 | 5 |
| 1.5KE13A | 1.5KE13CA | 11.10 | 12.40 | 13.70 | 1 | 18.2 | 83.5 | 5 |
| 1.5KE15A | 1.5KE15CA | 12.80 | 14.30 | 15.80 | 1 | 21.2 | 71.7 | 5 |
| 1.5KE16A | 1.5KE16CA | 13.60 | 15.20 | 16.80 | 1 | 22.5 | 67.6 | 5 |
| 1.5KE18A | 1.5KE18CA | 15.30 | 17.10 | 18.90 | 1 | 25.2 | 60.3 | 5 |
| 1.5KE20A | 1.5KE20CA | 17.10 | 19.00 | 21.00 | 1 | 27.7 | 54.9 | 5 |
| 1.5KE22A | 1.5KE22CA | 18.80 | 20.90 | 23.10 | 1 | 30.6 | 49.7 | 5 |
| 1.5KE24A | 1.5KE24CA | 20.50 | 22.80 | 25.20 | 1 | 33.2 | 45.8 | 5 |
| 1.5KE27A | 1.5KE27CA | 23.10 | 25.70 | 28.40 | 1 | 37.5 | 40.5 | 5 |
| 1.5KE30A | 1.5KE30CA | 25.60 | 28.50 | 31.50 | 1 | 41.4 | 36.7 | 5 |
| 1.5KE33A | 1.5KE33CA | 28.20 | 31.40 | 34.70 | 1 | 45.7 | 33.3 | 5 |
| 1.5KE36A | 1.5KE36CA | 30.80 | 34.20 | 37.80 | 1 | 49.9 | 30.5 | 5 |
| 1.5KE39A | 1.5KE39CA | 33.30 | 37.10 | 41.00 | 1 | 53.9 | 28.2 | 5 |
| 1.5KE43A | 1.5KE43CA | 36.80 | 40.90 | 45.20 | 1 | 59.3 | 25.6 | 5 |
| 1.5KE47A | 1.5KE47CA | 40.20 | 44.70 | 49.40 | 1 | 64.8 | 23.5 | 5 |
| 1.5KE51A | 1.5KE51CA | 43.60 | 48.50 | 53.60 | 1 | 70.1 | 21.7 | 5 |
| 1.5KE56A | 1.5KE56CA | 47.80 | 53.20 | 58.80 | 1 | 77.0 | 19.7 | 5 |
| 1.5KE62A | 1.5KE62CA | 53.00 | 58.90 | 65.10 | 1 | 85.0 | 17.9 | 5 |
| 1.5KE68A | 1.5KE68CA | 58.10 | 64.60 | 71.40 | 1 | 92.0 | 16.5 | 5 |
| 1.5KE75A | 1.5KE75CA | 64.10 | 71.30 | 78.80 | 1 | 103.0 | 14.8 | 5 |
| 1.5KE82A | 1.5KE82CA | 70.10 | 77.90 | 86.10 | 1 | 113.0 | 13.5 | 5 |
| 1.5KE91A | 1.5KE91CA | 77.80 | 86.50 | 95.50 | 1 | 125.0 | 12.2 | 5 |
| 1.5KE100A | 1.5KE100CA | 85.50 | 95.00 | 105.00 | 1 | 137.0 | 11.1 | 5 |
| 1.5KE110A | 1.5KE110CA | 94.00 | 105.00 | 116.00 | 1 | 152.0 | 10.0 | 5 |
| 1.5KE120A | 1.5KE120CA | 102.00 | 114.00 | 126.00 | 1 | 165.0 | 9.20 | 5 |
| 1.5KE130A | 1.5KE130CA | 111.00 | 124.00 | 137.00 | 1 | 179.0 | 8.50 | 5 |
| 1.5KE150A | 1.5KE150CA | 128.00 | 143.00 | 158.00 | 1 | 207.0 | 7.30 | 5 |
| 1.5KE160A | 1.5KE160CA | 136.00 | 152.00 | 168.00 | 1 | 219.0 | 6.60 | 5 |
| 1.5KE170A | 1.5KE170CA | 145.00 | 162.00 | 179.00 | 1 | 234.0 | 6.50 | 5 |
| 1.5KE180A | 1.5KE180CA | 154.00 | 171.00 | 189.00 | 1 | 246.0 | 6.20 | 5 |
| 1.5KE200A | 1.5KE200CA | 171.00 | 190.00 | 210.00 | 1 | 274.0 | 5.50 | 5 |
| 1.5KE220A | 1.5KE220CA | 185.00 | 209.00 | 231.00 | 1 | 328.0 | 4.60 | 5 |
| 1.5KE250A | 1.5KE250CA | 214.00 | 237.00 | 263.00 | 1 | 344.0 | 4.40 | 5 |
| 1.5KE300A | 1.5KE300CA | 256.00 | 285.00 | 315.00 | 1 | 414.0 | 3.70 | 5 |
| 1.5KE350A | 1.5KE350CA | 300.00 | 332.00 | 368.00 | 1 | 482.0 | 3.20 | 5 |
| 1.5KE400A | 1.5KE400CA | 342.00 | 380.00 | 420.00 | 1 | 548.0 | 2.80 | 5 |
| 1.5KE440A | 1.5KE440CA | 376.00 | 418.00 | 462.00 | 1 | 602.0 | 2.50 | 5 |
| 1.5KE480A | 1.5KE480CA | 408.00 | 456.00 | 504.00 | 1 | 658.0 | 2.30 | 5 |

For bidirectional type having VR of 10 volts and less, the IR limit is double.

For parts without A, the VBR is +10% and VC is 5% higher than with A parts.

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Ratings and Characteristic Curves

Figure 1 - Peak Pulse Power Rating Curve

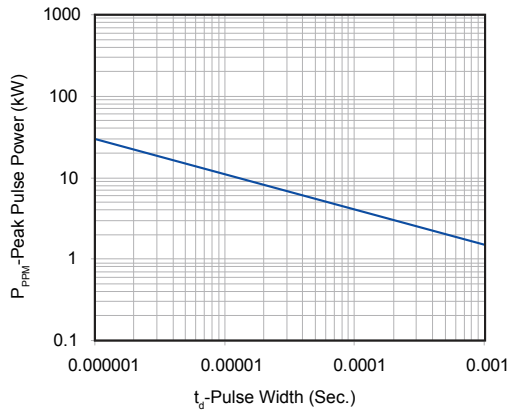


Figure 2 - Pulse Derating Curve

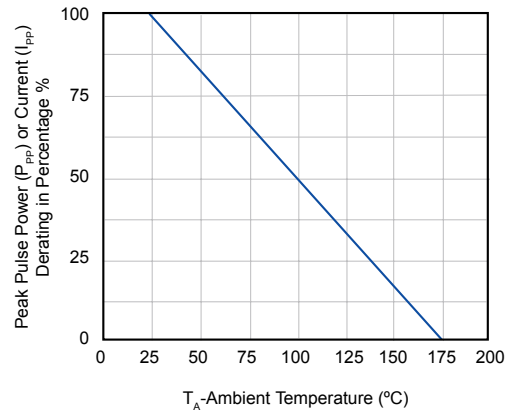


Figure 3 - Pulse Waveform

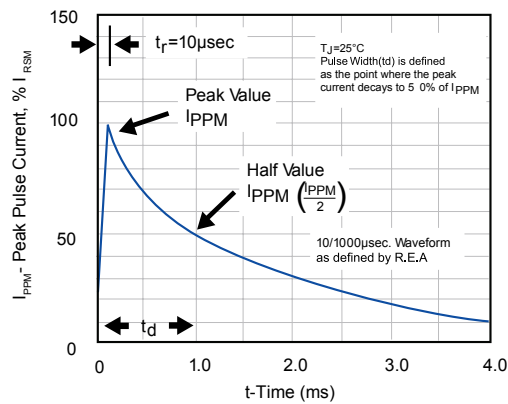


Figure 4 - Typical Junction Capacitance

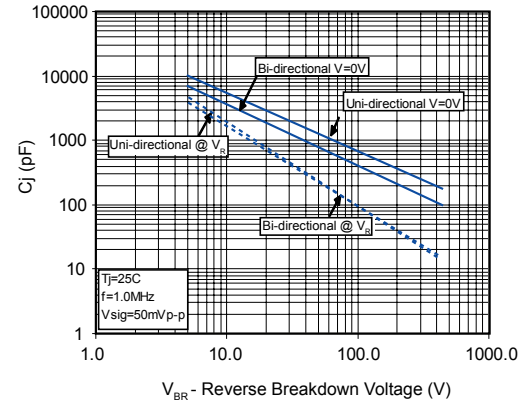


Figure 5 - Steady State Power Derating Curve

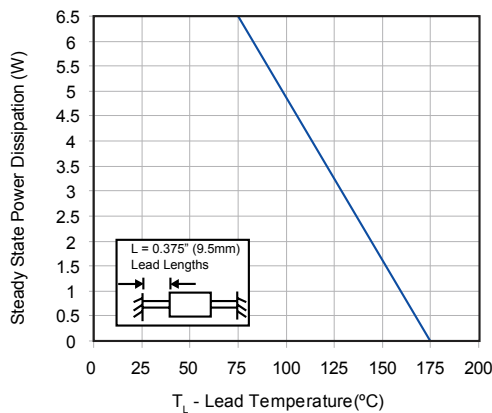
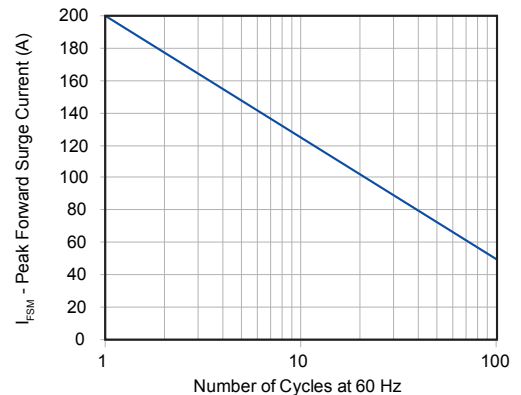


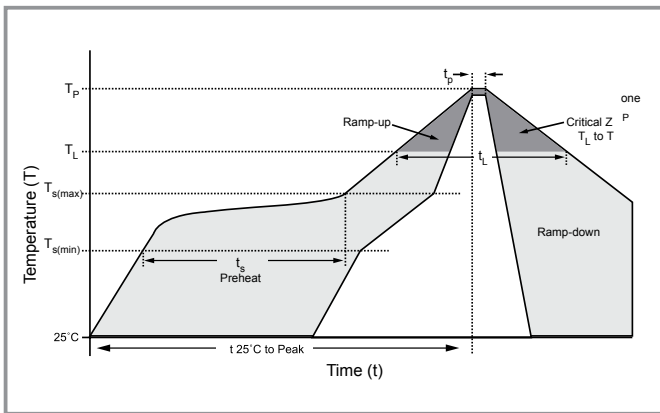
Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



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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 ^{+0/-5} °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 | 0.045oz., 1.2g |
| Case | JEDEC DO-201 molded plastic body over passivated junction. |
| Polarity | Color band denotes the cathode except Bipolar. |
| Termina | Matte Tin axial leads, solderable per JESD22-B102D. |

Environmental Specifications

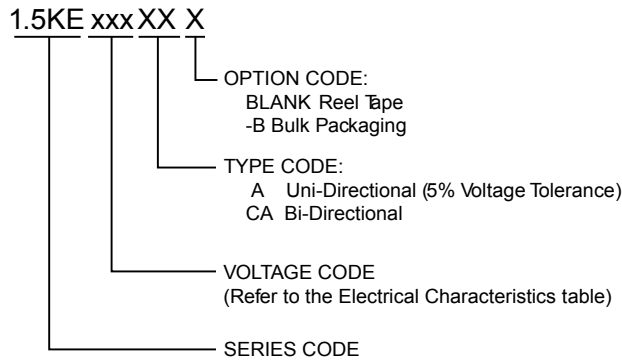
| | |
|--------------------|--------------|
| Temperature Cycle | JESD22-A104 |
| Pressure Cooker | JESD 22-A102 |
| High Temp. Storage | JESD22-A103 |
| HTRB | JESD22-A108 |
| Thermal Shock | JESD22-A106 |

Flow/Wave Soldering

| | |
|--------------------|------------|
| Peak Temperature : | 265°C |
| Dipping Time : | 10 seconds |
| Soldering : | 1 time |

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Part Numbering System



Packaging

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification |
|--------------|-------------------|----------|------------------|-------------------------|
| 1.5KExxxXX | DO-201 | 1000 | Tape & Reel | ELA STD RS-296E |
| 1.5KExxxXX-B | DO-201 | 500 | BULK | Concord Packing Spec |

Warehouse Storage Conditions of Products

- Storage Conditions:
 1. Storage Temperature: -10°C~+40°C
 2. Relative Humidity: ≤75%RH
 3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year

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