

Description

The TWS303X, TWS304X and TWS306X and TWS308X 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 DIP4 package with different lead forming options.

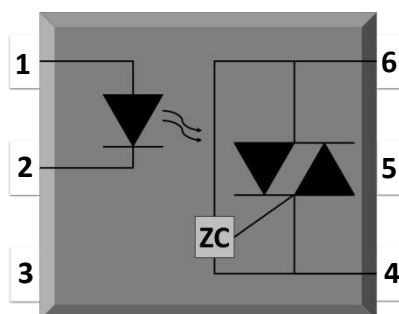
Features

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

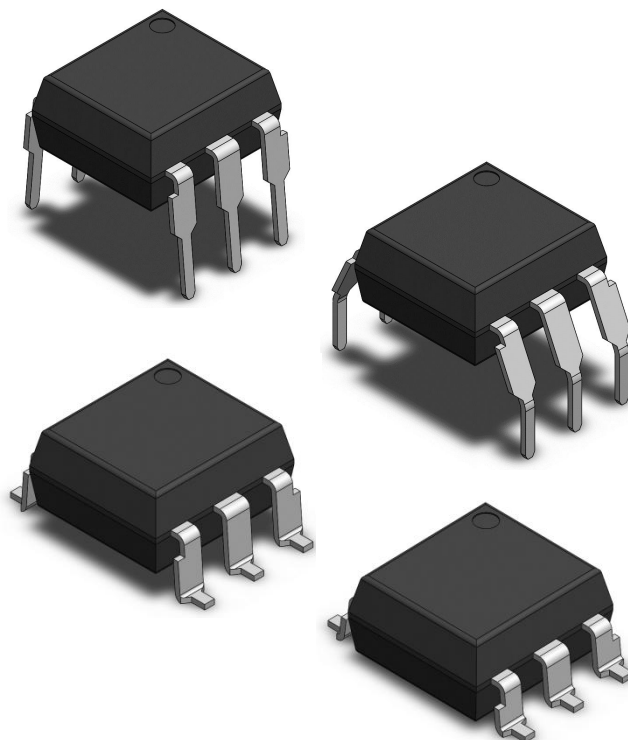
SCHEMATIC



PIN DEFINITION

- | | |
|------------|--------------|
| 1. Anode | 4. Terminal |
| 2. Cathode | 5. Substrate |
| 3. NC | 6. 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	TWS303X	V_{DRM}	250	V	
	TWS304X		400		
	TWS306X		600		
	TWS308X		800		
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	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%

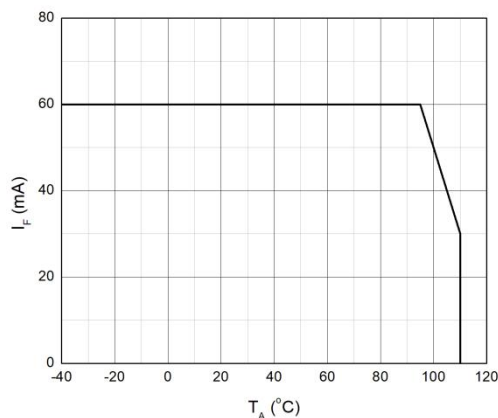
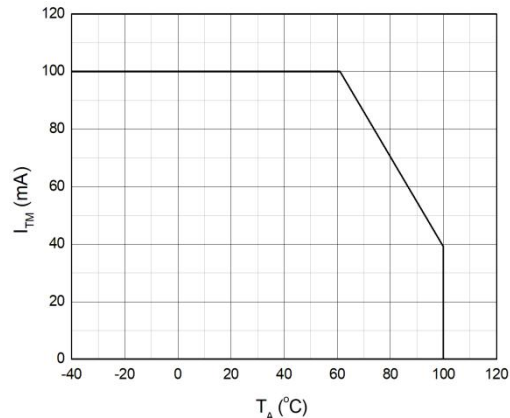
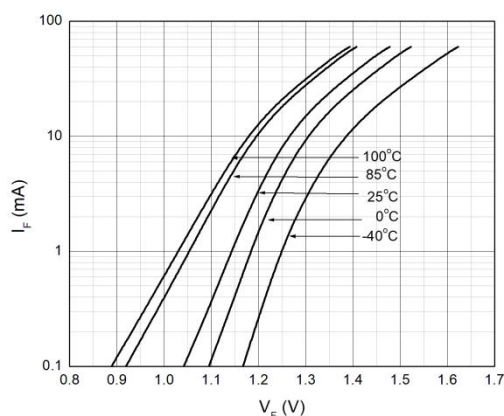
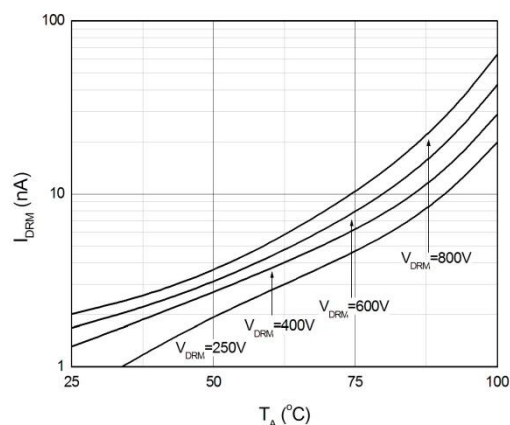
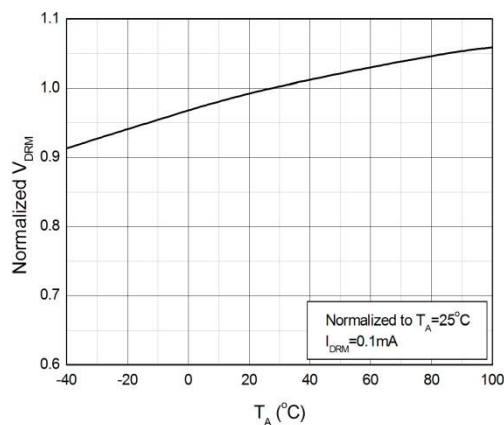
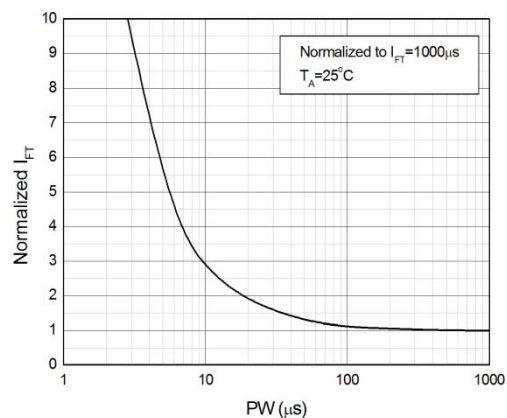
Note 2. For 10 seconds

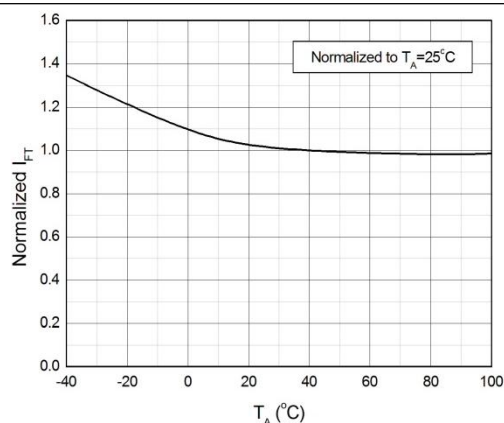
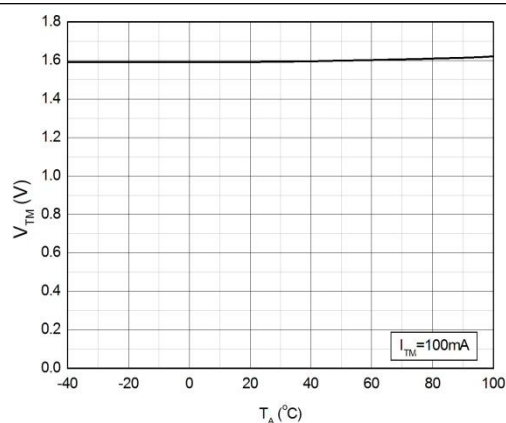
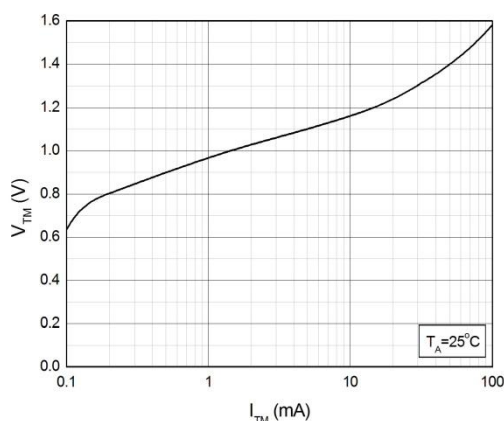
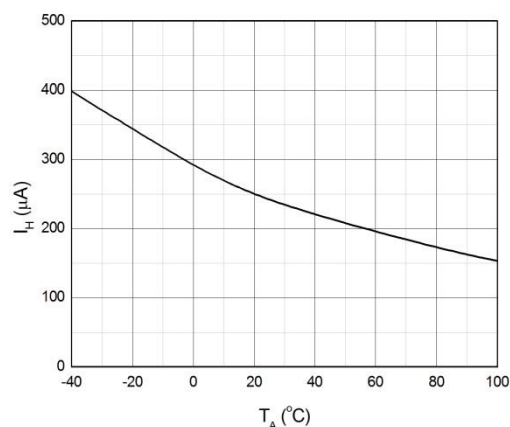
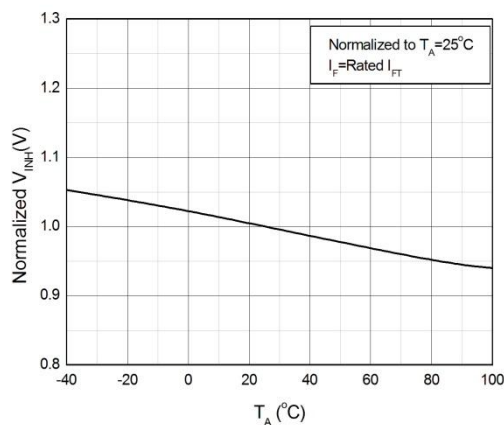
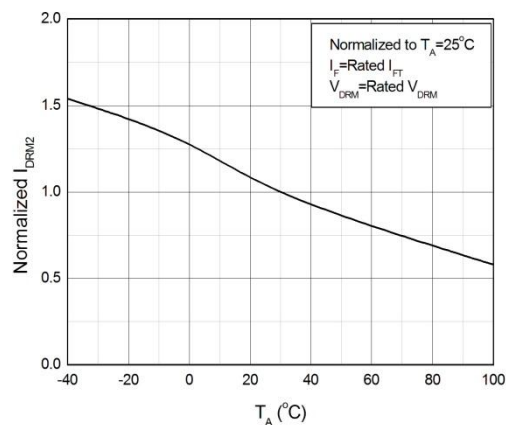
ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C

PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT								
Forward Voltage		V_F	-	1.24	1.4	V	$I_F=10\text{mA}$	
Reverse Current		I_R	-	-	10	μA	$V_R=6\text{V}$	
Input Capacitance		C_{in}	-	8.5	250	pF	$V=0, f=1\text{kHz}$	
OUTPUT								
Peak Off-state Current, Either Direction		I_{DRM}	-	-	500	nA	$V_{DRM}=\text{Rated } V_{DRM}$ $I_F=0$	3
Peak On-state Current, Either Direction		V_{TM}	-	1.59	2.5	V	$I_{TM}=100\text{mA}$	
Critical Rate of Rise of Off-state Voltage		dV/dt	1000	-	-	V/ μs	$V_{PEAK}=\text{Rated } V_{DRM}$	4
TRANSFER CHARACTERISTICS								
LED Trigger Current	TWS3031,TWS3041, TWS3061,TWS3081	I_{FT}	-	-	15	mA	Terminal Voltage = 3V $I_{TM}=100\text{mA}$	
	TWS3032,TWS3042, TWS3062,TWS3082		-	-	10			
	TWS3033,TWS3043, TWS3063,TWS3083		-	-	5			
Holding Current		I_H	-	237	-	μA		
Isolation Resistance		R_{iso}	10^{12}	10^{14}	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance		C_{io}	-	0.4	-	pF	$V=0, f=1\text{MHz}$	
ZERO-CROSSING CHARACTERISTICS								
Inhibit Voltage		V_{INH}	-	-	20	V	$I_F=\text{Rated } I_{FT}$	
Leakage in Inhibited State		I_{DRM2}	-	-	500	μA	$I_F=\text{Rated } I_{FT}$ $V_{DRM}=\text{Rated } V_{DRM}$	

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 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

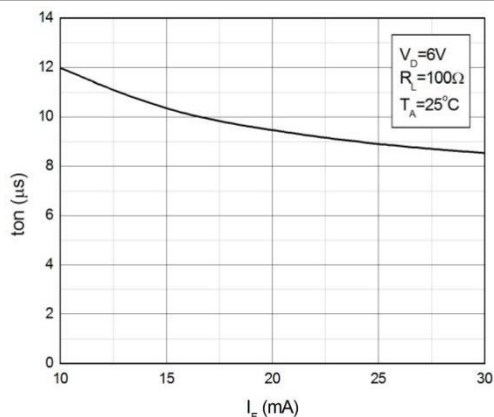
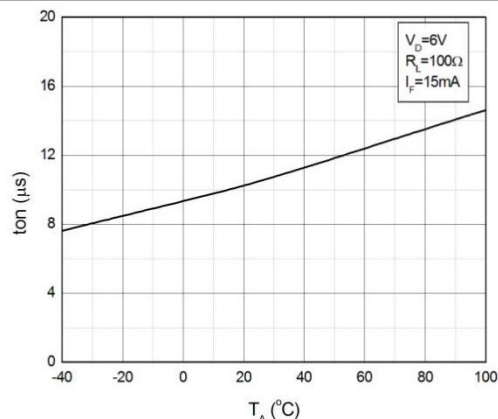


Fig.14 Turn On Time vs. Ambient Temperature



TEST CIRCUITS

Fig.15 Test Circuits of Turn On Time

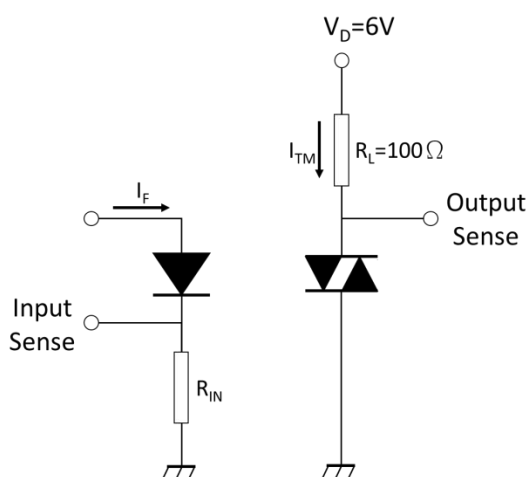


Fig.16 Waveforms of Turn On Time

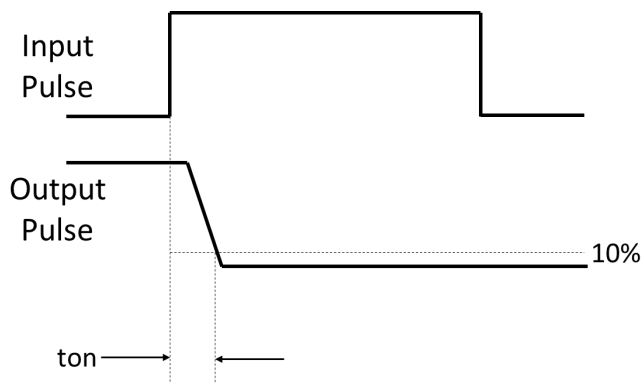


Fig.17 Test Circuits of dV/dt

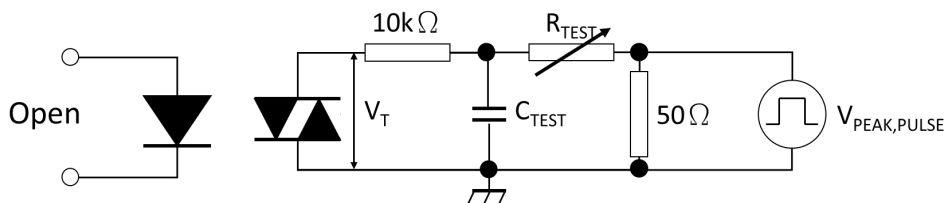
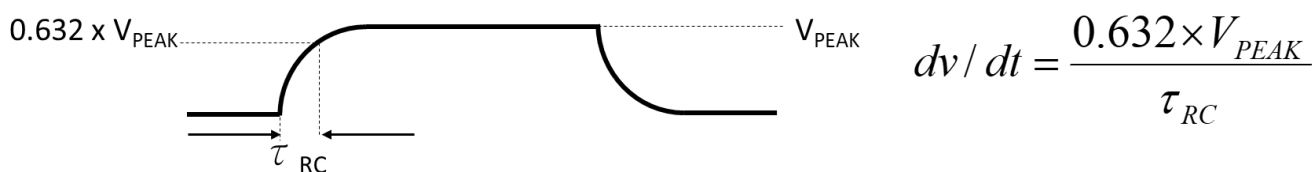
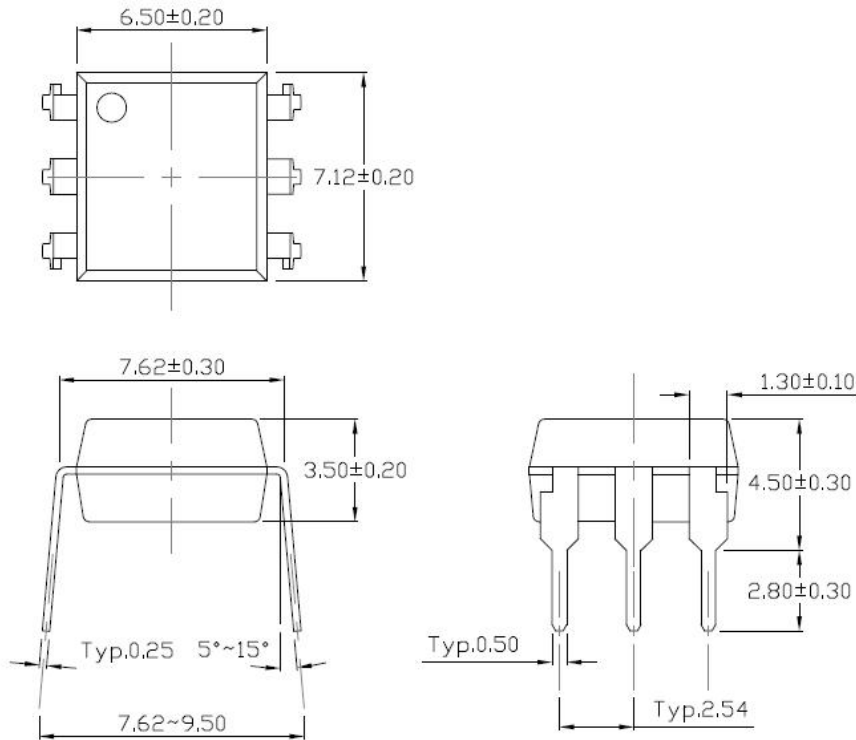


Fig.18 Waveforms of dV/dt

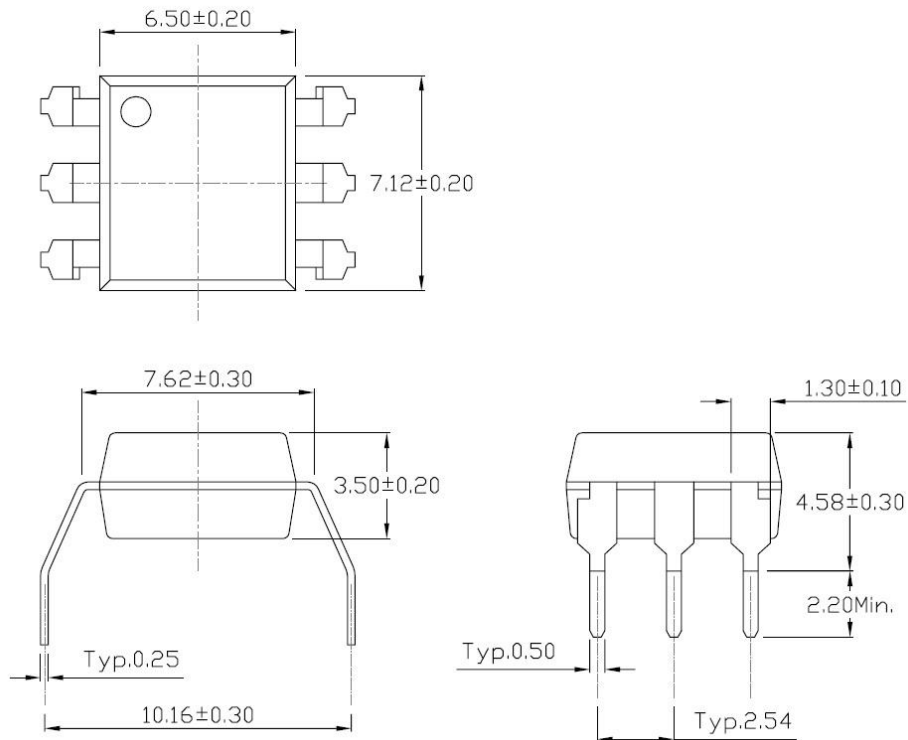


PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Standard DIP – Through Hole (DIP Type)

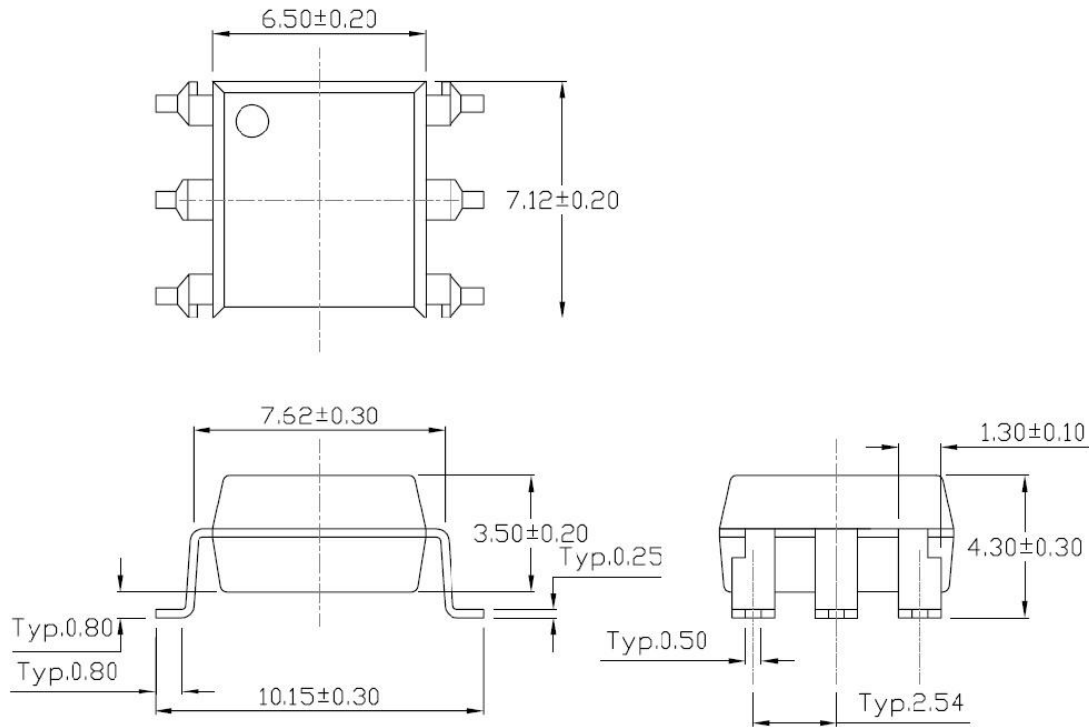


Gullwing (400mil) Lead Forming – Through Hole (M Type)

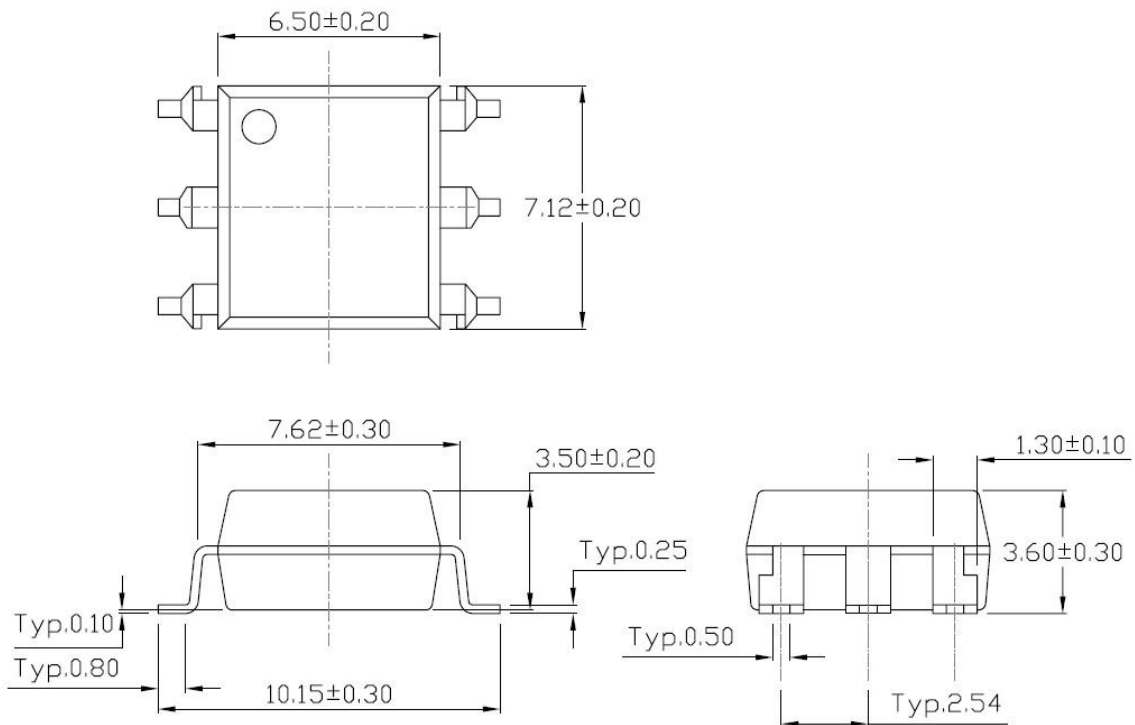


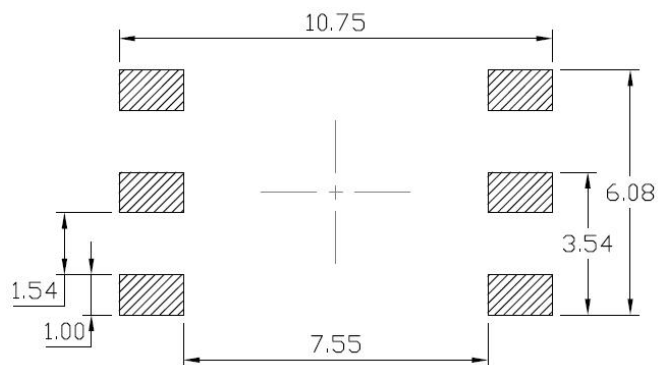
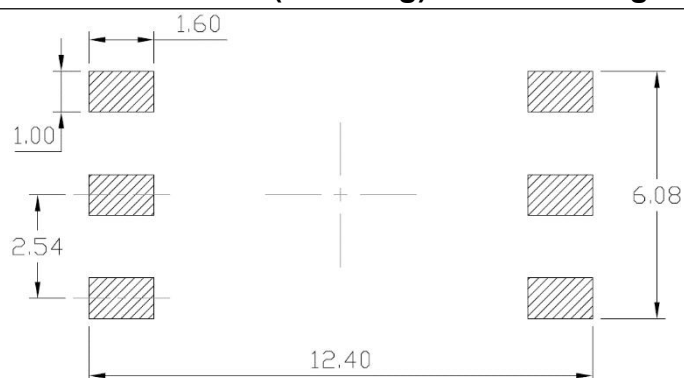
PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming (S Type)



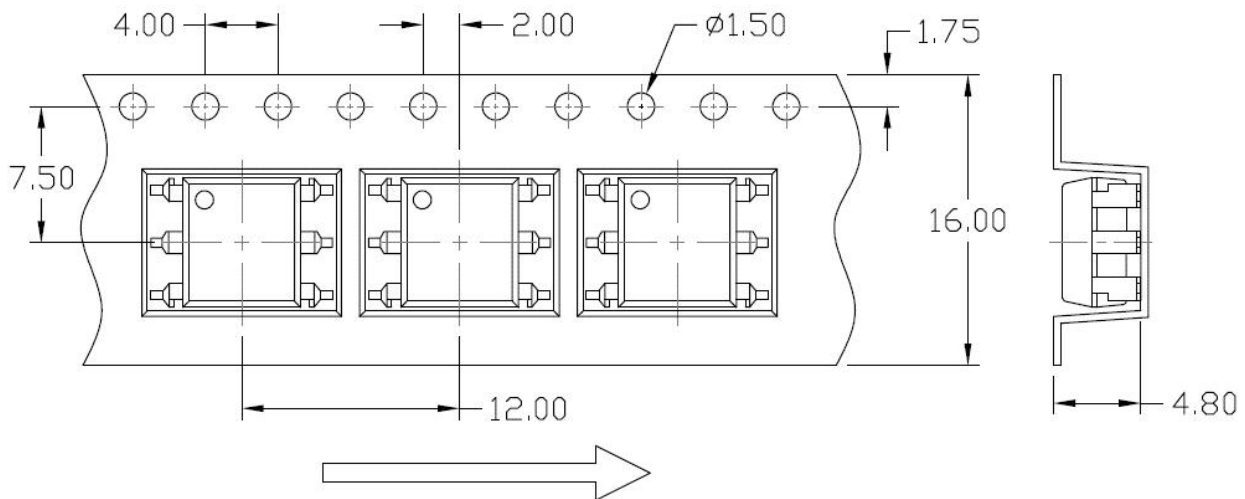
Surface Mount (Low Profile) Lead Forming (SL Type)



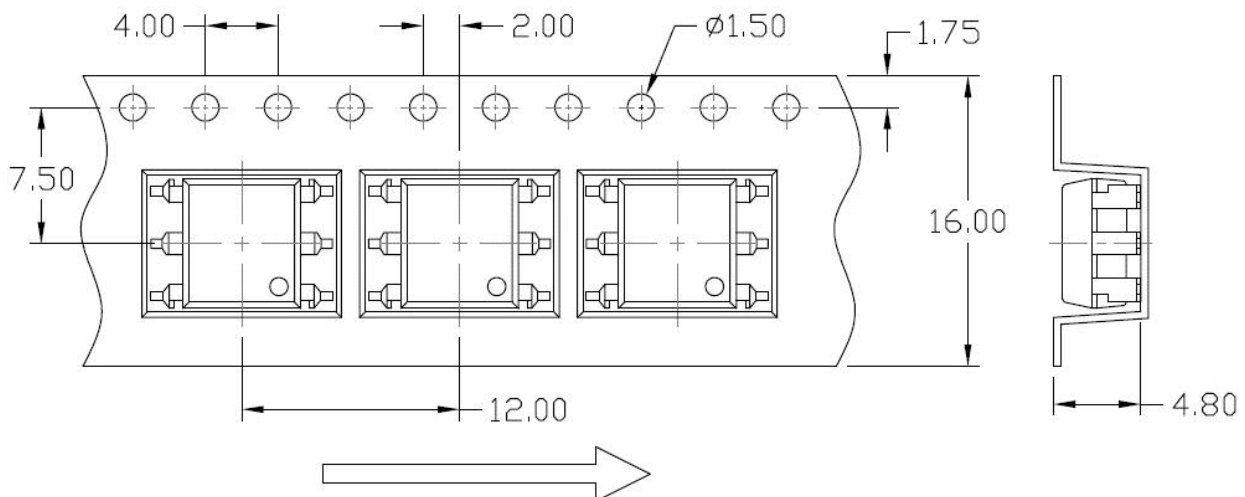
RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)**Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming****Surface Mount (Gullwing) Lead Forming**

CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S(T1) & SL(T1)

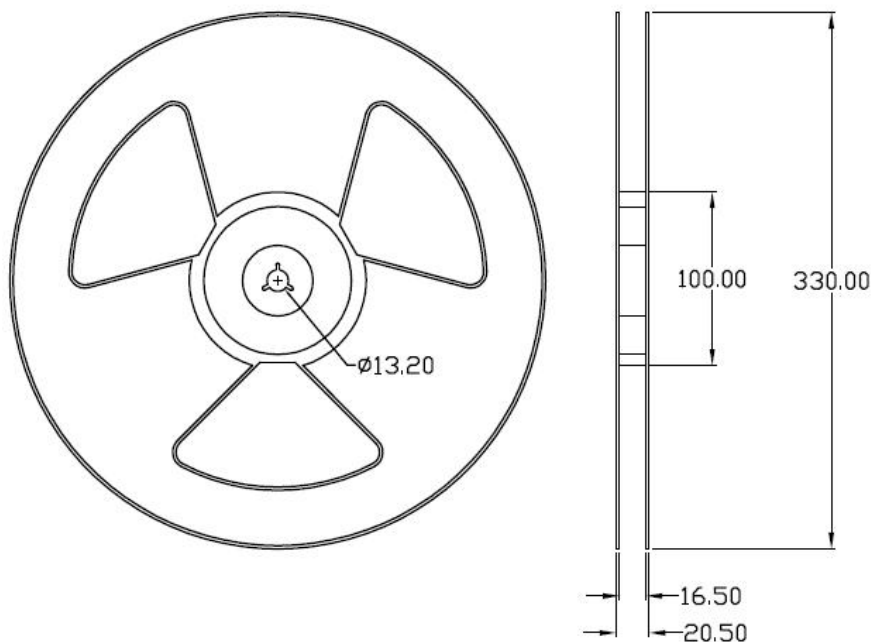


Option S(T2) & SL(T2)



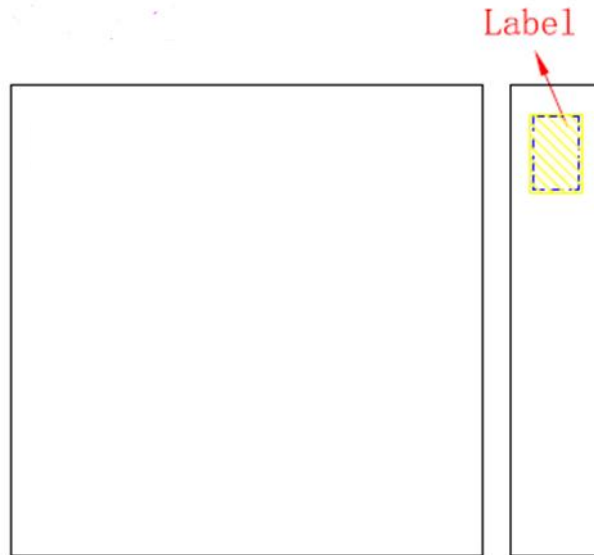
REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S & Option SL



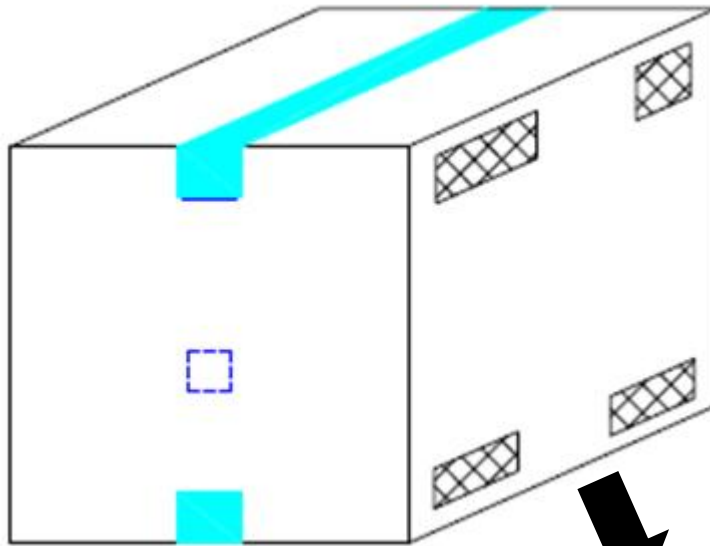
BOX SPECIFICATIONS (Reel Type)

Inner Box

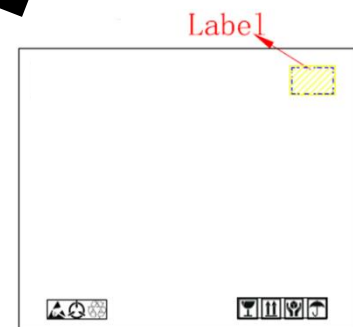


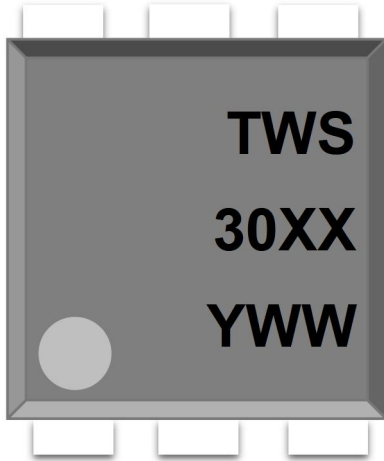
- L x W x H = 36cm x 36cm x 6.9cm

Outer Box



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

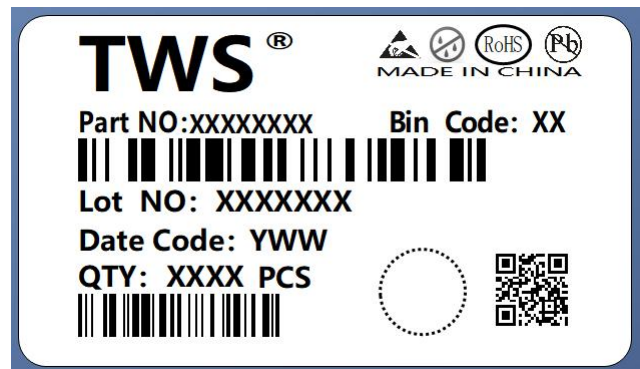


ORDERING AND MARKING INFORMATION**MARKING INFORMATION**

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

ORDERING INFORMATION**LABEL INFORMATION****TWS30XX(Y)(Z)-G**

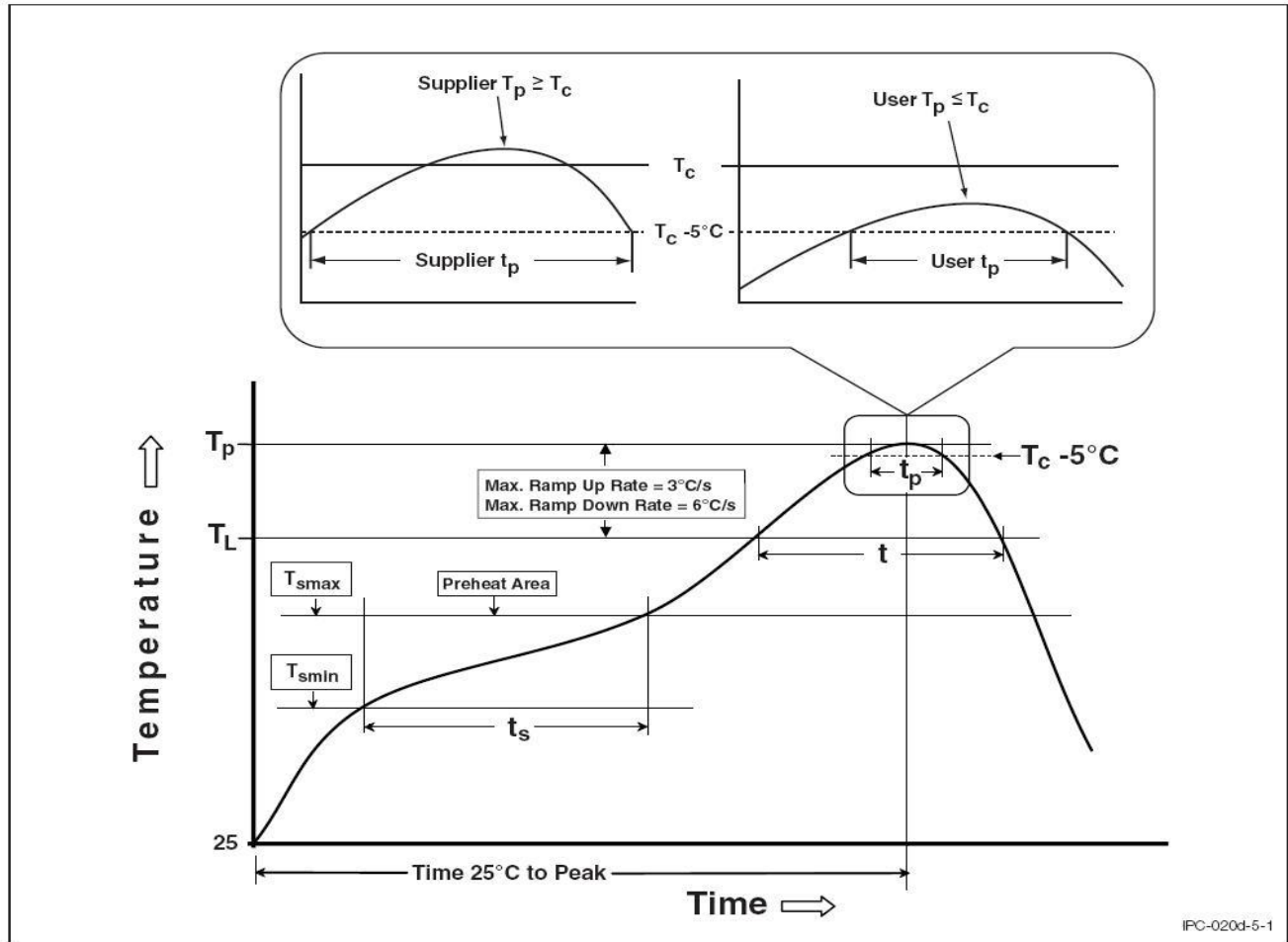
TWS – Company Abbr.
 30XX – Part Number
 (31/32/33/41/42/43/61/62/63/81/82/83)
 Y – Lead Form Option (M/S/SL/None)
 Z – Tape and Reel Option (T1/T2)
 G – Green Option (G or None)

**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



IPC-020d-5-1

Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T _{smmin})	100	150°C
Temperature Max. (T _{smmax})	150	200°C
Time (t _s) from (T _{smmin} to T _{smmax})	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.