

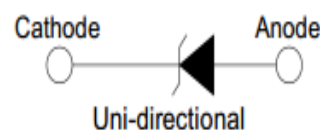
## Description

## 1.5KE Series 1500W

The 1.5KE 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
- Typical maximum temperature coefficient  
 $\Delta V_{BR} = 0.1\% \times V_{BR@25^{\circ}\text{C}} \times \Delta T$
- Glass passivated Chip junction in DO-201 package
- 1500W peak pulse capability at 10×1000μs waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical  $I_R$  less than 1μA above 11V
- High temperature soldering guaranteed: 260°C/40 seconds / 0.375", (9.5mm) lead length, 5lbs., (2.3kg) tension
- Plastic package has underwriters laboratory flammability classification 94v-0



## Application

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

## Maximum Ratings and Characteristics (Ta=25°C unless otherwise specified)

| Rating                                                                               | Symbol         | Value      | Units |
|--------------------------------------------------------------------------------------|----------------|------------|-------|
| Peak Pulse Power Dissipation by 10x1000μs test waveform (Fig.1)(Note 1)              | $P_{PPM}$      | 1500       | Watts |
| Steady State Power Dissipation on infinite heat sink at TL=75°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 to 175 | °C    |
| Typical Thermal Resistance Junction to Lead                                          | $R_{uJL}$      | 15         | °C/W  |
| Typical Thermal Resistance Junction to Ambient                                       | $R_{uJA}$      | 75         | °C/W  |

Notes:

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

### Electrical Characteristics

| Type Number |            | Reverse Stand-Off Voltage | Breakdown Voltage Min.@IT |             | Test Current | Maximum Clamping Voltage@Ipp | Peak Pulse Current | Reverse Leakage @VRWM |
|-------------|------------|---------------------------|---------------------------|-------------|--------------|------------------------------|--------------------|-----------------------|
| (UNI)       | (BI)       | VRWM(V)                   | VBR MIN.(V)               | VBR MAX.(V) | IT(mA)       | Vc(V)                        | Ipp(A)             | IR(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                      | 9.50        | 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               | 1                     |
| 1.5KE12A    | 1.5KE12CA  | 10.20                     | 11.40                     | 12.60       | 1            | 16.7                         | 91.0               | 1                     |
| 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                     |
| 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                     |
| 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                        | 9.20               | 1                     |
| 1.5KE130A   | 1.5KE130CA | 111.00                    | 124.00                    | 137.00      | 1            | 179.0                        | 8.50               | 1                     |
| 1.5KE150A   | 1.5KE150CA | 128.00                    | 143.00                    | 158.00      | 1            | 207.0                        | 7.30               | 1                     |
| 1.5KE160A   | 1.5KE160CA | 136.00                    | 152.00                    | 168.00      | 1            | 219.0                        | 6.60               | 1                     |
| 1.5KE170A   | 1.5KE170CA | 145.00                    | 162.00                    | 179.00      | 1            | 234.0                        | 6.50               | 1                     |
| 1.5KE180A   | 1.5KE180CA | 154.00                    | 171.00                    | 189.00      | 1            | 246.0                        | 6.20               | 1                     |
| 1.5KE200A   | 1.5KE200CA | 171.00                    | 190.00                    | 210.00      | 1            | 274.0                        | 5.50               | 1                     |
| 1.5KE220A   | 1.5KE220CA | 185.00                    | 209.00                    | 231.00      | 1            | 328.0                        | 4.60               | 1                     |
| 1.5KE250A   | 1.5KE250CA | 214.00                    | 237.00                    | 263.00      | 1            | 344.0                        | 4.40               | 1                     |
| 1.5KE300A   | 1.5KE300CA | 256.00                    | 285.00                    | 315.00      | 1            | 414.0                        | 3.70               | 1                     |
| 1.5KE350A   | 1.5KE350CA | 300.00                    | 332.00                    | 368.00      | 1            | 482.0                        | 3.20               | 1                     |
| 1.5KE400A   | 1.5KE400CA | 342.00                    | 380.00                    | 420.00      | 1            | 548.0                        | 2.80               | 1                     |
| 1.5KE440A   | 1.5KE440CA | 376.00                    | 418.00                    | 462.00      | 1            | 602.0                        | 2.50               | 1                     |
| 1.5KE480A   | 1.5KE480CA | 408.00                    | 456.00                    | 504.00      | 1            | 658.0                        | 2.30               | 1                     |
| 1.5KE510A   | 1.5KE510CA | 434.00                    | 485.00                    | 535.00      | 1            | 698.0                        | 2.10               | 1                     |
| 1.5KE530A   | 1.5KE530CA | 450.00                    | 503.50                    | 556.50      | 1            | 725.0                        | 2.10               | 1                     |
| 1.5KE540A   | 1.5KE540CA | 459.00                    | 513.00                    | 567.00      | 1            | 740.0                        | 2.00               | 1                     |
| 1.5KE550A   | 1.5KE550CA | 467.00                    | 522.50                    | 577.50      | 1            | 760.0                        | 2.00               | 1                     |
| 1.5KE600A   | 1.5KE600CA | 512.00                    | 570.00                    | 630.00      | 1            | 828.0                        | 1.80               | 1                     |

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

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

Figure 1 - Peak Pulse Power Rating Curve

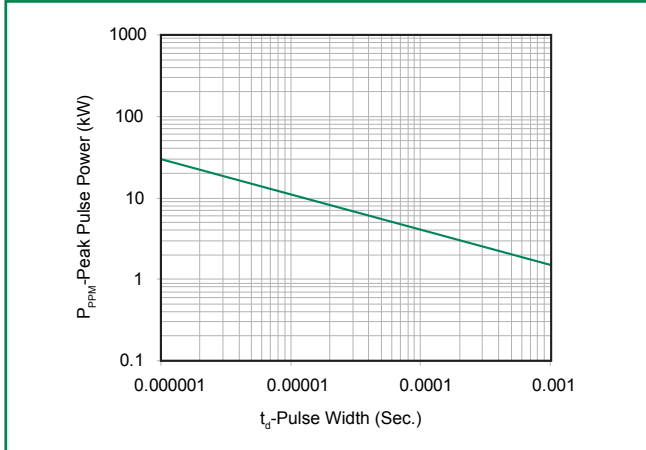


Figure 2 - Pulse Derating Curve

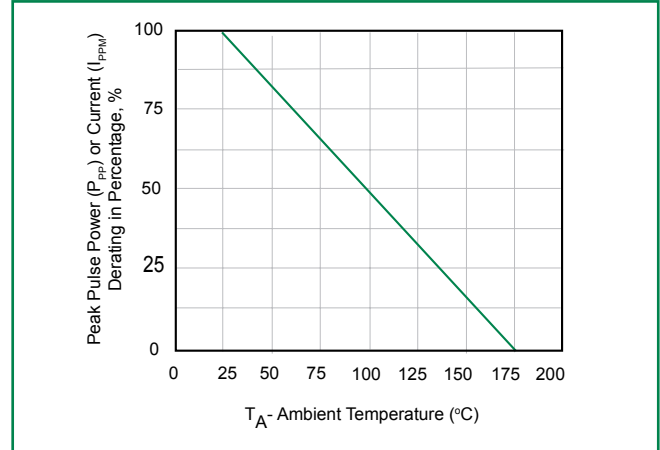


Figure 3 - Pulse Waveform

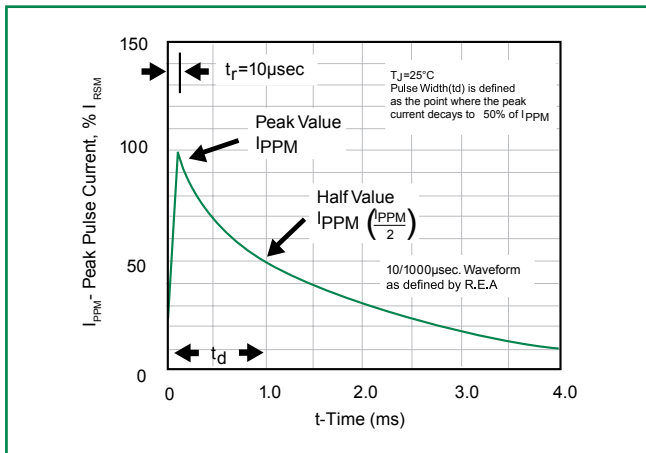


Figure 4 - Typical Junction Capacitance Uni-Directional

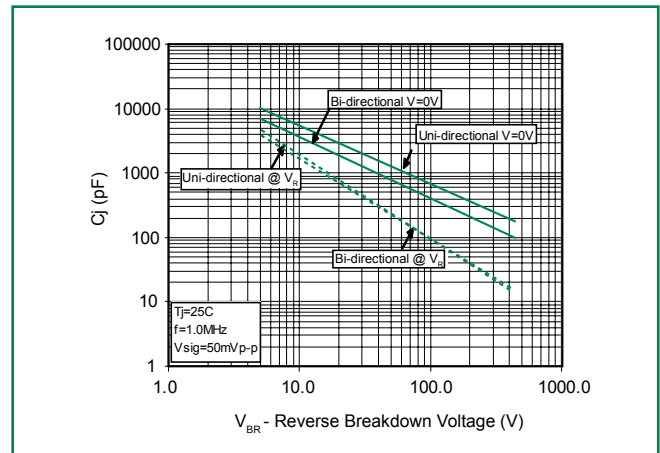


Figure 5 - Steady State Power Derating Curve

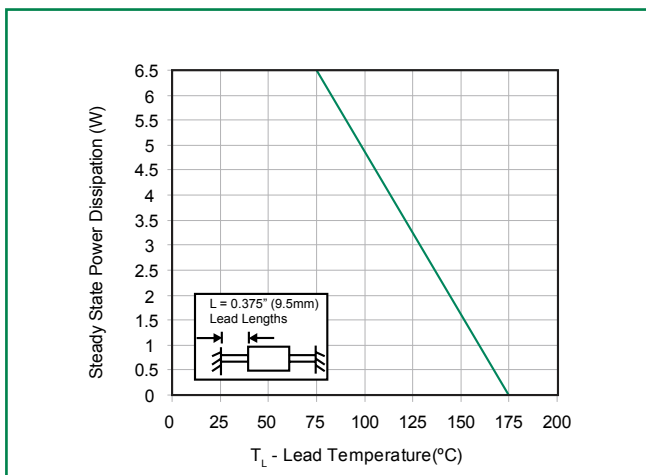
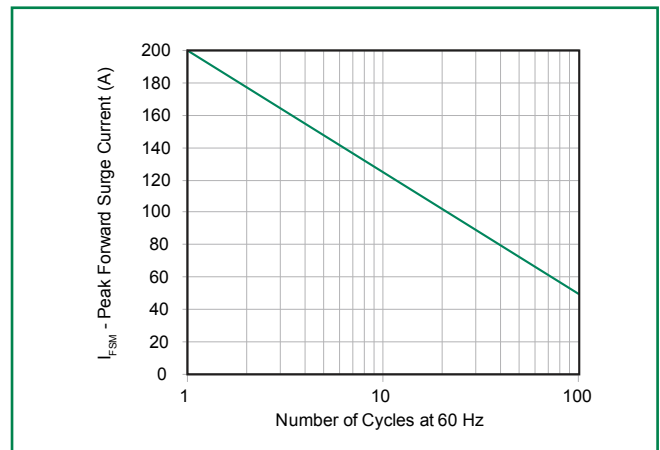
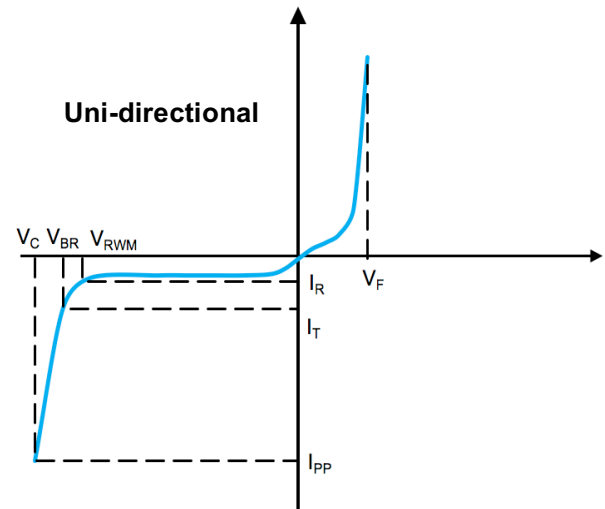
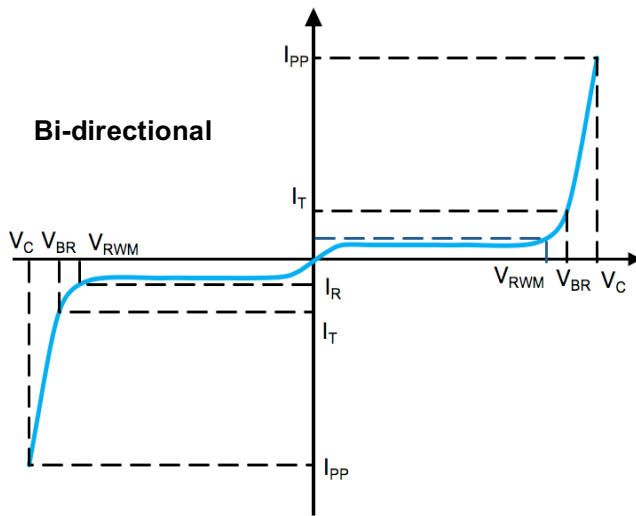


Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

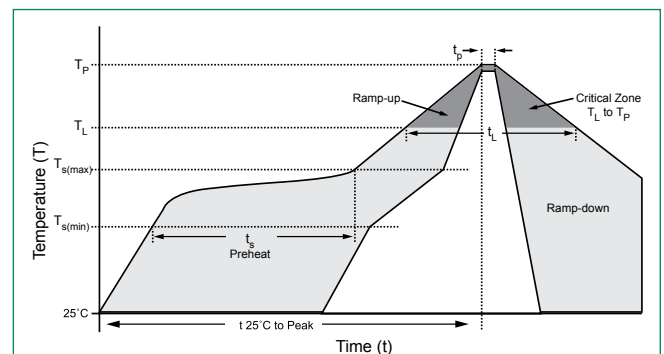


### I-V Curve Characteristics



### Recommended Soldering Conditions

|                                                        |                                    |                         |
|--------------------------------------------------------|------------------------------------|-------------------------|
| 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                   |



### Flow/Wave Soldering(Solder Dipping)

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

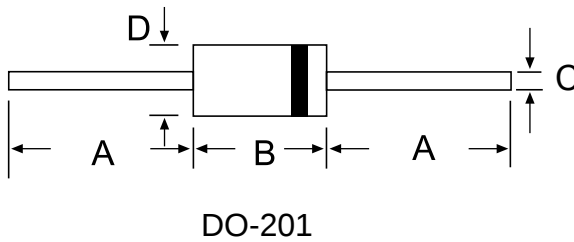
### Physical Specifications

|          |                                                                      |
|----------|----------------------------------------------------------------------|
| Weight   | 0.015oz., 0.4g                                                       |
| Case     | JEDEC DO-204AC (DO-15) molded plastic body over passivated junction. |
| Polarity | Color band denotes the cathode except Bipolar.                       |
| Terminal | Matte Tin axial leads, solderable per JESD22-B102D.                  |

### Environmental Specifications

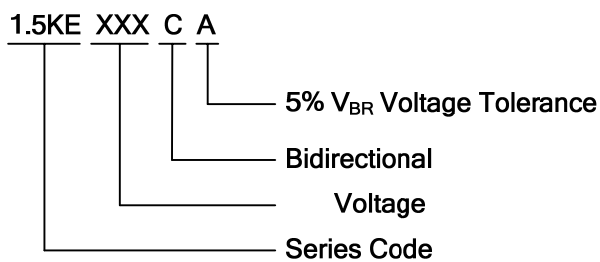
|                    |              |
|--------------------|--------------|
| Temperature Cycle  | JESD22-A104  |
| Pressure Cooker    | JESD 22-A102 |
| High Temp. Storage | JESD22-A103  |
| HTRB               | JESD22-A108  |
| Thermal Shock      | JESD22-A106  |

### Dimensions

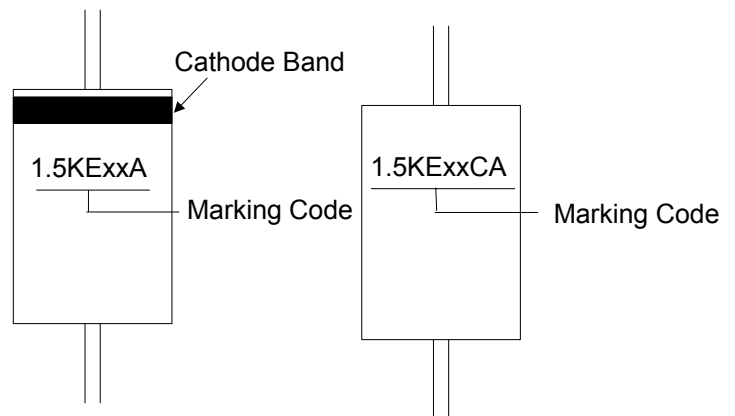


| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| A          | 1.000  | -     | 25.40       | -    |
| B          | 0.285  | 0.375 | 7.20        | 9.50 |
| C          | 0.038  | 0.042 | 0.96        | 1.07 |
| D          | 0.190  | 0.210 | 4.80        | 5.30 |

### Part Number Code



### Marking Code



### Packaging

| Part Number | Component Package | Quantity | Packing Option |
|-------------|-------------------|----------|----------------|
| 1.5KExxxxx  | DO-201            | 1000     | Box            |

### Packaging Dementions Unit:Inches(Millimeters)

