



# Datasheet

## Gas Discharge Tube (GDT)

Series / Models	SMD5050(BVL) Series
Product Code	10.12.05.XXXX-BVL 10.12.20.XXXX-BVL
Version	A0
Date	2025-10-29
File Number	SP-GDT-354

## Version History

Version	Date	Page	Description	Author
A0	2025-10-29	/	Initial draft	Xia Wu

## Description

Gas discharge tubes (GDT) 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.

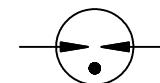
The SMD5050(BVL) series GDT is a surface mount packaged component. Not only is it small in size and easy to install on various compact printed circuit boards (PCBs), but it also has excellent performance. The low capacitance characteristic minimizes its impact on signals when used in high-frequency communication circuits. High insulation resistance ensures that the performance of the circuit will not suffer additional losses under normal operating conditions. The SMD5050 series GDT can not only be used to protect communication interfaces, but its ability to withstand high surge currents(8/20uS, 5KA) also makes it suitable for power supply protection.

## Features

- | Excellent response to fast rising transients
- | Stable breakdown voltage
- | GHz working frequency
- | 8/20μs Impulse current capability:5KA
- | Surface Mount package
- | Non-Radioactive
- | Ultra Low capacitance (<0.8pF)
- | Size: 4.2mm\*5mm\*5mm



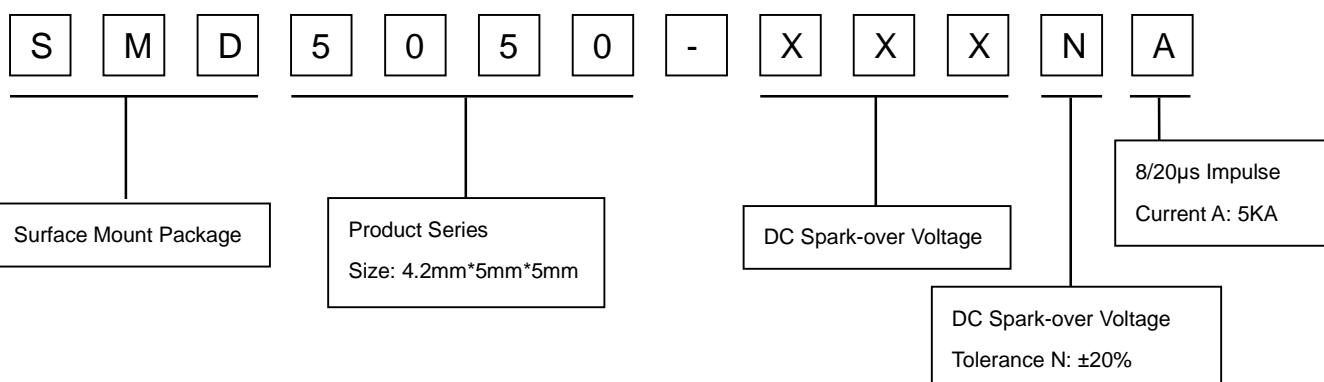
## Electrical symbol



## Applications

- | CATV equipment
- | Broad Band equipment
- | Antennas
- | xDSL, ADSL, ADSL2, VDSL, and VDSL2
- | RS 485
- | Telecom Base Station
- | Medical Electronics
- | Power Supply AC Main
- | Test Equipment
- | EV power Charging
- | General Telecom Equipment
- | Inverter/Variable Frequency Drivers
- | Renewable Energy
- | (VFDs)
- | IEEE 802.3 compliant Ethernet interfaces

## Part Number Code



## Electrical Characteristics

Model	SMD5050-350NA (BVL)	SMD5050-400NA (BVL)	SMD5050-470NA (BVL)	Units
<b>DC Spark-over Voltage</b> <sup>1) 2)</sup> at 100V/S	350±20%	400±20%	470±20%	V
<b>Impulse Spark-over Voltage</b> at 100V/μS	<450	<500	<600	V
at 1KV/μS	<550	<600	<700	V
<b>Front of wave spark-over voltage</b> at 1.2/50 μs, 6 kV	<700	<800	<900	V
<b>Service life (According to IEC 61643-311)</b>				
Nominal impulse discharge current 8/20μs ±5 times	5	5	5	KA
Max. impulse discharge current 8/20μs 1 time	10	10	10	KA
Alternating Discharge Current 50Hz,1S 10 times	2.5	2.5	2.5	A
Impulse life 10/1000μS 300 times	100	100	100	A
1.2/50μS, 2Ω <sup>3)</sup> 40 times	6	6	6	KV
1.2/50μS, 12Ω <sup>3)</sup> 80 times	6	6	6	KV
<b>Glow Voltage</b> at 10mA	~160	~160	~160	V
<b>Arc Voltage</b> at 1A	~15	~15	~15	V
<b>Insulation Resistance</b>	>1	>1	>1	GΩ
Insulation Resistance Measuring Voltage	100	100	100	V <sub>dc</sub>
<b>Capacitance</b> at 1MHz	<0.8	<0.8	<0.8	pF
<b>Weight</b>	~0.42	~0.42	~0.42	g
<b>Operation temperature</b>	-40~+125	-40~+125	-40~+125	°C
<b>Recommended storage</b> <sup>4)</sup>				
Temperature	+5~+35	+5~+35	+5~+35	°C
Humidity	45~80	45~80	45~80	%
Period	≤ 2	≤ 2	≤ 2	year
<b>Climatic category (IEC60068-1)</b>	40/125/21	40/125/21	40/125/21	
<b>Certifications</b> <sup>5)</sup>				
 UL497B	E465335	◎	--	◎
 EN 61643-311	J50569381	--	--	--
IEC 61643-311				
<b>Marking</b>	Without			
<b>Surface treatment</b>	Matte-tin plated			
<b>Moisture sensitivity level</b> <sup>6)</sup>	1			

1) At delivery AQL 0.65 level II, DIN ISO 2859.

2) In ionized mode.

3) Tested with MOVs.

4) Specified in terms of corrosion against tin plating.

5) “◎” indicates that the product has passed the certification, “--” indicates that the product is not certified.

6) Tests according to JEDEC J-STD-020.

## Electrical Characteristics

Model	SMD5050-600NA (BVL)	SMD5050-800NA (BVL)	SMD5050-1000 (BVL)	Units
<b>DC Spark-over Voltage</b> <sup>1) 2)</sup> at 100V/S	600±20%	800±20%	1000±20%	V
<b>Impulse Spark-over Voltage</b> at 100V/μS	<750	<1000	<1200	V
at 1KV/μS	<850	<1100	<1300	V
<b>Front of wave spark-over voltage</b> at 1.2/50 μs, 6 kV	<1000	<1200	<1500	V
<b>Service life (According to IEC 61643-311)</b>				
Nominal impulse discharge current 8/20μs ±5 times	5	5	5	KA
Max. impulse discharge current 8/20μs 1 time	10	10	10	KA
Alternating Discharge Current 50Hz,1S 10 times	2.5	2.5	2.5	A
Impulse life 10/1000μS 300 times	100	100	100	A
1.2/50μS, 2Ω <sup>3)</sup> 40 times	6	6	6	KV
1.2/50μS, 12Ω <sup>3)</sup> 80 times	6	6	6	KV
<b>Glow Voltage</b> at 10mA	~160	~160	~160	V
<b>Arc Voltage</b> at 1A	~15	~15	~15	V
<b>Insulation Resistance</b>	>1	>1	>1	GΩ
Insulation Resistance Measuring Voltage	100	100	100	V <sub>dc</sub>
<b>Capacitance</b> at 1MHz	<0.8	<0.8	<0.8	pF
<b>Weight</b>	~0.42	~0.42	~0.42	g
<b>Operation temperature</b>	-40~+125	-40~+125	-40~+125	°C
<b>Recommended storage</b> <sup>4)</sup>				
Temperature	+5~+35	+5~+35	+5~+35	°C
Humidity	45~80	45~80	45~80	%
Period	≤ 2	≤ 2	≤ 2	year
<b>Climatic category (IEC60068-1)</b>	40/125/21	40/125/21	40/125/21	
<b>Certifications</b> <sup>5)</sup>				
 UL497B	E465335	◎	--	--
 EN 61643-311	J50569381	◎	--	--
IEC 61643-311				
<b>Marking</b>	Without			
<b>Surface treatment</b>	Matte-tin plated			
<b>Moisture sensitivity level</b> <sup>6)</sup>	1			

1) At delivery AQL 0.65 level II, DIN ISO 2859.

2) In ionized mode.

3) Tested with MOVs.

4) Specified in terms of corrosion against tin plating.

5) “◎” indicates that the product has passed the certification, “--” indicates that the product is not certified.

6) Tests according to JEDEC J-STD-020.

## Electrical Characteristics

Model	SMD5050-1200 (BVL)	SMD5050-1500 (BVL)	Units
<b>DC Spark-over Voltage</b> <sup>1) 2)</sup> at 100V/S	1200±20%	1500±20%	V
<b>Impulse Spark-over Voltage</b> at 100V/μS	<1500	<1800	V
at 1KV/μS	<1600	<1900	V
<b>Front of wave spark-over voltage</b> at 1.2/50 μs, 6 kV	<1700	<2000	V
<b>Service life (According to IEC 61643-311)</b>			
Nominal impulse discharge current 8/20μs ±5 times	5	5	KA
Max. impulse discharge current 8/20μs 1 time	10	10	KA
Alternating Discharge Current 50Hz,1S 10 times	2.5	2.5	A
Impulse life 10/1000μS 300 times	100	100	A
1.2/50μS, 2Ω <sup>3)</sup> 40 times	6	6	KV
1.2/50μS, 12Ω <sup>3)</sup> 80 times	6	6	KV
<b>Glow Voltage</b> at 10mA	~300	~300	V
<b>Arc Voltage</b> at 1A	~25	~25	V
<b>Insulation Resistance</b>	>1	>1	GΩ
Insulation Resistance Measuring Voltage	100	100	V <sub>DC</sub>
<b>Capacitance</b> at 1MHz	<0.8	<0.8	pF
<b>Weight</b>	~0.42	~0.42	g
<b>Operation temperature</b>	-40~+125	-40~+125	°C
<b>Recommended storage</b> <sup>4)</sup>			
Temperature	+5~+35	+5~+35	°C
Humidity	45~80	45~80	%
Period	≤ 2	≤ 2	years
<b>Climatic category (IEC60068-1)</b>	40/125/21	40/125/21	
<b>Certifications</b> <sup>5)</sup>			
 UL497B	E465335	--	--
 EN 61643-311	J50569381	--	--
IEC 61643-311			
<b>Marking</b>	Without		
<b>Surface treatment</b>	Matte-tin plated		
<b>Moisture sensitivity level</b> <sup>6)</sup>	1		

1) At delivery AQL 0.65 level II, DIN ISO 2859.

2) In ionized mode.

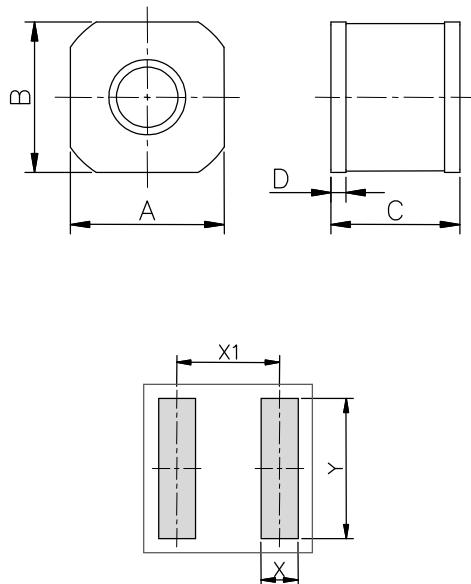
3) Tested with MOVs.

4) Specified in terms of corrosion against tin plating.

5) “◎” indicates that the product has passed the certification, “--” indicates that the product is not certified.

6) Tests according to JEDEC J-STD-020.

## Dimensions

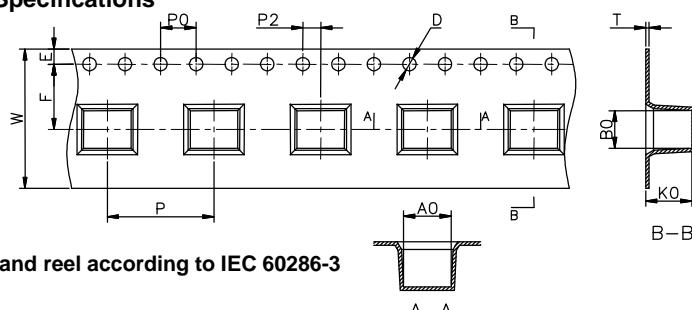


Recommended Soldering Pad Layout

Symbol	Millimeters	Inches
A	5.0±0.2	0.197±0.008
B	5.0±0.2	0.197±0.008
C	4.2±0.3	0.165±0.012
D	0.5±0.1	0.020±0.004
X	1.2	0.047
X1	4.0	0.157
Y	5.5	0.217

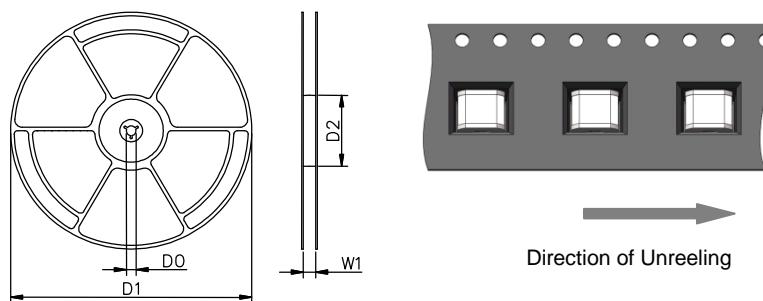
## Packaging Information

## Tape Specifications



Tape and reel according to IEC 60286-3

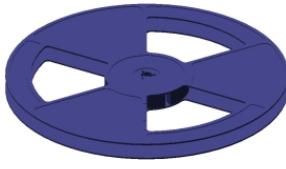
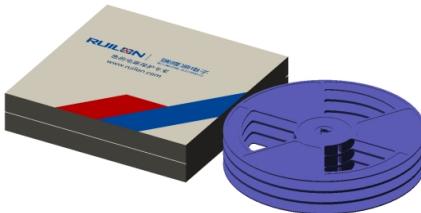
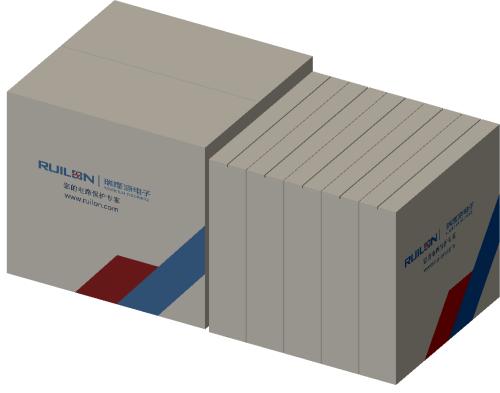
## Reel Specifications



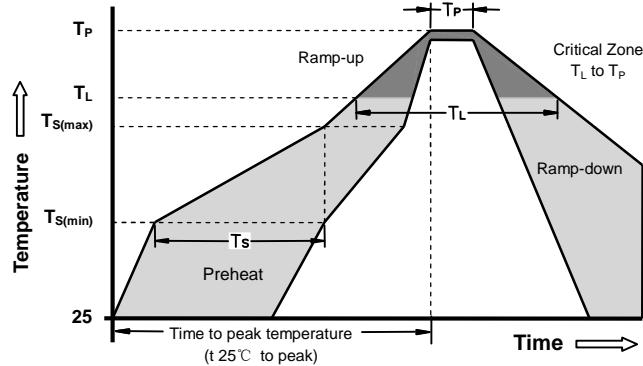
Symbol	Millimeters	Inches
W	16±0.3	0.630±0.012
A0	5.3±0.1	0.209±0.004
B0	4.3±0.1	0.169±0.004
K0	5.2±0.1	0.205±0.004
P	12±0.1	0.472±0.004
F	7.5±0.1	0.295±0.004
E	1.75±0.1	0.069±0.004
D	1.5+0.1/-0.0	0.059+0.004/-0.0
P0	4±0.1	0.157±0.004
P2	2±0.1	0.079±0.004
T	0.4±0.1	0.016±0.004
D0	13.3±0.15	0.524±0.006
D1	330±2	12.992±0.079
D2	100+1/-2	3.937+0.039/-0.079
W1	16.5±0.4	0.65±0.016

## Gas Discharge Tube(GDT)

## SMD5050 (BVL) Series

	Reel	Inner Box	Carton
Size	330×17mm	340×333×70mm	375×353×380mm
Quantity	MPQ/MOQ: 1 reel=1,000pcs	1 Inner Box=3 reels=3,000pcs	1 Carton=5 Inner boxes=15,000pcs
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 is no quality defect nor change in protection levels during the temporary change in DC spark-over voltage.

## 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<sub>8/20μs</sub></b>	Current impulse with a nominal virtual front time of 8 $\mu$ s and a nominal time to half-value of 20 $\mu$ s.
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

- | 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.
- | 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.
- | Gas discharge tubes must be handled with care and must not be dropped.
- | Do not continue to use damaged gas discharge tubes.
- | 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.
- | 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.
- | 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.