

Random-Phase Photo TRIAC Coupler

Description

The SL301X, SL302X and SL305X series consists of a high efficient AlGaAs Light Emitting Diode and monolithic silicon random-phase photo triac with plastic DIP6 package. They are designed for interfacing between electronic controls and power triacs and power triacs to control loads.

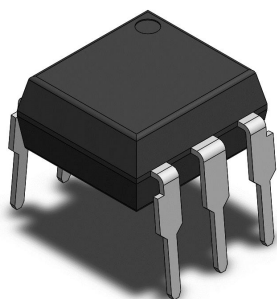
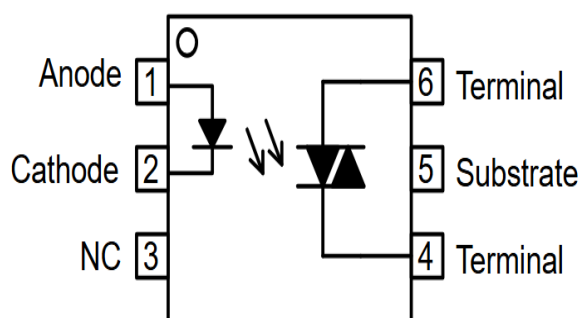
Features

- High isolation 5000 VRMS
- DC input with random-phase photo triac output
- Operating temperature range -40 to -100
- REACH & ROHS compliance
- Maximum reverse voltage 6V

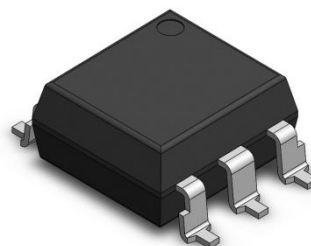
Applications

- Solenoid/valve controls
- Industrial Controls
- Motor controls
- Lamp Ballasts
- Static AC power switch
- Solid state relays
- Interfacing microprocessors to 115 to 240VAC peripherals

Functional Diagram



SL30XX DIP-6



SL30XXS SMD-6

Absolute maximum ratings (TA = 25°C unless otherwise noted)

PARAMETER		SYMBOL	VALUE	UNIT	NOTE
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	
Off-state Output Terminal Voltage	SL301X	V _{DRM}	250	V	
	SL302X		400		
	SL305X		600		
Peak Repetitive Surge Current PW=100μs, 120pps		I _{TSM}	1	A	
Junction Temperature		T _j	125	°C	
Output Power Dissipation		P _O	300	mW	
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 (TA = 25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
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	$V=0, f=1\text{kHz}$	
Peak Off-state Current, Either Direction	I_{DRM}	-	-	100	nA	$V_{DRM}=\text{Rated } V_{DRM}$ $I_F=0$	3
Peak On-state Current, Either Direction	V_{TM}	-	1.58	2.5	V	$I_{TM}=100\text{mA}$	
Critical Rate of Rise of Off-state Voltage	dV/dt	1000	-	-	$\text{V}/\mu\text{s}$	$V_{PEAK}=\text{Rated } V_{DRM}$	4

Transfer Characteristics (TA = 25°C unless otherwise noted)

LED Trigger Current	SL3010,SL3021,SL3051	I_{FT}	-	-	15	mA	Terminal Voltage = 3V $I_{TM}=100\text{mA}$	
	SL3011,SL3022,SL3052		-	-	10			
	SL3012,SL3023,SL3053		-	-	5			
Holding Current		I_H	-	257	-	μA		
Isolation Resistance		R_{iso}	10^{12}	10^{14}	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance		C_{IO}	-	0.8	-	pF	$V=0, f=1\text{MHz}$	

Note3. Test voltage must be applied within dV/dt rating.

Note4. Refer to Fig.15 & Fig.16

Characteristic Curves

Fig.1 Normalized Trigger Current vs. LED Trigger Pulse Width

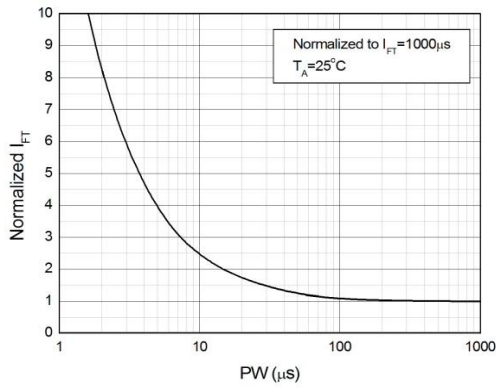


Fig.2 Normalized Off-state Terminal Voltage vs. Ambient Temperature

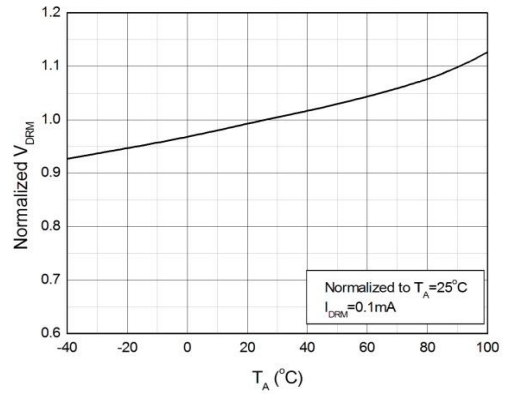


Fig.3 Off-state Terminal Current vs. Ambient Temperature

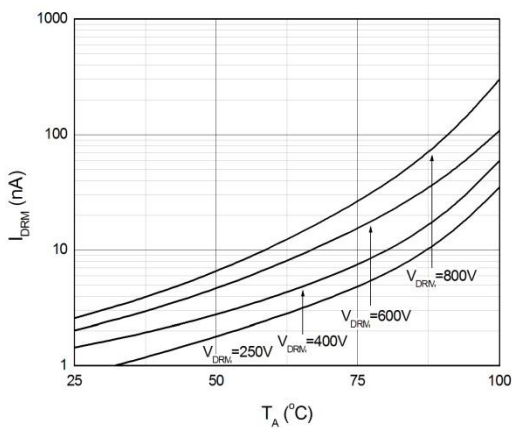


Fig.4 Forward Current vs. Forward Voltage

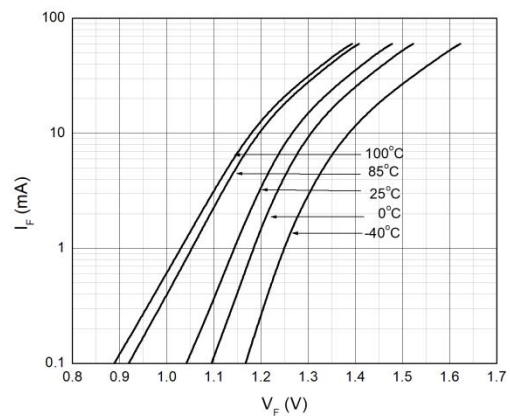


Fig.5 On-state Terminal Current vs. Ambient Temperature

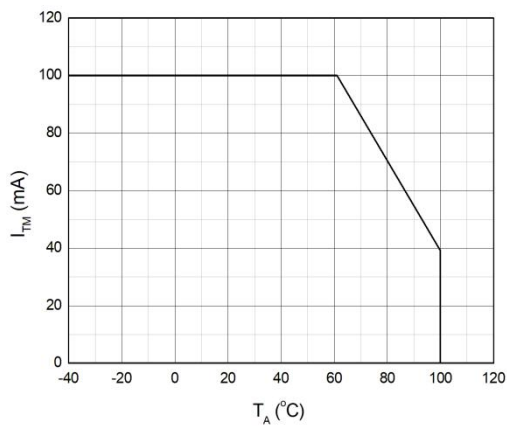
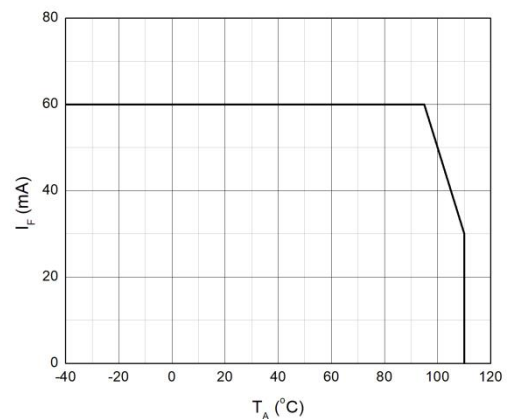
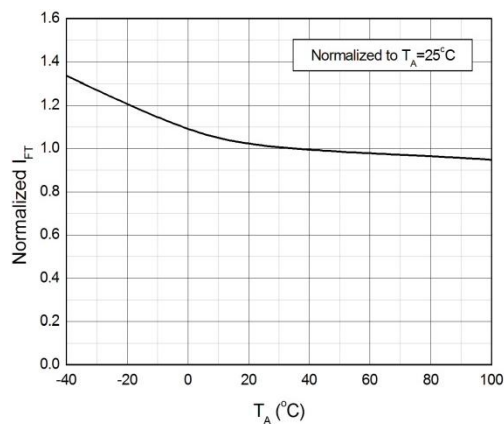


Fig.6 Forward Current vs. Ambient Temperature

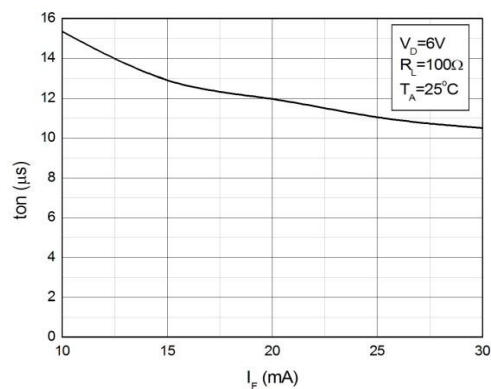


Characteristic Curves

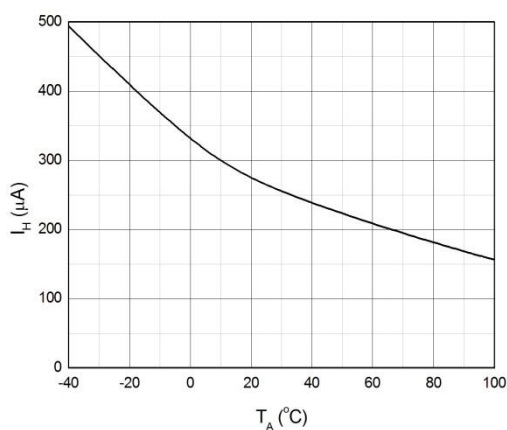
**Fig.7 Turn On Time
vs. Ambient Temperature**



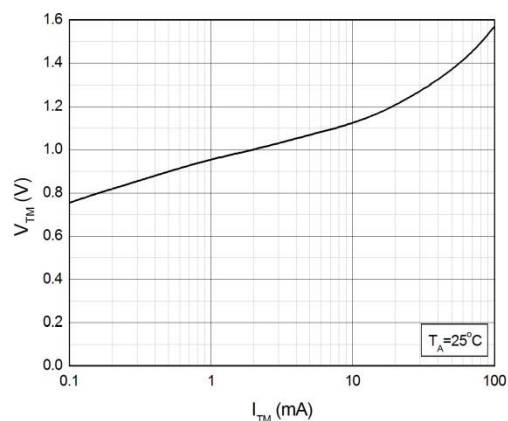
**Fig.8 On-state Terminal Voltage
vs. Ambient Temperature**



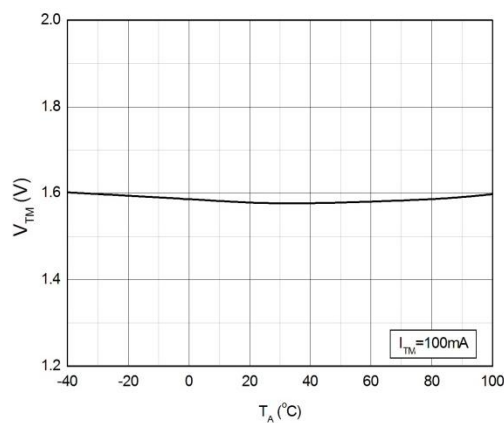
**Fig.9 Holding Current
vs. Ambient Temperature**



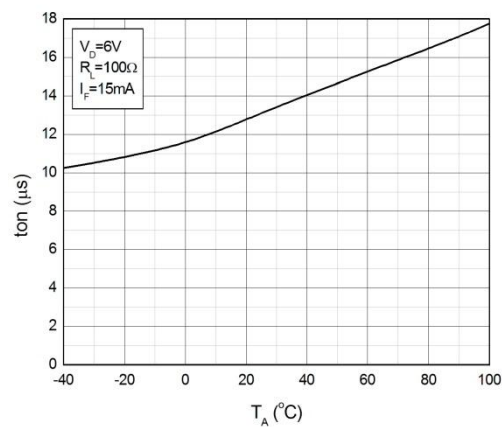
**Fig.10 On-state Terminal Voltage
vs. On-state Terminal Current**



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



**Fig.12 Normalized Trigger Current
vs. Ambient Temperature**



Test Circuits

Fig.13 Test Circuits of Turn On Time

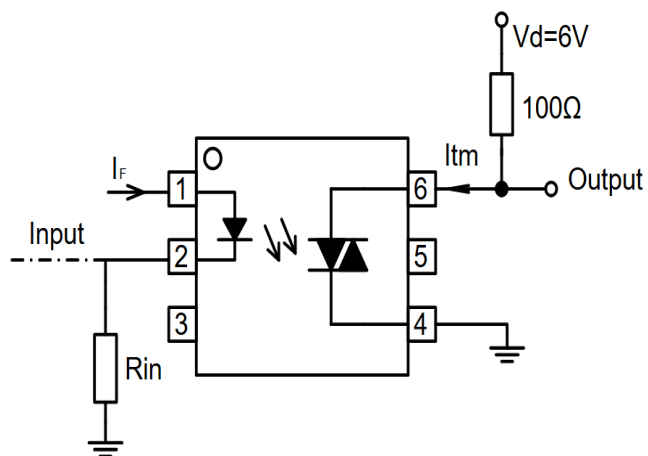


Fig.14 Waveforms of Turn On Time

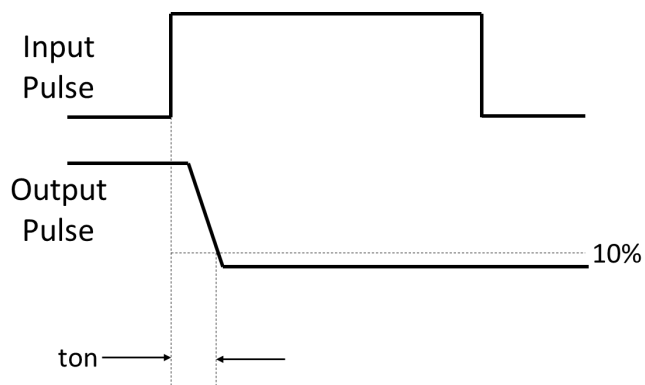


Fig.15 Test Circuits of dV/dt

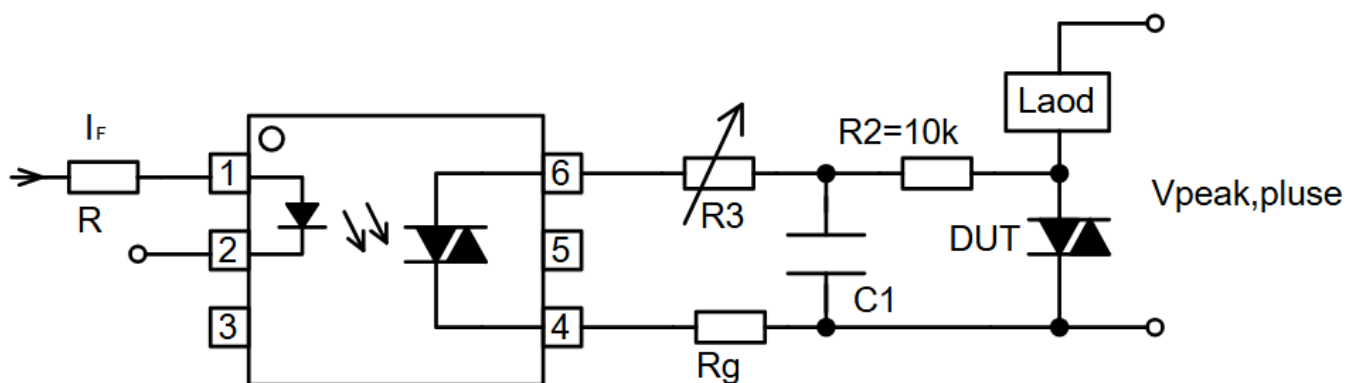
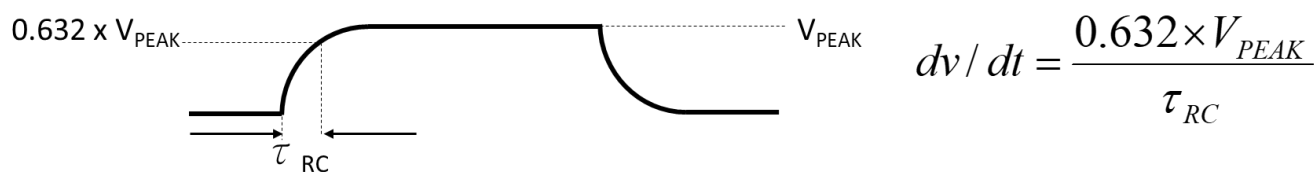
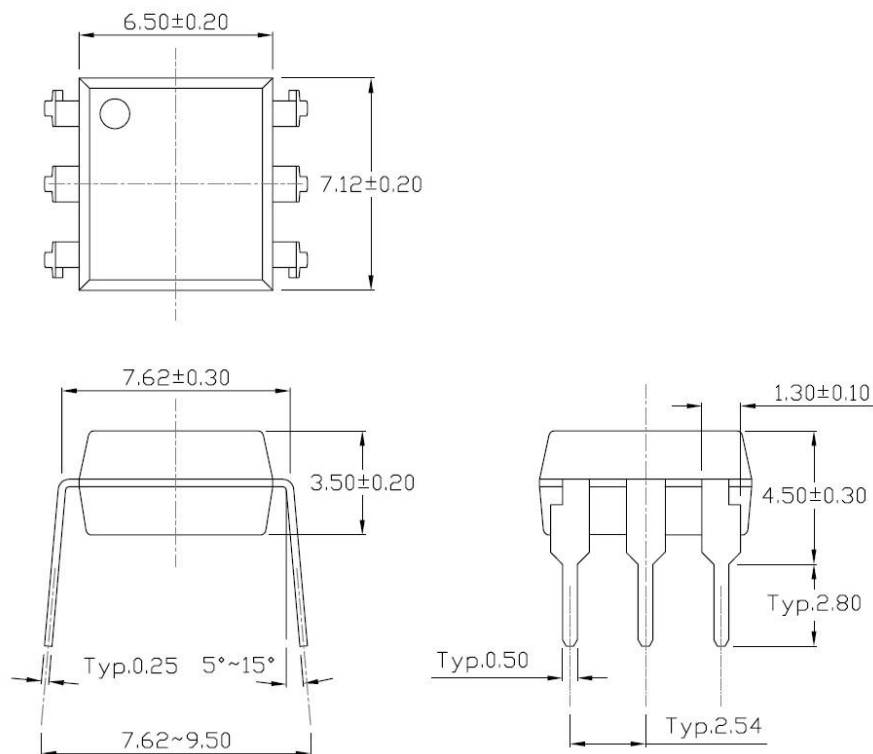


Fig.16 Waveforms of dV/dt

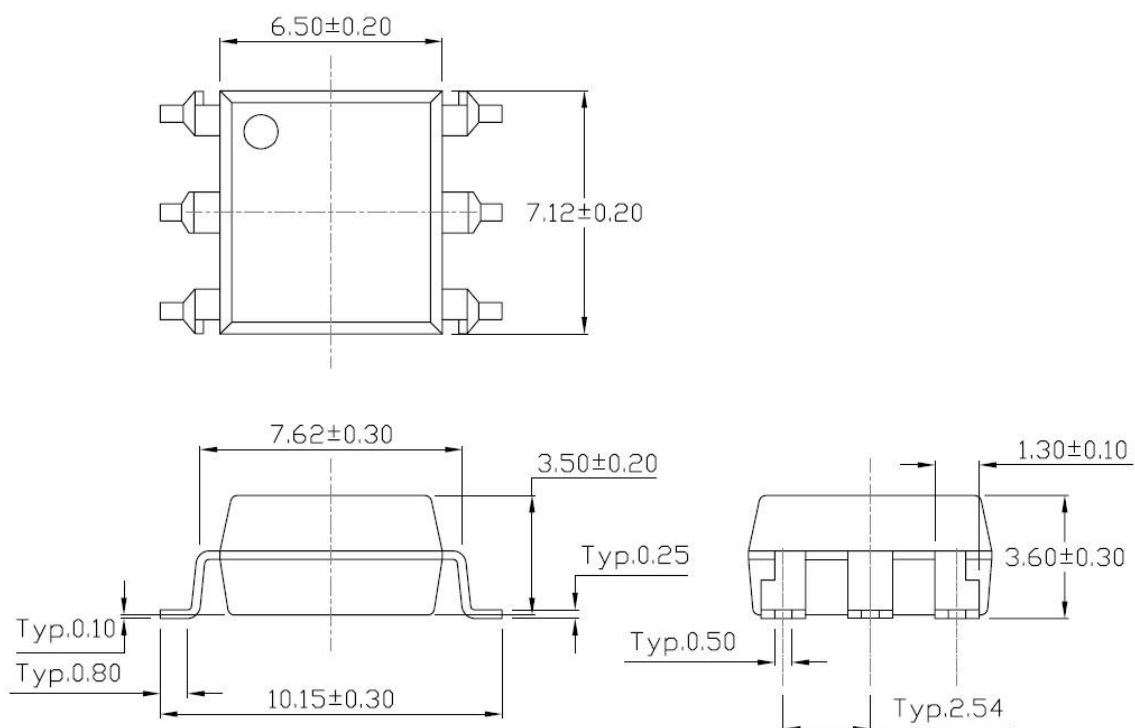


Package Dimensions (Dimensions in mm unless otherwise stated)

DIP-6

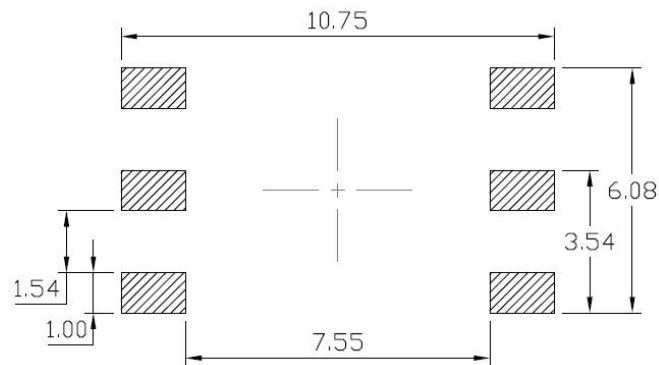


SMD-6

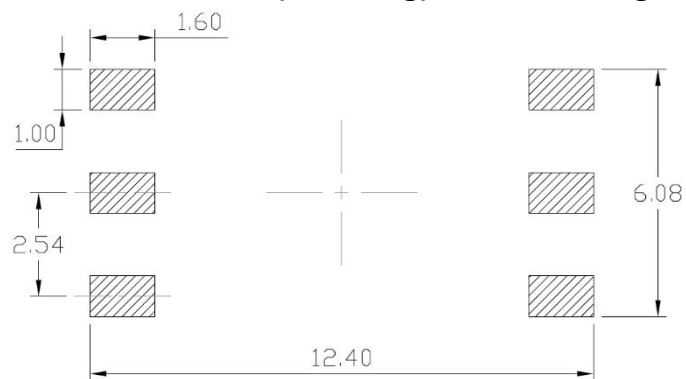


Recommended Solder Mask (Dimensions in mm unless otherwise stated)

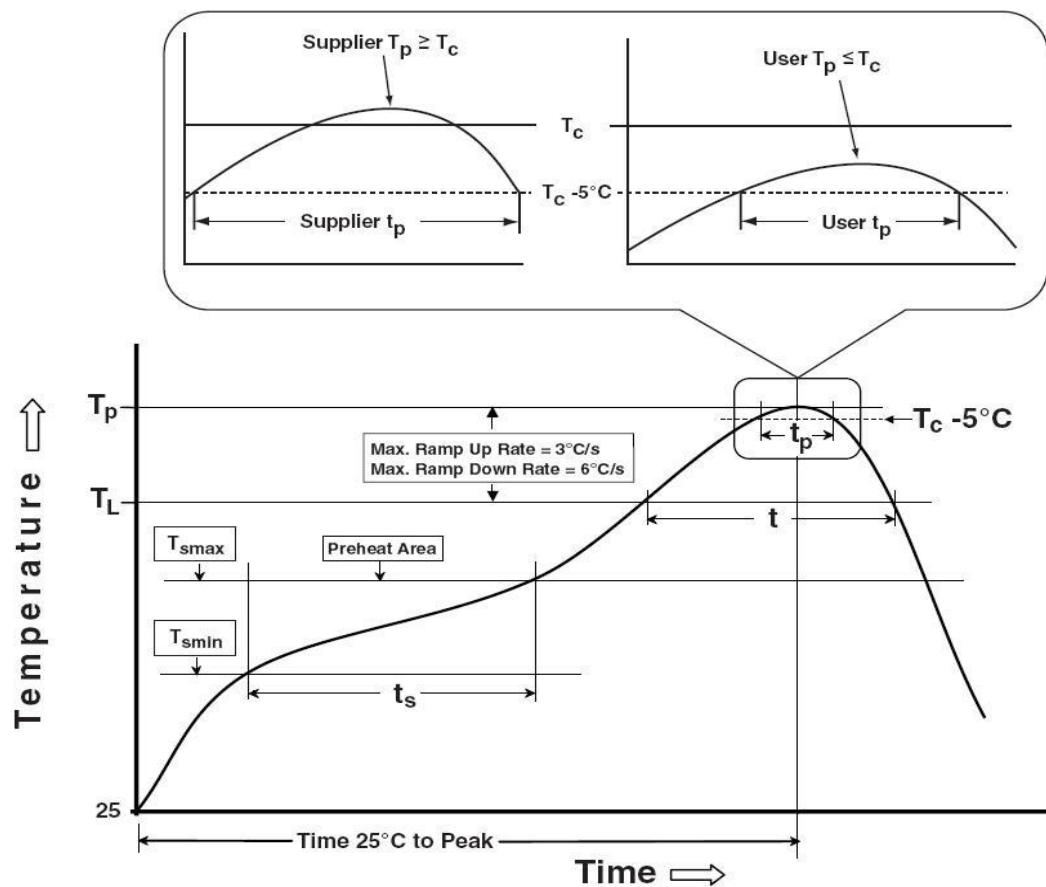
Surface Mount Lead Forming & Surface Mount (Low Profile) Lead Forming



Surface Mount (Gullwing) Lead Forming



REFLOW PROFILE



IPC-020d-5-1

Reflow Information

Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	100	150°C
Temperature Max. (T_{smax})	150	200°C
Time (t_s) from (T_{smin} to T_{smax})	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.