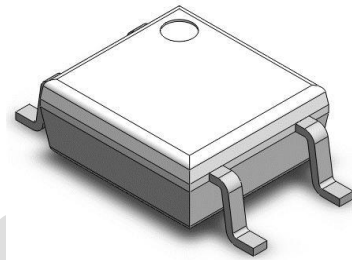


Specification for APC-301X, APC-302X, and APC-305X

**APC-301X, APC-302X, APC-305X**

*SOP4, DC Input, Random-Phase Photo TRIAC Photo Coupler*

The APC-301X, APC-302X and APC-305X 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, APC-301X, APC-302X and APC-305X series provide the most stable isolation feature.

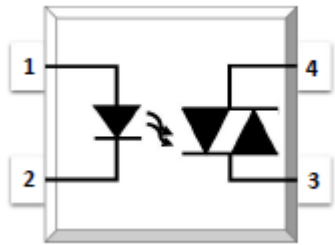


**Features:**

- High isolation  $V_{rms}$ : 3750V
- DC input with random-phase photo TRIAC output
- Operating temperature: - 40 °C to 100 °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:**

- Solenoid/valve controls
- Lighting controls
- Motor controls
- Temperature controls
- Static AC power switches
- Solid state relays

Schematic Diagram	PIN Definition
	1. Anode 2. Cathode 3. Terminal 4. Terminal

Absolute Maximum Ratings				
Parameter	Symbol	Value	Unit	Note
Input				
Forward Current	$I_F$	60	mA	
Reverse Voltage	$V_R$	6	V	
Junction Temperature	$V_R$	125	°C	
Input Power Dissipation	$P_I$	100	mW	
Output				
Off-state Output Terminal Voltage	APC-301X	250	V	
	APC-302X	400		
	APC-305X	600		
Common				
Total Power Dissipation	$P_{tot}$	330	mW	
Isolation Voltage	$V_{iso}$	3750	V <sub>rms</sub>	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 T <sub>a</sub> =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>	-	8.5	250	pF	V=0, f=1kHz	
Output							
Peak off-state Current, Either direction	I <sub>DRM</sub>	-	-	100	nA	V <sub>DRM</sub> =Rated V <sub>DRM</sub> I <sub>F</sub> =0	3
Peak on-state Current, Either direction	V <sub>TM</sub>	-	1.58	2.5	V	I <sub>TM</sub> = 100 mA	
Critical Rate of Rise of Off-state Voltage	Dv/dt	1000	-	-	V/μs	V <sub>PEAK</sub> = Rated V <sub>DRM</sub>	4
Transfer Characteristics							
LED Trigger Current	APC-3010, APC-3021 APC-3051	I <sub>FT</sub>	-	-	15	mA	Terminal Voltage = 3V I <sub>TM</sub> = 100 mA
	APC-3011, APC-3022 APC-3052		-	-	10		
	APC-3012 APC-3023 APC-3053		-	-	5		
Holding Current	I <sub>H</sub>	-	257	-	μA		
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	

Note 3. Test voltage must be applied within dV/dt rating

Note 4. Refer to Fig. 15 & Fig 16

### Naming System:

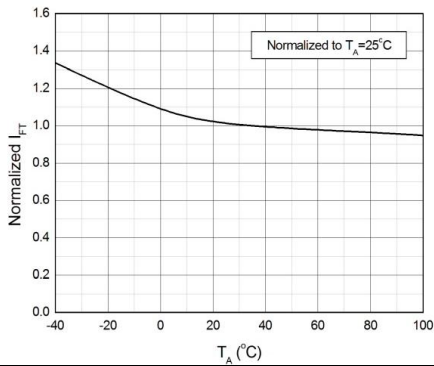
#### **APC-30KX**

K: Indicated to the LED output voltage value listed on Page 2

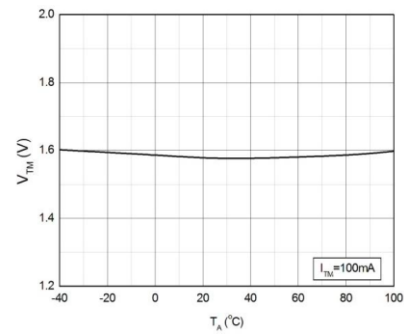
X: Indicated to the LED trigger current value listed on Page 3

Characteristic Curves	
<b>Fig 1. Forward Current vs. Ambient Temperature</b>	<b>Fig 2. On-state Terminal Current vs. Ambient Temperature</b>
<b>Fig 3. Forward Current vs. Forward Voltage</b>	<b>Fig 4. Off-state Terminal Current vs. Ambient Temperature</b>
<b>Fig 5. Normalized Off-state Terminal Voltage vs. Ambient Temperature</b>	<b>Fig 6. Normalized Trigger Current vs. LED Trigger Pulse Width</b>

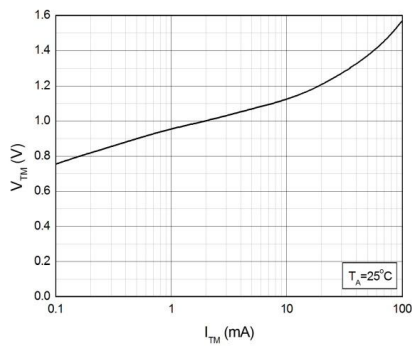
**Fig 7. Normalized Trigger Current vs. Ambient Temperature**



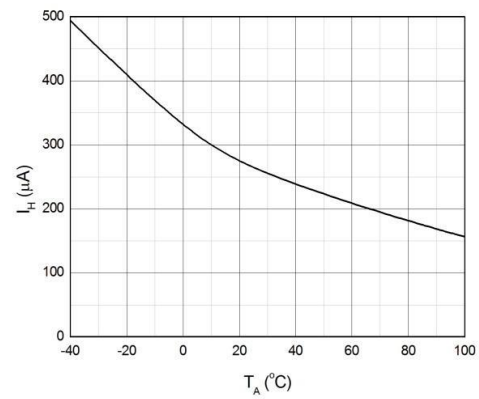
**Fig 8. On-state Terminal Voltage vs. Ambient Temperature**



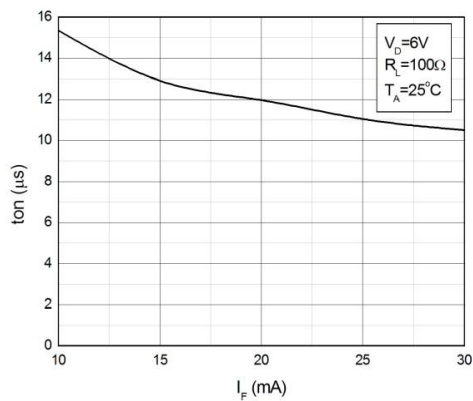
**Fig 9. On-state Terminal Voltage vs. On-state Terminal Current**



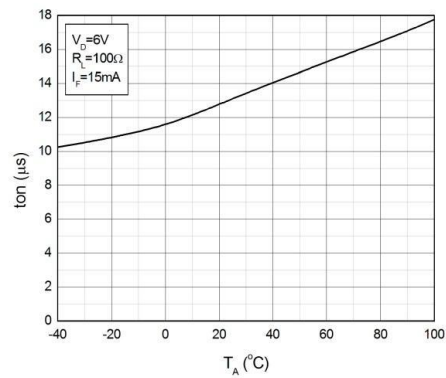
**Fig 10. Holding Current vs. Ambient Temperature**

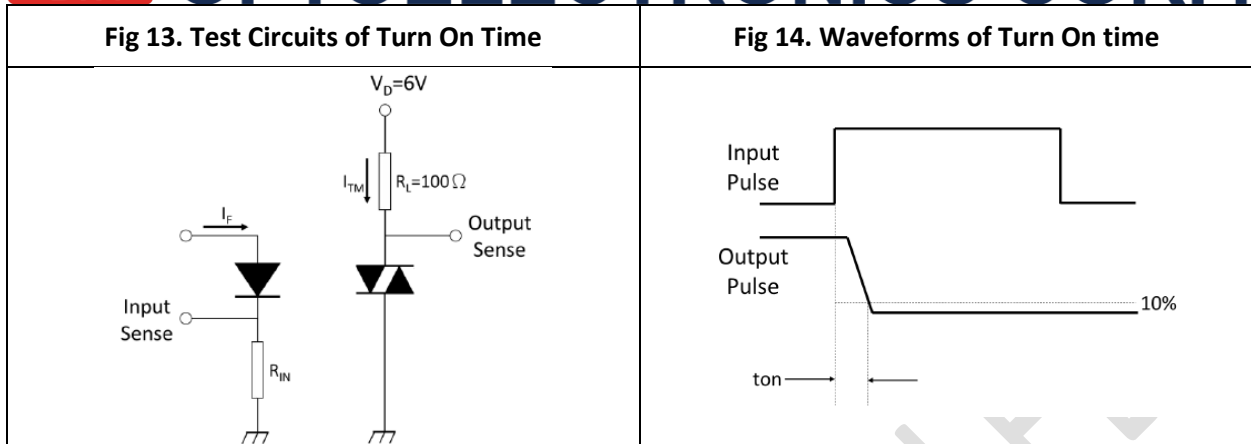


**Fig 11. Turn On Time vs. Forward Current**

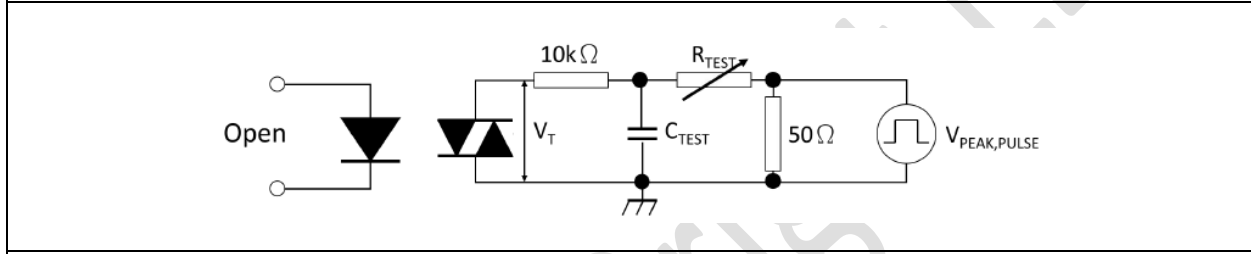


**Fig 12. Turn On Time vs. Ambient Temperature**

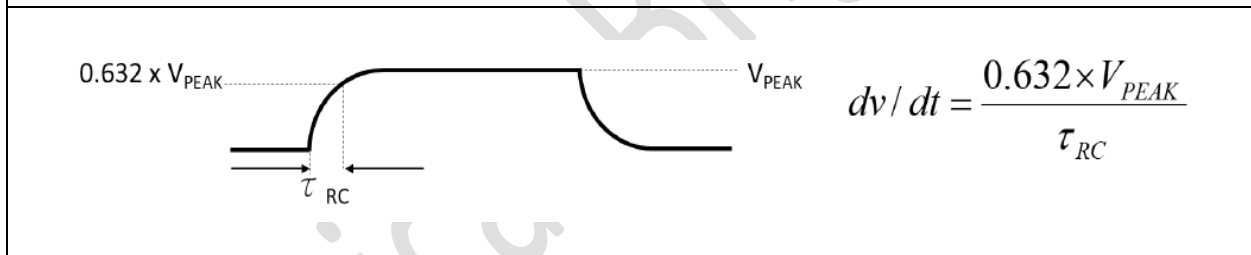


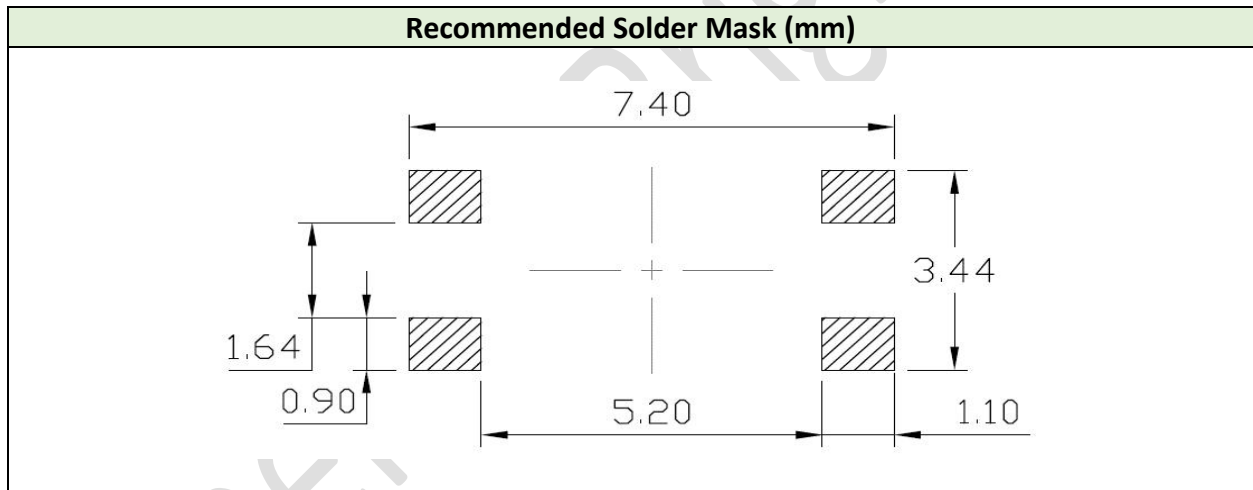
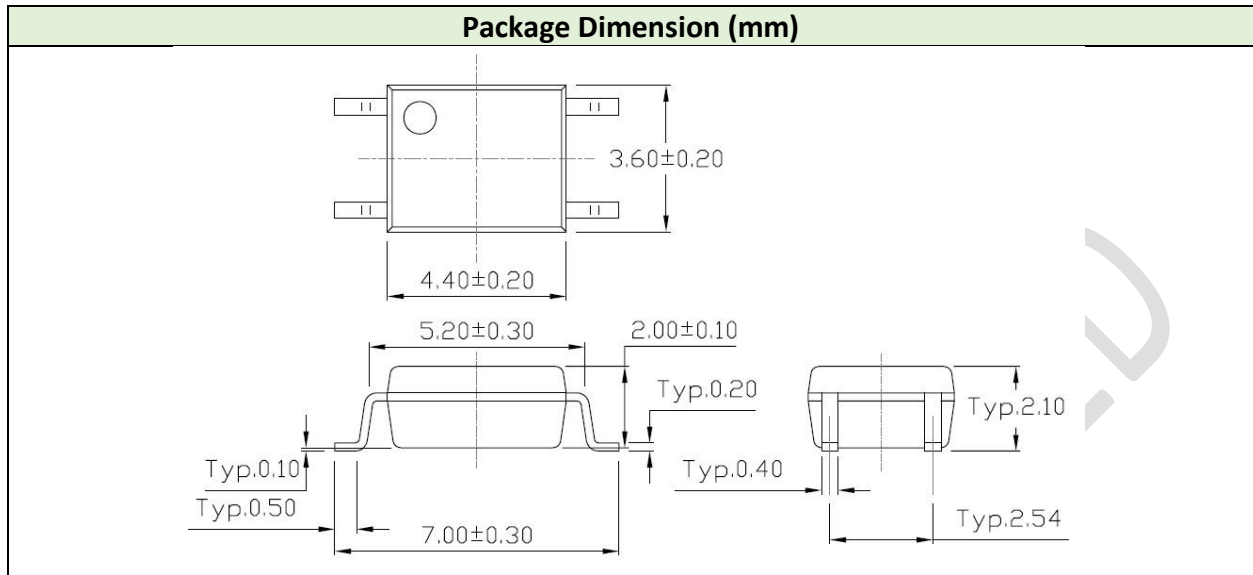


**Fig 15. Test Circuits of dV/dt**



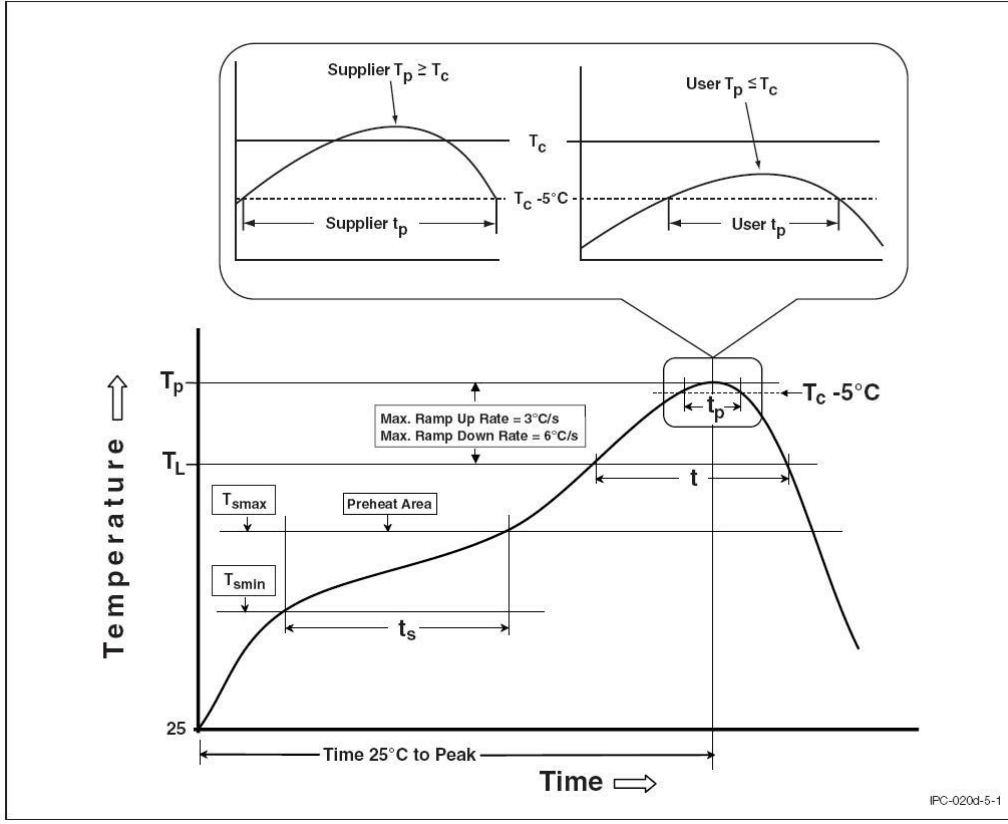
**Fig 16. Waveforms of dV/dt**





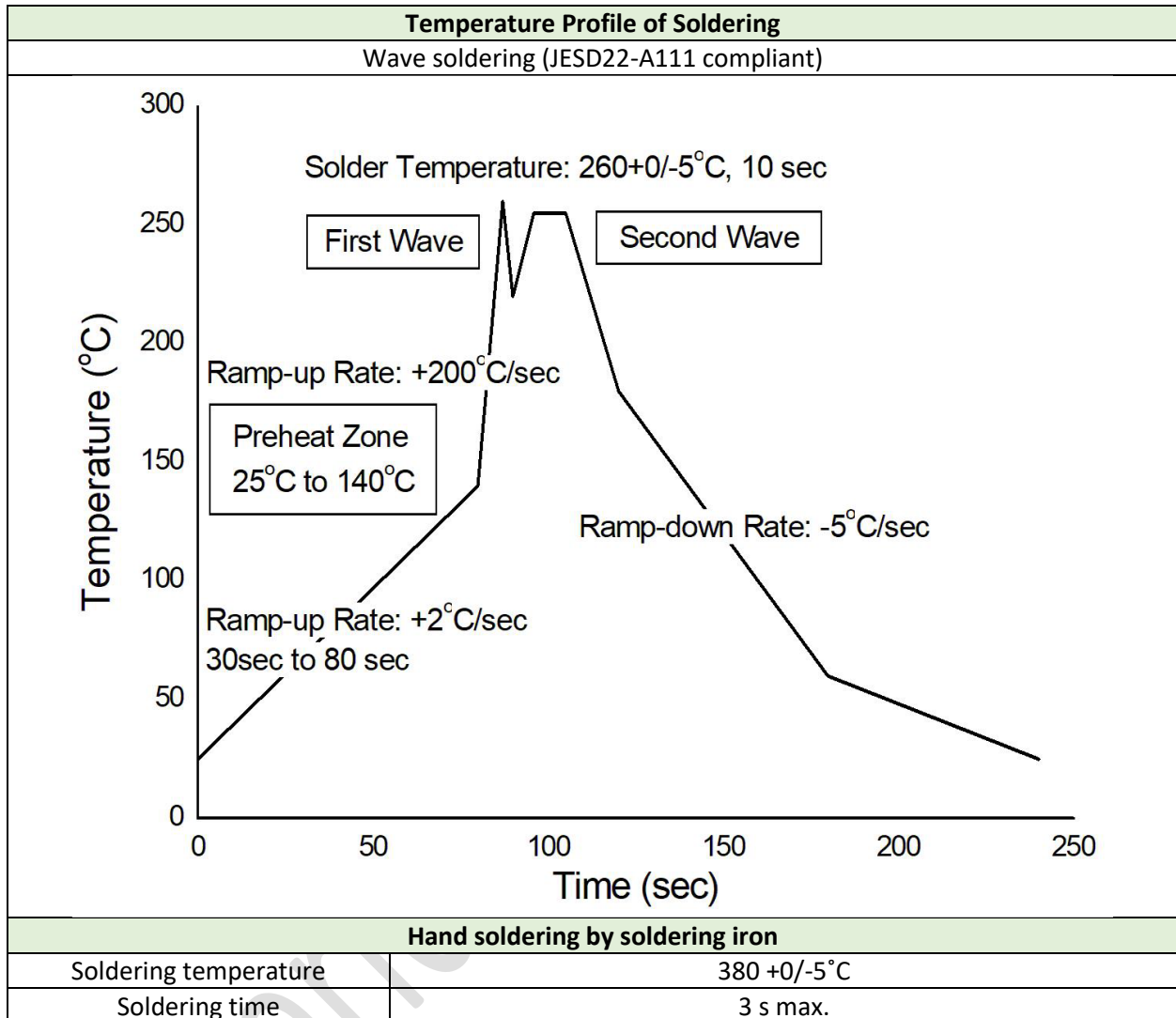
**Reflow Information**

**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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