GDT
Gas Discharge Tube

SPA Series

Description

The Gas Discharge Tube (GDT) is a protective device which is filled with certain proportion of noble gas, or mixed gas or other discharge media in the space between metal electrodes and metalized ceramics, and then sealed at high temperature to form a single-gap or multi-gap switch type protective device. When the protected circuit or equipment suffers to surge, GDT will change from high impedance state to low impedance state and release the surge energy to reduce the residual voltage of the circuit, and then protect the equipment or humanbody from the hazard of transient overvoltage.

Features

- Fast Response
- Stable Performance Over Surface Life
- High Current Rating
- Low Capacitance
- High Insulation Resistance
- RoHS & REACH Compliant

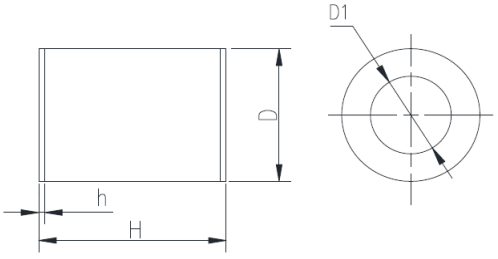
Agency Approvals

Agency	Standards	File No.
	UL497B	E513446
	TUV	On-going

Applications

- Class I and Class II SPD
- N-PE Mode Protection In AC Power

Dimensions (mm)



D	D1	H	h
Φ 11.8 ± 0.3	Φ 6.9	16 ± 0.5	0.5

Notes: Pin type can be customized.

Part Number System

SP A 601 H - XX

- Lead Type
  A: No Lead, B: Single Lead, C: With Lead, 0、1、2.....With Different Lead)
- Nominal Discharge Current
  (I_n = H: 20 kA, D: 40 kA, E: 50 kA, F: 60 kA)
- D.C. Spark-over Voltage (100 V/s)
  (601: 60×10^1)
- Product Structure:
  Φ 11.8 × 16 mm
- Series: SP

Glossary

Item	Description
V_s	**D.C.Spark-over Voltage** The voltage at which the GDT sparks over with slowly increasing d.c. voltage. — (IEC 61643-311)
V	**Impulse Spark-over Voltage** The highest Voltage which appears across the terminals of a GDT in the period between the application of an impulse of given wave-shape and the time when current begins to flow. — (ITU-T K.12)
V_a	**Arc Voltage** Voltage drop across the GDT during arc current flow. — (IEC 61643-311)
V_{gl}	**Glow Voltage** The peak value of the voltage drop across the GDT when a glow-current is flowing, It is sometimes called the glow mode voltage. — (ITU-T K.12)
8/20 μs	**8/20 Current Impulse** Current impulse with a nominal virtual front time of 8 μs and a nominal time to half-value of 20 μs. — (IEC 61643-11)
10/350 μs	**10/350 Current Impulse** Current impulse with a nominal virtual front time of 10 μs and a nominal time to half-value of 350 μs. — (IEC 61643-11)
1.2/50 μs	**1.2/50 Voltage Impulse** Voltage impulse with a nominal virtual front time of 1.2 μs and a nominal time to half-value of 50 μs. — (IEC 61643-11)
I	**Alternating Discharge Current** The r.m.s. value of an approximately sinusoidal alternating current passing through the gas discharge tube. — (ITU-T K.12)
I_n	**Nominal Discharge Current** Crest value of the current through the GDT having a current waveshape of 8/20 μs. — (IEC 61643-11)
I_{max}	**Maximum Discharge Current** Crest value of a current through the GDT having an 8/20 μs waveshape and magnitude according to the manufacturers specification. I_{max} is equal to or greater than I_n. — (IEC 61643-11)

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I_{imp}	**Impulse Discharge Current** Crest value of a discharge current through the SPD with specified charge transfer Q and specified energy W/R in the specified time. — (IEC 61643-11)
U_p	**Voltage Protection Level** Maximum voltage to be expected at the SPD terminals due to an impulse stress with defined voltage steepness and an impulse stress with a discharge current with given amplitude and waveshape. — (GB 18802.11、IEC 61643-11)
U_C	**maximum r.m.s. voltage** Which may be continuously applied to the SPD's mode of protection. — (IEC 61643-11)
I_f	**follow current** Peak current supplied by the electrical power system and flowing through the SPD after a discharge current impulse. — (IEC 61643-11)
class I	**class I tests** Tests carried out with the impulse discharge current Iimp, with an 8/20 current impulse with a crest value equal to the crest value of Iimp, and with a 1.2/50 voltage impulse. — (IEC 61643-11)
class II	**class II tests** Tests carried out with the nominal discharge current I_n, and the 1.2/50μs voltage impulse. — (IEC 61643-11)

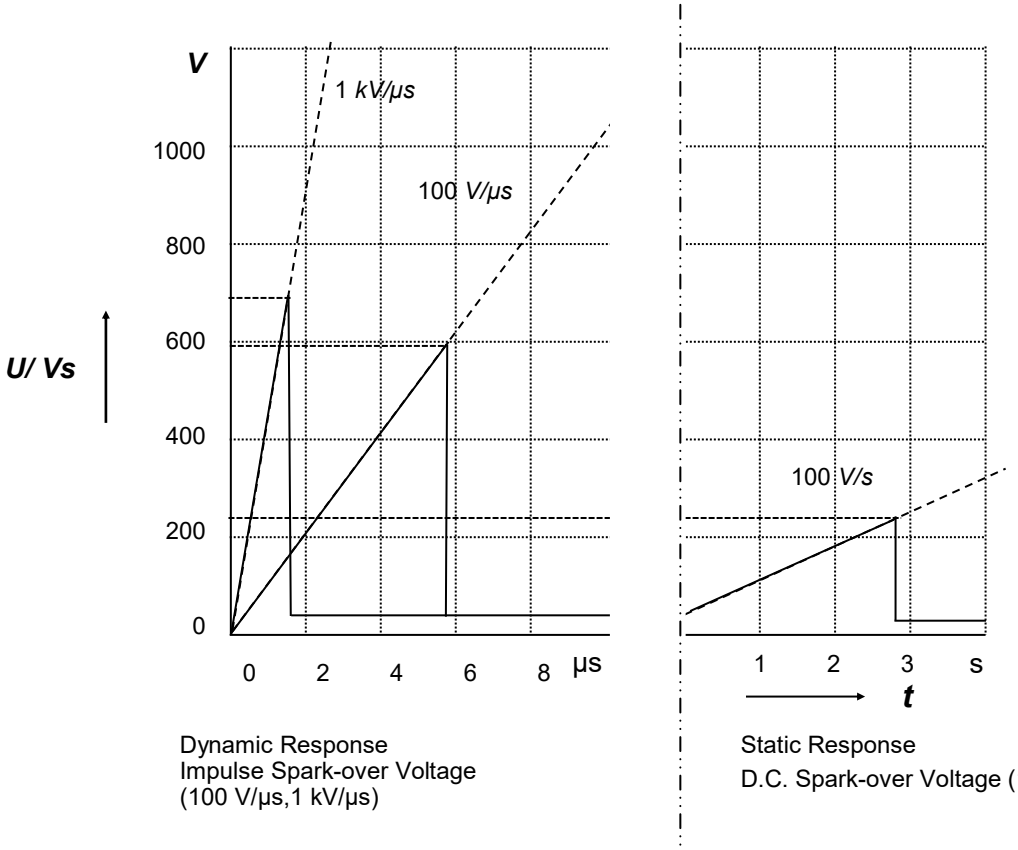
GDT

Specifications

Model			SPA351D - XX	SPA601D - XX	SPA801D - XX	SPA152H - XX	SPA202H - XX	Units
Category			II	II	II	II	II	
Application			N - PE	N - PE	N - PE	N - PE	N - PE	
Nominal D.C. Spark-over Voltage (100 V/s)			350	600	800	1500	2000	V
D.C.Spark-over Voltage (100 V/s)			280 ~ 420	480 ~ 720	640 ~ 960	1200 ~ 1800	1600 ~ 2400	V
Impulse Spark-over Voltage @1 kV/μs			< 900	< 1400	< 1600	< 2800	< 4000	V
GB/T18802.311								
Nominal Impulse Discharge Current @8/20 μs I_n			40	40	40	20	20	kA
Maximum Impulse Discharge Current @8/20 μs I_{max}			60	60	60	40	40	kA
Class II (Comply with IEC61643-11)								
Max Continuous Operating Voltage U_c 50/60 Hz			110	255	255	320	440	Vrms
Follow Current Cut-off Ability AC 50/60 Hz I_f			100	100	100	100	100	Arms
Nominal Discharge Current @8/20 μs I_n			20	20	20	20	20	kA
Maximum Discharge Current @8/20 μs I_{max}			40	40	40	40	40	kA
Insulation Resistance (100 VDC)			> 1000	> 1000	> 1000	> 1000	> 1000	MΩ
Capacitance at 100 kHz			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	pF
Agency Approvals	UL1449		●	●	●	○	○	
	TUV		○	○	○	○	○	

Notes: Pin type can be customized.

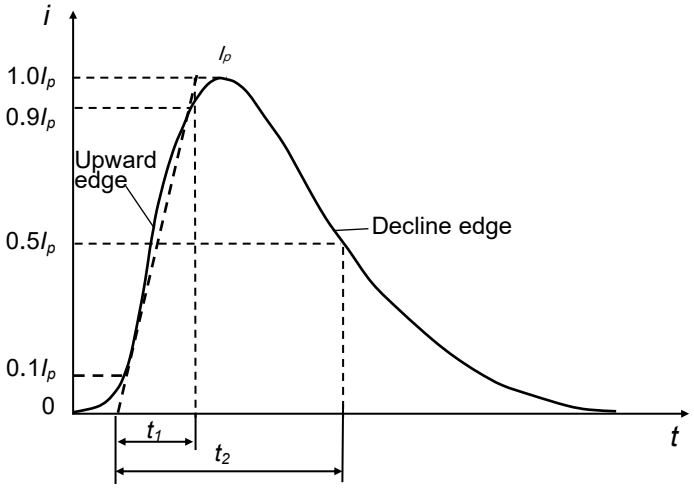
Reference Curve for Spark-over Voltage (Refer to 230 VDC)



Dynamic Response
Impulse Spark-over Voltage
(100 V/μs,1 kV/μs)

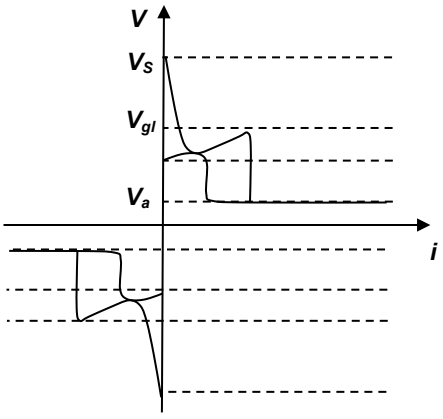
Static Response
D.C. Spark-over Voltage (100 V/s)

Reference Curve for Impulse Discharge Current

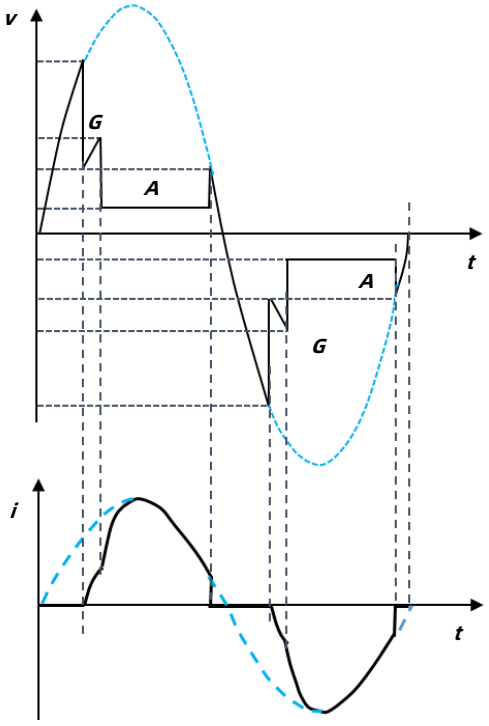


I_p: Peak current
t_1: Rise time in μs
t_2: Delay time to half value in μs

Electrical Characteristics



Relationship between Current and Voltage

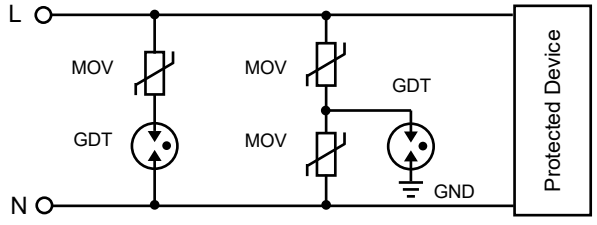


Time Variation Patterns of Voltage and Current

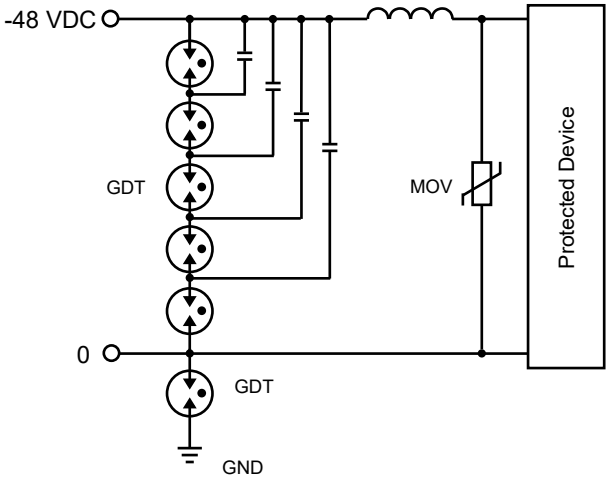
V_s : Spark-over Voltage
Vgl: Glow Voltage
Va : Arc Voltage
G : Glow Mode
A : Arc Mode

Application Example

AC Power Protection



DC Power Protection



Recommended Hand-soldering Parameters

Items	Condition
Soldering Iron Temperature	350 °C (Max.)
Soldering Time	4 s (Max.)
Space between soldering point and product body	2 mm (Min.)

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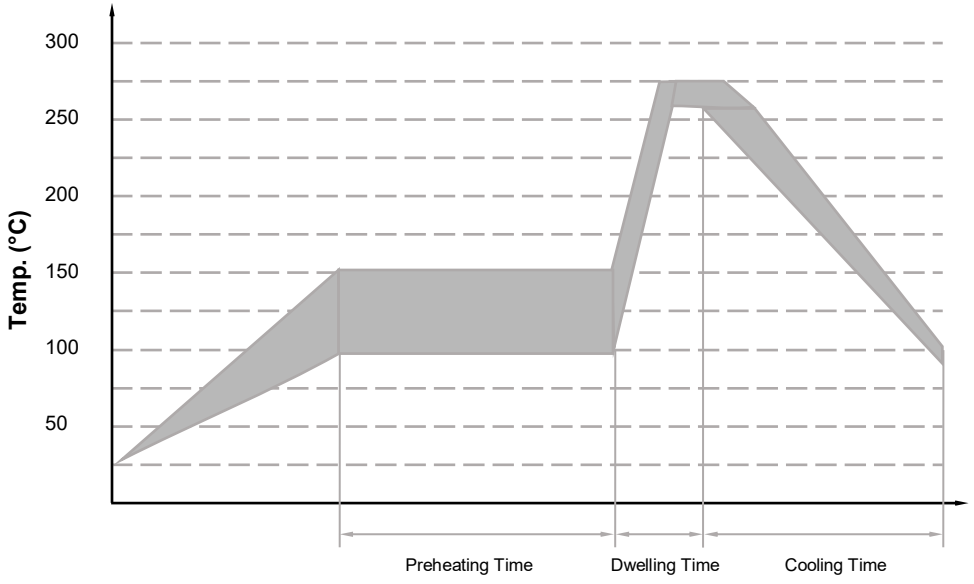
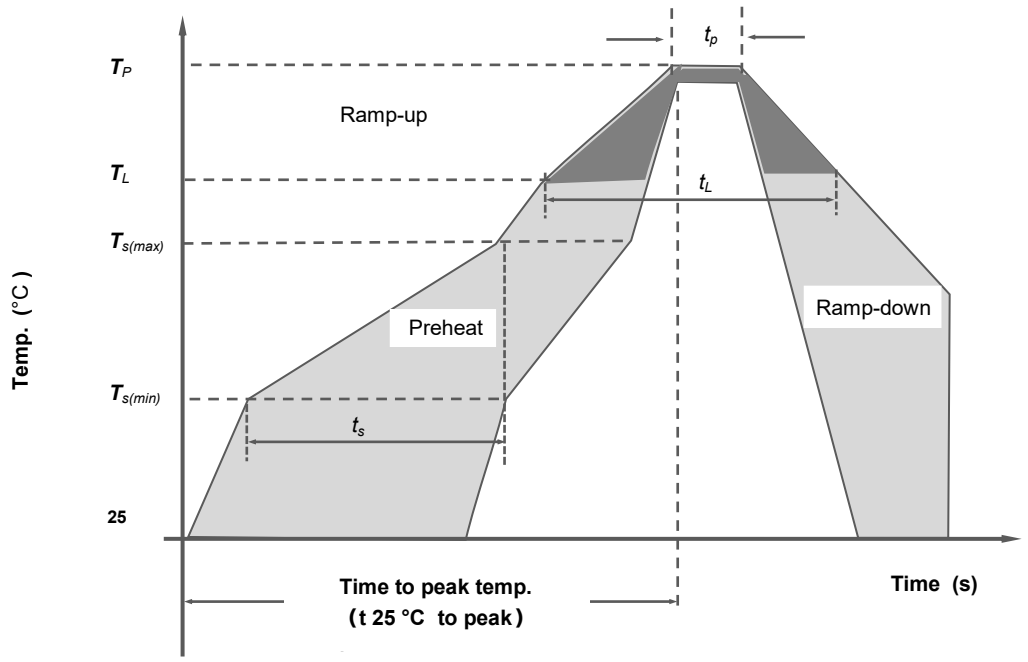
Wave Soldering Parameters (For Reference Only)



Item	Temp. (°C)	Time (s)
Preheating	90 to 150	< 150
Dwelling	255 to 280	3 to 10

Reflow Soldering Parameters (Reference)

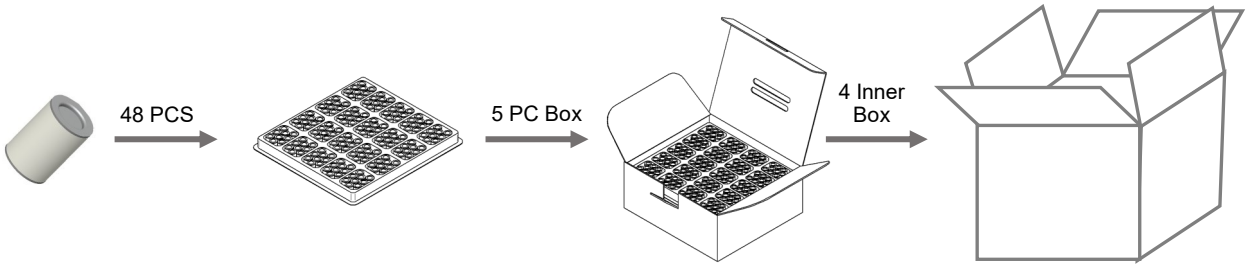


Reflow Condition		Pb-Free Assembly
Preheat	Temp. Min $T_{s(min)}$	150 °C
	Temp. Max $T_{s(max)}$	200 °C
	Time (Min to Max) t_s	(60 to 180) s
Average ramp up rate (Liquidus Temp. (T_L) to peak)		3 °C / second max
$T_{s\ (max)}$ to T_L Ramp-up Rate		5 °C / second max
Reflow	Temp. (T_L) (Liquidus)	217 °C
	Temp. (t_L)	(60 to 150) s
Peak Temp. (T_P)		(255 to 260) °C
Time within 5 °C of actual peak Temp. (t_P)		(10 to 30) s
Ramp-down Rate		6 °C / second max
Time 25 °C to peak Temp. (T_P)		8 minutes max
Do not exceed		260 °C

Packaging Information

PC Box Package

Item	PC Box	Inner Box	Carton
Dimensions (mm)	215 × 205 × 15	230 × 210 × 60	440 × 250 × 325
Quantity (PCS)	48	240	960
Notes: Packaging dimensions and quantity are for reference only.			



Please refer to the specifications for the packaging details.

GDT

ATTENTION

Usage

1. Do not operate GDT in power supply networks, whose maximum operation voltage exceeds the minimum spark-overvoltage of the GDT.
2. The GDT 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.
3. If the contacts of GDT are defective, current load can cause sparks and loud noises.
4. When air pressure is from 55 kPa to 106 kPa. The relative altitude shall be +5000 m to –500 m.

Replacement

The GDT is a non-repairable product. For safety sake, please use equivalent GDT for replacement.

Storage

The packaged GDT should be placed in a dry, ventilation and non-corrosive environment.

Installation Position

Do not install the GDT in a touchable position.

Mechanical Stress

Do not take violent action such as knocking when assembling, to avoid product failure.