BRIGHTEK

BRIGHTEK (EUROPE) LIMITED

Brighten Up The World With LED!

ISO/TS 16949:2009 BS EN ISO 14001:2004 QC 080000 IECQ HSPM

PRODUCT DATASHEET

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

- DC-In Solid State Relay
- SMD7
- Zero-Cross TRIAC Output

Release Date: 24 June 2025 Version: A00

TDRX213(S)(T1)-GV

TDRX213(S) Series

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DESCRIPTION:

RoHS Compliant

The TDRX213(S) series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon zero-cross photo TRIAC to drive a power TRIAC in a plastic DIP7 package with SMD7 lead forming option.

FEATURES:

- High isolation 5000Vrms
- DC input with TRIAC output
- Operating temperature range -40°C to +85°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:

TDR X 213 (S) (T1)- G V	
TDRX213	Part Number
X	Selection: On-State RMS Current (X=0~3)
S	Lead Form Option: SMD7
T1	Selection: Tape and Reel Option (T1(default)/T2)
G	Green Option
V	VDE Option

Ordering Information:

TDRX213(S)(T1)-GV

X = Selection: On-State RMS Current (X=0~3)

Part Number	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
TDR0213(S)(T1)-GV	$IT_{(RMS)}$ *	---	---	0.3	A	I_{TSM}=3A ** P_W=100µs, 120pps
TDR1213(S)(T1)-GV		---	---	0.6		I_{TSM}=6A P_W=100µs, 120pps
TDR2213(S)(T1)-GV		---	---	0.9		I_{TSM}=9A P_W=100µs, 120pps
TDR3213(S)(T1)-GV		---	---	1.2		I_{TSM}=12A P_W=100µs, 120pps

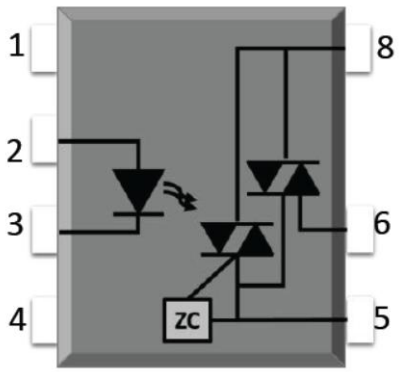
* $IT_{(RMS)}$ = On-State RMS Current

** I_{TSM} = Non-repetitive Surge Current

Version No.	Original Release Date
Rev: A00	29/08/2024

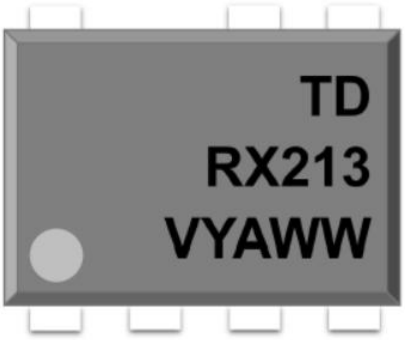
SCHEMATIC DIAGRAM & MARKING:

Schematic Diagram:



PIN Definition	
1	NC
2	Anode
3	Cathode
4	NC
5	Gate
6	Terminal
7	(Absent)
8	Terminal

Marking Information:



Marking Definition	
TD	Manufacturer Code
RX213	Part Number
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}	600	V
On-State RMS Current	TDR0213	$I_{T(RMS)}$	0.3	A
	TDR1213		0.6	
	TDR2213		0.9	
	TDR3213		1.2	
Non-repetitive Surge Current P_W=100µs, 120pps	TDR0213	I_{TSM}	3	A
	TDR1213		6	
	TDR2213		9	
	TDR3213		12	
Junction Temperature		T_j	125	°C
COMMON				
Total Power Dissipation		P_{tot}	400	mW
Isolation Voltage		V_{iso}	5000 *1	Vrms
Operating Temperature		T_{opr}	-40~+85	°C
Storage Temperature		T_{stg}	-40~+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:

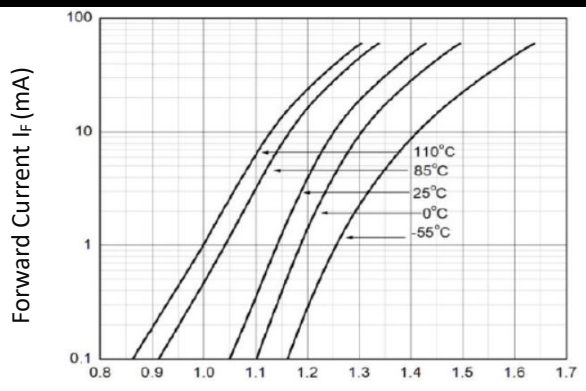
Electrical Optical Characteristics at T_a=25°C:

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}	---	30	---	pF	V=0, f=1kHz
OUTPUT						
Peak Off-State Current Either Direction	I_{DRM}	---	---	100	μA	V_{DRM}=600V I_F=0
On-State Terminal Voltage	V_{TM}	---	1.7	2.5	V	I_{TM}=Rated I_{TM}
Critical Rate of Rise of Off-State Voltage - Breakdown Voltage	dV/dt	1000	---	---	V	V_{PEAK}=600V *1
TRANSFER CHARACTERISTICS						
LED Trigger Current	I_{FT}	---	---	10	mA	R_L=100Ω Terminal Voltage=6V
Holding Current	I_H	---	---	25	mA	---
Isolation Resistance	R_{ISO}	10^12	10^14	---	Ω	DC=500V, 40~60% R.H.
Floating Capacitance	C_{IO}	---	0.25	1	pF	V=0, f=1MHz
ZERO-CROSSING CHARACTERISTICS						
Inhibit Voltage	V_{INH}	---	---	20	V	I_F=10mA
Leakage in Inhibited State	I_{DRM2}	---	---	500	μA	I_F=10mA V_{DRM}=600V
Response Time (Rise)	T_{ON}	---	30	---	μs	V_D=6V, R_L=100Ω I_F=10mA

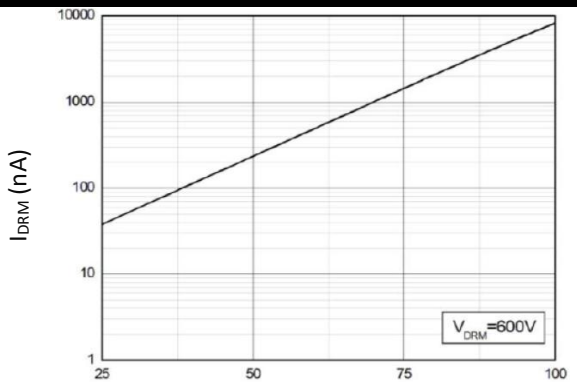
*1. Test voltage must be applied within dV/dt rating.

CHARACTERISTIC CURVES:

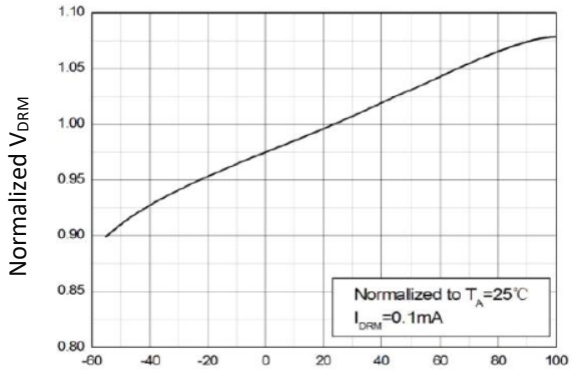
Forward Current v.s. Forward Voltage



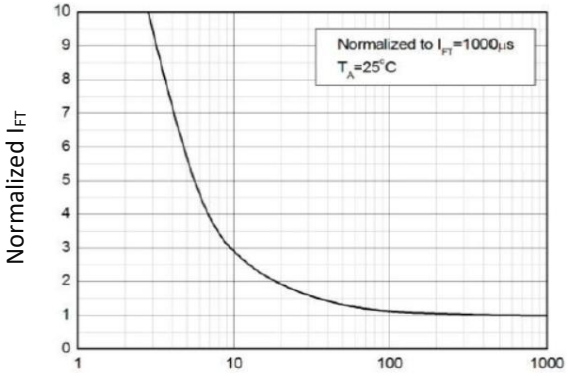
Off-State Terminal Current v.s. Ambient Temperature



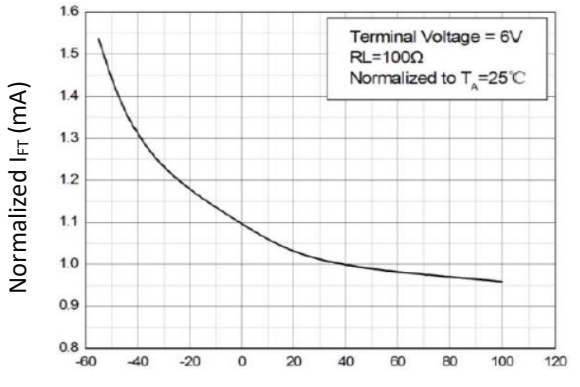
Normalized Off-State Terminal Voltage v.s. Ambient Temperature



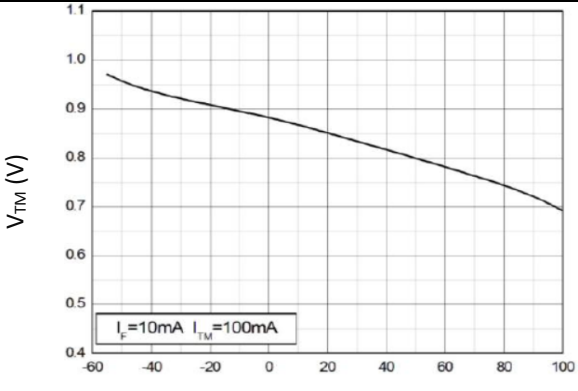
Normalized Trigger Current v.s. LED Trigger Pulse Width



Normalized Trigger Current v.s. Ambient Temperature

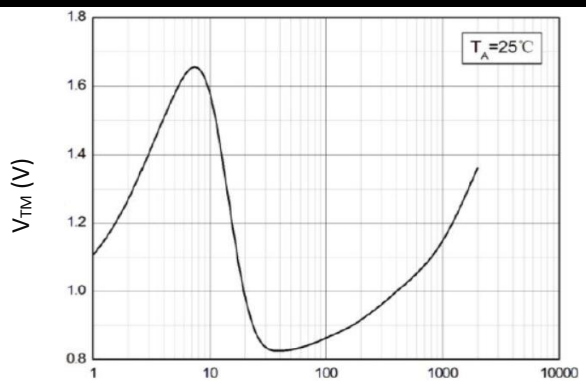


On-State Terminal Voltage v.s. Ambient Temperature



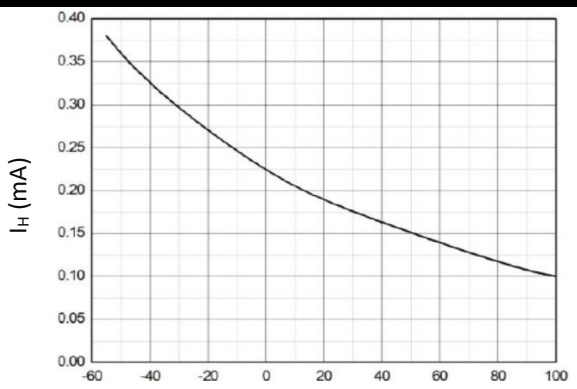
CHARACTERISTIC CURVES:

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



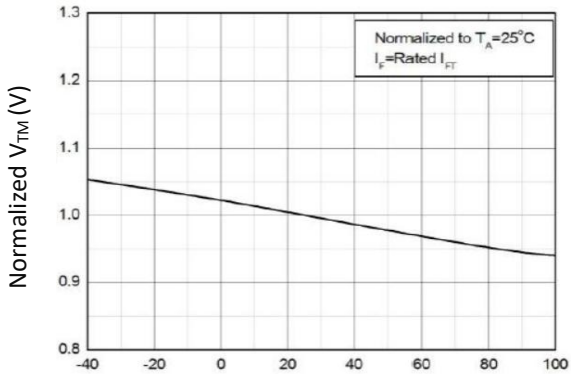
I_{TM} (mA)

Holding Current v.s. Ambient Temperature



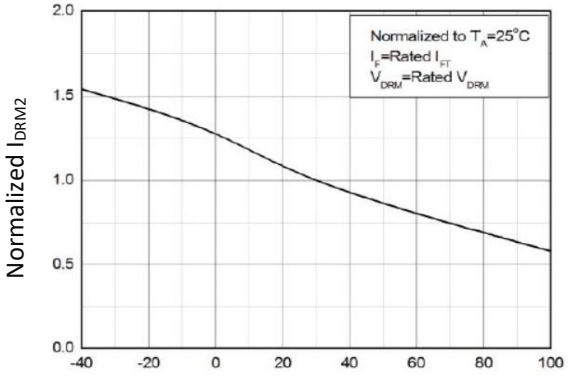
Ambient Temperature T_a (°C)

Normalized Inhibit Voltage v.s Ambient Temperature



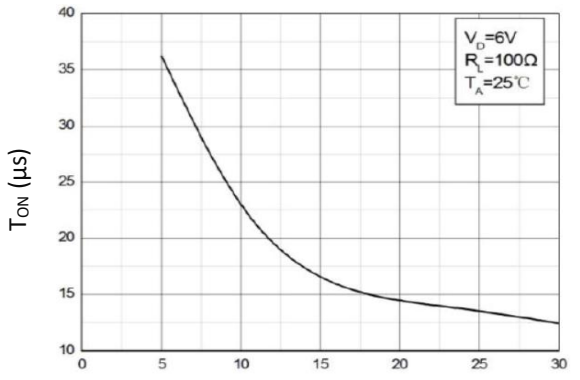
Ambient Temperature T_a (°C)

Normalized Leakage in Inhibit State v.s. Ambient Temperature



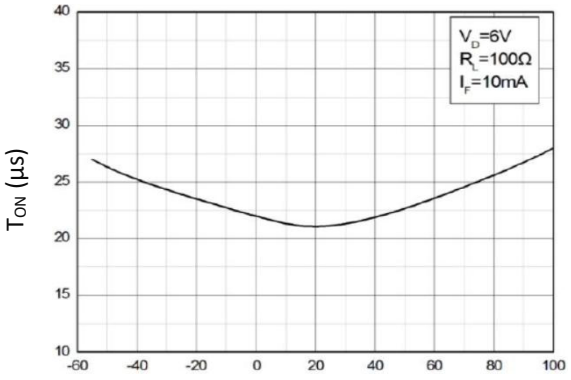
Ambient Temperature T_a (°C)

Turn On Time v.s. Forward Current



I_F (mA)

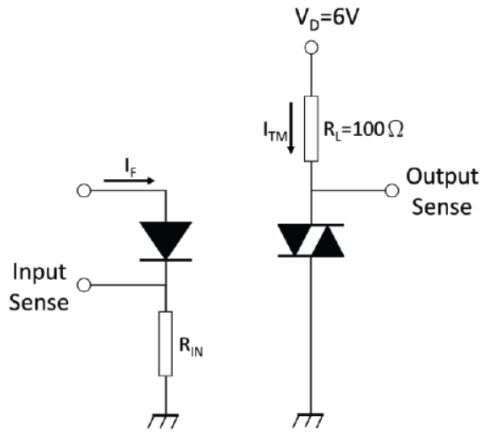
Turn On Time v.s. Ambient Temperature

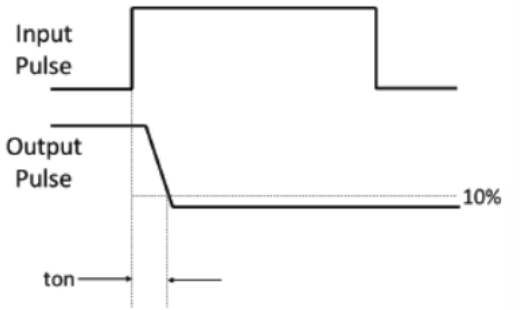


Ambient Temperature T_a (°C)

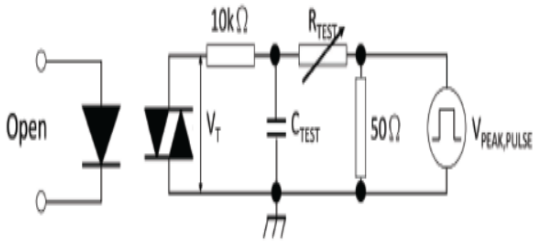
TEST CIRCUIT:

Test Circuit and Waveforms of Turn On Time:





Test Circuit and Waveforms of dV/dt:

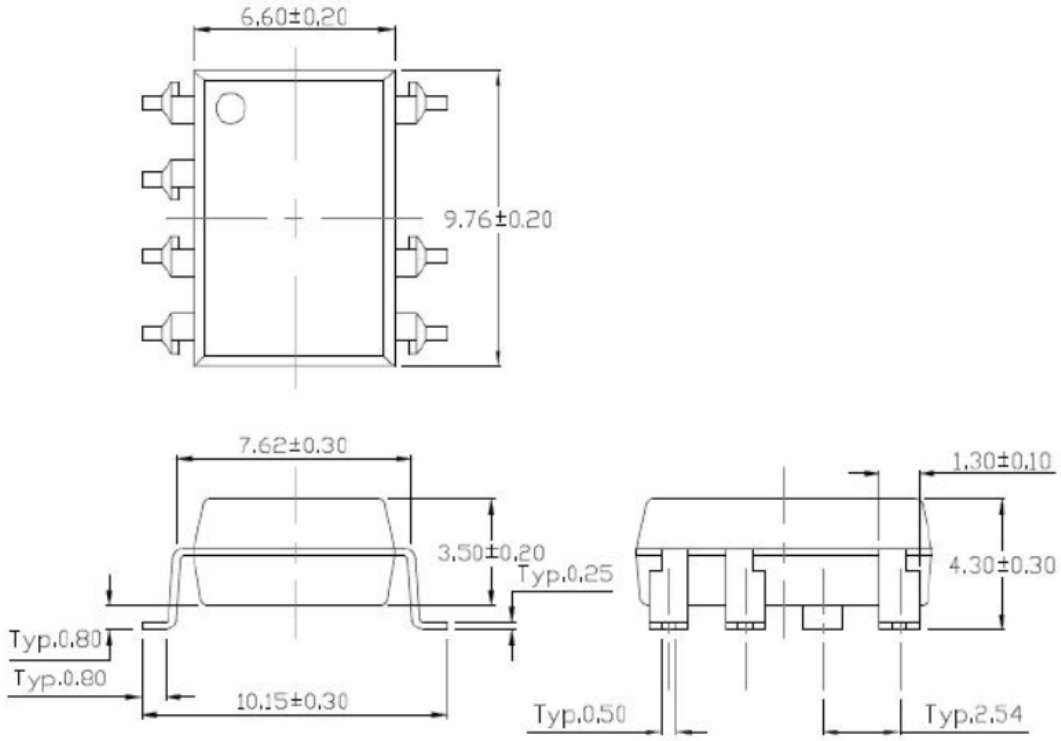


$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

OUTLINE DIMENSION:

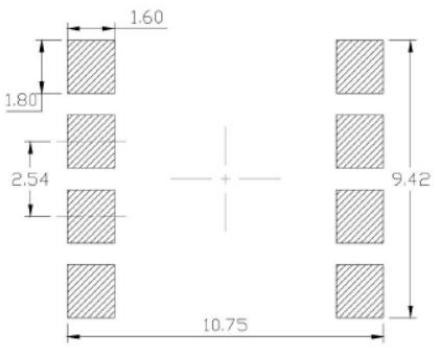
Package Dimension:

Surface Mount Lead Forming - SMD (S Type)



1. All dimensions are in millimetre (mm).

Recommended Soldering Mask:



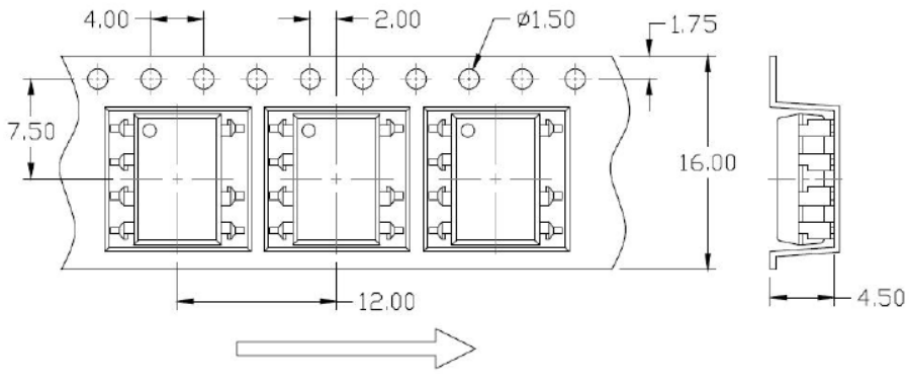
1. Dimensions are in millimetre (mm).

PACKING SPECIFICATION:

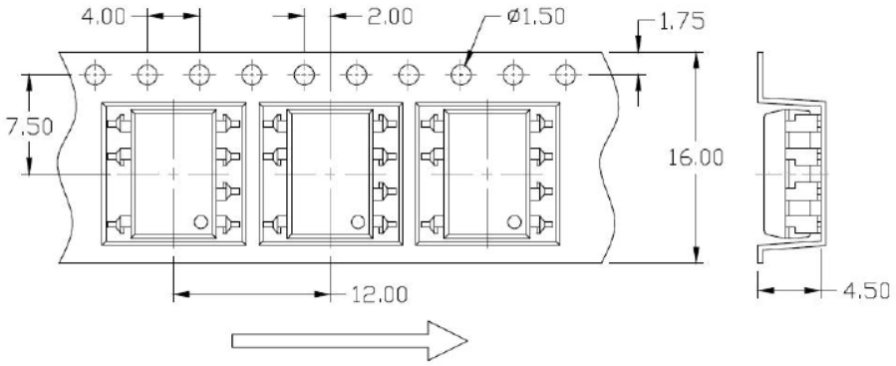
Reel Dimension:

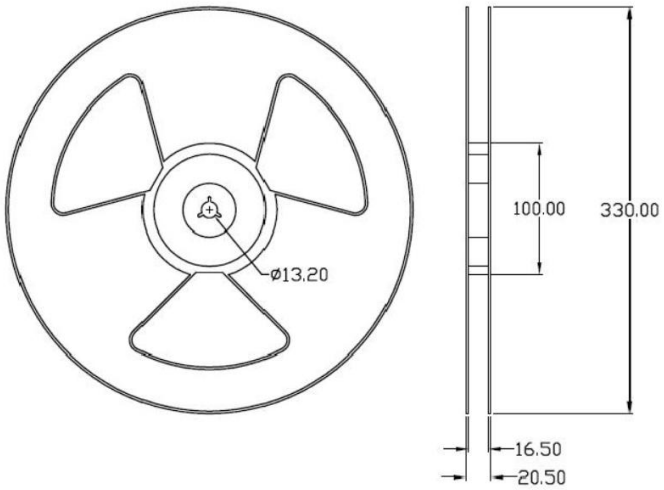
T1/T2: 1000pcs/reel

Reel Option: T1 (default)



Reel Option: T2

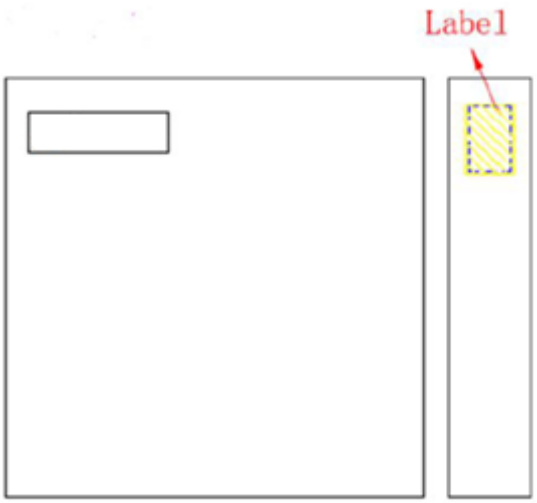




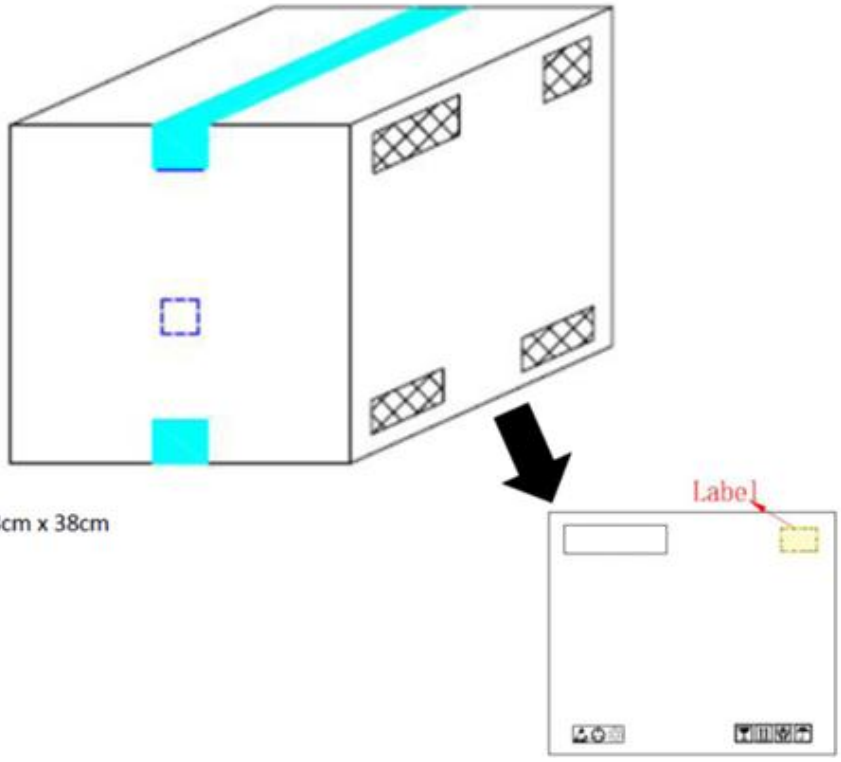
PACKING SPECIFICATION:

Box Dimension:

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



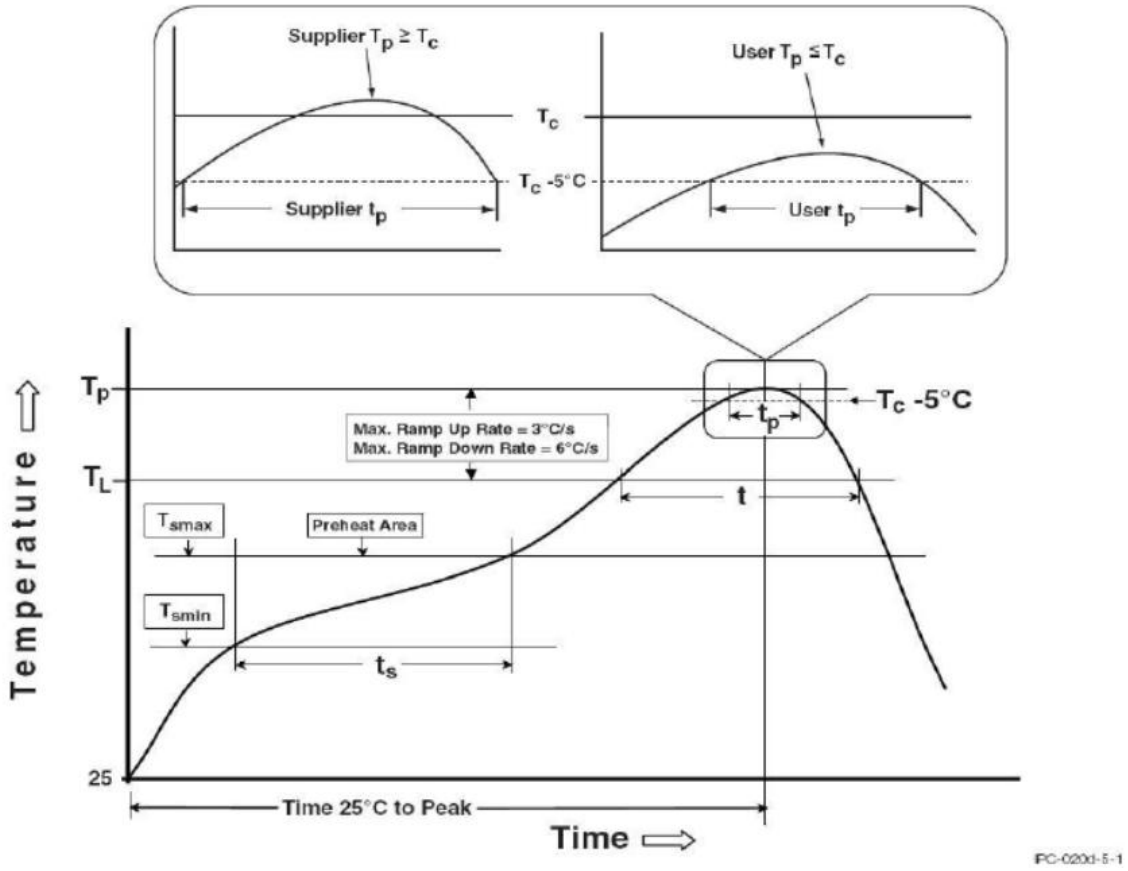
- L x W x H = 36cm x 36cm x 6.9cm



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

RECOMMENDED SOLDERING PROFILE:

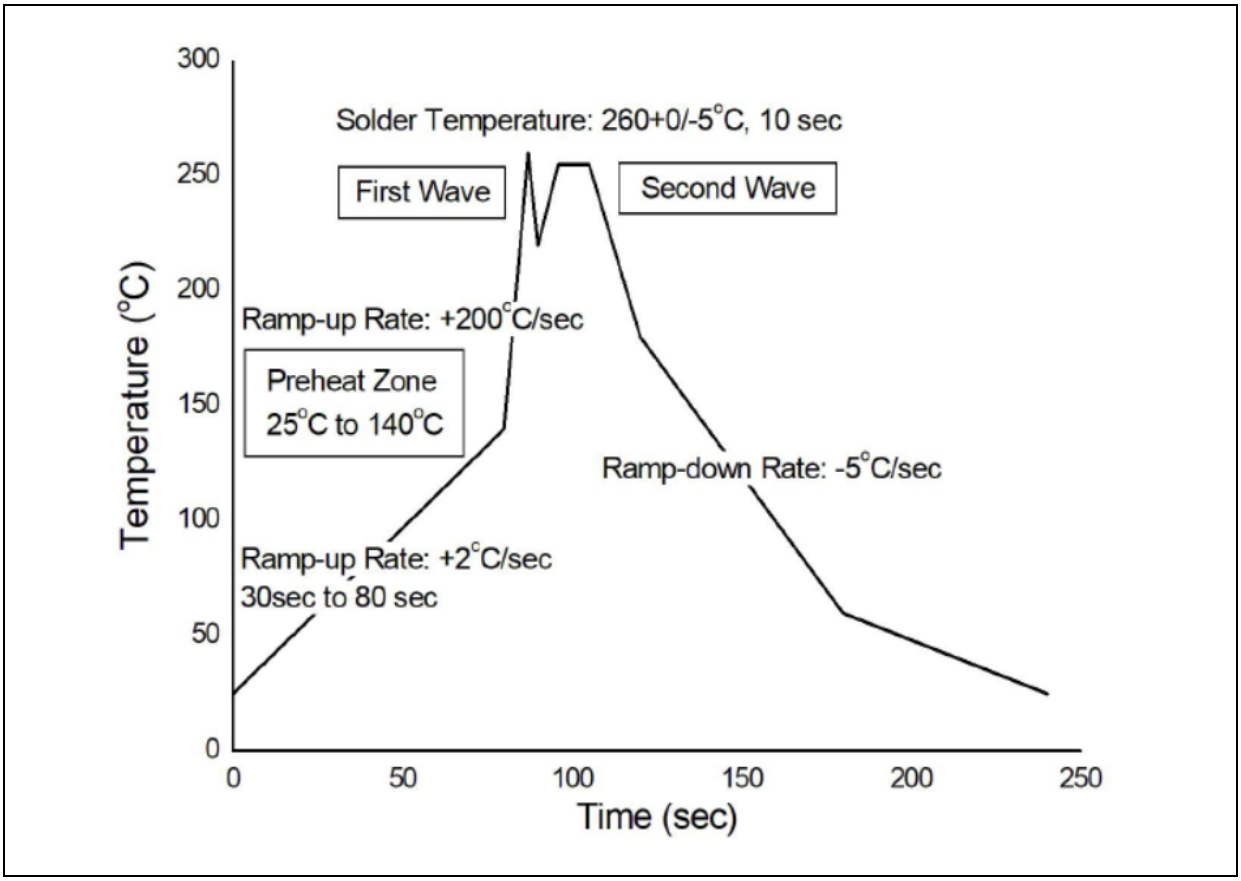
Reflow Information:



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.