

## Gas Discharge Tube (GDT) Data Sheet

### Features

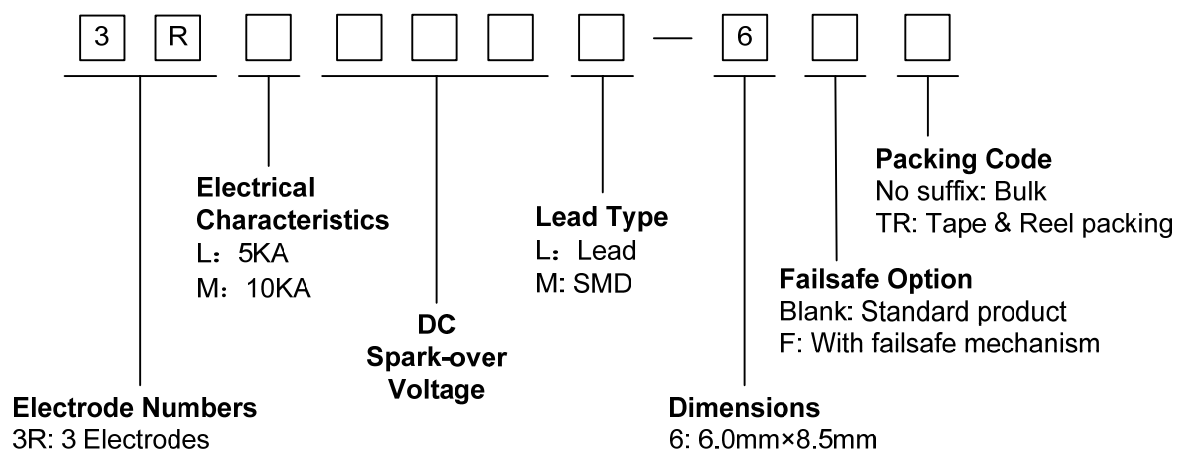
- Provide ultra-fast response to surge voltage from slow-rising surge of 100V/s to rapid-rising surge of 1KV/μs.
- Stable breakdown voltage.
- High insulation resistance.
- Low capacitance (≤2pF)
- High holdover voltage
- Large absorbing transient current capability.
- Micro-Gap Design
- Size: 6.0mm\*8.5mm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



### Applications

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

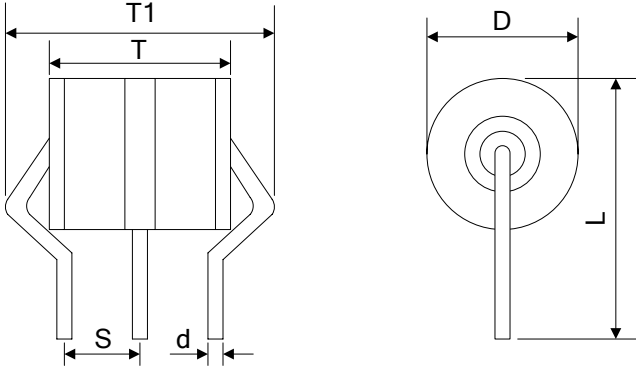
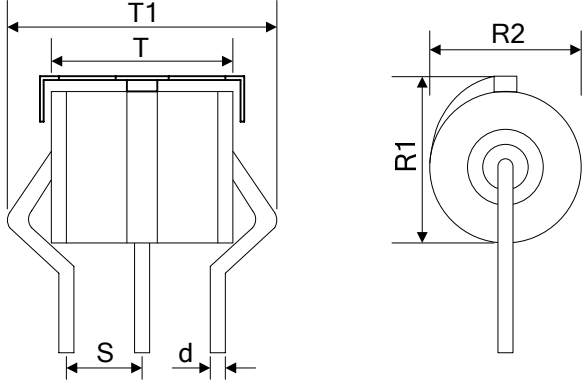
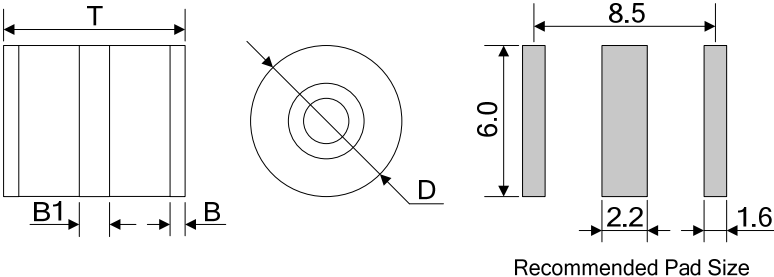
### Part Number Code



### Marking

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

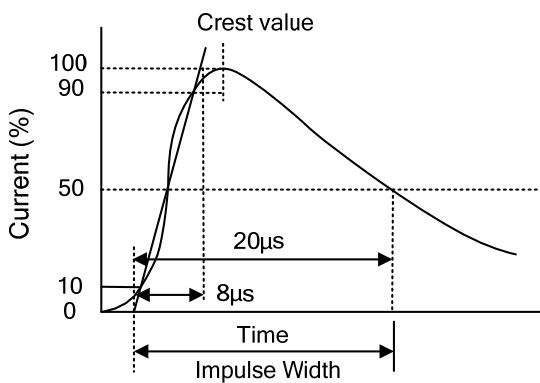
**Dimensions**

| L Type   |    | Dimension (mm) |       |            |
|----------|---|----------------|-------|------------|
|          |   | Symbol         | 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**

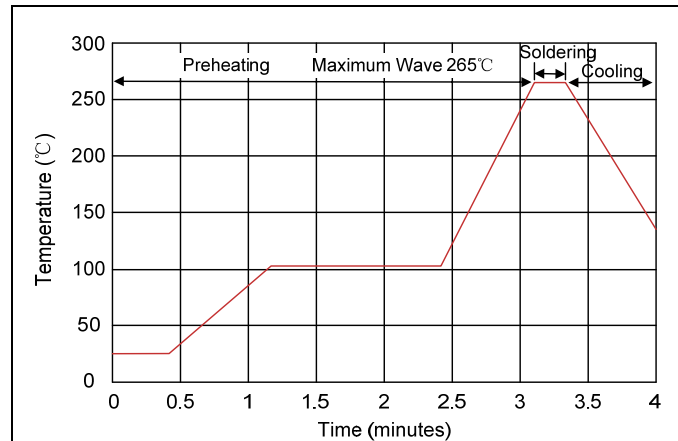
| Part Number |           | DC Spark-over Voltage | Maximum Impulse Spark-over Voltage | Nominal Impulse Discharge Current | Alternating Discharge Current | Impulse Life            | Minimum Insulation Resistance |               | Maximum Capacitance | Device Marking Code |
|-------------|-----------|-----------------------|------------------------------------|-----------------------------------|-------------------------------|-------------------------|-------------------------------|---------------|---------------------|---------------------|
|             |           | 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            |
| 3RL100L-6   | 3RL100M-6 | 100 $\pm$ 20%         | 750                                | 5.0                               | 5.0                           | 200                     | 50                            | 1.0           | 2.0                 | 3RL100-6            |
| 3RL110L-6   | 3RL145M-6 | 110 $\pm$ 20%         | 750                                | 5.0                               | 5.0                           | 200                     | 50                            | 1.0           | 2.0                 | 3RL110-6            |
| 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%         | 800                                | 5.0                               | 5.0                           | 200                     | 100                           | 1.0           | 2.0                 | 3RL300-6            |
| 3RL350L-6   | 3RL350M-6 | 350 $\pm$ 20%         | 850                                | 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            |
| 3RL800L-6   | 3RL800M-6 | 800 $\pm$ 20%         | 1500                               | 5.0                               | 5.0                           | 200                     | 250                           | 1.0           | 2.0                 | 3RL800-6            |
| 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            |
| 3RM100L-6   | 3RM100M-6 | 100 $\pm$ 20%         | 750                                | 10                                | 10                            | 300                     | 50                            | 1.0           | 2.0                 | 3RM100-6            |
| 3RM110L-6   | 3RM145M-6 | 110 $\pm$ 20%         | 750                                | 10                                | 10                            | 300                     | 50                            | 1.0           | 2.0                 | 3RM110-6            |
| 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%         | 800                                | 10                                | 10                            | 300                     | 100                           | 1.0           | 2.0                 | 3RM300-6            |
| 3RM350L-6   | 3RM350M-6 | 350 $\pm$ 20%         | 850                                | 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            |
| 3RM800L-6   | 3RM800M-6 | 800 $\pm$ 20%         | 1500                               | 10                                | 10                            | 300                     | 250                           | 1.0           | 2.0                 | 3RM800-6            |

**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.  |                             |
| 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.  |                             |
| Impulse Discharge Current          | <p>Maximum surge current that can be applied through center electrode with 8/20<math>\mu s</math> 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>The graph shows a current waveform starting at 0% and rising to a peak of 100% labeled 'Crest value'. The time to reach the crest is 8<math>\mu s</math>. The time for the current to decay to 50% is 20<math>\mu s</math>. The total time from 10% to 90% is labeled 'Impulse Width'.</p> | To meet the specified value |
| Alternating Discharge Current      | <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.</p> <p><math>IR &gt; 10^8</math> ohms (-20%, +30% for 70~90V).</p>   |                             |
| Insulation Resistance              | The resistance of gas tube shall be measured between each side electrodes and center electrode.   |                             |
| Capacitance                        | <p>The capacitance of gas tube shall be measured between each side electrodes and center electrode.</p> <p>Test frequency: 1MHz</p>   |                             |

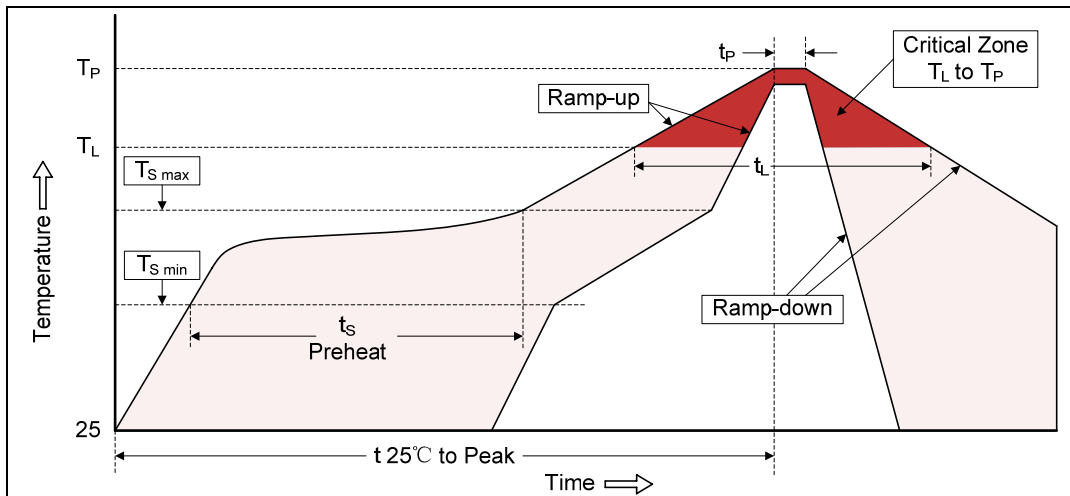
**Recommended Soldering Conditions**

**Wave Soldering**



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

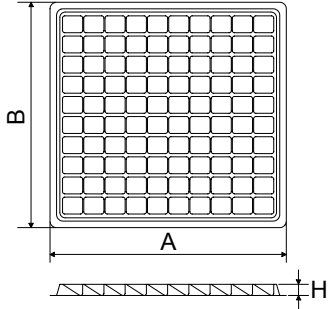
**Reflow Soldering**



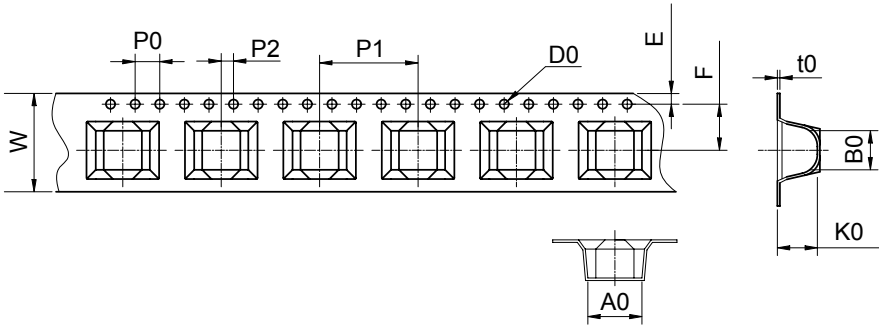
| Profile Feature  | Pb-Free Assembly |
|--|------------------|
| Average ramp-up rate (T <sub>L</sub> to T <sub>P</sub> )     | 3°C/second max.  |
| Preheat  |                  |
| -Temperature Min (T <sub>S min</sub> )                       | 150°C            |
| -Temperature Max (T <sub>S max</sub> )                       | 200°C            |
| -Time (min to max) (t <sub>s</sub> )                         | 60-180 seconds   |
| T <sub>S max</sub> to T <sub>L</sub>                         |                  |
| -Ramp-up Rate  | 3°C/second max.  |
| Time maintained above:                                       |                  |
| -Temperature (T <sub>L</sub> )                               | 217°C            |
| -Time (t <sub>L</sub> )                                      | 60-150 seconds   |
| Peak Temperature (T <sub>P</sub> )                           | 260°C            |
| Time within 5°C of actual Peak Temperature (t <sub>p</sub> ) | 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  | Symbol           | Dimension (mm) |           |
|---|------------------|----------------|-----------|
|   |                  | Spec.          | Tolerance |
|  | A                | 217.0          | ±1.0      |
|   | B                | 207.0          | ±1.0      |
|   | H                | 10.3           | ±0.2      |
|   | Quantity: 100pcs |                |           |
| Inner box   | Symbol           | Dimension (mm) |           |
|   |                  | Spec.          | Tolerance |
|   |                  | A0             | 338.0     |
|   | B0               | 336.0          | ±1.0      |
| H0  | 58.0             | ±1.0           |           |
| Quantity: 500pcs  |                  |                |           |

**SMD Packing (Tape & Reel)**

| Tape  | Symbol | Dimension (mm) |                |           |
|---|--------|----------------|----------------|-----------|
|   |        | 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   | Symbol         | Dimension (mm) |           |
|   |        |                | Spec.          | Tolerance |
|   |        |                | D              | 330.00    |
| d   |        |                | 13.00          | ±0.50     |
| L   |        | 20.00          | ±0.50          |           |
| t   | 2.00   | ±0.20          |                |           |
| Quantity: 600pcs  |        |                |                |           |