

**LSOP4, DC Input, Photo Transistor Coupler****Description**

The TWS100X series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic LSOP4 package.

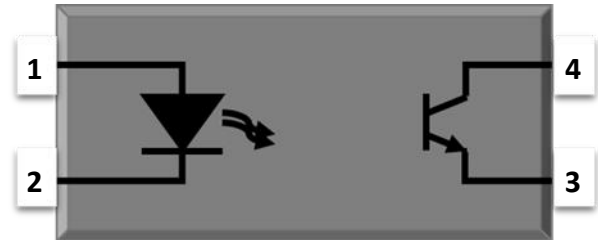
With the robust coplanar double mold structure, TWS100X series provide the most stable isolation feature.

**Features**

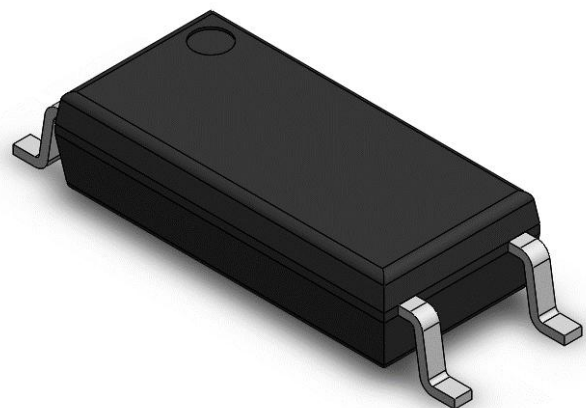
- High isolation 5000 VRMS
- CTR flexibility available see order information
- DC input with transistor output
- Operating temperature range - 55 °C to 110 °C
- RoHS & REACH Compliance
- Halogen free
- MSL class 1

**Applications**

- Switch mode power supplies
- Programmable controllers
- Household appliances
- Office equipment

**SCHEMATIC****PIN DEFINITION**

1. Anode
2. Cathode
3. Emitter
4. Collector

**PACKAGE OUTLINE**

**LSOP4, DC Input, Photo Transistor Coupler**

<b>ABSOLUTE MAXIMUM RATINGS</b>				
PARAMETER	SYMBOL	VALUE	UNIT	NOTE
<b>INPUT</b>				
Forward Current	$I_F$	60	mA	
Peak Forward Current	$I_{FP}$	1	A	1
Reverse Voltage	$V_R$	6	V	
Input Power Dissipation	$P_I$	100	mW	
<b>OUTPUT</b>				
Collector - Emitter Voltage	$V_{CEO}$	80	V	
Emitter - Collector Voltage	$V_{ECO}$	7	V	
Collector Current	$I_C$	50	mA	
Output Power Dissipation	$P_O$	150	mW	
<b>COMMON</b>				
Total Power Dissipation	$P_{tot}$	250	mW	
Isolation Voltage	$V_{iso}$	5000	V <sub>rms</sub>	2
Operating Temperature	$T_{opr}$	-55~110	°C	
Storage Temperature	$T_{stg}$	-55~125	°C	
Soldering Temperature	$T_{sol}$	260	°C	

Note 1. 100μs pulse, 100Hz frequency

Note 2. AC For 1 Minute, R.H. = 40 ~ 60%

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ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C							
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT							
Forward Voltage	V <sub>F</sub>	-	1.24	1.4	V	I <sub>F</sub> =10mA	
Reverse Current	I <sub>R</sub>	-	-	10	μA	V <sub>R</sub> =6V	
Input Capacitance	C <sub>in</sub>	-	30	250	pF	V=0, f=1kHz	
OUTPUT							
Collector Dark Current	I <sub>CEO</sub>	-	-	100	nA	V <sub>CE</sub> =20V, I <sub>F</sub> =0	
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	80	-	-	V	I <sub>C</sub> =0.1mA, I <sub>F</sub> =0	
Emitter-Collector Breakdown Voltage	BV <sub>ECO</sub>	7	-	-	V	I <sub>E</sub> =0.1mA, I <sub>F</sub> =0	
TRANSFER CHARACTERISTICS							
Current Transfer Ratio	TWS1007	CTR	80	-	160	%	I <sub>F</sub> =5mA, V <sub>CE</sub> =5V
	TWS1008		130	-	260		
	TWS1009		200	-	400		
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	-	0.1	0.3	V	I <sub>F</sub> =10mA, I <sub>C</sub> =1mA	
Isolation Resistance	R <sub>ISO</sub>	10 <sup>12</sup>	10 <sup>14</sup>	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C <sub>IO</sub>	-	0.4	1	pF	V=0, f=1MHz	
Cut-off Frequency	F <sub>c</sub>	-	80	-	kHz	V <sub>CE</sub> =2V, I <sub>C</sub> =2mA R <sub>L</sub> =100Ω, -3dB	3
Response Time (Rise)	Tr	-	5	18	μs	V <sub>CE</sub> =2V, I <sub>C</sub> =2mA	4
Response Time (Fall)	Tf	-	6	18	μs	R <sub>L</sub> =100Ω	4

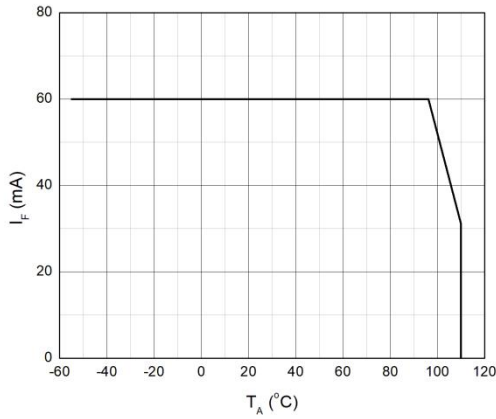
Note 3. Fig.12&amp;13

Note 4. Fig.14

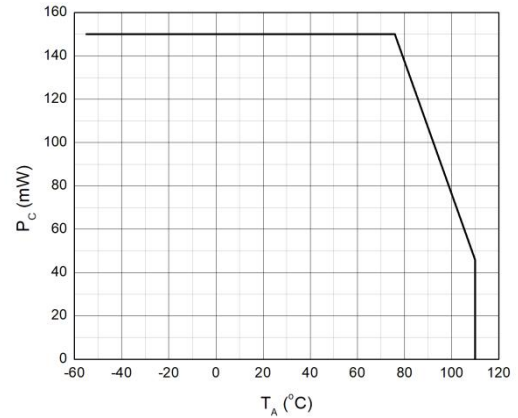
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CHARACTERISTIC CURVES

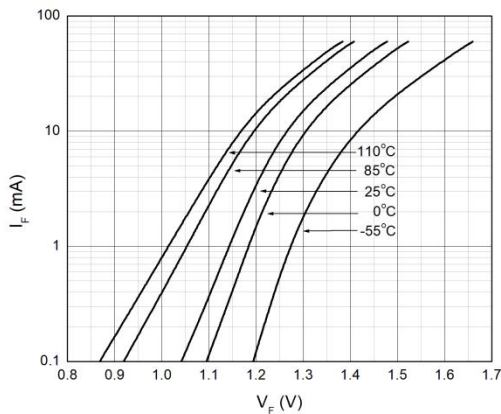
**Fig.1 Forward Current vs. Ambient Temperature**



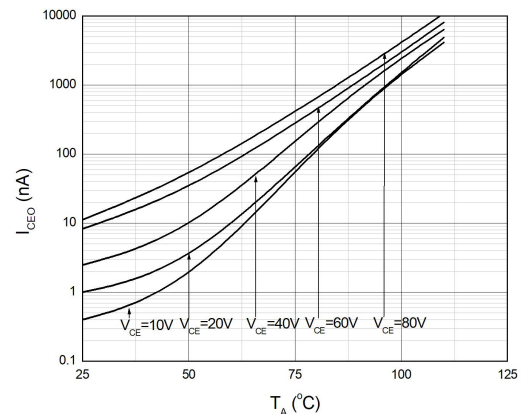
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



**Fig.3 Forward Current vs. Forward Voltage**



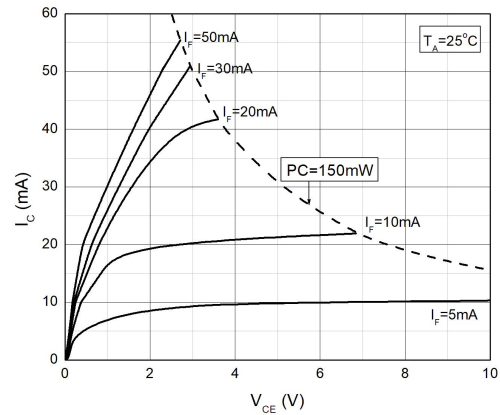
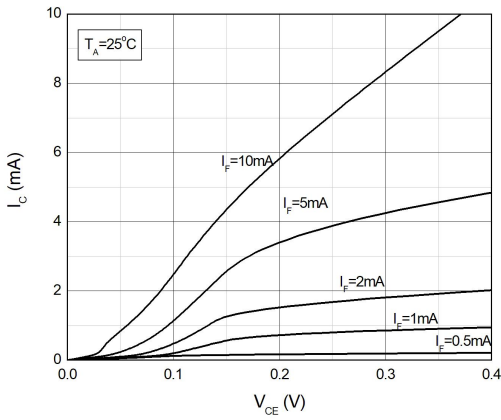
**Fig.4 Collector Dark Current vs. Ambient Temperature**



**Fig.5 Collector Current vs. Collector-emitter Voltage**

**Fig.6 Collector Current vs. Collector-emitter Voltage**

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CHARACTERISTIC CURVES

Fig.7 Normalized Current Transfer Ratio vs. Forward Current

Fig.8 Normalized Current Transfer Ratio vs. Ambient Temperature

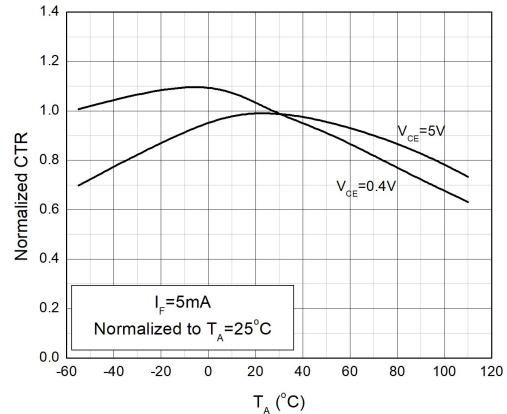
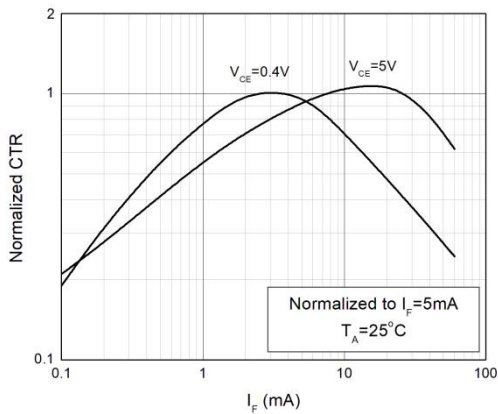


Fig.9 Collector-emitter Saturation Voltage vs. Ambient Temperature

Fig.10 Switching Time vs. Load Resistance

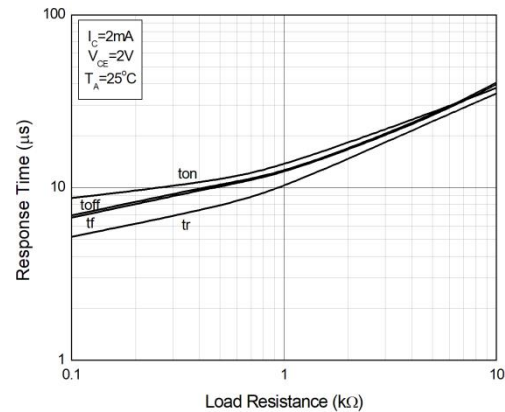
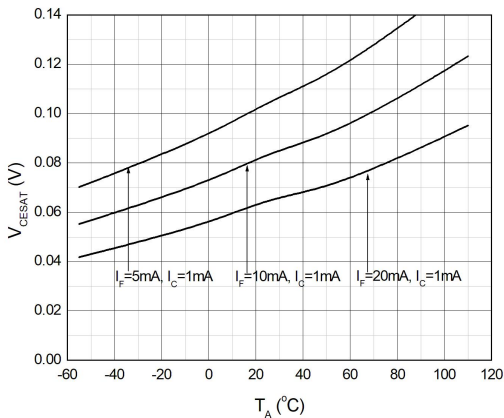
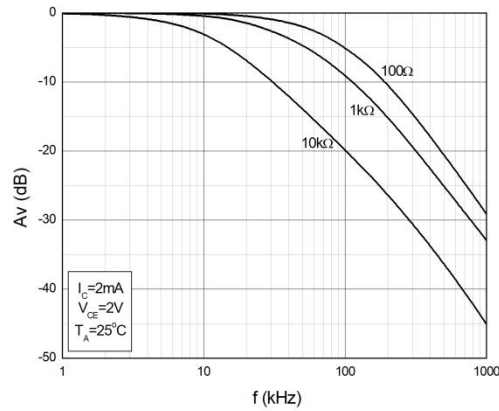


Fig.11 Frequency Response

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TEST CIRCUITS

Fig.12 Test Circuits of Response Time

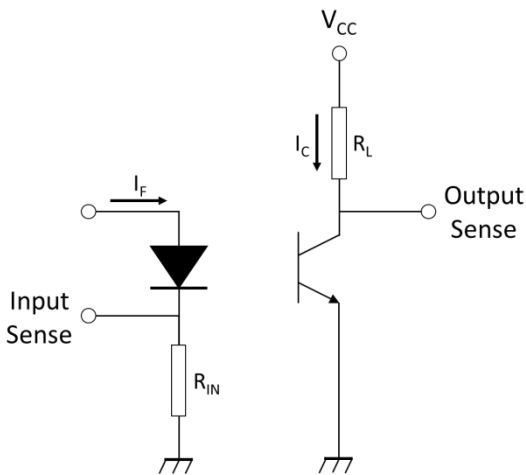


Fig.13 Curves of Response Time

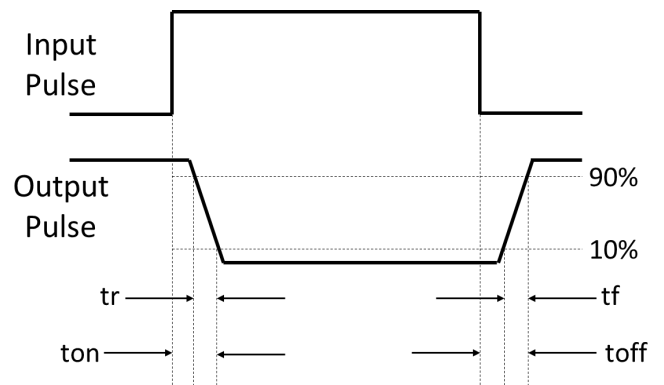
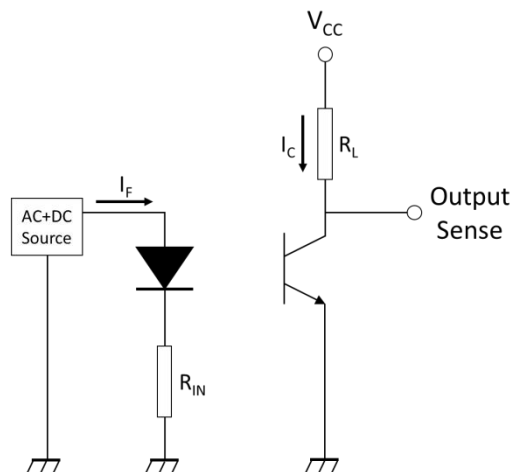
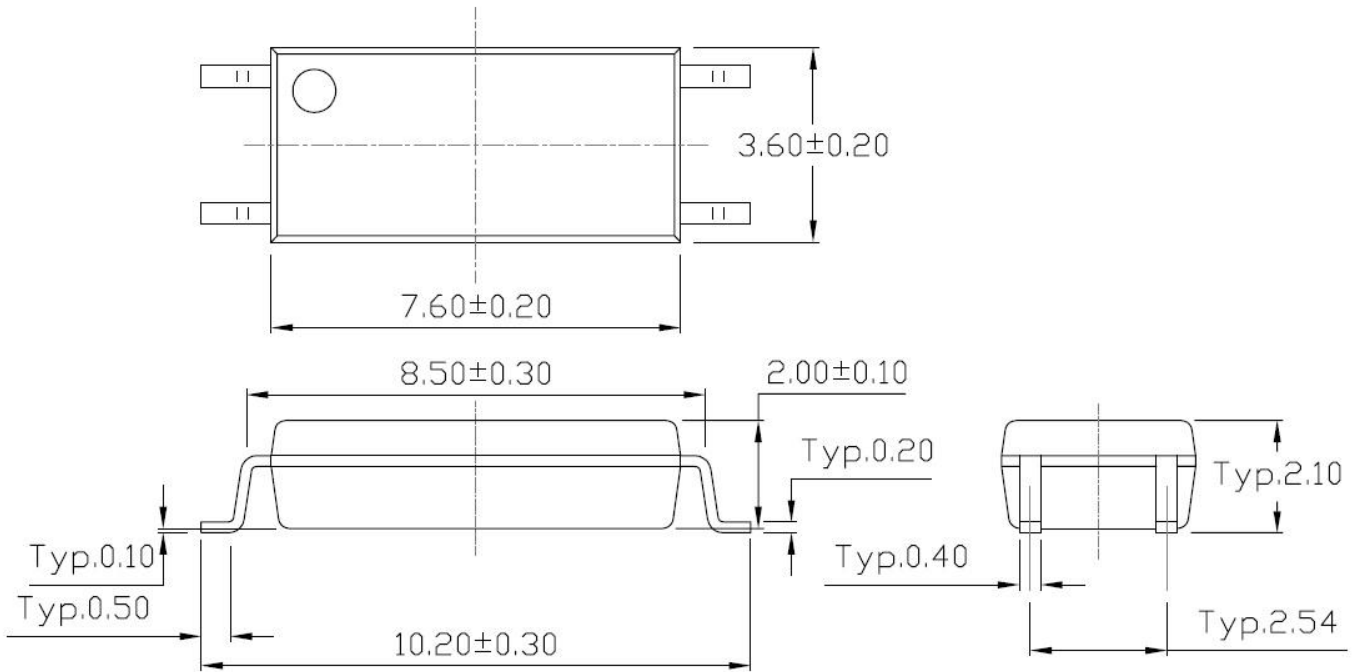


Fig.14 Test Circuits of Frequency Response

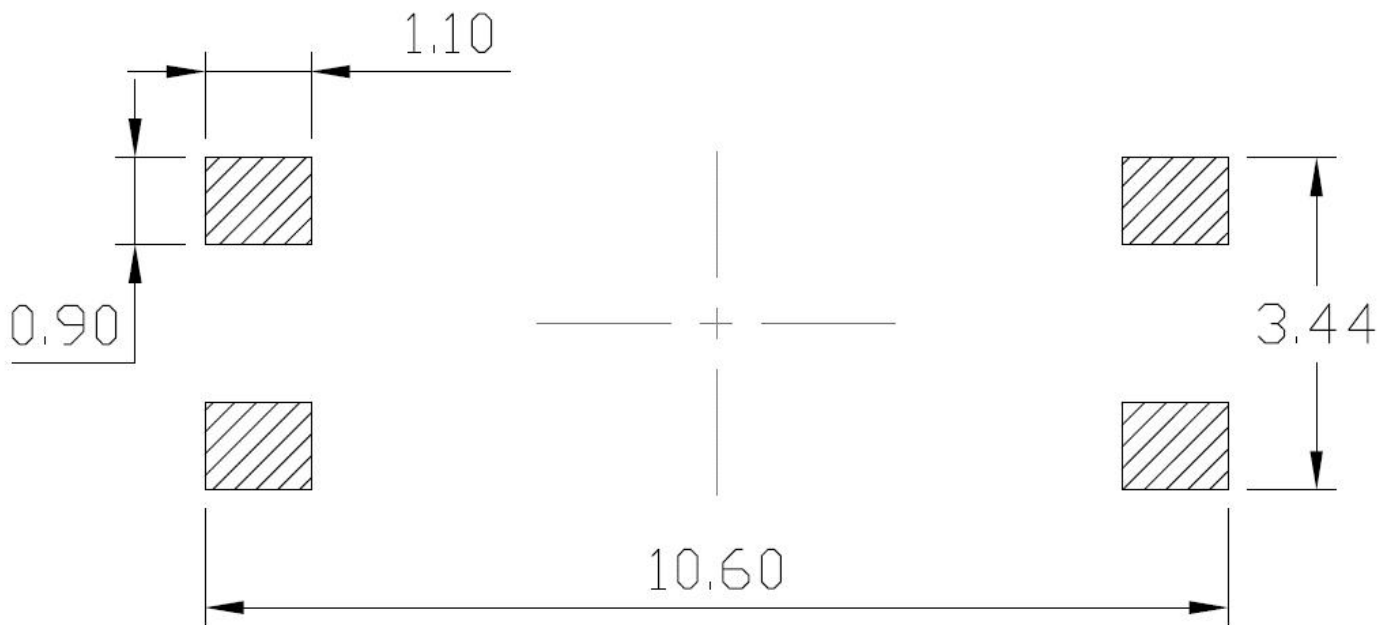


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**PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)**



**RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)**

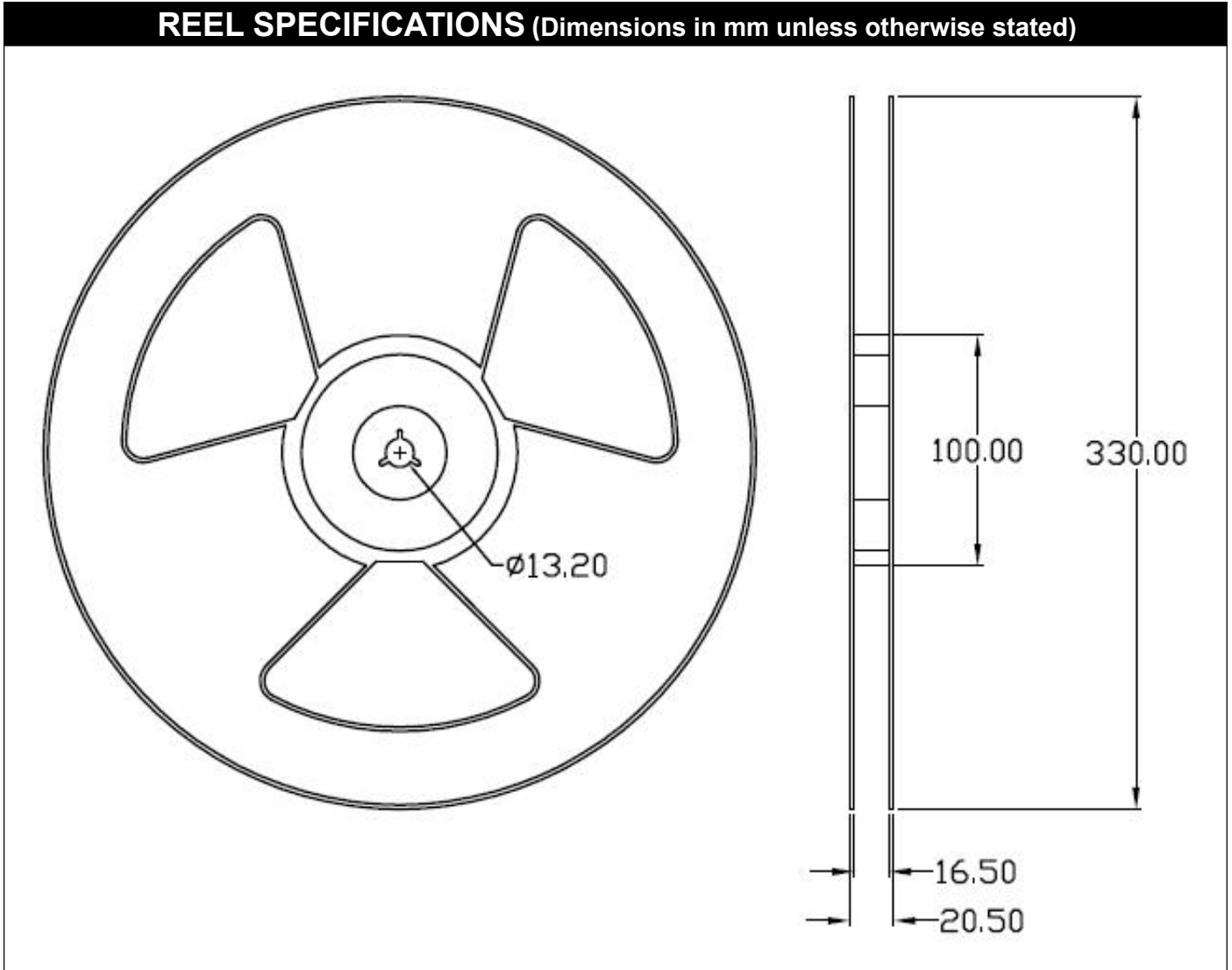






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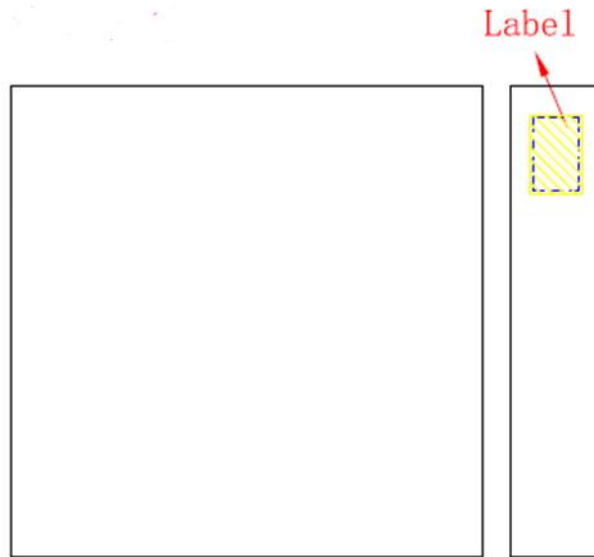
REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)



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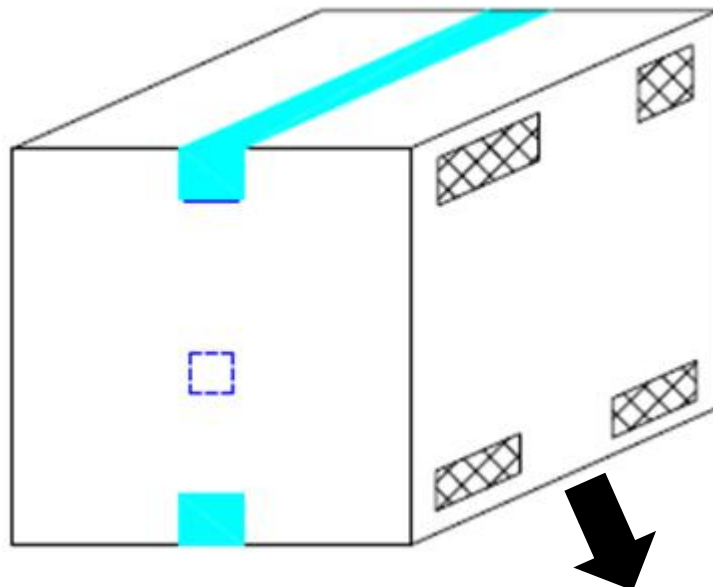
**BOX SPECIFICATIONS (Reel Type)**

**Inner Box**

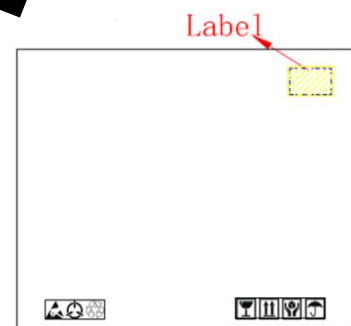


- L x W x H = 36cm x 36cm x 6.9cm

**Outer Box**



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



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**ORDERING AND MARKING INFORMATION**

**MARKING INFORMATION**



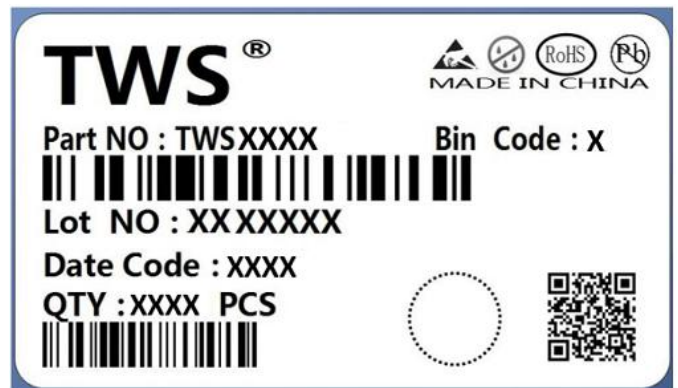
**TWS** : Company Abbr.  
**100X** : Part Number & Rank  
**Y** : Fiscal Year  
**WW** : Work Week

**ORDERING INFORMATION**

**TWS100X**

TWS – Company Abbr.  
 100X – Rank (0/1/2/3/4/5/6/7/8/9)

**LABEL INFORMATION**



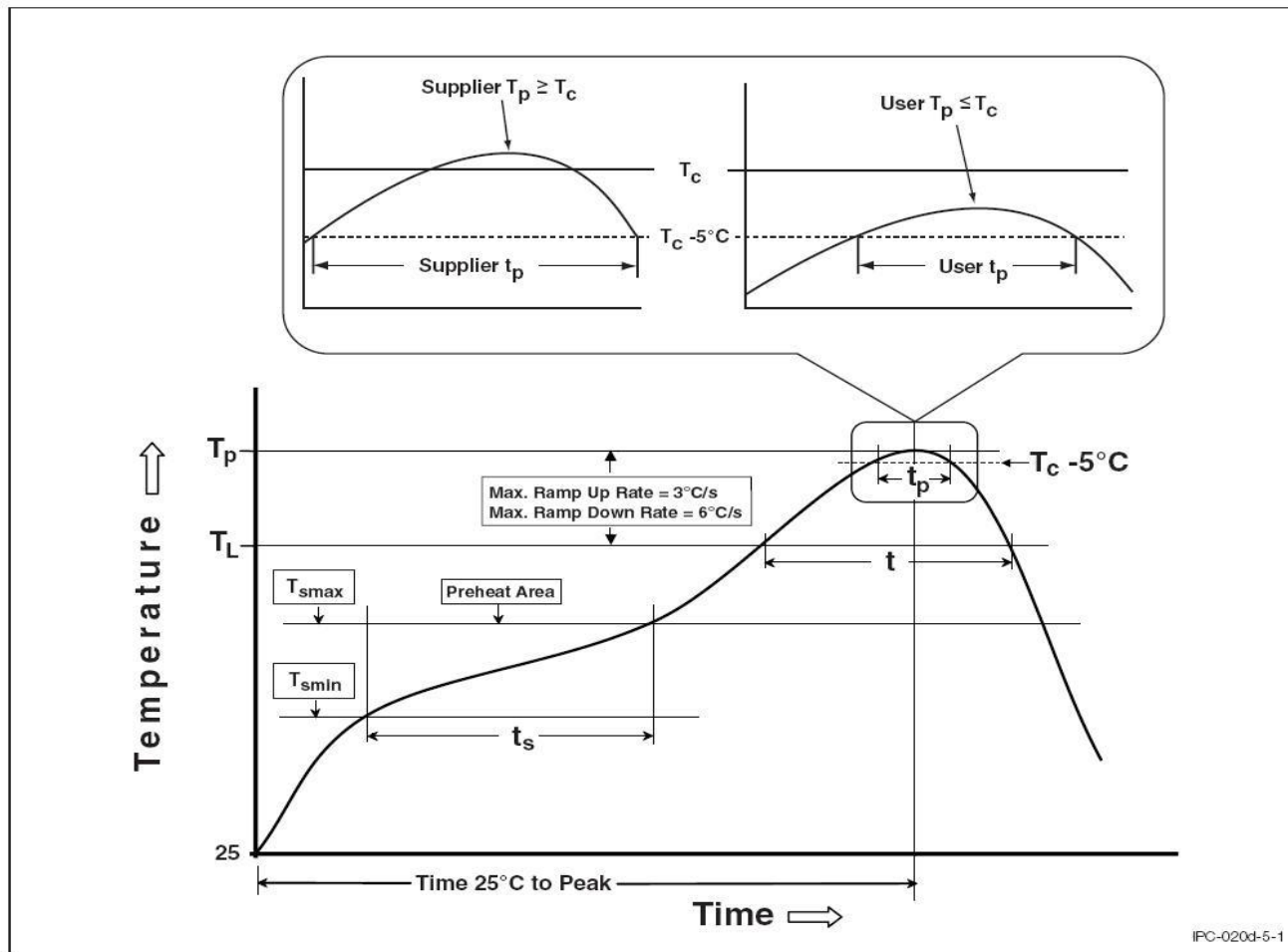
**PACKING QUANTITY**

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

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TEMPERATURE PROFILE OF SOLDERING

IR REFLOW SOLDERING (J-STWS-020D COMPLIANT)

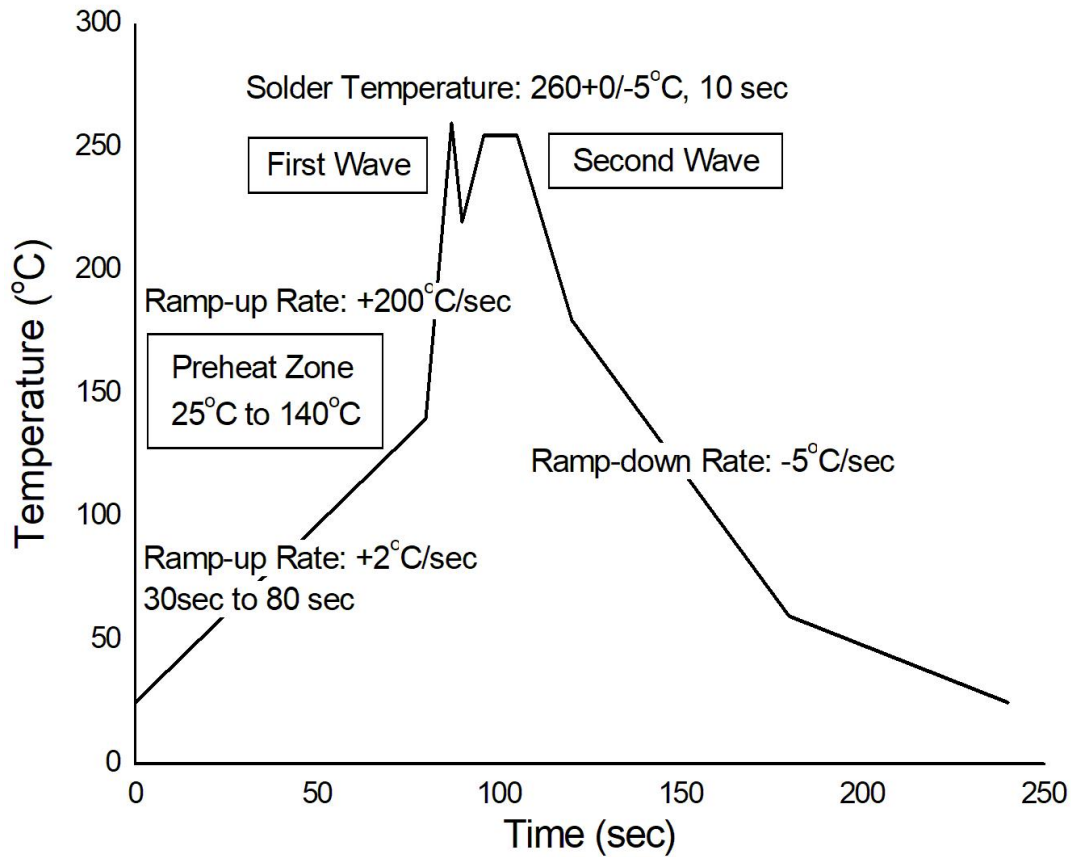


Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	100	150°C
Temperature Max. (T <sub>smax</sub> )	150	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds	60-120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	183°C	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

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**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.

Note 5. One time soldering is recommended for all soldering method.

Note 6. Do not solder more than three times for IR reflow soldering.