



### Description

The TDM303X, TDM304X and TDM306X series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon zero-cross photo triac in a plastic SOP4 package.

With the robust coplanar double mold structure, TDM303X, TDM304X and TDM306X series provide the most stable isolation feature.

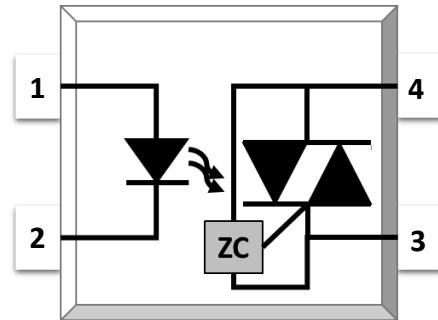
### Features

- High isolation 3750 VRMS
- DC input with zero-cross photo triac output
- Operating temperature range - 40 °C to 100 °C
- REACH 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

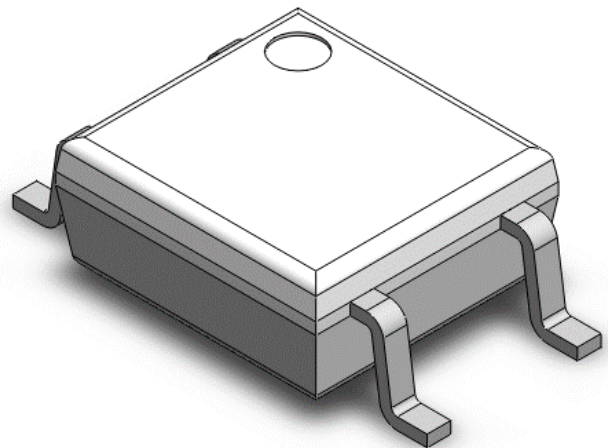
### SCHEMATIC



### 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	$I_F$	60	mA	
Reverse Voltage	$V_R$	6	V	
Junction Temperature	$T_j$	125	°C	
Input Power Dissipation	$P_I$	100	mW	
<b>OUTPUT</b>				
Off-state Output Terminal Voltage	TDM303X	250	V	
	TDM304X	400		
	TDM306X	600		
Peak Repetitive Surge Current PW=100µs, 120pps	$I_{TSM}$	1	A	
Junction Temperature	$T_j$	125	°C	
Output Power Dissipation	$P_O$	300	mW	
<b>COMMON</b>				
Total Power Dissipation	$P_{tot}$	400	mW	
Isolation Voltage	$V_{iso}$	3750	V <sub>rms</sub>	1
Operating Temperature	$T_{opr}$	-40~100	°C	
Storage Temperature	$T_{stg}$	-55~125	°C	
Soldering Temperature	$T_{sol}$	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
<b>INPUT</b>							
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	
<b>OUTPUT</b>							
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>	-	1.59	2.5	V	I <sub>TM</sub> =100mA	
Critical Rate of Rise of Off-state Voltage	dV/dt	1000	-	-	V/μs	V <sub>PEAK</sub> =Rated V <sub>DRM</sub>	4
<b>TRANSFER CHARACTERISTICS</b>							
LED Trigger Current	TDM3031, TDM3041, TDM3061	I <sub>FT</sub>	-	-	15	mA	Terminal Voltage = 3V I <sub>TM</sub> =100mA
	TDM3032, TDM3042, TDM3062		-	-	10		
	TDM3033, TDM3043, TDM3063		-	-	5		
Holding Current	I <sub>H</sub>	-	237	-	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	
<b>ZERO-CROSSING CHARACTERISTICS</b>							
Inhibit Voltage	V <sub>INH</sub>	-	-	20	V	I <sub>F</sub> =Rated I <sub>FT</sub>	
Leakage in Inhibited State	I <sub>DRM2</sub>	-	-	500	μA	I <sub>F</sub> =Rated I <sub>FT</sub> V <sub>DRM</sub> =Rated V <sub>DRM</sub>	

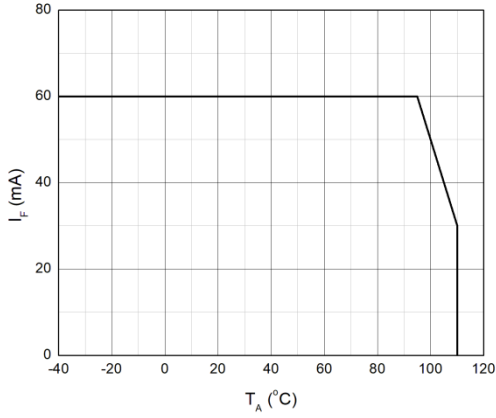
Note3. Test voltage must be applied within dV/dt rating.

Note4. Refer to Fig.17 & Fig.18

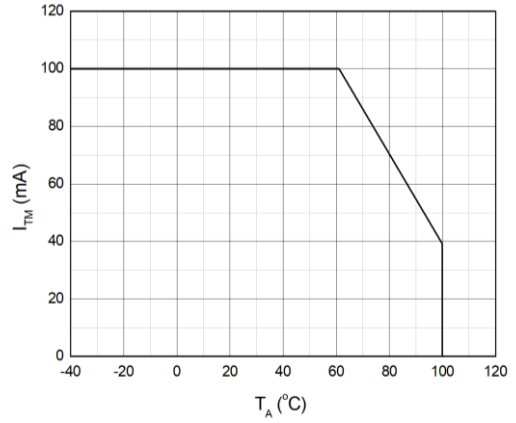


**CHARACTERISTIC CURVES**

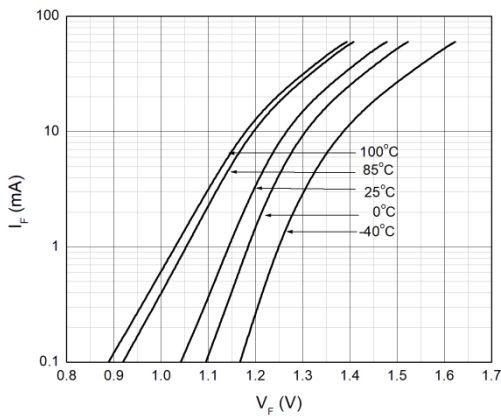
**Fig.1 Forward Current vs. Ambient Temperature**



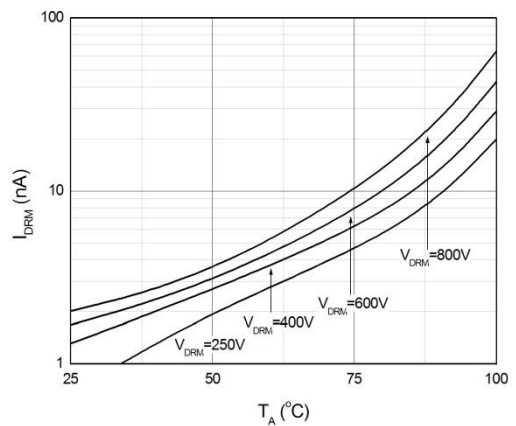
**Fig.2 On-state Terminal Current vs. Ambient Temperature**



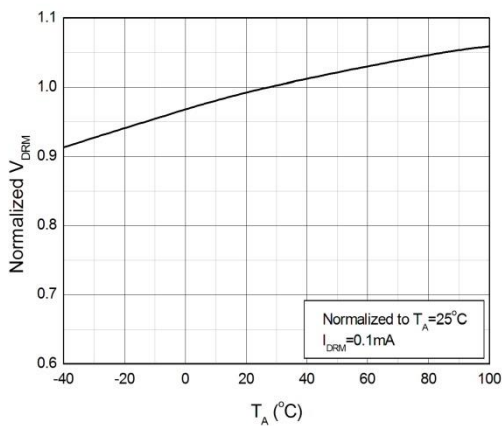
**Fig.3 Forward Current vs. Forward Voltage**



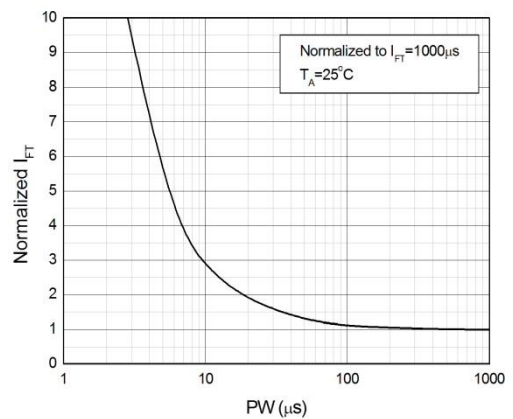
**Fig.4 Off-state Terminal Current vs. Ambient Temperature**



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



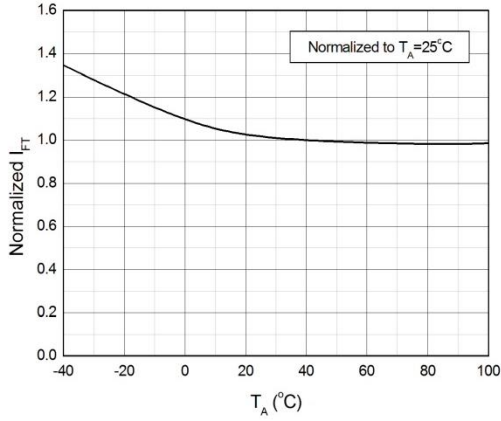
**Fig.6 Normalized Trigger Current vs. LED Trigger Pulse Width**



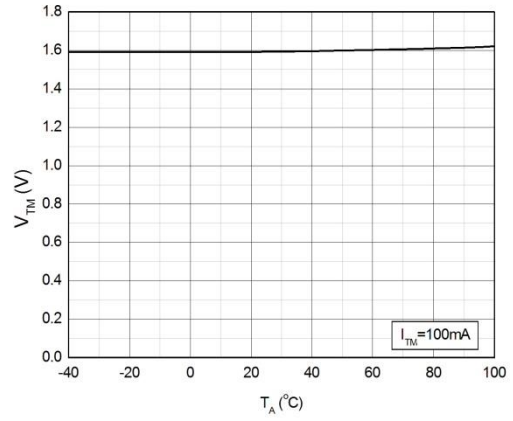


**CHARACTERISTIC CURVES**

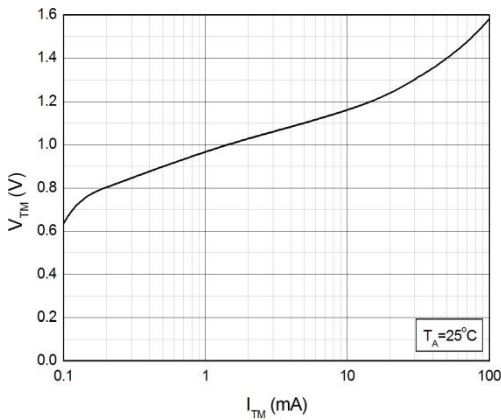
**Fig.7 Normalized Trigger Current vs. Ambient Temperature**



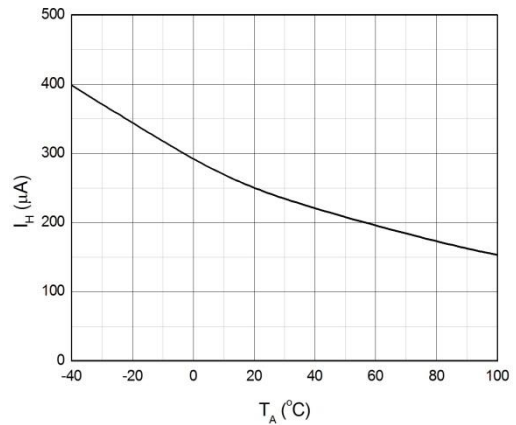
**Fig.8 On-state Terminal Voltage vs. Ambient Temperature**



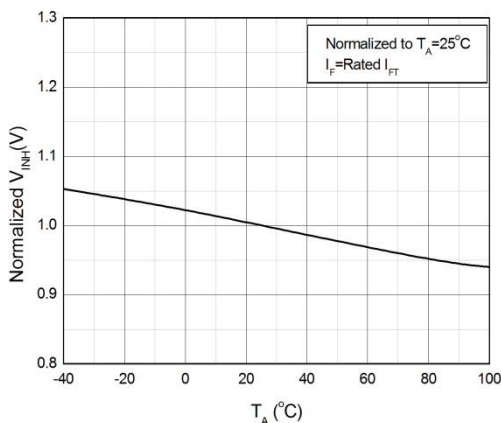
**Fig.9 On-state Terminal Voltage vs. On-state Terminal Current**



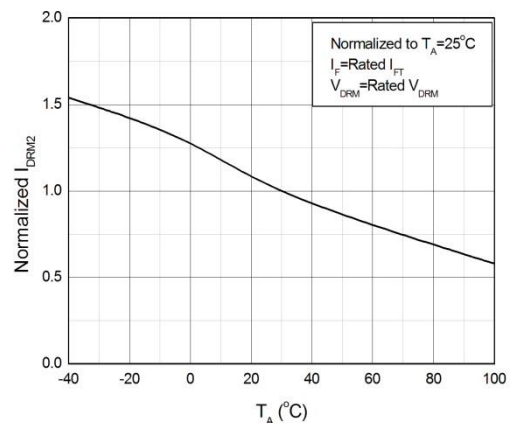
**Fig.10 Holding Current vs. Ambient Temperature**



**Fig.11 Normalized Inhibit Voltage vs. Ambient Temperature**

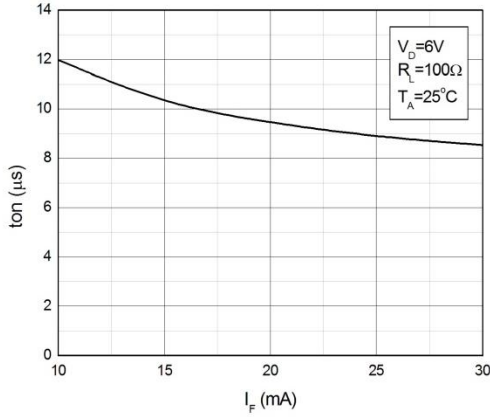


**Fig.12 Normalized Leakage in Inhibit State vs. Ambient Temperature**

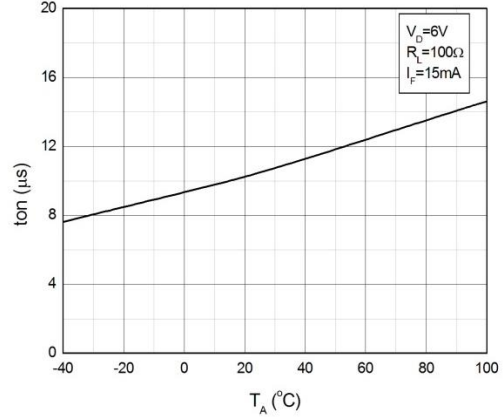


**CHARACTERISTIC CURVES**

**Fig.13 Turn On Time vs. Forward Current**

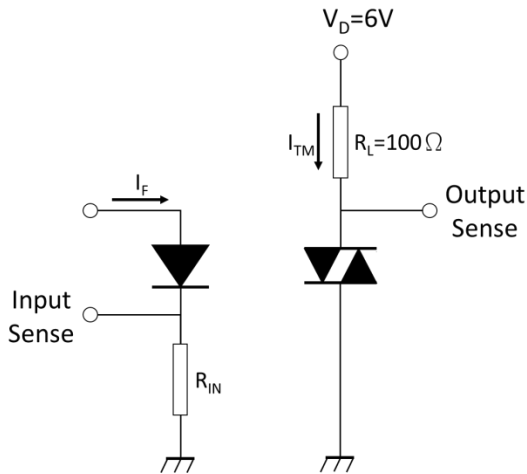


**Fig.14 Turn On Time vs. Ambient Temperature**

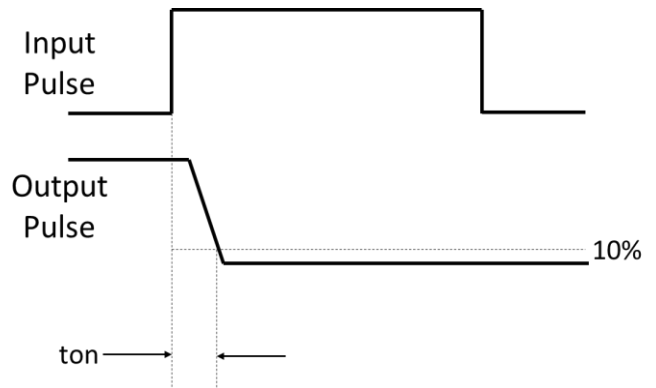


**TEST CIRCUITS**

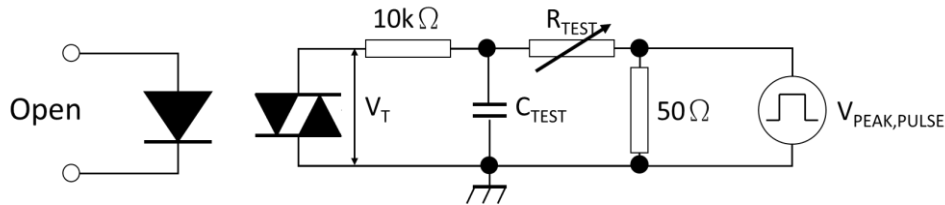
**Fig.15 Test Circuits of Turn On Time**



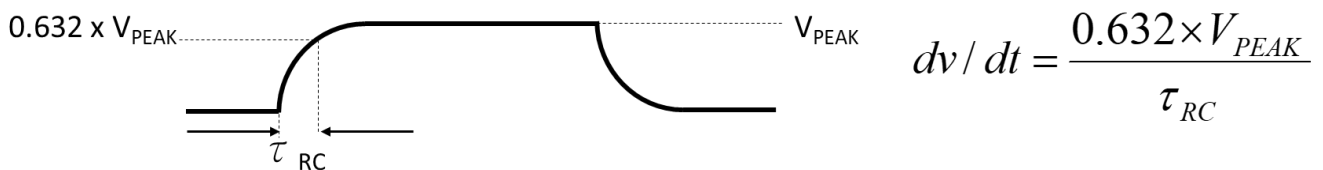
**Fig.16 Waveforms of Turn On Time**



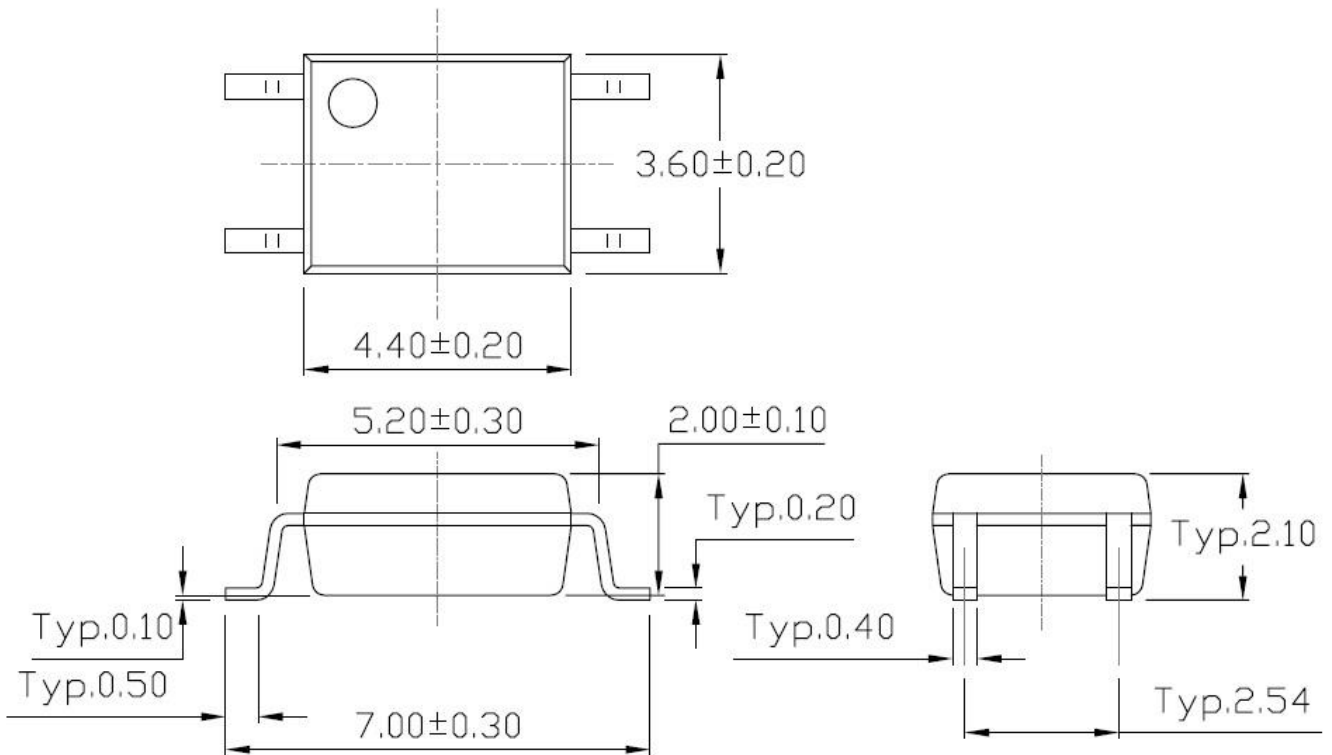
**Fig.17 Test Circuits of  $dv/dt$**



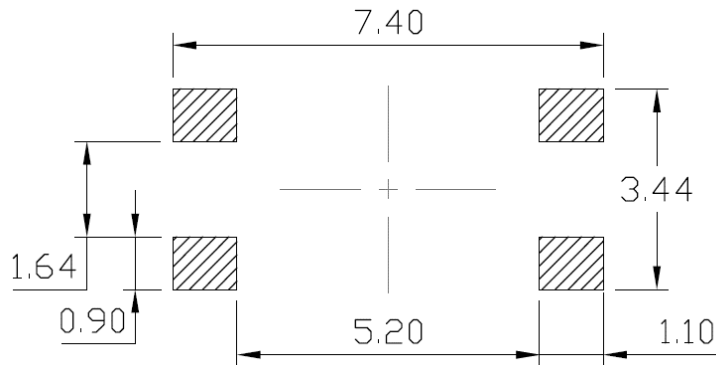
**Fig.18 Waveforms of  $dv/dt$**



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

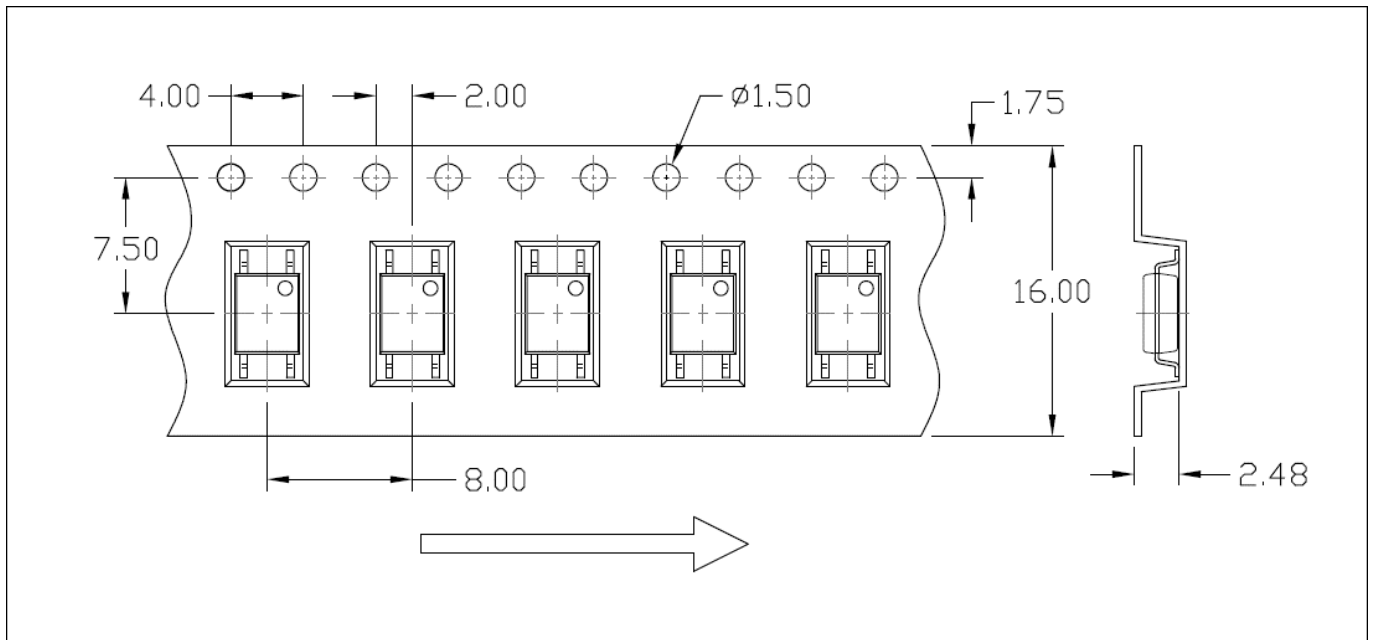


**Recommended Solder Mask (Dimensions in mm unless otherwise stated)**

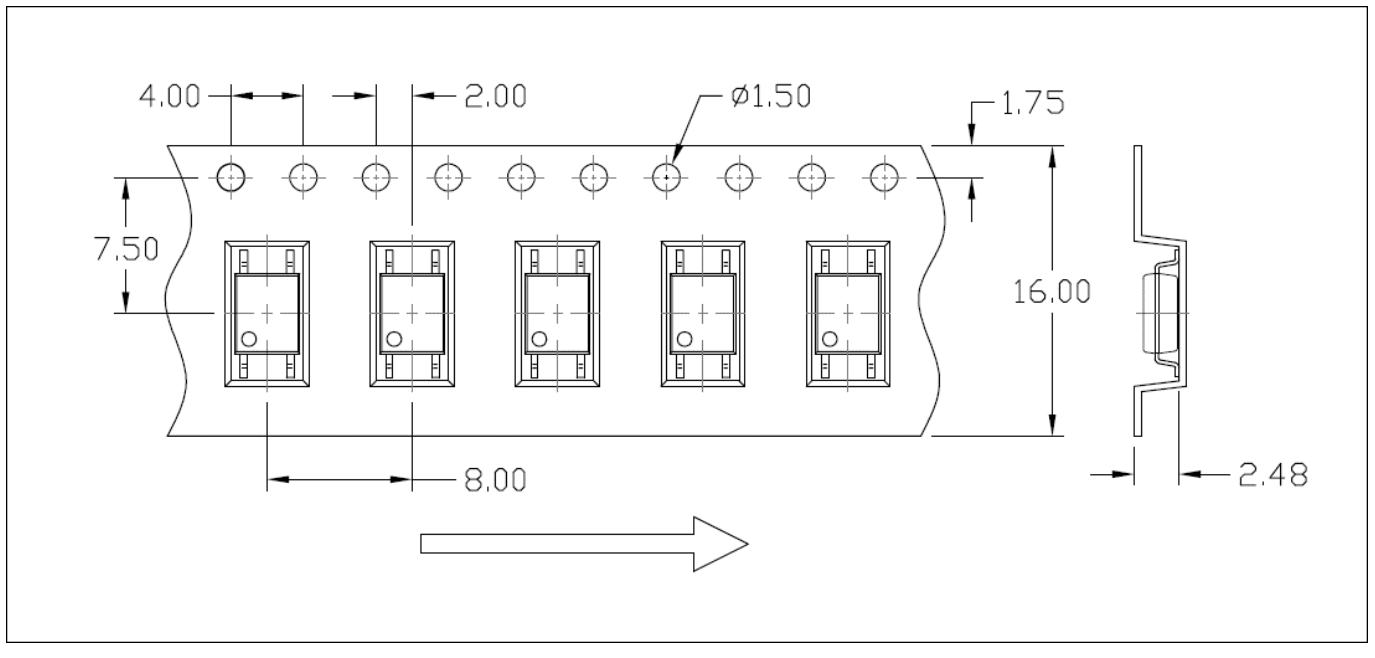


**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Option T1**



**Option T2**

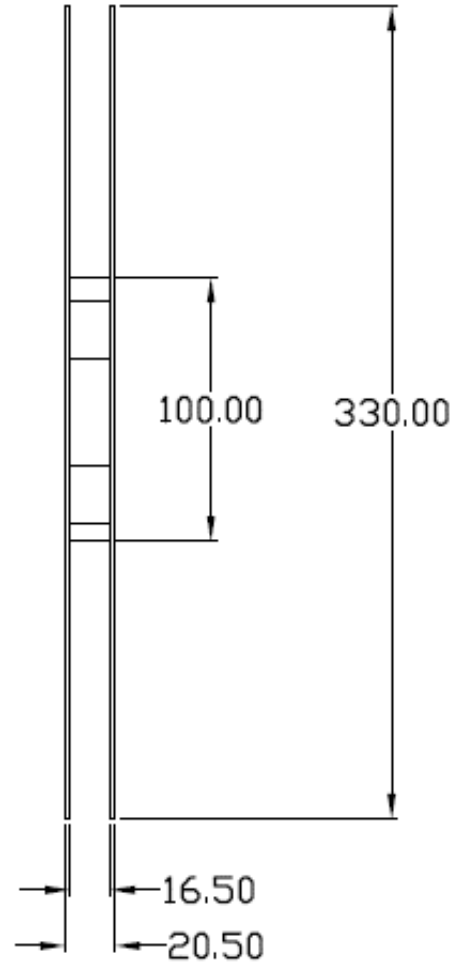
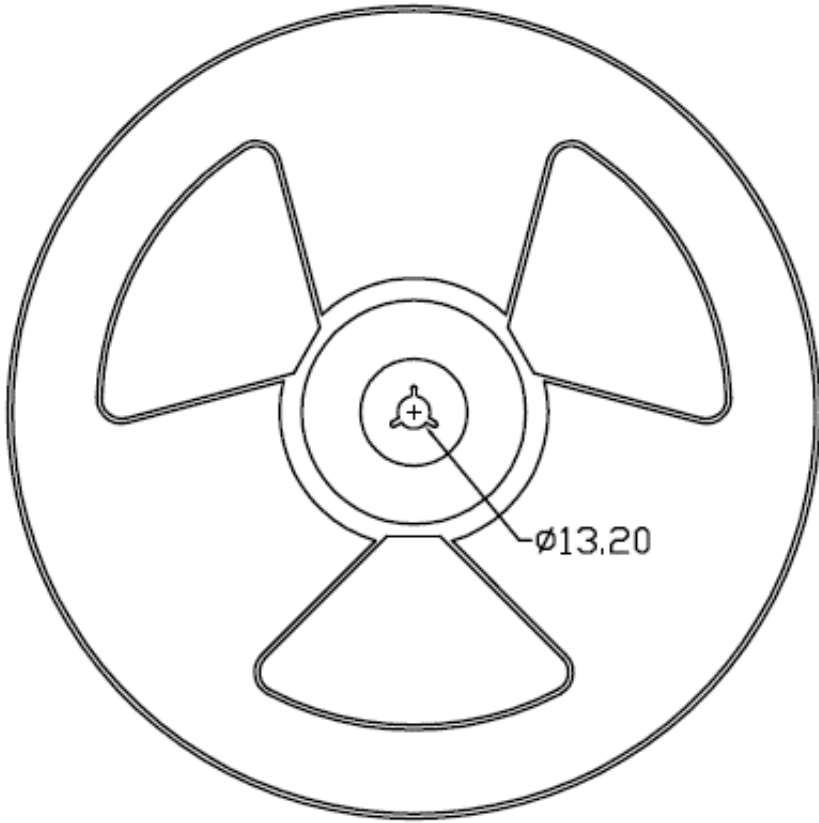






**REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Option T1 & T2**



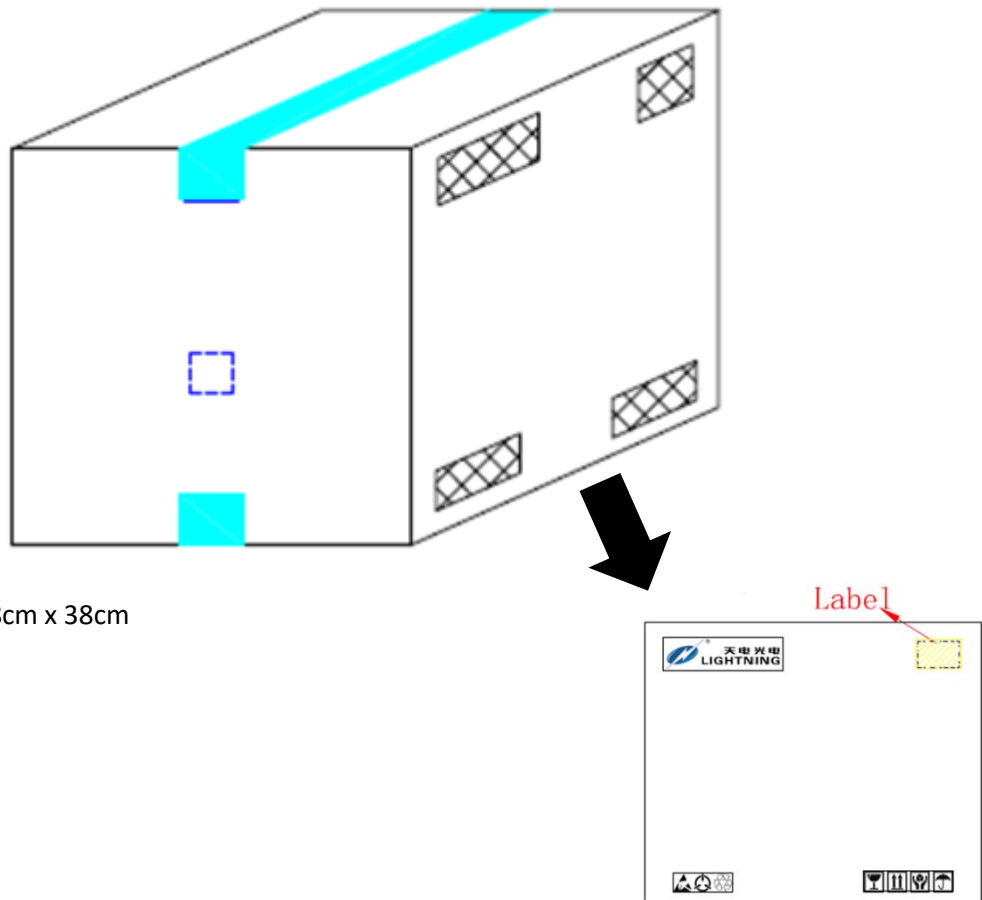
**BOX SPECIFICATIONS (Reel Type)**

**Inner Box**



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

**Outer Box**

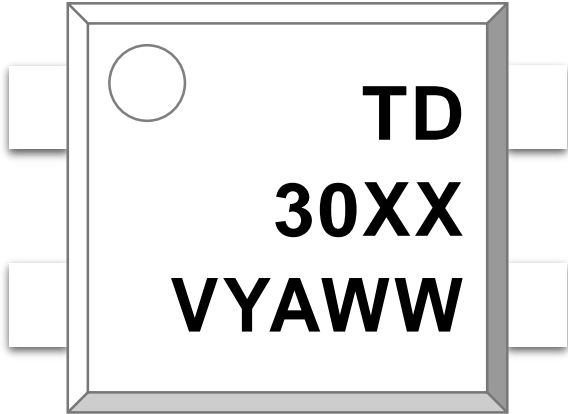


- L x W x H = 45cm x 38cm x 38cm



**ORDERING AND MARKING INFORMATION**

**MARKING INFORMATION**



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

**ORDERING INFORMATION**

**TDM30XX(Z)-GV**

TD – Company Abbr.  
 M – SOP Package  
 30XX – Rank  
 (31/32/33/41/42/43/61/62/63)  
 Z – Tape and Reel Option (T1/T2)  
 G – Green  
 V – VDE Option (V or None)

**LABEL INFORMATION**

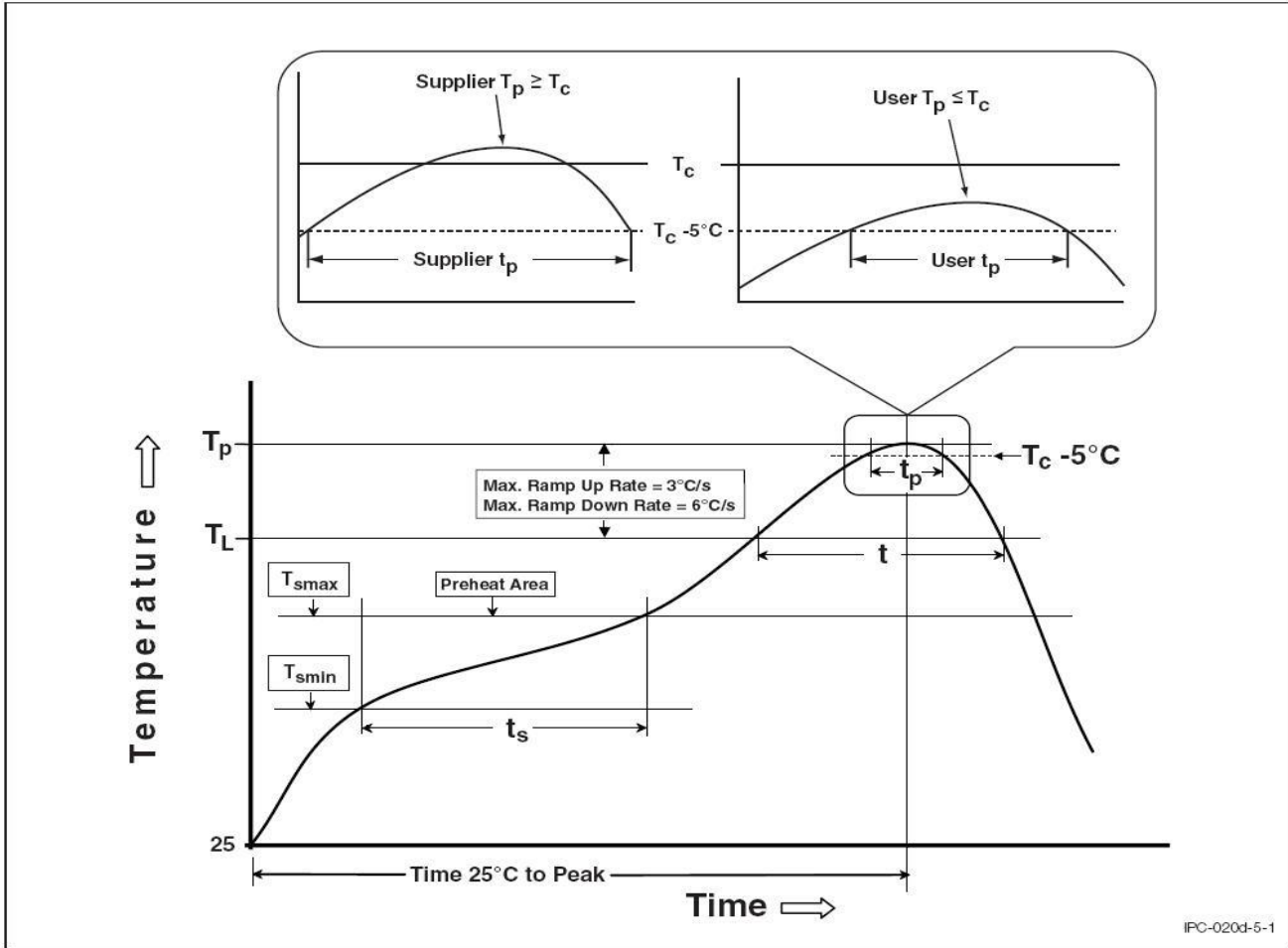
福建天电光电有限公司  
 FUJIAN LIGHTNING OPTOELECTRONIC CO., LTD.  
 Part No : XXXXXXXXXXXXX Bin Code : X  
 Lot No : XXXXXXXXXXXX  
 Date Code : XXXX  
 Q'ty : XXXX pcs

**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**



IPC-020d-5-1

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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