

### Description

The TD101X series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic LSOP4 package.

With the robust coplanar double mold structure, TD101X series provide the most stable isolation feature.

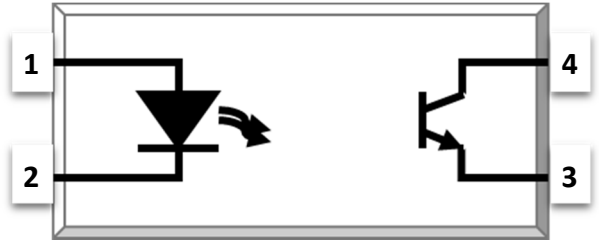
### Features

- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- RoHS & REACH Compliance
- MSL class 1
- Regulatory Approvals
  - UL - UL1577
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898

### Applications

- Switch mode power supplies
- Programmable controllers
- Household appliances
- Office equipment

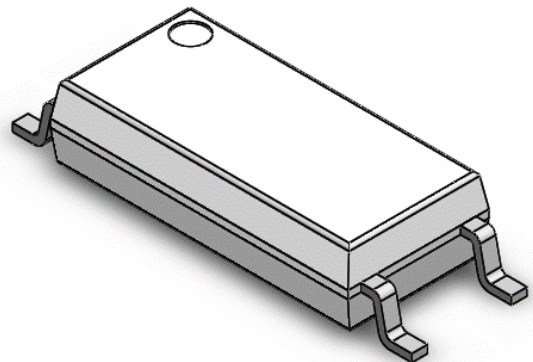
### SCHEMATIC



### PIN DEFINITION

1. Anode
2. Cathode
3. Emitter
4. Collector

### PACKAGE OUTLINE





**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT	NOTE
<b>INPUT</b>				
Forward Current	$I_F$	60	mA	
Peak Forward Current	$I_{FP}$	1	A	1
Reverse Voltage	$V_R$	6	V	
Input Power Dissipation	$P_I$	100	mW	
<b>OUTPUT</b>				
Collector - Emitter Voltage	$V_{CEO}$	80	V	
Emitter - Collector Voltage	$V_{ECO}$	7	V	
Collector Current	$I_C$	50	mA	
Output Power Dissipation	$P_O$	150	mW	
<b>COMMON</b>				
Total Power Dissipation	$P_{tot}$	250	mW	
Isolation Voltage	$V_{iso}$	5000	V <sub>rms</sub>	2
Operating Temperature	$T_{opr}$	-55~110	°C	
Storage Temperature	$T_{stg}$	-55~125	°C	
Soldering Temperature	$T_{sol}$	260	°C	

Note 1. 100µs pulse, 100Hz frequency

Note 2. AC For 1 Minute, R.H. = 40 ~ 60%



**LSOP4, DC Input, Photo Transistor Coupler**

ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C							
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT							
Forward Voltage	V <sub>F</sub>	-	1.45	1.6	V	I <sub>F</sub> =50mA	
Reverse Current	I <sub>R</sub>	-	-	10	μA	V <sub>R</sub> =6V	
Input Capacitance	C <sub>in</sub>	-	30	250	pF	V=0, f=1kHz	
OUTPUT							
Collector Dark Current	I <sub>CEO</sub>	-	-	100	nA	V <sub>CE</sub> =20V, I <sub>F</sub> =0	
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	80	-	-	V	I <sub>C</sub> =0.1mA, I <sub>F</sub> =0	
Emitter-Collector Breakdown Voltage	BV <sub>ECO</sub>	7	-	-	V	I <sub>E</sub> =0.1mA, I <sub>F</sub> =0	
TRANSFER CHARACTERISTICS							
Current Transfer Ratio	TD1010	CTR	300	-	600	%	I <sub>F</sub> =5mA, V <sub>CE</sub> =5V
	TD1015		50	-	150		
	TD1016		100	-	300		
	TD1017		80	-	160		
	TD1018		130	-	260		
	TD1019		200	-	400		I <sub>F</sub> =10mA, V <sub>CE</sub> =5V
	TD1011		60	-	300		
	TD1012		63	-	125		
	TD1013		100	-	200		I <sub>F</sub> =1mA, V <sub>CE</sub> =5V
	TD1014		160	-	320		
	TD1012		22	-	-		
	TD1013		34	-	-		
	TD1014		56	-	-		
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	-	0.1	0.3	V	I <sub>F</sub> =10mA, I <sub>C</sub> =1mA	
Isolation Resistance	R <sub>ISO</sub>	10 <sup>12</sup>	10 <sup>14</sup>	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C <sub>IO</sub>	-	0.4	1	pF	V=0, f=1MHz	
Cut-off Frequency	F <sub>c</sub>	-	80	-	kHz	V <sub>CE</sub> =2V, I <sub>C</sub> =2mA R <sub>L</sub> =100Ω, -3dB	3
Response Time (Rise)	T <sub>r</sub>	-	5	18	μs	V <sub>CE</sub> =2V, I <sub>C</sub> =2mA R <sub>L</sub> =100Ω	4
Response Time (Fall)	T <sub>f</sub>	-	6	18	μs		4

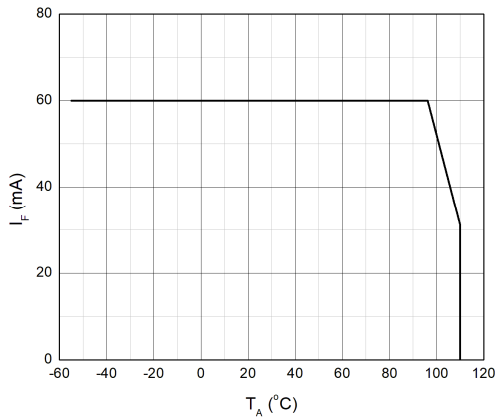
Note 3. Fig.12&13

Note 4. Fig.14

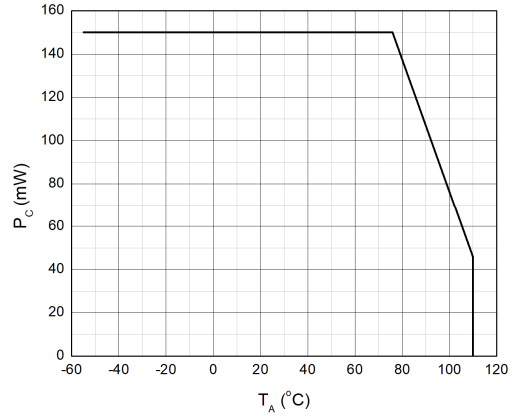


**CHARACTERISTIC CURVES**

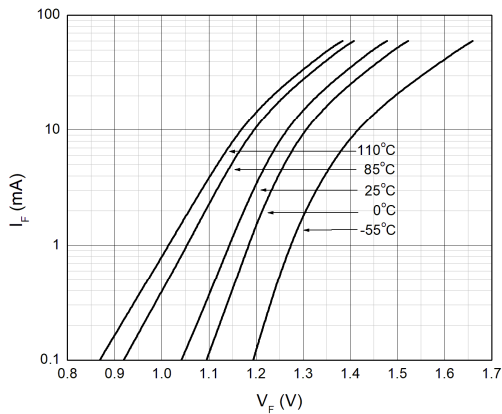
**Fig.1 Forward Current vs. Ambient Temperature**



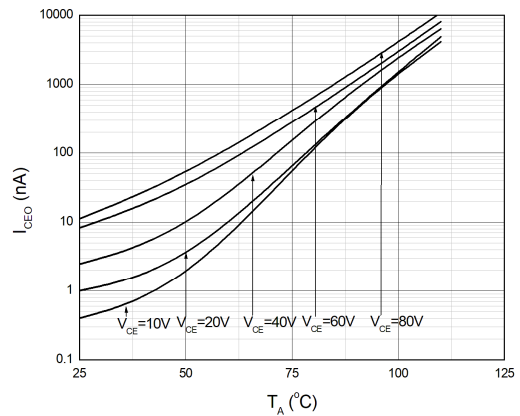
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



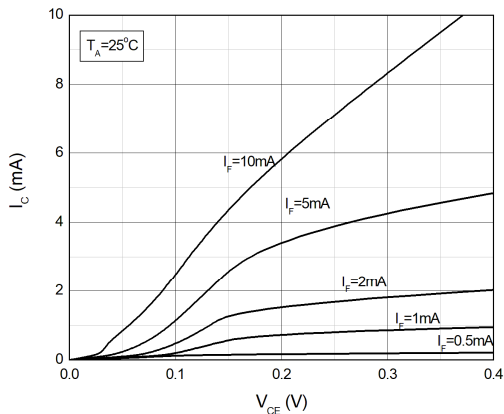
**Fig.3 Forward Current vs. Forward Voltage**



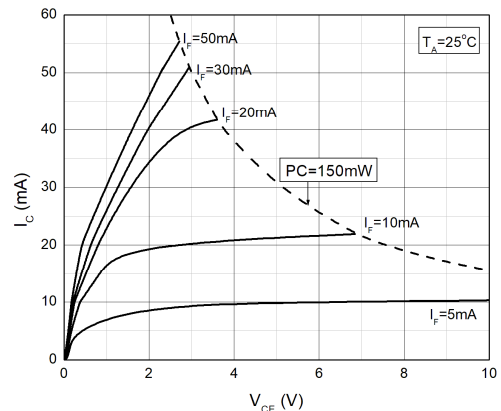
**Fig.4 Collector Dark Current vs. Ambient Temperature**



**Fig.5 Collector Current vs. Collector-emitter Voltage**

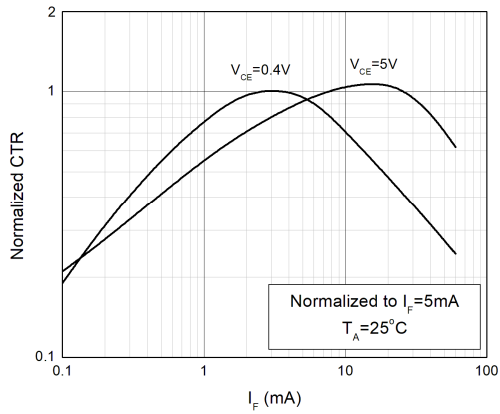


**Fig.6 Collector Current vs. Collector-emitter Voltage**

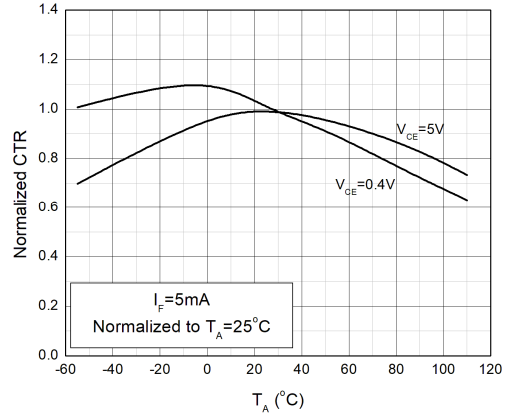


**CHARACTERISTIC CURVES**

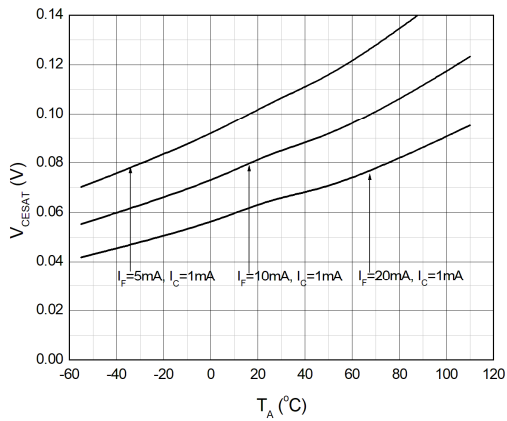
**Fig.7 Normalized Current Transfer Ratio vs. Forward Current**



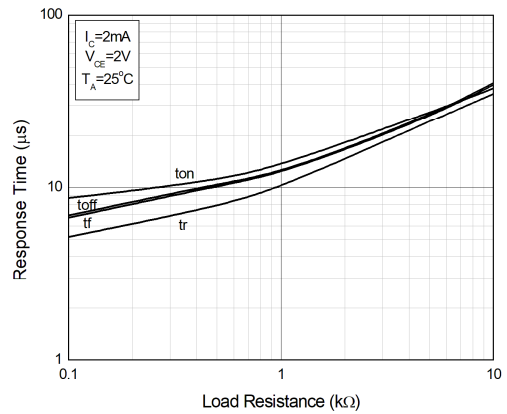
**Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature**



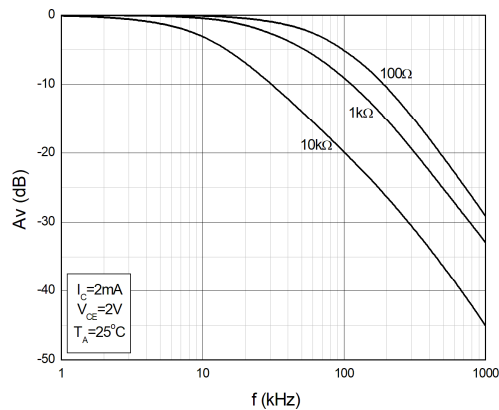
**Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature**



**Fig.10 Switching Time vs. Load Resistance**

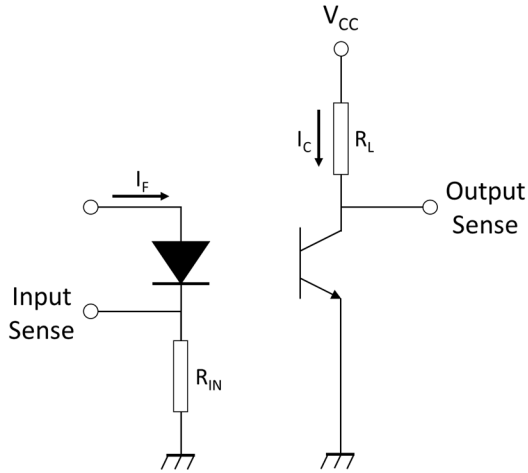


**Fig.11 Frequency Response**

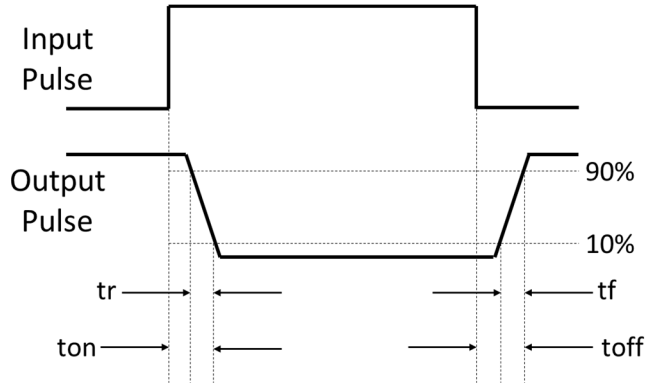


**TEST CIRCUITS**

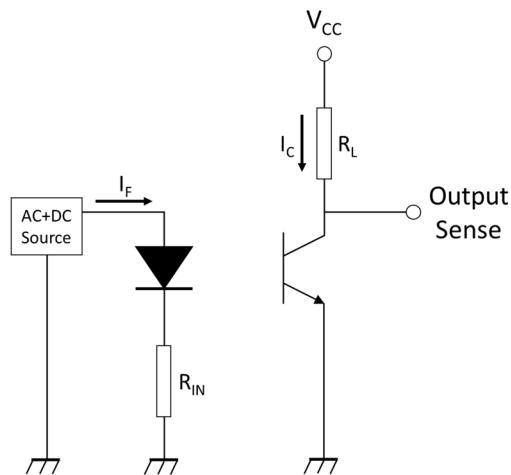
**Fig.12 Test Circuits of Response Time**



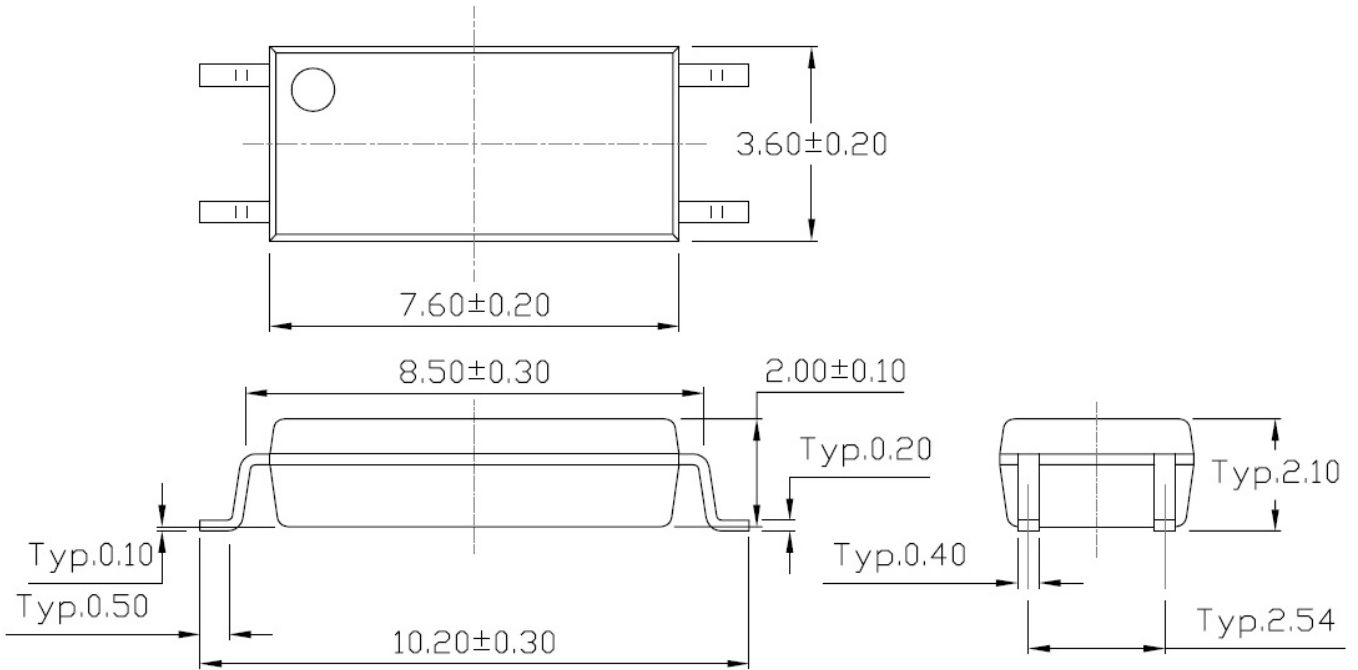
**Fig.13 Curves of Response Time**



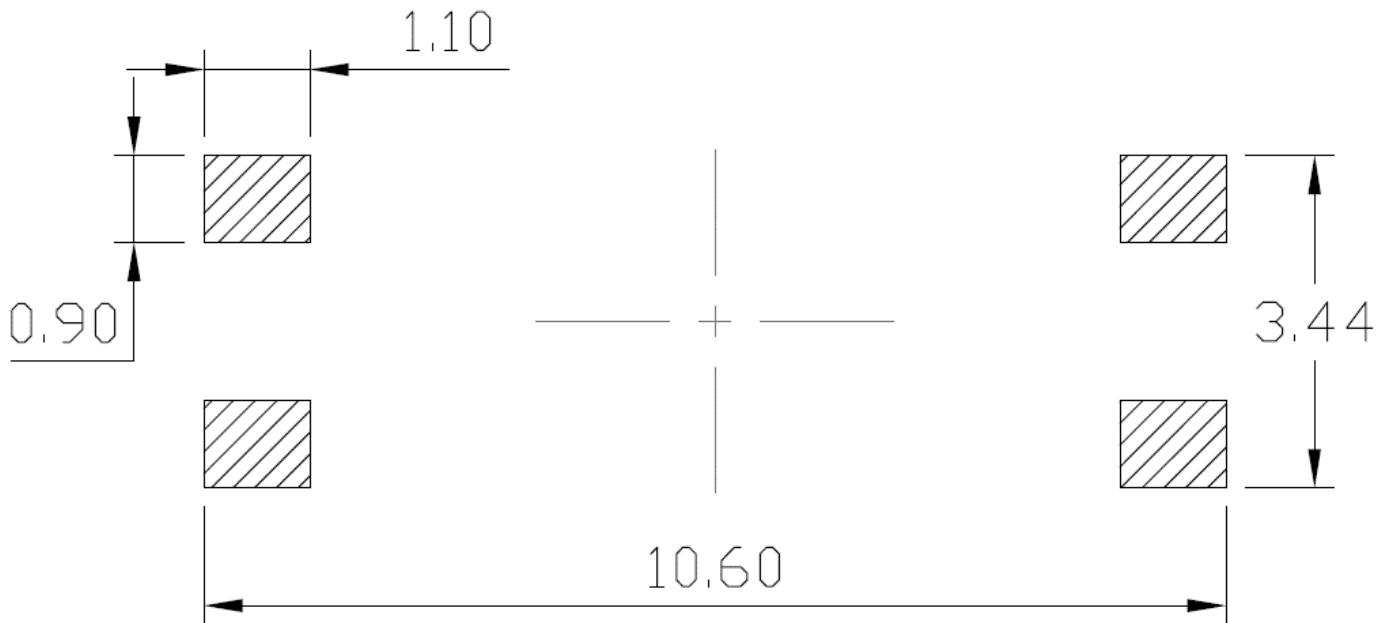
**Fig.14 Test Circuits of Frequency Response**



**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**

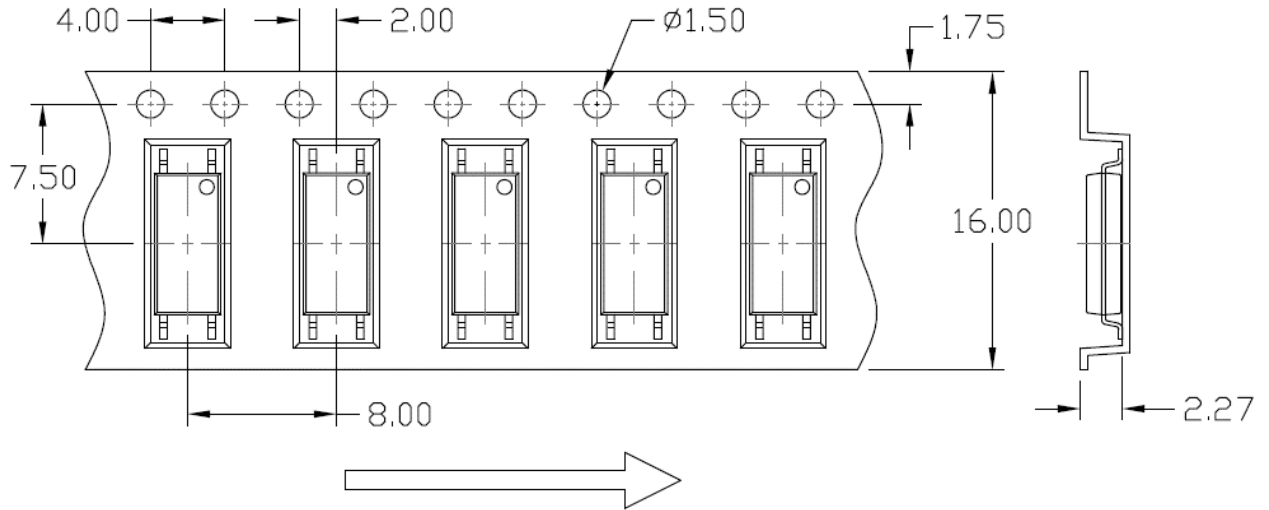


**RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)**

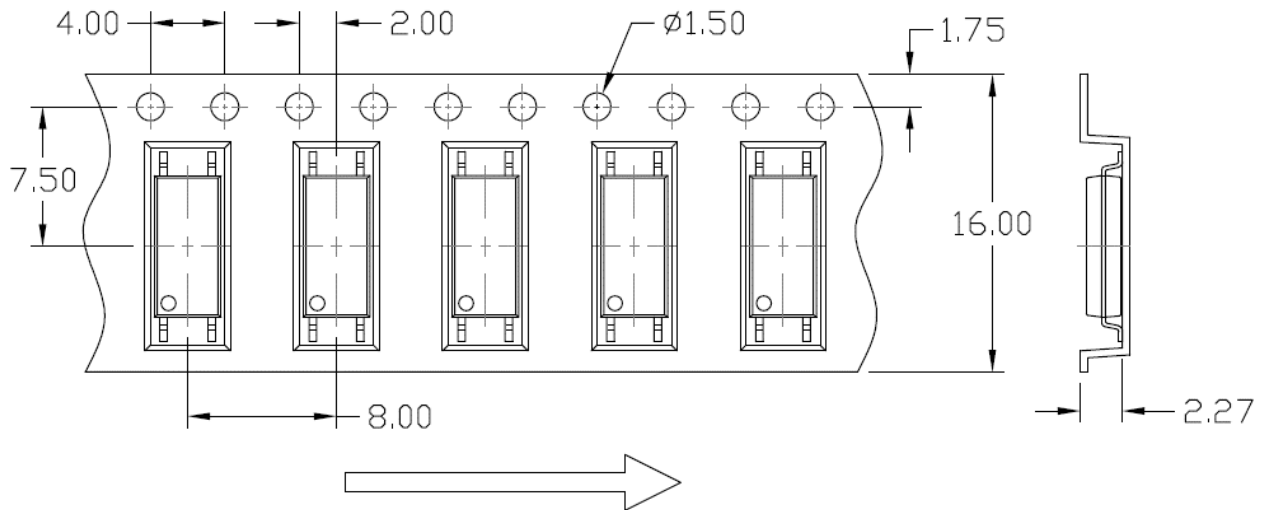


### CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

#### Option T1



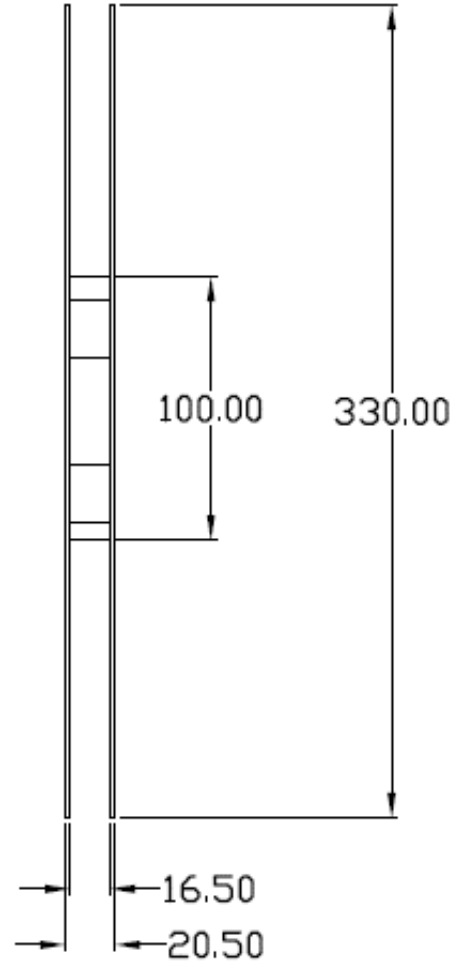
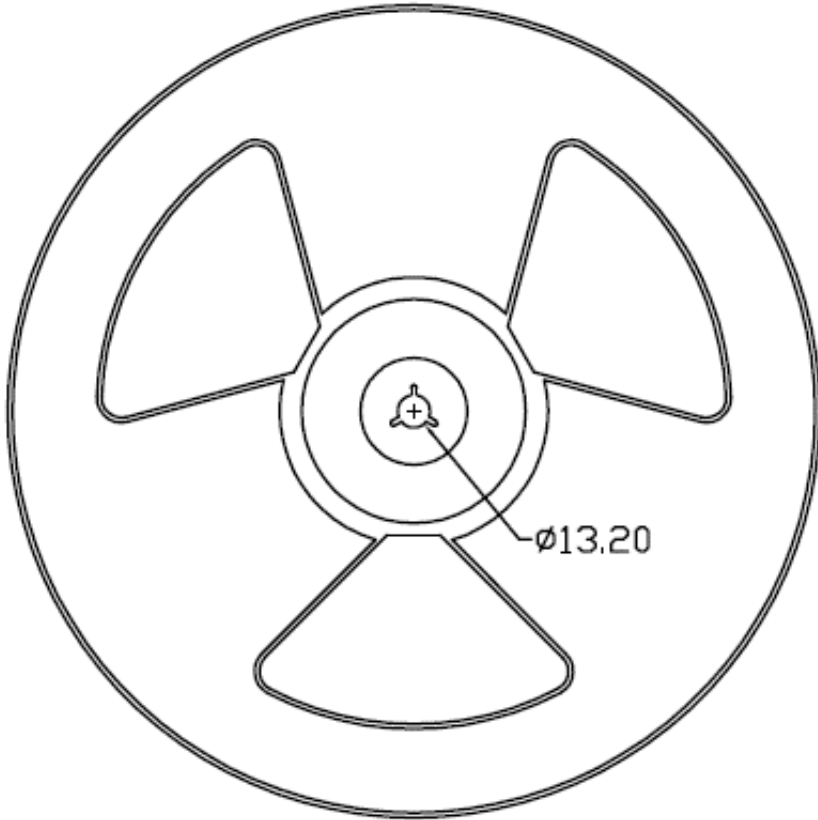
#### Option T2





**REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Option T1 & T2**



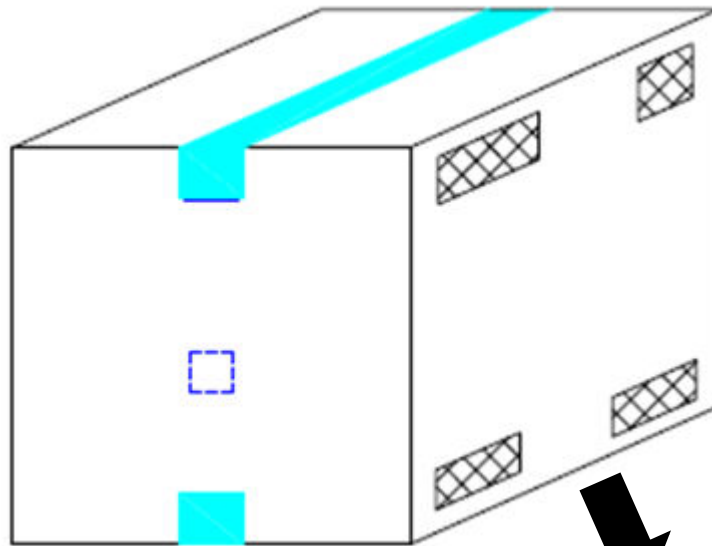
**BOX SPECIFICATIONS (Reel Type)**

**Inner Box**

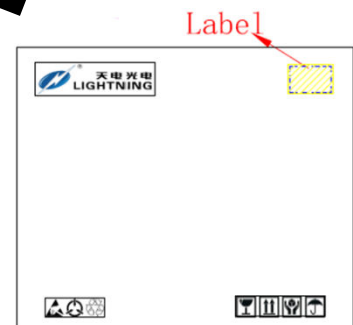


- L x W x H = 36cm x 36cm x 6.9cm

**Outer Box**



- L x W x H = 45cm x 38cm x 38cm





**ORDERING AND MARKING INFORMATION**

**MARKING INFORMATION**



**TD** : Company Abbr.  
**101X** : Part Number & Rank  
**V** : VDE Option  
**Y** : Fiscal Year  
**A** : Manufacturing Code  
**WW** : Work Week

**ORDERING INFORMATION**

**TD101X(Z)-GV**

TD – Company Abbr.  
 101X – Rank (0/1/2/3/4/5/6/7/8/9)  
 Z – Tape and Reel Option (T1/T2)  
 G – Green  
 V – VDE Option (V or None)

**LABEL INFORMATION**

**福建天电光电有限公司**  
 FUJIAN LIGHTNING OPTOELECTRONIC CO., LTD.

Part No : XXXXXXXXXXXXX      Bin Code : X

Lot No : XXXXXXXXXXXX

Date Code : XXXX

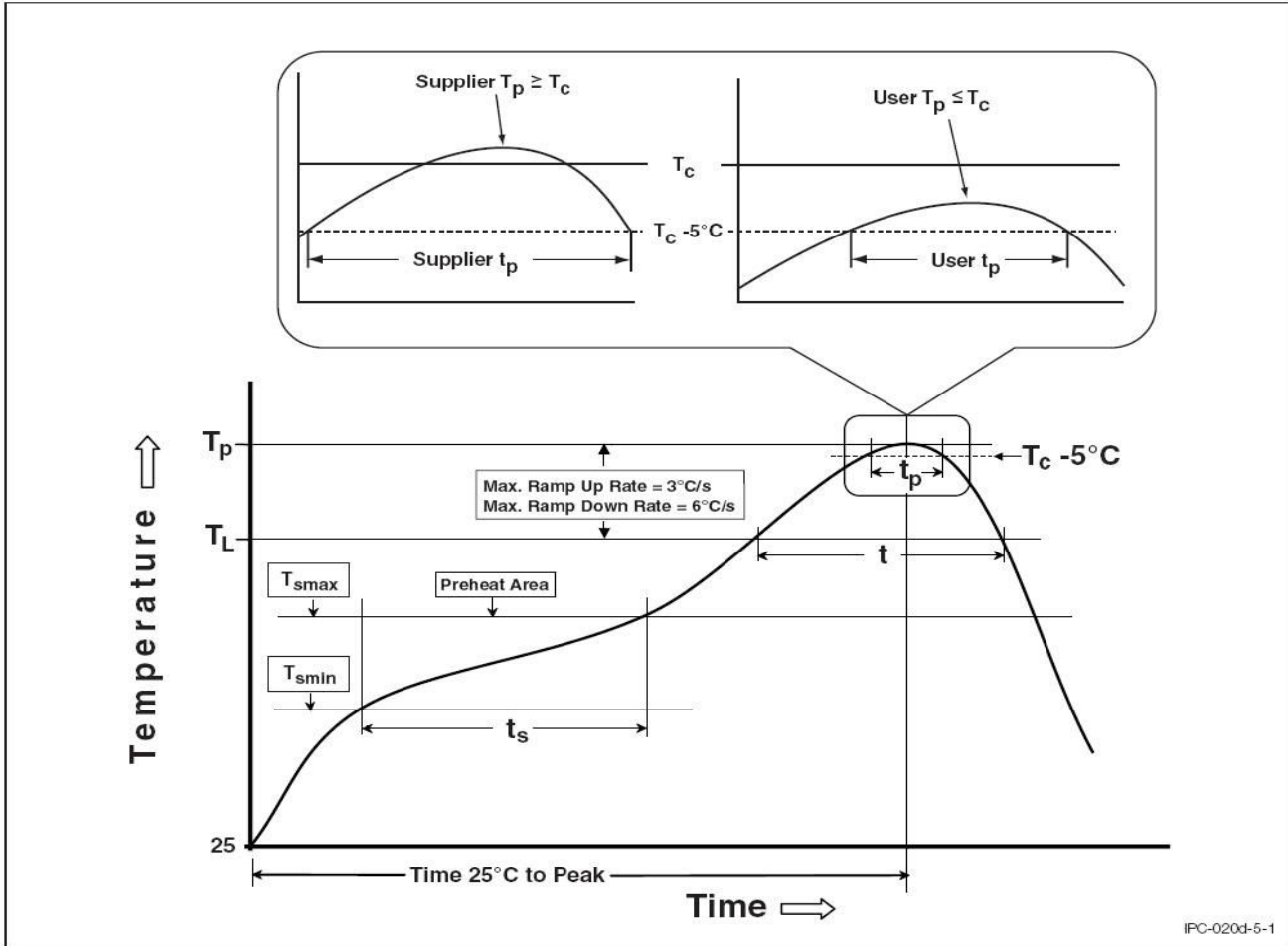
Q'ty : XXXX pcs

**PACKING QUANTITY**

Option	Quantity	Quantity – Inner box	Quantity – Outer box
T1	3000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 45k Units
T2	3000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 45k Units

**REFLOW INFORMATION**

**REFLOW PROFILE**



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. ( $T_{smin}$ )	100	150°C
Temperature Max. ( $T_{smax}$ )	150	200°C
Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	60-120 seconds	60-120 seconds
Ramp-up Rate ( $t_L$ to $t_P$ )	3°C/second max.	3°C/second max.
Liquidous Temperature ( $T_L$ )	183°C	217°C
Time ( $t_L$ ) Maintained Above ( $T_L$ )	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time ( $t_P$ ) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate ( $T_P$ to $T_L$ )	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.



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- Please contact LIGHTNING sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify LIGHTNING's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.