



JOC304XD4 Series

Rev.A.1.1

DESCRIPTION:

The JOC304XD4 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 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_{AC} peripherals.

MAIN FEATURES

High isolation 5000 VRMS

DC input with zero-cross photo triac output

Operating temperature range -55 °C to 100 °C

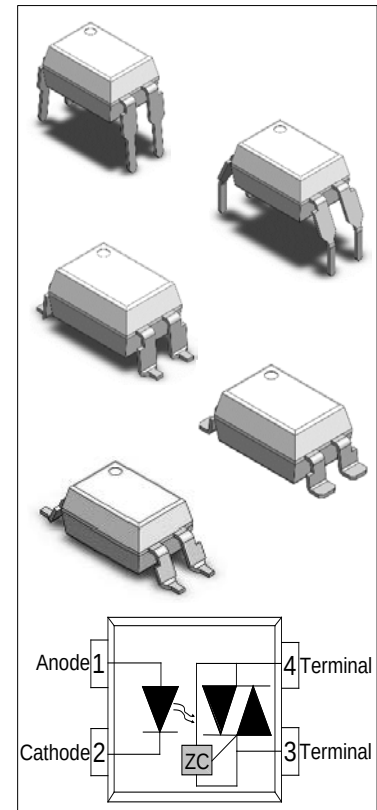
REACH & RoHS compliance

HBM: H3A ; MM: M4

CQC approved

VDE approved

UL approved



ABSOLUTE MAXIMUM RATINGS (Temperature=25°C)

Parameter		Symbol	Value	Unit
Input	Forward Current	I_F	60	mA
	Reverse Voltage	V_R	6	V
	Junction Temperature	T_j	125	°C
	Input Power Dissipation	P_I	100	mW
	Power Dissipation Derating ($T_a \geq 25^\circ\text{C}$)	$\Delta P_D/^\circ\text{C}$	-1.33	mW/°C
Output	Off-state Output Terminal Voltage	V_{OFF}	400	V
	Peak On-state Current (100µs pulse, 120 pps)	I_{TP}	2	A
	On-state RMS Current	$I_{T(RMS)}$	100	mA
	Peak Repetitive Surge Current ($P_W=10$ ms)	I_{TSM}	1	A
	Junction Temperature	T_j	125	°C
	Output Power Dissipation	P_O	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_{tot}	350	mW
Isolation Voltage		V_{iso}	5000 ^①	V _{rms}
Operating Temperature		T_{opr}	-55~100	$^\circ\text{C}$
Storage Temperature		T_{stg}	-55~125	$^\circ\text{C}$
Soldering Temperature		T_{sol}	260 ^②	$^\circ\text{C}$

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

NOTE2: For 10 seconds

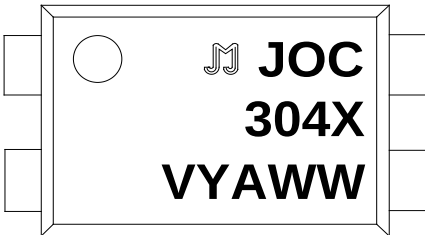
ELECTRICAL CHARACTERISTICS (Temperature=25 $^\circ\text{C}$)

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	μA
	Input Capacitance		C_{in}	$V=0, f=1\text{kHz}$	-	10	-	pF
Output	Peak Off-state Current, Either Direction		I_{OFF}	$V_{\text{OFF}}=400\text{V}, I_F=0$	-	-	100 ^③	nA
	Peak On-state Voltage, Either Direction		V_{TM}	$I_{\text{TM}}=100\text{mA}$	-	1.7	2.5	V
	Critical Rate of Rise of Off-state voltage		dV/dt	$V_{\text{PEAK}}=400\text{V}, I_F=0$	1000 ^④	-	-	V/ μs
Transfer Characteristics	LED Trigger Current	JOC3041D4	I_{FT}	Terminal Voltage=3V $I_{\text{TM}}=100\text{mA}$	-	-	15	mA
		JOC3042D4			-	-	10	
		JOC3043D4			-	-	5	
	Holding Current		I_H	$I_{\text{TM}}=2\text{mA}, I_F=\text{Rated } I_{\text{FT}}$	-	250	-	μA
	Isolation Resistance		R_{ISO}	DC500V 40~60%R.H.	10^{12}	10^{14}	-	Ω
	Floating Capacitance		C_{IO}	$V=0, f=1\text{MHz}$	-	10	-	pF
	Response Time		t_{on}	$V_D=6\text{V}, R_L=100\Omega, I_F=20\text{mA}$	-	15	50	μs
Zero-crossing Characteristics	Inhibit Voltage		V_{IH}	$I_F=\text{Rated } I_{\text{FT}}$	-	-	20	V
	Leakage in Inhibited State		I_{OFF2}	$I_F=\text{Rated } I_{\text{FT}}, V_{\text{OFF}}=\text{Rated } V_{\text{OFF}}$	-	-	1	mA

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

NOTE4: Refer to Fig.14 & Fig.15

ORDERING AND MARKING INFORMATION

MARKING INFORMATION			
		JOC : Company Abbr. 304X : Part Number & Rank V : VDE Option Y : Fiscal Year A : Manufacturing Code WW : Work Week	
ORDERING INFORMATION			
JOC304XD4(Y)(Z)-GV			
JOC – Company Abbr. 304X – Part Number (1/2/3) D4 – DIP4 Package Y – Lead Form Option (M/S/SL/SLM/None) Z – Tape and Reel Option (T1/T3) G – Green V – VDE Option (V or None)			
Packing Quantity			
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
S(T3)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box =15k 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
SLM(T1)	1500 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box =22.5k Units

Characteristics Curves

FIG.1: Forward Current vs. Ambient Temperature

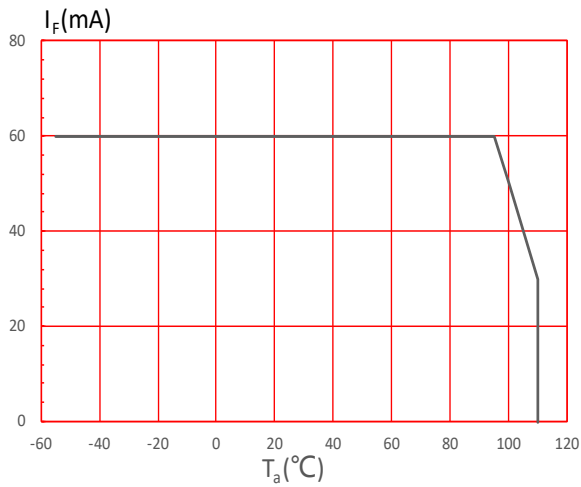


FIG.2: On-state Terminal Current vs. Ambient Temperature

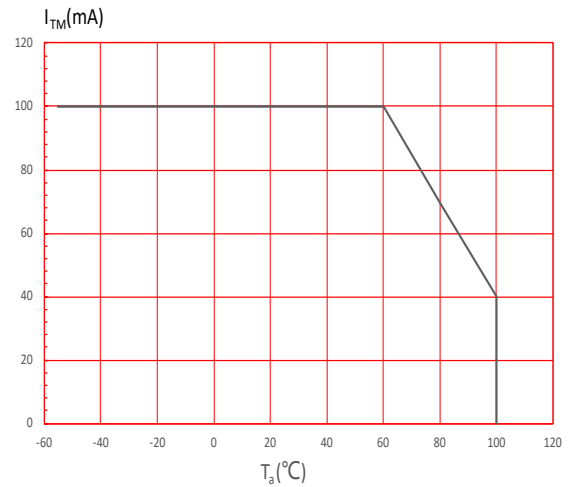


FIG.3: Forward Current vs. Forward Voltage

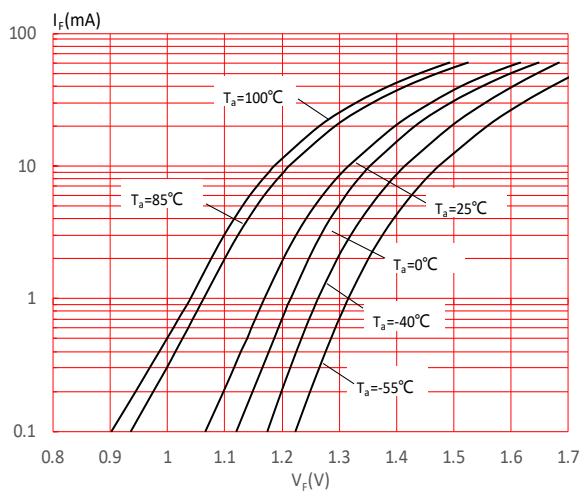


FIG.4: Normalized Off-state Terminal Current vs. Ambient Temperature

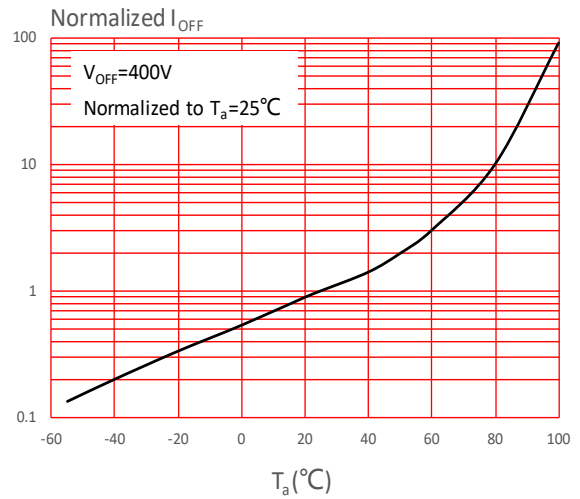


FIG.5: Normalized Off-state Terminal Voltage vs. Ambient Temperature

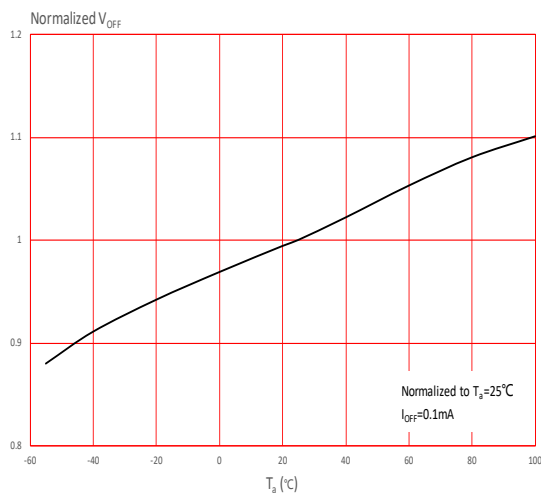


FIG.6: Normalized Trigger Current vs. Ambient Temperature

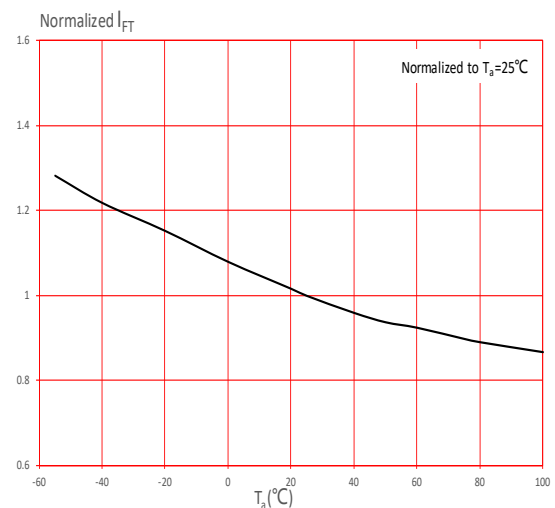
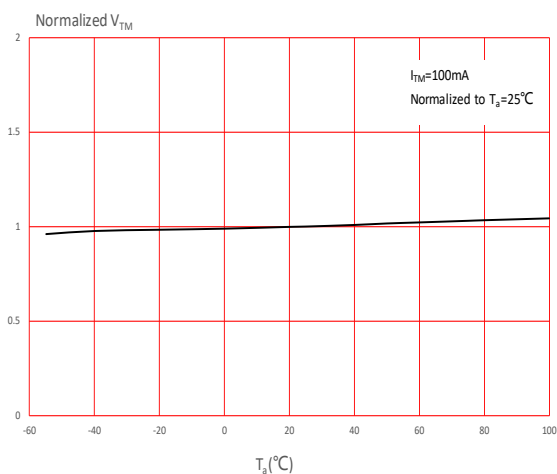
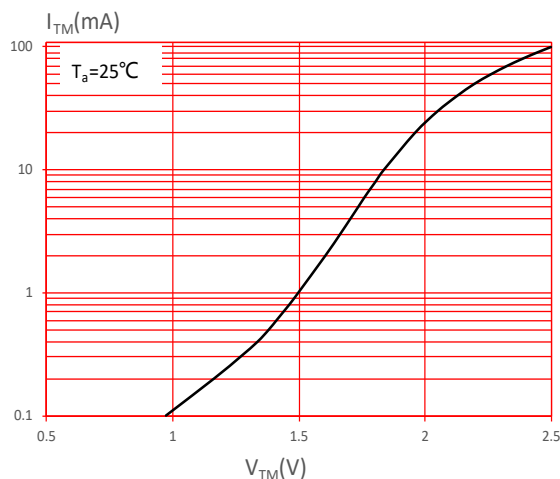
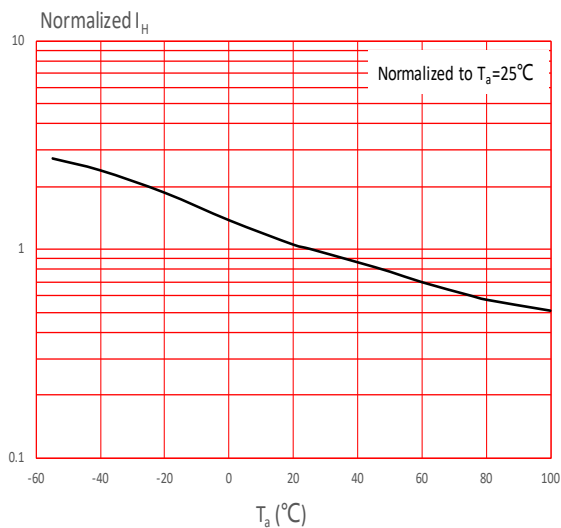
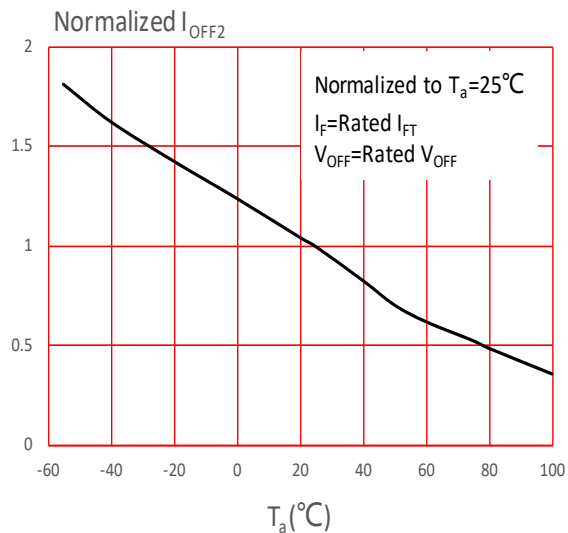
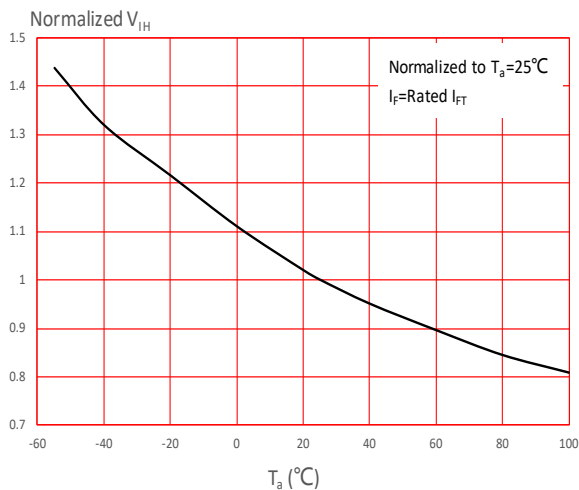


FIG.7: Normalized On-state Terminal Voltage vs. Ambient Temperature

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

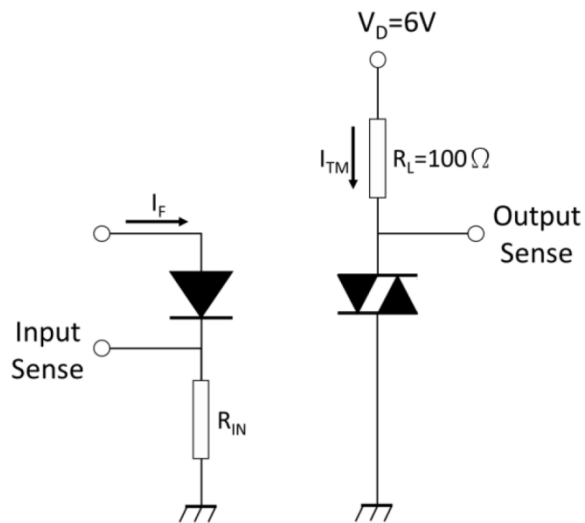


FIG.13: Waveforms of Turn On Time

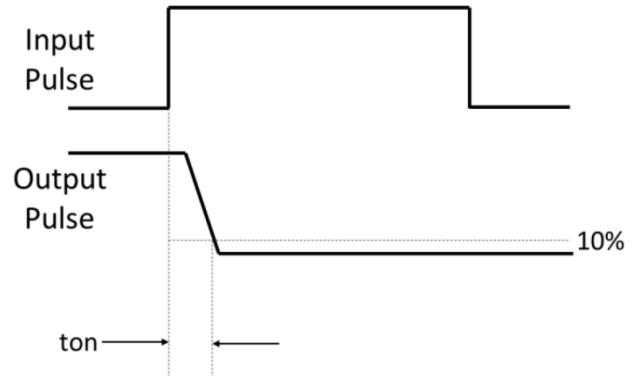


Fig.14: Test Circuits of dV/dt

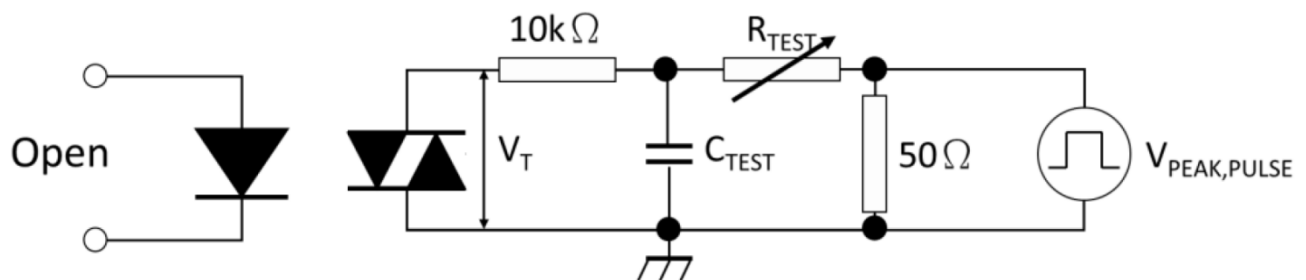
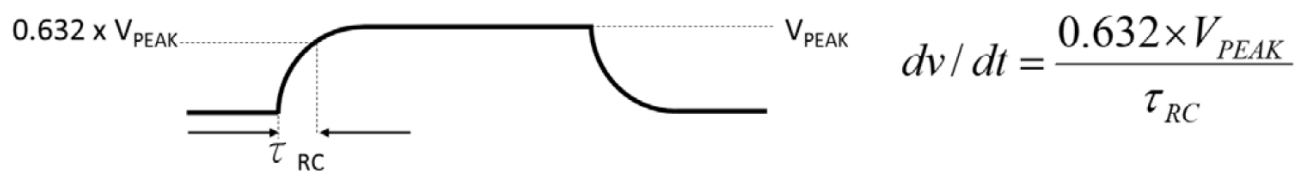
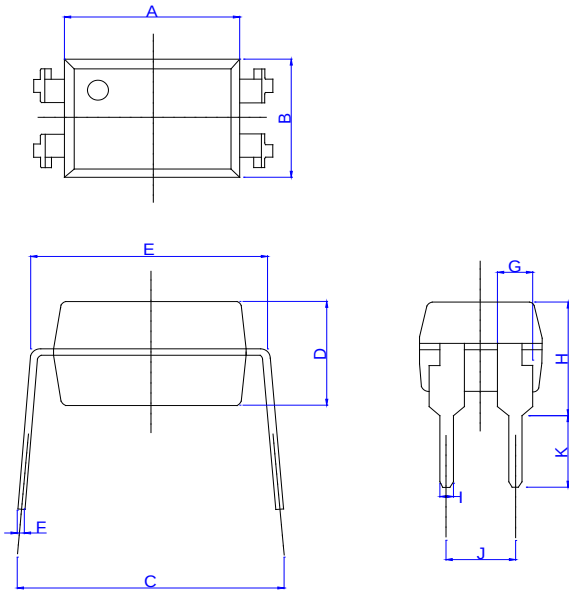


Fig.15: Waveforms of dV/dt



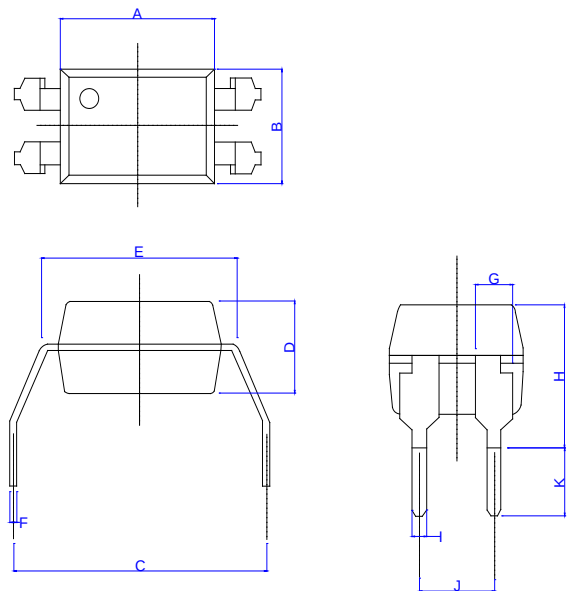
Package Dimension (Unit: mm)

Standard DIP Type:



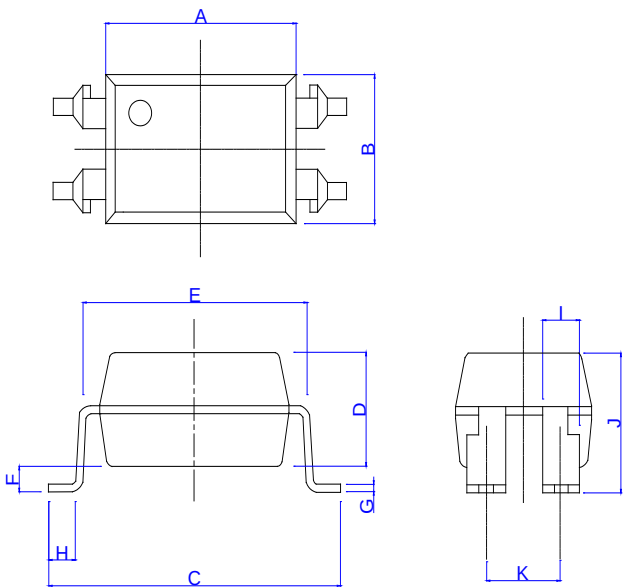
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	4.38		4.78	0.173		0.189
C	7.62		9.50	0.301		0.375
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.25			0.010	
G	1.20		1.40	0.047		0.055
H	4.20		4.80	0.166		0.190
I		0.50			0.020	
J		2.54	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

Option M Type:



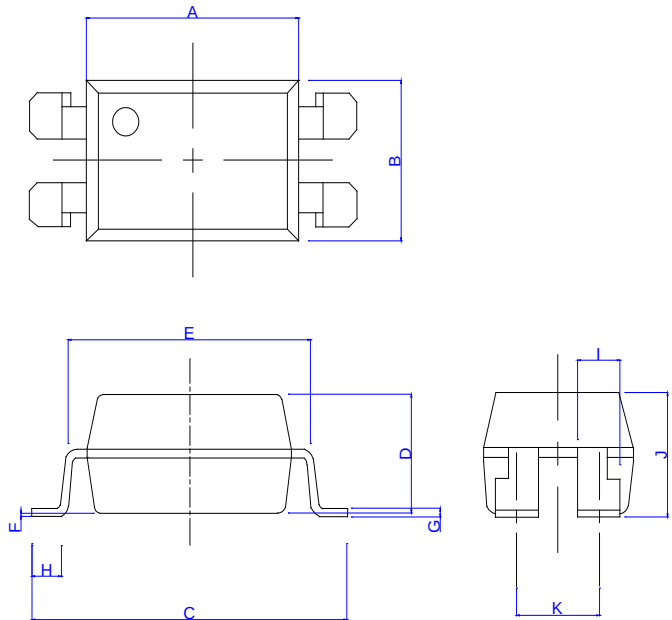
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	4.38		4.78	0.173		0.189
C	9.86		10.46	0.390		0.413
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.25			0.010	
G	1.20		1.40	0.047		0.055
H	4.28		4.88	0.169		0.193
I		0.50			0.020	
J		2.54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

Option S Type:



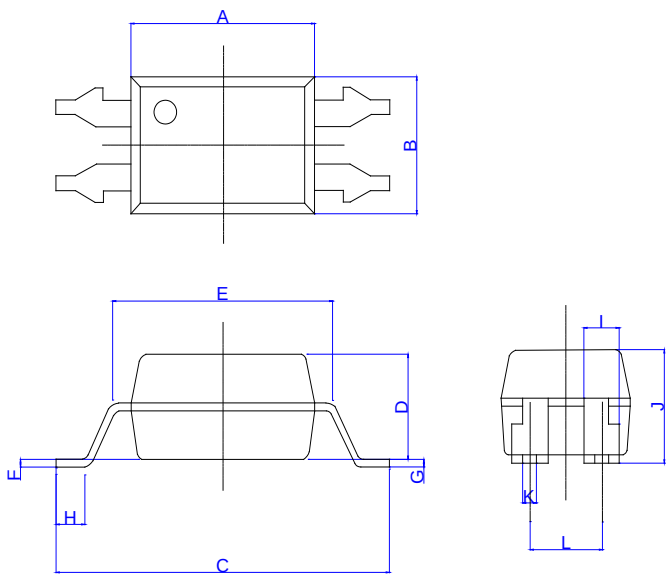
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	4.38		4.78	0.173		0.189
C	9.85		10.45	0.389		0.413
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.80		0.032		
G		0.25		0.010		
H		0.80		0.032		
I	1.20		1.40	0.047		0.055
J	4.00		4.60	0.158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

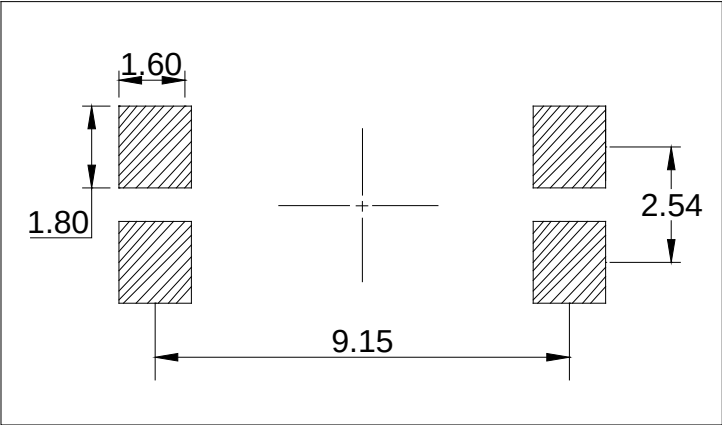
Option SLM Type:



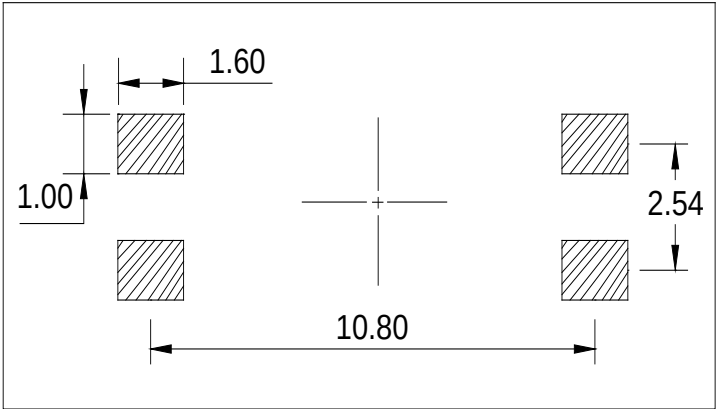
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.248		0.264
B	4.38		4.78	0.172		0.188
C	11.50		12.10	0.453		0.476
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.288		0.312
F	0.05		0.45	0.002		0.018
G	0.05		0.45	0.002		0.018
H	0.40		0.80	0.016		0.031
I	1.20		1.40	0.047		0.055
J	3.45		4.05	0.136		0.159
K	0.30		0.70	0.012		0.028
L	2.24		2.84	0.088		0.112

RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

Option S/SL

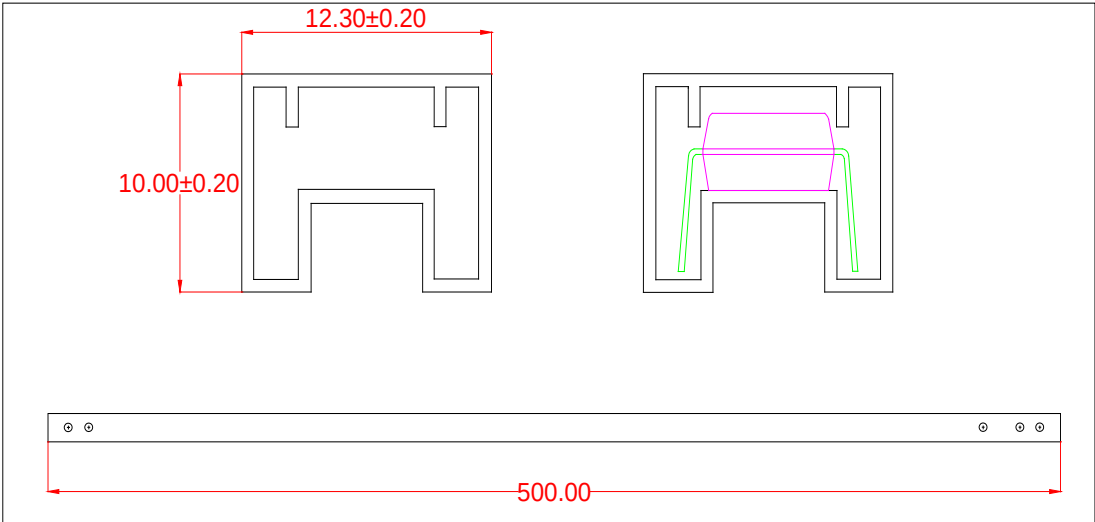


Option SLM

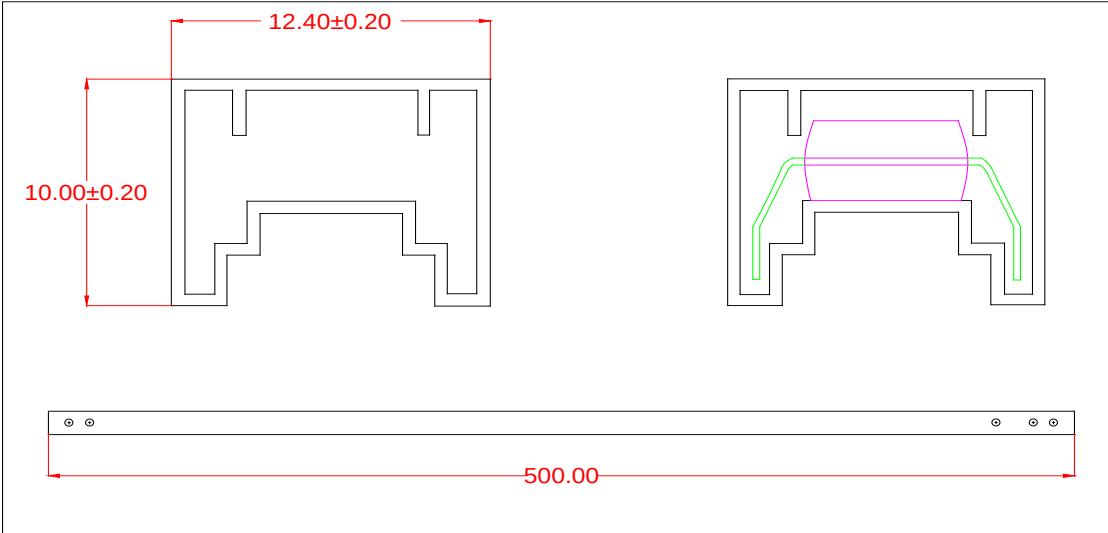


TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Standard DIP

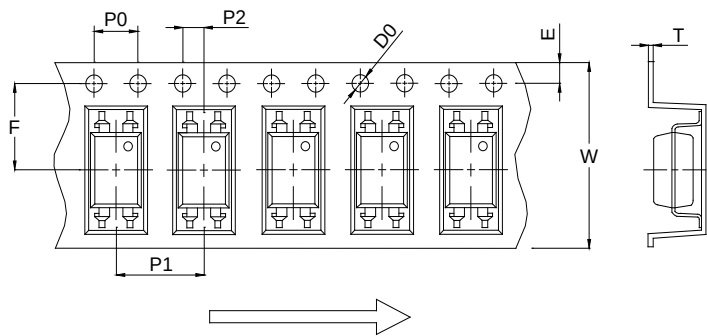


Option M



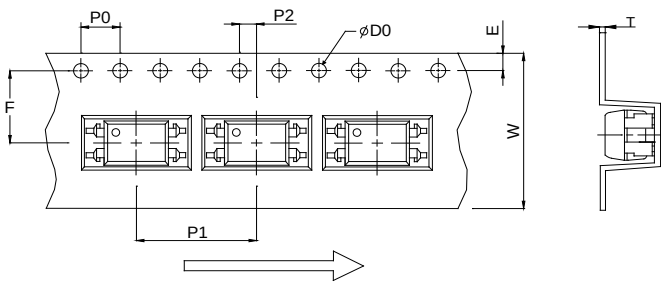
CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S(T1)



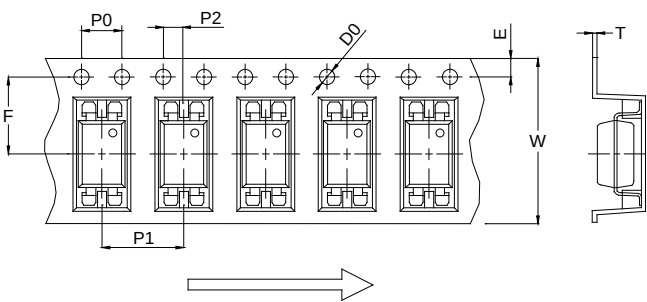
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50			0.059	
P0		4.00			0.157	
P1		8.00			0.315	
P2		2.00			0.079	
E		1.75			0.069	
F		7.50			0.295	
T		0.40			0.016	
W		16.00			0.630	

Option S(T3)



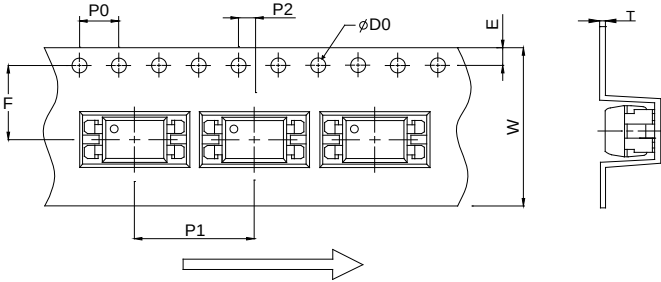
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50			0.059	
P0		4.00			0.157	
P1		12.00			0.472	
P2		2.00			0.079	
E		1.75			0.069	
F		7.50			0.295	
T		0.40			0.016	
W		16.00			0.630	

Option SL(T1)



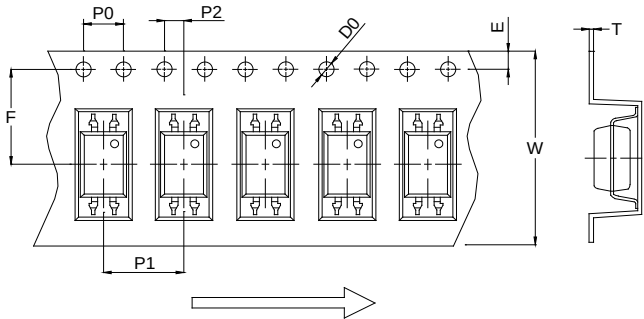
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50			0.059	
P0		4.00			0.157	
P1		8.00			0.315	
P2		2.00			0.079	
E		1.75			0.069	
F		7.50			0.295	
T		0.40			0.016	
W		16.00			0.630	

Option SL(T3)



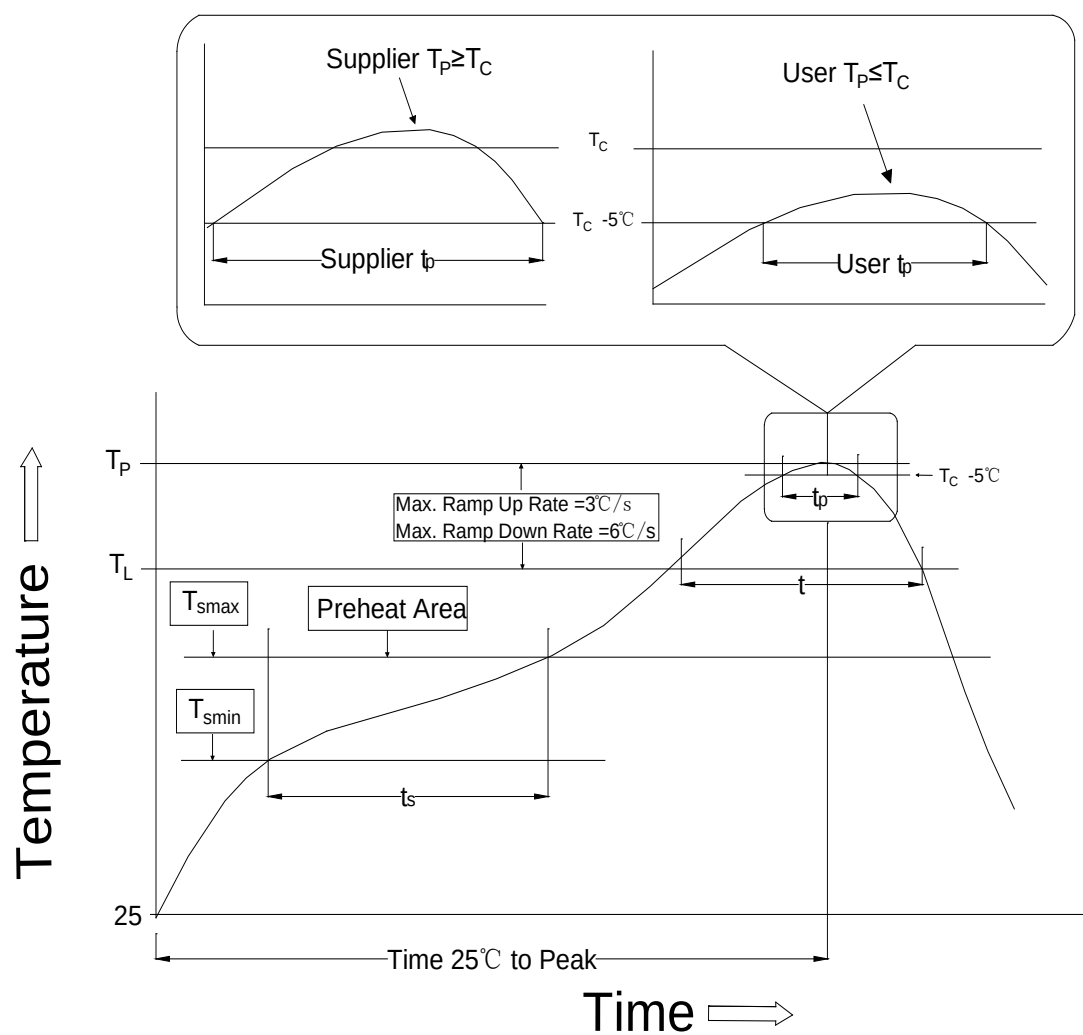
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50			0.059	
P0		4.00			0.157	
P1		12.00			0.472	
P2		2.00			0.079	
E		1.75			0.069	
F		7.50			0.295	
T		0.40			0.016	
W		16.00			0.630	

Option SLM(T1)



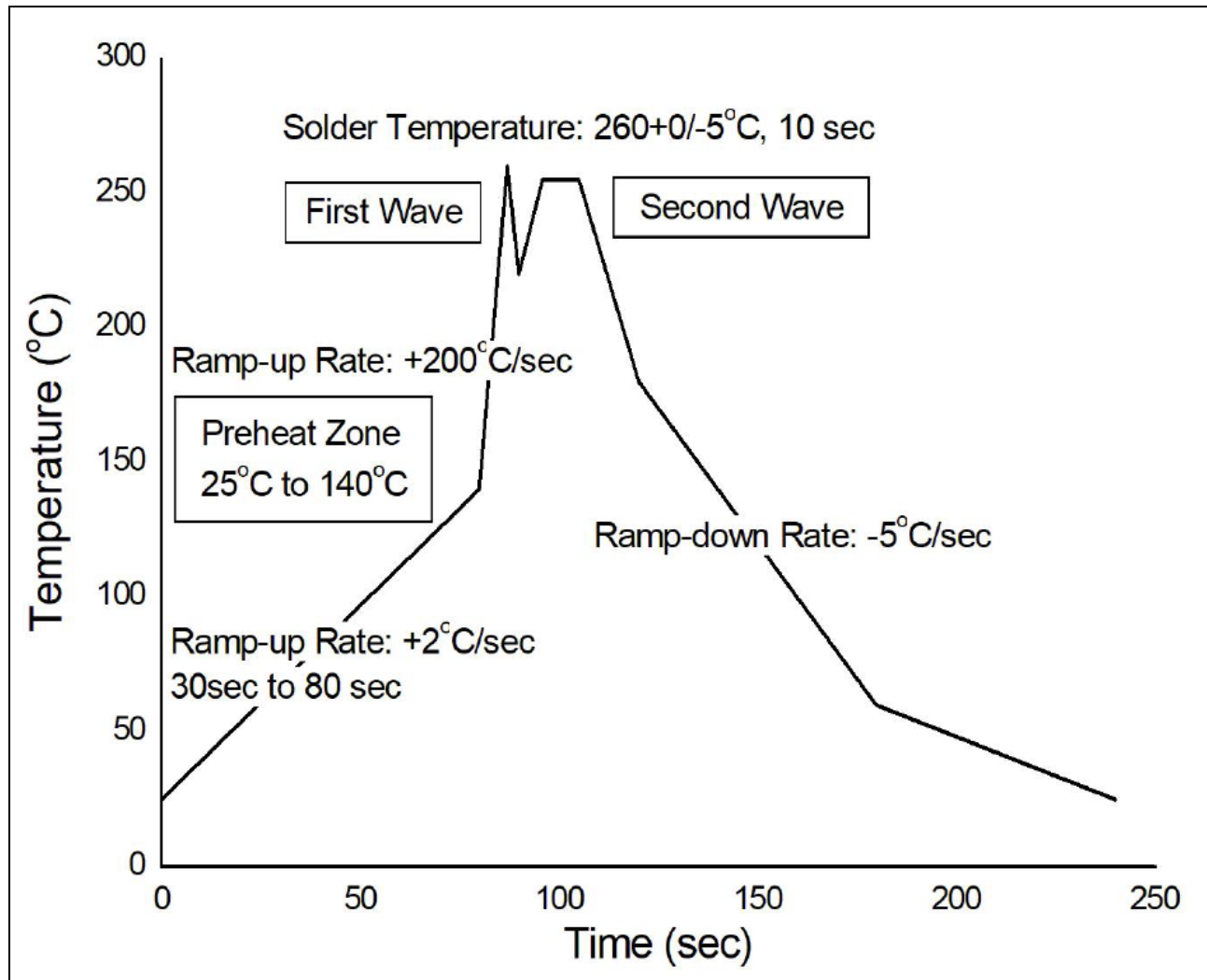
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50			0.059	
P0		4.00			0.157	
P1		8.00			0.315	
P2		2.00			0.079	
E		1.75			0.069	
F		11.50			0.453	
T		0.25			0.010	
W		24.00			0.945	

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.
Liquidus 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.

WAVE SOLDERING



HAND SOLDERING BY SOLDERING IRON

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

Document Revision History

Date	Revision	Changes
Apr.2, 2025	A.1.0	Last update
Nov.5, 2025	A.1.1	Add SLM package

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