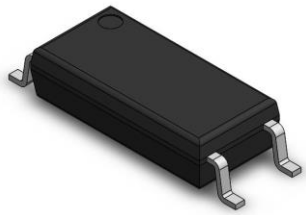
AMERICAN BRIGHT OPTOELECTRONICS CORP.

Specification for APC-101X Series

APC-101X

LSOP4, DC Input, Photo Transistor Coupler



The APC-101X 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, APC-101X series provide the most stable isolation feature.

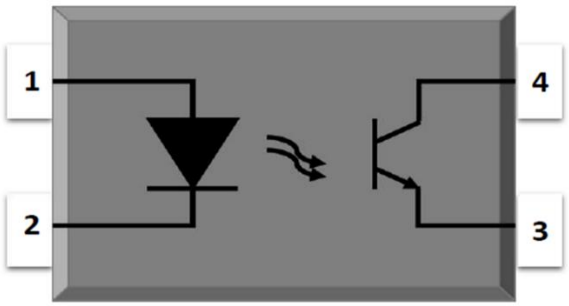
Features:

- High isolation V_{rms}: 5000V
- CTR flexibility available
- DC input with transistor output
- Operating temperature: - 55 °C to 110 °C
- RoHS & REACH Compliance
- MSL Class 1
- Halogen free (Optional)
- UL - UL1577
- VDE - EN60747-5-5(VDE0884-5)
- CQC - GB4943.1, GB8898
- cUL- CSA Component Acceptance Service Notice No. 5A

Applications:

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

Rev. 1.0 (09/16/2021)

Schematic Diagram	PIN Definition
	1. Anode 2. Cathode 3. Emitter 4. Collector

Absolute Maximum Ratings				
Parameter	**Symbol**	**Value**	**Unit**	**Note**
Input				
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	
Output				
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	
Common				
Total Power Dissipation	P_{tot}	250	mW	
Isolation Voltage	V_{iso}	5000	Vrms	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%

Electrical Optical Characteristics at T_a=25°C								
Parameter		Symbol	min	Typ.	Max.	unit	Test Condition	Note
Input								
Forward Voltage		V_F	-	1.45	1.6	V	I_F=50mA	
Reverse Current		I_R	-	-	10	μA	V_R=6V	
Input Capacitance		C_{in}	-	30	250	pF	V=0, f=1kHz	
Output								
Collector Dark Current		I_{CEO}	-	-	100	nA	V_{EC}=20V, I_F=0	
Collector – Emitter Breakdown Voltage		BV_{CEO}	80	-	-	V	I_C=0.1mA, I_F=0	
Emitter – Collector Breakdown Voltage		BV_{ECO}	6	-	-	V	I_E=0.1mA, I_F=0	
Transfer Characteristics								
Current Transfer Ratio	**APC-1010**	CTR	300	-	600	%	I_F=5mA, V_{CE}=5V	3
	APC-1015		50	-	150			
	APC-1016		100	-	300			
	APC-1017		80	-	160			
	APC-1018		130	-	260			
	APC-1019		200	-	400			
	APC-1011		60	-	300		I_F=10mA, V_{CE}=5V	
	APC-1012		63	-	125			
	APC-1013		100	-	200			
	APC-1014		160	-	320			
Collector – Emitter Saturation Voltage		$V_{CE(sat)}$	-	0.1	0.3	V	I_F=10mA, I_C=1mA	
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	
Cut-off Frequency		Fc	-	80	-	kHz	V_{CE}=2V, I_C=2mA R_L=100Ω,-3dB	4
Response Time (rise)		Tr	-	6	18	μs	V_{CE}=2V, I_C=2mA R_L=100Ω	5
Response Time (fall)		Tf	-	8	18	μs		5

Note 3. CTR Value varies for each rank
Note 4. Fig.12&13
Note 5. Fig.14

Naming System:

APC-101X

X: Indicated to the CTR value listed on Page 3 (0/1/2/3/4/5/6/7/8/9)

Characteristic Curves

Fig 1. Forward Current vs. Ambient Temperature

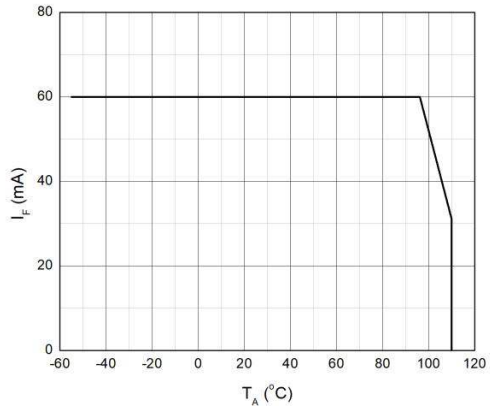


Fig 2. Collector Power Dissipation vs. Ambient Temperature

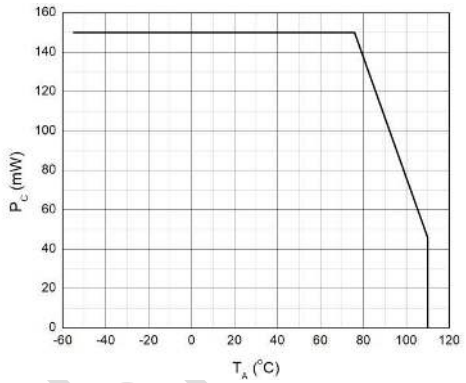


Fig 3. Forward Current vs. Forward Voltage

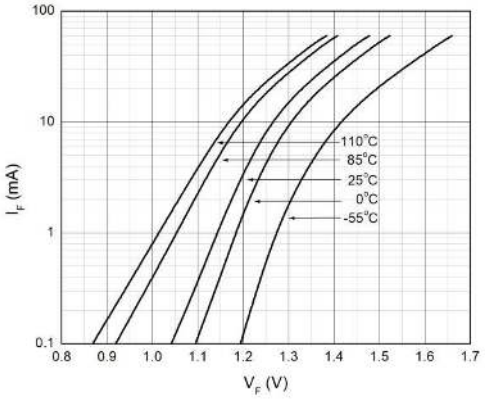


Fig 4. Collector Dark Current vs. Ambient Temperature

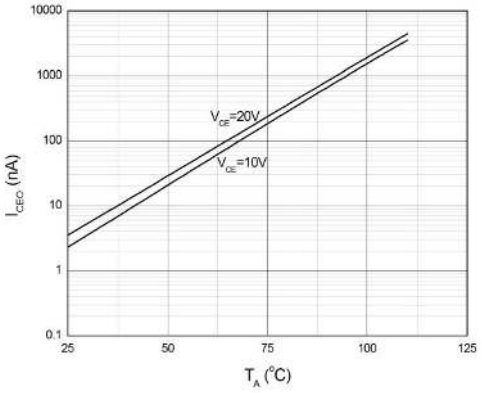


Fig 5. Collector Current vs. Collector-emitter Voltage

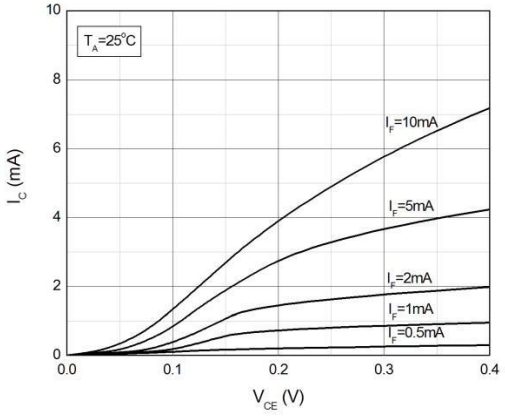


Fig 6. Collector Current vs. Collector-emitter Voltage

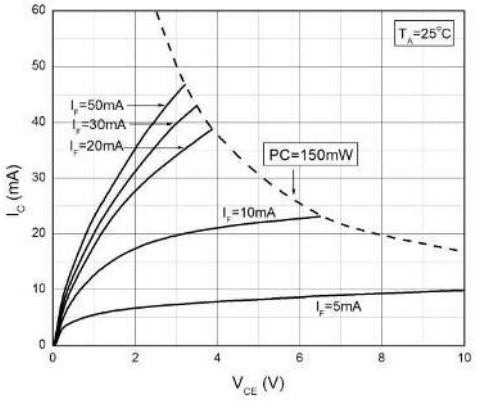


Fig 7. Normalized Current Transfer Ratio vs. Forward Current

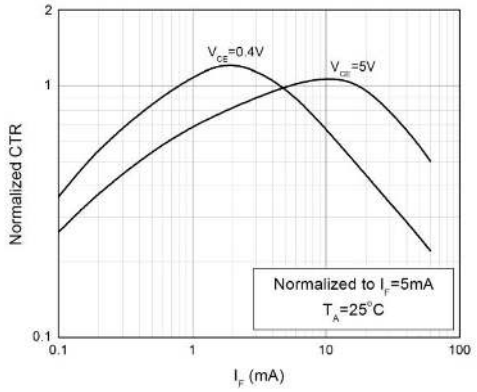


Fig 8. Normalized Current Transfer Ratio vs. Ambient Temperature

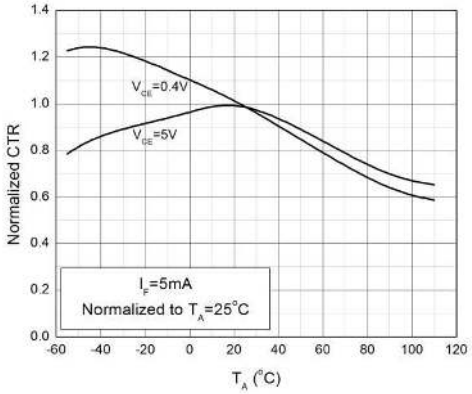


Fig 9. Collector-emitter Saturation Voltage vs. Ambient Temperature

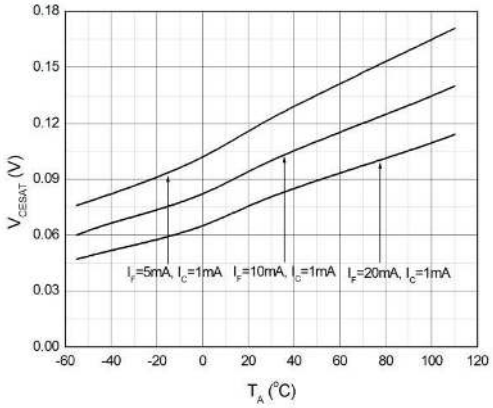


Fig 10. Switching Time vs. Load Resistance

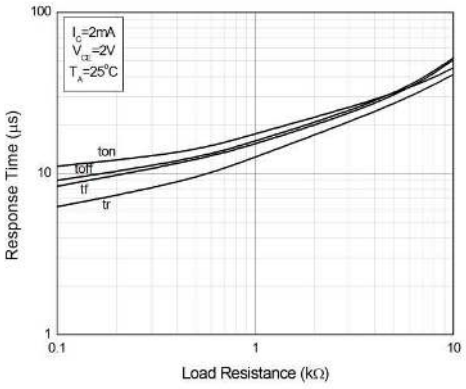


Fig 11. Frequency Response

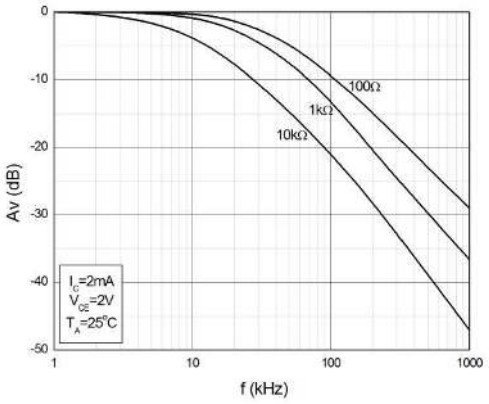


Fig 12. Test Circuits of Response Time

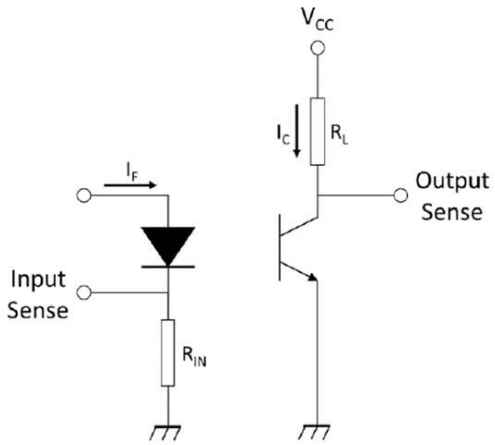
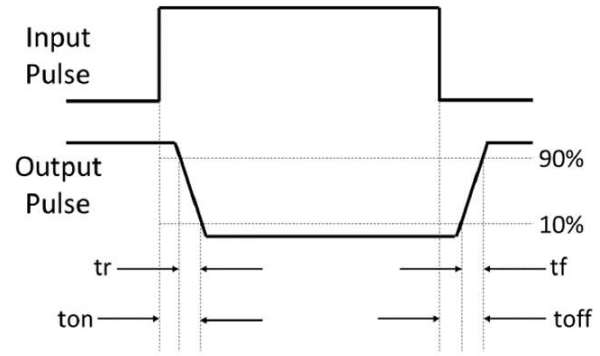
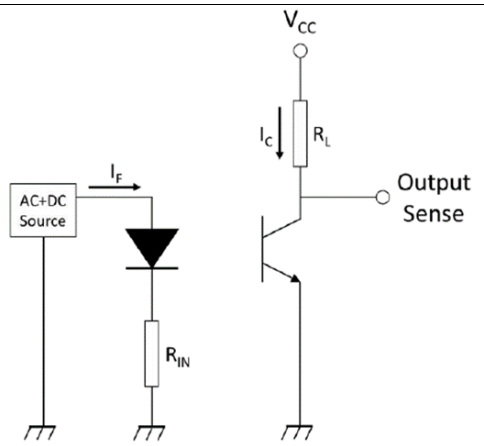


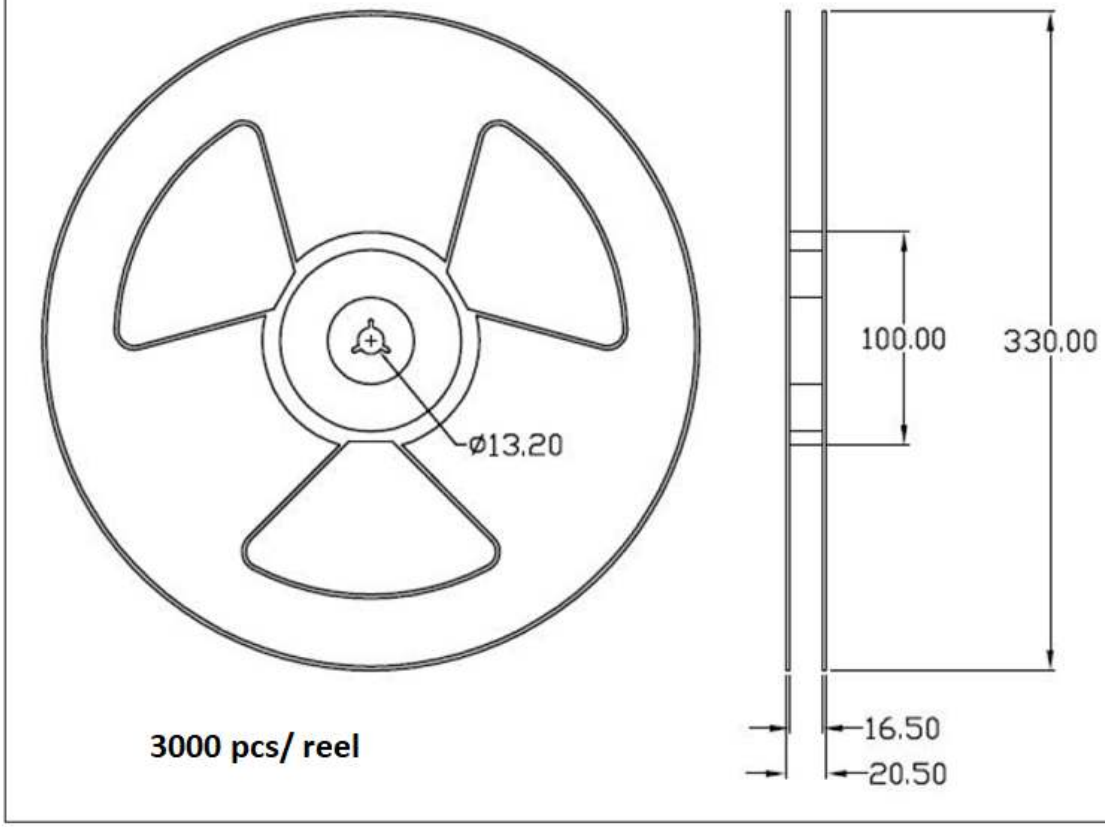
Fig 13. Curves of Response Time	Fig 14. Test Circuits of Frequency Response



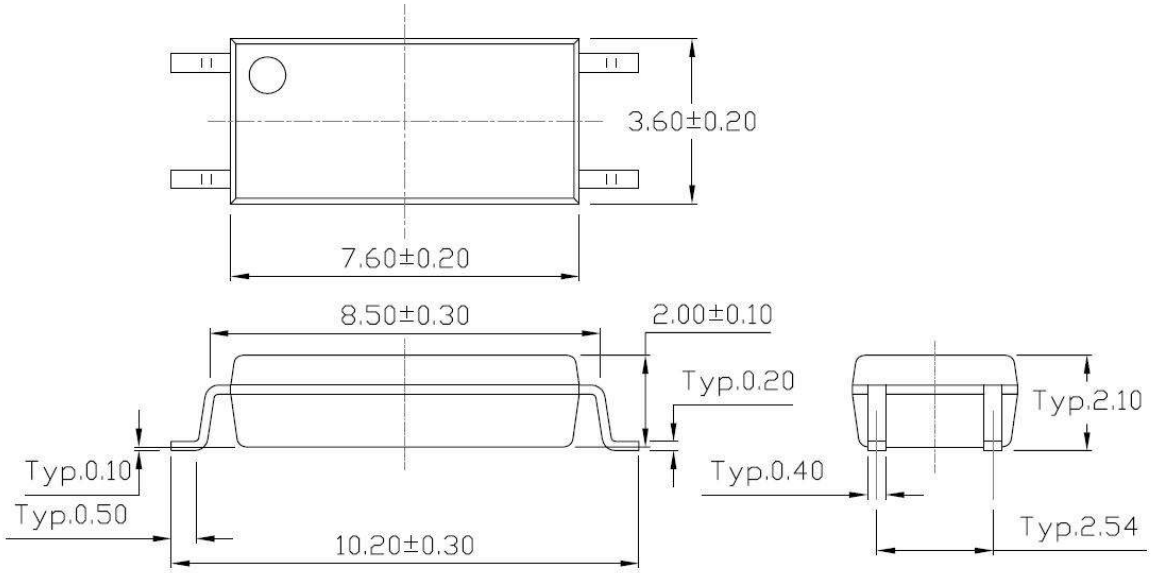


REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

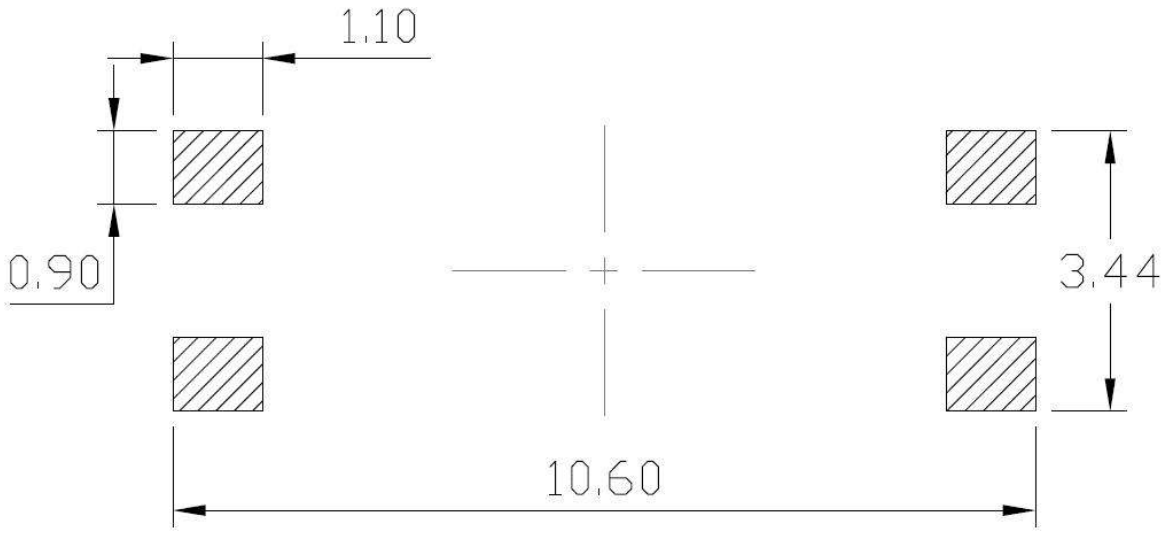
Option T1 & T2



Package Dimension (mm)

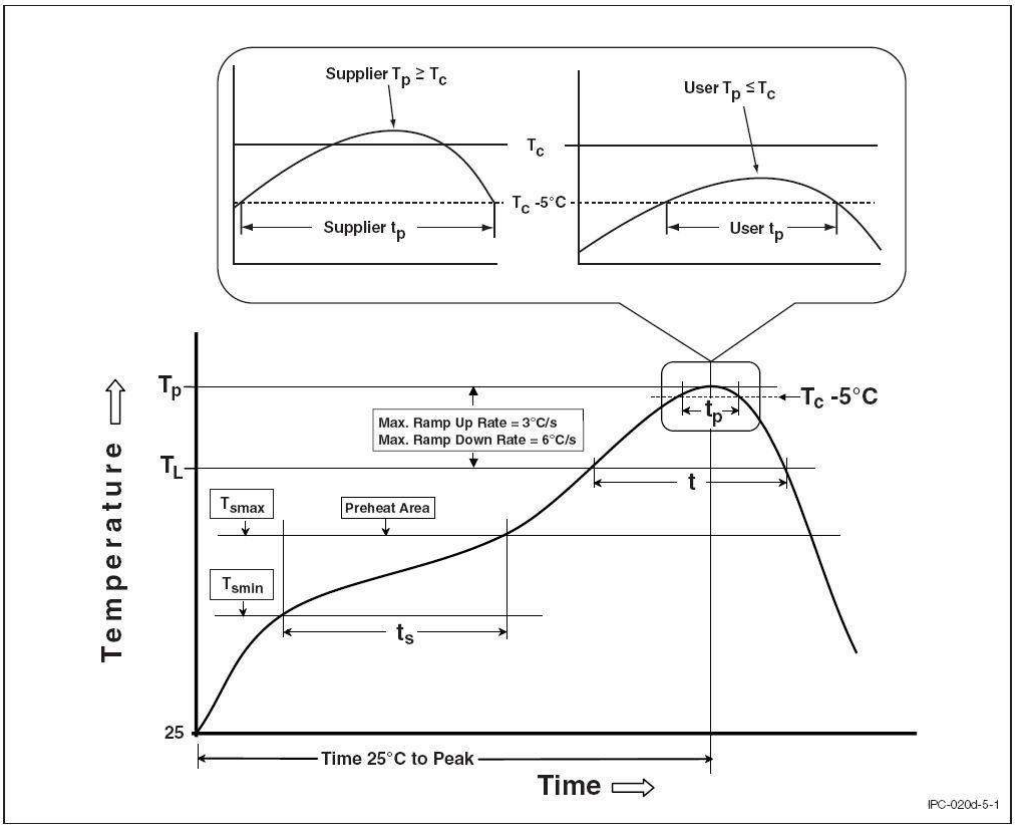


Recommended Solder Mask (mm)

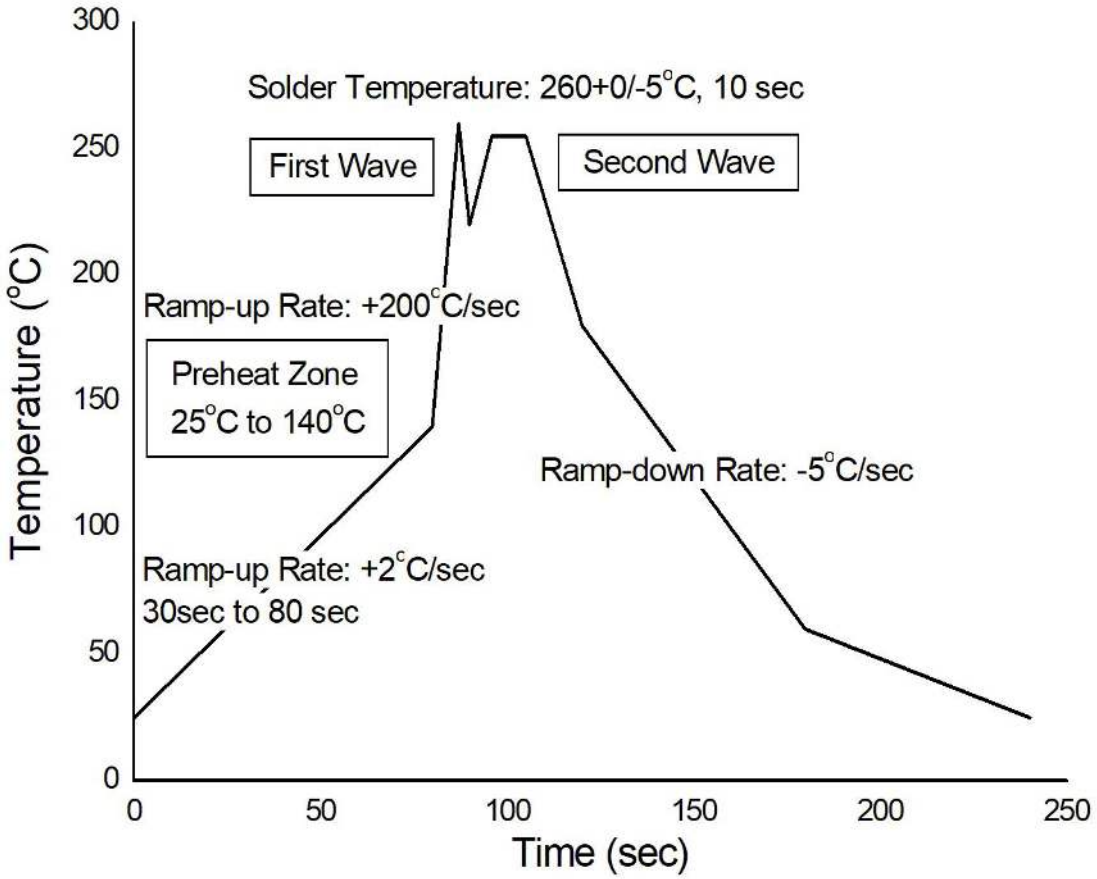


Reflow Information

Reflow Profile



Profile Feature	Sn-Pb Assembly Profile	Pb-free Assembly Profile
Temperature min. ($T_{s, min}$)	100˚C	150˚C
Temperature Max. ($T_{s, Max}$)	150˚C	200˚C
Time (ts) from ($T_{s, min}$ to $T_{s, max}$)	60-120 s	60-120 s
Ramp-up Rate (tL to tP)	3˚C/s max.	3˚C/s max.
Liquidous Temperature (TL)	183˚C	217˚C
Time (tL) Maintained Above (TL)	60-150 s	60-150 s
Peak Body Package Temperature	235˚C +0˚C/ -5˚C	260˚C +0˚C/ -5˚C
Time (tP) within 5°C of 260°C	20 s	30 s
Ramp-down Rate (TP to TL)	6˚C/s max.	6˚C/s max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Temperature Profile of Soldering	
Wave soldering (JESD22-A111 compliant)	
	
Hand soldering by soldering iron	
Soldering temperature	380 +0/-5˚C
Soldering time	3 s max.

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

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