Innovative Service Around the Globe YAGEO

# DATA SHEET

## TRANSIENT VOLTAGE SUPPRESSORS
## AC/DC POWER SUPPLY

1.5KE series

**RoHS compliant & Halogen free**

Product specification– April 29, 2019 V.0

# 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 12V.
- High Temperature soldering guaranteed: 265℃/10 seconds/.375″, (9.5mm) lead length, 5lbs (2.3kg) tension
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020.
- Safety certification: UL: E244458

## Mechanical Data

- Case: JEDEC DO-201 Moulded plastic
- Terminal: Axial leads, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Mounting Position: Any
- Weight: 0.97g

## Applications

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

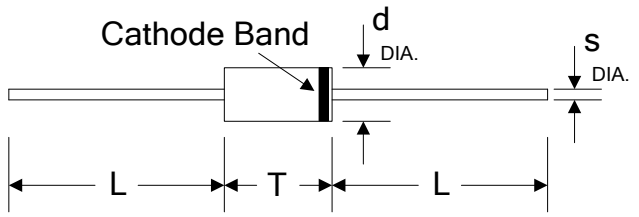
## Maximum Ratings and Characteristics

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.5) | $P_{M(AV)}$ | 6.5 | Watts |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note2, Fig.6) | $I_{FSM}$ | 200 | Amps |
| Operating junction and Storage Temperature Range. | $T_J$,$T_{STG}$ | -55 to +175 | ℃ |
| Typical thermal resistance junction to lead | $R_{\theta JL}$ | 15 | ℃/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 75 | ℃/W |

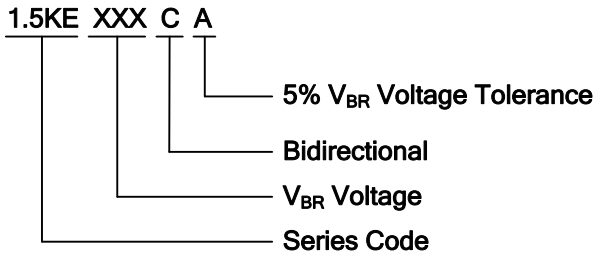
Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above $T_A$=25℃ per Fig.2.
2. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.

## 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 | 0.210 |
| s | 0.96 | 1.07 | 0.038 | 0.042 |

## Part Number Code




## Ordering Code for different package

Box package: Add suffix "/B" at the end of the part number, such as 1.5KE100CA/B

Reel package: Add suffix "/TR13" at the end of the part number, such as 1.5KE75A/TR13

## 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 | 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 | 8.65~9.55 | 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 | 1 |
| 1.5KE15A | 1.5KE15CA | 12.80 | 14.30~15.80 | 1 | 21.2 | 71.7 | 1 |
| 1.5KE16A | 1.5KE16CA | 13.60 | 15.20~16.80 | 1 | 22.5 | 67.6 | 1 |
| 1.5KE18A | 1.5KE18CA | 15.30 | 17.10~18.90 | 1 | 25.2 | 60.3 | 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) |
| 1.5KE20A | 1.5KE20CA | 17.10 | 19.00~21.00 | 1 | 27.7 | 54.9 | 1 |
| 1.5KE22A | 1.5KE22CA | 18.80 | 20.90~23.10 | 1 | 30.6 | 49.7 | 1 |
| 1.5KE24A | 1.5KE24CA | 20.50 | 22.80~25.20 | 1 | 33.2 | 45.8 | 1 |
| 1.5KE27A | 1.5KE27CA | 23.10 | 25.70~28.40 | 1 | 37.5 | 40.5 | 1 |
| 1.5KE30A | 1.5KE30CA | 25.60 | 28.50~31.50 | 1 | 41.4 | 36.7 | 1 |
| 1.5KE33A | 1.5KE33CA | 28.20 | 31.40~34.70 | 1 | 45.7 | 33.3 | 1 |
| 1.5KE36A | 1.5KE36CA | 30.80 | 34.20~37.80 | 1 | 49.9 | 30.5 | 1 |
| 1.5KE39A | 1.5KE39CA | 33.30 | 37.10~41.00 | 1 | 53.9 | 28.2 | 1 |

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

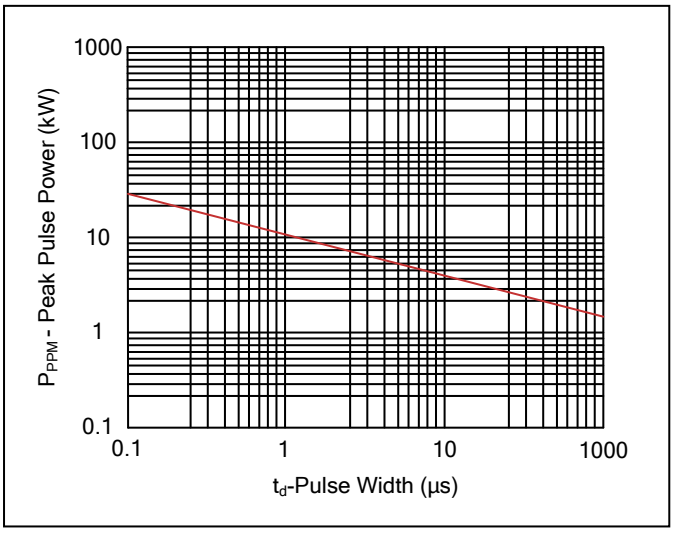
| Part Number | | Reverse Stand-Off Voltage | Breakdown Voltage @$I_T$ | Test Current | Maximum Clamping Voltage @$I_{PP}$ | Peak Pulse Current | Reverse Leakage @$V_{RWM}$ |
|---|---|---|---|---|---|---|---|
| Unidirectional | Bidirectional | $V_{RWM}$(V) | $V_{BR}$(V) | $I_T$(mA) | $V_C$(V) | $I_{PP}$(A) | $I_R$(μA) |
| 1.5KE43A | 1.5KE43CA | 36.80 | 40.90~45.20 | 1 | 59.3 | 25.6 | 1 |
| 1.5KE47A | 1.5KE47CA | 40.20 | 44.70~49.40 | 1 | 64.8 | 23.5 | 1 |
| 1.5KE51A | 1.5KE51CA | 43.60 | 48.50~53.60 | 1 | 70.1 | 21.7 | 1 |
| 1.5KE56A | 1.5KE56CA | 47.80 | 53.20~58.80 | 1 | 77.0 | 19.7 | 1 |
| 1.5KE62A | 1.5KE62CA | 53.00 | 58.90~65.10 | 1 | 85.0 | 17.9 | 1 |
| 1.5KE68A | 1.5KE68CA | 58.10 | 64.60~71.40 | 1 | 92.0 | 16.5 | 1 |
| 1.5KE75A | 1.5KE75CA | 64.10 | 71.30~78.80 | 1 | 103.0 | 14.8 | 1 |
| 1.5KE82A | 1.5KE82CA | 70.10 | 77.90~86.10 | 1 | 113.0 | 13.5 | 1 |
| 1.5KE91A | 1.5KE91CA | 77.80 | 86.50~95.50 | 1 | 125.0 | 12.2 | 1 |
| 1.5KE100A | 1.5KE100CA | 85.50 | 95.00~105.00 | 1 | 137.0 | 11.1 | 1 |
| 1.5KE110A | 1.5KE110CA | 94.00 | 105.00~116.00 | 1 | 152.0 | 10.0 | 1 |
| 1.5KE120A | 1.5KE120CA | 102.00 | 114.00~126.00 | 1 | 165.0 | 9.2 | 1 |
| 1.5KE130A | 1.5KE130CA | 111.00 | 124.00~137.00 | 1 | 179.0 | 8.5 | 1 |
| 1.5KE150A | 1.5KE150CA | 128.00 | 143.00~158.00 | 1 | 207.0 | 7.3 | 1 |
| 1.5KE160A | 1.5KE160CA | 136.00 | 152.00~168.00 | 1 | 219.0 | 6.9 | 1 |
| 1.5KE170A | 1.5KE170CA | 145.00 | 162.00~179.00 | 1 | 234.0 | 6.5 | 1 |

| 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) |
| 1.5KE180A | 1.5KE180CA | 154.00 | 171.00~189.00 | 1 | 246.0 | 6.2 | 1 |
| 1.5KE200A | 1.5KE200CA | 171.00 | 190.00~210.00 | 1 | 274.0 | 5.5 | 1 |
| 1.5KE220A | 1.5KE220CA | 185.00 | 209.00~231.00 | 1 | 328.0 | 4.6 | 1 |
| 1.5KE250A | 1.5KE250CA | 214.00 | 237.00~263.00 | 1 | 344.0 | 4.4 | 1 |
| 1.5KE300A | 1.5KE300CA | 256.00 | 285.00~315.00 | 1 | 414.0 | 3.7 | 1 |
| 1.5KE350A | 1.5KE350CA | 300.00 | 332.00~368.00 | 1 | 482.0 | 3.2 | 1 |
| 1.5KE400A | 1.5KE400CA | 342.00 | 380.00~420.00 | 1 | 548.0 | 2.8 | 1 |
| 1.5KE440A | 1.5KE440CA | 376.00 | 418.00~462.00 | 1 | 602.0 | 2.5 | 1 |
| 1.5KE480A | 1.5KE480CA | 408.00 | 456.00~504.00 | 1 | 658.0 | 2.3 | 1 |
| 1.5KE510A | 1.5KE510CA | 434.00 | 485.00~535.00 | 1 | 698.0 | 2.1 | 1 |
| 1.5KE530A | 1.5KE530CA | 450.00 | 503.50~556.50 | 1 | 725.0 | 2.1 | 1 |
| 1.5KE540A | 1.5KE540CA | 459.00 | 513.00~567.00 | 1 | 740.0 | 2.0 | 1 |
| 1.5KE550A | 1.5KE550CA | 467.00 | 522.50~577.50 | 1 | 760.0 | 2.0 | 1 |

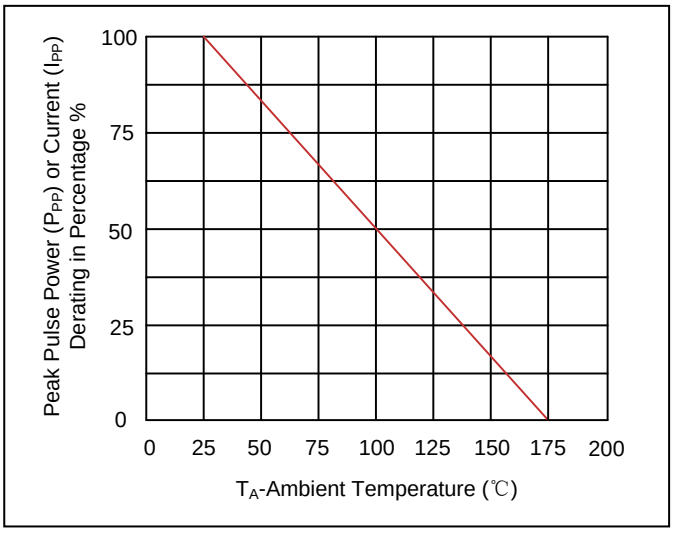
Notes: For bidirectional type having $V_{RWM}$ of 10V and less, the $I_R$ limit is double.

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

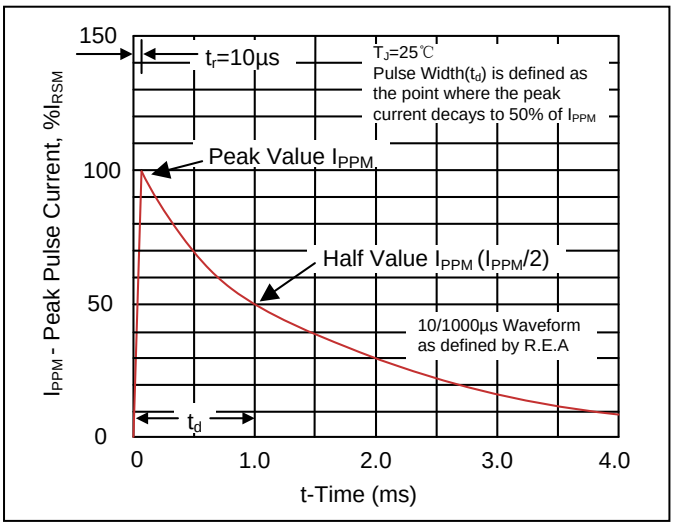
### Figure 1. Peak Pulse Power Rating Curve



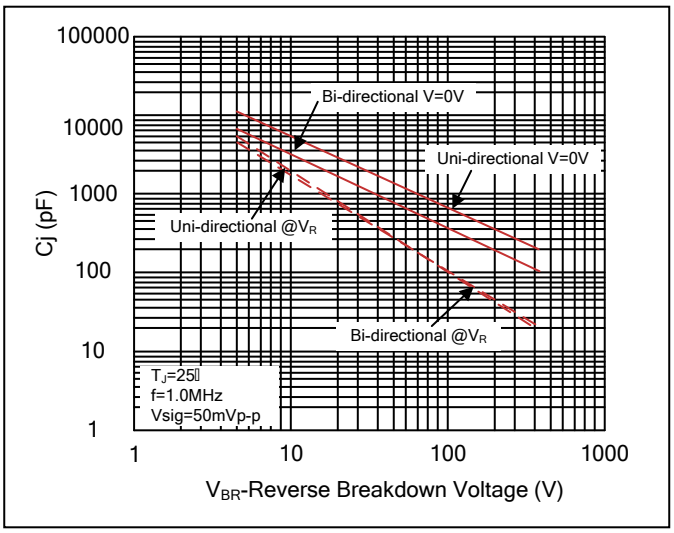

### Figure 2. Pulse Derating Curve



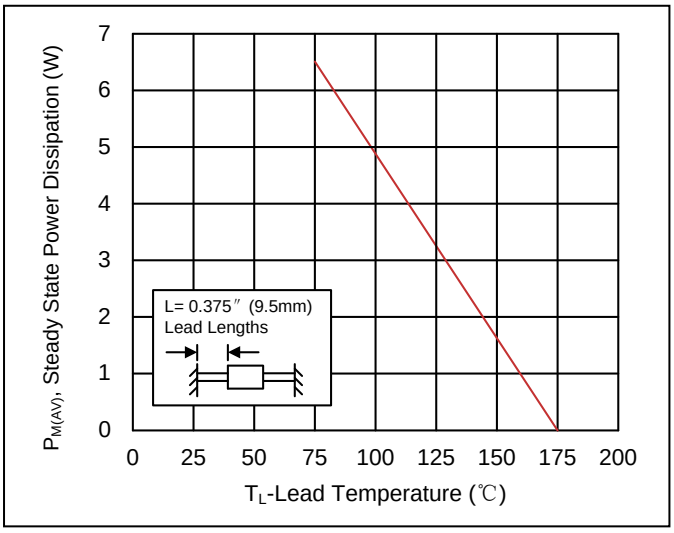

### Figure 3. Pulse Waveform



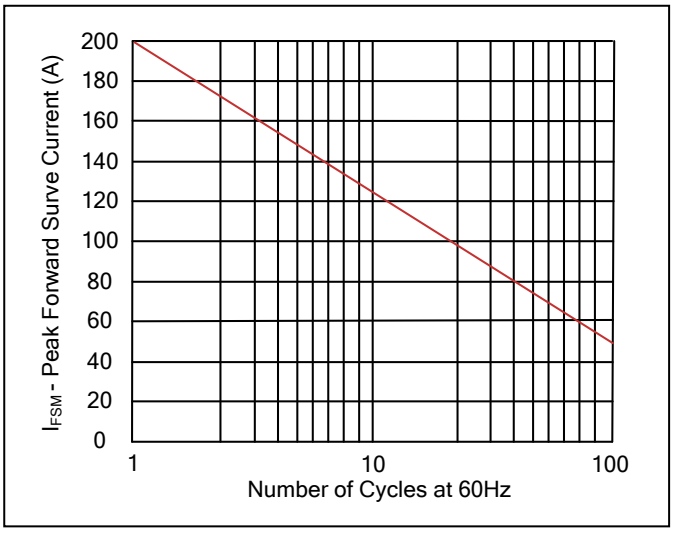

### Figure 4. Typical Junction Capacitance




### Figure 5. Steady State Power Dissipation Derating Curve

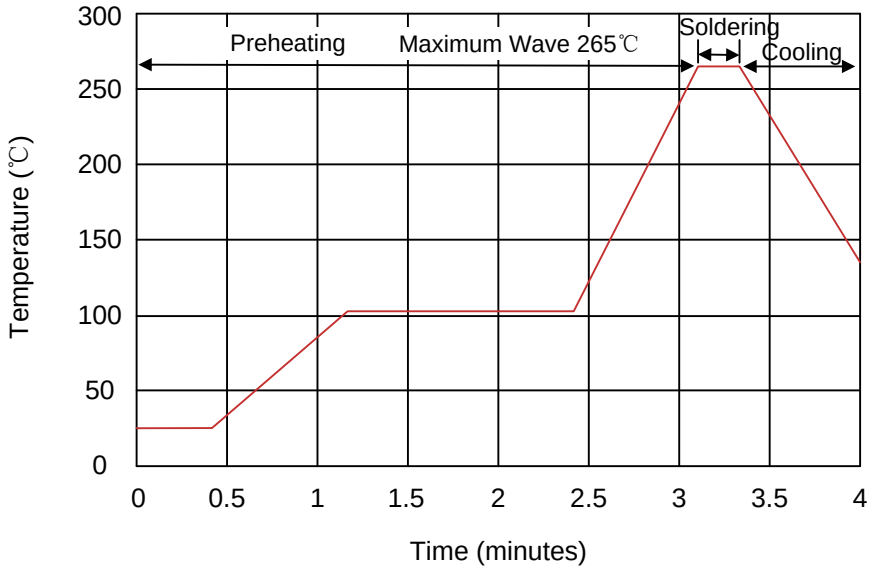



### Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



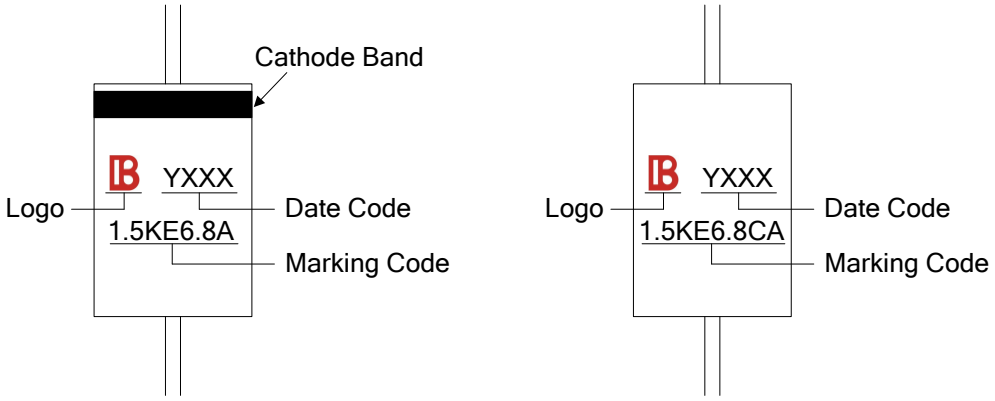
## Recommended Soldering Conditions

Wave Soldering



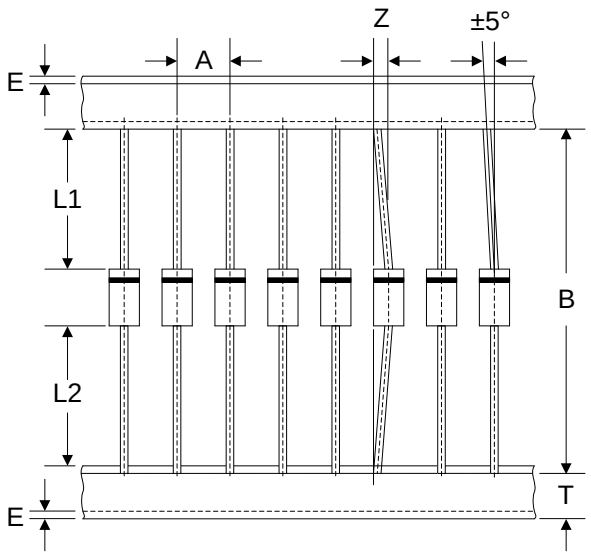

| Item | Conditions |
|---|---|
| Peak Temperature | 265℃ |
| Dipping Time | 10 seconds |
| Soldering | 1 time |

## Marking Code



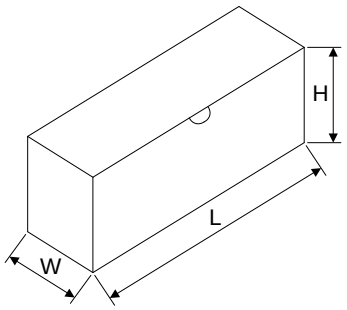
## Packaging

Tape



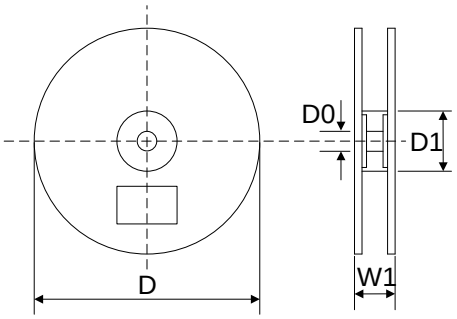

| Symbol | Dimension (mm) |
|---|---|
| A | 10.0±0.5 |
| B | 53.0±1.0 |
| Z | 1.2Max. |
| T | 6.0±0.4 |
| E | 0.8Max. |
| L1-L2 | 1.0Max. |

Box




| | |
|---|---|
| L | 250.0±5.0 |
| W | 75.0±5.0 |
| H | 114.0±5.0 |
| Quantity: 1000PCS | |

Reel




| | |
|---|---|
| D | 330.0±3.0 |
| D0 | 16.4±2.0 |
| D1 | 86.0±2.0 |
| W1 | 76.0±3.0 |
| Quantity: 1200PCS | |