



# Datasheet

## Gas Discharge Tube (GDT)

|                 |                |
|-----------------|----------------|
| Series / Models | SMD3216 Series |
| Product Code    | 10.12.00.XXXX  |
| Version         | A5             |
| Date            | 2025-02-08     |
| File Number     | SP-GDT-001     |

Version History

| Version | Date       | Page   | Description                                                                                     | Author        |
|---------|------------|--------|-------------------------------------------------------------------------------------------------|---------------|
| A0      | 2015-11-19 | /      | Initial draft                                                                                   | George Hu     |
| A1      | 2017-04-20 | Page 4 | Add 10/700μS electrical characteristics                                                         | George Hu     |
| A2      | 2022-05-17 | All    | Use a new document layout                                                                       | XianTao Jiang |
| A3      | 2023-11-02 | Page 4 | Update Electrical Characteristics                                                               | Xia Wu        |
| A4      | 2024-08-19 | Page 4 | Update Electrical Characteristics                                                               | Xia Wu        |
| A5      | 2025-02-08 | All    | 1. Add cover and version history<br>2. Delete some models<br>3. Update Packaging Specifications | Xia Wu        |

## Gas Discharge Tube (GDT)

## SMD3216 Series

### Description

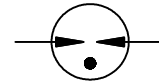
Gas discharge tubes (GDTs) are generally in a high insulation resistance state, equivalent to an open circuit, which has almost no impact on the normal operation of the circuit. When transient overvoltage occurs in the circuit and the voltage amplitude exceeds the breakdown voltage of the GDT, the gas inside the GDT is ionized, causing the GDT to quickly conduct and limit the overvoltage to a lower level, thereby protecting electronic devices or circuit components connected in parallel from high voltage impact damage. After the overvoltage disappears, the GDT immediately returns to a high insulation resistance state, and the circuit resumes normal operation.

The SMD3216 series adopts a standard EIA1206 square GDT, which is currently the smaller size GDT in size on the market. The SMD3216 series GDT has ultra-low capacitance, can withstand high surge currents, and will not cause damage.

The SMD3216 series is suitable for installation on compact circuit boards and can be used to protect communication interfaces (such as Ethernet interfaces, RS-232 interfaces, etc.), prevent interface chip damage caused by induced lightning, electrostatic discharge, etc., and ensure stable and transmitted communication signals.



### Electrical symbol



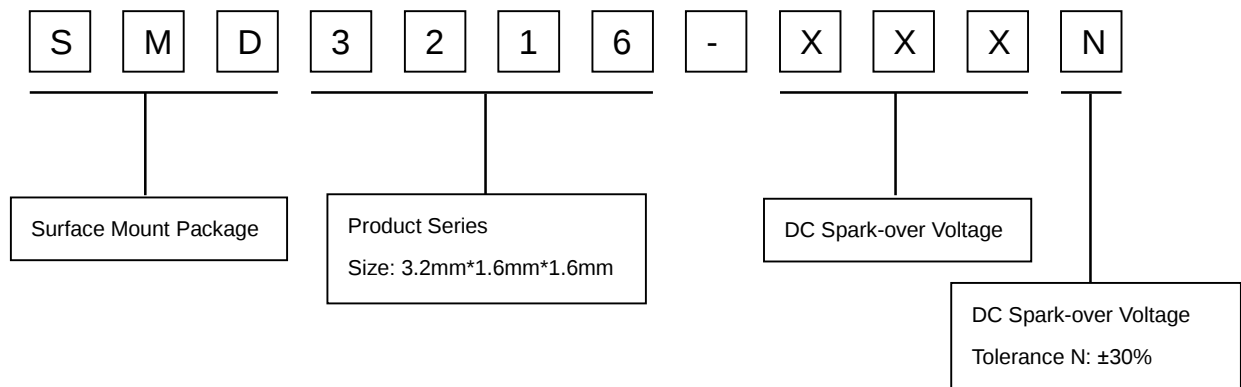
### Features

- I Excellent response to fast rising transients
- I Stable breakdown voltage
- I GHz working frequency
- I 8/20μs Impulse current capability: 500A
- I Surface Mount package
- I Non-Radioactive
- I Ultra Low capacitance(<0.3pF) and insertion loss
- I Very small size: 3.2mm\*1.6mm\*1.6mm (EIA 1206)

### Applications

- I Communication equipment
- I Test equipment
- I Data lines
- I Telecom SLIC protection
- I Broadband equipment
- I ADSL equipment, including ADSL2+
- I XDSL equipment
- I Satellite and CATV equipment
- I General telecom equipment

### Part Number Code



# Gas Discharge Tube (GDT)

# SMD3216 Series

## Electrical Characteristics

| Part Number                                    | DC Spark-over Voltage <sup>1) 2)</sup><br>@100V/S | Impulse Spark-over Voltage |        | Insulation Resistance <sup>3)</sup> | Capacitance<br>@1 MHz | Glow Voltage<br>@10mA | Arc Voltage<br>@1A | Service life <sup>4)</sup>           |                                                         |
|------------------------------------------------|---------------------------------------------------|----------------------------|--------|-------------------------------------|-----------------------|-----------------------|--------------------|--------------------------------------|---------------------------------------------------------|
|                                                |                                                   | 100V/μS                    | 1KV/μS |                                     |                       |                       |                    | Impulse Discharge Current<br>@8/20μS | Impulse Withstanding Voltage Capacity<br>@10/700μS, 40W |
|                                                |                                                   | Max                        | Max    |                                     |                       |                       |                    | Min                                  | Max                                                     |
|                                                | V                                                 | V                          | V      | GΩ                                  | pF                    | V                     | V                  | A                                    | KV                                                      |
| SMD3216-090N                                   | 90±30%                                            | 500                        | 600    | 1                                   | 0.3                   | 60                    | 10                 | 500                                  | 6                                                       |
| SMD3216-150N                                   | 150±30%                                           | 500                        | 600    | 1                                   | 0.3                   | 60                    | 10                 | 500                                  | 6                                                       |
| SMD3216-200N                                   | 200±30%                                           | 600                        | 700    | 1                                   | 0.3                   | 60                    | 10                 | 500                                  | 6                                                       |
| SMD3216-300N                                   | 300±30%                                           | 700                        | 800    | 1                                   | 0.3                   | 60                    | 10                 | 500                                  | 6                                                       |
| SMD3216-400N                                   | 400±30%                                           | 800                        | 900    | 1                                   | 0.3                   | 60                    | 10                 | 500                                  | 6                                                       |
| Glow to Arc transition Current.....            |                                                   |                            |        | <0.1A                               |                       |                       |                    |                                      |                                                         |
| Weight.....                                    |                                                   |                            |        | ~0.03g                              |                       |                       |                    |                                      |                                                         |
| Operation temperature .....                    |                                                   |                            |        | -40~+125°C                          |                       |                       |                    |                                      |                                                         |
| Recommended storage <sup>5)</sup>              |                                                   |                            |        |                                     |                       |                       |                    |                                      |                                                         |
| - Temperature .....                            |                                                   |                            |        | +5~+35°C                            |                       |                       |                    |                                      |                                                         |
| - Humidity .....                               |                                                   |                            |        | 45~+80%                             |                       |                       |                    |                                      |                                                         |
| - Period.....                                  |                                                   |                            |        | ≤ 2 years                           |                       |                       |                    |                                      |                                                         |
| Climatic category (IEC 60068-1).....           |                                                   |                            |        | 40/125/21                           |                       |                       |                    |                                      |                                                         |
| Marking.....                                   |                                                   |                            |        | Without                             |                       |                       |                    |                                      |                                                         |
| Surface treatment.....                         |                                                   |                            |        | Matte-tin plated                    |                       |                       |                    |                                      |                                                         |
| Moisture sensitivity level <sup>6)</sup> ..... |                                                   |                            |        | 1                                   |                       |                       |                    |                                      |                                                         |

<sup>1)</sup> At delivery AQL 0.65 level II, DIN ISO 2859.

<sup>2)</sup> In ionized mode.

<sup>3)</sup> Insulation Resistance Measuring Voltage: nominal voltage 90~150V at DC 50V, others at DC 100V.

<sup>4)</sup> Tests according to ITU-T K.12 and UL 497B.

<sup>5)</sup> Specified in terms of corrosion against tin plating.

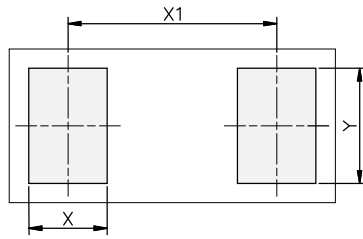
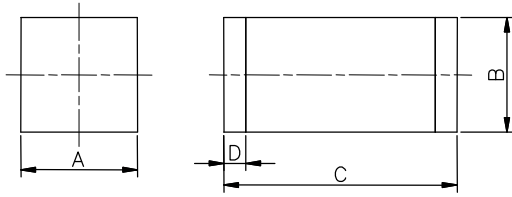
<sup>6)</sup> Tests according to JEDEC J-STD-020.

Terms and current waveforms in accordance with ITU-T K. 12, IEC61643-21 and IEC 61643-311.

# Gas Discharge Tube (GDT)

## SMD3216 Series

### Dimensions

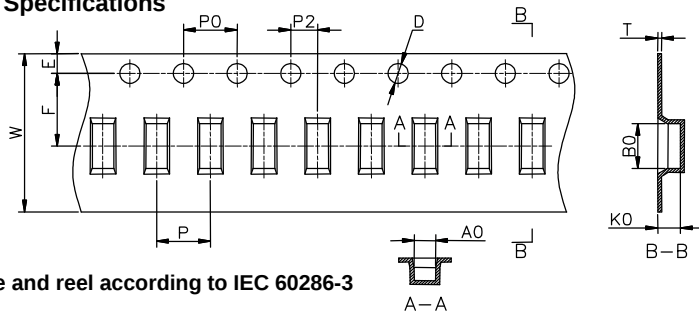


Recommended Soldering Pad Layout

| Symbol | Millimeters | Inches      |
|--------|-------------|-------------|
| A      | 1.6±0.2     | 0.063±0.008 |
| B      | 1.6±0.2     | 0.063±0.008 |
| C      | 3.2±0.3     | 0.126±0.012 |
| D      | 0.3±0.1     | 0.012±0.004 |
| X      | 1.3         | 0.051       |
| X1     | 3.3         | 0.130       |
| Y      | 1.8         | 0.071       |

### Packaging Information

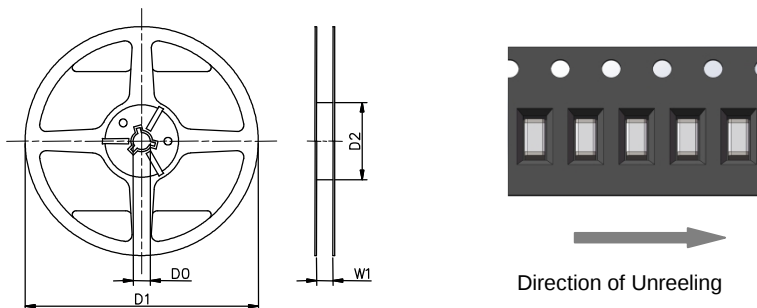
#### Tape Specifications



Tape and reel according to IEC 60286-3

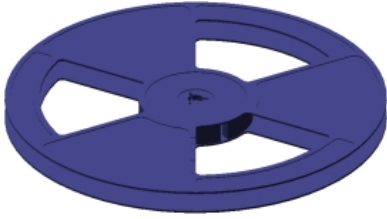
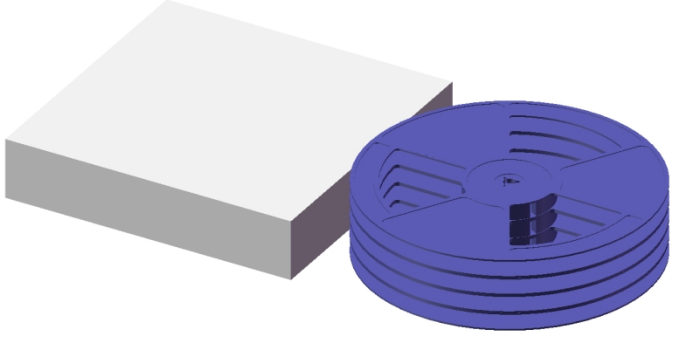
| Symbol | Millimeters  | Inches             |
|--------|--------------|--------------------|
| W      | 12±0.3       | 0.472±0.012        |
| A0     | 1.86±0.1     | 0.073±0.004        |
| B0     | 3.6±0.1      | 0.142±0.004        |
| K0     | 1.7±0.1      | 0.067±0.004        |
| P      | 4.0±0.1      | 0.157±0.004        |
| F      | 5.5±0.1      | 0.217±0.004        |
| E      | 1.75±0.1     | 0.069±0.004        |
| D      | 1.5+0.1/-0.0 | 0.059+0.004/-0.0   |
| P0     | 4±0.1        | 0.157±0.004        |
| P2     | 2±0.1        | 0.079±0.004        |
| T      | 0.35±0.05    | 0.014±0.002        |
| D0     | 13.3±0.15    | 0.524±0.006        |
| D1     | 178±2        | 7.007±0.079        |
| D2     | 60+1/-2      | 2.362+0.039/-0.079 |
| W1     | 12.5±0.4     | 0.492±0.016        |

#### Reel Specifications

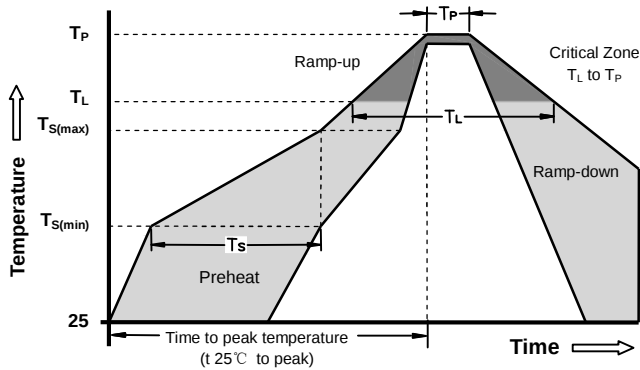


# Gas Discharge Tube (GDT)

## SMD3216 Series

|          | Reel                                                                              | Inner Box                                                                          |
|----------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Size     | 178×12.5mm                                                                        | 180×184×64mm                                                                       |
| Quantity | MPQ/MOQ: 1 reel=2,000pcs                                                          | 1 Inner Box=4 reels=8,000pcs                                                       |
| Photos   |  |  |

### Soldering Parameters - Reflow Soldering (Surface Mount Devices)



| Reflow Condition                                     |                                   | Pb - Free assembly |
|------------------------------------------------------|-----------------------------------|--------------------|
| Preheat                                              | -Temperature Min ( $T_{s(min)}$ ) | 150°C              |
|                                                      | -Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|                                                      | - Time (min to max) ( $t_s$ )     | 60 -180 Seconds    |
| Average ramp up rate ( Liquids Temp $T_L$ ) to peak  |                                   | 3°C/second max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                 |                                   | 5°C/second max     |
| Reflow                                               | - Temperature ( $T_L$ ) (Liquids) | 217°C              |
|                                                      | - Time (min to max) ( $t_s$ )     | 60 -150 Seconds    |
| Peak Temperature ( $T_p$ )                           |                                   | 260 +0/-5°C        |
| Time within 5°C of actual peak Temperature ( $t_p$ ) |                                   | 10 - 30 Seconds    |

Surface mounted components (SMD) may exhibit a temporary increase in the DC spark-over voltage after the solder reflow process. The components will recover within 24 hours. There are no quality defects or changes in protection level during the temporary change of DC spark-over voltage.

# Gas Discharge Tube (GDT)

# SMD3216 Series

## Terms and definitions

| NO. | Item                                        | Definitions                                                                                                                                                                                                                        |
|-----|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | <b>Gas discharge tube(GDT)</b>              | A gap, or several gaps, in an enclosed discharge medium, other than air at atmospheric pressure, designed to protect apparatus or personnel, or both, from high transient voltages. Also referred to as "gas tube surge arrester". |
| 2   | <b>DC Spark-over Voltage</b>                | The voltage at which the gas discharge tube sparks over with slowly increasing d.c. voltage.                                                                                                                                       |
| 3   | <b>Impulse Spark-over Voltage</b>           | The highest voltage which appears across the terminals of a gas discharge tube in the period between the application of an impulse of given wave-shape and the time when current begins to flow.                                   |
| 5   | <b>Arc voltage</b>                          | Voltage drop across the GDT during arc current flow.                                                                                                                                                                               |
| 6   | <b>Glow voltage</b>                         | Peak value of voltage drop across the GDT when a glow current is flowing.                                                                                                                                                          |
| 7   | <b>Impulse discharge current<br/>8/20μs</b> | Current impulse with a nominal virtual front time of 8 μs and a nominal time to half-value of 20 μs.                                                                                                                               |
| 8   | <b>Alternating Discharge Current</b>        | The rms value of an approximately sinusoidal alternating current passing through the gas discharge tube.                                                                                                                           |
| 9   | <b>Insulation Resistance</b>                | Insulation resistance shall be measured from each terminal to every other terminal of the GDT. The test is performed with DC50V when normal spark-over Voltage 70~150V, others with DC100V.                                        |
| 10  | <b>Capacitance</b>                          | The capacitance shall be measured once at 1 MHz between all terminals unless otherwise specified.                                                                                                                                  |

## Cautions

- I Do not operate gas discharge tubes in power supply networks, whose maximum operating voltage exceeds the minimum spark-over voltage of the gas discharge tubes.
- I Gas discharge tubes may become hot in the event of longer periods of current stress (burn risk). In the event of overload the connectors may fail or the component may be destroyed.
- I Gas discharge tubes must be handled with care and must not be dropped.
- I Do not continue to use damaged gas discharge tubes.
- I The shown SMD pad dimensions represent a safe way to mount the arrester and are a recommendation of the manufacturer. During the reflow process it must be assured that no solder material reduces the insulation distance between the pads below the arrester.
- I SMD gas discharge tubes should be soldered within 24 month after shipment.
- I The electrical characteristics described in this datasheet are only typical characteristics, and all of these characteristics have been confirmed through testing and inspection. If the customer's usage requirements are different from this or have special requirements, please contact Ruilongyuan Electronics Co., Ltd. If protection failure or circuit damage occurs as a result, our company is not responsible for it.
- I Ruilongyuan Electronics Co., Ltd. always strives to improve our products. Consequently, the products described in this datasheet may be updated from time to time, and the corresponding product specifications may also be updated accordingly. So, before or at the time of placing your order, please check to what extent the product descriptions and specifications contained in this publication are still applicable. Ruilongyuan Electronics Co., Ltd. still reserves the right to cease production and delivery of products. Consequently, we cannot guarantee that all products listed in this datasheet will always be available. The above provisions do not apply to individual agreements with customers for specific products.
- I Ruilongyuan Electronics Co., Ltd. models may have different product codes. Different product code representations are due to the use of different production processes, but do not affect their respective product specifications.