

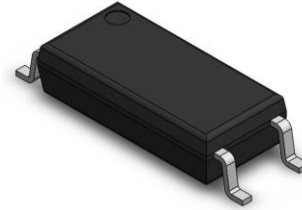


# AMERICAN BRIGHT OPTOELECTRONICS CORP.

## 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.

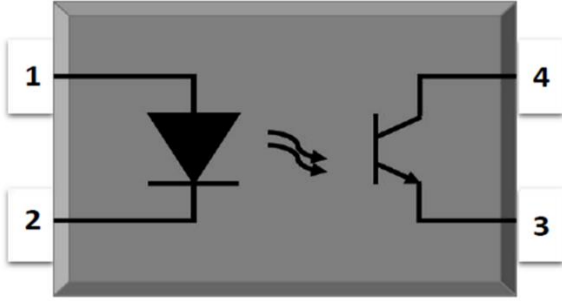
With the robust coplanar double mold structure, APC-101X series provide the most stable isolation feature.

#### 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

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	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%

Electrical Optical Characteristics at T <sub>a</sub> =25°C							
Parameter	Symbol	min	Typ.	Max.	unit	Test Condition	Note
Input							
Forward Voltage	V <sub>F</sub>	-	1.45	1.6	V	I <sub>F</sub> =50mA	
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>EC</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>	6	-	-	V	I <sub>E</sub> =0.1mA, I <sub>F</sub> =0	
Transfer Characteristics							
Current Transfer Ratio	<b>APC-1010</b>	CTR	300	-	600	%	3
	<b>APC-1015</b>		50	-	150		
	<b>APC-1016</b>		100	-	300		
	<b>APC-1017</b>		80	-	160		
	<b>APC-1018</b>		130	-	260		
	<b>APC-1019</b>		200	-	400		
	<b>APC-1011</b>		60	-	300		
	<b>APC-1012</b>		63	-	125		
	<b>APC-1013</b>		100	-	200		
	<b>APC-1014</b>		160	-	320		
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	4
Response Time (rise)	T <sub>r</sub>	-	6	18	μs	V <sub>CE</sub> =2V, I <sub>C</sub> =2mA	5
Response Time (fall)	T <sub>f</sub>	-	8	18	μs	R <sub>L</sub> =100Ω	5

Note 3. CTR Value varies for each rank

Note 4. Fig.12&13

Note 5. Fig.14

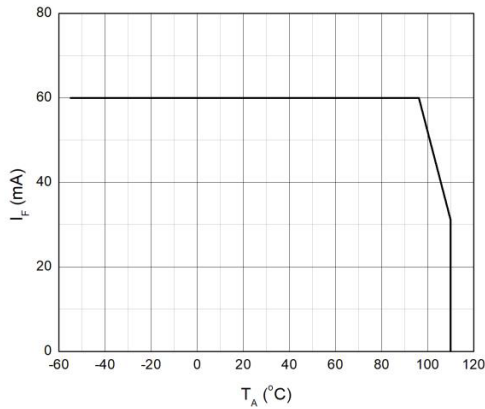
## Naming System:

### **APC-101X**

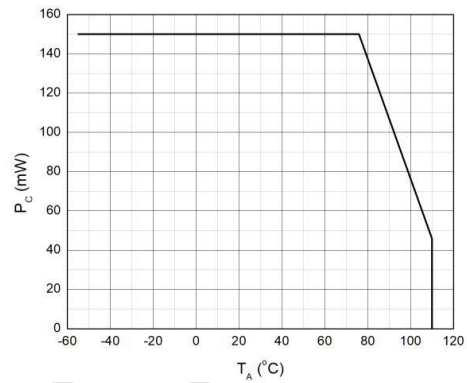
X: Indicated to the CTR value listed on Page 3 (0/1/2/3/4/5/6/7/8/9)

**Characteristic Curves**

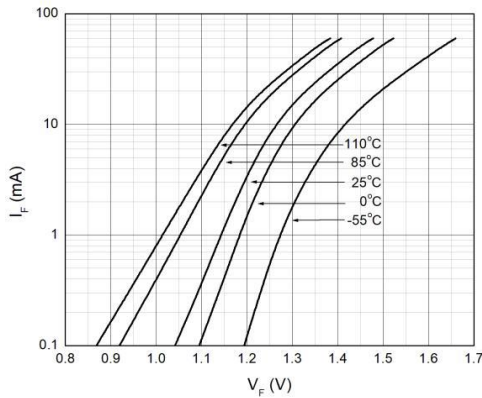
**Fig 1. Forward Current vs. Ambient Temperature**



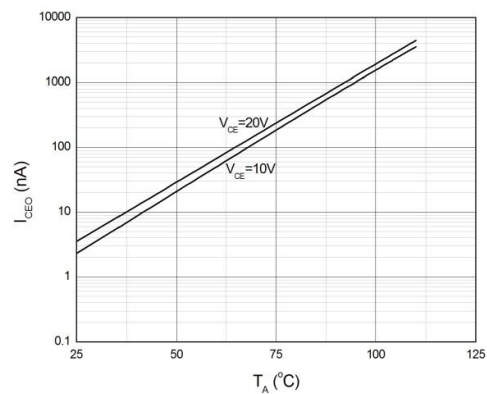
**Fig 2. Collector Power Dissipation vs. Ambient Temperature**



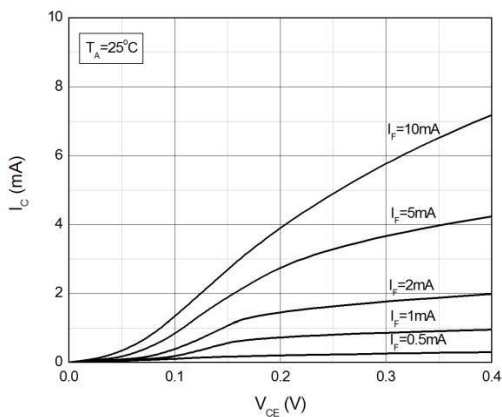
**Fig 3. Forward Current vs. Forward Voltage**



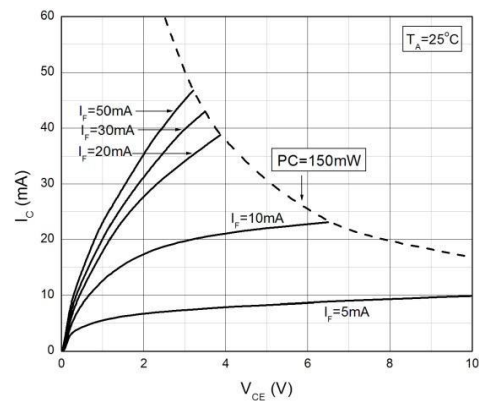
**Fig 4. Collector Dark Current vs. Ambient Temperature**



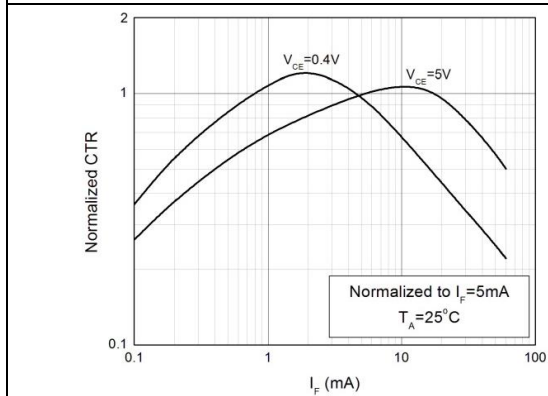
**Fig 5. Collector Current vs. Collector-emitter Voltage**



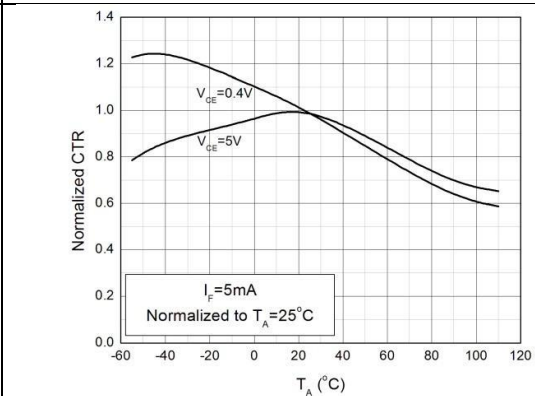
**Fig 6. Collector Current vs. Collector-emitter Voltage**



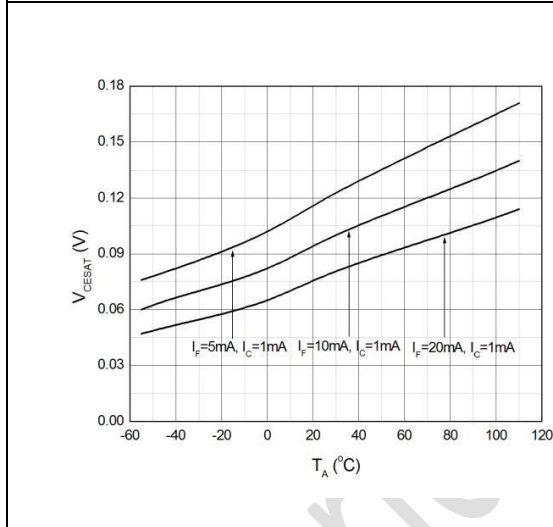
**Fig 7. Normalized Current Transfer Ratio vs. Forward Current**



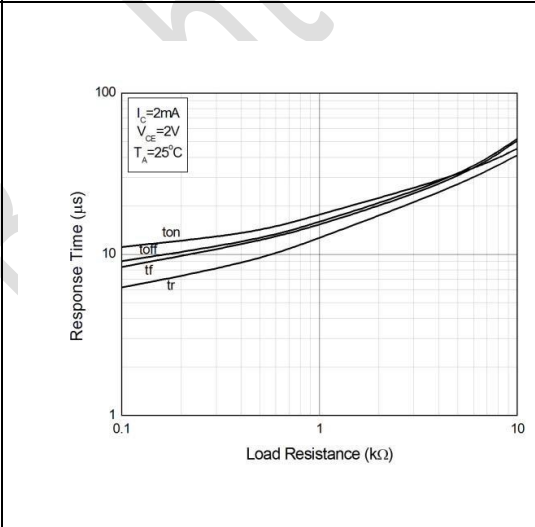
**Fig 8. Normalized Current Transfer Ratio vs. Ambient Temperature**



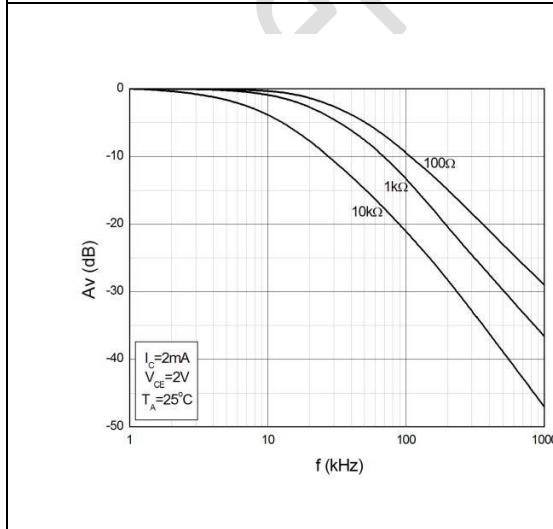
**Fig 9. Collector-emitter Saturation Voltage vs. Ambient Temperature**



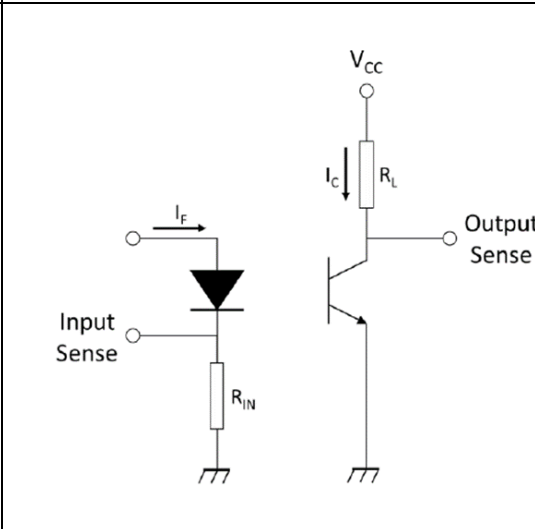
**Fig 10. Switching Time vs. Load Resistance**

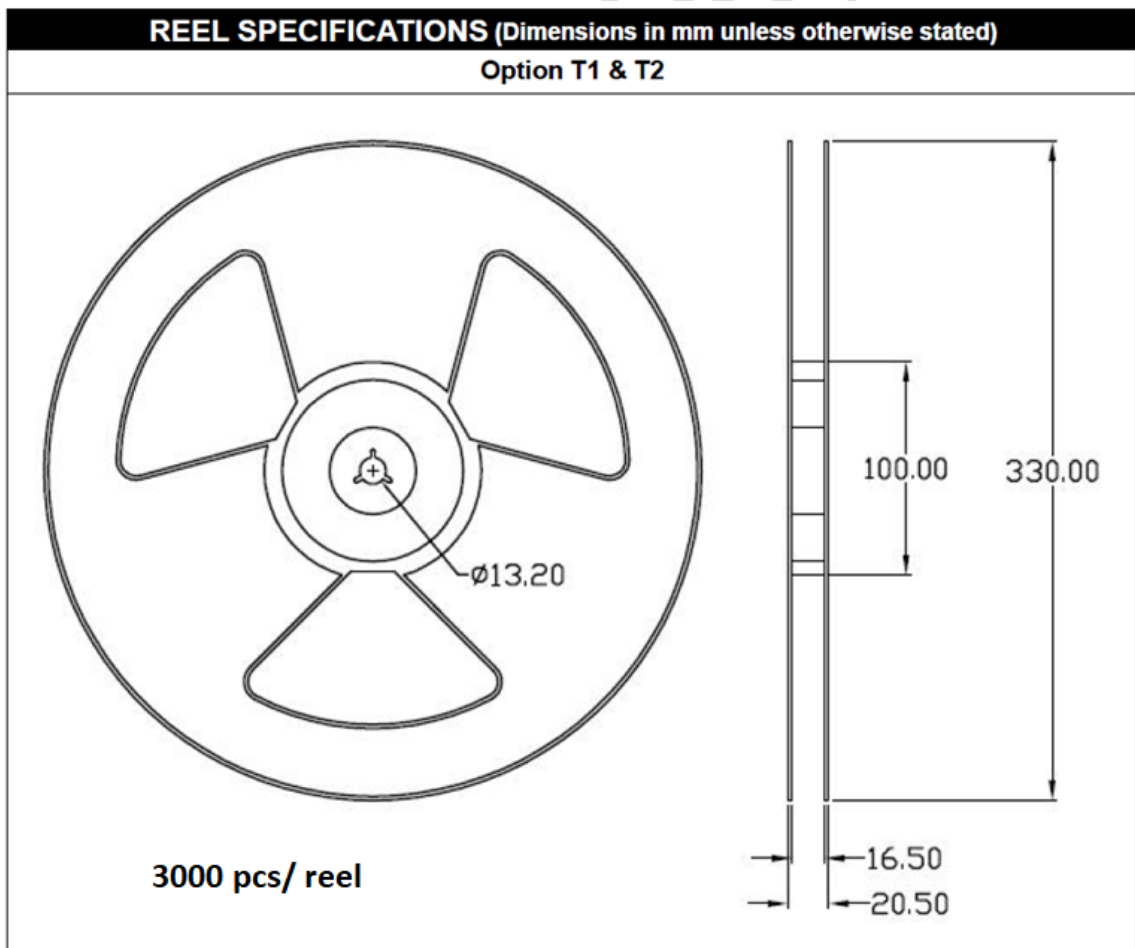
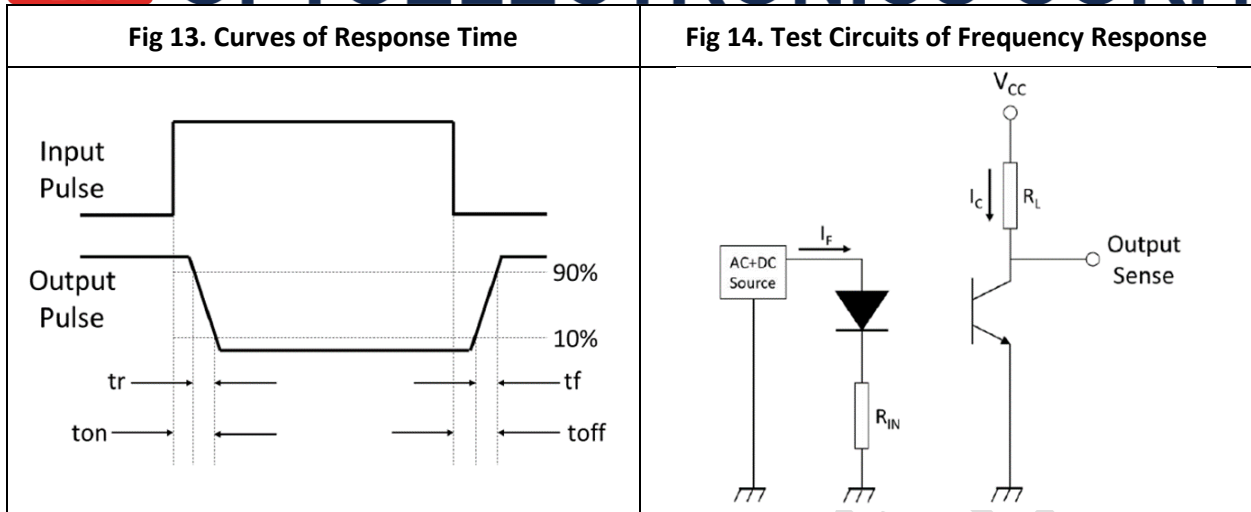


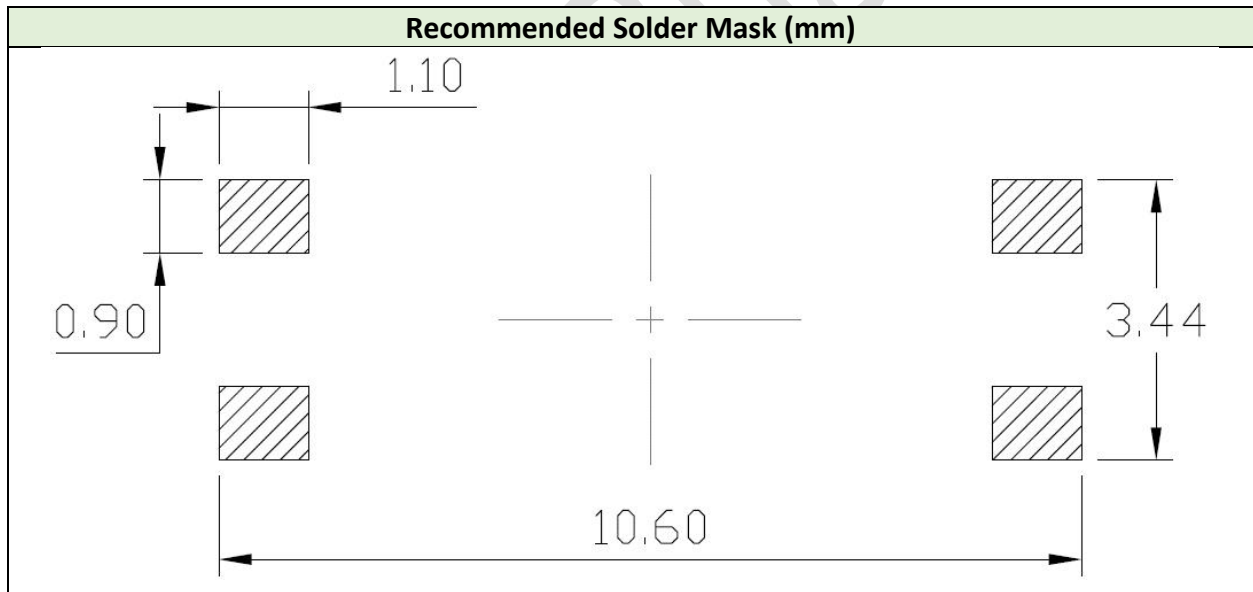
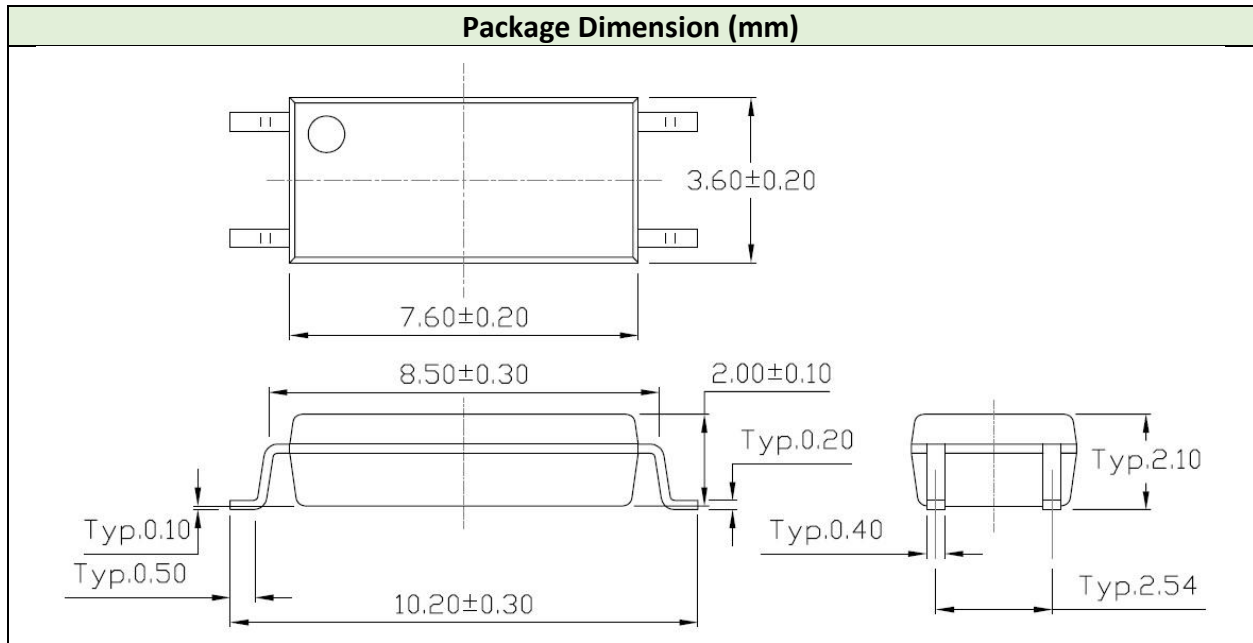
**Fig 11. Frequency Response**



**Fig 12. Test Circuits of Response Time**

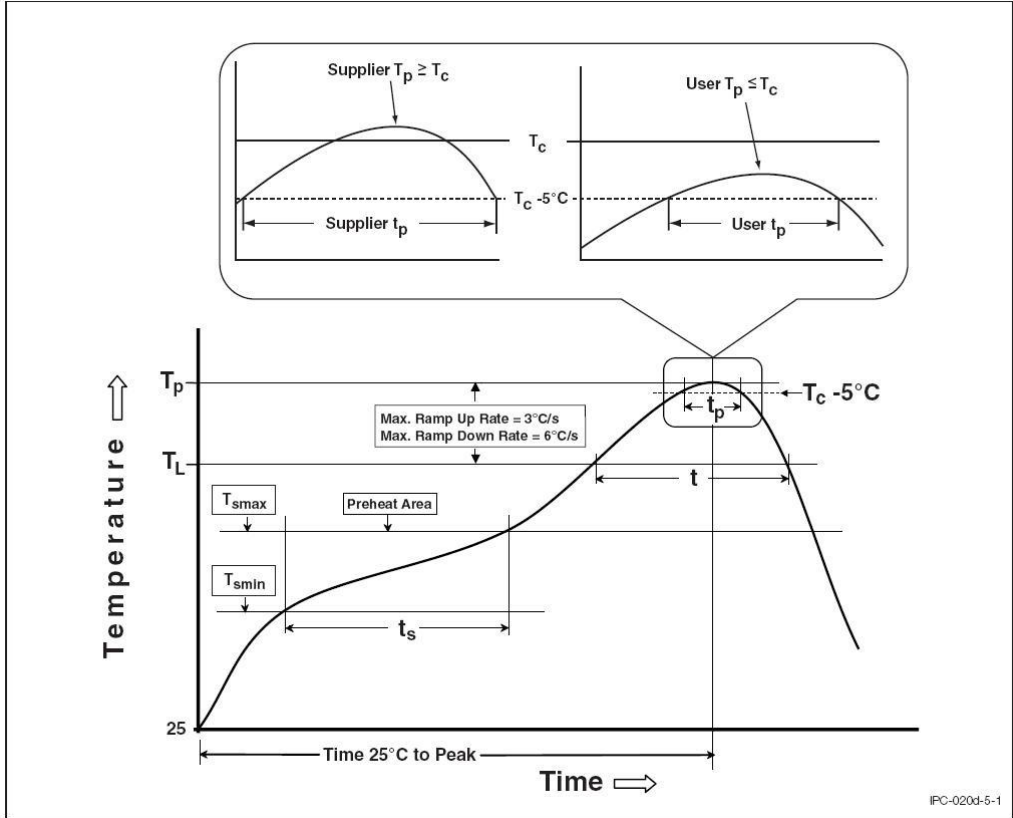






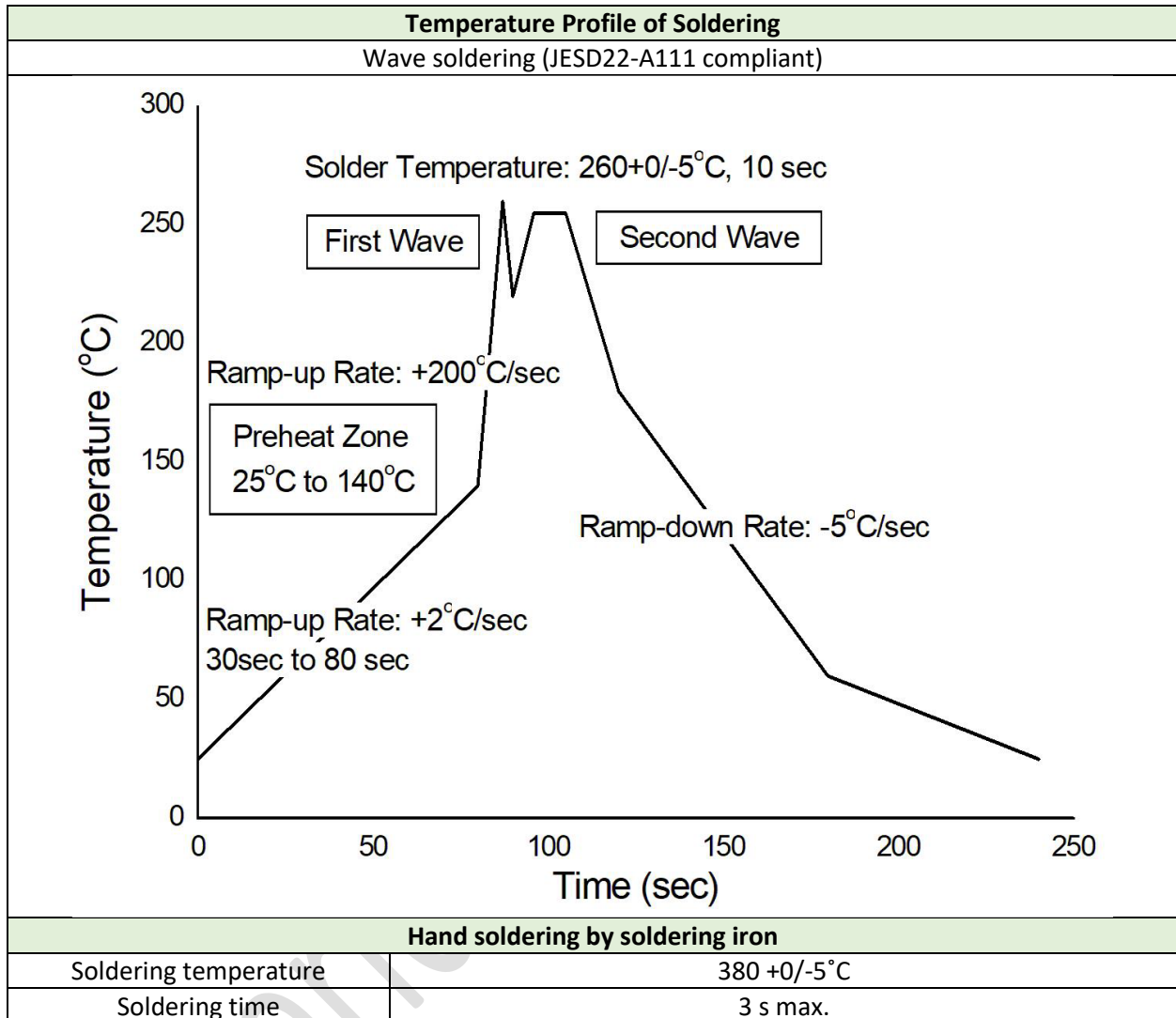
**Reflow Information**

**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 ( $t_s$ ) from ( $T_{s, min}$ to $T_{s, max}$ )	60-120 s	60-120 s
Ramp-up Rate ( $t_L$ to $t_P$ )	3°C/s max.	3°C/s max.
Liquidous Temperature ( $T_L$ )	183°C	217°C
Time ( $t_L$ ) Maintained Above ( $T_L$ )	60-150 s	60-150 s
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 s	30 s
Ramp-down Rate ( $T_P$ to $T_L$ )	6°C/s max.	6°C/s max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes 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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