# Transient Voltage Suppressors (TVS) Data Sheet

## Features

- Glass passivated junction
- Low zener impedance
- Excellent clamping capability
- 1500W peak pulse power capability at 10/1000μs waveform, repetition rate (duty cycle):0.01%
- Fast response time
- Typical $I_R$ less than 1μA above 13V.
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020.
- AEC-Q101 Qualified

## Mechanical Data

- Case: JEDEC DO-201Moulded plastic
- Terminal: Axial leads, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Mounting Position: Any

## Applications

- I/O interface
- AC/DC power supply
- Low frequency signal transmission line (RS232, RS485, etc.)

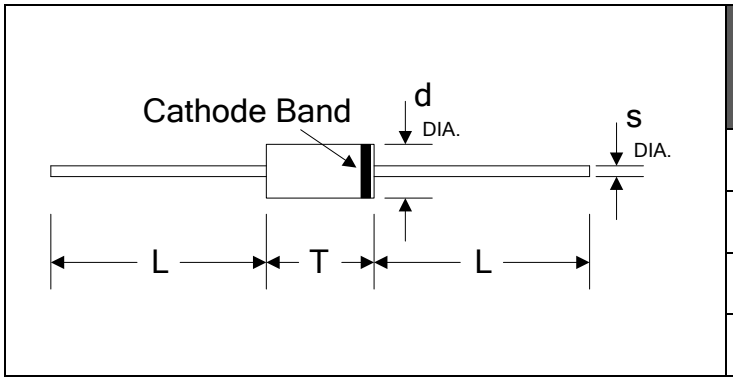
## Maximum Ratings and Characteristics

Ratings at 25℃ ambient temperature unless otherwise specified.

| Rating | Symbol | Value | Units |
|---|---|---|---|
| Peak pulse power dissipation at 10/1000μs waveform (Note1, Fig.1) | $P_{PPM}$ | Minimum 1500 | Watts |
| Peak pulse current of at 10/1000μs waveform (Note 1, Fig.3) | $I_{PPM}$ | See Table | Amps |
| Steady state power dissipation at $T_L$=75℃ (Fig.4) | $P_{M(AV)}$ | 6.15 | Watts |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2) | $I_{FSM}$ | 100 | Amps |
| Operating junction and Storage Temperature Range. | $T_J$,$T_{STG}$ | -55 to +150 | ℃ |
| Maximum instantaneous forward voltage @ 50A forunidirectional only (Note3) | $V_F$ | 3.5/5.0 | V |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 20 | ℃/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 75 | ℃/W |

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above $T_A$=25℃ per Fig.2.
2. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.
3. $V_F$ =3.5 V for devices of V (BR) < 220V, and $V_F$ =5.0 Volt max. for devices of V (BR) >220V

## Dimensions (DO-201)




| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| L | 25.40 | - | 1.000 | - |
| T | 7.20 | 9.50 | 0.285 | 0.375 |
| d | 4.80 | 5.30 | 0.190 | 0.1210 |
| s | 0.90 | 1.30 | 0.035 | 0.051 |

## Electrical Characteristics ($T_A$=25℃)

| Part Number | | Reverse Stand-Off Voltage | Breakdown Voltage @$I_T$ | Test Current | Maximum Clamping Voltage@$I_{PP}$ | Peak Pulse Current | Reverse Leakage @$V_{RWM}$ |
|---|---|---|---|---|---|---|---|
| Unidirectional | Bidirectional | $V_{RWM}$(V) | $V_{BR}$(V) | $I_T$(mA) | $V_C$(V) | $I_{PP}$(A) | $I_R$(μA) |
| 1.5KE6.8A-AR | 1.5KE6.8CA-AR | 5.80 | 6.45~7.14 | 10 | 10.5 | 143.0 | 1000 |
| 1.5KE7.5A-AR | 1.5KE7.5CA-AR | 6.40 | 7.13~7.88 | 10 | 11.3 | 133.0 | 500 |
| 1.5KE8.2A-AR | 1.5KE8.2CA-AR | 7.02 | 7.79~8.61 | 10 | 12.1 | 124.0 | 200 |
| 1.5KE9.1A-AR | 1.5KE9.1CA-AR | 7.78 | 8.65~9.55 | 1 | 13.4 | 112.0 | 50 |
| 1.5KE10A-AR | 1.5KE10CA-AR | 8.55 | 9.5~10.5 | 1 | 14.5 | 103.0 | 10 |
| 1.5KE11A-AR | 1.5KE11CA-AR | 9.40 | 10.5~11.6 | 1 | 15.6 | 96.2 | 5 |
| 1.5KE12A-AR | 1.5KE12CA-AR | 10.2 | 11.4~12.6 | 1 | 16.7 | 89.8 | 5 |
| 1.5KE13A-AR | 1.5KE13CA-AR | 11.1 | 12.4~13.7 | 1 | 18.2 | 82.4 | 5 |
| 1.5KE15A-AR | 1.5KE15CA-AR | 12.8 | 14.3~15.8 | 1 | 21.2 | 70.8 | 1 |
| 1.5KE16A-AR | 1.5KE16CA-AR | 13.6 | 15.2~16.8 | 1 | 22.5 | 66.7 | 1 |
| 1.5KE18A-AR | 1.5KE18CA-AR | 15.3 | 17.1~18.9 | 1 | 25.2 | 59.5 | 1 |
| 1.5KE20A-AR | 1.5KE20CA-AR | 17.1 | 19.0~21.0 | 1 | 27.7 | 54.2 | 1 |
| 1.5KE22A-AR | 1.5KE22CA-AR | 18.8 | 20.9~23.1 | 1 | 30.6 | 49.0 | 1 |
| 1.5KE24A-AR | 1.5KE24CA-AR | 20.5 | 22.8~25.2 | 1 | 33.2 | 45.2 | 1 |
| 1.5KE27A-AR | 1.5KE27CA-AR | 23.1 | 25.7~28.4 | 1 | 37.5 | 40.0 | 1 |
| 1.5KE30A-AR | 1.5KE30CA-AR | 25.6 | 28.5~31.5 | 1 | 41.4 | 36.2 | 1 |
| 1.5KE33A-AR | 1.5KE33CA-AR | 28.2 | 31.4~34.7 | 1 | 45.7 | 32.8 | 1 |
| 1.5KE36A-AR | 1.5KE36CA-AR | 30.8 | 34.2~37.8 | 1 | 49.9 | 30.1 | 1 |
| 1.5KE39A-AR | 1.5KE39CA-AR | 33.3 | 37.1~41.0 | 1 | 53.9 | 27.8 | 1 |
| 1.5KE43A-AR | 1.5KE43CA-AR | 36.8 | 40.9~45.2 | 1 | 59.3 | 25.3 | 1 |
| 1.5KE47A-AR | 1.5KE47CA-AR | 40.2 | 44.7~49.4 | 1 | 64.8 | 23.1 | 1 |
| 1.5KE51A-AR | 1.5KE51CA-AR | 43.6 | 48.5~53.6 | 1 | 70.1 | 21.4 | 1 |
| 1.5KE56A-AR | 1.5KE56CA-AR | 47.8 | 53.2~58.8 | 1 | 77.0 | 19.5 | 1 |
| 1.5KE62A-AR | 1.5KE62CA-AR | 53.0 | 58.9~65.1 | 1 | 85.0 | 17.6 | 1 |
| 1.5KE68A-AR | 1.5KE68CA-AR | 58.1 | 64.6~71.4 | 1 | 92.0 | 16.3 | 1 |
| 1.5KE75A-AR | 1.5KE75CA | 64.1 | 71.3~78.8 | 1 | 103.0 | 14.6 | 1 |

## Electrical Characteristics ($T_A$=25℃)

| Part Number | | Reverse Stand-Off Voltage | Breakdown Voltage @$I_T$ | Test Current | Maximum Clamping Voltage@$I_{PP}$ | Peak Pulse Current | Reverse Leakage @$V_{RWM}$ |
|---|---|---|---|---|---|---|---|
| Unidirectional | Bidirectional | $V_{RWM}$(V) | $V_{BR}$(V) | $I_T$(mA) | $V_C$(V) | $I_{PP}$(A) | $I_R$(μA) |
| 1.5KE82A-AR | 1.5KE82CA-AR | 70.1 | 77.9~86.1 | 1 | 113.0 | 13.3 | 1 |
| 1.5KE91A-AR | 1.5KE91CA-AR | 77.8 | 86.5~95.5 | 1 | 125.0 | 12.0 | 1 |
| 1.5KE100A-AR | 1.5KE100CA-AR | 85.5 | 95~105 | 1 | 137.0 | 10.9 | 1 |
| 1.5KE110A-AR | 1.5KE110CA-AR | 94.0 | 105~116 | 1 | 152.0 | 9.9 | 1 |
| 1.5KE120A-AR | 1.5KE120CA-AR | 102 | 114~126 | 1 | 165.0 | 9.1 | 1 |
| 1.5KE130A-AR | 1.5KE130CA-AR | 111 | 124~137 | 1 | 179.0 | 8.4 | 1 |
| 1.5KE150A-AR | 1.5KE150CA-AR | 128 | 143~158 | 1 | 207.0 | 7.2 | 1 |
| 1.5KE160A-AR | 1.5KE160CA-AR | 136 | 152~168 | 1 | 219.0 | 6.8 | 1 |
| 1.5KE170A-AR | 1.5KE170CA-AR | 145 | 162~179 | 1 | 234.0 | 6.4 | 1 |
| 1.5KE180A-AR | 1.5KE180CA-AR | 154 | 171~189 | 1 | 246.0 | 6.1 | 1 |
| 1.5KE200A-AR | 1.5KE200CA-AR | 171 | 190~210 | 1 | 274.0 | 5.5 | 1 |
| 1.5KE220A-AR | 1.5KE220CA-AR | 185 | 209~231 | 1 | 328.0 | 4.6 | 1 |
| 1.5KE250A-AR | 1.5KE250CA-AR | 214 | 237~263 | 1 | 344.0 | 4.4 | 1 |
| 1.5KE300A-AR | 1.5KE300CA-AR | 256 | 285~315 | 1 | 414.0 | 3.6 | 1 |
| 1.5KE350A-AR | 1.5KE350CA-AR | 300 | 333~368 | 1 | 482.0 | 3.1 | 1 |
| 1.5KE400A-AR | 1.5KE400CA-AR | 342 | 380~420 | 1 | 548.0 | 2.7 | 1 |
| 1.5KE440A-AR | 1.5KE440CA-AR | 376 | 418~462 | 1 | 602.0 | 2.5 | 1 |

Notes: For bidirectional type having VRWM of 10V and less, the IR limit is double.

## Ratings and Characteristic Curves ($T_A$=25℃ unless otherwise noted)

Figure 1. Peak Pulse Power Rating Curve

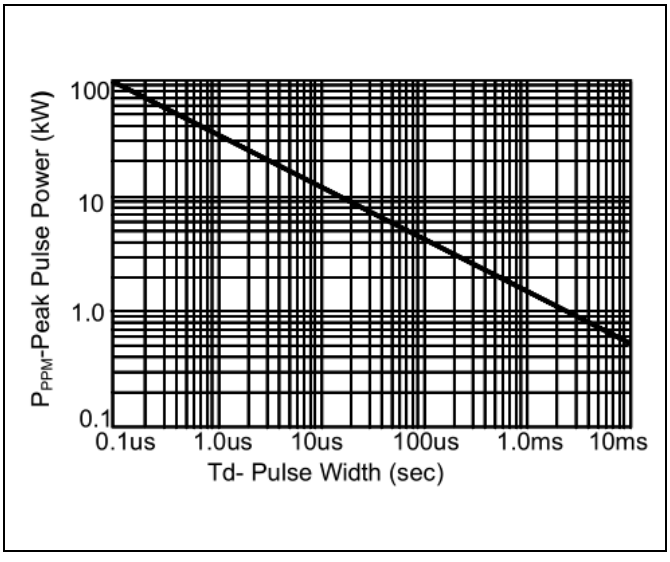
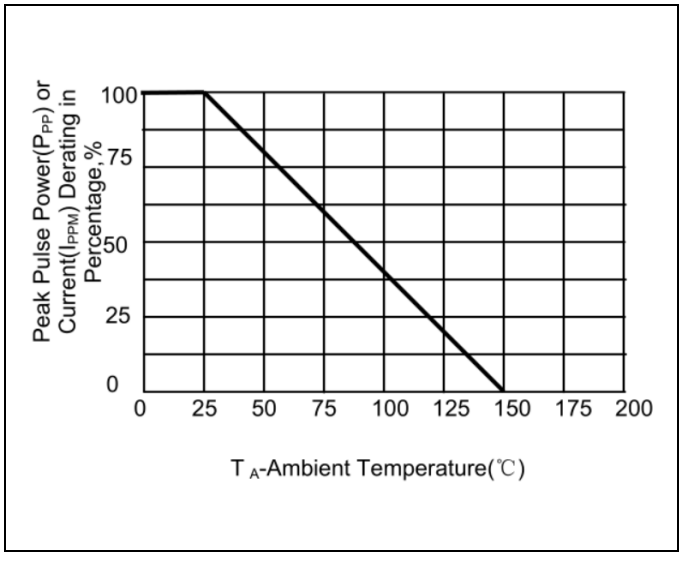



Figure 2. Pulse Derating Curve



## Ratings and Characteristic Curves ($T_A$=25℃ unless otherwise noted)

Figure 3. Pulse Waveform

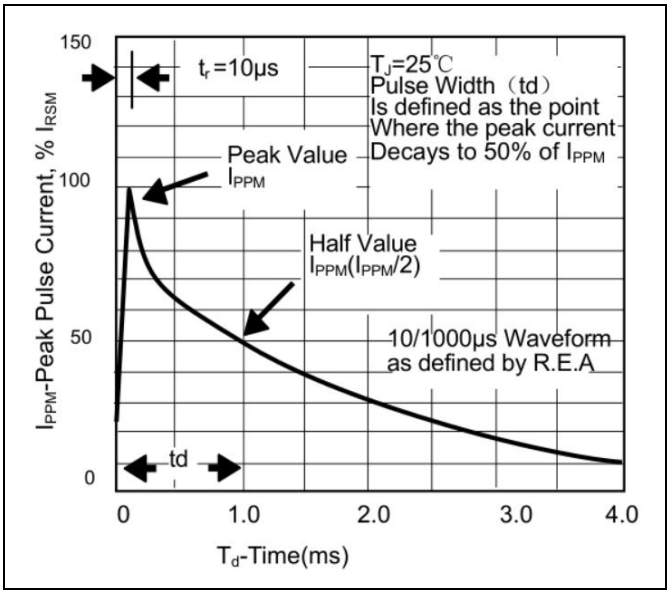
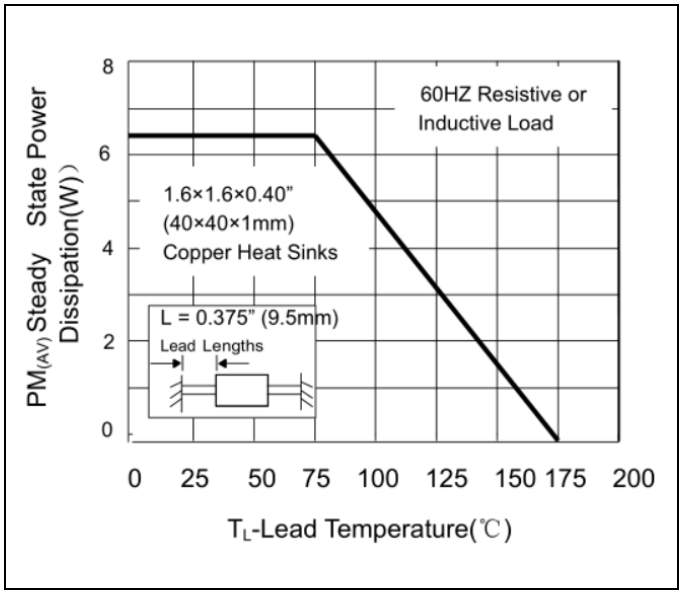
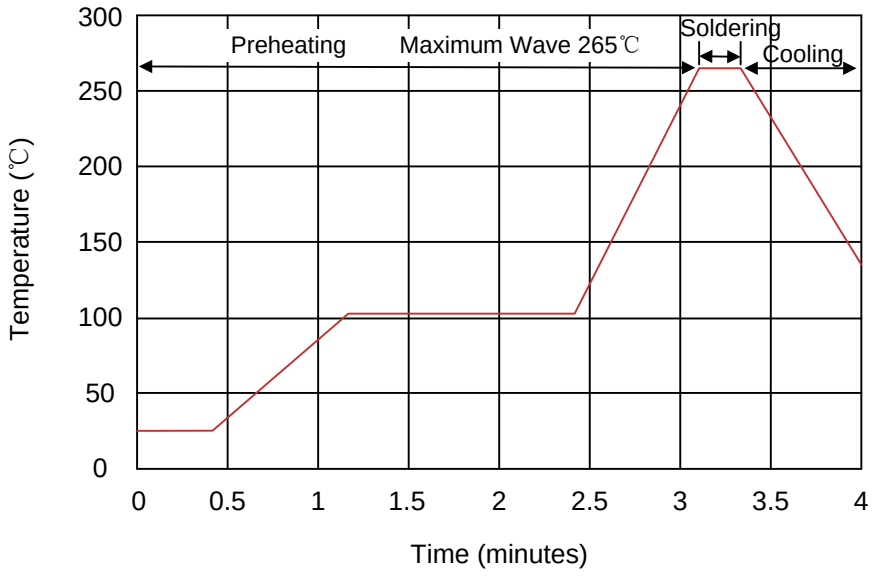



Figure 4. Steady State Power Dissipation Derating Curve



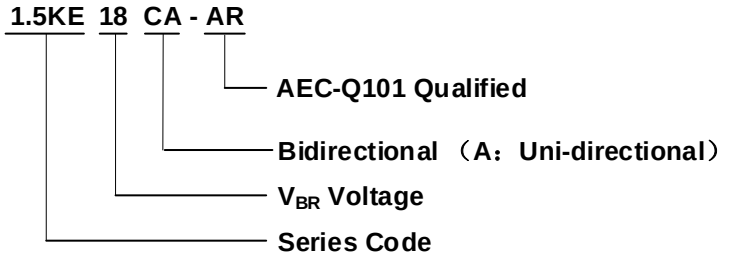

## Recommended Soldering Conditions

Wave Soldering

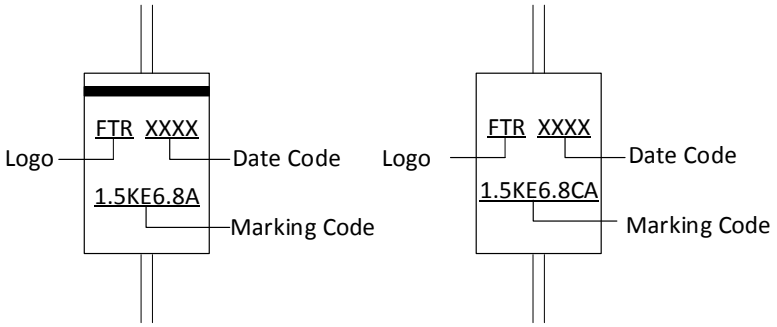



| Item | Conditions |
|---|---|
| Peak Temperature | 265℃ |
| Dipping Time | 10 seconds |
| Soldering | 1 time |

## Partnumber code

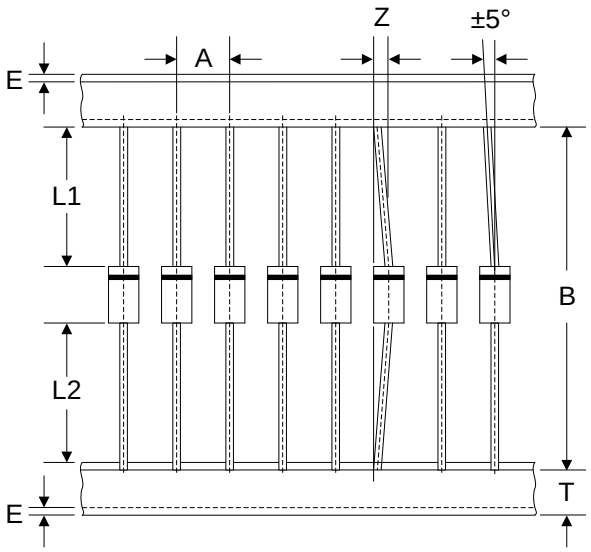



## Marking code



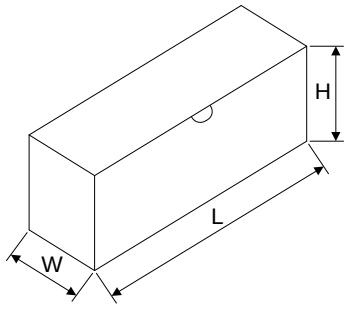

## Packaging

Tape




| Symbol | Dimension (mm) |
|---|---|
| A | 10.0±0.5 |
| B | 53.0±1.0 |
| Z | 1.2Max. |
| T | 6.0±0.4 |
| E | 0.8Max. |
| L1-L2 | 1.0Max. |

Box




| | |
|---|---|
| L | 260.0±5.0 |
| W | 75.0±5.0 |
| H | 114.0±5.0 |
| Quantity: 1000PCS | |