

## DC Input, Random-Phase Photo TRIAC Coupler

### Description

The SL301X, SL302X and SL305X 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 DIP6 package with different lead forming options. With the robust coplanar double mold structure, SL301X, SL302X and SL305X series provide the most stable isolation feature.

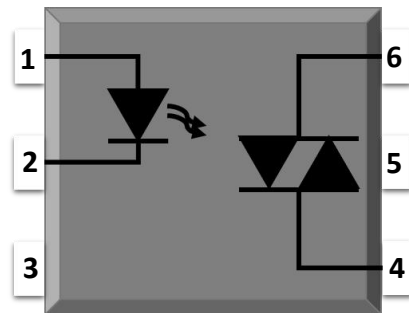
### Features

- High isolation 5000 VRMS
- DC input with random-phase photo triac output
- Operating temperature range - 40 °C to 100 °C
- REACH & RoHS compliance
- MSL class 1
- Regulatory Approvals
  - 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
- Interfacing microprocessors to 115 to 240VAC peripherals

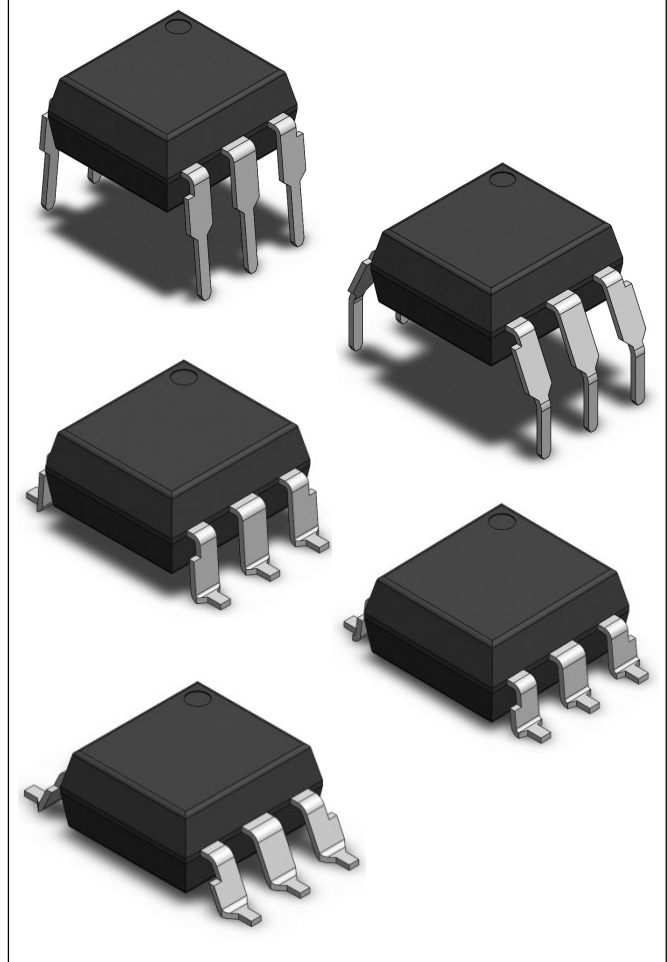
### SCHEMATIC



### PIN DEFINITION

- |            |              |
|------------|--------------|
| 1. Anode   | 4. Terminal  |
| 2. Cathode | 5. Substrate |
| 3. NC      | 6. Terminal  |

### PACKAGE OUTLINE



## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	NOTE
<b>INPUT</b>				
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	
<b>OUTPUT</b>				
Off-state Output Terminal Voltage	SL301X	250	V	
	SL302X	400		
	SL305X	600		
Peak Repetitive Surge Current PW=100 $\mu$ s, 120pps	$I_{TSM}$	1	A	
Junction Temperature	$T_j$	125	°C	
Output Power Dissipation	$P_o$	300	mW	
<b>COMMON</b>				
Total Power Dissipation	$P_{tot}$	400	mW	
Isolation Voltage	$V_{iso}$	5000	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 Ta=25°C

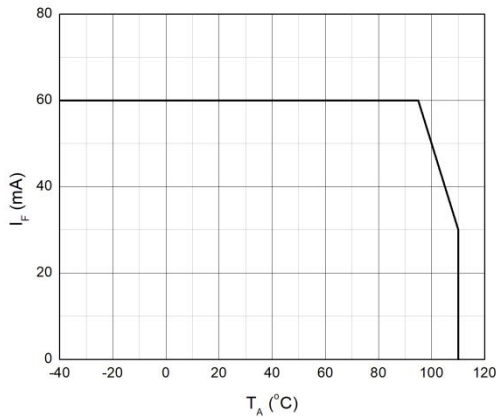
PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT								
Forward Voltage		$V_F$	-	1.24	1.4	V	$I_F=10\text{mA}$	
Reverse Current		$I_R$	-	-	10	$\mu\text{A}$	$V_R=6\text{V}$	
Input Capacitance		$C_{in}$	-	8.5	250	pF	$V=0, f=1\text{kHz}$	
OUTPUT								
Peak Off-state Current, Either Direction		$I_{DRM}$	-	-	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	-	-	V/ $\mu\text{s}$	$V_{PEAK}=\text{Rated } V_{DRM}$	4
TRANSFER CHARACTERISTICS								
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	-	$\mu\text{A}$		
Isolation Resistance		$R_{iso}$	$10^{12}$	$10^{14}$	-	$\Omega$	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.

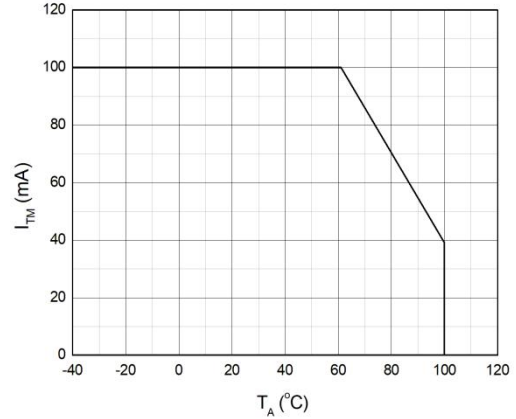
Note4. Refer to Fig.15 & Fig.16

## CHARACTERISTIC CURVES

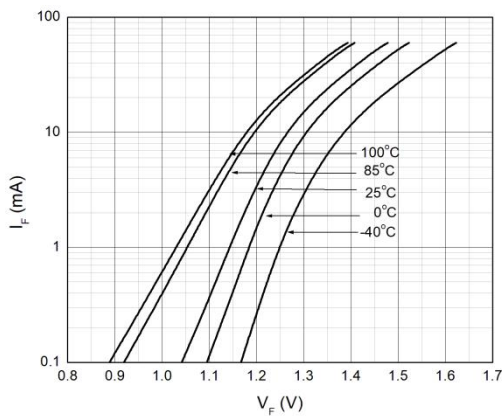
**Fig.1 Forward Current vs. Ambient Temperature**



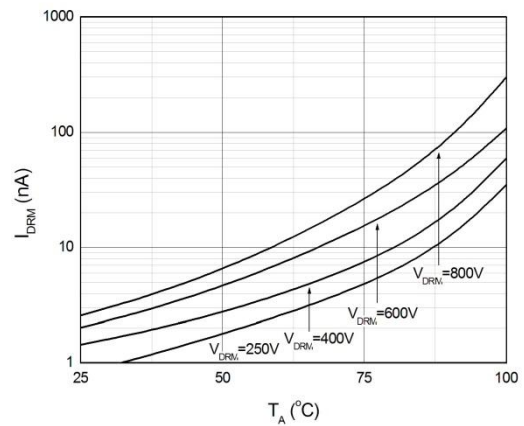
**Fig.2 On-state Terminal Current vs. Ambient Temperature**



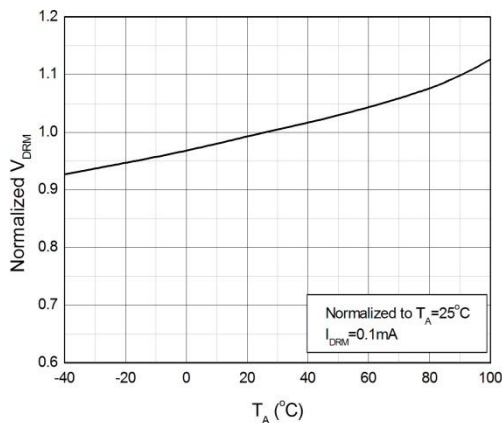
**Fig.3 Forward Current vs. Forward Voltage**



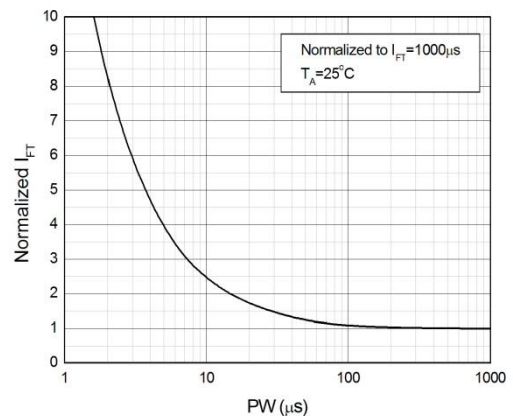
**Fig.4 Off-state Terminal Current vs. Ambient Temperature**



**Fig.5 Normalized Off-state Terminal Voltage vs. Ambient Temperature**

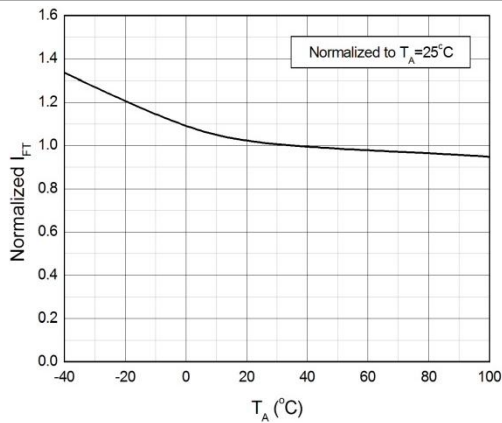


**Fig.6 Normalized Trigger Current vs. LED Trigger Pulse Width**

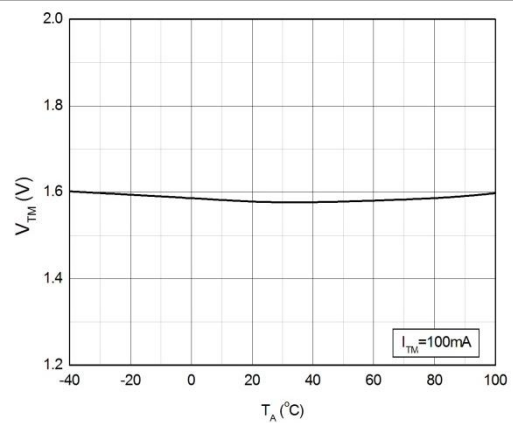


## CHARACTERISTIC CURVES

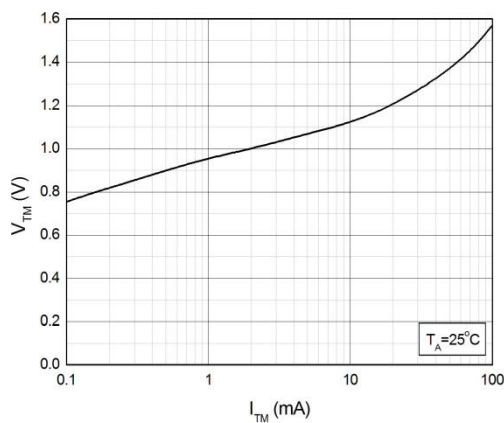
**Fig.7 Normalized Trigger Current vs. Ambient Temperature**



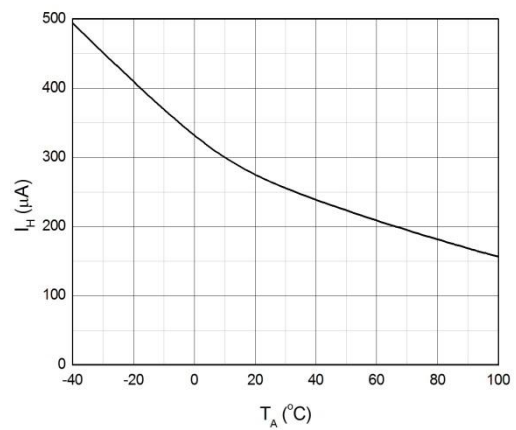
**Fig.8 On-state Terminal Voltage vs. Ambient Temperature**



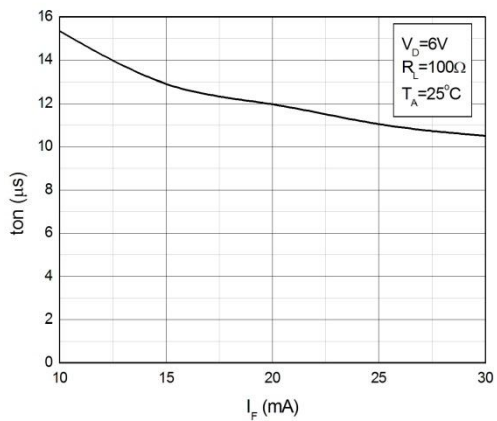
**Fig.9 On-state Terminal Voltage vs. On-state Terminal Current**



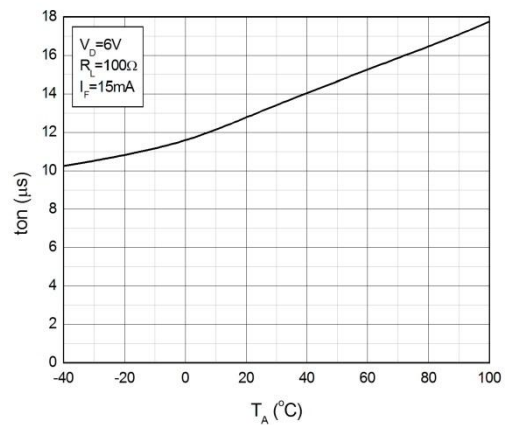
**Fig.10 Holding Current vs. Ambient Temperature**



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

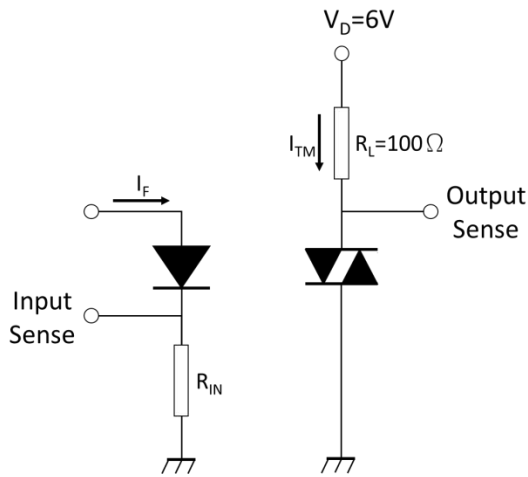


**Fig.12 Turn On Time vs. Ambient Temperature**

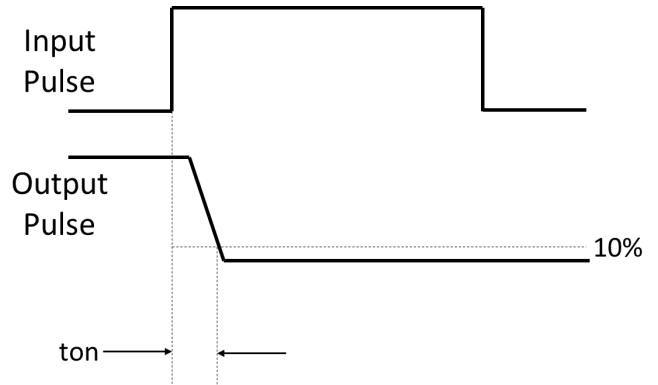


## TEST CIRCUITS

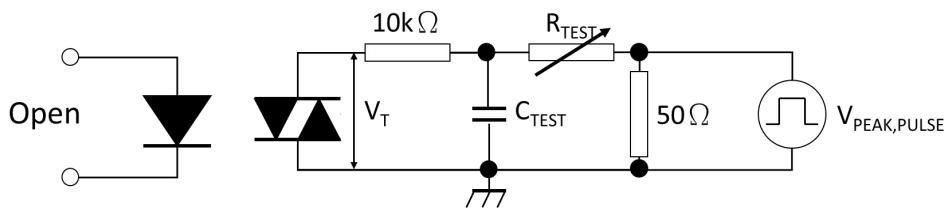
**Fig.13 Test Circuits of Turn On Time**



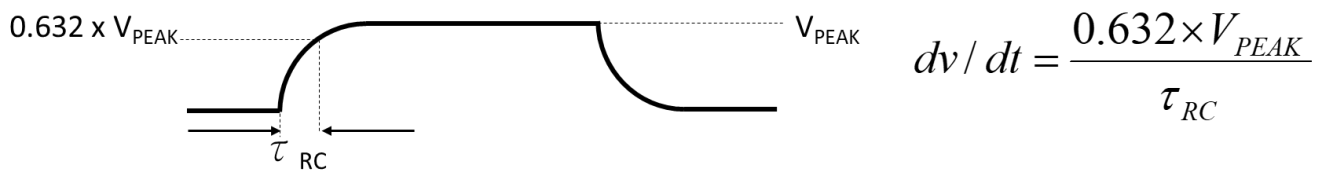
**Fig.14 Waveforms of Turn On Time**



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

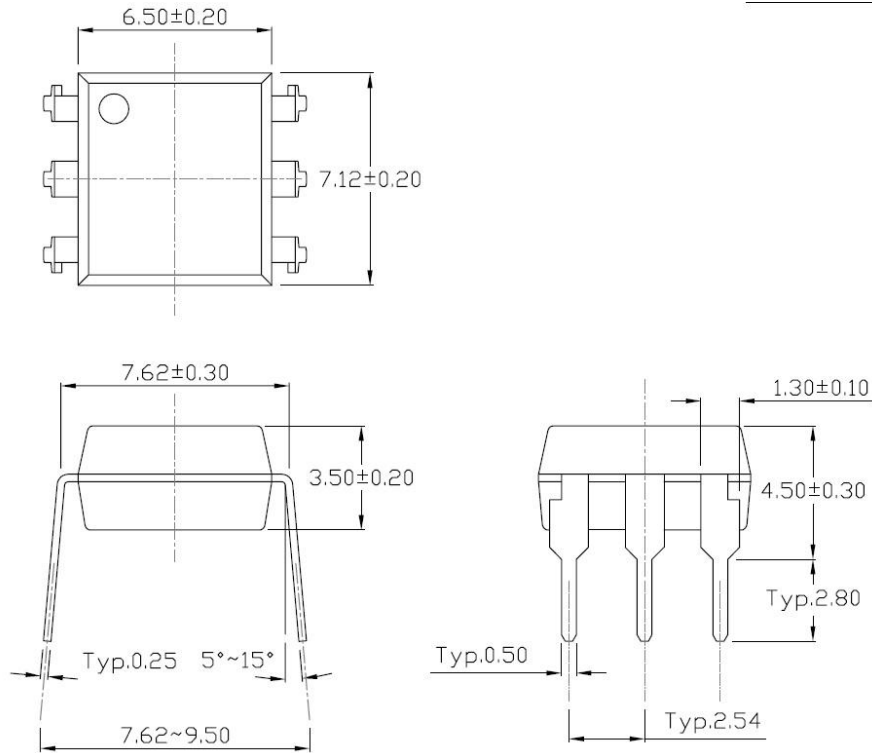


**Fig.16 Waveforms of dV/dt**

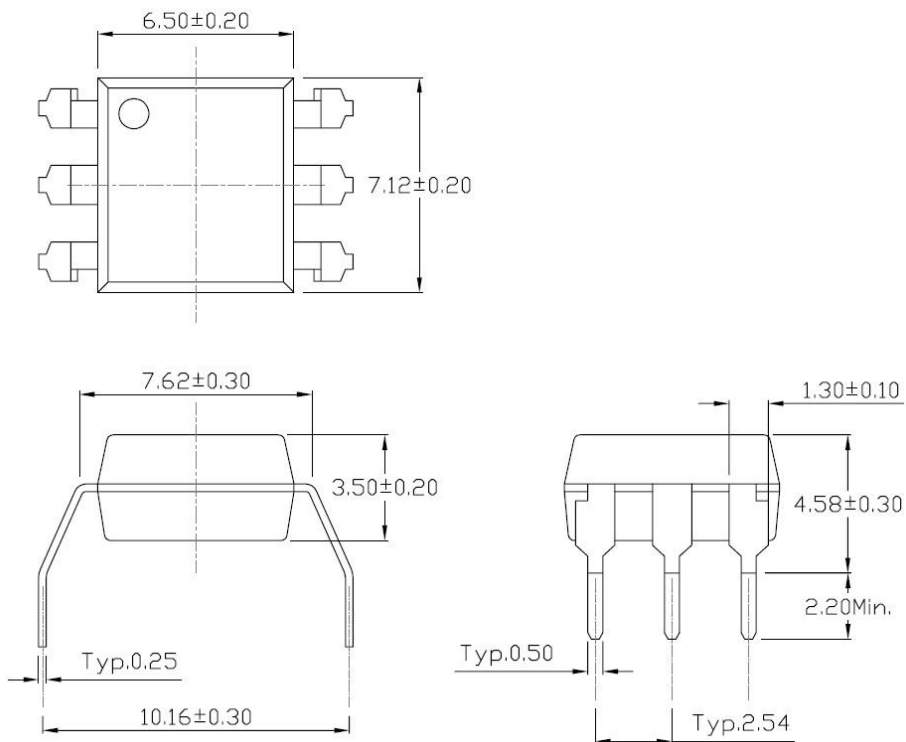


## PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

### Standard DIP – Through Hole (DIP Type)

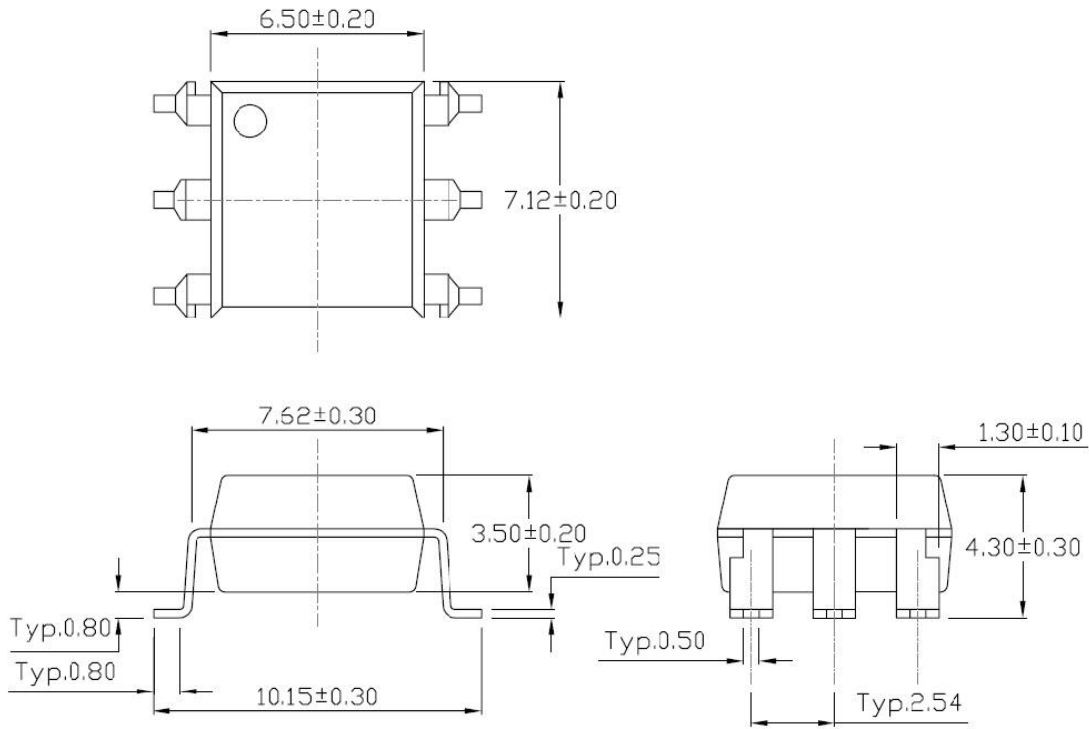


### Gullwing (400mil) Lead Forming – Through Hole (M Type)

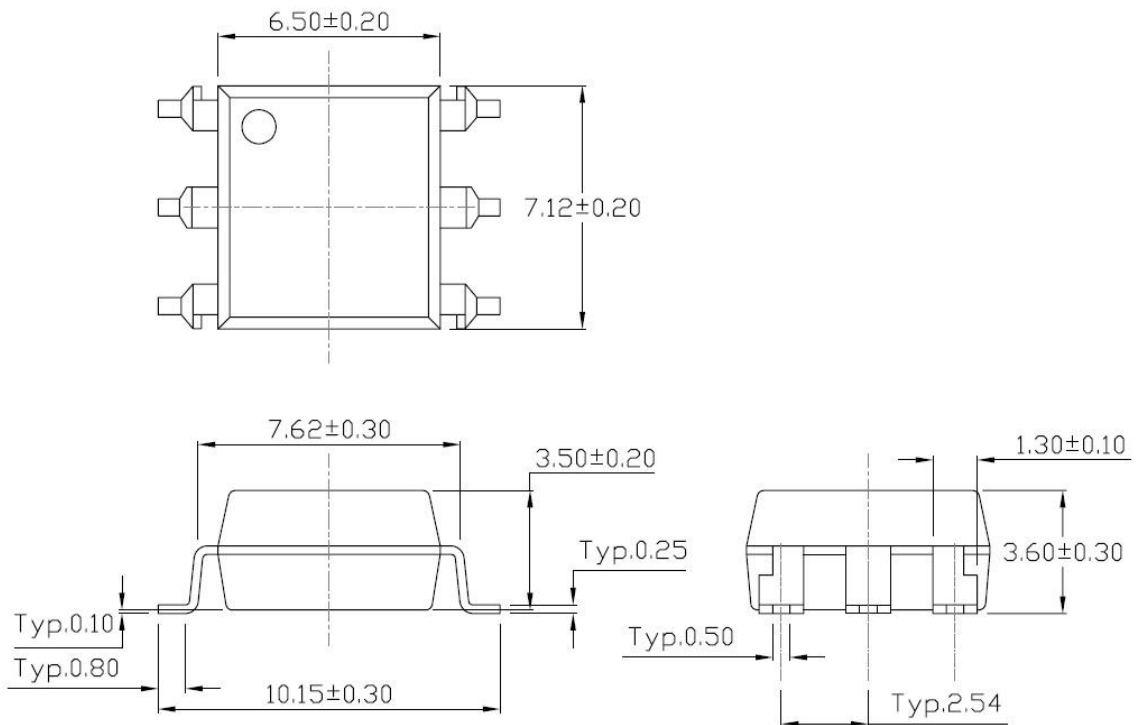


## PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

### Surface Mount Lead Forming (S Type)



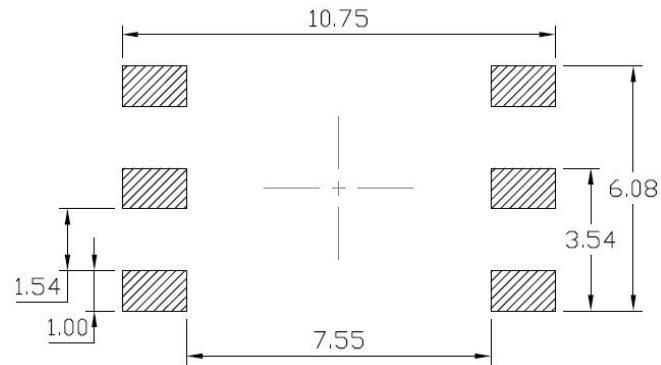
### Surface Mount (Low Profile) Lead Forming (SL Type)



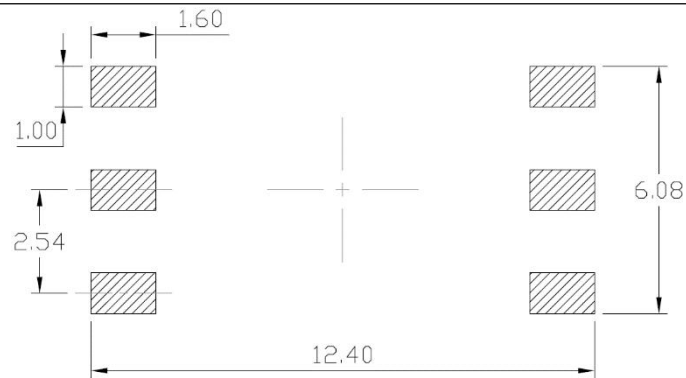


## RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

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

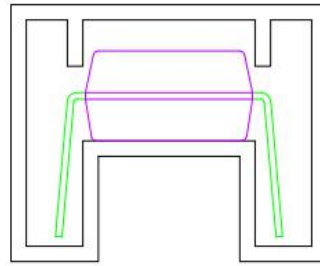
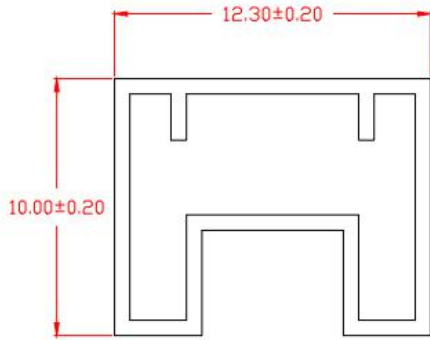


### Surface Mount (Gullwing) Lead Forming



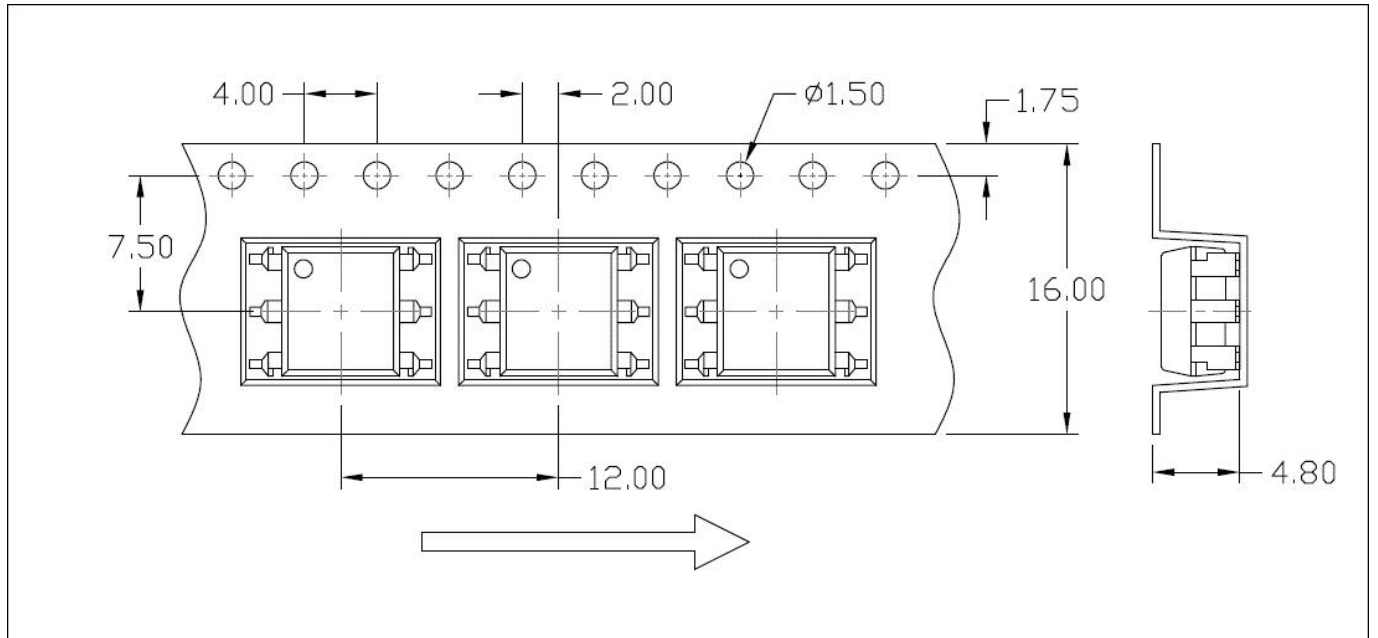
## TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

### Standard DIP

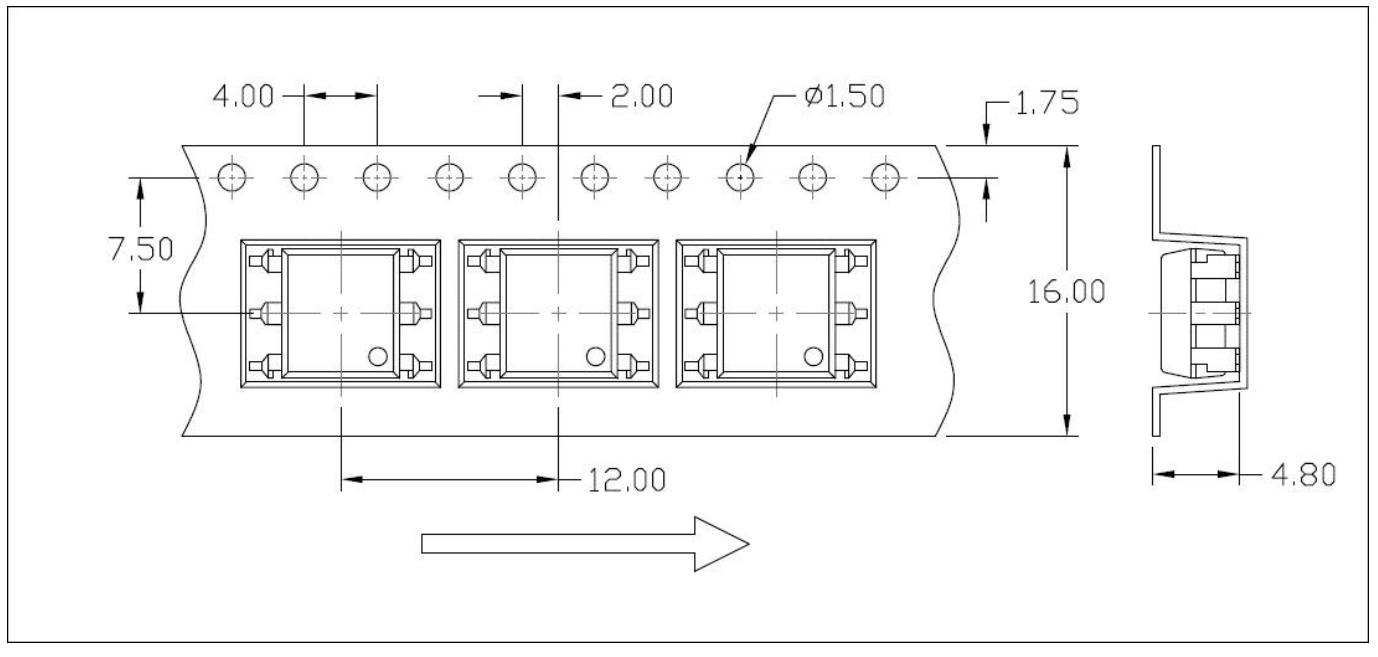


## CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

### Option S(T1) & SL(T1)

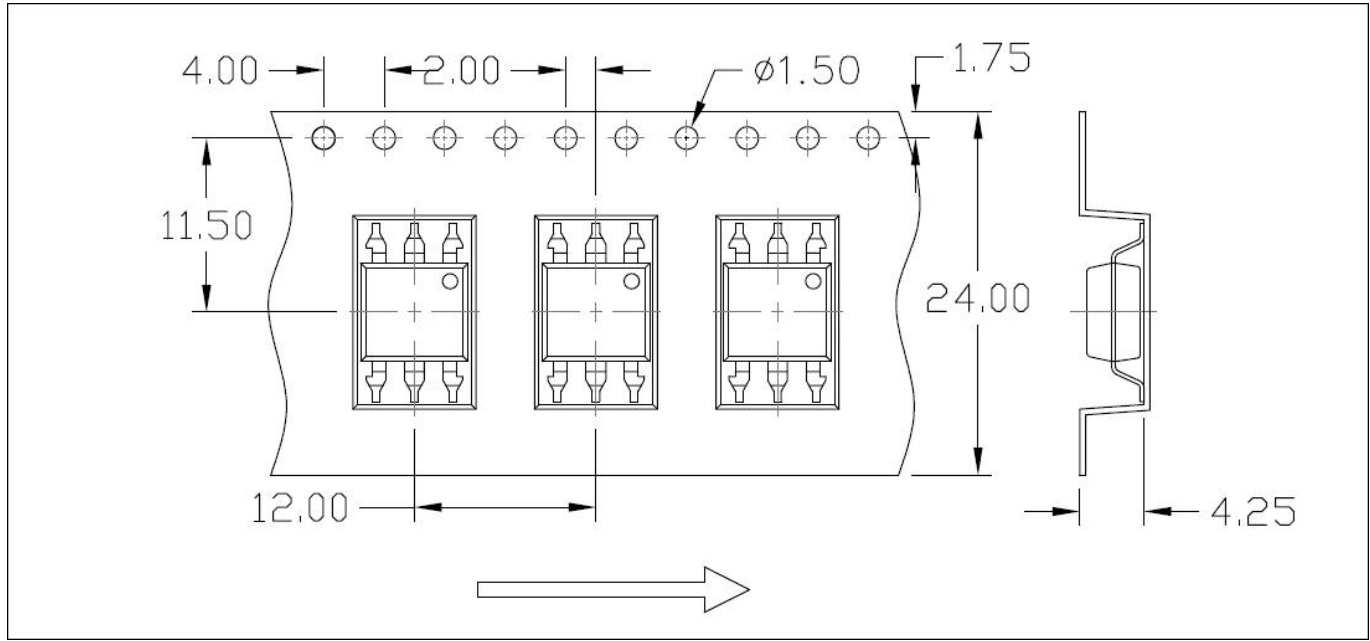


### Option S(T2) & SL(T2)

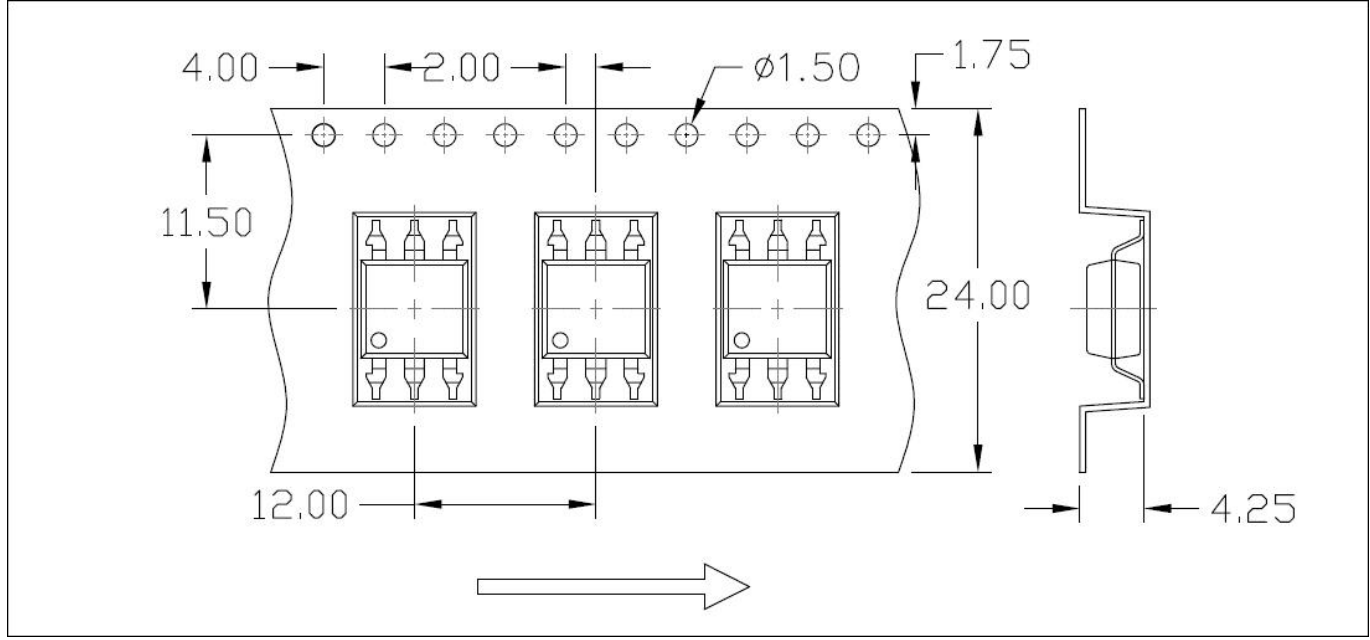


**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Option SLM(T1)**

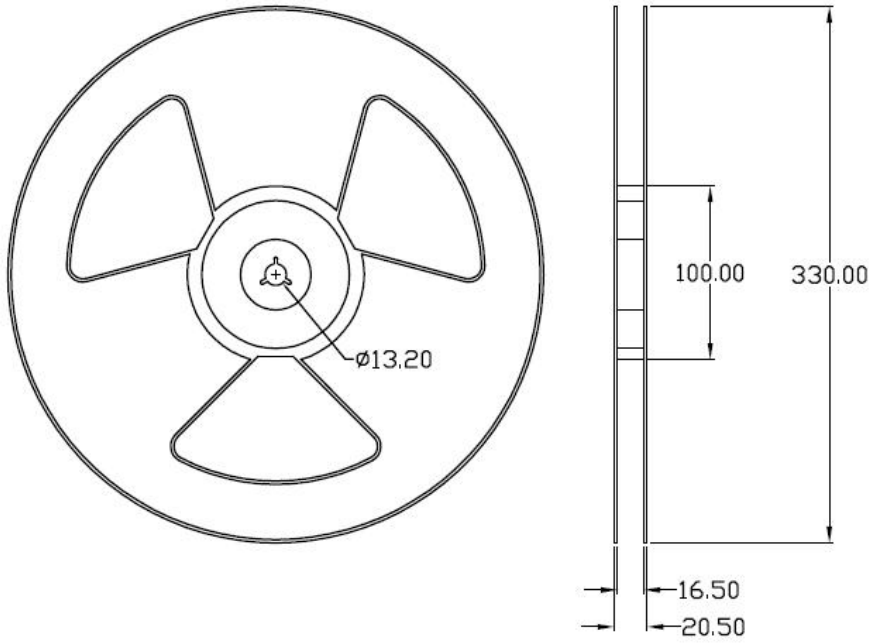


**Option SLM(T2)**

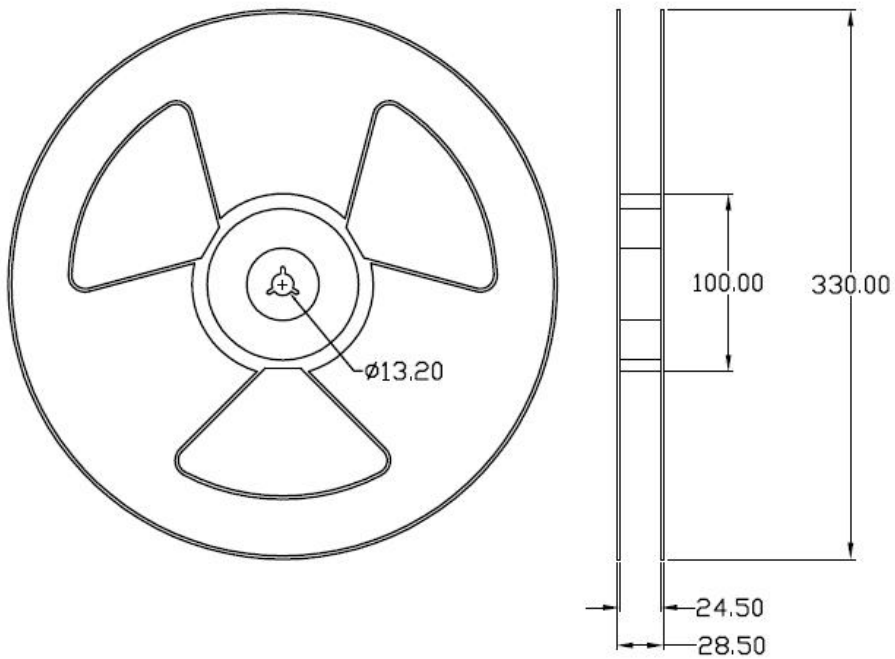


## REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

### Option S & Option SL

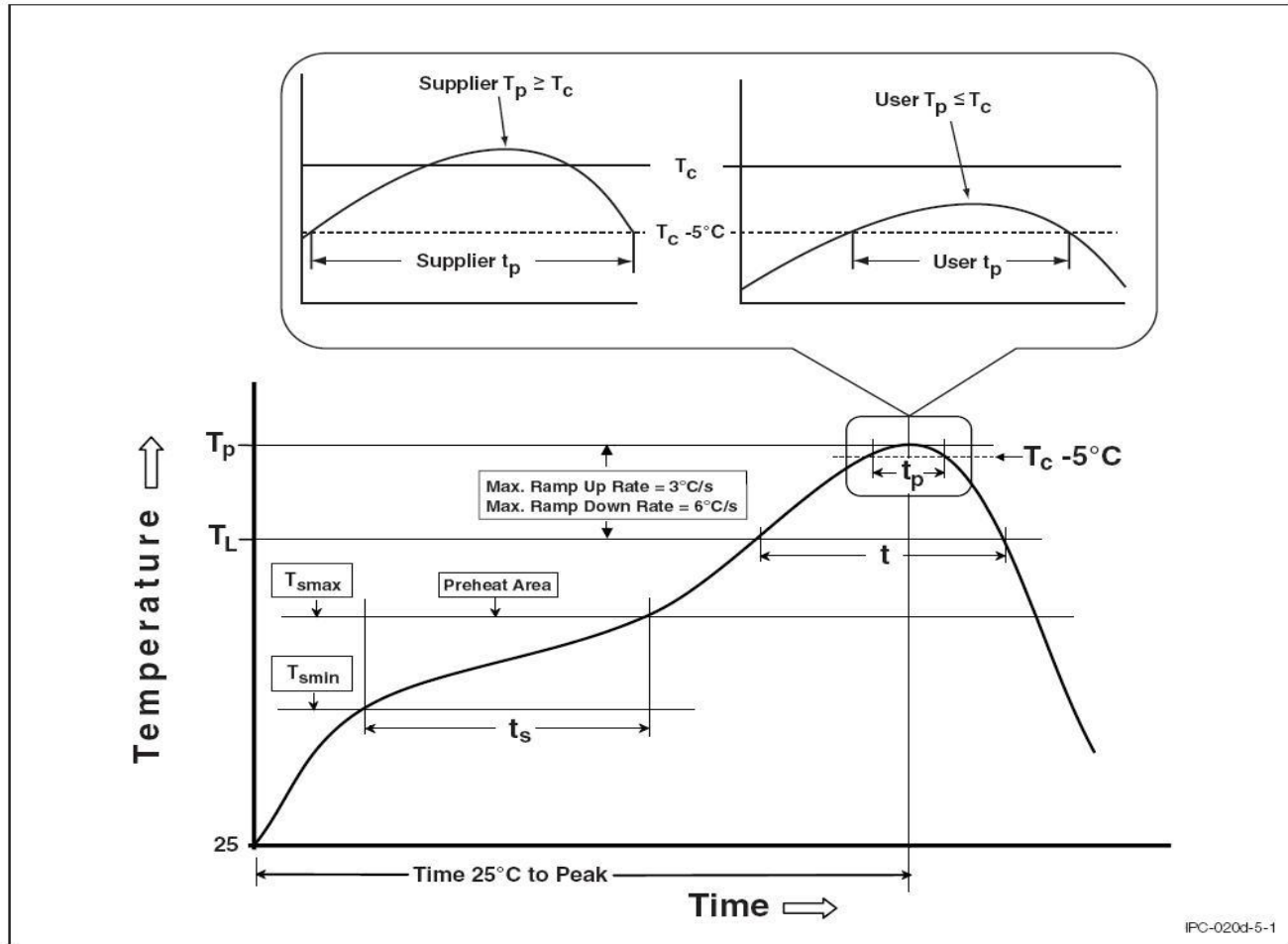


### Option SLM



## REFLOW INFORMATION

### REFLOW PROFILE



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T <sub>min</sub> )	100	150°C
Temperature Max. (T <sub>max</sub> )	150	200°C
Time (t <sub>s</sub> ) from (T <sub>min</sub> to T <sub>max</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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