

Description

The M301X, M302X and M305X 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, M301X, M302X and M305X series provide the most stable isolation feature.

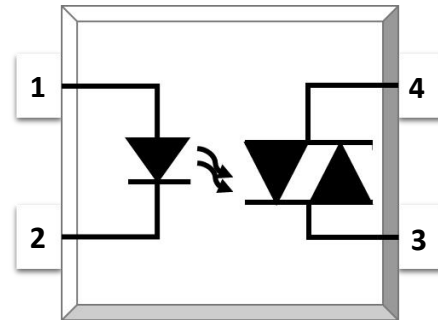
Features

- 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

Applications

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

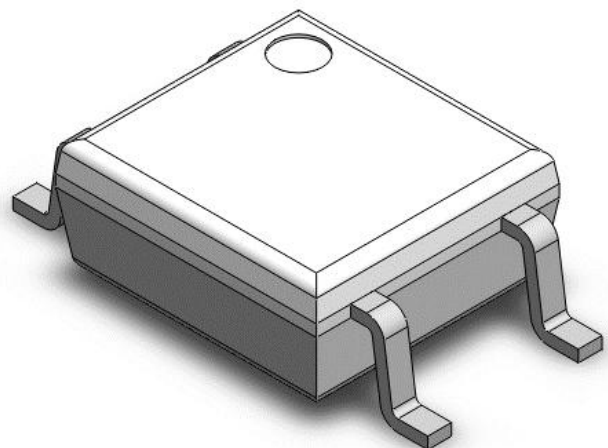
SCHEMATIC



PIN DEFINITION

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

PACKAGE OUTLINE



ABSOLUTE MAXIMUM RATINGS					
PARAMETER		SYMBOL	VALUE	UNIT	NOTE
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	M301X	V _{DRM}	250	V	
	M302X		400		
	M305X		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}	330	mW	
Isolation Voltage		V _{iso}	3750	V _{rms}	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	
Critical Rate of Rise of Off-state Voltage	dV/dt	1000	-	-	V/μs	V _{PEAK} =Rated V _{DRM}	4
TRANSFER CHARACTERISTICS							
LED	M3010, M3021, M3051	I _{FT}	-	-	15	Terminal Voltage = 3V I _{TM} =100mA	
Trigger	M3011, M3022, M3052		-	-	10		
Current	M3012, M3023, M3053		-	-	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}	-	0.4	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

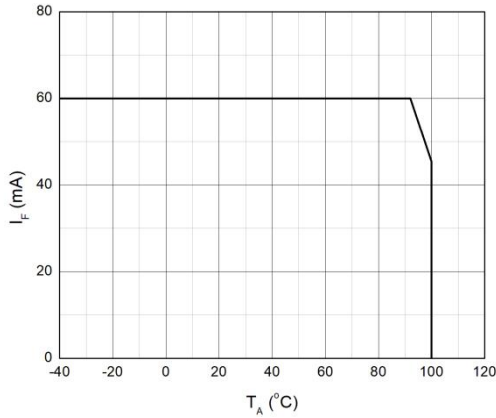


Fig.2 On-state Terminal Current vs. Ambient Temperature

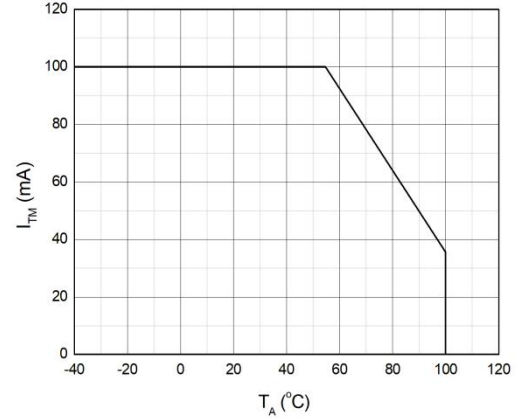


Fig.3 Forward Current vs. Forward Voltage

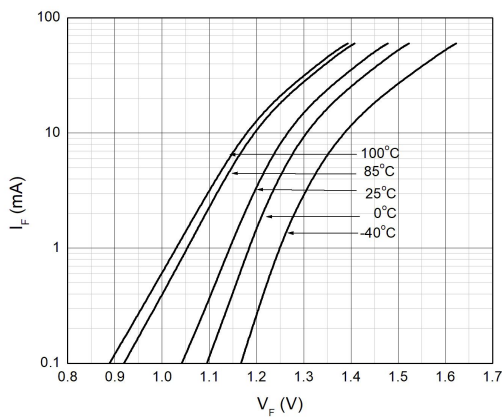


Fig.4 Off-state Terminal Current vs. Ambient Temperature

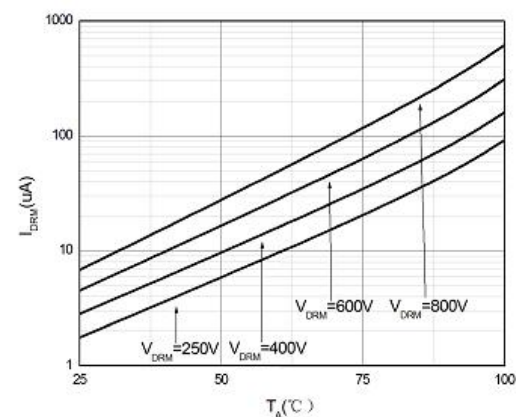


Fig.5 Normalized Off-state Terminal Voltage vs. Ambient Temperature

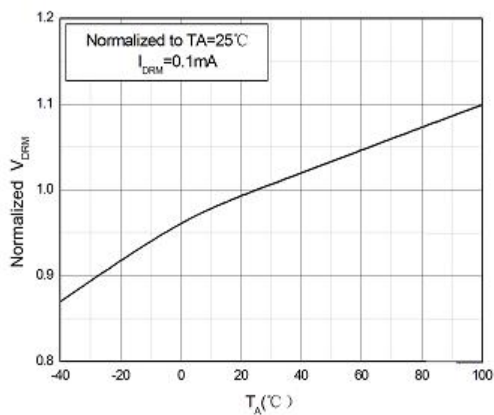
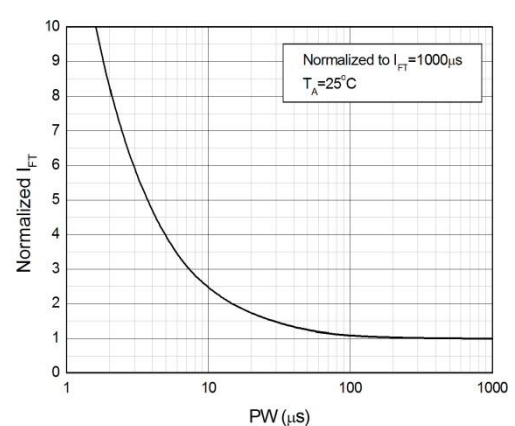


Fig.6 Normalized Trigger Current vs. LED Trigger Pulse Width



CHARACTERISTIC CURVES

Fig.7 Normalized Trigger Current vs. Ambient Temperature

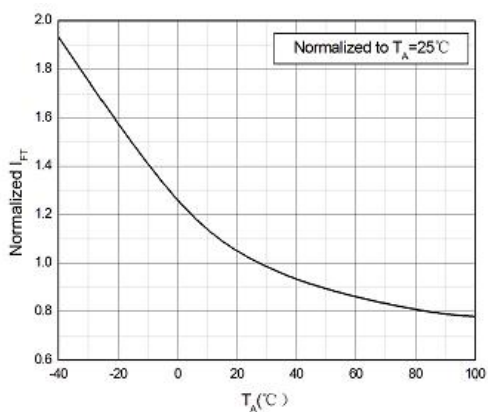


Fig.8 On-state Terminal Voltage vs. Ambient Temperature

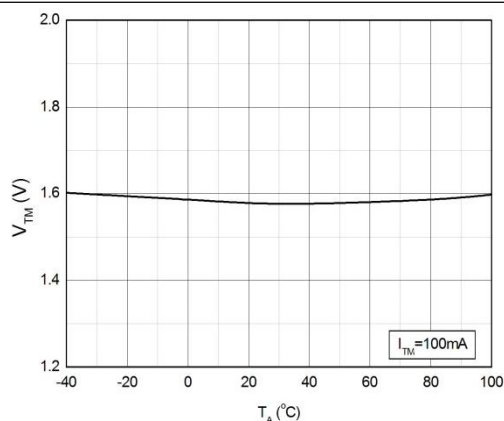


Fig.9 On-state Terminal Voltage vs. On-state Terminal Current

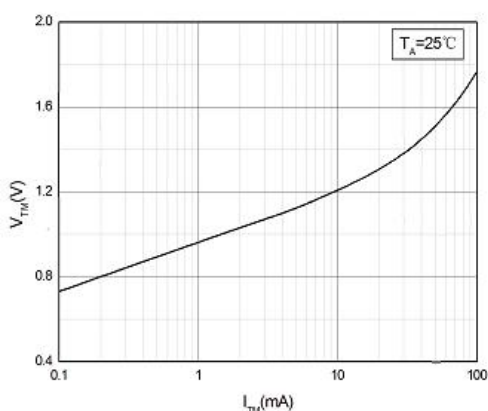


Fig.10 Holding Current vs. Ambient Temperature

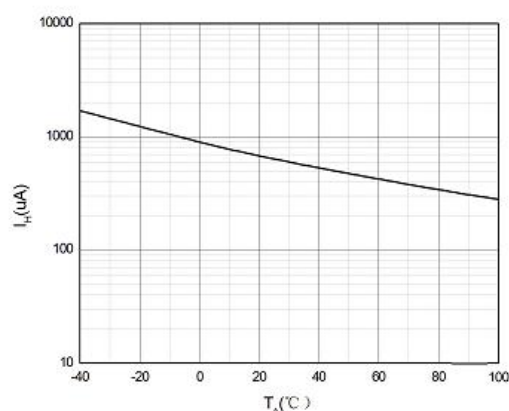


Fig.11 Turn On Time vs. Forward Current

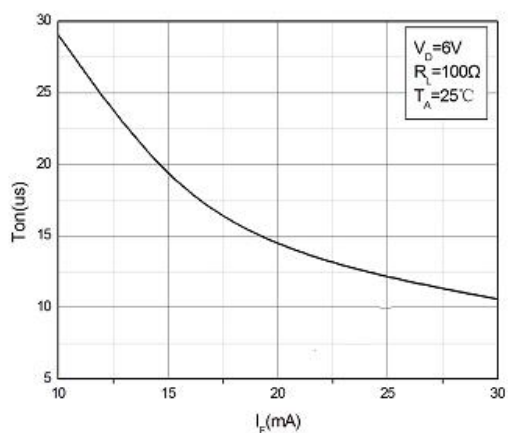
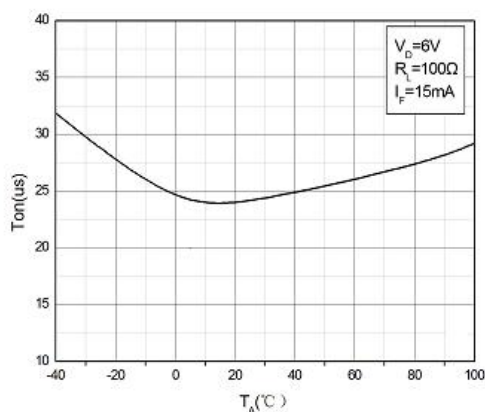


Fig.12 Turn On Time vs. Ambient Temperature



TEST CIRCUITS

Fig.13 Test Circuits of Turn On Time

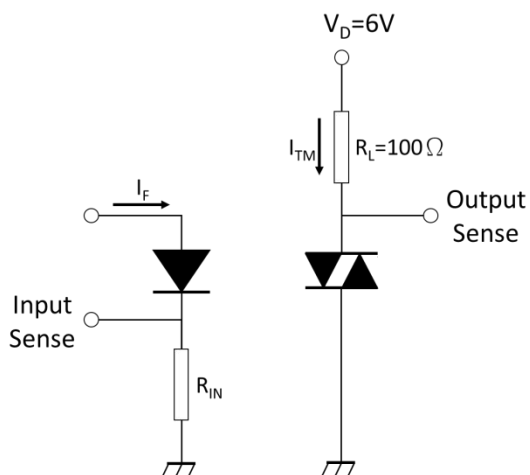


Fig.14 Waveforms of Turn On Time

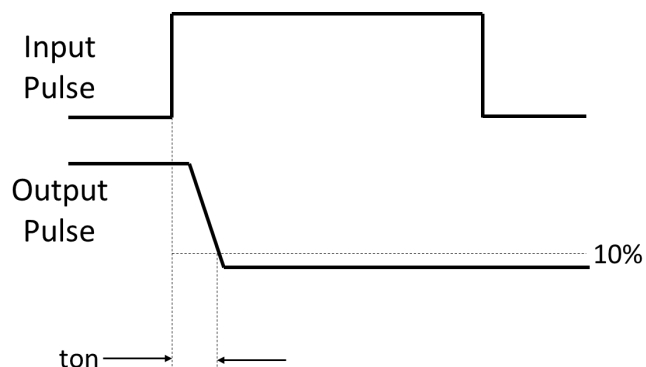


Fig.15 Test Circuits of dV/dt

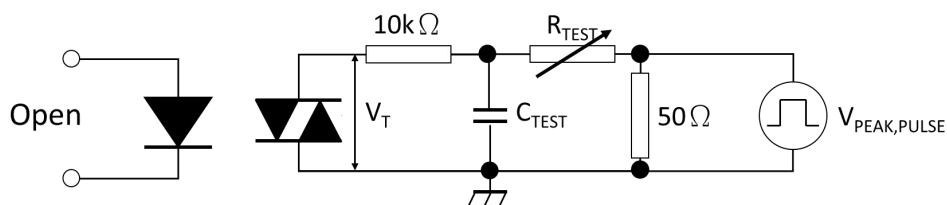
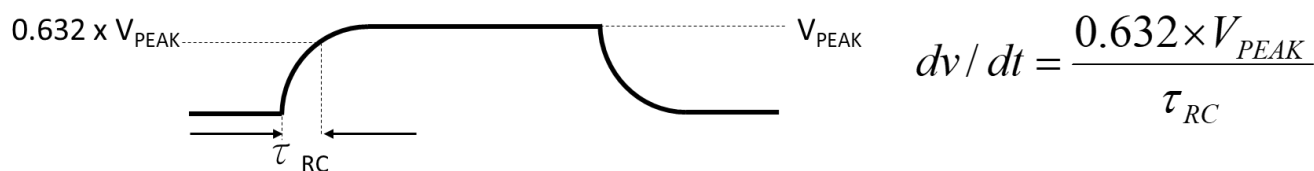
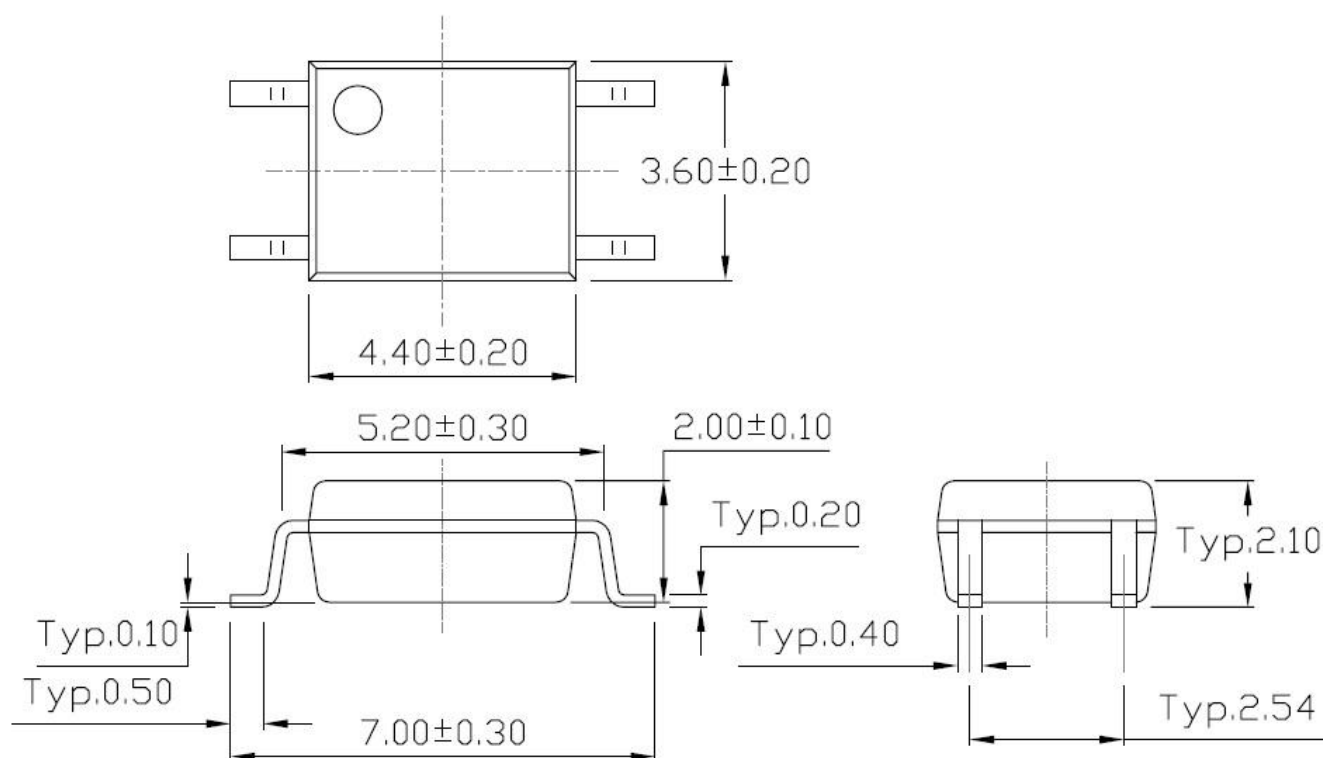


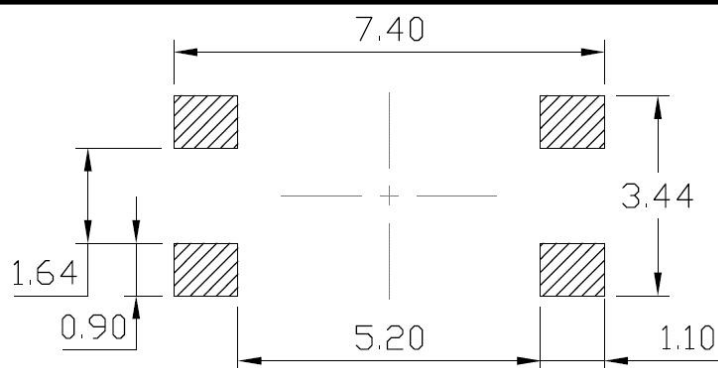
Fig.16 Waveforms of dV/dt



PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

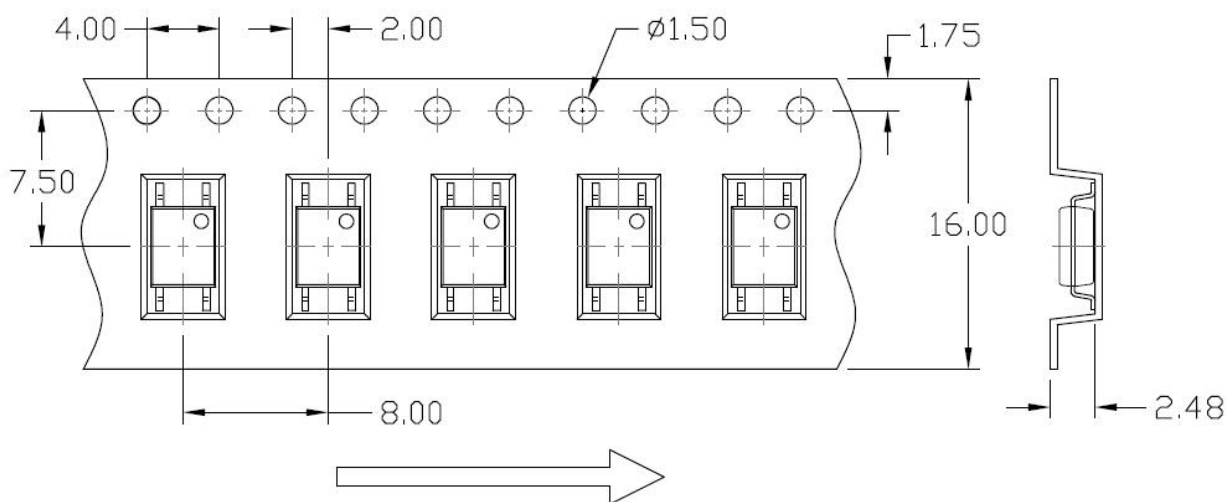


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

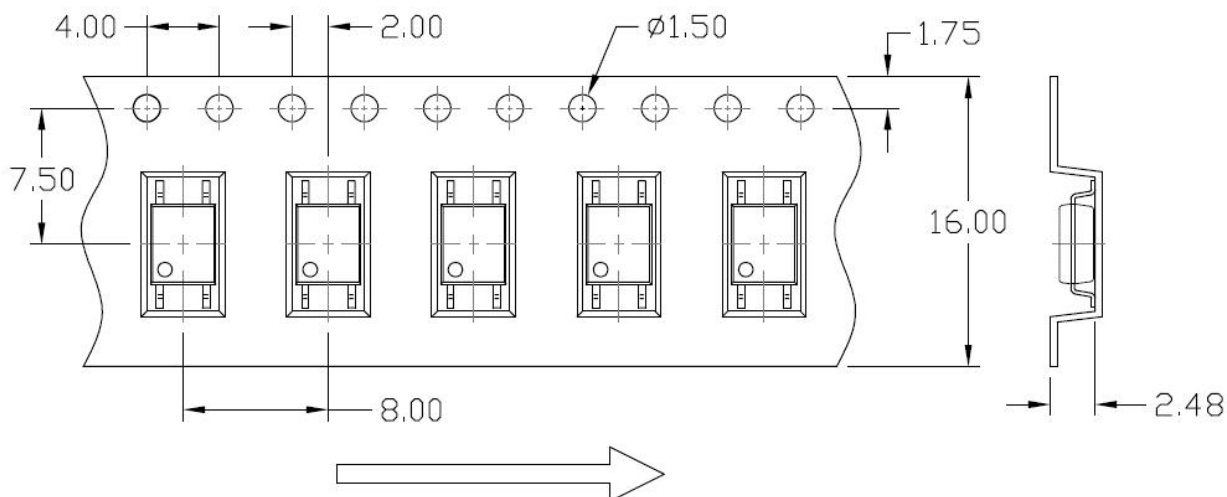


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1

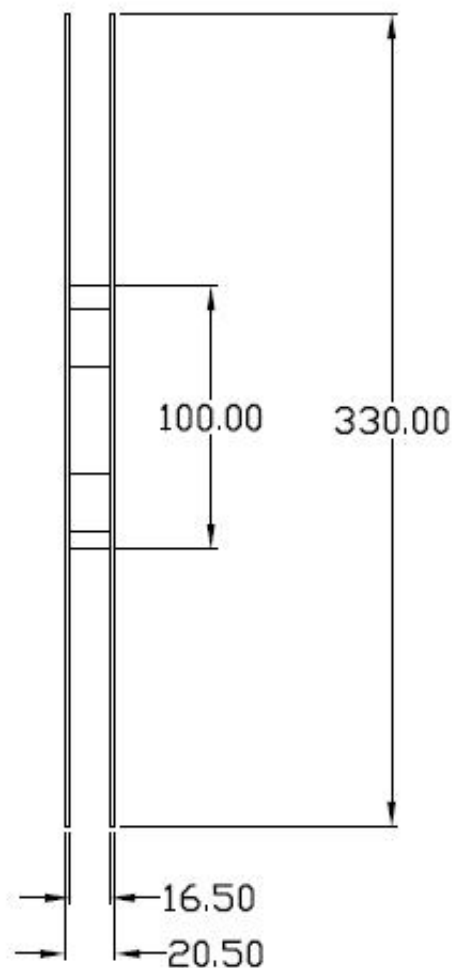
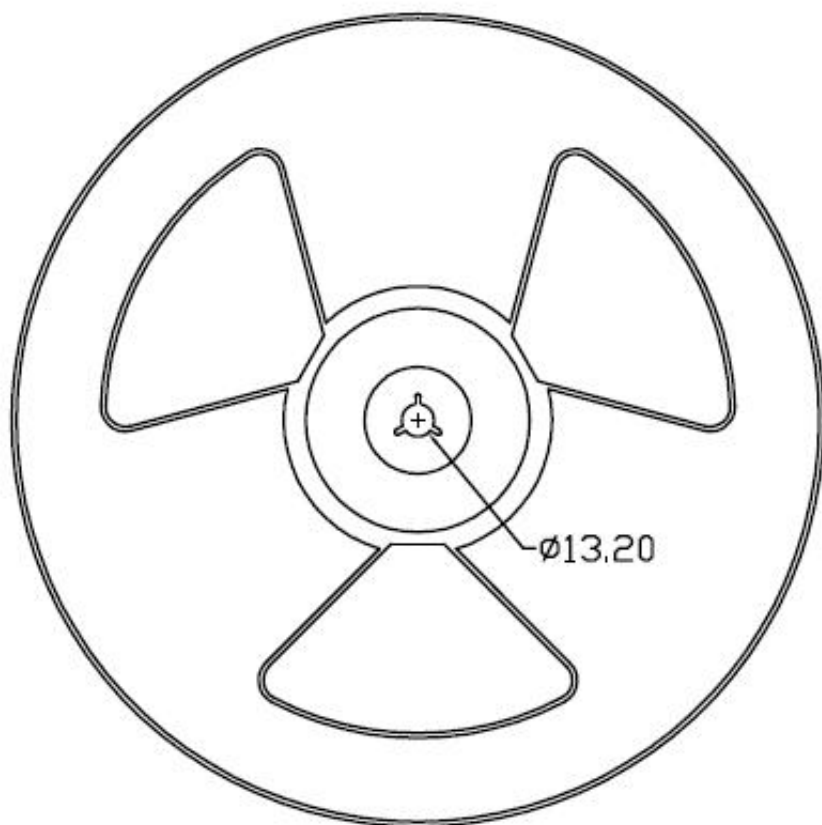


Option T2



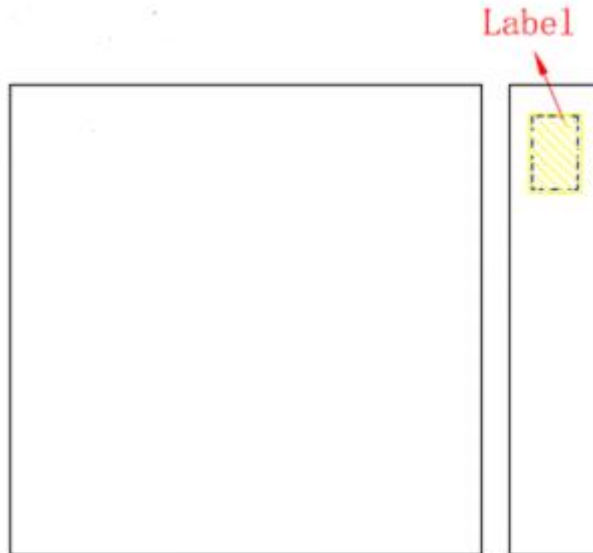
REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1 & T2



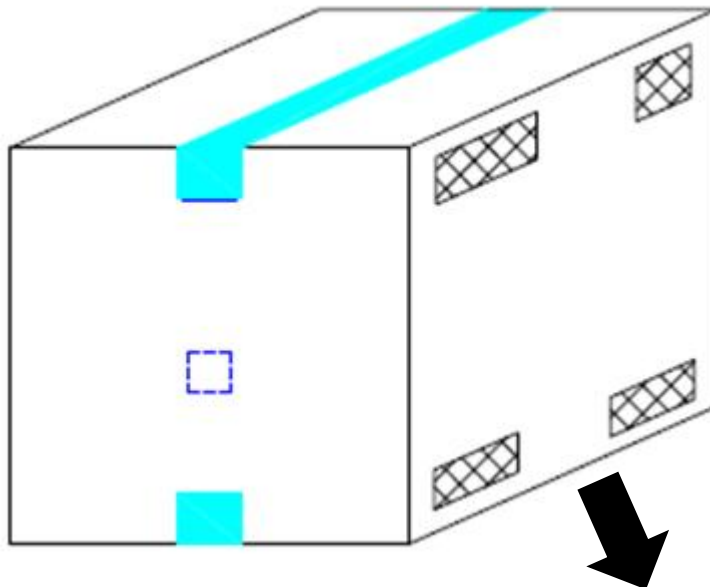
BOX SPECIFICATIONS (Reel Type)

Inner Box

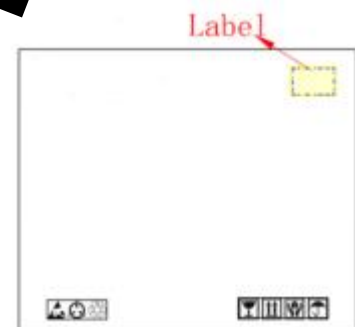


- L x W x H = 36cm x 36cm x 6.9cm

Outer Box

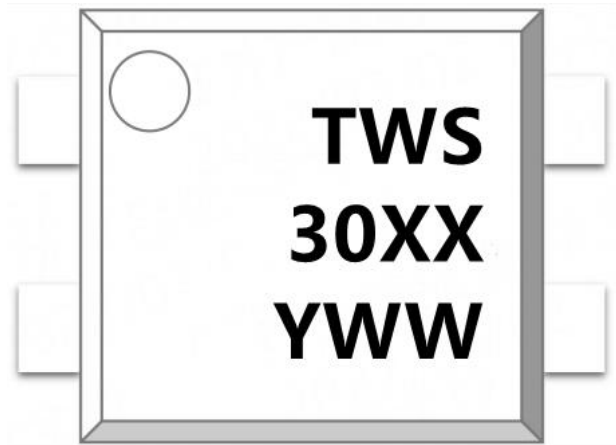


- L x W x H = 45cm x 38cm x 38cm



ORDERING AND MARKING INFORMATION

MARKING INFORMATION



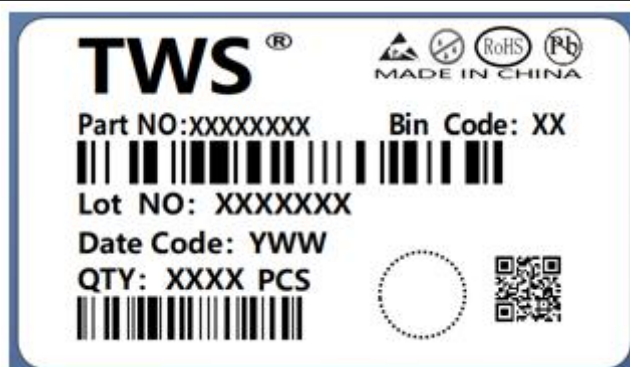
TWS : Company Abbr.
 30XX : Part Number & Rank
 Y : Fiscal Year
 WW : Work Week

ORDERING INFORMATION

TWS M30XX(Z)-G

TWS – 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

LABEL INFORMATION

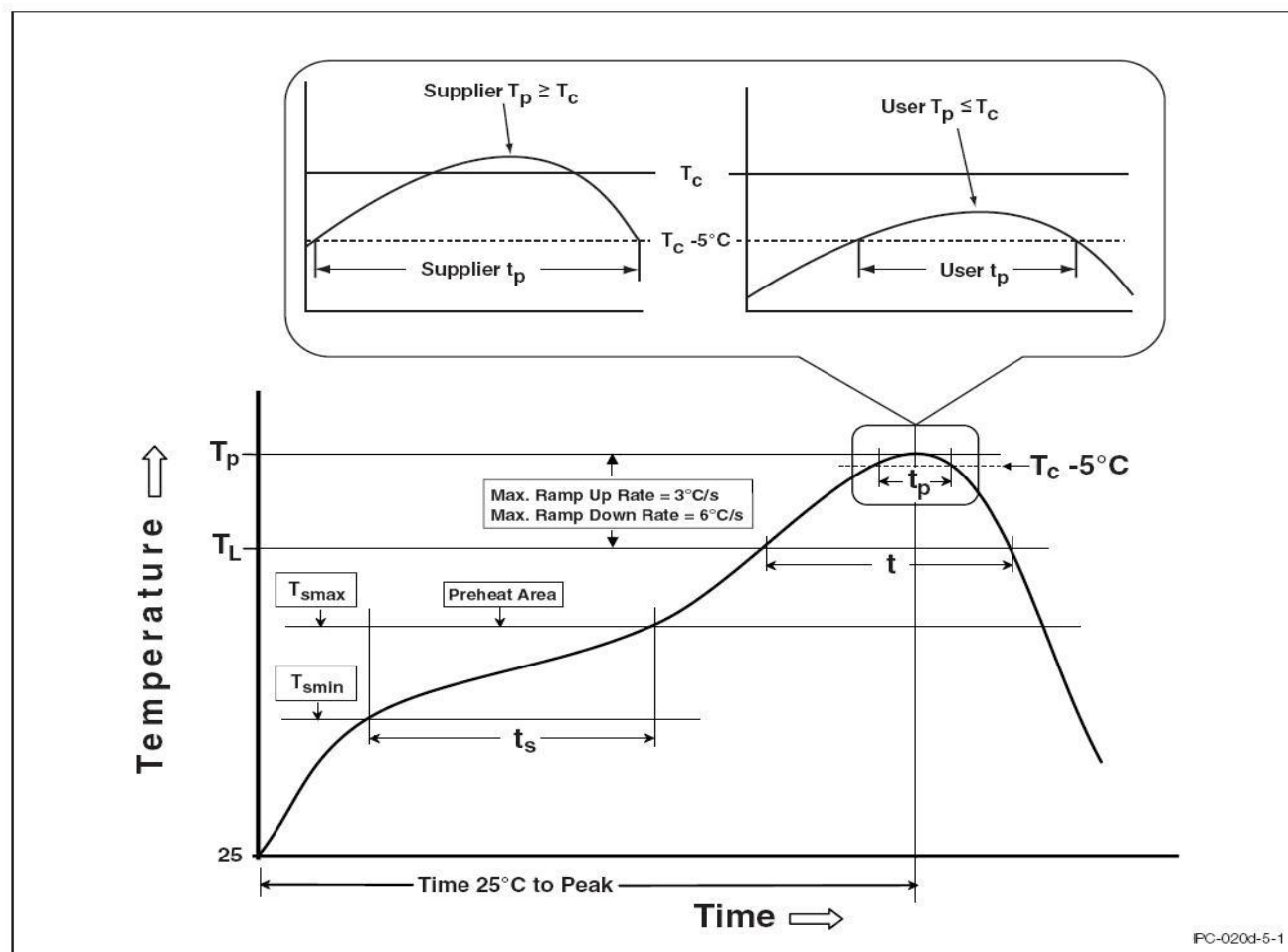


PACKING QUANTITY

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



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.