



## 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.

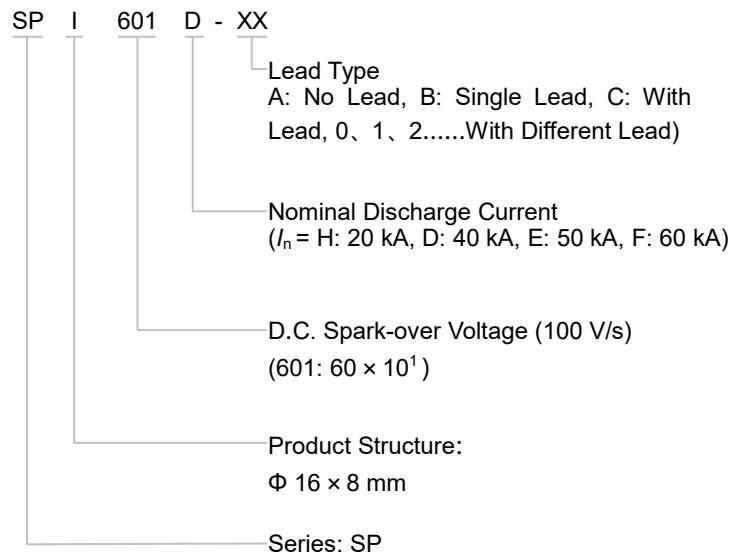
## Features

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

## Applications

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

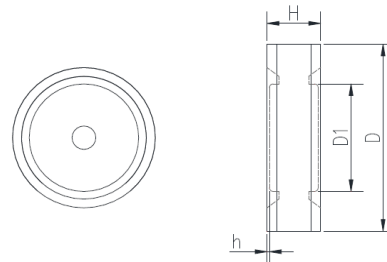
## Part Number System



## Agency Approvals

Agency	Standards	File No.
	UL497B	E513446
	TUV	No.B107221002 Rev.00

## Dimensions (mm)



D	D1	H	h
$\Phi 16 \pm 0.3$	$\Phi 9.2$	$8 \pm 0.6$	0.2

Notes: Pin type can be customized.

**Glossary**



Item	Description
$V_s$	<b>D.C. Spark-over Voltage</b> The voltage at which the GDT sparks over with slowly increasing d.c. voltage. — (IEC 61643-311)
$V$	<b>Impulse Spark-over Voltage</b> 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)
$V_a$	<b>Arc Voltage</b> Voltage drop across the GDT during arc current flow. — (IEC 61643-311)
$V_{gl}$	<b>Glow Voltage</b> 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)
<b>8/20 <math>\mu</math>s</b>	<b>8/20 Current Impulse</b> Current impulse with a nominal virtual front time of 8 $\mu$ s and a nominal time to half-value of 20 $\mu$ s. — (IEC 61643-11)
<b>10/350 <math>\mu</math>s</b>	<b>10/350 Current Impulse</b> Current impulse with a nominal virtual front time of 10 $\mu$ s and a nominal time to half-value of 350 $\mu$ s. — (IEC 61643-11)
<b>1.2/50 <math>\mu</math>s</b>	<b>1.2/50 Voltage Impulse</b> Voltage impulse with a nominal virtual front time of 1.2 $\mu$ s and a nominal time to half-value of 50 $\mu$ s. — (IEC 61643-11)
$I$	<b>Alternating Discharge Current</b> The r.m.s. value of an approximately sinusoidal alternating current passing through the gas discharge tube. — (ITU-T K.12)
$I_n$	<b>Nominal Discharge Current</b> Crest value of the current through the GDT having a current waveshape of 8/20 $\mu$ s. — (IEC 61643-11)
$I_{max}$	<b>Maximum Discharge Current</b> Crest value of a current through the GDT having an 8/20 $\mu$ s waveshape and magnitude according to the manufacturers specification. $I_{max}$ is equal to or greater than $I_n$ . — (IEC 61643-11)

GDT

GDT

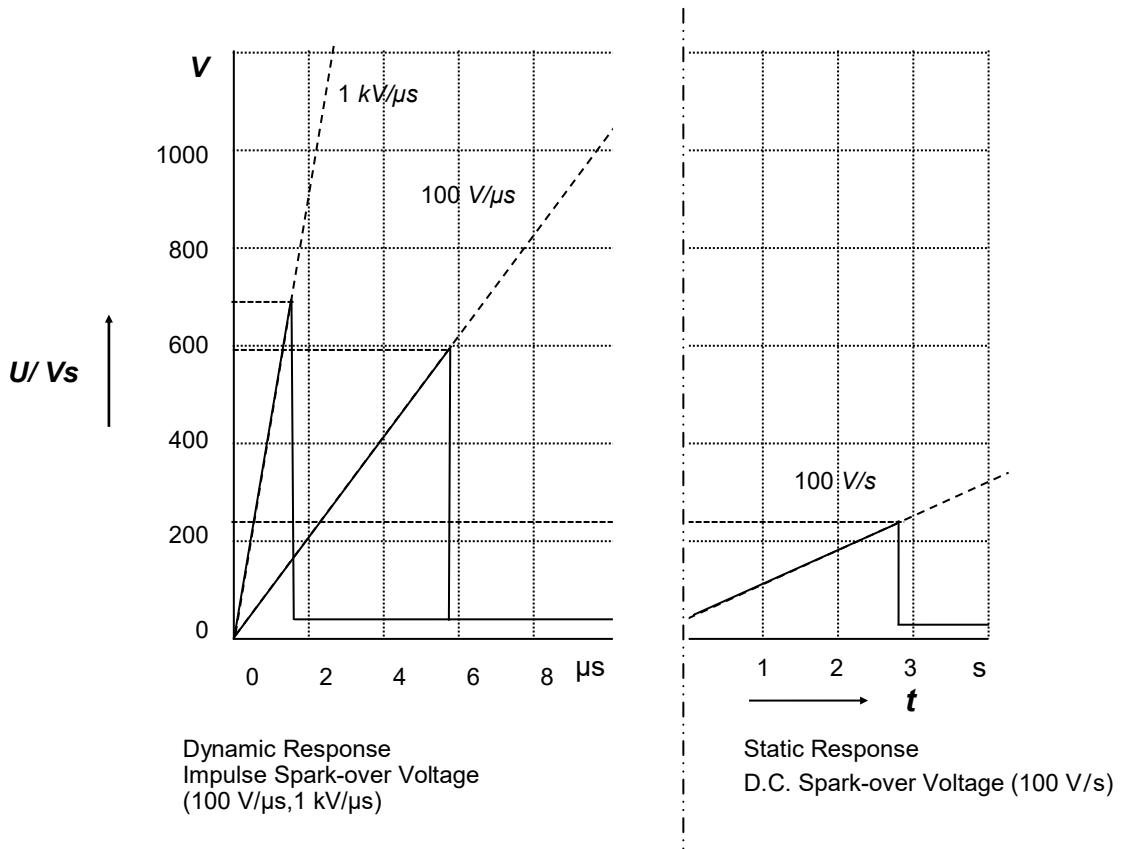
$I_{imp}$	<p><b>Impulse Discharge Current</b> Crest value of a discharge current through the SPD with specified charge transfer Q and specified energy W/R in the specified time.</p> <p style="text-align: right;">— (IEC 61643-11)</p>
$U_p$	<p><b>Voltage Protection Level</b> Maximum voltage to be expected 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.</p> <p style="text-align: right;">— (GB 18802.11、IEC 61643-11)</p>
$U_C$	<p><b>maximum r.m.s. voltage</b> Which may be continuously applied to the SPD's mode of protection.</p> <p style="text-align: right;">— (IEC 61643-11)</p>
$I_f$	<p><b>follow current</b> Peak current supplied by the electrical power system and flowing through the SPD after a discharge current impulse.</p> <p style="text-align: right;">— (IEC 61643-11)</p>
<i>class I</i>	<p><b>class I tests</b> Tests carried out with the impulse discharge current <math>I_{imp}</math>, with an 8/20 current impulse with a crest value equal to the crest value of <math>I_{imp}</math>, and with a 1.2/50 voltage impulse.</p> <p style="text-align: right;">— (IEC 61643-11)</p>
<i>class II</i>	<p><b>class II tests</b> Tests carried out with the nominal discharge current <math>I_n</math>, and the 1.2/50<math>\mu</math>s voltage impulse.</p> <p style="text-align: right;">— (IEC 61643-11)</p>

**Specifications**

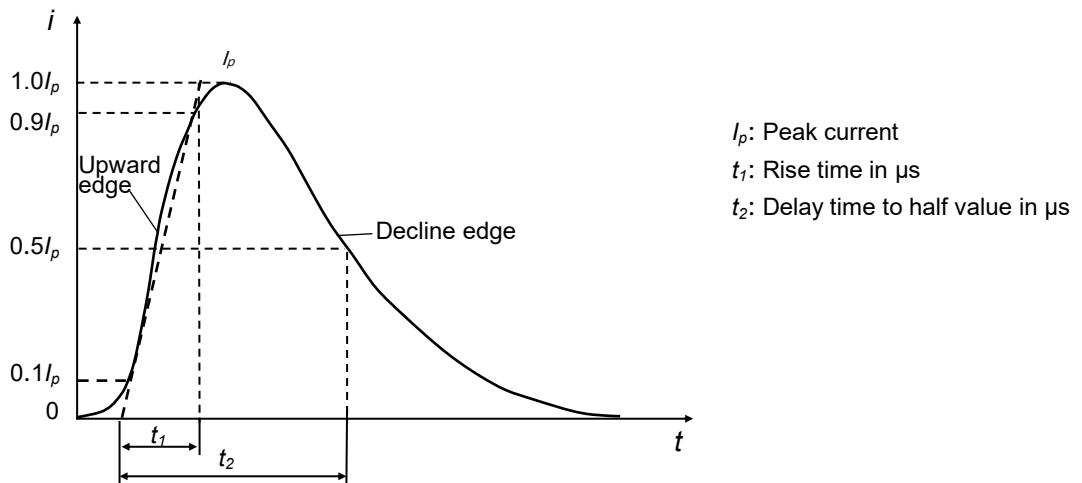
Model	SPI351D - XX   SPI601D - XX   SPI801D - XX   SPI152H - XX   SPI252H - XX						
Category	II	I & II	I & II	II	II	Units	
Application	N - PE	N - PE	N - PE	N - PE	N - PE		
Nominal D.C. Spark-over Voltage (100 V/s)	350	600	800	1500	2500	V	
D.C. Spark-over Voltage (100 V/s)	280 ~ 420	480 ~ 720	640 ~ 960	1200 ~ 1800	2000 ~ 3000	V	
Impulse Spark-over Voltage @1 kV/μs	< 800	< 1200	< 1600	< 2800	< 4500	V	
<b>GB/T18802.311</b>							
Nominal Impulse Discharge Current @8/20 μs $I_n$	40	40	40	20	20	kA	
Maximum Impulse Discharge Current @8/20 μs $I_{max}$	80	80	80	40	40	kA	
<b>Class II (Comply with IEC61643-11)</b>							
Max Continuous Operating Voltage $U_c$ 50/60 Hz	110	255	255	320	440	Vrms	
Follow Current Cut-off Ability AC 50/60 Hz	100	100	100	100	100	Arms	
Nominal Discharge Current @8/20 μs $I_n$	30	30	30	20	20	kA	
Maximum Discharge Current @8/20 μs $I_{max}$	60	60	60	40	40	kA	
Insulation Resistance (100 VDC)	> 1000	> 1000	> 1000	> 1000	> 1000	MΩ	
Capacitance at 100 kHz	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	pF	
Agency Approvals	UL1449		○	●	●	○	●
	TUV		○	●	●	●	●

Notes: Pin type can be customized.

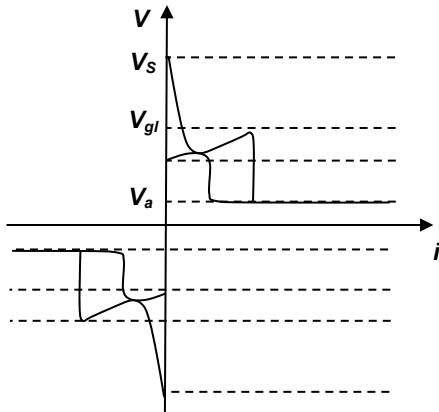
**Reference Curve for Spark-over Voltage (Refer to 230 VDC)**



**Reference Curve for Impulse Discharge Current**

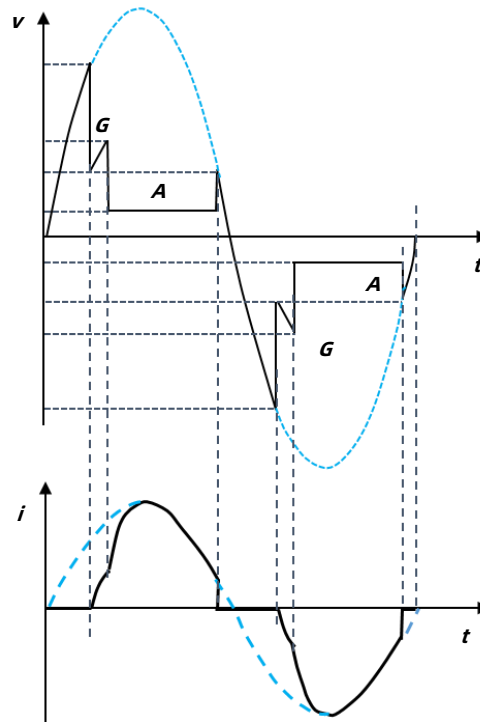


**Electrical Characteristics**



Relationship between Current and Voltage

- $V_s$  : Spark-over Voltage
- $V_{gl}$  : Glow Voltage
- $V_a$  : Arc Voltage
- G : Glow Mode
- A : Arc Mode

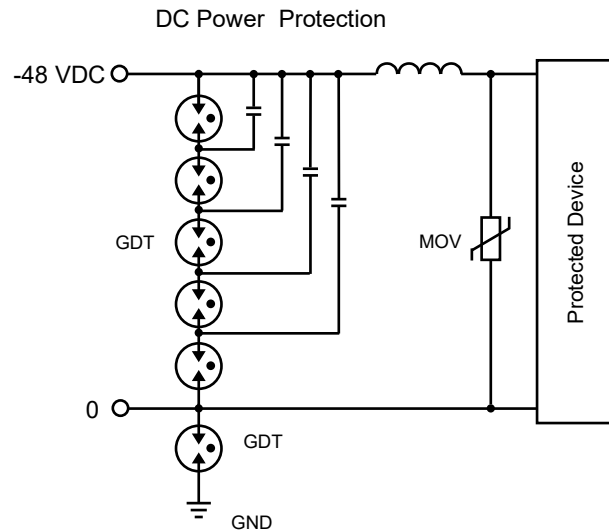
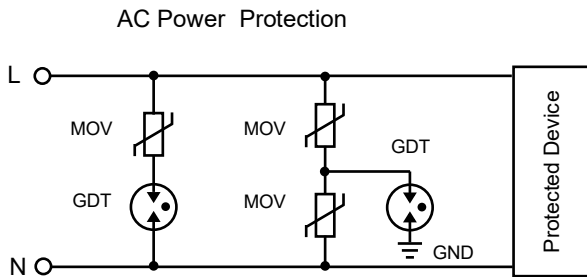


Time Variation Patterns of Voltage and Current

GDT

GDT

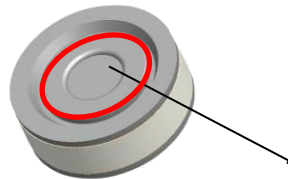
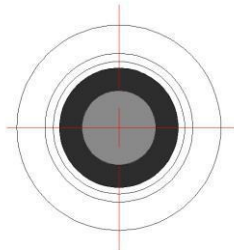
**Application Example**



### Recommended Hand-soldering Parameters

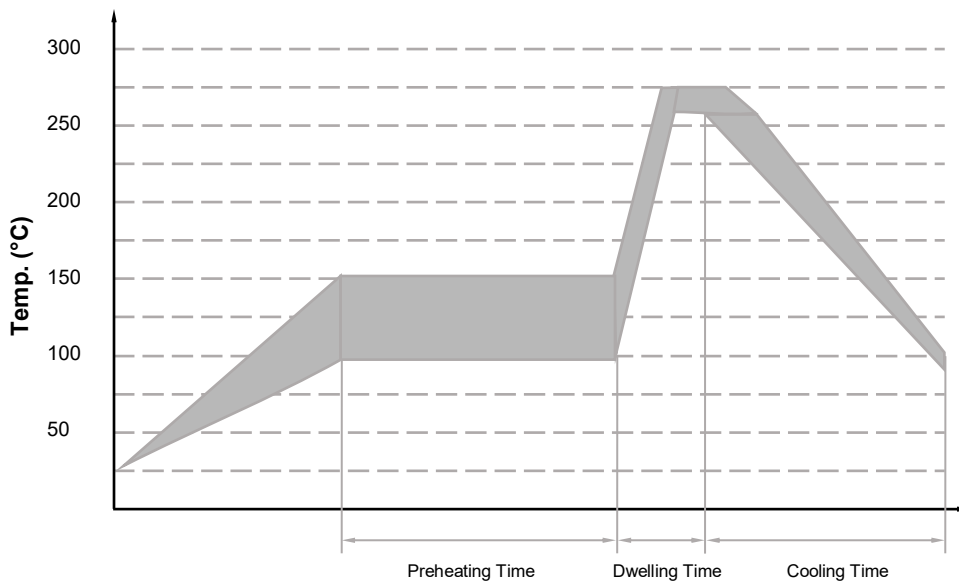
Items	Condition
Iron Temperature	350 °C (Max.)
Soldering Time	4 s (Max.)
Space between soldering point and the bottom of product	2 mm (Min.)

Welding Area: The shaded area shall be the welding area( no welding beyond the shaded area)



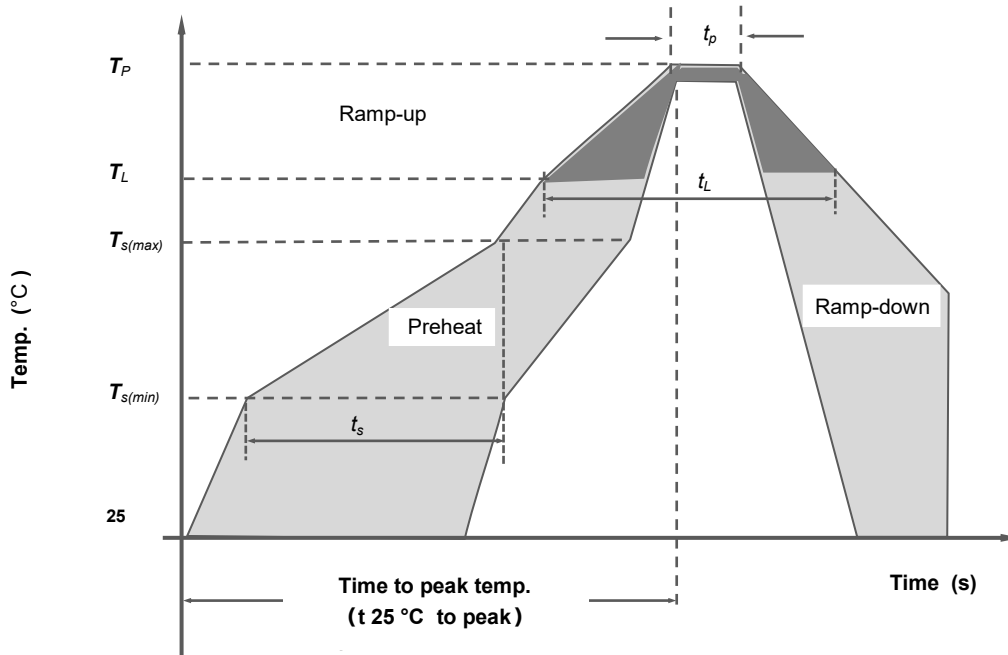
(Welding area: Red area)

### 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

GDT

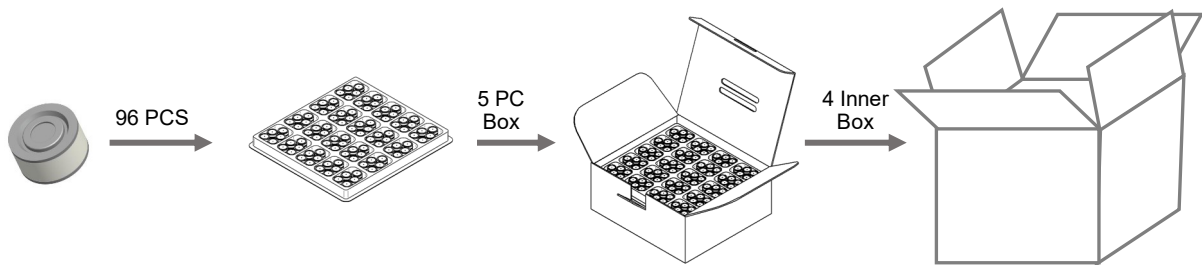
GDT



## Packaging Information

### PC Box Package

Item	PC Box	Inner Box	Carton
Dimensions (mm)	215 × 205 × 16	230 × 210 × 98	440 × 250 × 230
Quantity (PCS)	96	480	1920
Notes: Packaging dimensions and quantity are for reference only.			



Please refer to the specifications for the packaging details.



# 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.