



## Description

The TDM301X, TDM302X and TDM305X series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon random-phase photo triac in a plastic SOP4 package.

With the robust coplanar double mold structure, TDM301X, TDM302X and TDM305X series provide the most stable isolation feature.

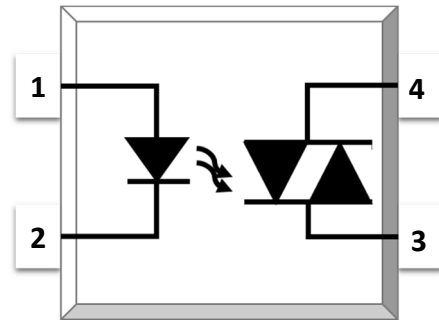
## Features

- High isolation 3750 VRMS
- DC input with random-phase photo triac output
- Operating temperature range - 40 °C to 100 °C
- REACH & RoHS compliance
- Halogen free
- MSL class 1
- Regulatory Approvals
  - UL - UL1577
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898

## Applications

- Solenoid/valve controls
- Lighting controls
- Motor controls
- Temperature controls
- Static AC power switches
- Solid state relays
- Interfacing microprocessors to 115 to 240VAC peripherals

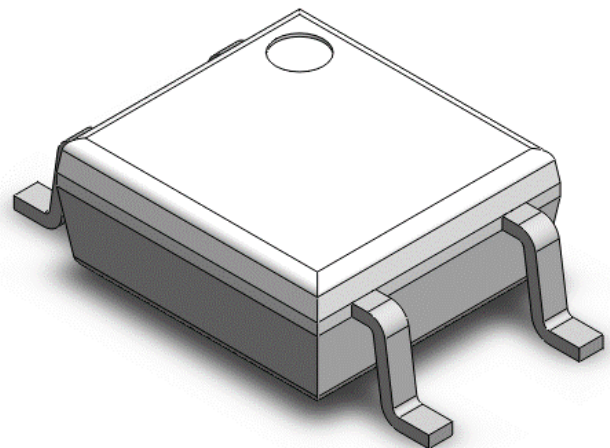
## SCHEMATIC



## PIN DEFINITION

1. Anode
2. Cathode
3. Terminal
4. Terminal

## PACKAGE OUTLINE





**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT	NOTE
<b>INPUT</b>				
Forward Current	I <sub>F</sub>	60	mA	
Reverse Voltage	V <sub>R</sub>	6	V	
Junction Temperature	T <sub>j</sub>	125	°C	
Input Power Dissipation	P <sub>I</sub>	100	mW	
<b>OUTPUT</b>				
Off-state Output Terminal Voltage	TDM301X	250	V	
	TDM302X	400		
	TDM305X	600		
Peak Repetitive Surge Current PW=100μs, 120pps	I <sub>TSM</sub>	1	A	
Junction Temperature	T <sub>j</sub>	125	°C	
Output Power Dissipation	P <sub>O</sub>	300	mW	
<b>COMMON</b>				
Total Power Dissipation	P <sub>tot</sub>	330	mW	
Isolation Voltage	V <sub>iso</sub>	3750	V <sub>rms</sub>	1
Operating Temperature	T <sub>opr</sub>	-40~100	°C	
Storage Temperature	T <sub>stg</sub>	-55~125	°C	
Soldering Temperature	T <sub>sol</sub>	260	°C	2

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

Note 2. For 10 seconds



ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C							
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT							
Forward Voltage	V <sub>F</sub>	-	1.24	1.4	V	I <sub>F</sub> =10mA	
Reverse Current	I <sub>R</sub>	-	-	10	μA	V <sub>R</sub> =6V	
Input Capacitance	C <sub>in</sub>	-	8.5	250	pF	V=0, f=1kHz	
OUTPUT							
Peak Off-state Current, Either Direction	I <sub>DRM</sub>	-	-	100	nA	V <sub>DRM</sub> =Rated V <sub>DRM</sub> I <sub>F</sub> =0	3
Peak On-state Current, Either Direction	V <sub>TM</sub>	-	1.58	2.5	V	I <sub>TM</sub> =100mA I <sub>F</sub> =Rated I <sub>FT</sub>	
Critical Rate of Rise of Off-state Voltage	dV/dt	1000	-	-	V/μs	V <sub>PEAK</sub> =Rated V <sub>DRM</sub>	4
TRANSFER CHARACTERISTICS							
LED Trigger Current	TDM3010, TDM3021, TDM3051	I <sub>FT</sub>	-	-	15	Terminal Voltage = 3V I <sub>TM</sub> =100mA	
	TDM3011, TDM3022, TDM3052		-	-	10		
	TDM3012, TDM3023, TDM3053		-	-	5		
Holding Current	I <sub>H</sub>	-	257	-	μA		
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	

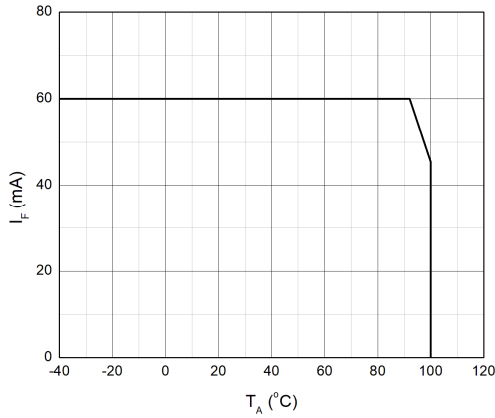
Note3. Test voltage must be applied within dV/dt rating.

Note4. Refer to Fig.15 & Fig.16

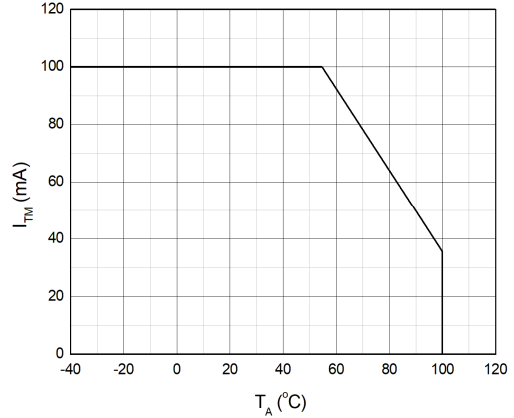


**CHARACTERISTIC CURVES**

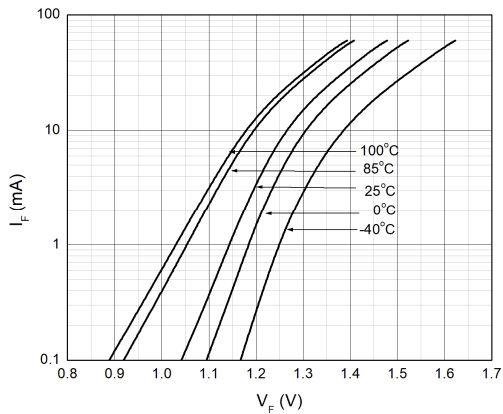
**Fig.1 Forward Current vs. Ambient Temperature**



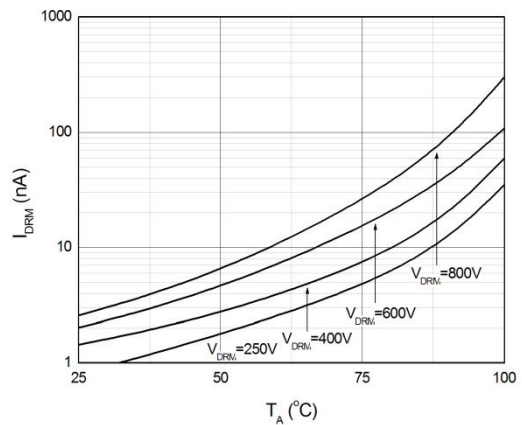
**Fig.2 On-state Terminal Current vs. Ambient Temperature**



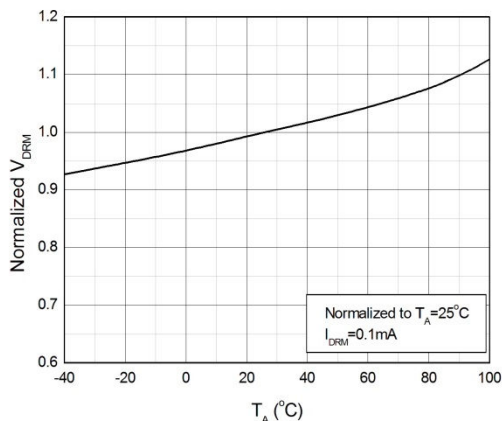
**Fig.3 Forward Current vs. Forward Voltage**



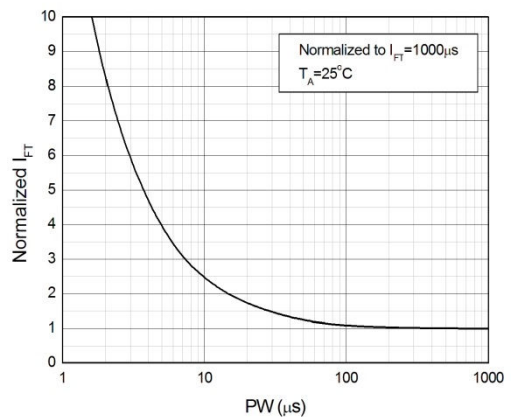
**Fig.4 Off-state Terminal Current vs. Ambient Temperature**



**Fig.5 Normalized Off-state Terminal Voltage vs. Ambient Temperature**



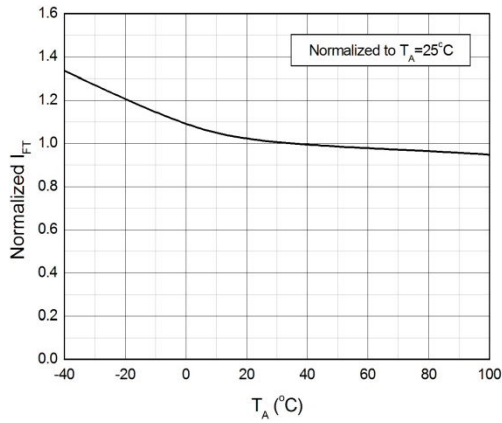
**Fig.6 Normalized Trigger Current vs. LED Trigger Pulse Width**



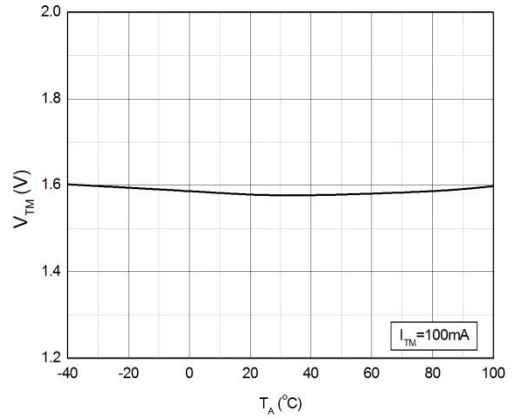


**CHARACTERISTIC CURVES**

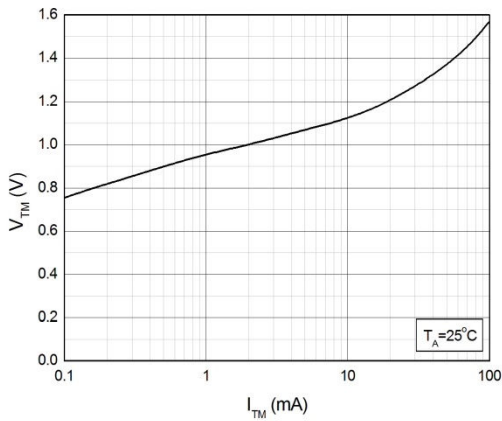
**Fig.7 Normalized Trigger Current vs. Ambient Temperature**



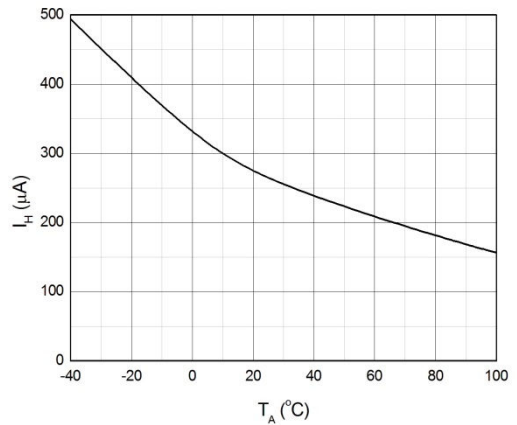
**Fig.8 On-state Terminal Voltage vs. Ambient Temperature**



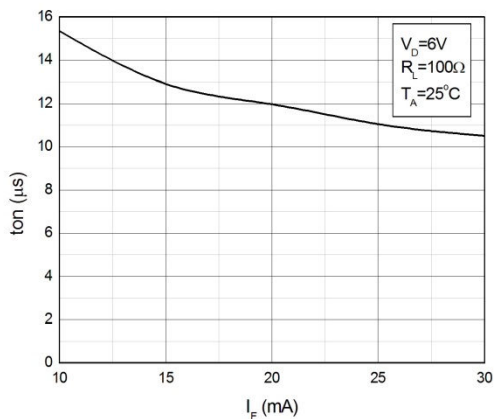
**Fig.9 On-state Terminal Voltage vs. On-state Terminal Current**



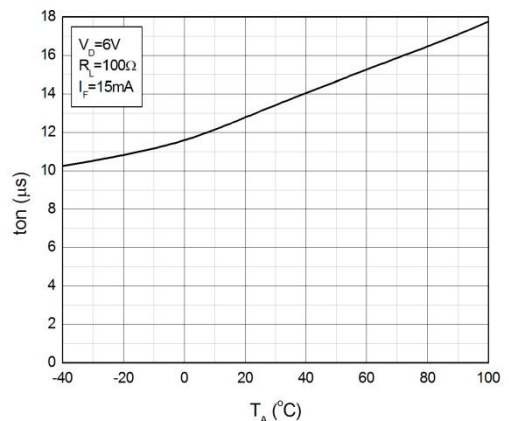
**Fig.10 Holding Current vs. Ambient Temperature**



**Fig.11 Turn On Time vs. Forward Current**

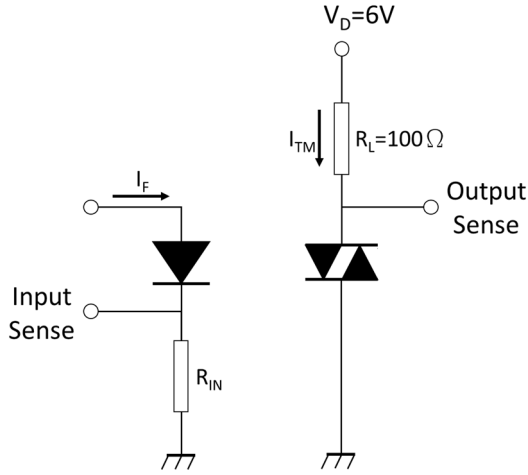


**Fig.12 Turn On Time vs. Ambient Temperature**

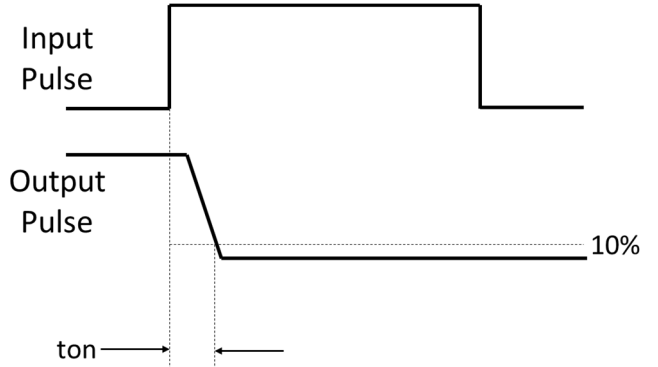


**TEST CIRCUITS**

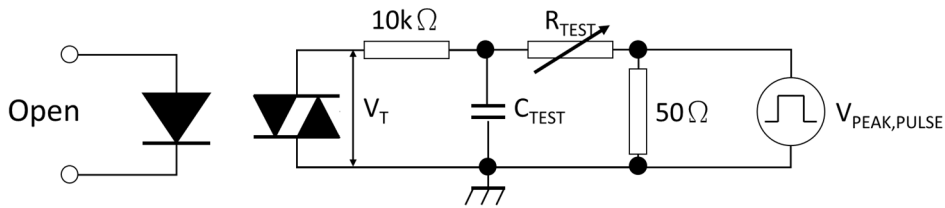
**Fig.13 Test Circuits of Turn On Time**



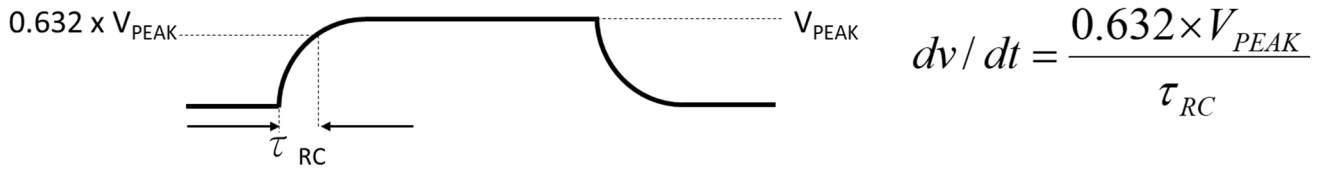
**Fig.14 Waveforms of Turn On Time**



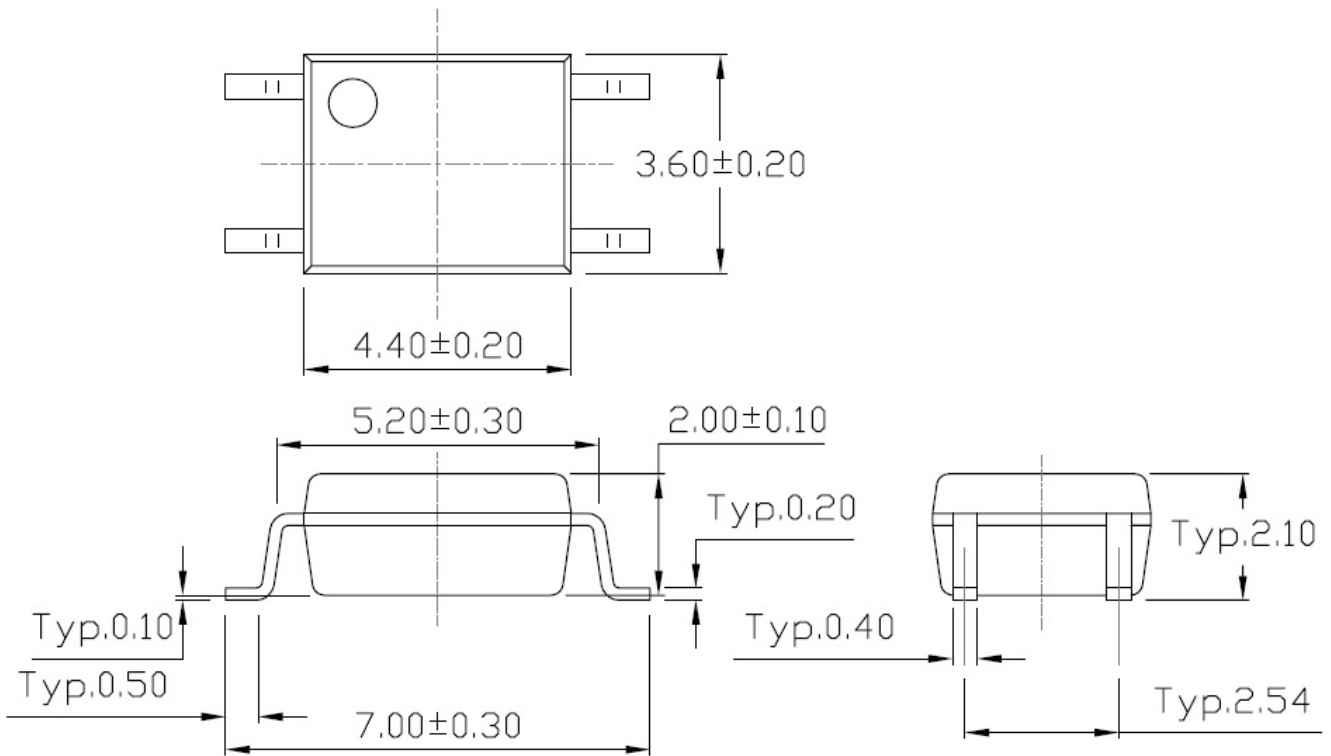
**Fig.15 Test Circuits of dV/dt**



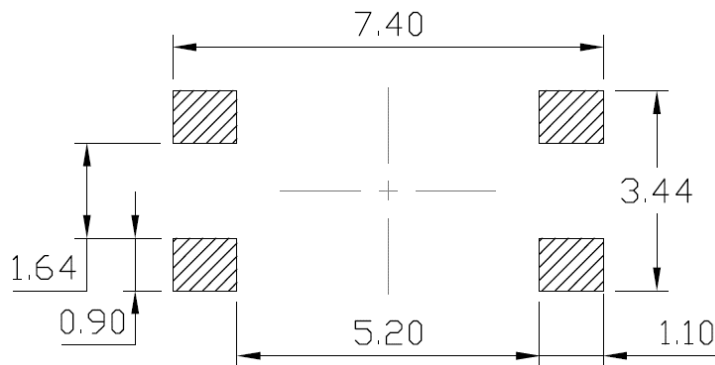
**Fig.16 Waveforms of dV/dt**



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

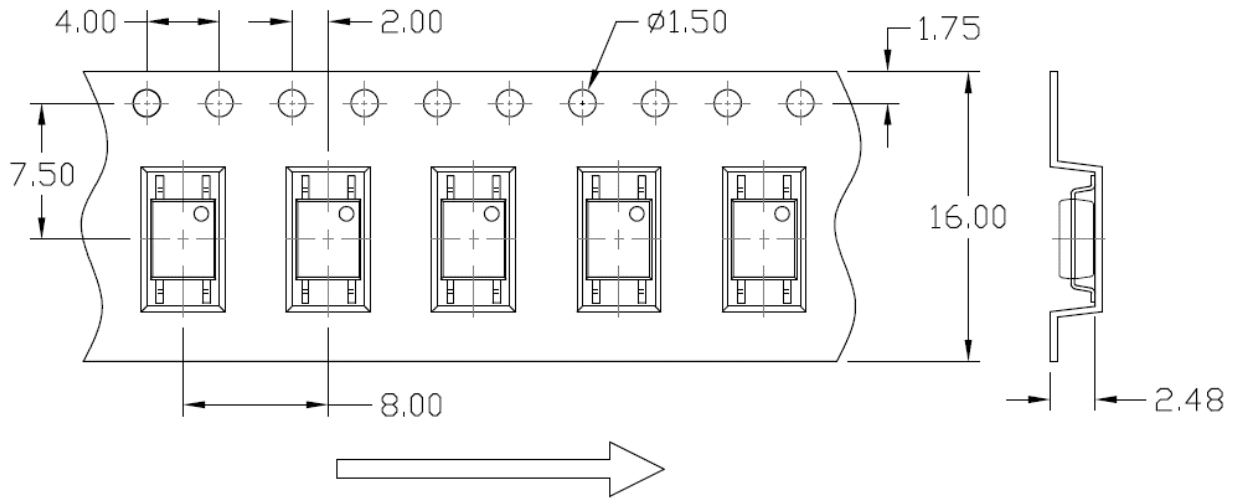


**Recommended Solder Mask (Dimensions in mm unless otherwise stated)**

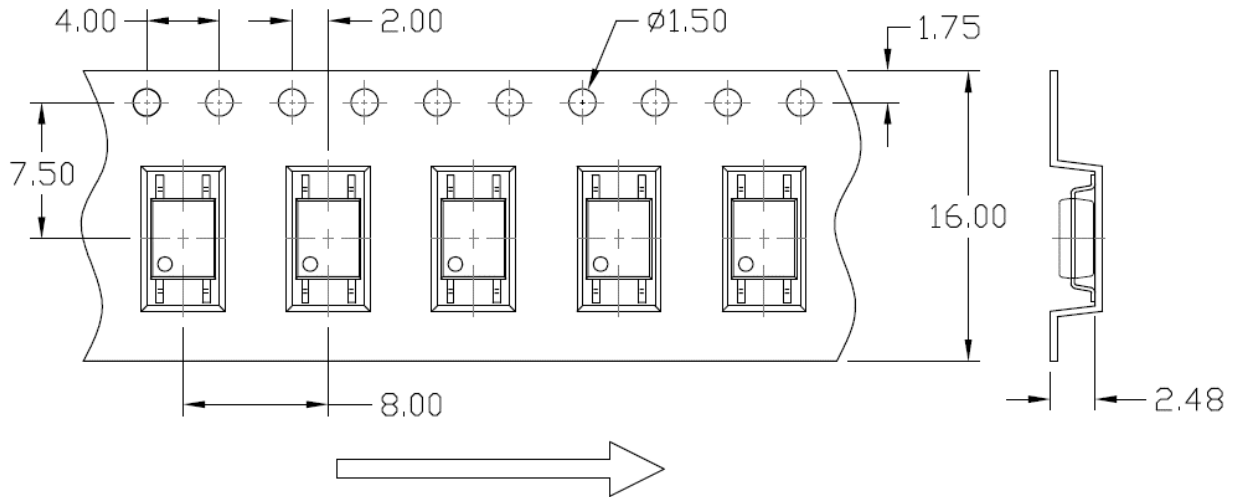


**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Option T1**



**Option T2**

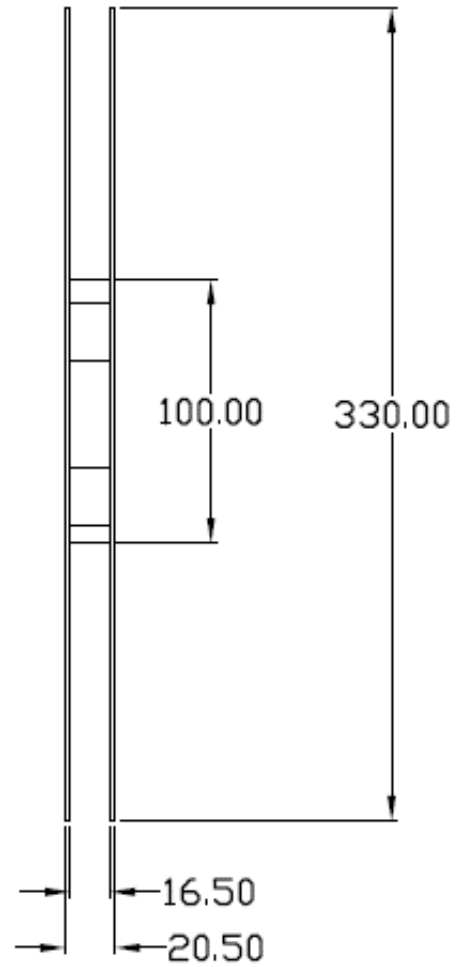
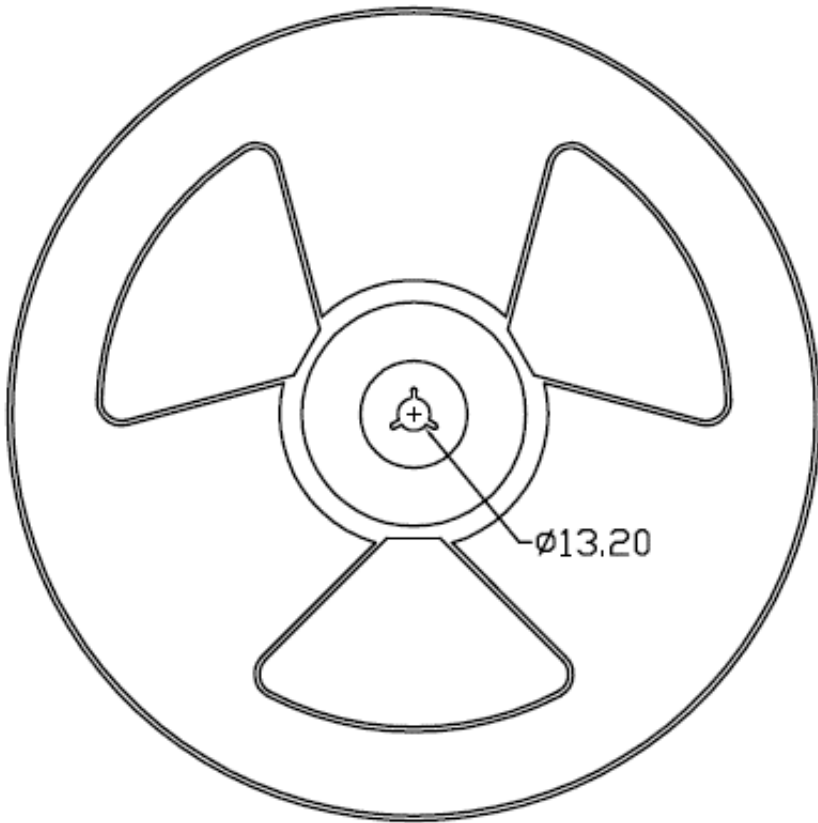






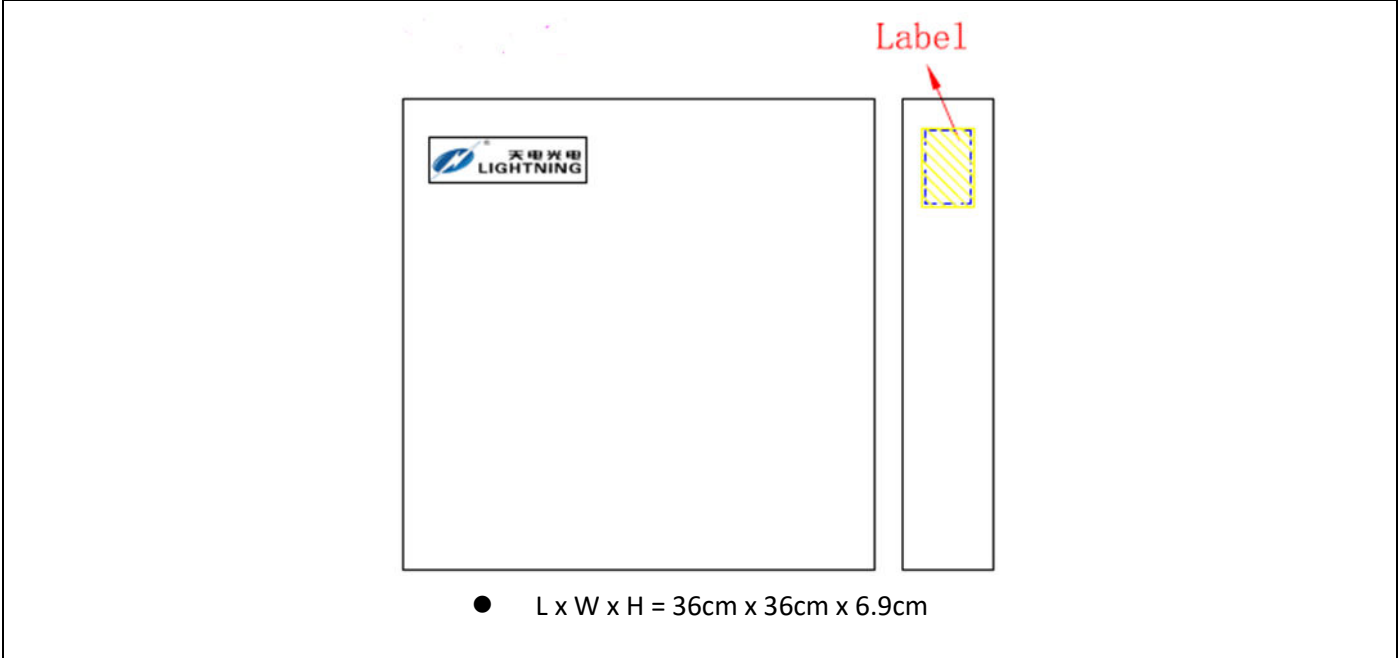
**REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

Option T1 & T2

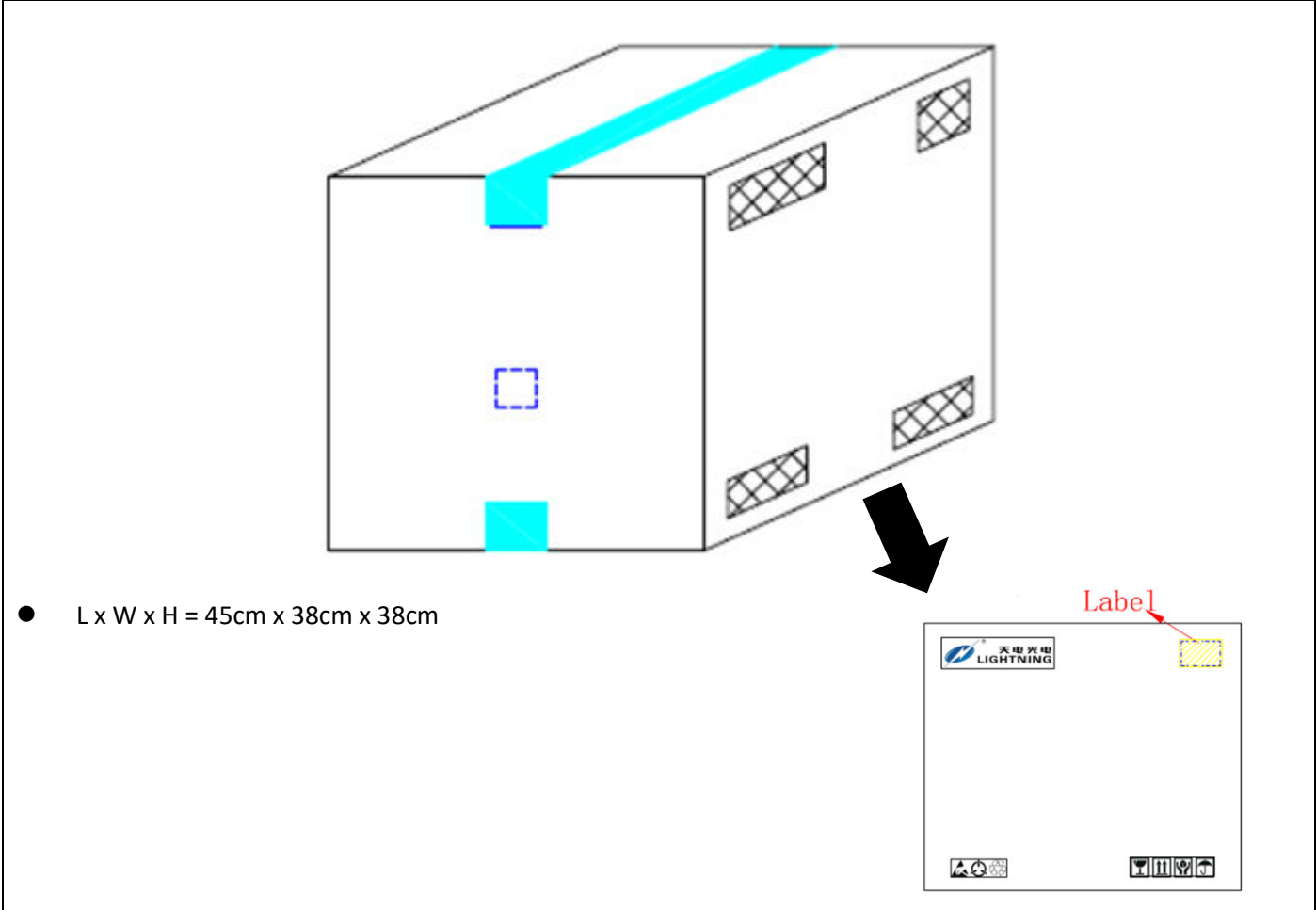


**BOX SPECIFICATIONS (Reel Type)**

**Inner Box**



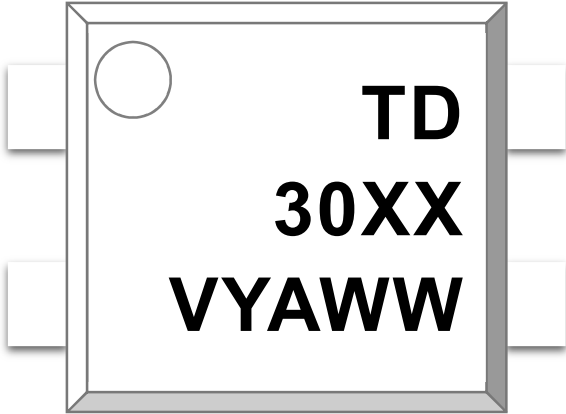
**Outer Box**





**ORDERING AND MARKING INFORMATION**

**MARKING INFORMATION**



**TD** : Company Abbr.  
**30XX** : Part Number & Rank  
**V** : VDE Option  
**Y** : Fiscal Year  
**A** : Manufacturing Code  
**WW** : Work Week

**ORDERING INFORMATION**

**LABEL INFORMATION**

**TDM30XX(Z)-GV**

TD – Company Abbr.  
 M – SOP Package  
 30XX – Rank  
 (10/11/12/21/22/23/51/52/53)  
 Z – Tape and Reel Option (T1/T2)  
 G – Green  
 V – VDE Option (V or None)

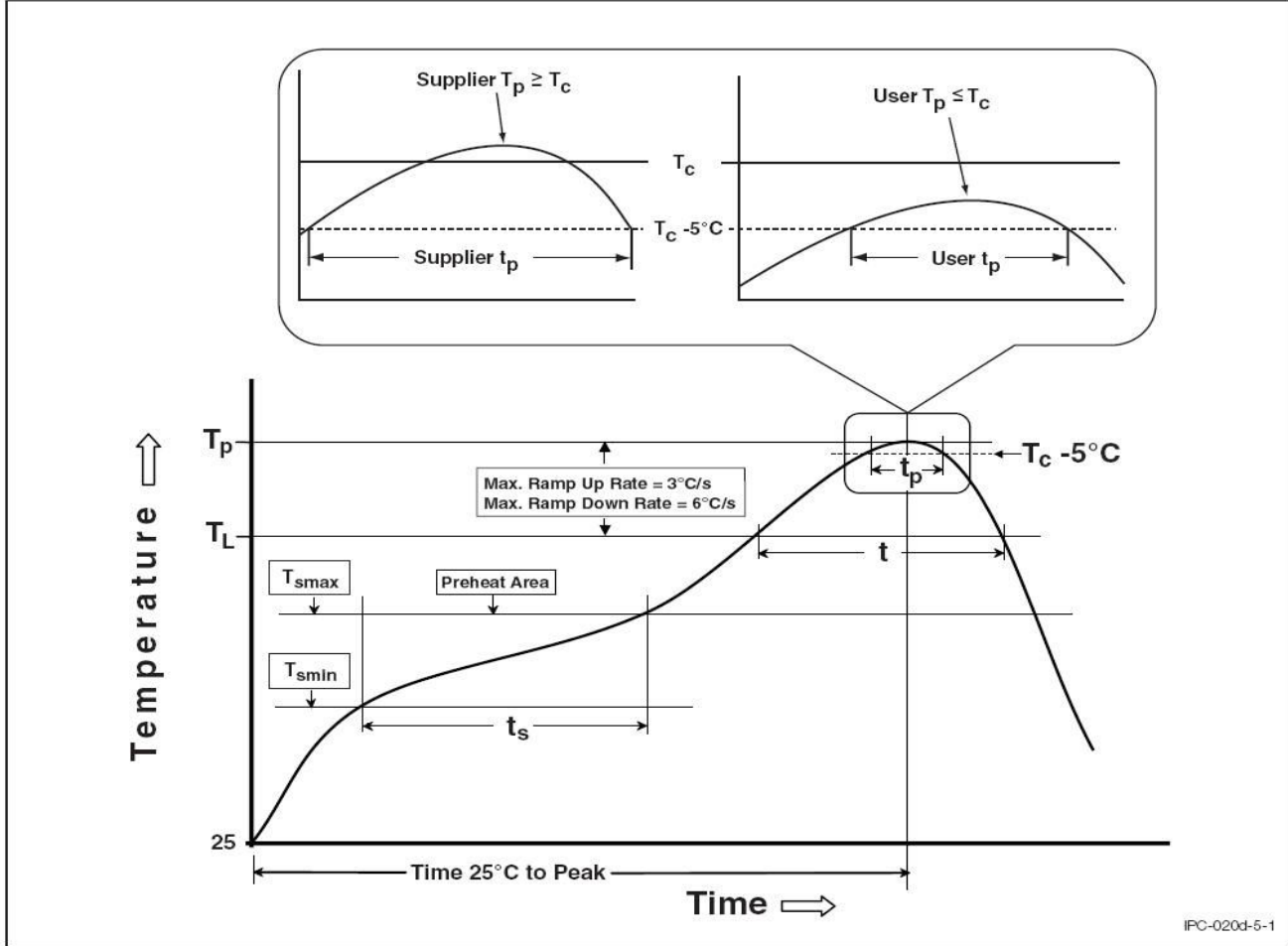
**福建天电光电有限公司**  
 FUJIAN LIGHTNING OPTOELECTRONIC CO., LTD.  
 Part No : XXXXXXXXXXXXXXXX Bin Code : X  
 Lot No : XXXXXXXXXXXX  
 Date Code : XXXX  
 Q'ty : XXXX pcs

**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**



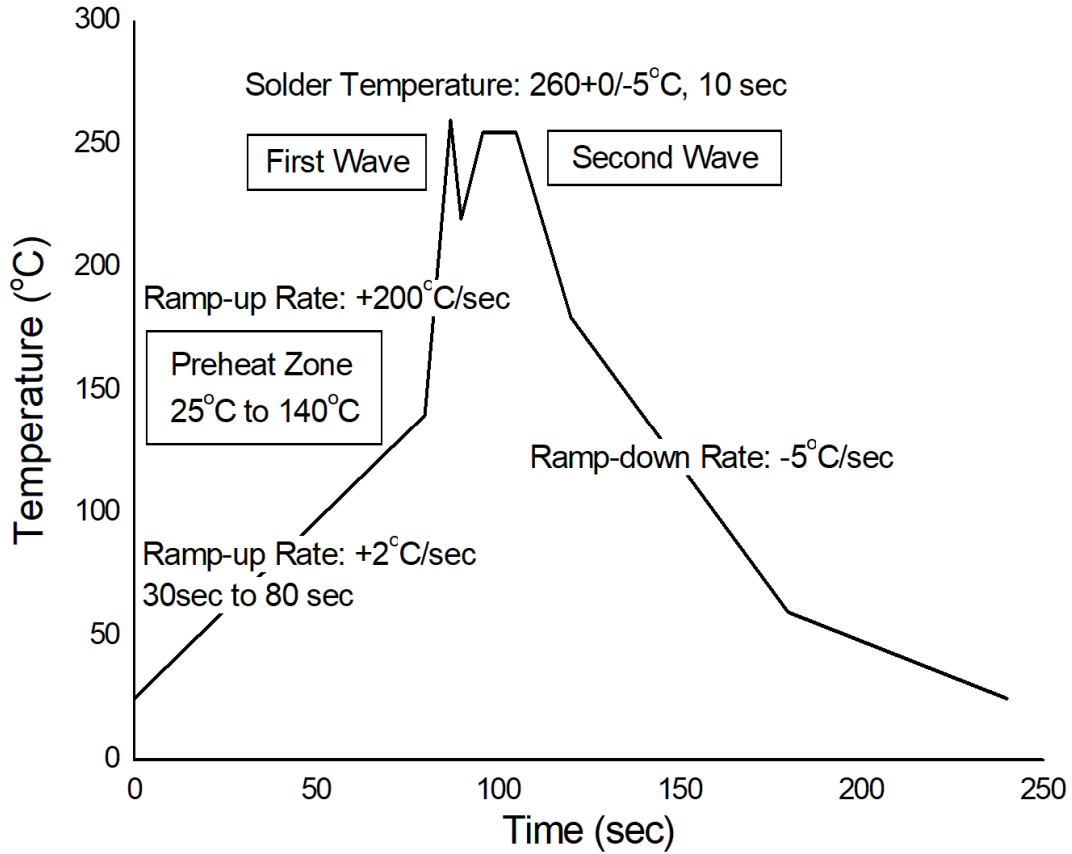
IPC-020d-5-1

Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	100	150°C
Temperature Max. (T <sub>smax</sub> )	150	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	183°C	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.



**TEMPERATURE PROFILE OF SOLDERING**

**WAVE SOLDERING (JESD22-A111 COMPLIANT)**



**HAND SOLDERING BY SOLDERING IRON**

Soldering Temperature	$380 \pm 0/-5^{\circ}\text{C}$
Soldering Time	3 sec max.

- One time soldering is recommended for all soldering method.
- Do not solder more than three times for IR reflow soldering.



## DISCLAIMER

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