



Description

The TD301X, TD302X and TD305X 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 DIP6 package with different lead forming options.

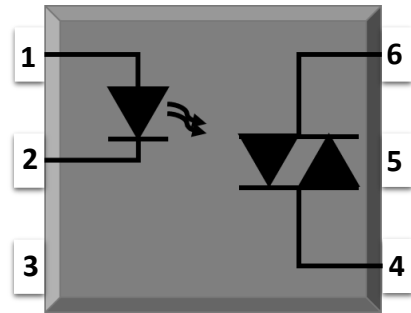
Features

- High isolation 5000 VRMS
- DC input with random-phase photo triac output
- Operating temperature range - 40 °C to 100 °C
- REACH & RoHS compliance
- 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
-

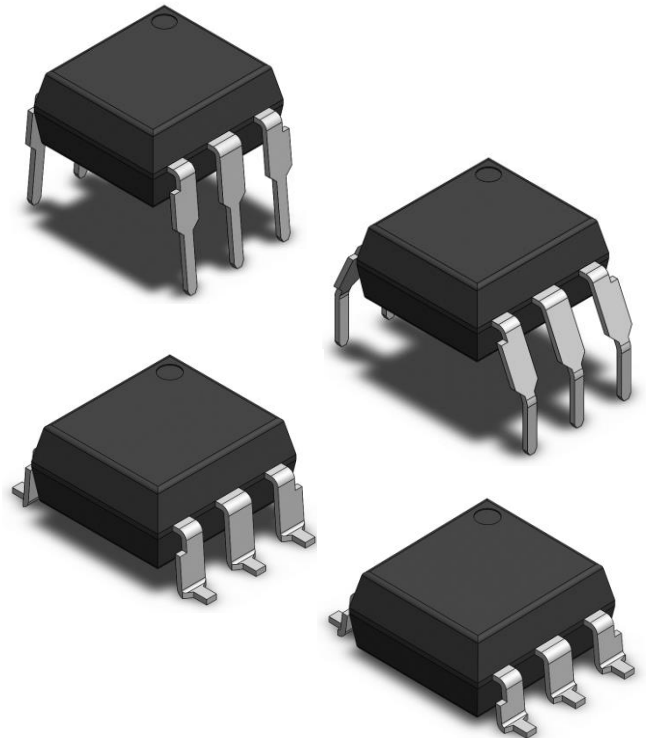
SCHEMATIC



PIN DEFINITION

- | | |
|------------|--------------|
| 4. Anode | 1. Terminal |
| 5. Cathode | 2. Substrate |
| 6. NC | 3. Terminal |

PACKAGE OUTLINE





ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	VALUE	UNIT	NOTE	
INPUT					
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		
OUTPUT					
Off-state Output Terminal Voltage	TD301X	250	V		
	TD302X	400			
	TD305X	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		
COMMON					
Total Power Dissipation	P_{tot}	400	mW		
Isolation Voltage	V_{iso}	5000	Vrms	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
INPUT							
Forward Voltage	V _F	-	1.24	1.4	V	I _F =10mA	
Reverse Current	I _R	-	-	10	μA	V _R =6V	
Input Capacitance	C _{in}	-	8.5	250	pF	V=0, f=1kHz	
OUTPUT							
Peak Off-state Current, Either Direction	I _{DRM}	-	-	100	nA	V _{DRM} =Rated V _{DRM} I _F =0	3
Peak On-state Current, Either Direction	V _{TM}	-	1.58	2.5	V	I _{TM} =100mA I _F =Rated I _{FT}	
Critical Rate of Rise of Off-state Voltage	dV/dt	1000	-	-	V/μs	V _{PEAK} =Rated V _{DRM}	4
TRANSFER CHARACTERISTICS							
LED Trigger Current	TD3010,TD3021,TD3051	I _{FT}	-	-	15	mA	Terminal Voltage = 3V I _{TM} =100mA
	TD3011,TD3022,TD3052		-	-	10		
	TD3012,TD3023,TD3053		-	-	5		
Holding Current		I _H	-	257	-	μA	
Isolation Resistance		R _{iso}	10 ¹²	10 ¹⁴	-	Ω	DC500V, 40 ~ 60% R.H.
Floating Capacitance		C _{IO}	-	0.8	-	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

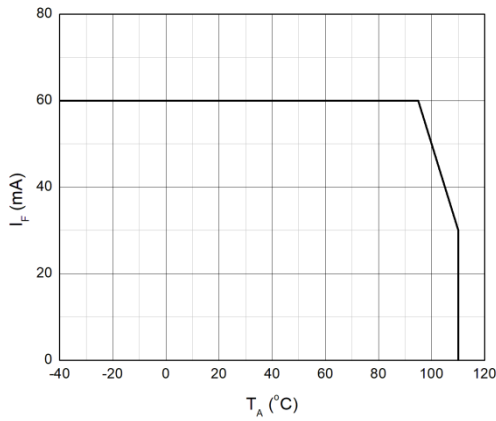


Fig.2 On-state Terminal Current vs. Ambient Temperature

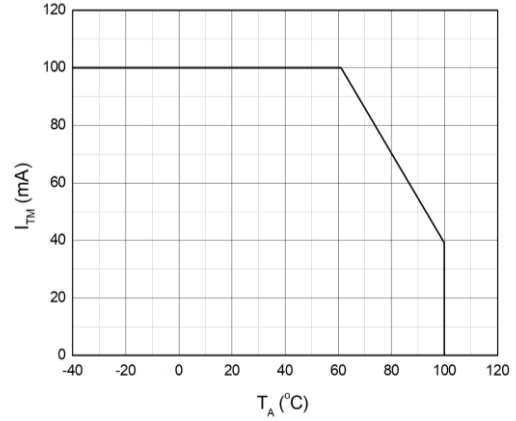


Fig.3 Forward Current vs. Forward Voltage

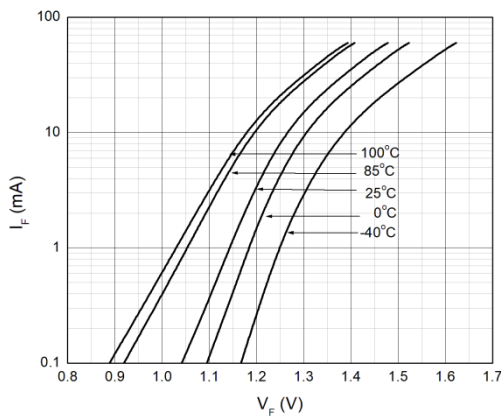


Fig.4 Off-state Terminal Current vs. Ambient Temperature

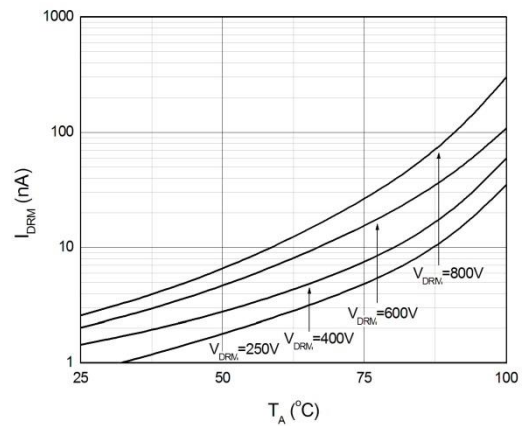


Fig.5 Normalized Off-state Terminal Voltage vs. Ambient Temperature

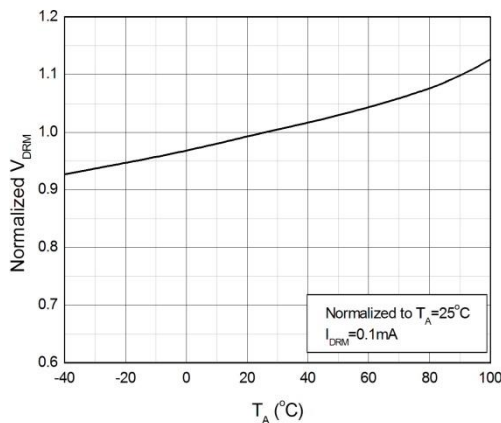
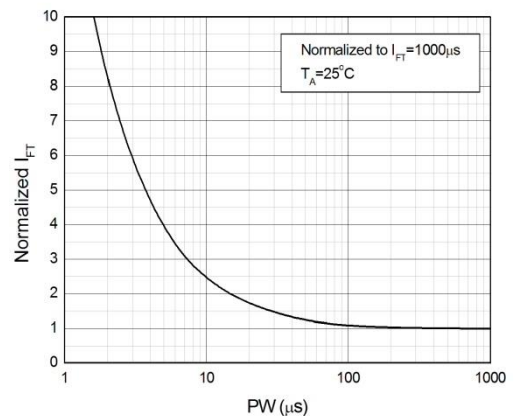


Fig.6 Normalized Trigger Current vs. LED Trigger Pulse Width





CHARACTERISTIC CURVES

Fig.7 Normalized Trigger Current vs. Ambient Temperature

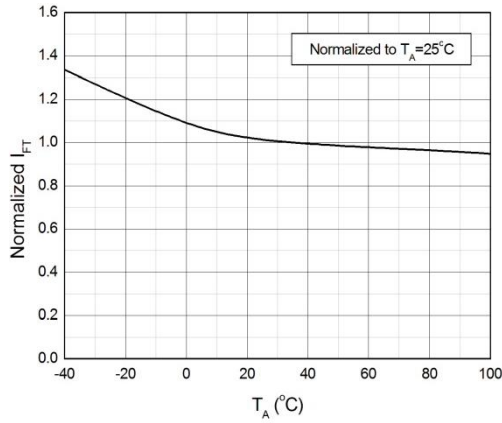


Fig.8 On-state Terminal Voltage vs. Ambient Temperature

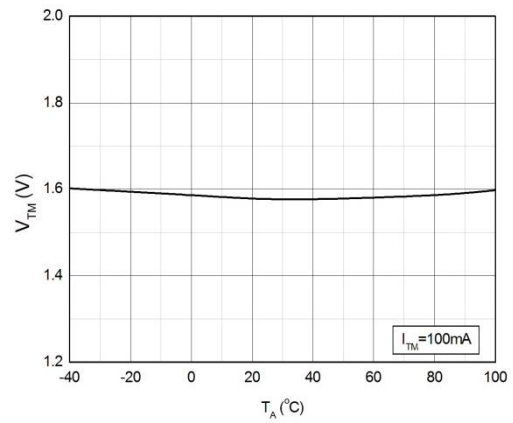


Fig.9 On-state Terminal Voltage vs. On-state Terminal Current

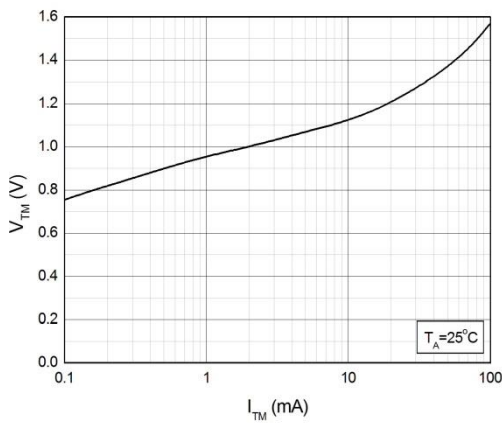


Fig.10 Holding Current vs. Ambient Temperature

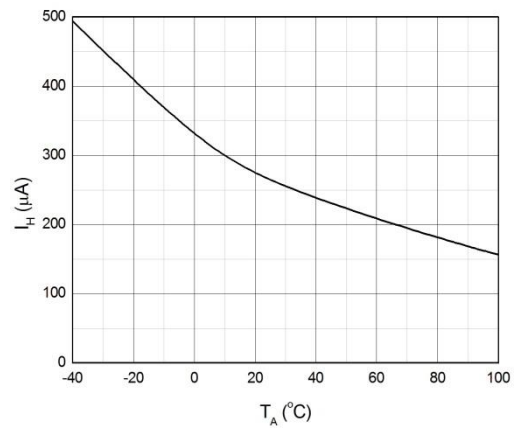


Fig.11 Turn On Time vs. Forward Current

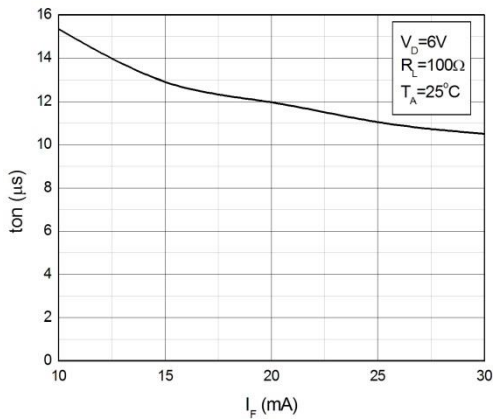
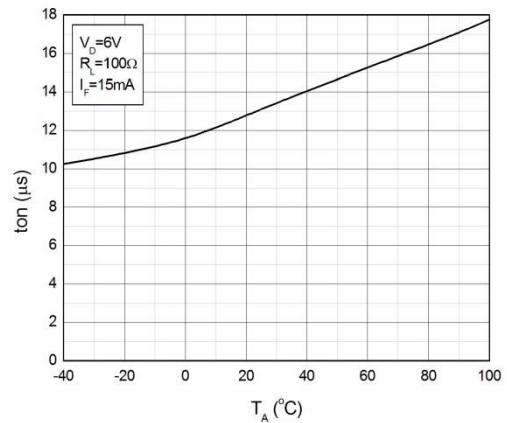


Fig.12 Turn On Time vs. Ambient Temperature



TEST CIRCUITS

Fig.13 Test Circuits of Turn On Time

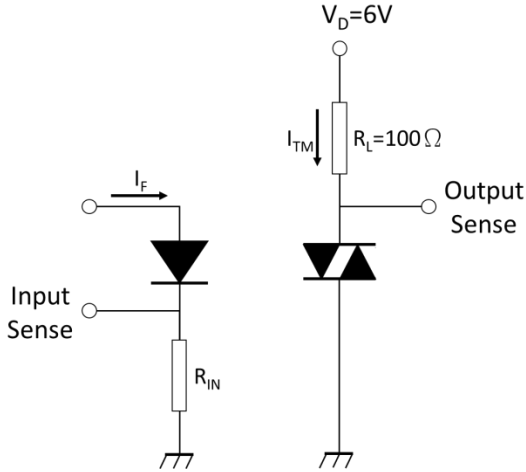


Fig.14 Waveforms of Turn On Time

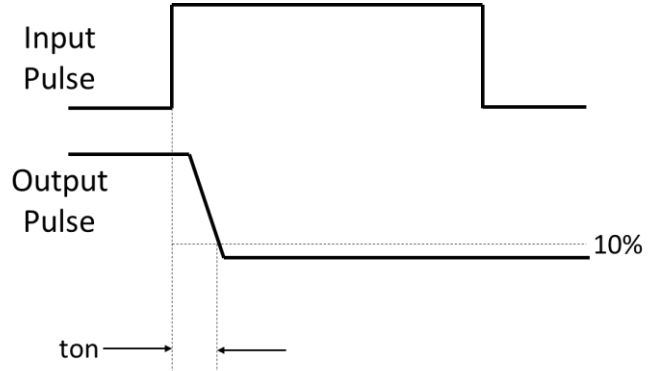


Fig.15 Test Circuits of dV/dt

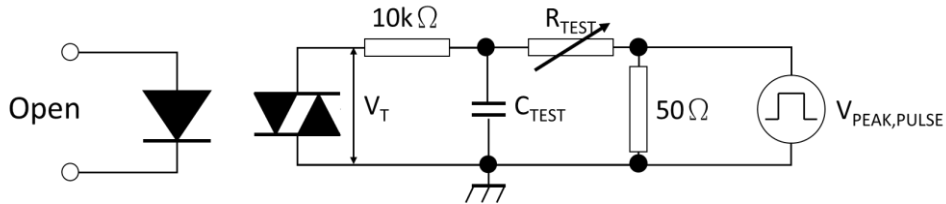
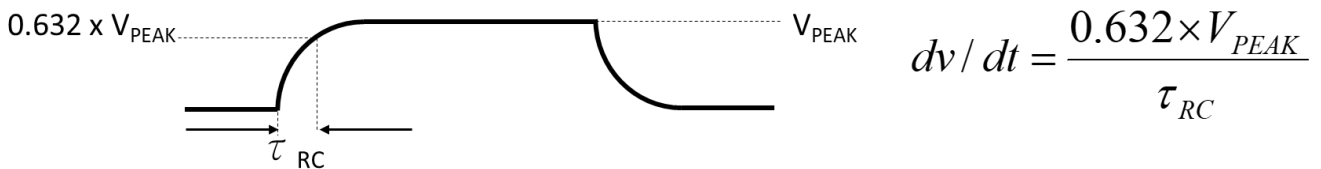
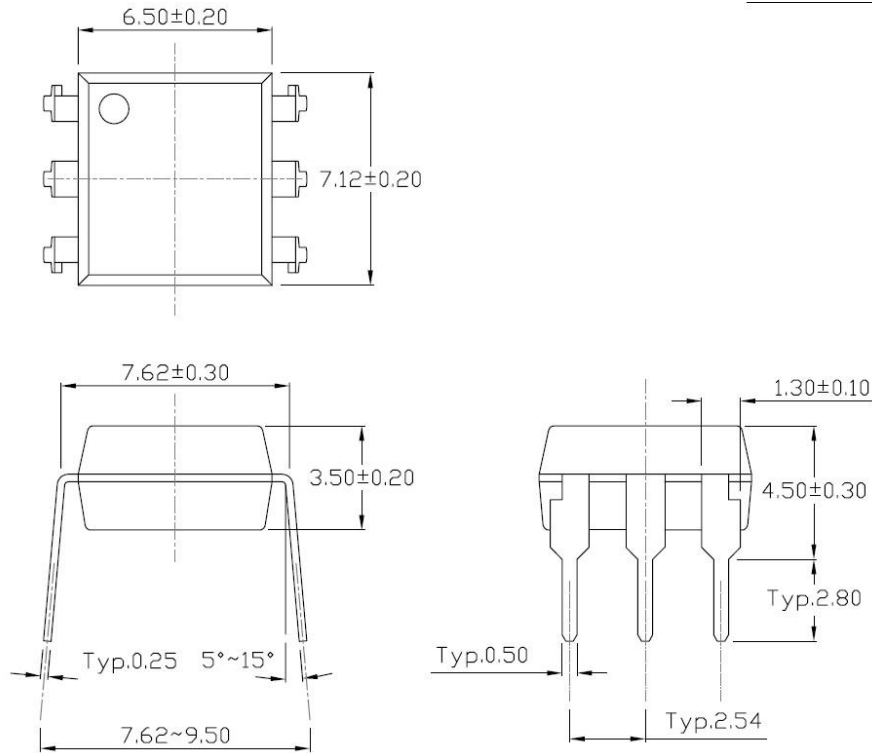


Fig.16 Waveforms of dV/dt

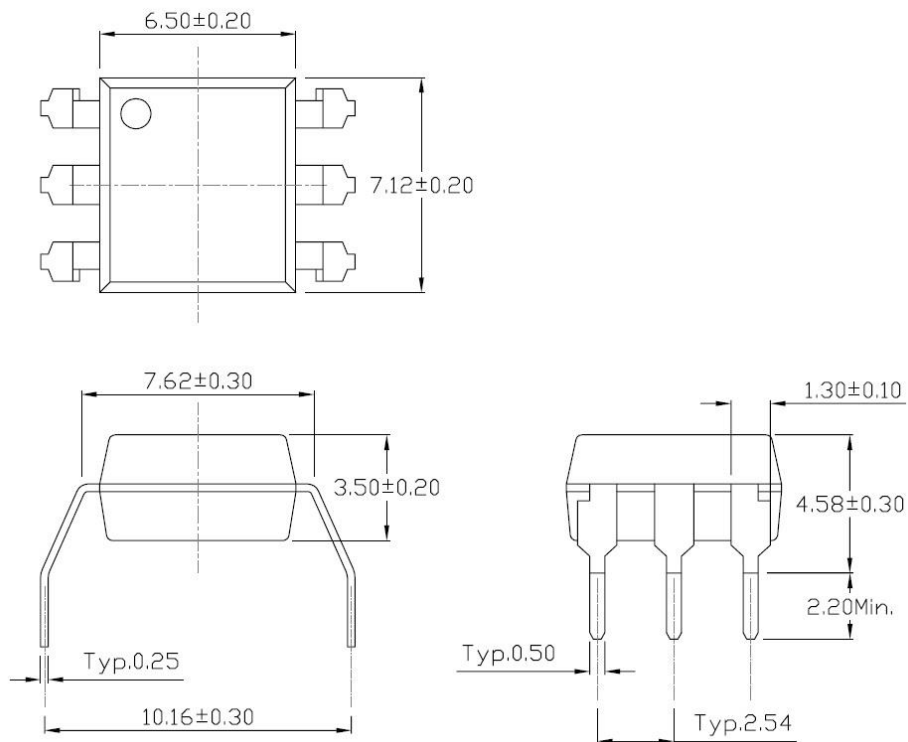


PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard DIP – Through Hole (DIP Type)

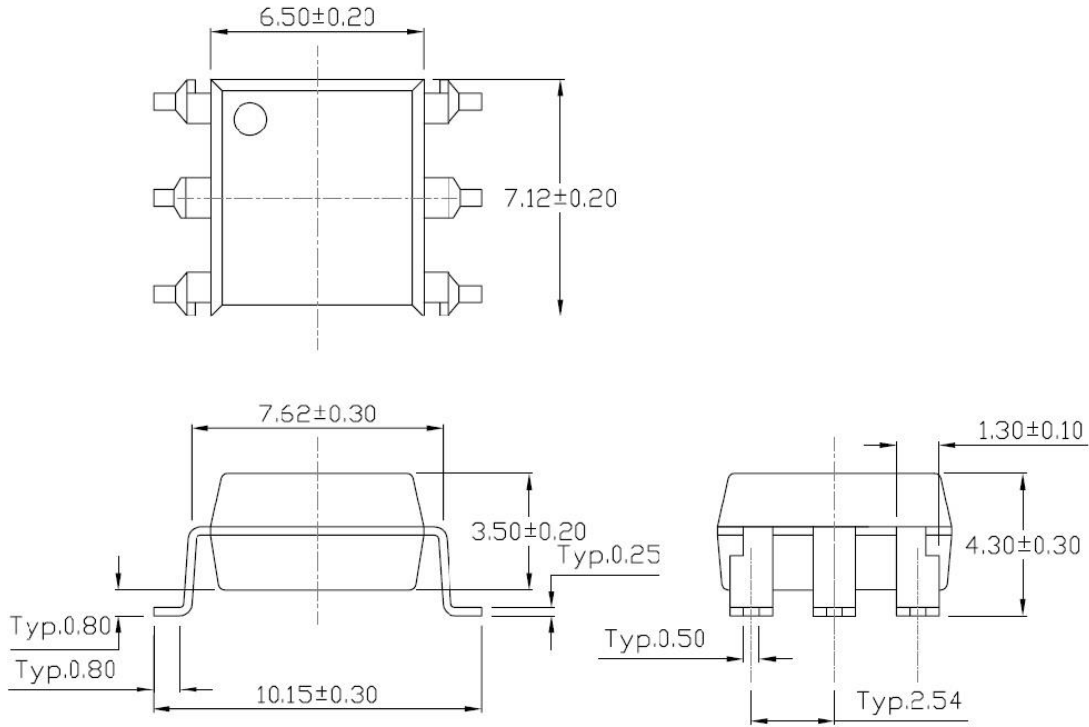


Gullwing (400mil) Lead Forming – Through Hole (M Type)

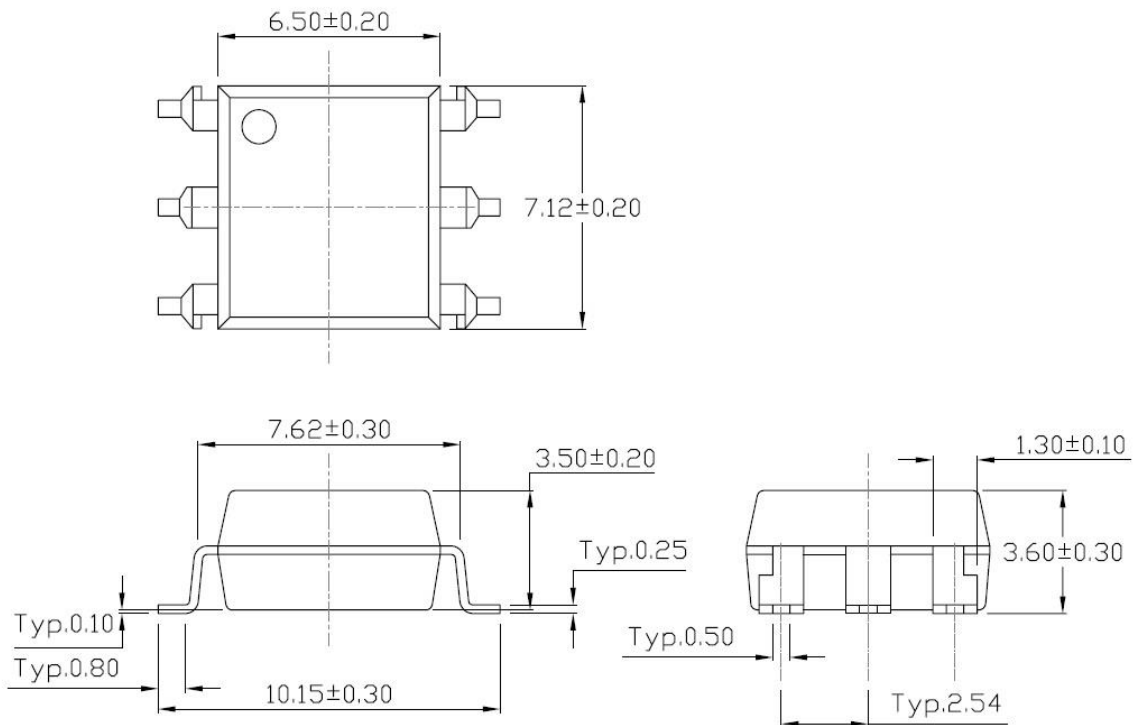


PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming (S Type)



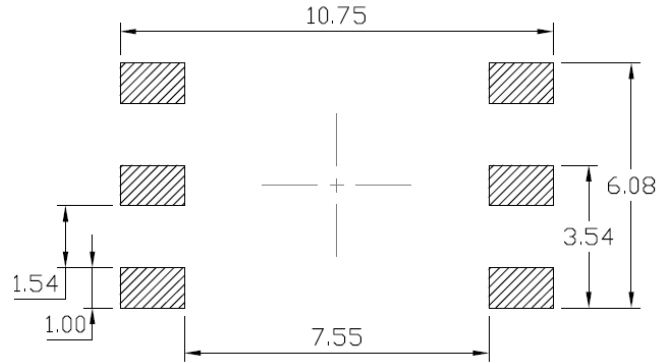
Surface Mount (Low Profile) Lead Forming (SL Type)



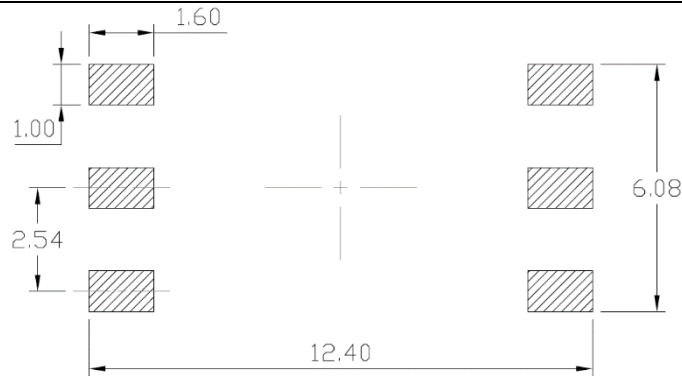


RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming

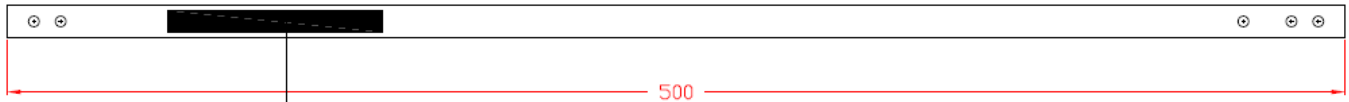
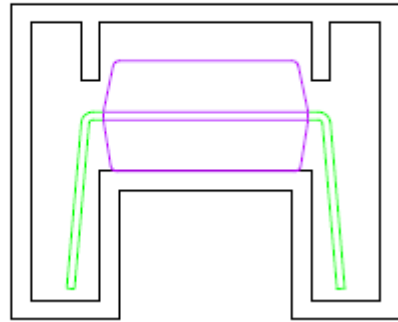
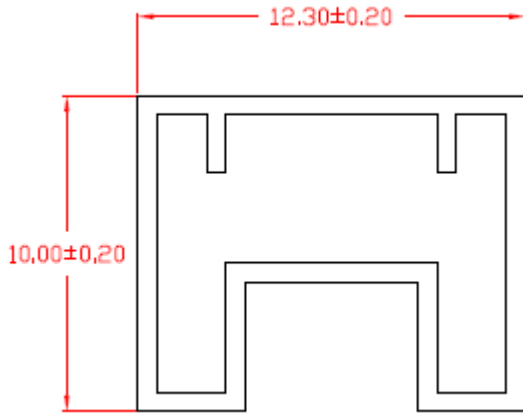


Surface Mount (Gullwing) Lead Forming

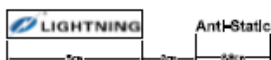
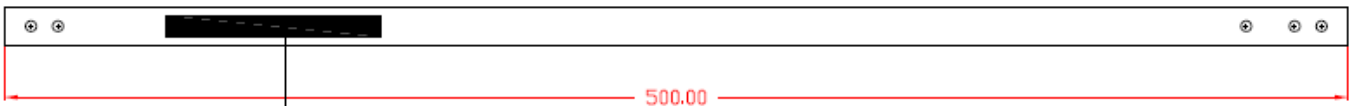
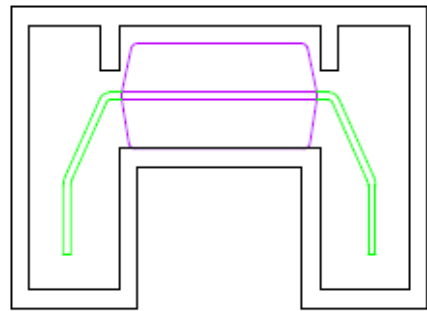
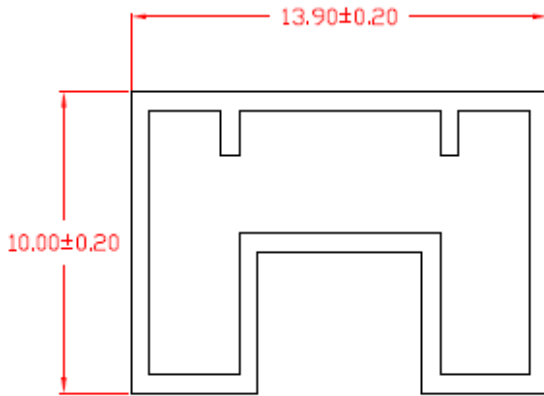


TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Standard DIP



Option M



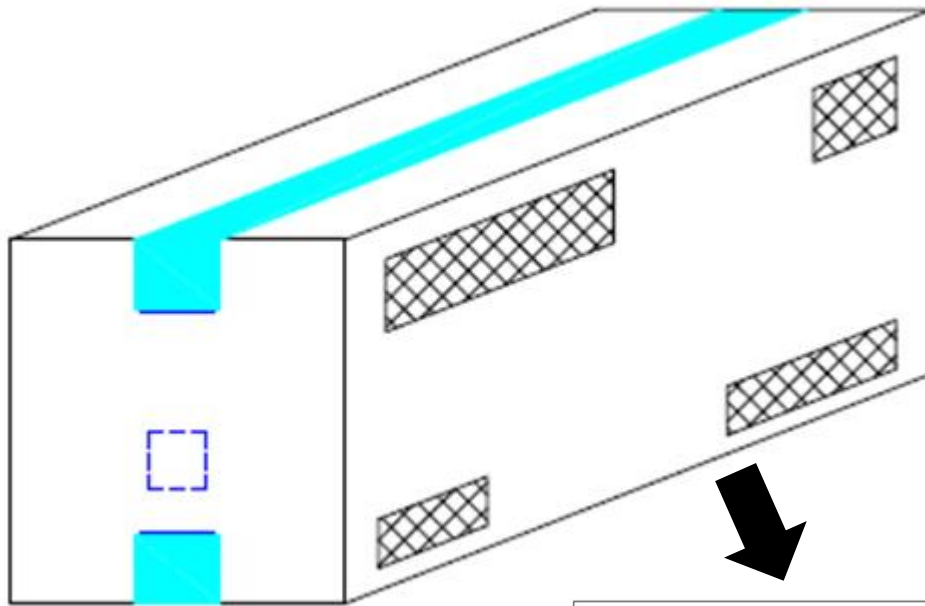
BOX SPECIFICATIONS (Tube Type)

Inner Box

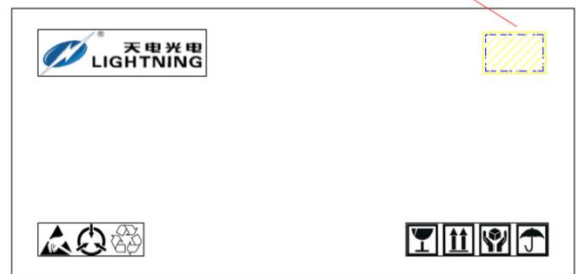


- L x W x H = 52.5cm x 10.7cm x 4.7cm

Outer Box



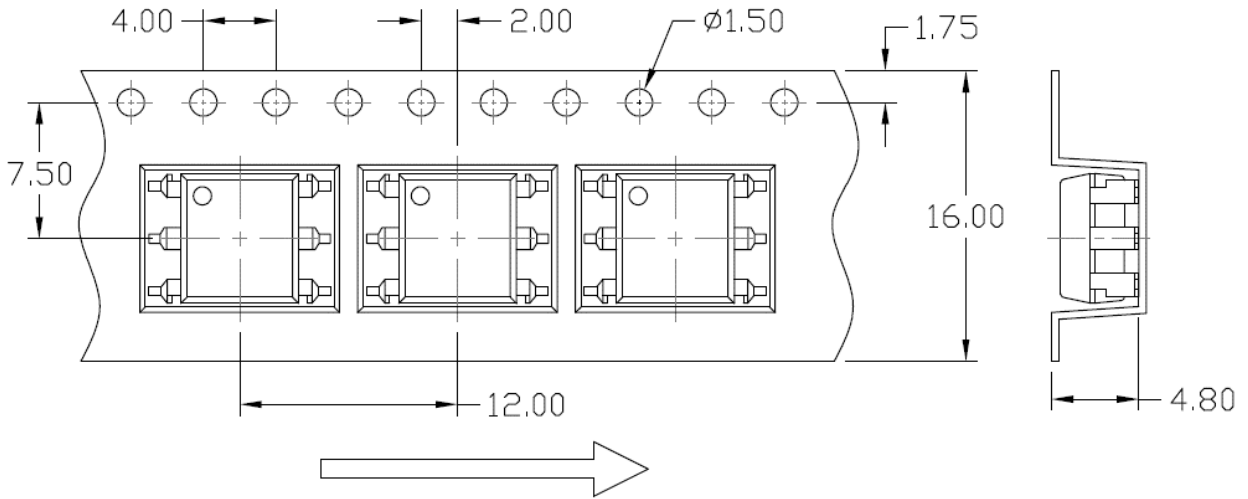
- L x W x H = 53.5cm x 23.5cm x 25.5cm



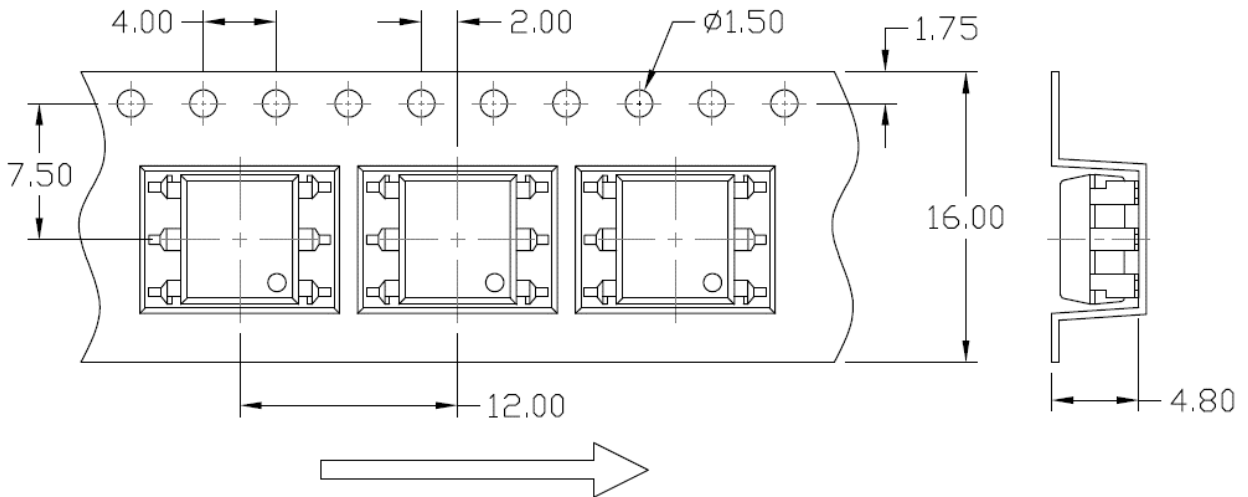


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S(T1) & SL(T1)



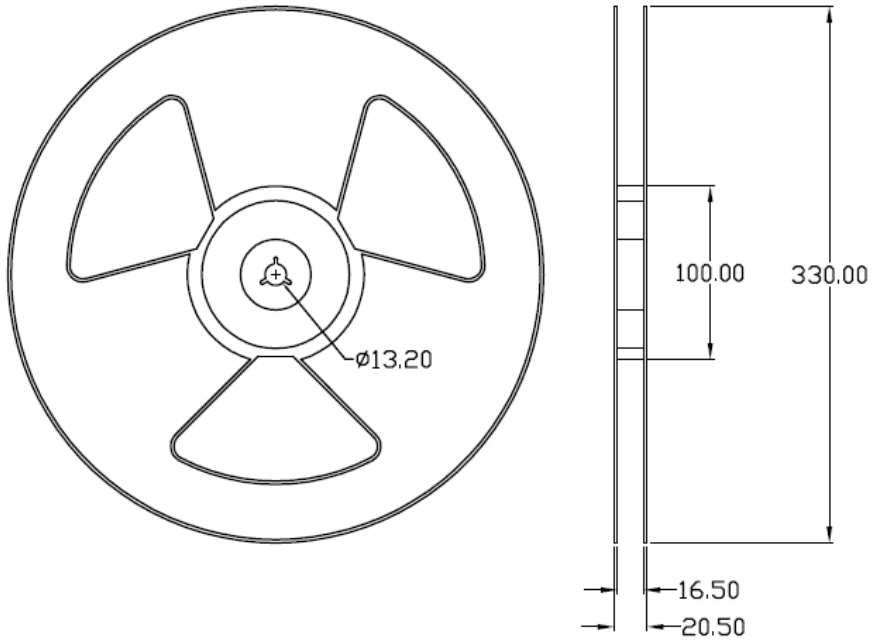
Option S(T2) & SL(T2)





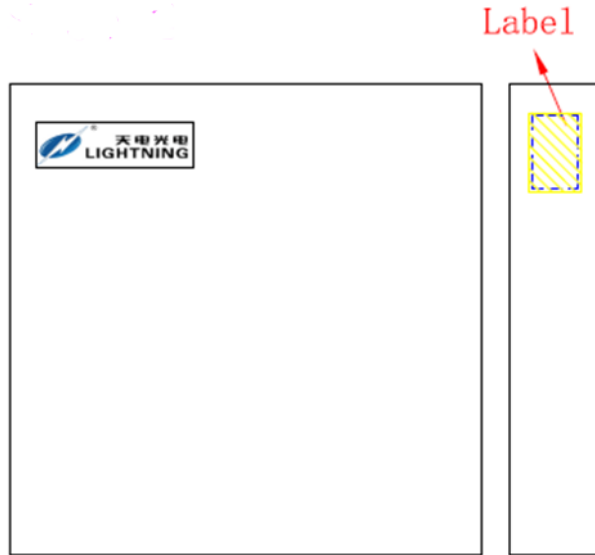
REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S & Option SL



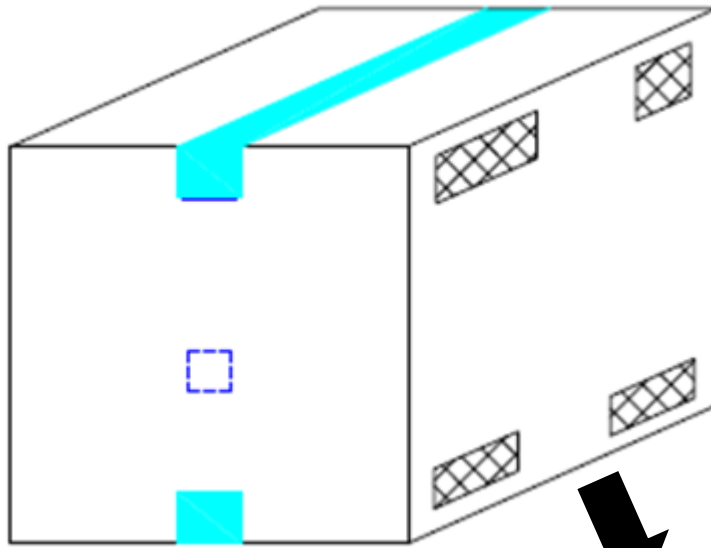
BOX SPECIFICATIONS (Reel Type)

Inner Box

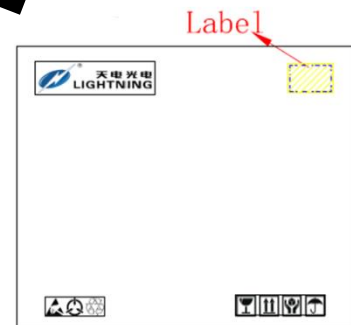


- L x W x H = 36cm x 36cm x 6.9cm

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

LABEL INFORMATION

TD30XX(Y)(Z)-GV

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

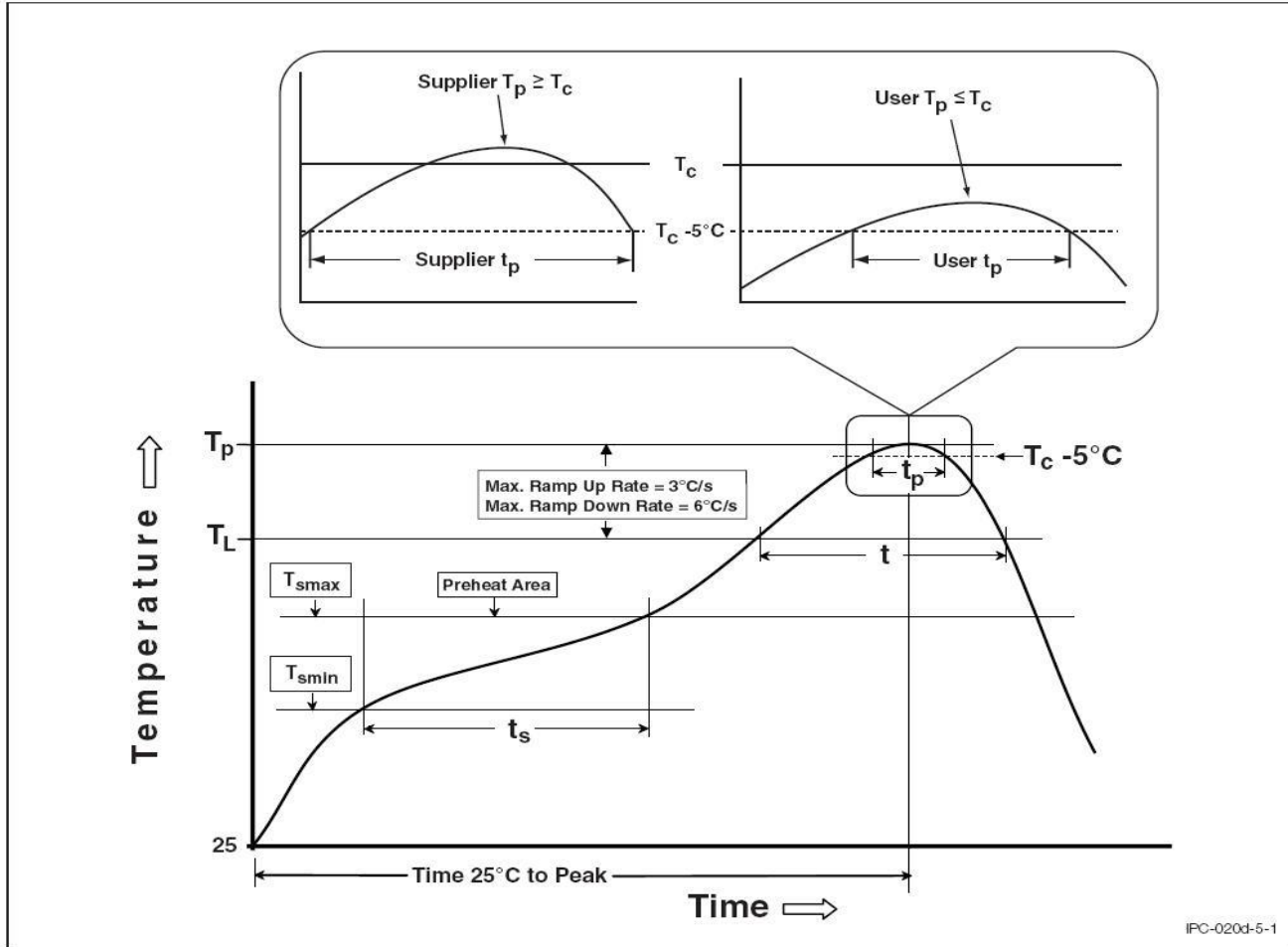
TD – Company Abbr.
 30XX – Part Number
 (10/11/12/21/22/23/51/52/53)
 Y – Lead Form Option (M/S/SL/None)
 Z – Tape and Reel Option (T1/T2)
 G – Green Option (G or None)
 V – VDE Option (V or None)

Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
None	50 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 16k Units
M	50 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box = 16k Units
S(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
S(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T1)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units
SL(T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 15k Units

REFLOW INFORMATION

REFLOW PROFILE

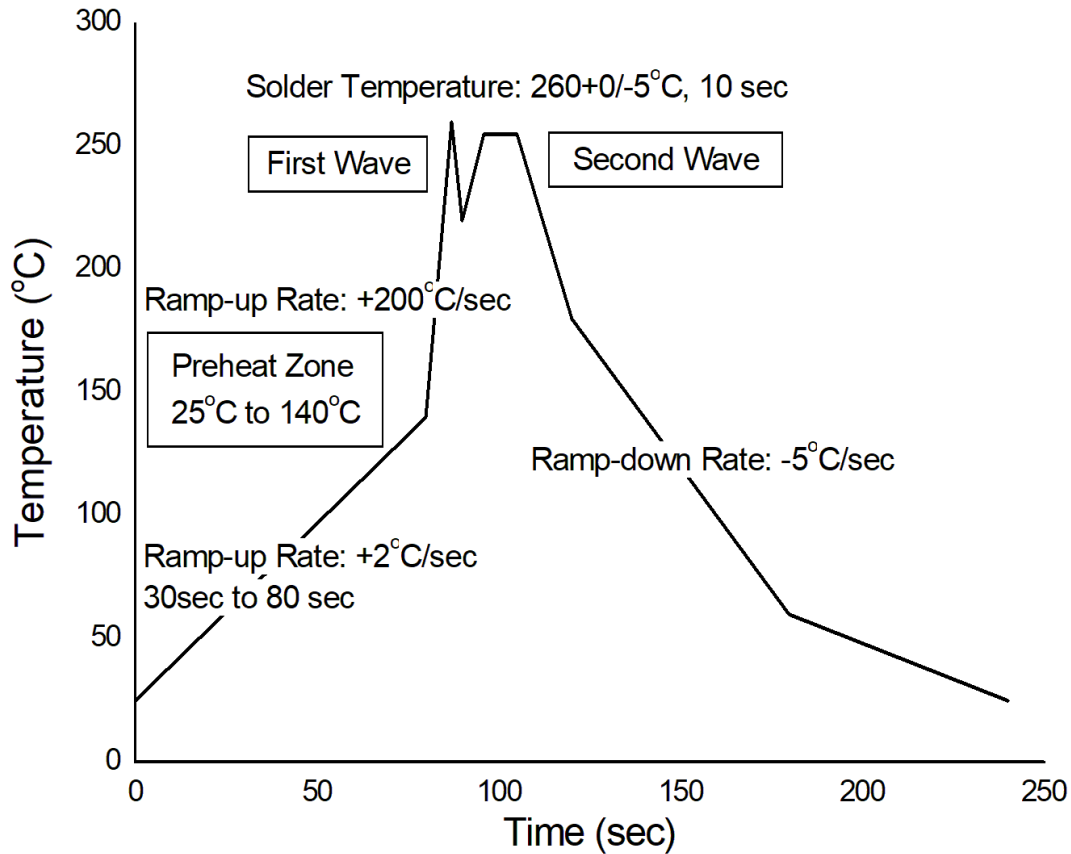


Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	100	150°C
Temperature Max. (T _{smax})	150	200°C
Time (t _s) from (T _{smin} to T _{smax})	60-120 seconds	60-120 seconds
Ramp-up Rate (t _L to t _P)	3°C/second max.	3°C/second max.
Liquidous Temperature (T _L)	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.



TEMPERATURE PROFILE OF SOLDERING

WAVE SOLDERING (JESD22-A111 COMPLIANT)



HAND SOLDERING BY SOLDERING IRON

Soldering Temperature	380+0/-5°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

- LIGHTNING is continually improving the quality, reliability, function and design. LIGHTNING reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
- LIGHTNING makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, LIGHTNING disclaims (a) any and all liability arising out of the application or use of any product, (b) any and all liability, including without limitation special, consequential or incidental damages, and (c) any and all implied warranties, including warranties of fitness for particular
- The products shown in this publication are designed for the general use in electronic applications such as office automation, equipment, communications devices, audio/visual equipment, electrical application and instrumentation purpose, non-infringement and merchantability.
- This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- 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.