BRIGHTEK

BRIGHTEK (EUROPE) LIMITED

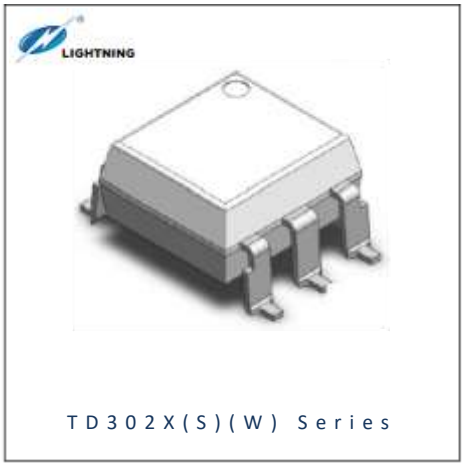
Brighten Up The World With LED!

PRODUCT DATASHEET

- ▶ DC Input Photo Coupler
- ▶ SMD6
- ▶ Random-Phase TRIAC

Release Date: 26 June 2025 Version: A01

TD302X(S)(T1)-GV(W)



TD302X(S)(W) Series

TD302X(S)(W) Series

DESCRIPTION:

The TD302X(S)(W) 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 SMD6 lead forming option.

With the robust coplanar double mold structure, TD302X(S)(W) series provide the most stable isolation feature.

FEATURES:

- High isolation 5000Vrms
- 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
  - cUL - CSA Component Acceptance Service Notice 5A
- Packing: 1000pcs/reel

APPLICATIONS:

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

Partner with: LIGHTNING

NAMING & ORDERING INFORMATION:

Naming Information:

TD302 X (S) (T1) - G V (W)	
TD302X	Part Number
X	Selection: LED Trigger Current (X=1~3)
S	Lead Form Option: SMD6
T1	Selection: Tape and Reel Option (T1(default)/T2)
G	Green Option
V	VDE Option
W	White Package

Ordering Information:

TD302X(S)(T1)-GV(W)

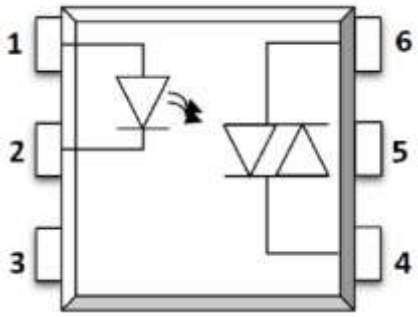
X = Selection: LED Trigger Current (X=1~3)

Part Number	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
TD3021(S)(T1)-GV(W)	I_{FT}	---	---	15	mA	I_{TM}=100mA Terminal Voltage=3V
TD3022(S)(T1)-GV(W)		---	---	10		
TD3023(S)(T1)-GV(W)		---	---	5		

Version No.	Original Release Date
Rev: A01	21/06/2021

SCHEMATIC DIAGRAM & MARKING:

Schematic Diagram:



PIN Definition	
1	Anode
2	Cathode
3	NC
4	Terminal
5	Substrate
6	Terminal

Marking Information:

Marking Definition	
TD	Manufacturer Code
302X	Part Number & Rank
V	VDE Applicable
Y	Fiscal Year
A	Manufacturing Code
WW	Work Week

Labelling Information:

This product is manufactured, tested, and packed by

LIGHTNING

for more details, please visit www.tdled.com

ABSOLUTE CHARACTERISTICS:

Absolute Maximum Ratings:

Parameter	Symbol	Ratings	Unit
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	V_{DRM}	400	V
Peak Repetitive Surge Current PW=100μs, 120pps	I_{TSM}	1	A
On-State RMS Current	$I_{T(RMS)}$	100	mA
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 *1	Vrms
Operating Temperature	T_{opr}	-40~+100	°C
Storage Temperature	T_{stg}	-55~+125	°C
Soldering Temperature	T_{sol}	260 *2	°C

*1. AC for 1 minute, R.H.=40~60%.
*2. For 10 seconds max.

ELECTRICAL CHARACTERISTICS:

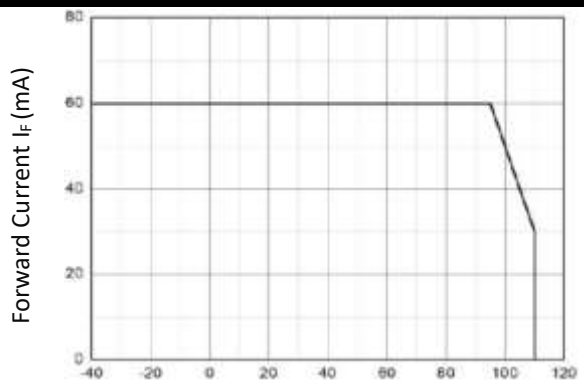
Electrical Optical Characteristics at T_a=25°C:

Parameter		Symbol	Values			Unit	Test Condition
			Min.	Typ.	Max.		
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 *1	nA	V_{DRM}=Rated V_{DRM} I_F=0
Peak On-State Voltage Either Direction		V_{TM}	---	1.58	2.5	V	I_{TM}=100mA
Critical Rate of Rise of Off-State Voltage		dV/dt	1000	---	---	V/μs	V_{PEAK}=400V I_F =0
TRANSFER CHARACTERISTICS							
LED Trigger Current	TD3021	I_{FT}	---	---	15	mA	I_{TM}=100mA Terminal Voltage=3V
	TD3022		---	---	10		
	TD3023		---	---	5		
Holding Current		I_H	---	257	---	μA	---
Isolation Resistance		R_{ISO}	10^12	10^14	---	Ω	DC=500V, 40~60% R.H.
Floating Capacitance		C_{IO}	---	0.8	---	pF	V=0, f=1MHz

*1. Test voltage must be applied within dV/dt rating.

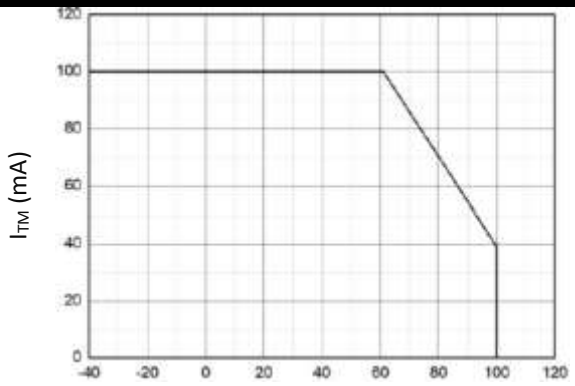
CHARACTERISTIC CURVES:

Forward Current v.s. Ambient Temperature



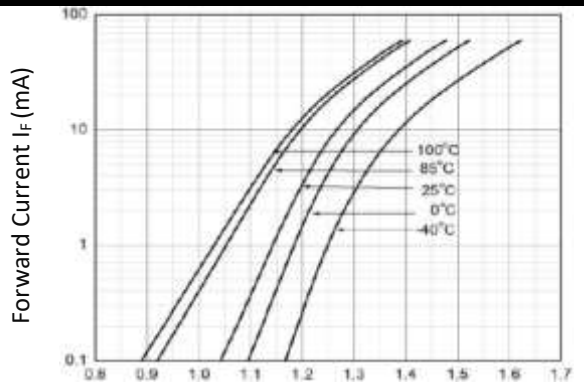
Ambient Temperature T_a (°C)

On-State Terminal Current v.s. Ambient Temperature



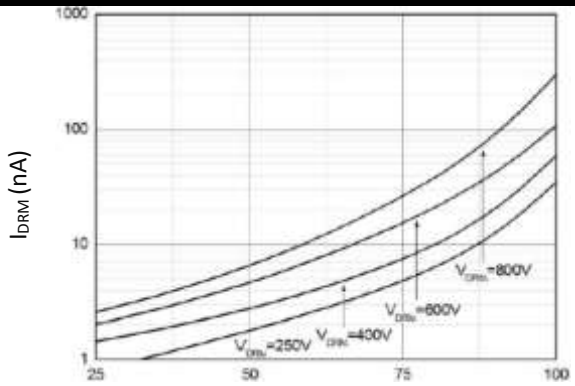
Ambient Temperature T_a (°C)

Forward Current v.s. Forward Voltage



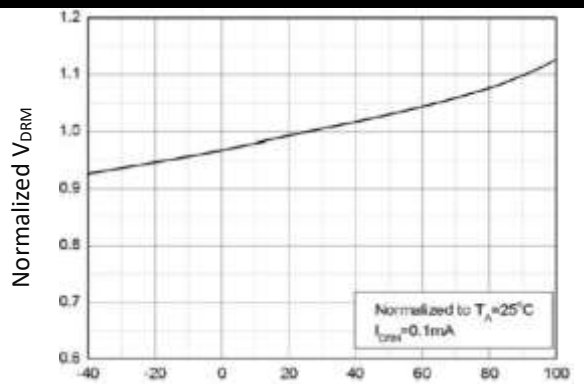
Forward Voltage V_F (V)

Off-State Terminal Current v.s. Ambient Temperature



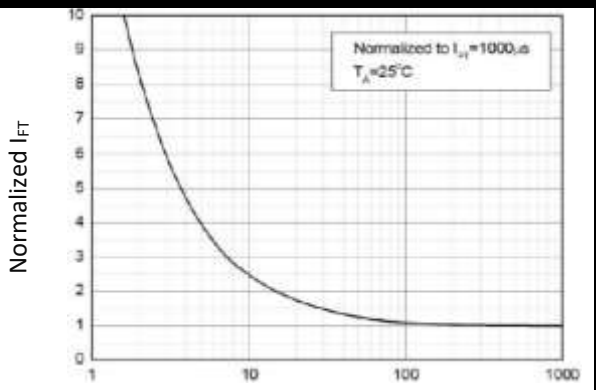
Ambient Temperature T_a (°C)

Normalized Off-State Terminal Voltage v.s. Ambient Temperature



Ambient Temperature T_a (°C)

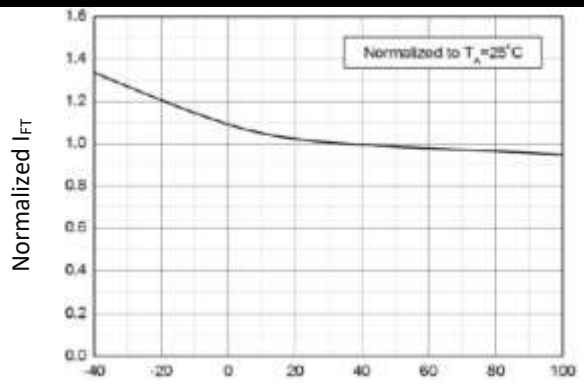
Normalized Trigger Current v.s. LED Trigger Pulse Width



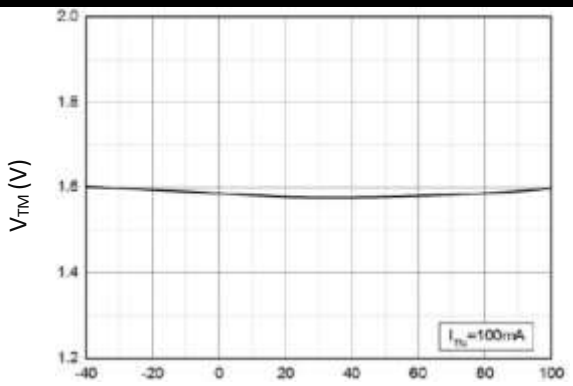
PW (μs)

CHARACTERISTIC CURVES:

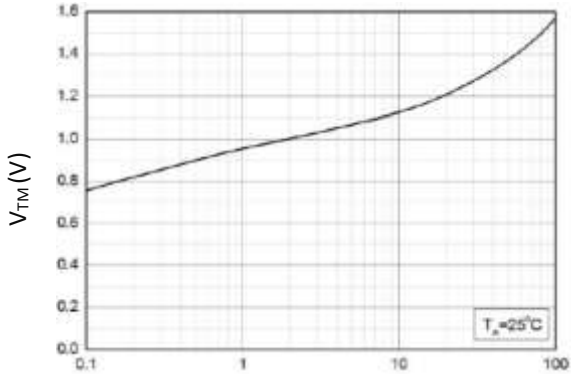
Normalized Trigger Current v.s. Ambient Temperature



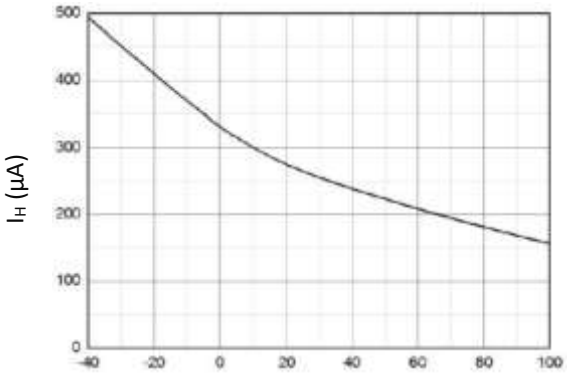
On-State Terminal Voltage v.s. Ambient Temperature



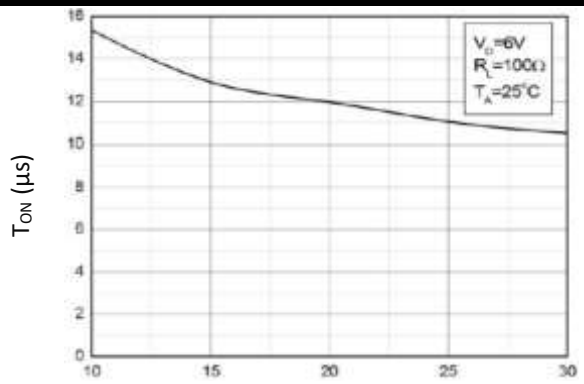
On-State Terminal Voltage v.s. On-State Terminal Current



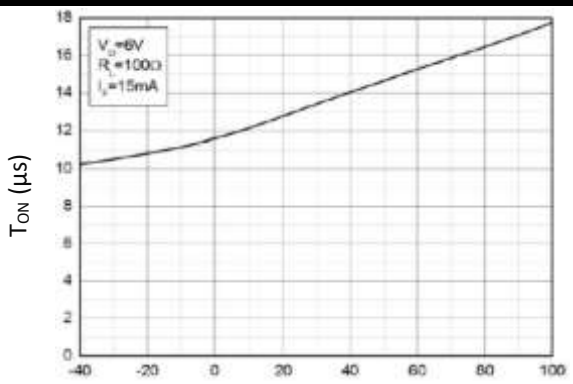
Holding Current v.s. Ambient Temperature



Turn On Time v.s. Forward Current

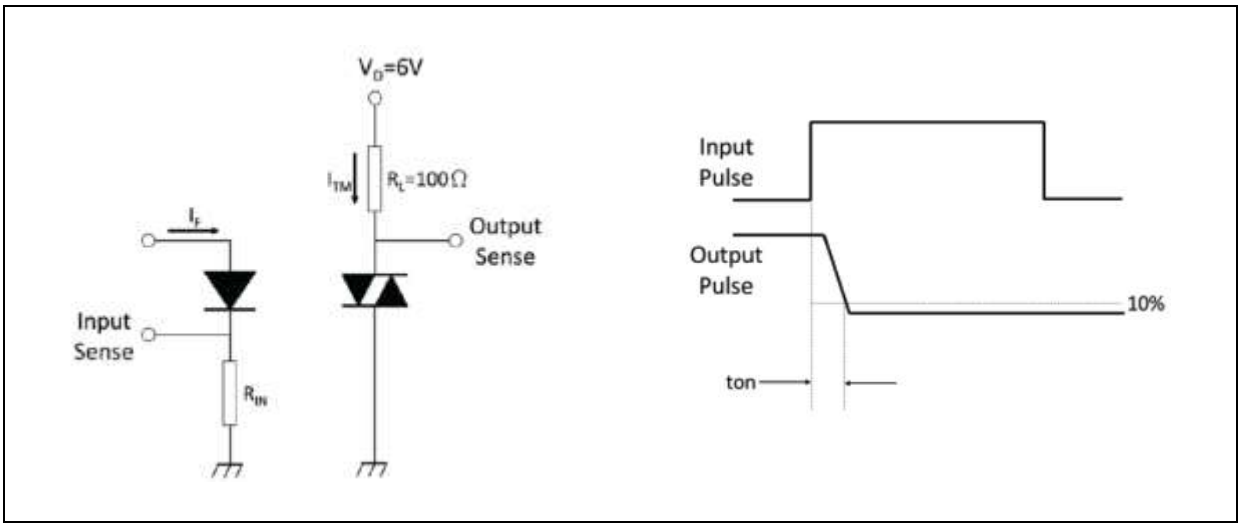


Turn On Time v.s. Ambient Temperature

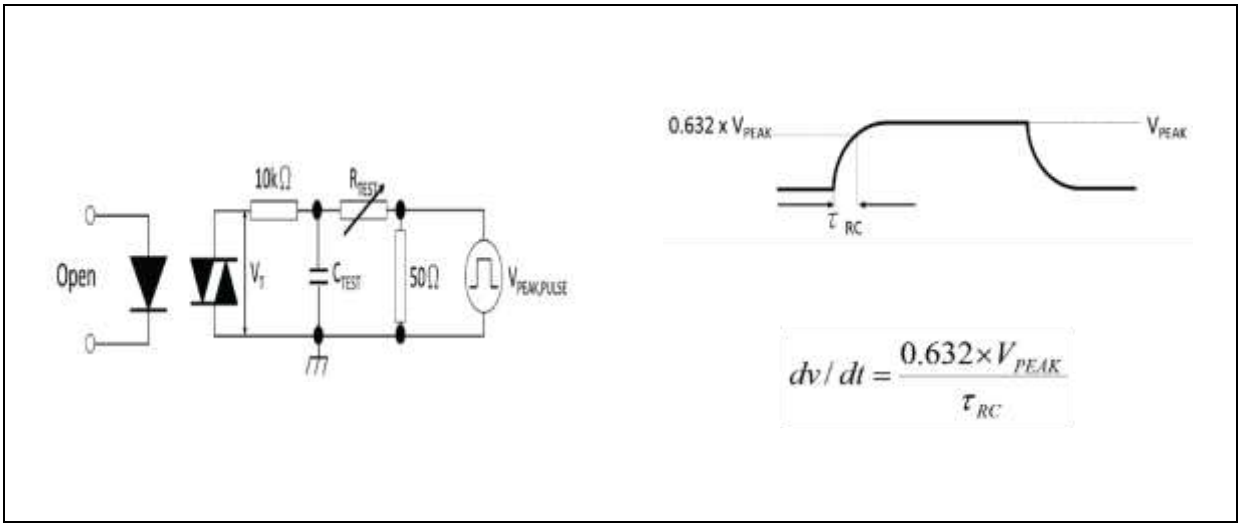


TEST CIRCUIT:

Test Circuit and Waveforms of Turn On Time:



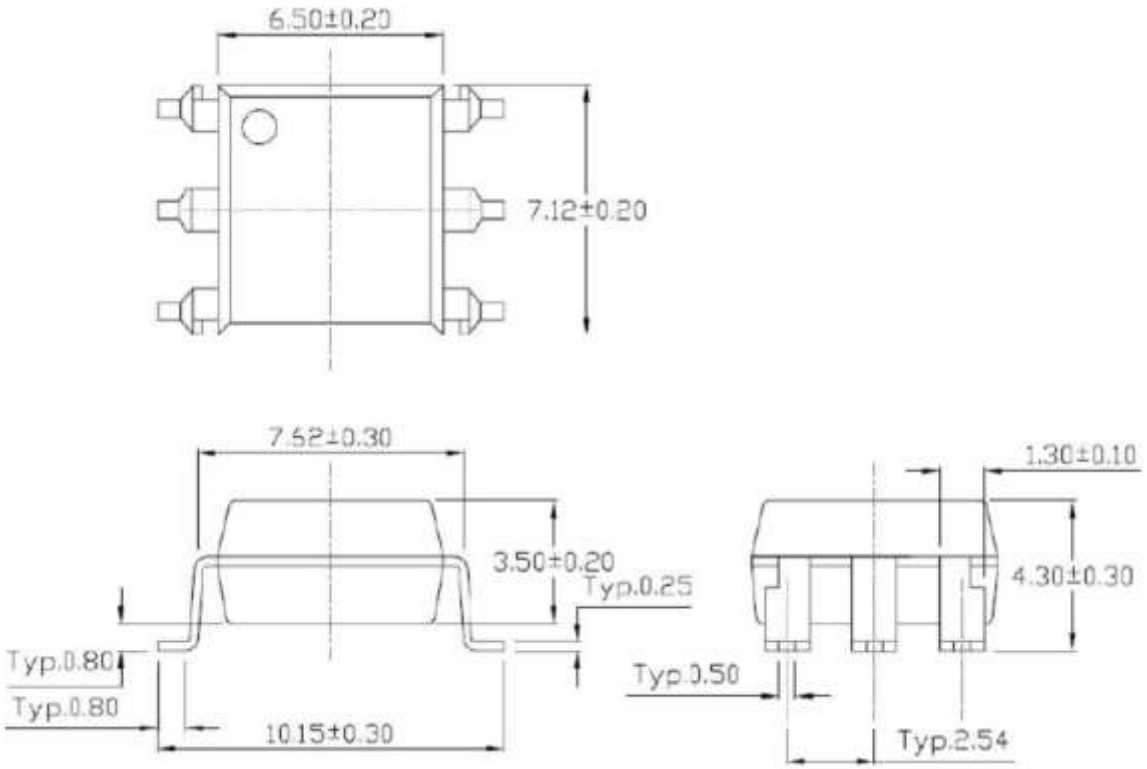
Test Circuit and Waveforms of dV/dt:



OUTLINE DIMENSION:

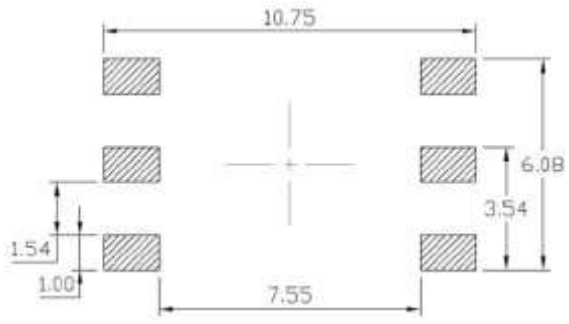
Package Dimension:

Surface Mount Lead Forming - SMD (S Type)



1. All dimensions are in millimetre (mm).

Recommended Soldering Mask:



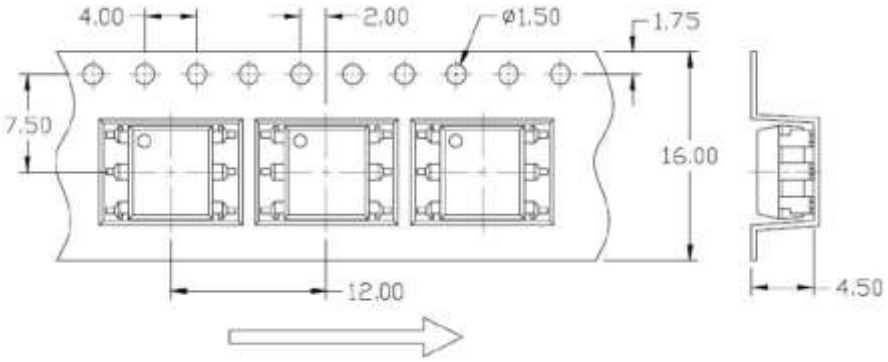
1. Dimensions are in millimetre (mm).

PACKING SPECIFICATION:

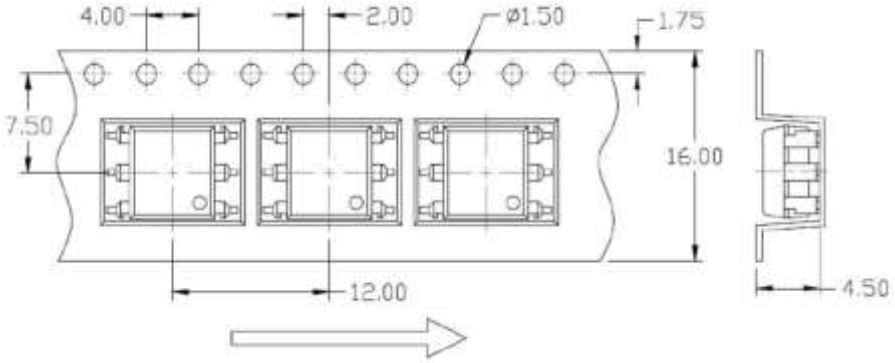
Reel Dimension:

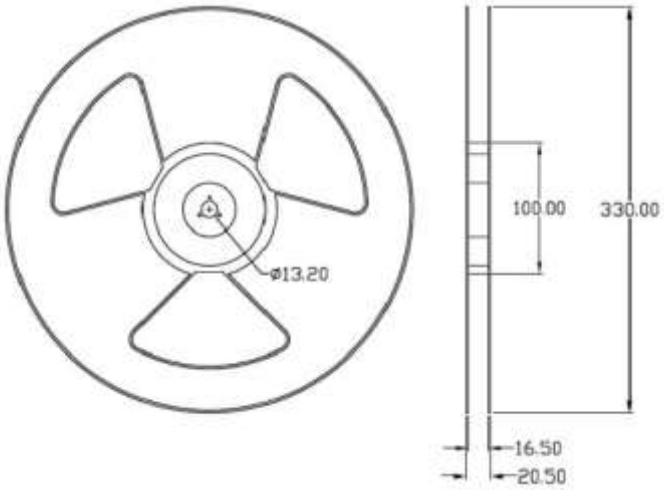
T1/T2: 1000pcs/reel

Reel Option: T1 (default)



Reel Option: T2

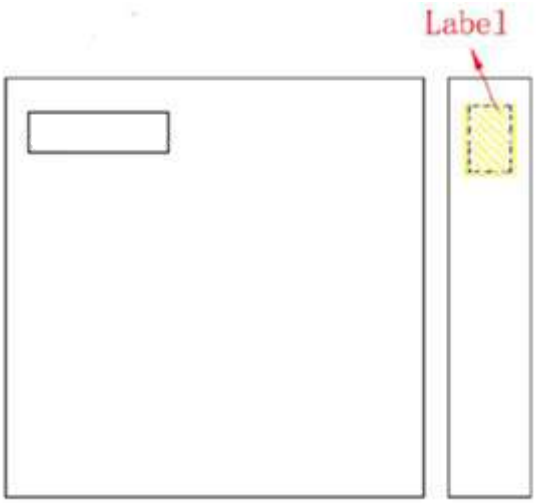




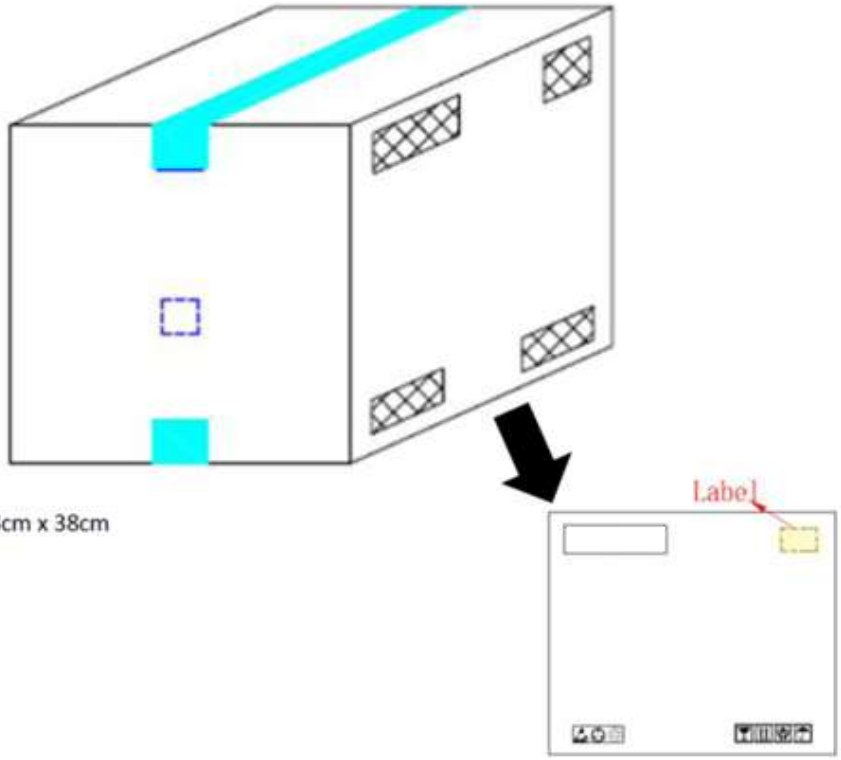
PACKING SPECIFICATION:

Box Dimension:

T1/T2: 3 reels (3Kpcs)/inner box, 5 inner boxes (15Kpcs)/carton



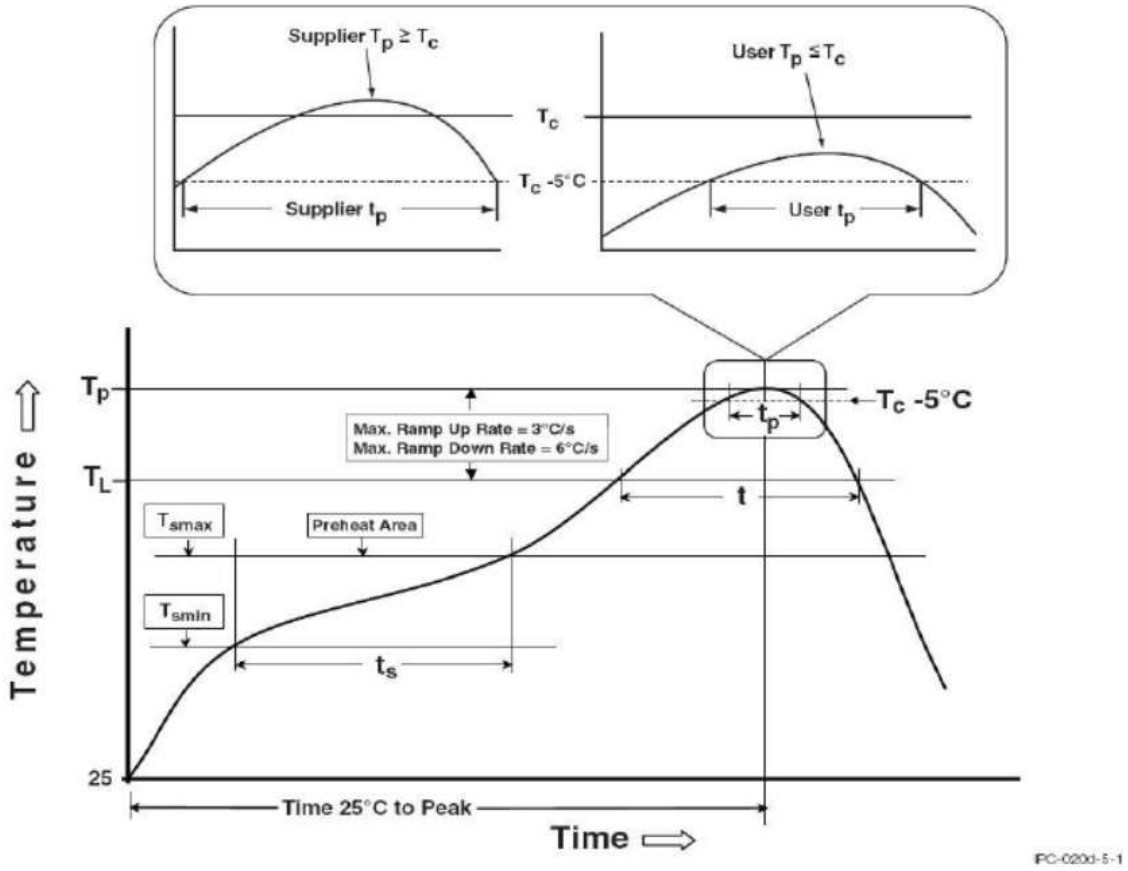
- L x W x H = 36cm x 36cm x 6.9cm



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

RECOMMENDED SOLDERING PROFILE:

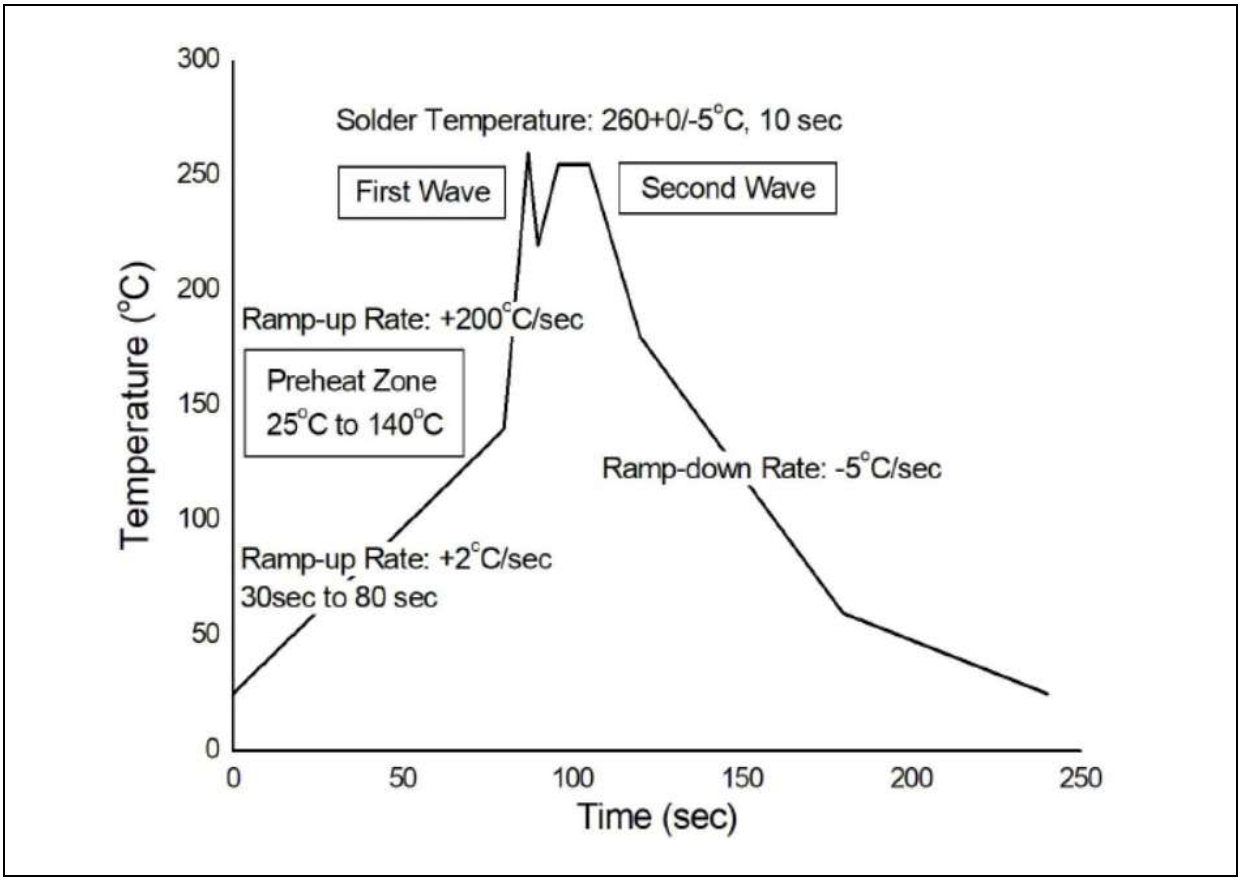
Reflow Information:



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	100°C	150°C
Temperature Max. (T_{smax})	150°C	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.

RECOMMENDED SOLDERING PROFILE:

Wave Soldering (JESD22-A111 Compliant):



Hand Soldering:

Soldering Temperature	380±5°C
Soldering Time	3 sec max.

Note:

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