

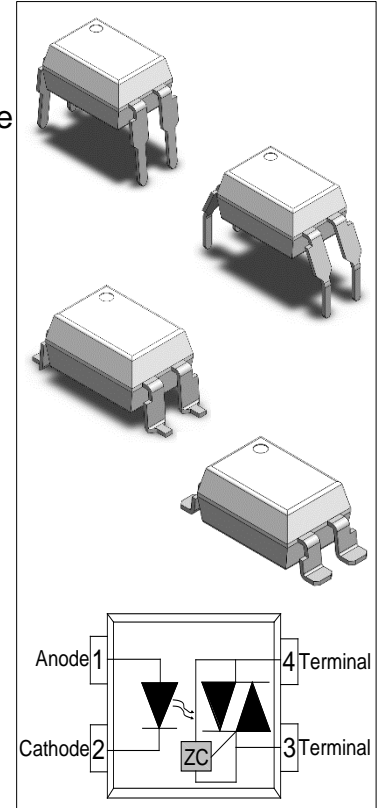


## JOC303XD4 Series

Rev.A.1.0

### DESCRIPTION:

The JOC303XD4 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon zero-cross photo triac in a plastic DIP4 and SMD package with different lead forming options. The products are widely used in solenoid/valve controls, lighting controls, motor controls, temperature controls, static AC power switches, solid state relays, interfacing microprocessors up to 120 V<sub>AC</sub> peripherals.



### MAIN FEATURES

- High isolation 5000 VRMS
- DC input with zero-cross photo triac output
- Operating temperature range -55 °C to 100 °C
- REACH & RoHS compliance
- HBM: H3A ; MM: M4
- CQC approved
- VDE approved
- UL approved

### ABSOLUTE MAXIMUM RATINGS (Temperature=25°C)

Parameter		Symbol	Value	Unit
Input	Forward Current	I <sub>F</sub>	60	mA
	Reverse Voltage	V <sub>R</sub>	6	V
	Junction Temperature	T <sub>j</sub>	125	°C
	Input Power Dissipation	P <sub>I</sub>	100	mW
	Power Dissipation Derating (T <sub>a</sub> ≥ 25 °C)	Δ P <sub>D</sub> /°C	-1.33	mW/°C
Output	Off-state Output Terminal Voltage	V <sub>OFF</sub>	250	V
	Peak On-state Current (100μs pulse, 120 pps)	I <sub>TP</sub>	2	A
	On-state RMS Current	I <sub>T(RMS)</sub>	100	mA
	Peak Repetitive Surge Current (P <sub>W</sub> =10 ms)	I <sub>TSM</sub>	1	A
	Junction Temperature	T <sub>j</sub>	125	°C
	Output Power Dissipation	P <sub>O</sub>	250	mW

	Power Dissipation Derating ( $T_a \geq 25^\circ\text{C}$ )	$\Delta P_D / ^\circ\text{C}$	-3.33	mW/ $^\circ\text{C}$
Total Power Dissipation		$P_{\text{tot}}$	350	mW
Isolation Voltage		$V_{\text{iso}}$	5000 <sup>①</sup>	V <sub>rms</sub>
Operating Temperature		$T_{\text{opr}}$	-55~100	$^\circ\text{C}$
Storage Temperature		$T_{\text{stg}}$	-55~125	$^\circ\text{C}$
Soldering Temperature		$T_{\text{sol}}$	260 <sup>②</sup>	$^\circ\text{C}$

**NOTE1:** AC for 1minute, R.H.=40~60%

**NOTE2:** For 10 seconds

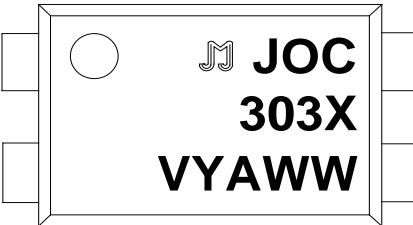
**ELECTRICAL CHARACTERISTICS** (Temperature=25 $^\circ\text{C}$ )

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage	$V_F$	$I_F=10\text{mA}$	-	1.27	2.2	V
	Reverse Current	$I_R$	$V_R=6\text{V}$	-	-	1	$\mu\text{A}$
	Input Capacitance	$C_{\text{in}}$	$V=0, f=1\text{kHz}$	-	10	-	pF
Output	Peak Off-state Current, Either Direction	$I_{\text{OFF}}$	$V_{\text{OFF}}=250\text{V}, I_F=0$	-	-	100 <sup>③</sup>	nA
	Peak On-state Voltage, Either Direction	$V_{\text{TM}}$	$I_{\text{TM}}=100\text{mA}$	-	1.7	2.5	V
	Critical Rate of Rise of Off-state voltage	dV/dt	$V_{\text{PEAK}}=250\text{V}, I_F=0$	1000 <sup>④</sup>	-	-	V/ $\mu\text{s}$
Transfer Characteristics	LED Trigger Current	JOC3031D4	Terminal Voltage=3V $I_{\text{TM}}=100\text{mA}$	-	-	15	mA
		JOC3032D4		-	-	10	
		JOC3033D4		-	-	5	
	Holding Current	$I_H$	$I_{\text{TM}}=2\text{mA}, I_F=\text{Rated } I_{\text{FT}}$	-	250	-	$\mu\text{A}$
	Isolation Resistance	$R_{\text{ISO}}$	DC500V 40~60%R.H.	$10^{12}$	$10^{14}$	-	$\Omega$
	Floating Capacitance	$C_{\text{IO}}$	$V=0, f=1\text{MHz}$	-	10	-	pF
Response Time	$t_{\text{on}}$	$V_D=6\text{V}, R_L=100\Omega, I_F=20\text{mA}$	-	15	50	$\mu\text{s}$	
Zero-crossing Characteristics	Inhibit Voltage	$V_{\text{IH}}$	$I_F=\text{Rated } I_{\text{FT}}$	-	-	20	V
	Leakage in Inhibited State	$I_{\text{OFF}2}$	$I_F=\text{Rated } I_{\text{FT}}, V_{\text{OFF}}=\text{Rated } V_{\text{OFF}}$	-	-	1	mA

**NOTE3:** Test voltage must be applied within dV/dt ratings.

**NOTE4:** Refer to Fig.14 & Fig.15

**ORDERING AND MARKING INFORMATION**

<b>MARKING INFORMATION</b>			
		<p>JOC : Company Abbr.                      303X : Part Number &amp; Rank                      V : VDE Option                      Y : Fiscal Year                      A : Manufacturing Code                      WW : Work Week</p>	
<b>ORDERING INFORMATION</b>			
<b>JOC303XD4(Y)(Z)-GV</b>			
<p>JOC – Company Abbr.                      303X – Part Number                      (1/2/3)                      D4 – DIP4 Package                      Y – Lead Form Option (M/S/SL/None)                      Z – Tape and Reel Option (T1/T3)                      G – Green                      V – VDE Option (V or None)</p>			
<b>Packing Quantity</b>			
Option	Quantity	Quantity – Inner box	Quantity –Outer box
None	100 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box =32k Units
M	100 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box =32k Units
S (T1)	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box =22.5k Units
SL(T1)	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box =22.5k Units
SL(T3)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box =15k Units

Characteristics Curves

FIG.1: Forward Current vs. Ambient Temperature

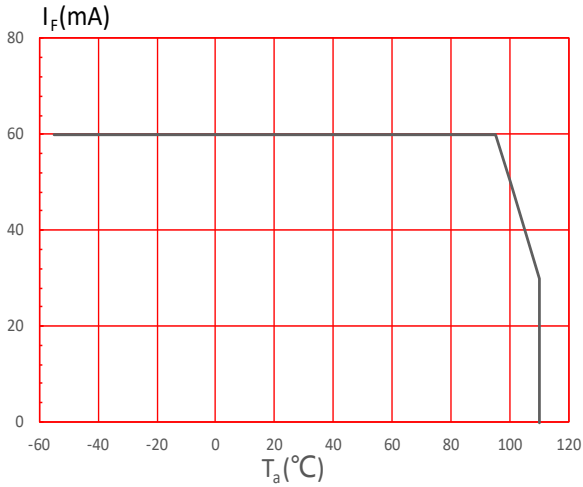


FIG.2: On-state Terminal Current vs. Ambient Temperature

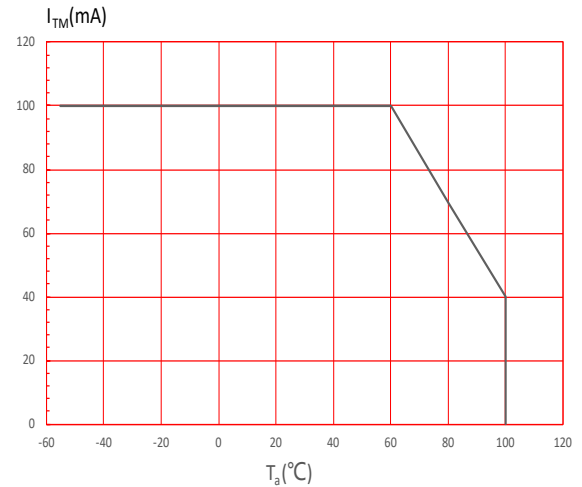


FIG.3: Forward Current vs. Forward Voltage

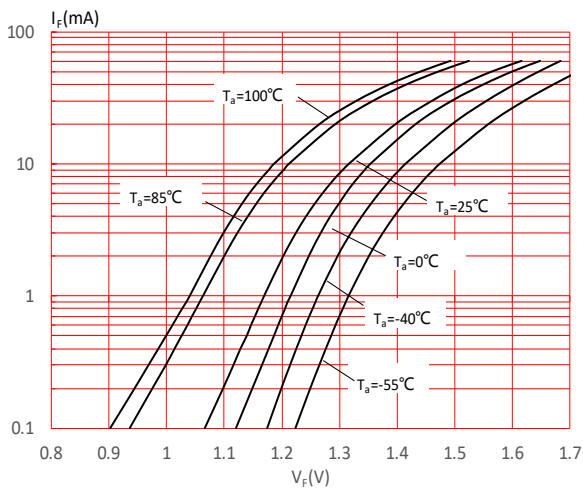


FIG.4: Normalized Off-state Terminal Current vs. Ambient Temperature

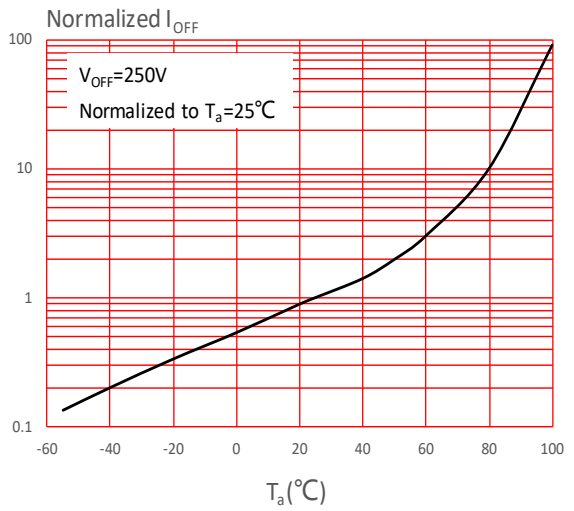


FIG.5: Normalized Off-state Terminal Voltage vs. Ambient Temperature

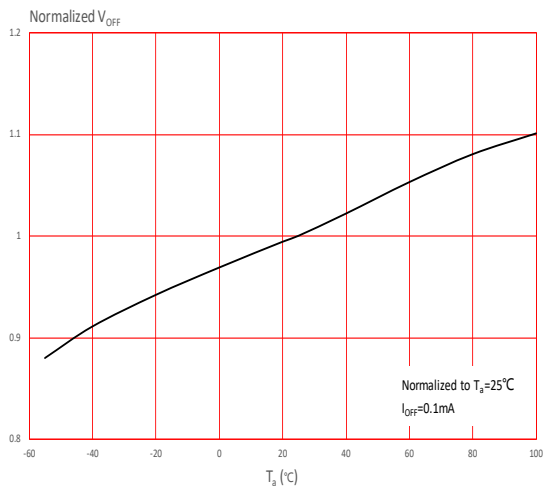
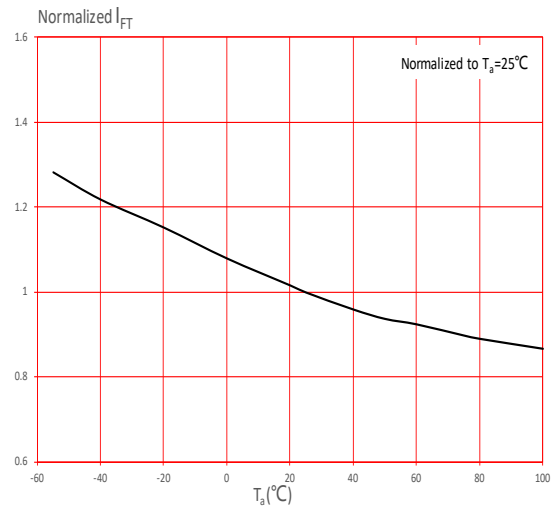
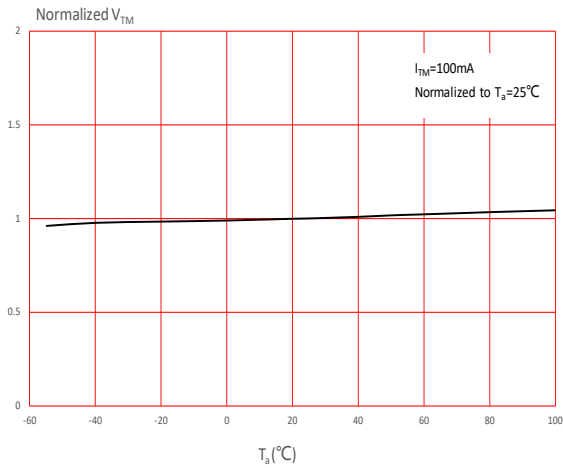


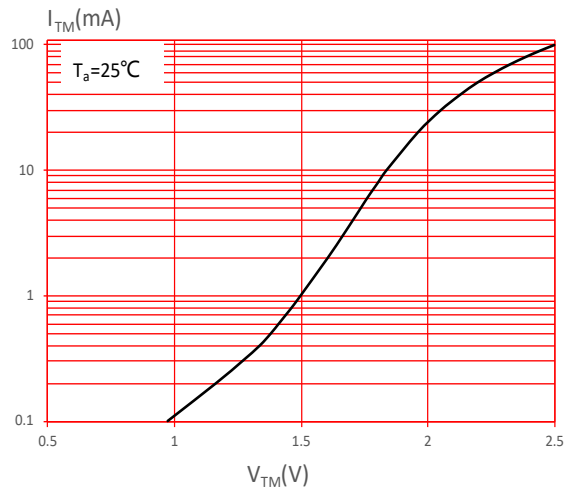
FIG.6: Normalized Trigger Current vs. Ambient Temperature



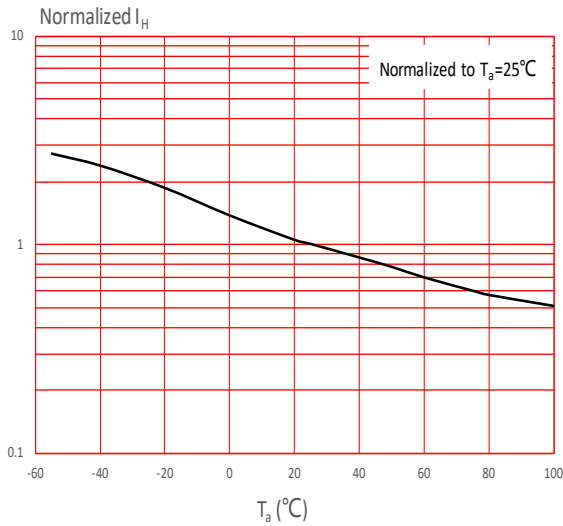
**FIG.7:** Normalized On-state Terminal Voltage vs. Ambient Temperature



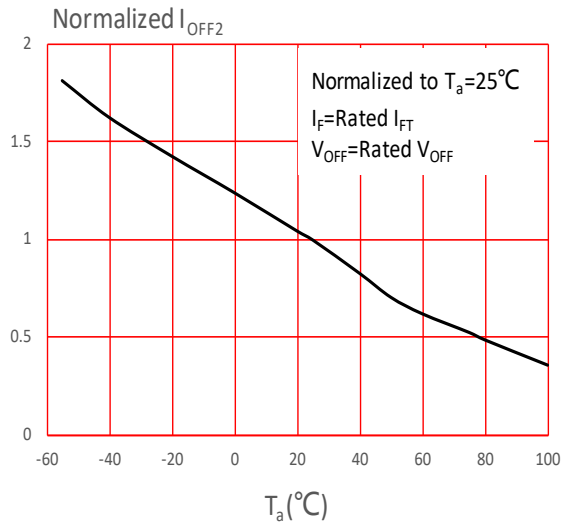
**FIG.8:** On-state Terminal Voltage vs. On-state Terminal Current



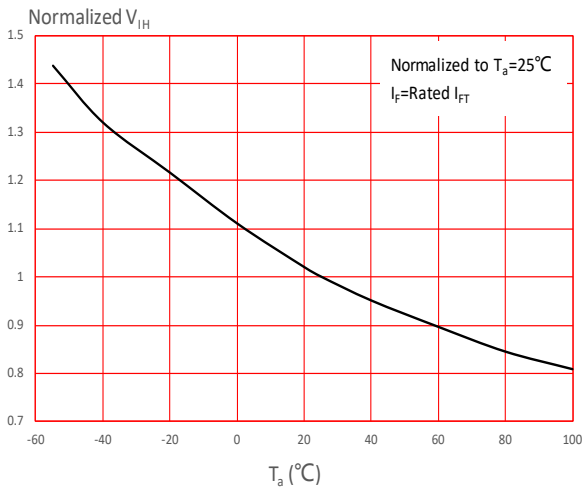
**FIG.9:** Normalized Holding Current vs. Ambient Temperature



**FIG.10:** Normalized Leakage in Inhibit State vs. Ambient Temperature



**FIG.11:** Normalized Inhibit Voltage vs. Ambient Temperature



TEST CIRCUITS

FIG.12: Test Circuits of Turn On Time

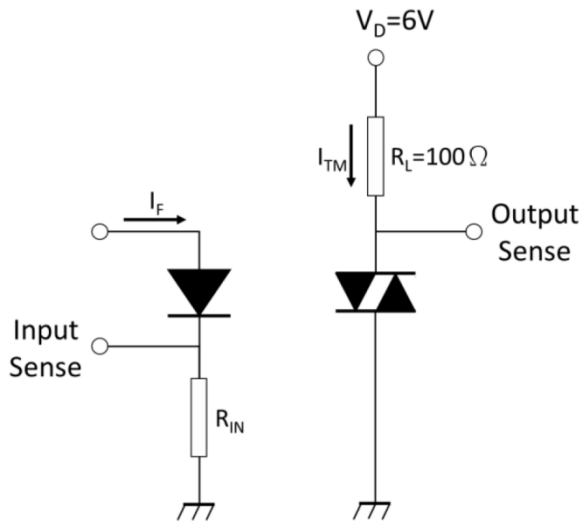


FIG.13: Waveforms of Turn On Time

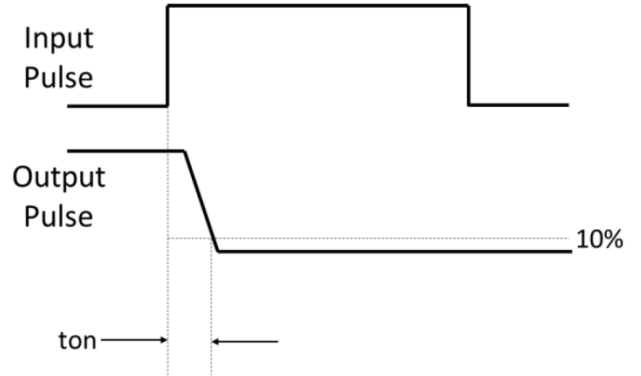


Fig.14: Test Circuits of dV/dt

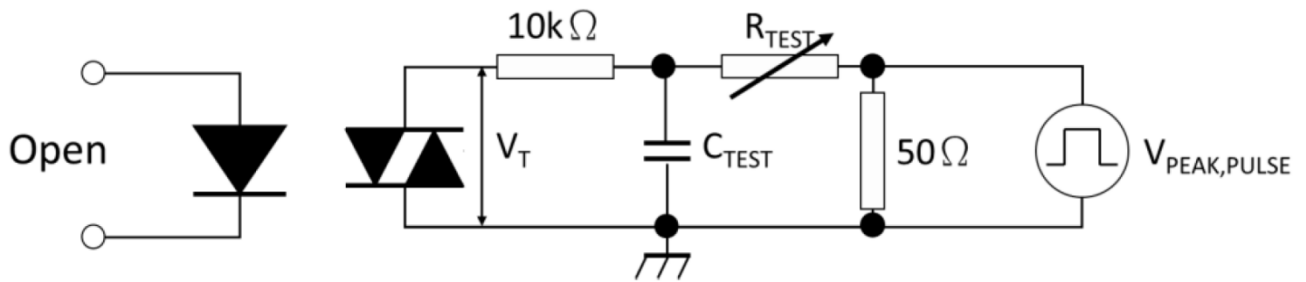
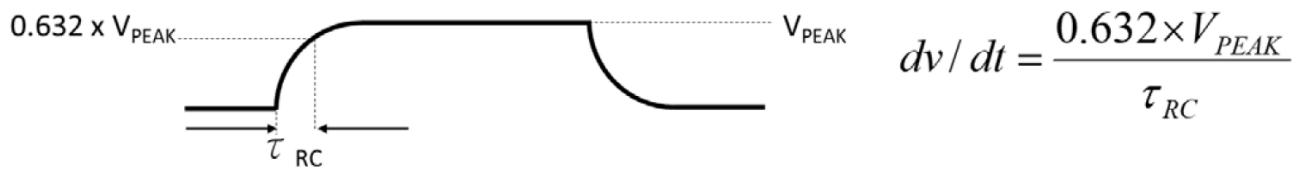
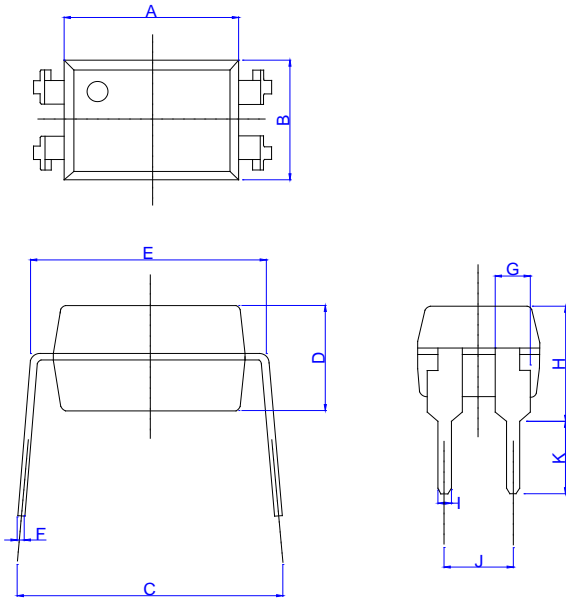


Fig.15: Waveforms of dV/dt



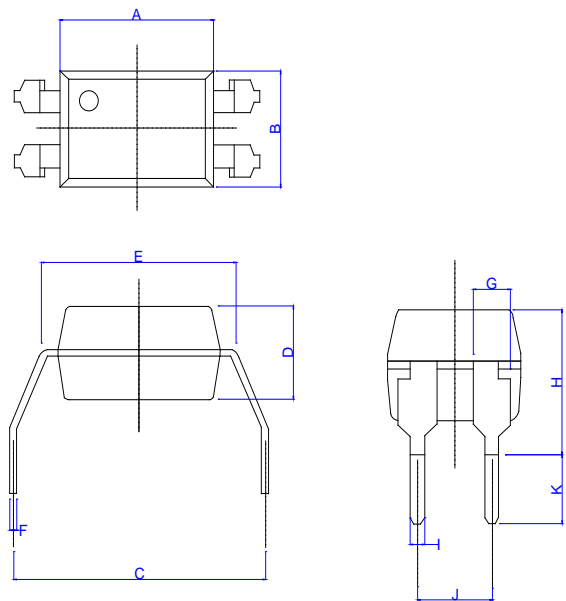
Package Dimension (Unit: mm)

Standard DIP Type:



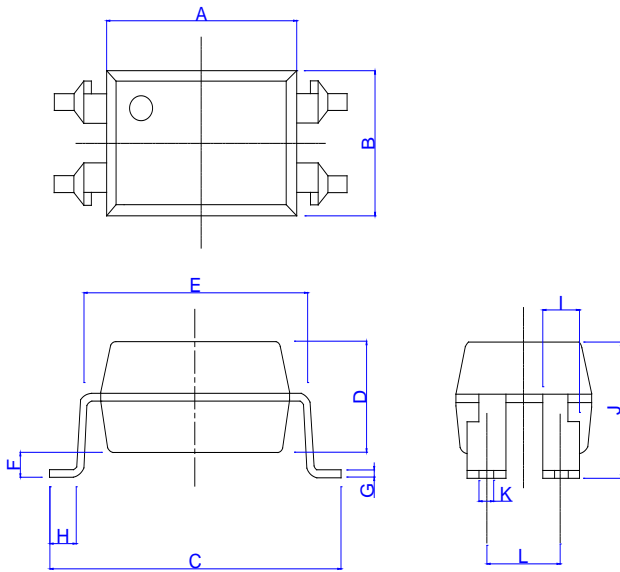
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	4.38		4.78	0.173		0.189
C	7.62		9.50	0.301		0.375
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.25			0.010	
G	1.20		1.40	0.047		0.055
H	4.20		4.80	0.166		0.190
I		0.50			0.020	
J		2.54			0.100	
K		2.80			0.111	

Option M Type:



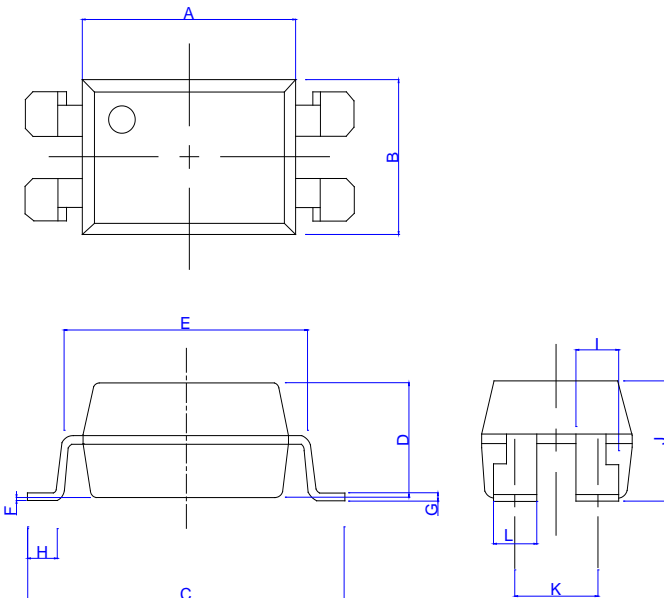
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	4.38		4.78	0.173		0.189
C	9.86		10.46	0.390		0.413
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.25			0.010	
G	1.20		1.40	0.047		0.055
H	4.28		4.88	0.169		0.193
I		0.50			0.020	
J		2.54			0.100	
K		2.20			0.087	

**Option S Type:**



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	4.38		4.78	0.173		0.189
C	9.85		10.45	0.389		0.413
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.80			0.032	
G		0.25			0.010	
H		0.80			0.032	
I	1.20		1.40	0.047		0.055
J	4.00		4.60	0.158		0.182
K		0.50			0.020	
L		2.54			0.100	

**Option SL Type:**

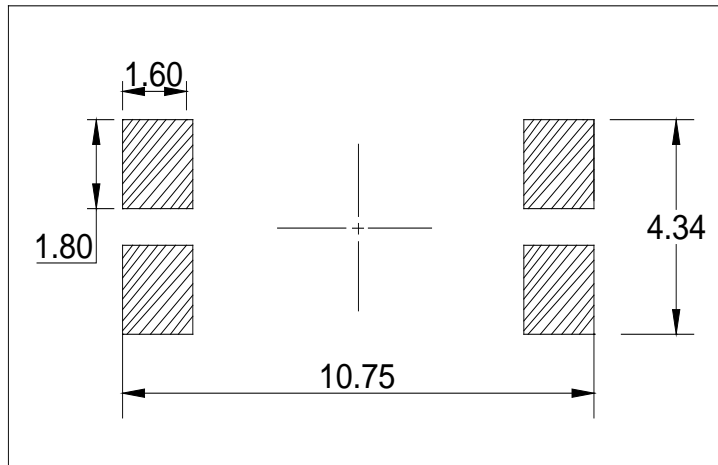


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	4.38		4.78	0.274		0.289
C	9.85		10.45	0.389		0.413
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.10			0.004	
G		0.25			0.010	
H		0.80			0.032	
I	1.20		1.40	0.047		0.055
J	3.30		3.90	0.130		0.154
K		2.54			0.100	
L		1.30			0.051	



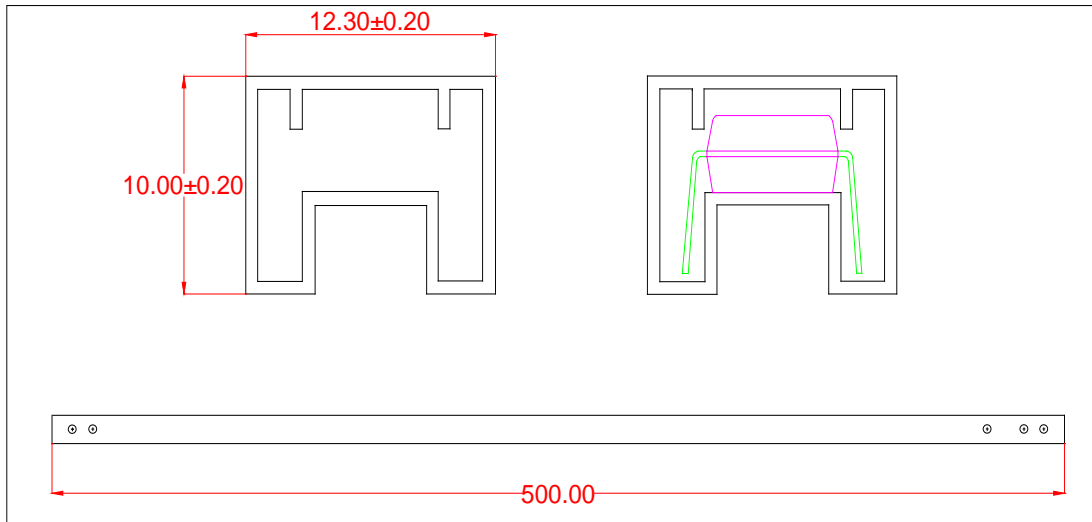
RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

Option S/SL

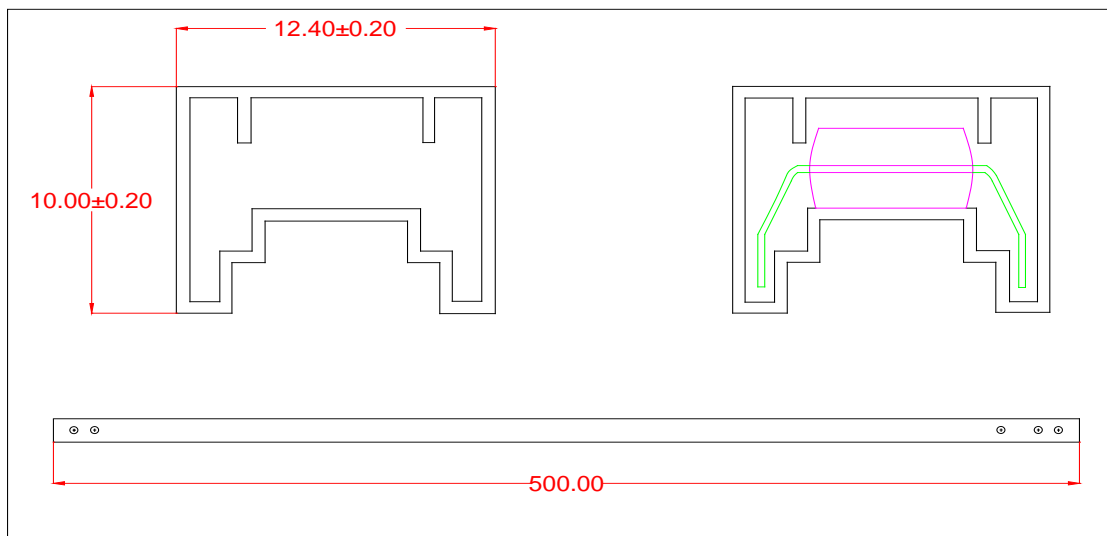


**TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

**Standard DIP**

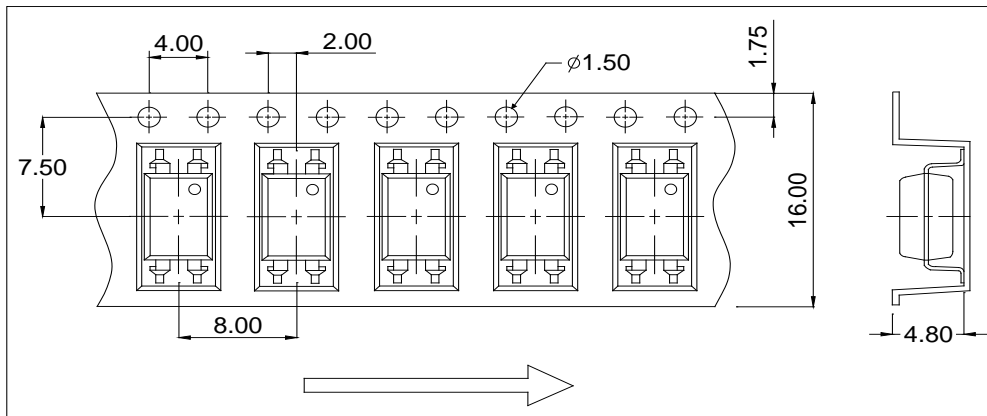


**Option M**

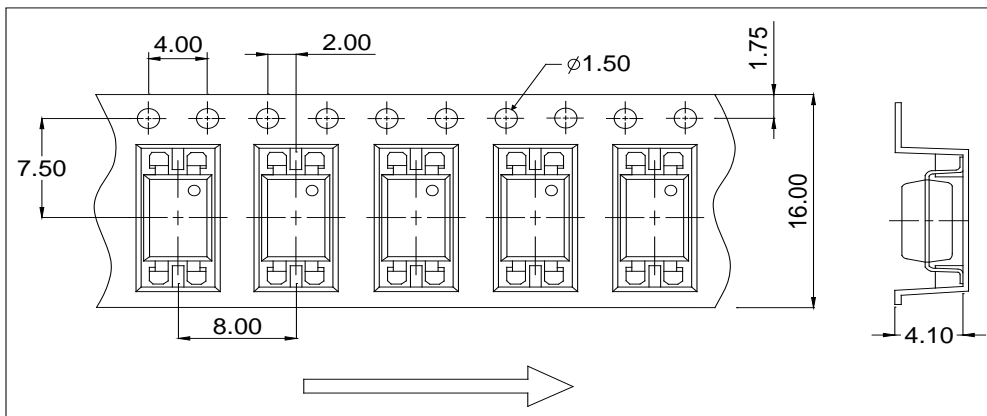


**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

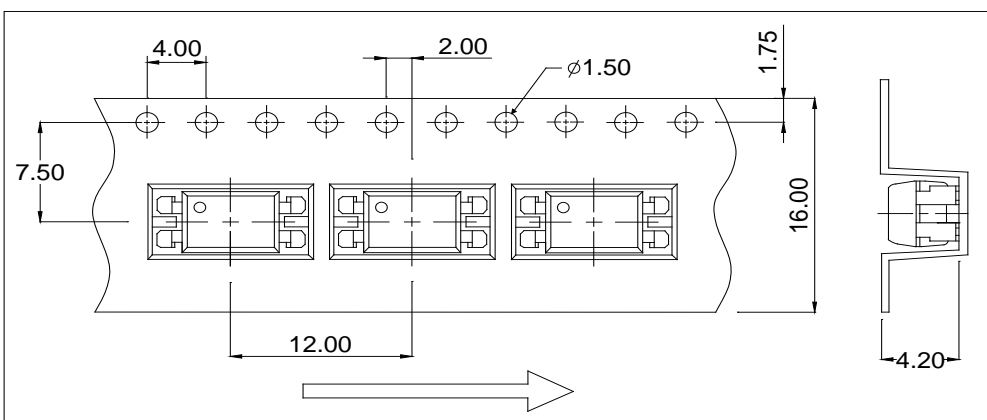
**Option S(T1)**



**Option SL(T1)**

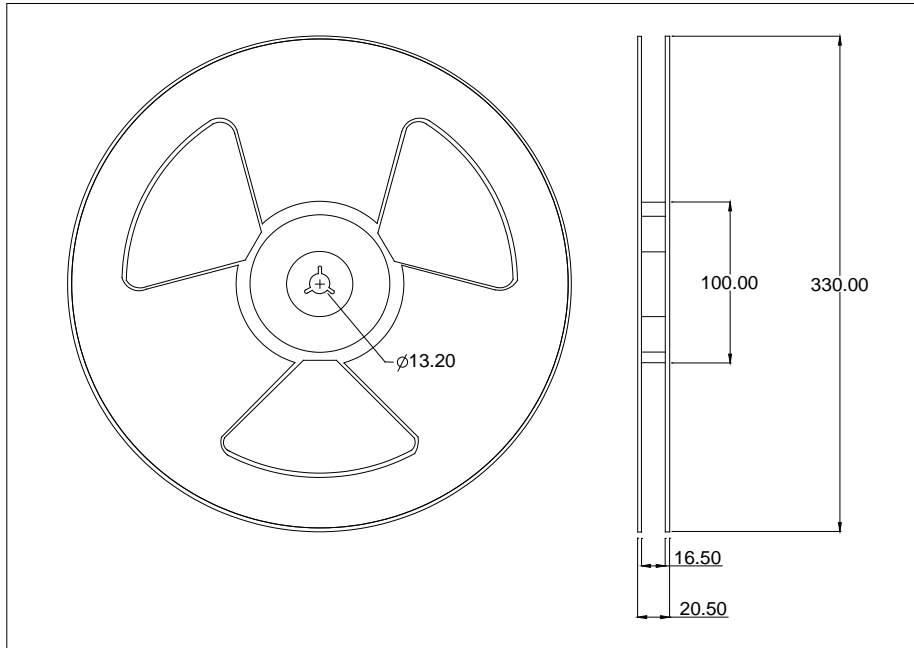


**Option SL(T3)**

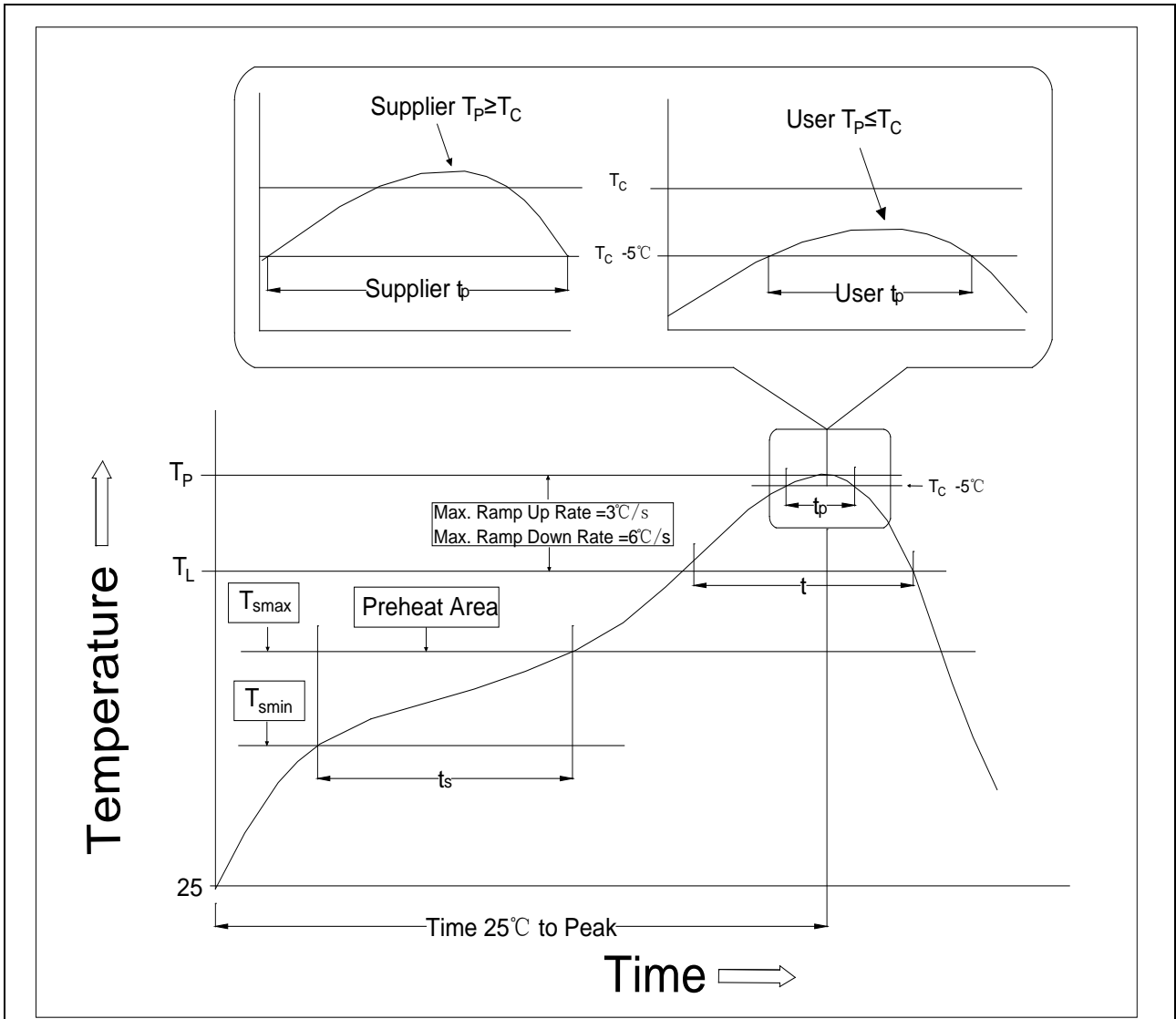


REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option SL

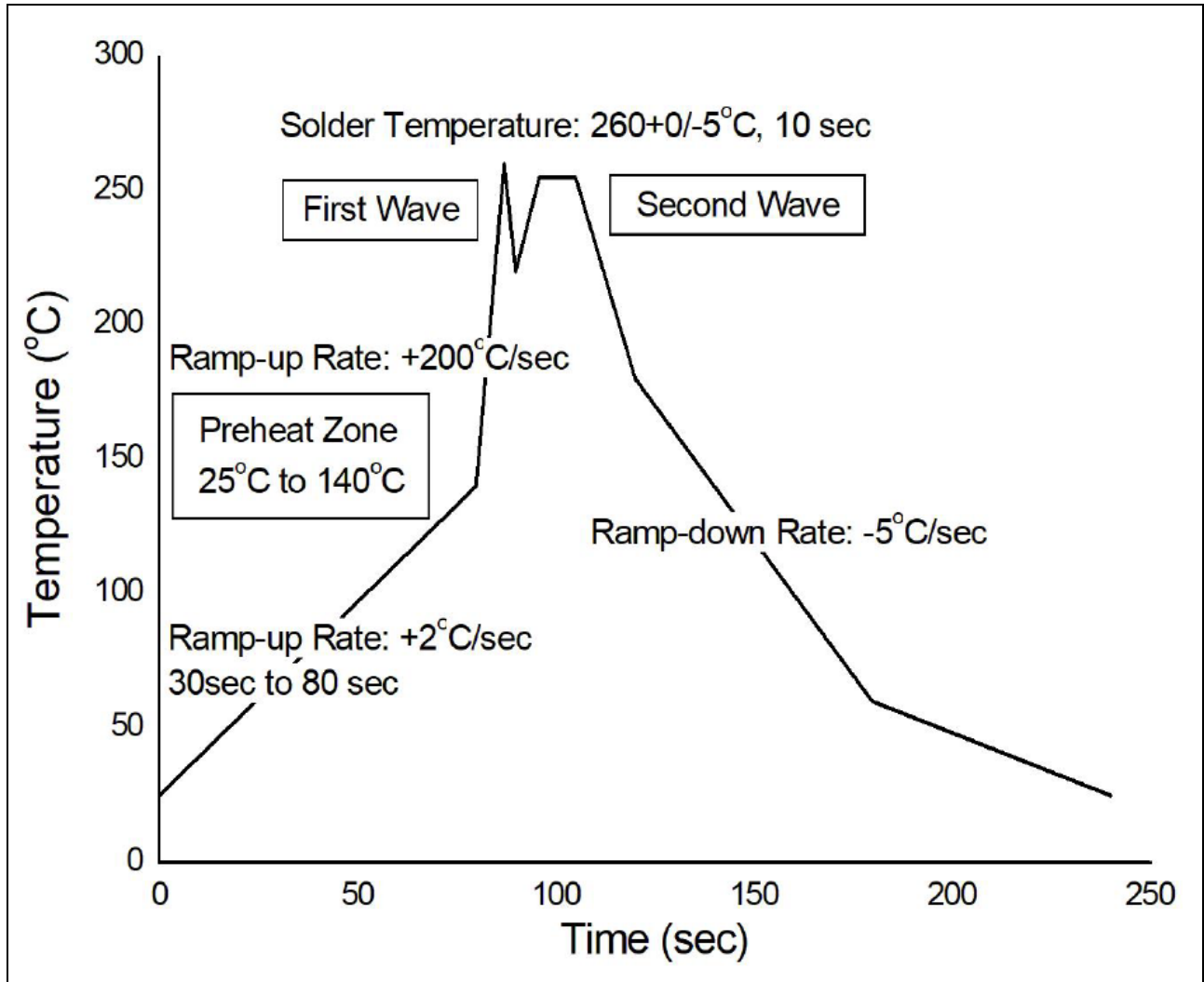


**REFLOW INFORMATION**



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

**WAVE SOLDERING**




**HAND SOLDERING BY SOLDERING IRON**

Soldering Temperature	360±5°C
Soldering Time	3s max.

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