Datasheet

Gas Discharge Tube (GDT)

Series / Models	3R090-3SQ-C
Product Code	10.13.31.0901
Version	A0
Date	2025-02-08
File Number	SP-GDT-260

Version History

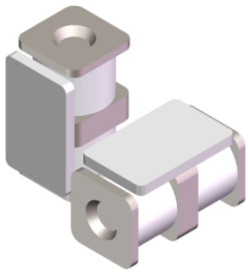
Version	Date	Page	Description	Author
A0	2025-02-08	/	Initial draft	Xia Wu

Gas Discharge Tube (GDT) 3R090-3SQ-C

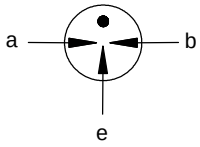
Description

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 3R090-3SQ-C 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 3R090-3SQ-C GDT can not only be used to protect communication interfaces, but its ability to withstand high surge currents (8/20uS, 6KA) also makes it suitable for power supply protection.



Electrical symbol



a = Tip
b = Ring
e = Ground
(center electrode)

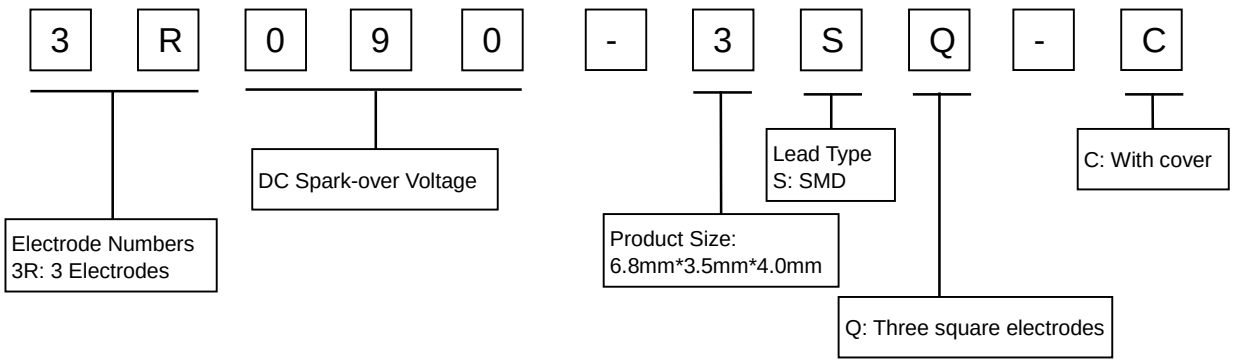
Features

- Extremely small size
- Excellent response to fast rising transients
- Stable breakdown voltage
- GHz working frequency
- 8/20μs Impulse current capability: 6KA
- Surface Mount package
- Non-Radioactive
- Ultra Low capacitance (<1pF)
- High insulation resistance
- Size: 6.8mm*3.5mm*4.0mm

Applications

- Communication equipment
- CATV equipment
- Data lines
- Telecom SLIC protection
- Broadband equipment
- ADSL equipment, including ADSL2+
- XDSL equipment
- Satellite and CATV equipment
- Test equipment
- Consumer electronics
- ESD protection

Part Number Code



Electrical Characteristics

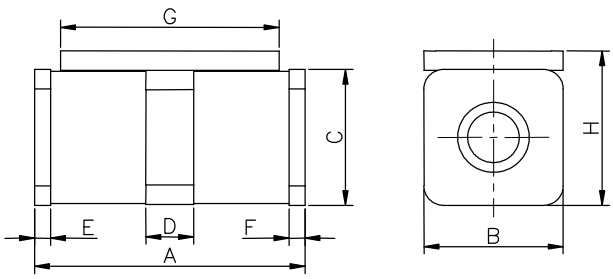
DC Spark-over Voltage [1) 2) 3)]	at 100V/S		90±20%	V
Impulse Spark-over Voltage [3)]	at 100V/μS		<500	V
	at 1KV/μS		<600	V
Service life				
Impulse Discharge Current	8/20μS [4)]	±5 times	6	KA
	8/20μS [5)]	300 times	100	A
	10/1000μS [4)]	300 times	20	A
Impulse Withstanding Voltage	10/700μS, 40Ω [6)]	±5 times	6	KV
Alternating Discharge Current	50Hz,1S [4)]	10 times	6	A
Insulation Resistance	at DC 50V		>1	GΩ
Capacitance	at 1MHz		<1	pF
Glow Voltage	at 10mA		~60	V
Arc Voltage	at 1A		~10	V
Glow to Arc transition current			~0.3	A
Weight			~0.35	g
Operation temperature			-40~+125	°C
Recommended storage [7)]				
Temperature			+5~+35	°C
Humidity			45~+80	%
Period			≤ 2	years
Climatic category (IEC60068-1)			40/125/21	
Marking			Without	
Surface treatment			Matte-tin plated	
Moisture sensitivity level [8)]			1	

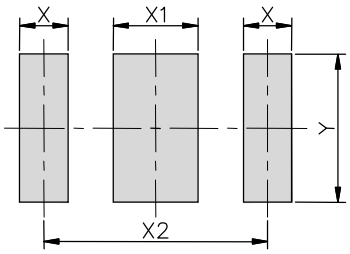
1) At delivery AQL 0.65 level II, DIN ISO 2859.
2) In ionized mode.
3) Tip or ring electrode to center electrode.
4) Total current through center electrode, half value through tip respectively ring electrode.
5) Tip electrode to ring electrode.
6) Tip to center electrode additional ring to center electrode.
7) Specified in terms of corrosion against tin plated.
8) Tests according to JEDEC J-STD-020.

Terms in accordance with ITU-T Rec. K.12, IEC 61643-21, IEC 61643-311.

Gas Discharge Tube (GDT) 3R090-3SQ-C

Dimensions



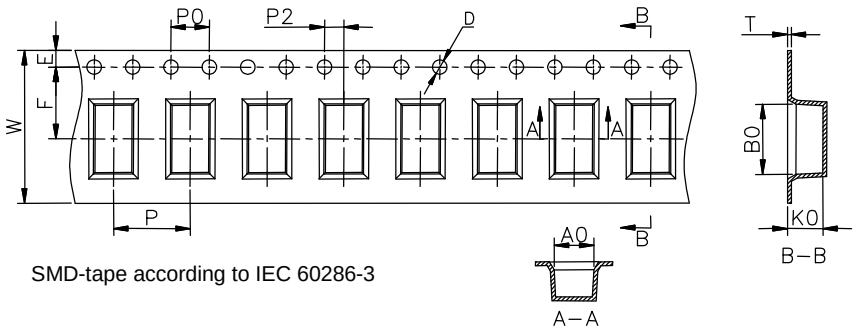


Recommended Soldering Pad Layout

Symbol	Millimeters	Inches
A	6.8±0.3	0.268±0.012
B	3.5±0.2	0.138±0.008
C	3.5±0.2	0.138±0.008
D	1.2±0.3	0.047±0.012
E	0.4±0.2	0.016±0.008
F	0.4±0.2	0.016±0.008
G	5.5±0.2	0.217±0.008
H	4.0±0.3	0.157±0.012
X	1.4	0.055
X1	1.8	0.071
X2	6.7	0.264
Y	4.2	0.165

Packaging Information

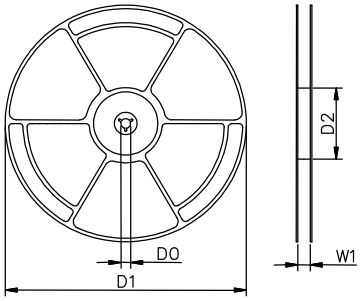
Tape Specifications

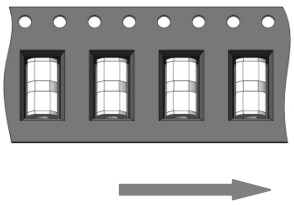


SMD-tape according to IEC 60286-3

Symbol	Millimeters	Inches
W	16±0.3	0.630±0.012
A0	3.8±0.1	0.150±0.004
B0	7.2±0.1	0.283±0.004
K0	4.7±0.1	0.185±0.004
P	8±0.1	0.315±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

Reel Specifications





Direction of Unreeling

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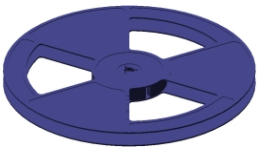
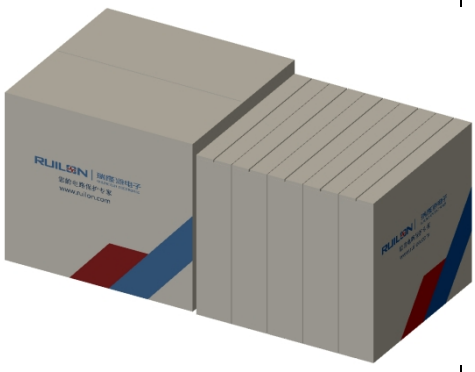
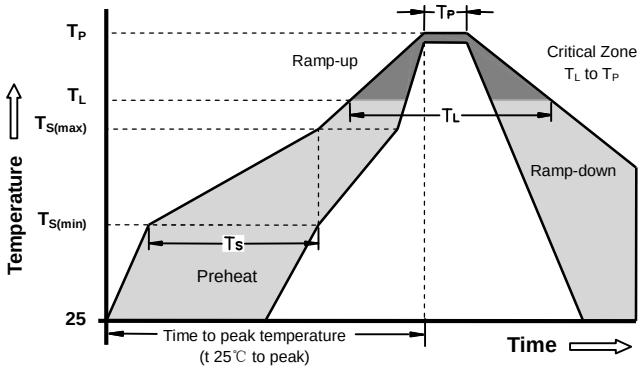
	Reel	Inner Box	Carton
Size	330×20.5mm	340×333×70mm	375×353×380mm
Quantity	MPQ/MOQ: 1 reel=1,500pcs	1 Inner Box=3 reels=4,500pcs	1Carton=5 Inner boxes=22,500pcs
Photos			

Soldering Parameters - Reflow Soldering (Surface Mount Devices)



Reflow Condition		Pb - Free assembly
Pre Heat	**-Temperature Min ($T_{s(min)}$)**	150°C
	-Temperature 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

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.

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 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 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.
- SMD gas discharge tubes should be soldered within 24 month after shipment.
- 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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