

## Gas Discharge Tube (GDT) Data Sheet

### Features

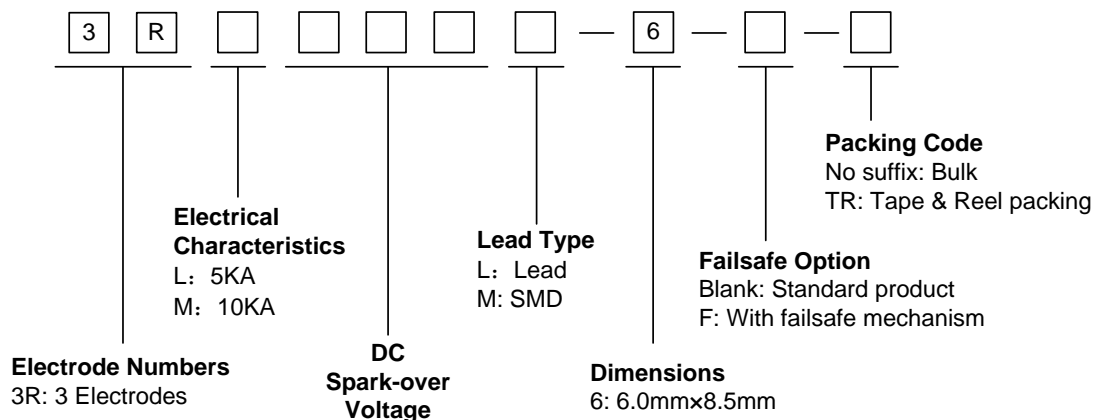
- Provide ultra-fast response to surge voltage from slow-rising surge of 100V/s to rapid-rising surge of 1KV/μs
- Stable breakdown voltage
- High insulation resistance
- Low capacitance (≤2pF)
- High holdover voltage
- Large absorbing transient current capability
- Micro-Gap Design
- Size: 6.0mm\*8.5mm
- Storage and operating temperature: -40°C ~ +85°C
- Meets MSL level 1, per J-STD-020
- Safety certification: E244458



### Applications

- Repeaters, Modems
- Telephone Interface, Line cards
- Data communication equipment
- Line test equipment

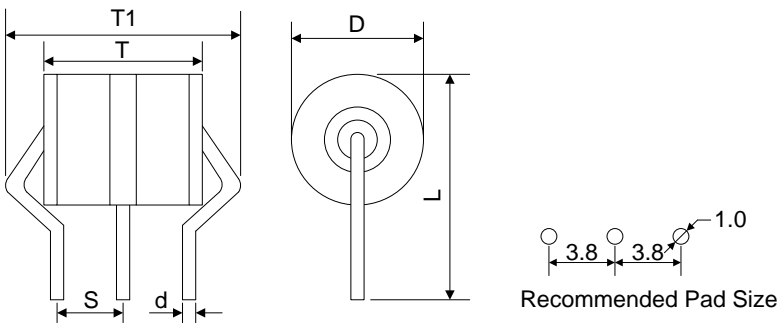
### Part Number Code



### Marking

**B** : BrightKing Logo  
 3RL090-6 : Device Marking Code  
 YXXX : Date Code

**Dimensions**

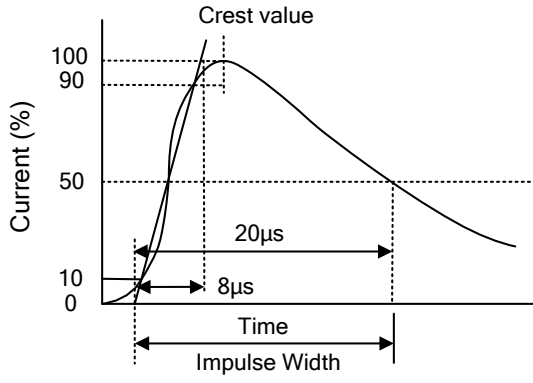
| L Type  | Symbol | Dimension (mm) |            |
|---|--------|----------------|------------|
|   |        | Spec.          | Tolerance  |
|  | D      | 6.0            | +0.2, -0.5 |
|   | T      | 8.5            | ±0.5       |
|   | T1     | 15.0           | Max.       |
|   | L      | 16.0           | Max.       |
| L-F Type  | S      | 3.8            | ±0.3       |
|   | d      | 0.8            | ±0.1       |
|   | R1     | 7.8            | ±0.4       |
|   | R2     | 6.3            | ±0.3       |
| M Type  | D      | 6.0            | ±0.2       |
|   | T      | 8.5            | ±0.5       |
|   | B      | 1.0            | ±0.1       |
|   | B1     | 1.5            | ±0.2       |

## Electrical Characteristics

| Part Number |           | DC Spark-over Voltage | Maximum Impulse Spark-over Voltage | Nominal Impulse Discharge Current | Alternating Discharge Current | Impulse Life            | Minimum Insulation Resistance |               | Maximum Capacitance | Device Marking Code |
|-------------|-----------|-----------------------|------------------------------------|-----------------------------------|-------------------------------|-------------------------|-------------------------------|---------------|---------------------|---------------------|
|             |           | 100V/s                | 1000V/ $\mu$ s                     | 8/20 $\mu$ s<br>10times           | 50Hz, 1sec                    | 10/1000 $\mu$ s<br>100A | Test Voltage                  | (G $\Omega$ ) | 1MHz                |                     |
|             |           | (V)                   | (V)                                | (KA)                              | (A)                           | (times)                 | DC(V)                         |               | (pF)                |                     |
| 3RL075L-6   | 3RL075M-6 | 75 $\pm$ 20%          | 750                                | 5.0                               | 5.0                           | 200                     | 25                            | 1.0           | 2.0                 | 3RL075-6            |
| 3RL090L-6   | 3RL090M-6 | 90 $\pm$ 20%          | 750                                | 5.0                               | 5.0                           | 200                     | 50                            | 1.0           | 2.0                 | 3RL090-6            |
| 3RL150L-6   | 3RL150M-6 | 150 $\pm$ 20%         | 800                                | 5.0                               | 5.0                           | 200                     | 100                           | 1.0           | 2.0                 | 3RL150-6            |
| 3RL230L-6   | 3RL230M-6 | 230 $\pm$ 20%         | 800                                | 5.0                               | 5.0                           | 200                     | 100                           | 1.0           | 2.0                 | 3RL230-6            |
| 3RL250L-6   | 3RL250M-6 | 250 $\pm$ 20%         | 800                                | 5.0                               | 5.0                           | 200                     | 100                           | 1.0           | 2.0                 | 3RL250-6            |
| 3RL300L-6   | 3RL300M-6 | 300 $\pm$ 20%         | 900                                | 5.0                               | 5.0                           | 200                     | 100                           | 1.0           | 2.0                 | 3RL300-6            |
| 3RL350L-6   | 3RL350M-6 | 350 $\pm$ 20%         | 900                                | 5.0                               | 5.0                           | 200                     | 100                           | 1.0           | 2.0                 | 3RL350-6            |
| 3RL470L-6   | 3RL470M-6 | 470 $\pm$ 20%         | 950                                | 5.0                               | 5.0                           | 200                     | 250                           | 1.0           | 2.0                 | 3RL470-6            |
| 3RL600L-6   | 3RL600M-6 | 600 $\pm$ 20%         | 1300                               | 5.0                               | 5.0                           | 200                     | 250                           | 1.0           | 2.0                 | 3RL600-6            |
| 3RM075L-6   | 3RM075M-6 | 75 $\pm$ 20%          | 750                                | 10                                | 10                            | 300                     | 25                            | 1.0           | 2.0                 | 3RM075-6            |
| 3RM090L-6   | 3RM090M-6 | 90 $\pm$ 20%          | 750                                | 10                                | 10                            | 300                     | 50                            | 1.0           | 2.0                 | 3RM090-6            |
| 3RM150L-6   | 3RM150M-6 | 150 $\pm$ 20%         | 800                                | 10                                | 10                            | 300                     | 100                           | 1.0           | 2.0                 | 3RM150-6            |
| 3RM230L-6   | 3RM230M-6 | 230 $\pm$ 20%         | 800                                | 10                                | 10                            | 300                     | 100                           | 1.0           | 2.0                 | 3RM230-6            |
| 3RM250L-6   | 3RM250M-6 | 250 $\pm$ 20%         | 800                                | 10                                | 10                            | 300                     | 100                           | 1.0           | 2.0                 | 3RM250-6            |
| 3RM300L-6   | 3RM300M-6 | 300 $\pm$ 20%         | 900                                | 10                                | 10                            | 300                     | 100                           | 1.0           | 2.0                 | 3RM300-6            |
| 3RM350L-6   | 3RM350M-6 | 350 $\pm$ 20%         | 900                                | 10                                | 10                            | 300                     | 100                           | 1.0           | 2.0                 | 3RM350-6            |
| 3RM470L-6   | 3RM470M-6 | 470 $\pm$ 20%         | 950                                | 10                                | 10                            | 300                     | 250                           | 1.0           | 2.0                 | 3RM470-6            |
| 3RM600L-6   | 3RM600M-6 | 600 $\pm$ 20%         | 1300                               | 10                                | 10                            | 300                     | 250                           | 1.0           | 2.0                 | 3RM600-6            |

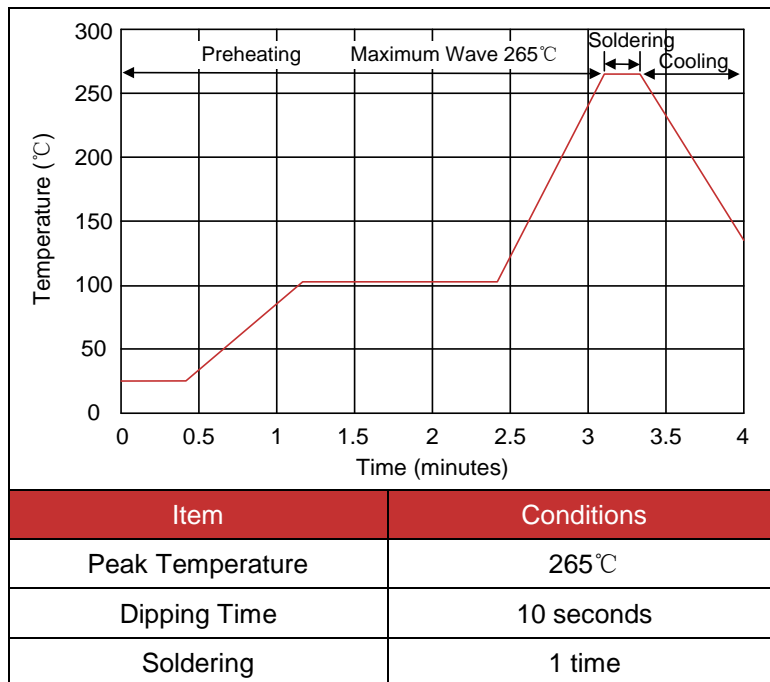
## Electrical Ratings

| Items                              | Test Condition/Description   | Requirement                 |
|------------------------------------|--|-----------------------------|
| DC Spark-over Voltage              | The voltage is measured with voltage ramp $dv/dt=100V/s$ . Test is between each side electrode and center electrode.                                 | To meet the specified value |
| Maximum Impulse Spark-over Voltage | The maximum impulse spark-over voltage is measured with voltage ramp $dv/dt=1000V/\mu s$ . Test is between each side electrode and center electrode. |                             |

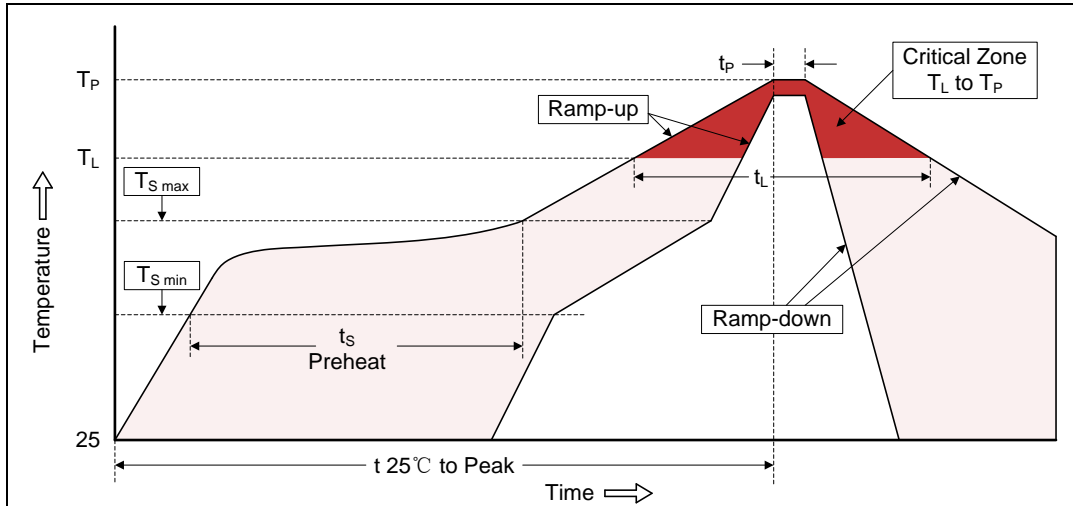
|                                      |  |  |
|--------------------------------------|--|--|
| <p>Impulse Discharge Current</p>     | <p>Maximum surge current that can be applied through center electrode with 8/20<math>\mu</math>s waveform, for 10 times with 3min interval time, which will be equally divided between each side electrode to center electrode, without causing the DC breakdown voltage to change more than 25% from its initial measured value.</p>  |  |
| <p>Alternating Discharge Current</p> | <p>Rated RMS value of AC current at 50Hz, 1 sec. for 10 times with interval time 3 min. DC spark-over voltage shall not change more than <math>\pm 25\%</math> from its initial value. Test is between each side electrode and center electrode. IR &gt; 10<sup>8</sup> ohms (-20%, +30% for 70~90V).</p>  |  |
| <p>Insulation Resistance</p>         | <p>The resistance of gas tube shall be measured between each side electrodes and center electrode.</p>   |  |
| <p>Capacitance</p>                   | <p>The capacitance of gas tube shall be measured between each side electrodes and center electrode.<br/>Test frequency: 1MHz</p>   |  |

**Recommended Soldering Conditions**

Wave Soldering



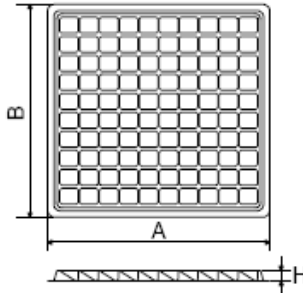
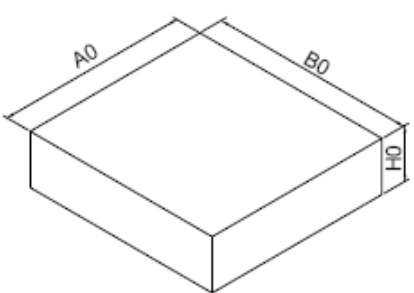
Reflow Soldering



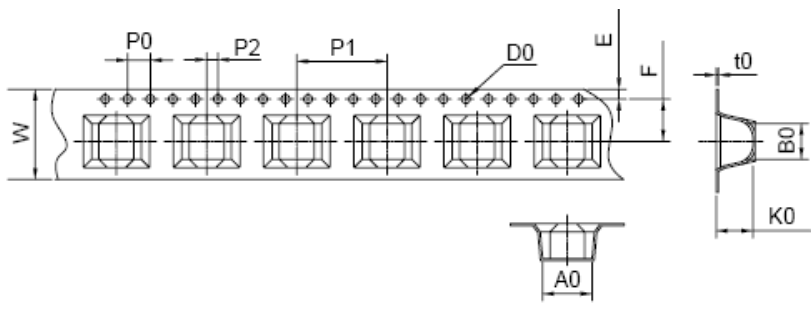
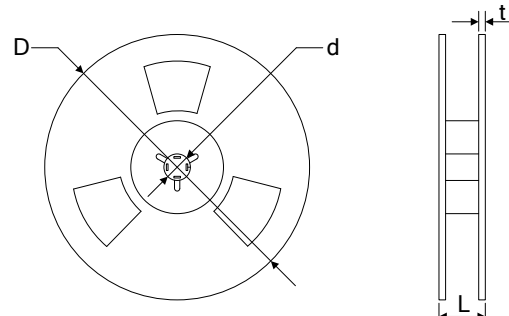
| Profile Feature                                      | Pb-Free Assembly |
|--|------------------|
| Average ramp-up rate ( $T_L$ to $T_P$ )              | 3°C/second max.  |
| Preheat  |                  |
| -Temperature Min ( $T_{S\ min}$ )                    | 150°C            |
| -Temperature Max ( $T_{S\ max}$ )                    | 200°C            |
| -Time (min to max) ( $t_s$ )                         | 60-180 seconds   |
| $T_{S\ max}$ to $T_L$                                |                  |
| -Ramp-up Rate  | 3°C/second max.  |
| Time maintained above:                               |                  |
| -Temperature ( $T_L$ )                               | 217°C            |
| -Time ( $t_L$ )                                      | 60-150 seconds   |
| Peak Temperature ( $T_P$ )                           | 260°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                        | 8 minutes max.   |

**Packaging**

**Axial Packing (Bulk)**

| Skin packing     |  | Dimension (mm)   |       |           |
|------------------|---|------------------|-------|-----------|
|                  |   | Symbol           | Spec. | Tolerance |
|                  |   | A                | 217.0 | ±2.0      |
|                  |   | B                | 207.0 | ±2.0      |
|                  |   | H                | 10.3  | ±0.5      |
| Quantity: 100pcs |   |                  |       |           |
| Inner box        |  | A0               | 225.0 | ±2.0      |
|                  |   | B0               | 210.0 | ±2.0      |
|                  |   | H0               | 60.0  | ±2.0      |
|                  |   | Quantity: 500pcs |       |           |

**SMD Packing (Tape & Reel)**

| Tape             |  | Dimension (mm) |   |           |
|------------------|---|----------------|---|-----------|
|                  |   | Symbol         | Spec.   | Tolerance |
|                  |   | W              | 16.00   | ±0.20     |
|                  |   | P0             | 4.00  | ±0.10     |
|                  |   | P1             | 16.00   | ±0.10     |
|                  |   | P2             | 2.00  | ±0.10     |
|                  |   | D0             | 1.55  | ±0.05     |
|                  |   | E              | 1.75  | ±0.10     |
|                  |   | F              | 7.50  | ±0.10     |
|                  |   | A0             | 8.80  | ±0.10     |
|                  |   | K0             | 6.20  | ±0.10     |
|                  |   | B0             | 6.35  | ±0.10     |
|                  |   | t0             | 0.50  | ±0.05     |
|                  |   | Reel           |  | D         |
| d                | 13.00   |                |   | ±0.50     |
| L                | 20.00   |                |   | ±2.00     |
| t                | 2.00  |                |   | ±0.20     |
| Quantity: 600pcs |   |                |   |           |