

## JOC304XM4 Series

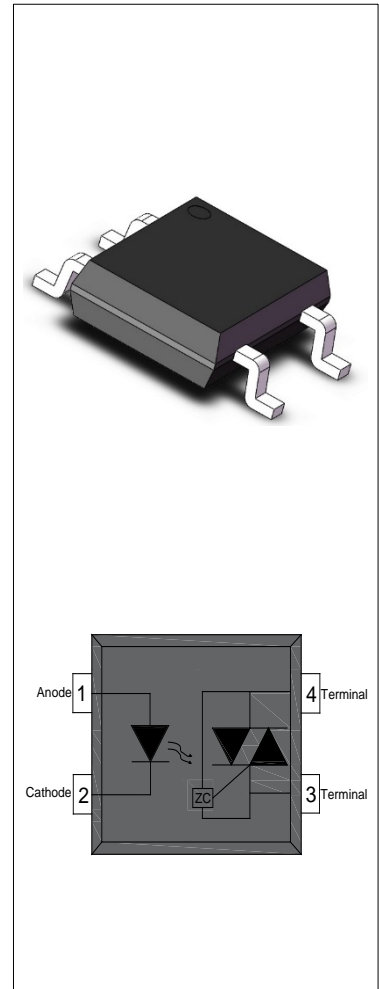
Rev.A.1.0

### DESCRIPTION:

The JOC304XM4 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 SOP4 package. With the robust coplanar double mold structure, JOC304XM4 series provide the most stable isolation feature. The products are widely used in solenoid/value 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 3750 VRMS
- DC input with zero-cross photo triac output
- Operating temperature range -55 °C to 100 °C
- REACH compliance
- Halogen free
- MSL class 1
- 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>	400	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 ( $P_W=10$ ms)	$I_{TSM}$	1	A
	Junction Temperature	$T_j$	125	$^{\circ}C$
	Output Power Dissipation	$P_O$	250	mW
	Power Dissipation Derating ( $T_a \geq 25^{\circ}C$ )	$\Delta P_D/^{\circ}C$	-3.33	mW/ $^{\circ}C$
Total Power Dissipation		$P_{tot}$	350	mW
Isolation Voltage		$V_{iso}$	3750 <sup>①</sup>	$V_{rms}$
Operating Temperature		$T_{opr}$	-55~100	$^{\circ}C$
Storage Temperature		$T_{stg}$	-55~150	$^{\circ}C$
Soldering Temperature		$T_{sol}$	260 <sup>②</sup>	$^{\circ}C$

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

**NOTE2**: For 10 seconds

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

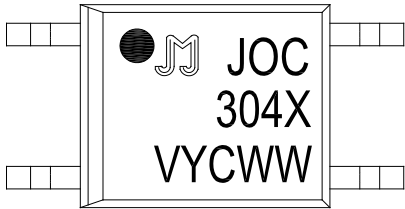
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	
Input	Forward Voltage	$V_F$	$I_F=10mA$	-	1.2	1.4	V	
	Reverse Current	$I_R$	$V_R=6V$	-	-	1	$\mu A$	
	Input Capacitance	$C_{in}$	$V=0, f=1kHz$	-	10	-	pF	
Output	Peak Off-state Current, Either Direction	$I_{OFF}$	$V_{OFF}=400V, I_F=0$	-	-	100 <sup>③</sup>	nA	
	Peak On-state Voltage, Either Direction	$V_{TM}$	$I_{TM}=100mA$	-	1.7	2.5	V	
	Critical Rate of Rise of Off-state voltage	dV/dt	$V_{PEAK}=400V, I_F=0$	1000 <sup>④</sup>	-	-	V/ $\mu s$	
Transfer Characteristics	LED Trigger Current	JOC3041M4	Terminal Voltage=3V $I_{TM}=100mA$	-	-	15	mA	
		JOC3042M4		-	-	10		
		JOC3043M4		-	-	5		
	Holding Current		$I_H$	$I_{TM}=2mA, I_F=Rated I_{FT}$	-	250	-	$\mu A$
	Isolation Resistance		$R_{ISO}$	DC500V 40~60%R.H.	$10^{12}$	$10^{14}$	-	$\Omega$
	Floating Capacitance		$C_{IO}$	$V=0, f=1MHz$	-	8	-	pF
	Response Time		$t_{on}$	$V_D=6V, R_L=100\Omega, I_F=20mA$	-	15	50	$\mu s$

Zero-Crossing Characteristics	Inhibit Voltage	$V_{IH}$	$I_{F=Rated} I_{FT}$	-	-	20	V
	Leakage in Inhibited State	$I_{OFF2}$	$I_{F=Rated} I_{FT}$ $V_{OFF=Rated} V_{OFF}$	-	-	5	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>			
	JOC : Company Abbr. 304X : Part Number & Rank V : VDE Option Y : Fiscal Year C : Manufacturing Code WW : Work Week		
<b>ORDERING INFORMATION</b>			
<b>JOC304MX(Z)-GV</b>			
JOC – Company Abbr. 304X – Rank (1/2/3) MX– SOP Package Z – Tape and Reel Option (T1) G – Green V – VDE Option (V or None)			
<b>Packing Quantity</b>			
<b>Option</b>	<b>Quantity</b>	<b>Quantity – Inner box</b>	<b>Quantity –Outer box</b>
T1	3000 Units/Reel	4 Reels/Inner box	5 Inner box/Outer box =60k Units

Characteristics Curves

FIG.1: Forward Current vs. Ambient Temperature

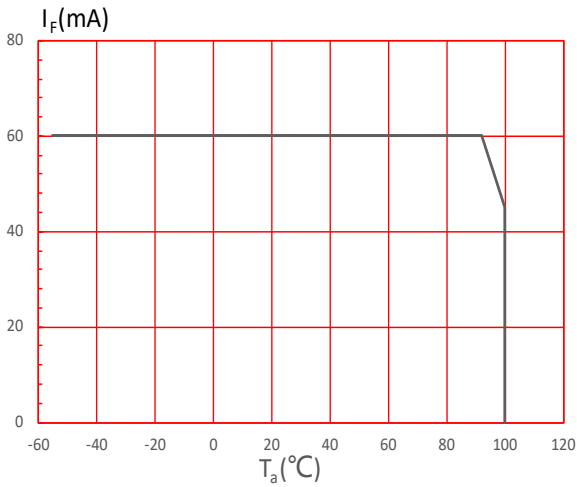


FIG.2: On-state Terminal Current vs. Ambient Temperature

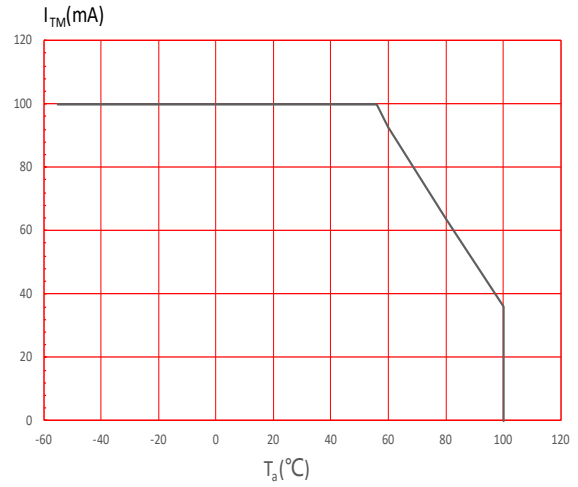


FIG.3: Forward Current vs. Forward Voltage

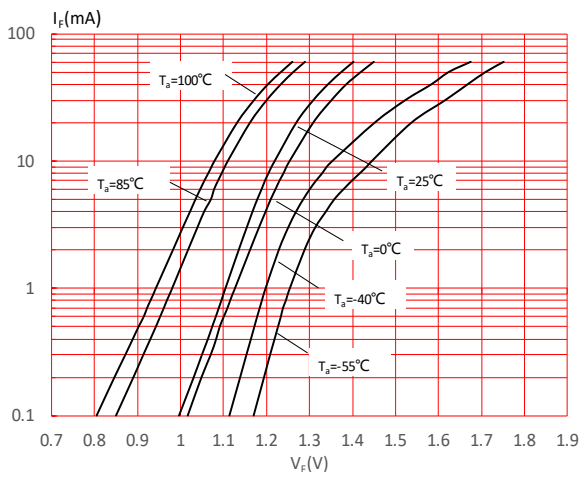


FIG.4: Normalized Off-state Terminal Current vs. Ambient Temperature

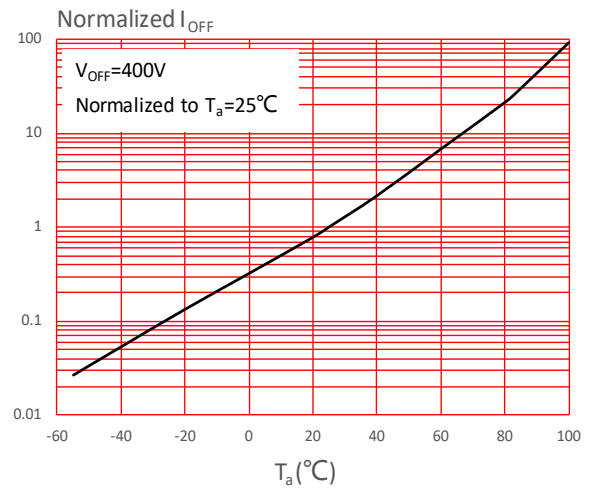


FIG.5: Normalized Off-state Terminal Voltage vs. Ambient Temperature

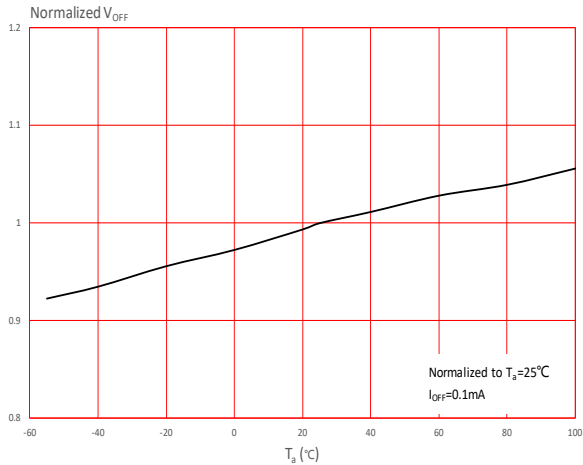
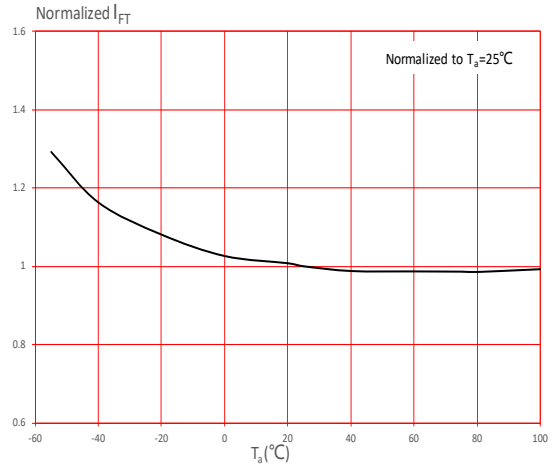
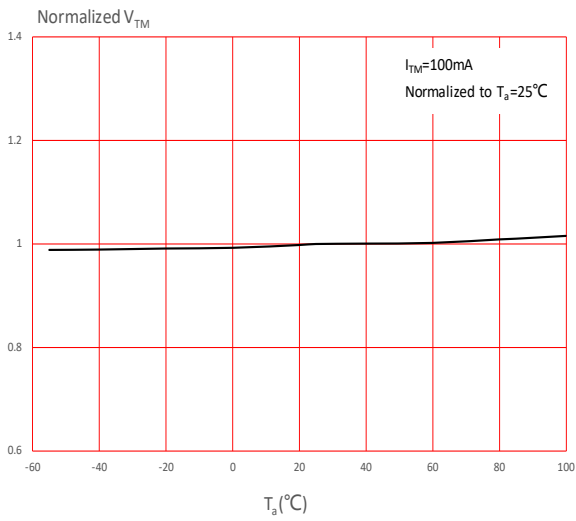


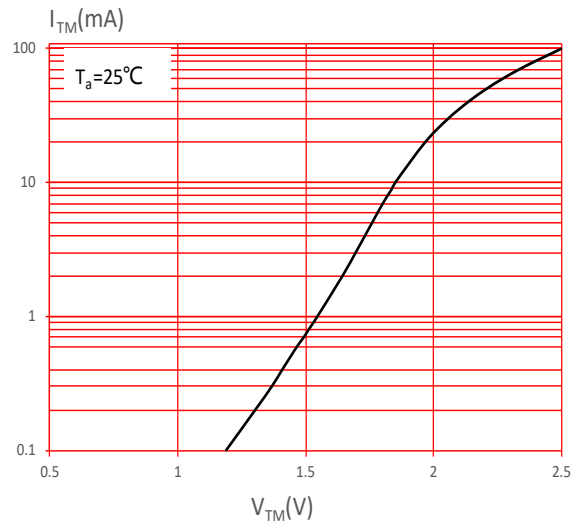
FIG.6: Normalized Trigger Current vs. Ambient Temperature



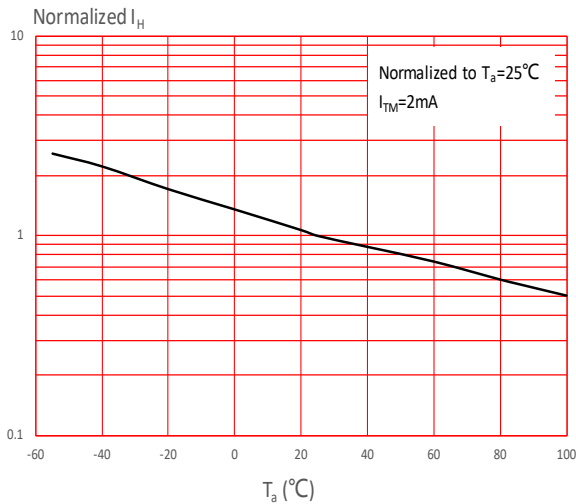
**FIG.7:** Normalized On-state Terminal Voltage vs. Ambient Temperature



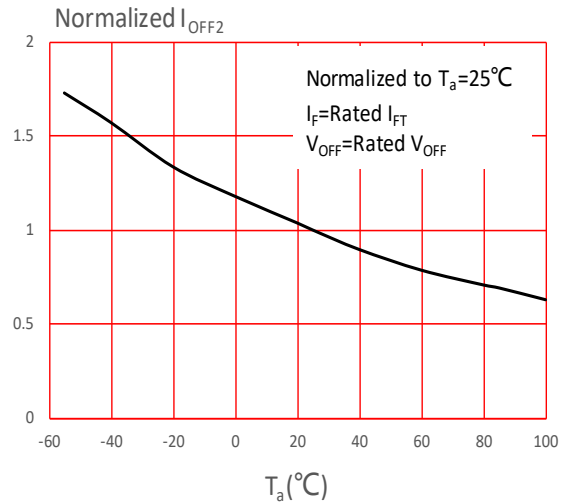
**FIG.8:** On-state Terminal Voltage vs. On-state Terminal Current



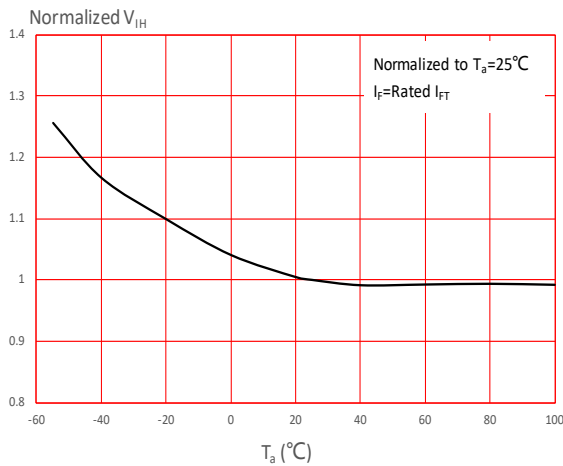
**FIG.9:** Normalized Holding Current vs. Ambient Temperature



**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

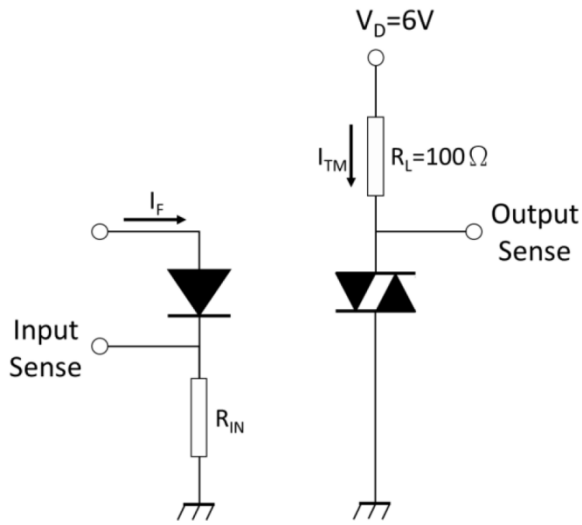


FIG.13: Waveforms of Turn On Time



Fig.14: Test Circuits of dV/dt

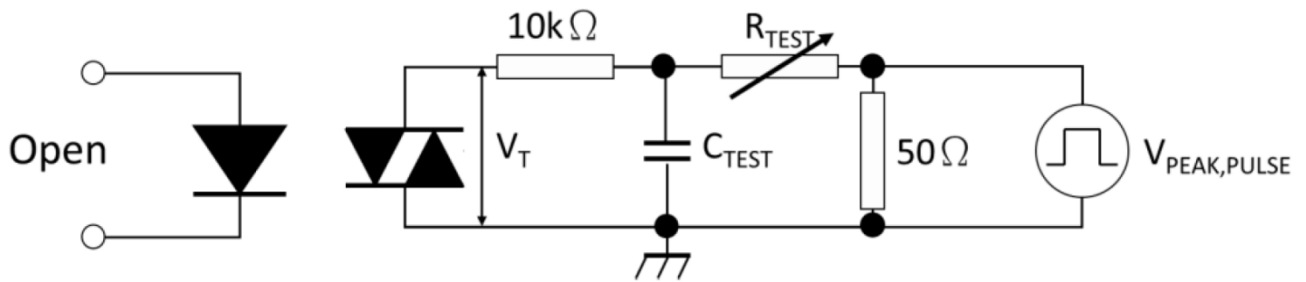
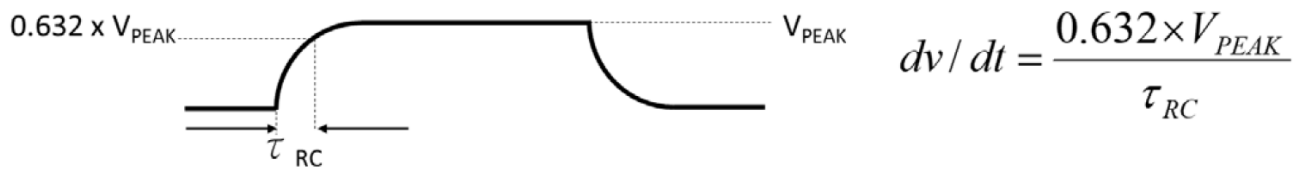
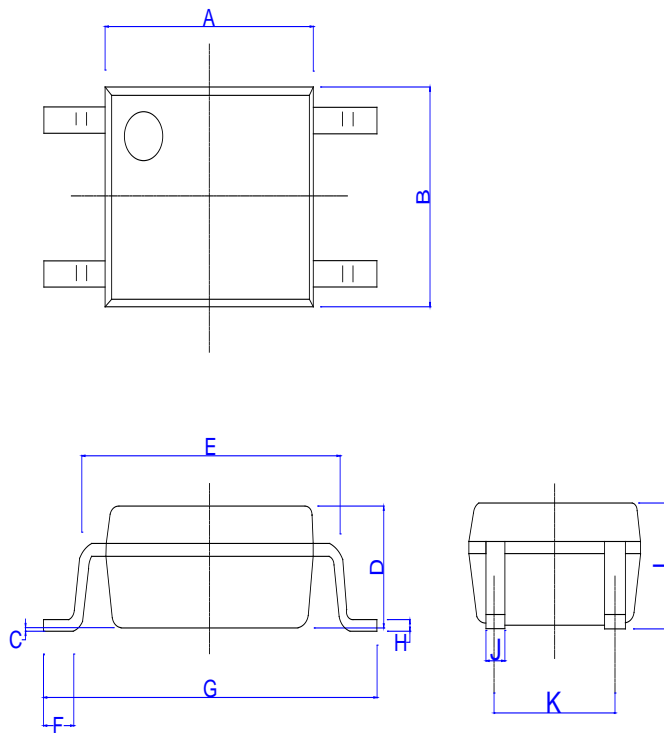


Fig.15: Waveforms of dV/dt

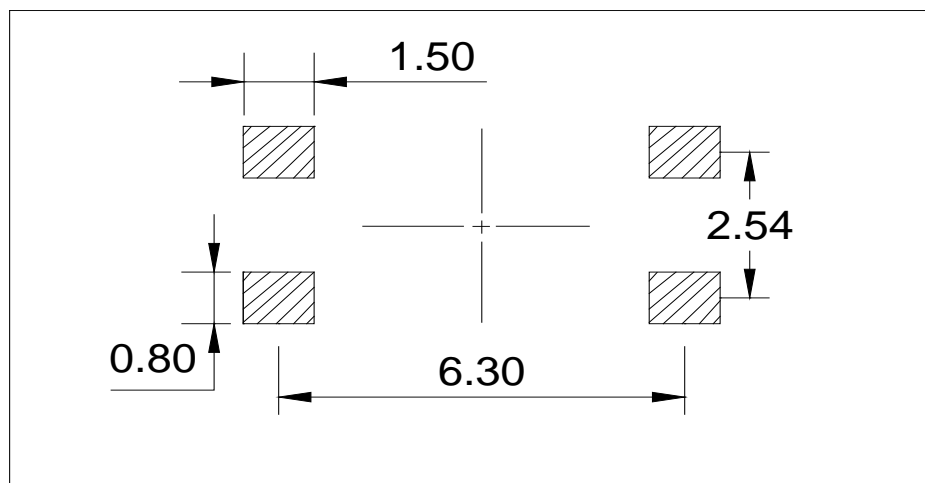


Package Dimension (Unit: mm)



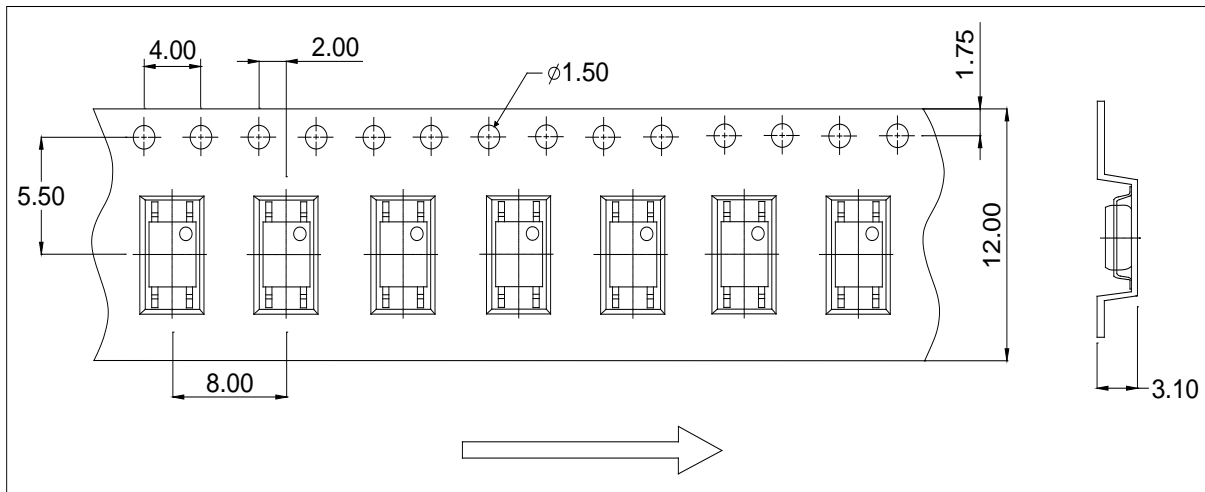
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.20		4.60	0.166		0.182
B	3.30		3.90	0.130		0.154
C		0.10			0.004	
D	1.90		2.80	0.075		0.110
E	4.90		5.60	0.194		0.220
F		0.50			0.020	
G	6.30		7.30	0.248		0.289
H		0.20			0.008	
I		2.70			0.106	
J		0.40			0.016	
K		2.54			0.100	

RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)



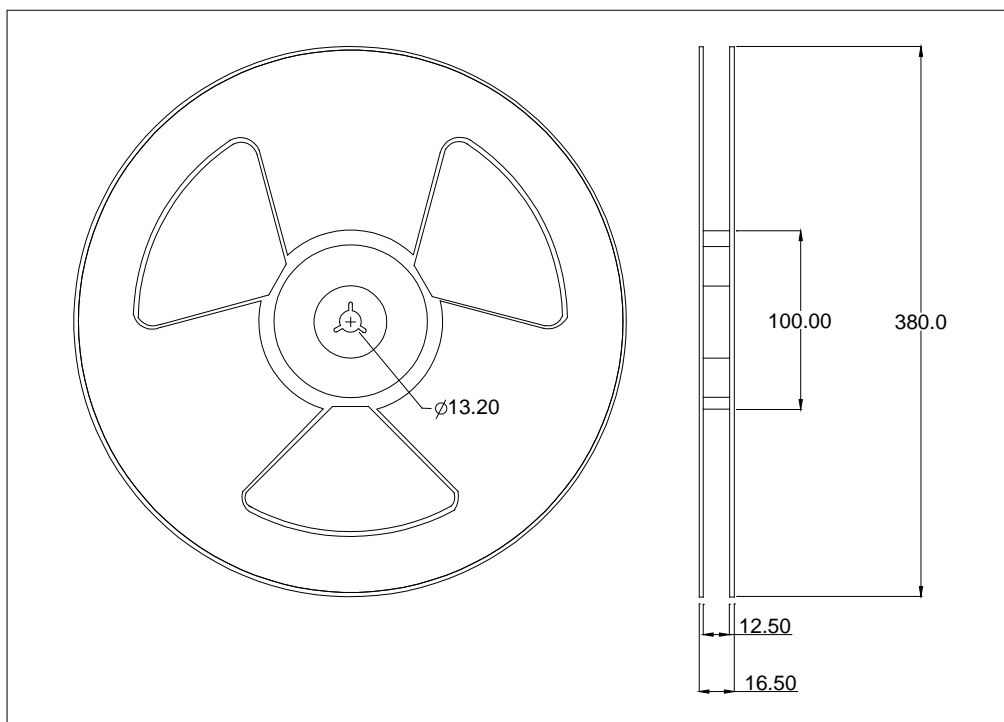
**CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

Option T1



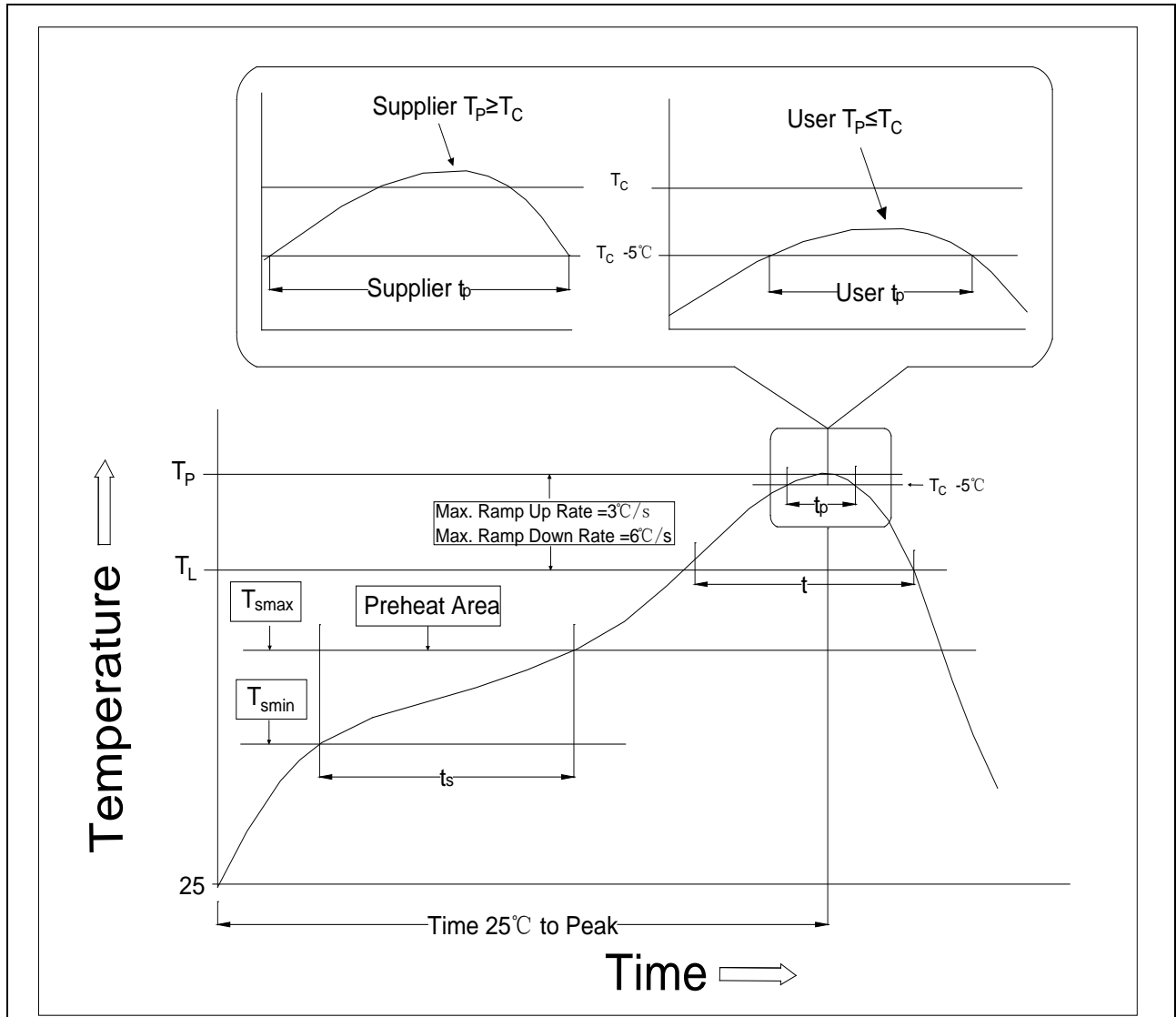
**REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)**

Option T1






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.

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