Datasheet

Gas Discharge Tubes (GDT)

Series / Models	2R-5(1000~4500V)
Product Code	10.12.56.XXXX
Version	A4
Date	2024-12-09
File Number	SP-GDT-030

Version History

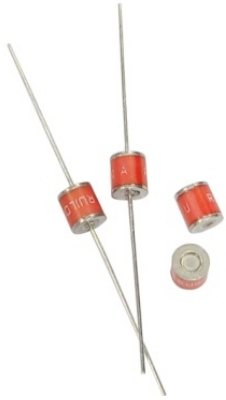
Version	Date	Page	Description	Author
A0	2017-04-19	/	Initial draft.	George Hu
A1	2018-06-12	Page 4	Update and refine relevant technical specifications.	George Hu
A2	2022-05-25	Page 4	Update Electrical Characteristics.	George Hu
A3	2024-03-13	Page 5	Update Certifications table.	Xia Wu
A4	2024-12-09	Page 4,6,13	1. Delete some models. 2. Add Y type leads dimensions and Packaging Information. 3. Add cautions.	Xia Wu

Gas Discharge Tubes (GDT) 2R-5(1000~4500V)

Description

2R-5 Gas Discharge Tubes (GDT) series provides high levels of protection against fast rising transients caused by lightning disturbances. Offered in a miniature surface mount package, it has a surge rating of 5KA/3KA 8/20μs.

2R-5 GDTs are high voltage (1000-4500V) components designed for surge protection and high isolation applications. It is also suitable for applications for which bias voltage or signal levels of several hundred volts are normally present. 2R-5 GDTs can be used in conjunction with MOVs (Metal Oxide Varistors) to provide superior protection performance for AC applications.



Agency Approvals

Agency	Standards	Certificate No.
	UL1449	E479668
	EN 61643-311 IEC 61643-311	J50571931

Features

- Voltage Ranges 1000V to 4500V
- Excellent response to fast rising transients
- 8/20μs Impulse current capability: 5KA/3KA
- Non-Radioactive
- Ultra Low capacitance (<1pF)
- Size: Φ5.5mm*6mm

Applications

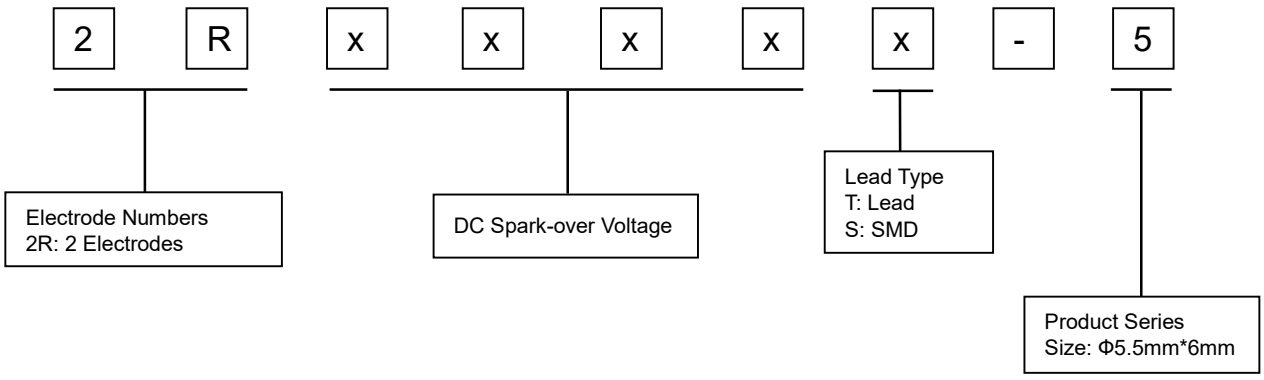
Automotive:

- On-board chargers
- Vehicle charging stations

Others:

- LED lighting
- Power supply
- Photovoltaic
- Air conditioning

Part Number Code



Electrical Characteristics

Part Number		DC Spark-over Voltage [1) 2)] @100V/S	Impulse Spark-over Voltage		Insulation Resistance [3)]	Capacitance @1MHz	Glow Voltage @10mA	Arc Voltage @1A	AC Withstand Voltage @5mA 1Min	Life Ratings		
			100V/μS	1KV/μS						Impulse Discharge Current @8/20μS		Alternating Discharge Current @50Hz 1S
			Max	Max	Min	Max	Typical	Typical		±5 times	1 time	10 times
DIP	SMD	V	V	V	GΩ	pF	V	V	V	KA	KA	A
2R1000T-5	2R1000S-5	1000±20%	1500	1600	1	1	150	15	500	5	10	2
2R1600T-5	2R1600S-5	1600±20%	2600	2800	1	1	170	18	800	5	10	2
2R2000T-5	2R2000S-5	2000±20%	3300	3500	1	1	260	30	1000	3	5	1
2R2500T-5	2R2500S-5	2500±20%	3800	4000	1	1	260	30	1300	3	5	1
2R3000T-5	2R3000S-5	3000±20%	4300	4500	1	1	260	30	1600	3	5	1
2R3600T-5	2R3600S-5	3600±20%	4800	5000	1	1	260	30	1900	3	5	1
2R4000T-5	2R4000S-5	4000±20%	5800	6000	1	1	260	35	2100	3	5	1
2R4500T-5	2R4500S-5	4500±20%	6300	6500	1	1	260	35	2300	3	5	1

Glow to Arc transition Current…..…….…..	~0.3A
Weight…….……..	DIP ~0.7g SMD ~0.43g
Operation and storage temperature……..	-40~+125°C
Climatic category (IEC 60068-1)……..	40/125/21
Marking, red negative……....	**RUILON XXX Y** XXX -Nominal voltage Y -Year of production
Surface treatment…….……..	DIP -Nickel Plated SMD -Matte-tin plated
Moisture sensitivity level [4)] ……..	1

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

[2)] In ionized mode.

[3)] Insulation Resistance Measuring Voltage at DC 100V.

[4)] Tests according to JEDEC J-STD-020.

Terms in accordance with ITU-T Rec. K.12, IEC 61643-311, GB/T 18802.311.

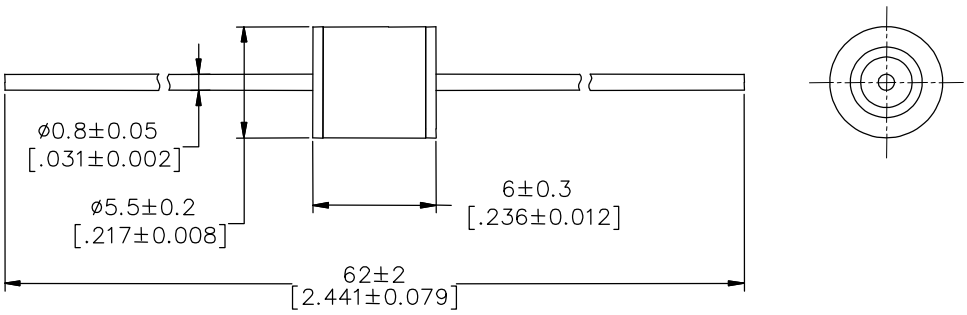
Certifications table

Part Number			
DIP	SMD	UL1449	EN 61643-311 IEC 61643-311
2R1000T-5	2R1000S-5	●	--
2R1600T-5	2R1600S-5	●	--
2R2000T-5	2R2000S-5	●	●
2R2500T-5	2R2500S-5	●	●
2R3000T-5	2R3000S-5	●	●
2R3600T-5	2R3600S-5	●	●
2R4000T-5	2R4000S-5	--	--
2R4500T-5	2R4500S-5	--	--

Notes:
1. ● indicates that the product has passed the certification.
2. -- indicates that the product is not certified.

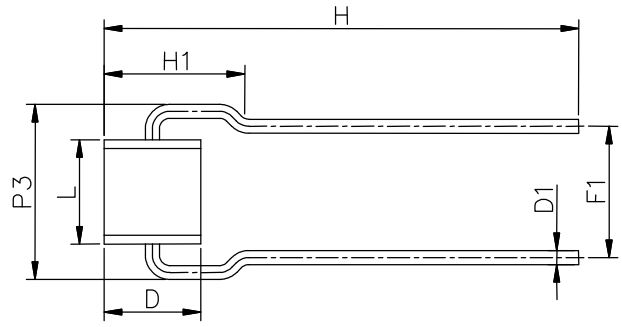
Dimensions (Unit: mm/inch)

DIP axial leads series (2RxxxT-5)



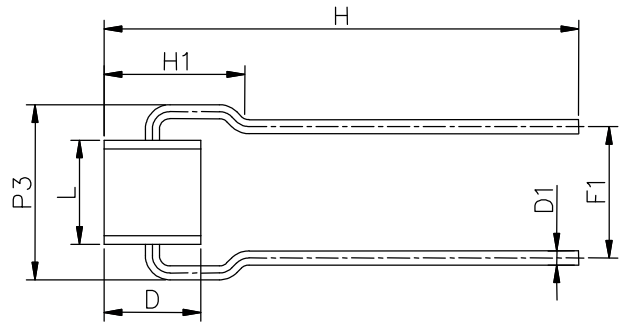
Gas Discharge Tubes (GDT) 2R-5(1000~4500V)

DIP unidirectional leads series (φ0.8 leads, 2RxxxT-5)



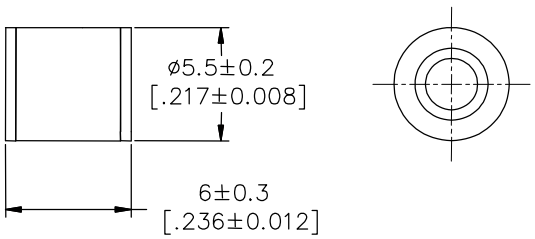
Symbol	Millimeters	Inches
D	φ5.5±0.2	0.217±0.008
D1	φ0.8±0.05	0.031±0.002
F1	7.5±0.5	0.295±0.020
H	27.0±2	1.063±0.079
H1	8.0±0.3	0.315±0.012
L	6.0±0.3	0.236±0.012
P3	10.0±0.5	0.394±0.020

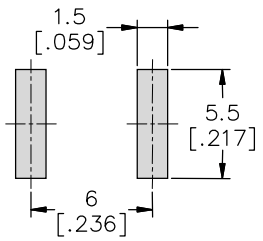
DIP unidirectional leads series (φ0.6 leads, 2RxxxT-5)



Symbol	Millimeters	Inches
D	φ5.5±0.2	0.217±0.008
D1	φ0.6±0.05	0.024±0.002
F1	7.5±0.5	0.295±0.020
H	27.0±2	1.063±0.079
H1	8.0±0.3	0.315±0.012
L	6.0±0.3	0.236±0.012
P3	10.0±0.5	0.394±0.020

SMD Series (2RxxxS-5)



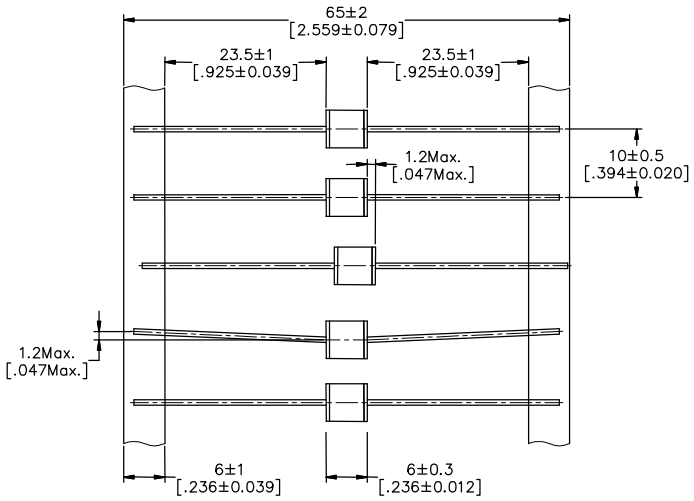


Recommended Soldering Pad Layout

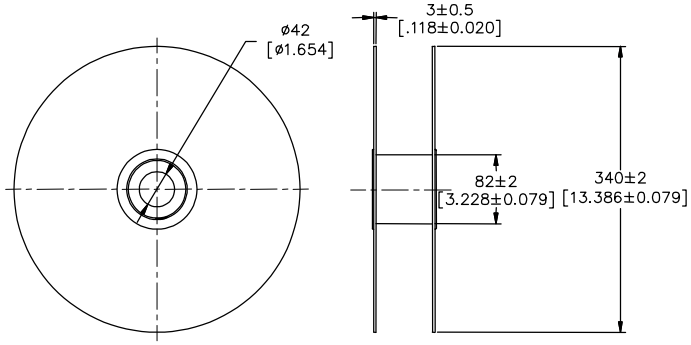
Packaging Information (Unit: mm/inch)

DIP axial leads series packaging (Default packaging)

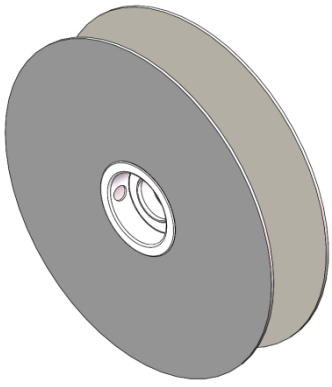
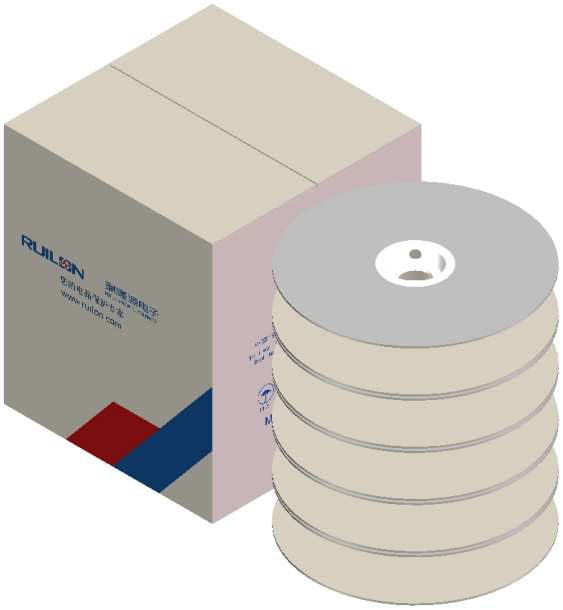
Tape



Reel

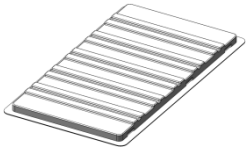
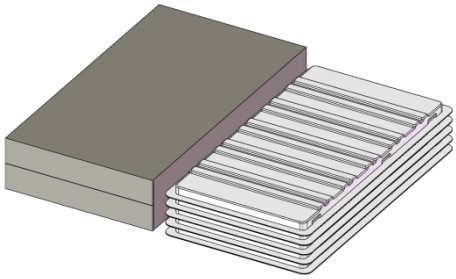
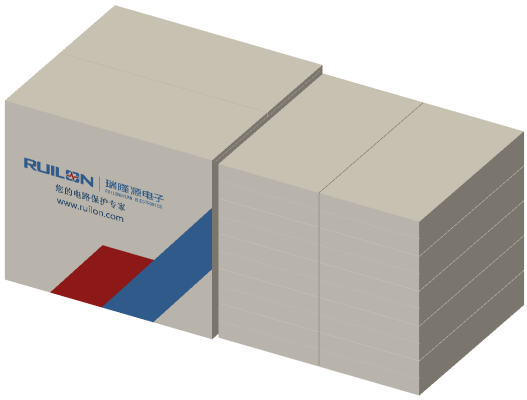


According to IEC 60286-1

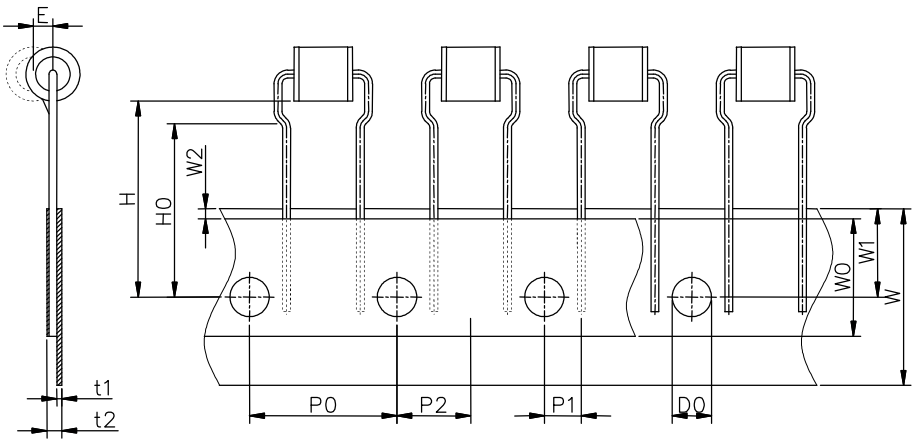
	Reel	Carton
Size	340×78mm	350×350×407mm
Quantity	MPQ/MOQ: 1 reel=1,000pcs	1 Carton=5 reels =5,000pcs
Photos		

Gas Discharge Tubes (GDT) 2R-5(1000~4500V)

DIP axial leads series packaging (Bulk)

	PVC tray	Inner Box	Carton
Size	265×148×10mm	275×150×50mm	315×290×272mm
Quantity	MPQ: 1 tray=100pcs	MOQ: 1 Inner Box=5 trays=500pcs	1 Carton=10 Inner boxes=5,000pcs
Photos			

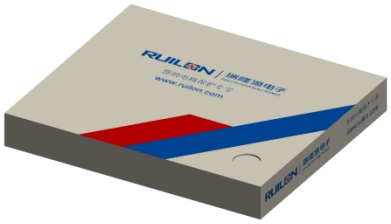
DIP unidirectional leads series packaging



According to IEC 60286-2

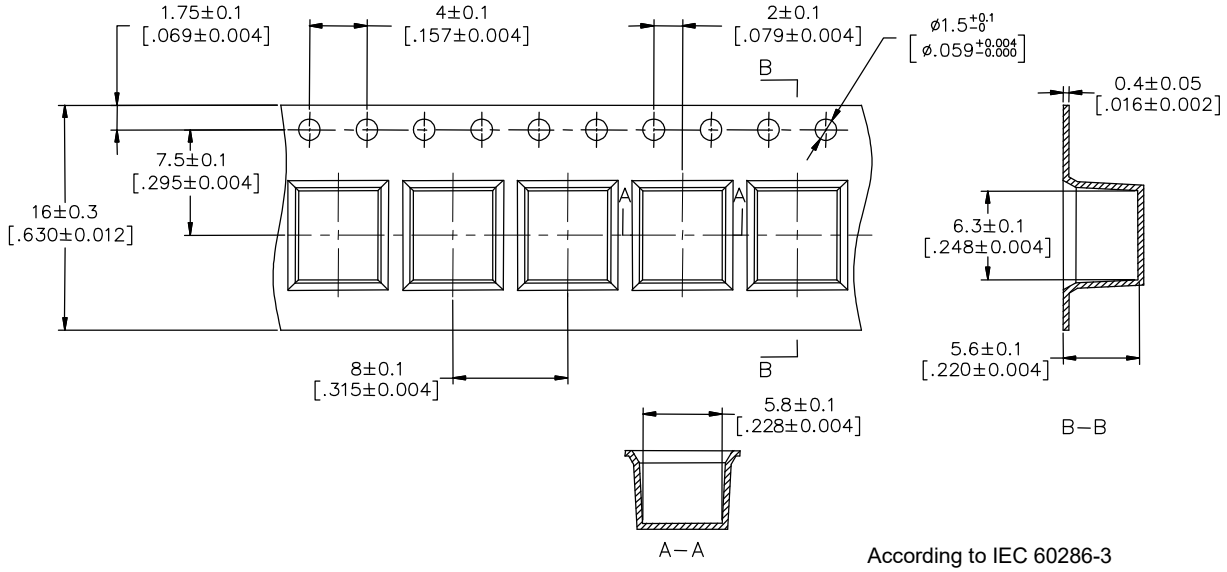
Symbol	Millimeter	Inches
D0	Φ4±0.2	0.157±0.008
E	2.0 Max	0.08 Max
H0	18±0.5	0.709±0.020
H	20+2/-0	0.787+0.079/-0
P0	15±0.5	0.591±0.020
P1	3.75±0.5	0.148±0.020
P2	7.5±0.5	0.295±0.020
W	18+1/-0.5	0.709+0.04/-0.02
W0	12±0.5	0.472±0.020
W1	9±0.5	0.354±0.020
W2	3.0 Max	0.118 Max
t1	0.5±0.2	0.020±0.008
t2	1.5 Max	0.059 Max

Gas Discharge Tubes (GDT) 2R-5(1000~4500V)

	Inner Box	Carton
Size	335×265×45mm	550×350×240mm
Quantity	MPQ/MOQ: 1 Inner Box=1300pcs	1Carton=10 Inner Box=13,000pcs
Photos	 	

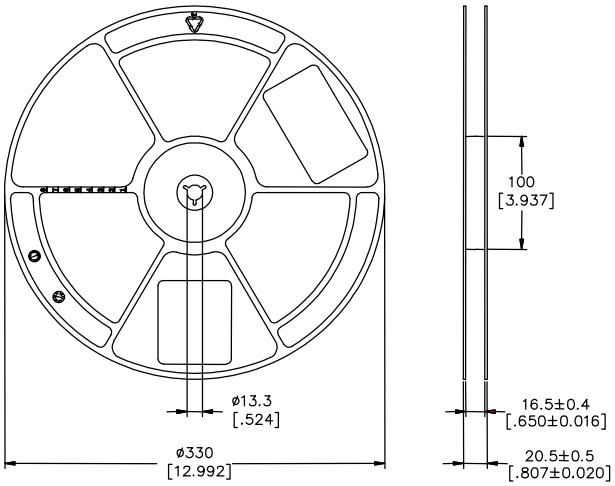
SMD series packaging

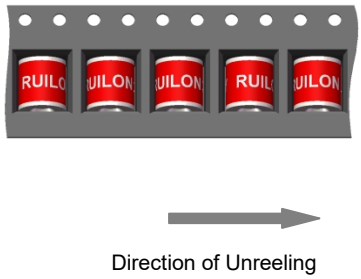
Tape

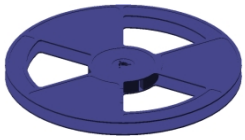
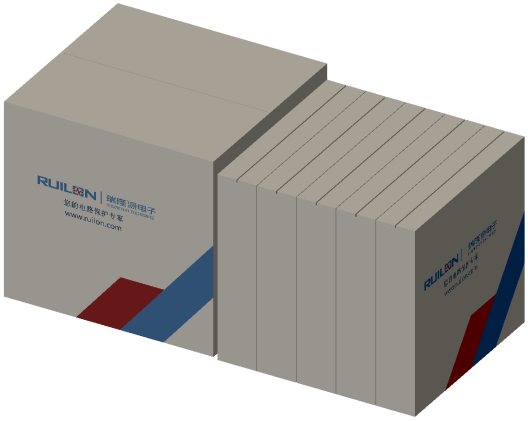


According to IEC 60286-3

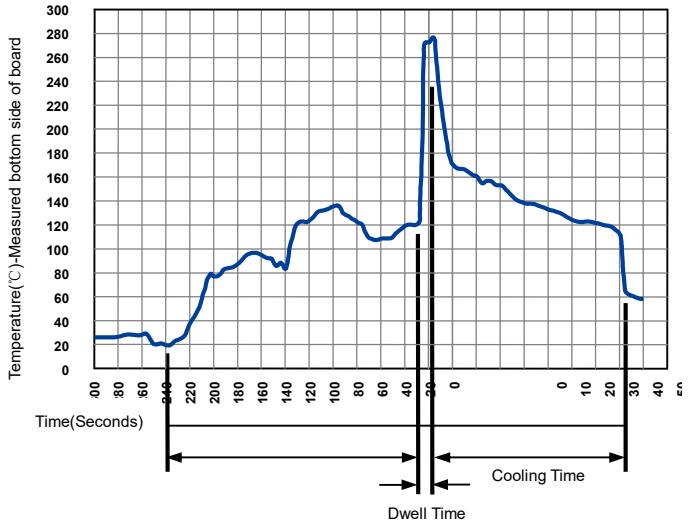
Reel





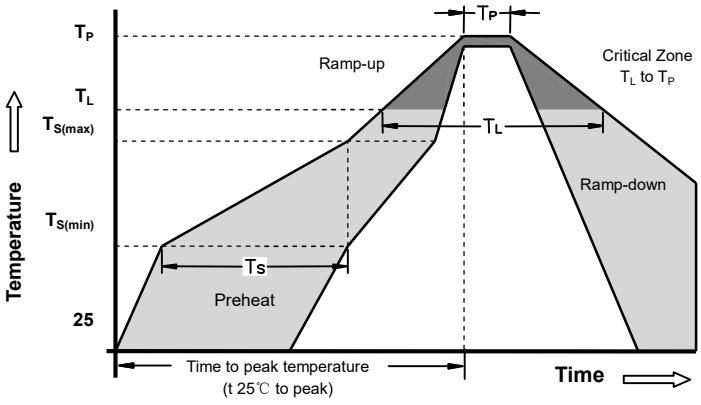
	Reel	Inner Box	Carton
Size	330×20.5mm	340×333×70mm	375×353×380mm
Quantity	MPQ/MOQ: 1 reel=1,000pcs	1 Inner Box=3 reels=3,000pcs	1 Carton=5 Inner boxes=15,000pcs
Photos			

Soldering Parameters - Wave soldering (Thru-Hole Devices)



Wave Soldering Condition		Pb-Free assembly
Preheat	Temperature Min	100°C
	Temperature Max	150°C
	Time (Min to Max)	60-180 Seconds
Solder Pot Temperature		280°C Max
Solder Dwell Time		2-5 Seconds

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 TL - 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
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max
Do not exceed		260°C

Terms and definitions

NO.	Item	Definitions
1	**Gas discharge tube(GDT)**	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	**DC Spark-over Voltage**	The voltage at which the gas discharge tube sparks over with slowly increasing d.c. voltage.
3	**Impulse Spark-over Voltage**	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	**Arc voltage**	Voltage drop across the GDT during arc current flow.
6	**Glow voltage**	Peak value of voltage drop across the GDT when a glow current is flowing.
7	**Impulse discharge current 8/20μs**	Current impulse with a nominal virtual front time of 8 μs and a nominal time to half-value of 20 μs.
8	**Alternating Discharge Current**	The rms value of an approximately sinusoidal alternating current passing through the gas discharge tube.
9	**Insulation Resistance**	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	**Capacitance**	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 surge arresters.
- 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.
- Electromagnetic fields and ionizing radiation may affect the electrical characteristics of the gas discharge tubes. The impact of such effects (inductive and capacitive field distortion from adjacent components) must be avoided by appropriate circuit design measures.
- If the contacts of the gas discharge tubes are defective, current load can cause sparks and loud noises.
- Gas discharge tubes must be handled with care and must not be dropped.
- Damaged gas discharge tubes must not be re-used.
- 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.
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