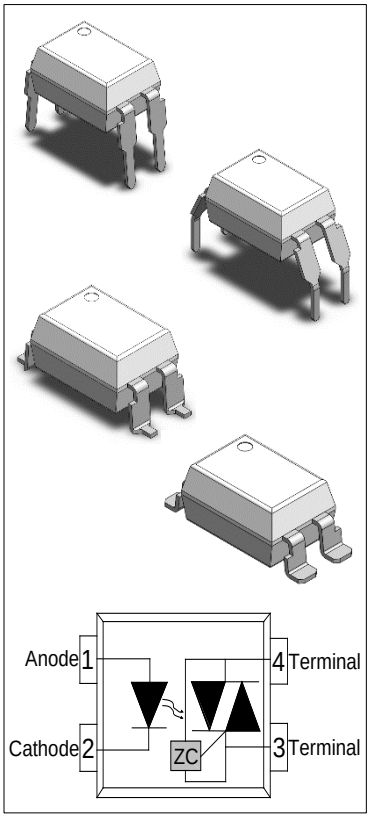
## JOC306XD4 Series

Rev.A.1.0

### DESCRIPTION:

The JOC306XD4 series combine an AIGaAs 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 265 $V_{AC}$ peripherals.




### MAIN FEATURES

High isolation 5000 VRMS
DC input with zero-cross photo triac output
Operating temperature range -55 ℃ to 100 ℃
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 | ℃ |
| | Input Power Dissipation | $P_I$ | 100 | mW |
| | Power Dissipation Derating ($T_a \geqslant 25℃$) | $\Delta P_D/℃$ | -1.33 | mW/℃ |
| Output | Off-state Output Terminal Voltage | $V_{OFF}$ | 600 | 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 | ℃ |
| | Output Power Dissipation | $P_O$ | 250 | mW |

| | | | | |
|---|---|---|---|---|
| | Power Dissipation Derating ($T_a \geqslant 25℃$) | $\Delta P_D/℃$ | -3.33 | mW/℃ |
| Total Power Dissipation | | $P_{tot}$ | 350 | mW |
| Isolation Voltage | | $V_{iso}$ | 5000① | Vrms |
| Operating Temperature | | $T_{opr}$ | -55~100 | ℃ |
| Storage Temperature | | $T_{stg}$ | -55~125 | ℃ |
| Soldering Temperature | | $T_{sol}$ | 260② | ℃ |

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

**NOTE2**: For 10 seconds

## ELECTRICAL CHARACTERISTICS (Temperature=25°C)

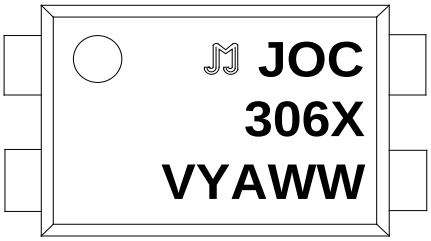
| Parameter | | | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|---|
| Input | Forward Voltage | | $V_F$ | $I_F$=10mA | - | 1.27 | 2.2 | V |
| | Reverse Current | | $I_R$ | $V_R$=6V | - | - | 1 | μA |
| | Input Capacitance | | $C_{in}$ | V=0, f=1kHz | - | 10 | - | pF |
| Output | Peak Off-state Current, Either Direction | | $I_{OFF}$ | $V_{OFF}$=600V, $I_F$=0 | - | - | 100③ | 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 | $V_{PEAK}$=600V, $I_F$=0 | 1000④ | - | - | V/μs |
| Transfer Characteristics | LED Trigger Current | JOC3061D4 | $I_{FT}$ | Terminal Voltage=3V $I_{TM}$=100mA | - | - | 15 | mA |
| | | JOC3062D4 | | | - | - | 10 | |
| | | JOC3063D4 | | | - | - | 5 | |
| | Holding Current | | $I_H$ | $I_{TM}$=2mA, $I_F$=Rated $I_{FT}$ | - | 250 | - | μA |
| | Isolation Resistance | | $R_{ISO}$ | DC500V 40~60%R.H. | $10^{12}$ | $10^{14}$ | - | Ω |
| | Floating Capacitance | | $C_{IO}$ | V=0, f=1MHz | - | 10 | - | pF |
| | Response Time | | $t_{on}$ | $V_D$=6V, $R_L$=100Ω, $I_F$=20mA | - | 15 | 50 | μs |
| 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 $V_{OFF}$ | - | - | 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.
306X : Part Number & Rank
V : VDE Option
Y : Fiscal Year
A : Manufacturing Code
WW : Work Week

### ORDERING INFORMATION

**JOC306XD4(Y)(Z)-GV**

JOC – Company Abbr.
306X – 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)

### 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 |
| 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

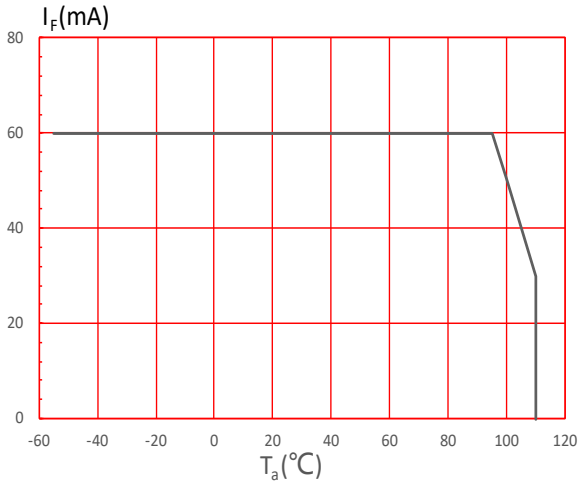



**FIG.2:** On-state Terminal Current vs. Ambient Temperature

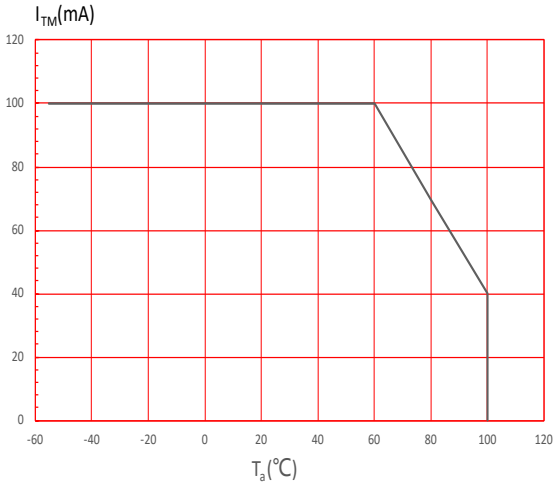



**FIG.3:** Forward Current vs. Forward Voltage

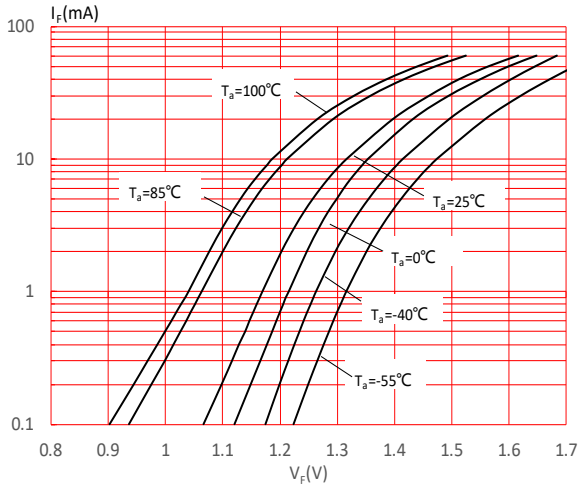



**FIG.4:** Normalized Off-state Terminal Current vs. Ambient Temperature

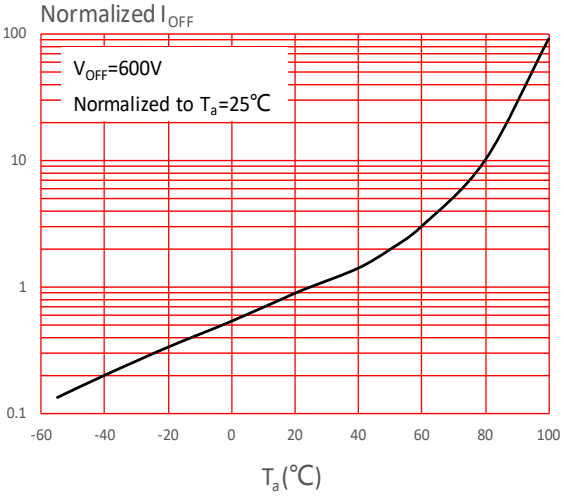



**FIG.5:** Normalized Off-state Terminal Voltage vs. Ambient Temperature

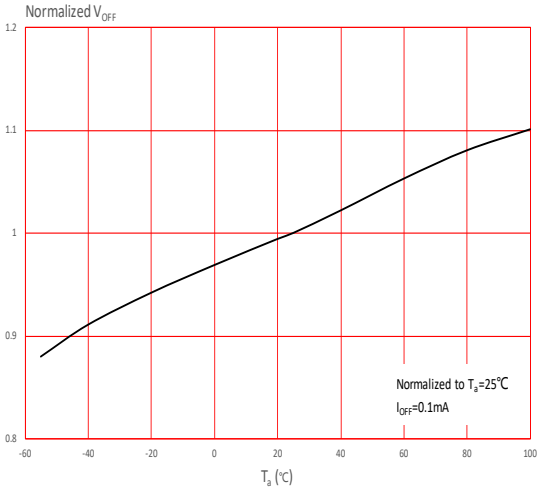



**FIG.6:** Normalized Trigger Current vs. Ambient Temperature

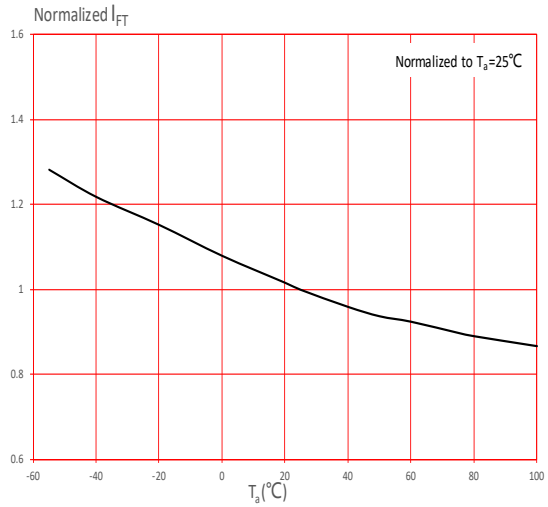


**FIG.7:** Normalized On-state Terminal Voltage vs. Ambient Temperature

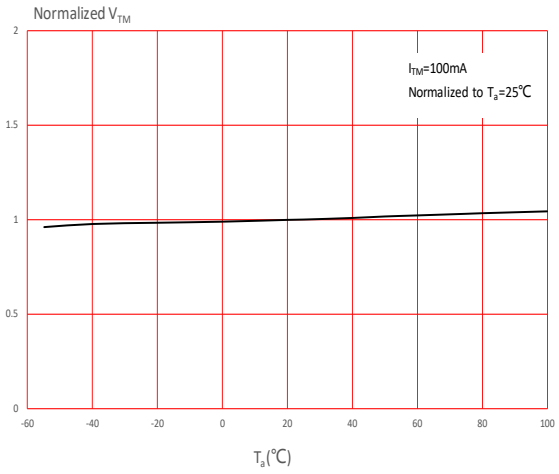



**FIG.8:** On-state Terminal Voltage vs. On-state Terminal Current

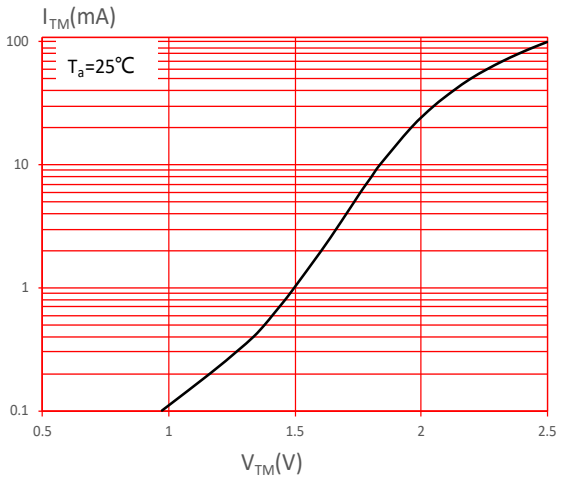



**FIG.9:** Normalized Holding Current vs. Ambient Temperature

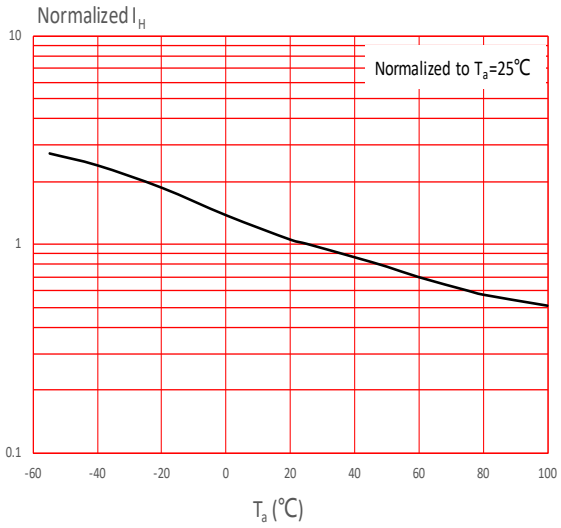



**FIG.10:** Normalized Leakage in Inhibit State vs. Ambient Temperature

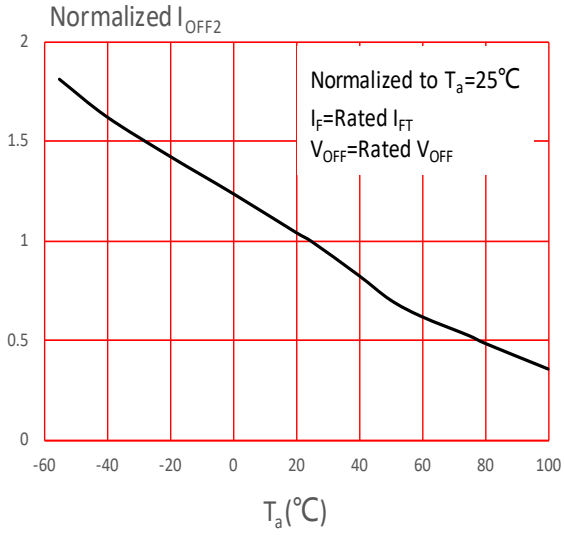
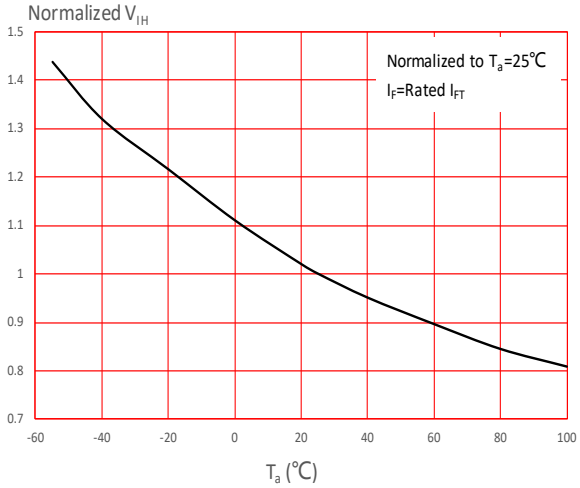



**FIG.11:** Normalized Inhibit Voltage vs. Ambient Temperature



## TEST CIRCUITS

**FIG.12:** Test Circuits of Turn On Time

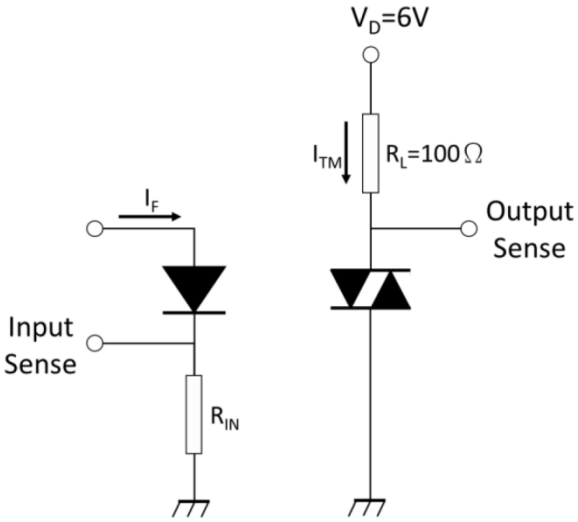



**FIG.13:** Waveforms of Turn On Time

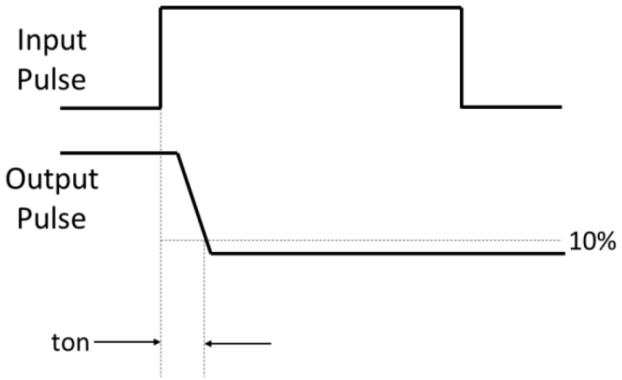



**Fig.14: Test Circuits of dV/dt**

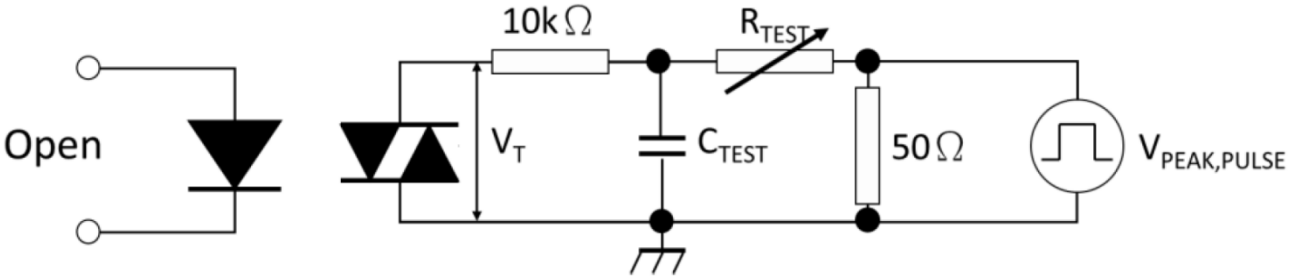
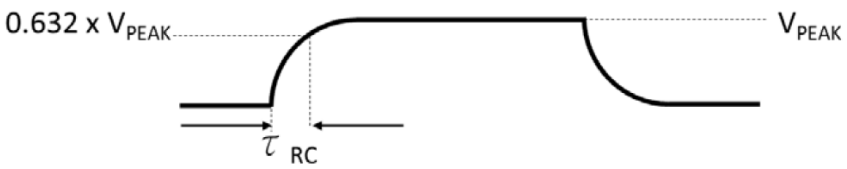


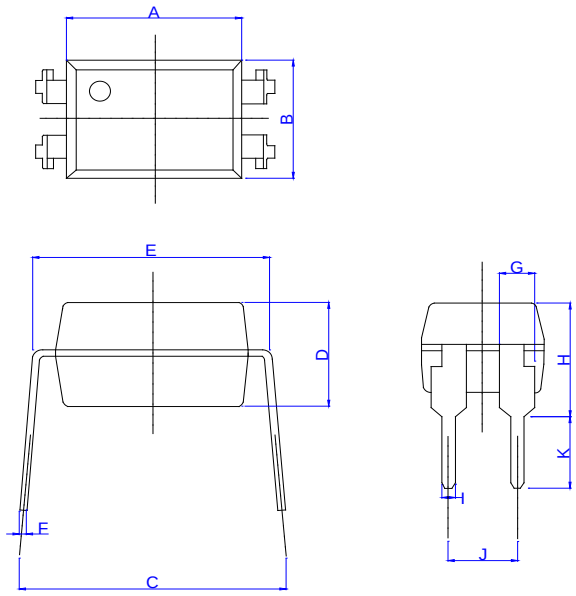

**Fig.15: Waveforms of dV/dt**




$$dv/dt = \frac{0.632 \times V_{PEAK}}{\tau_{RC}}$$

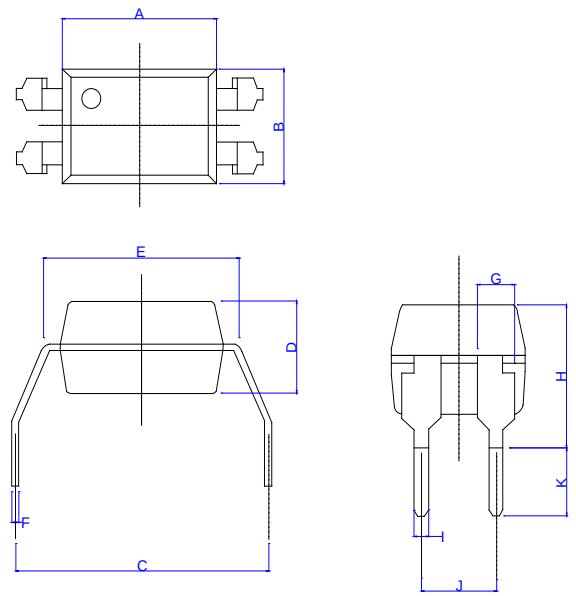
## Package Dimension (Unit: mm）

### Standard DIP Type:



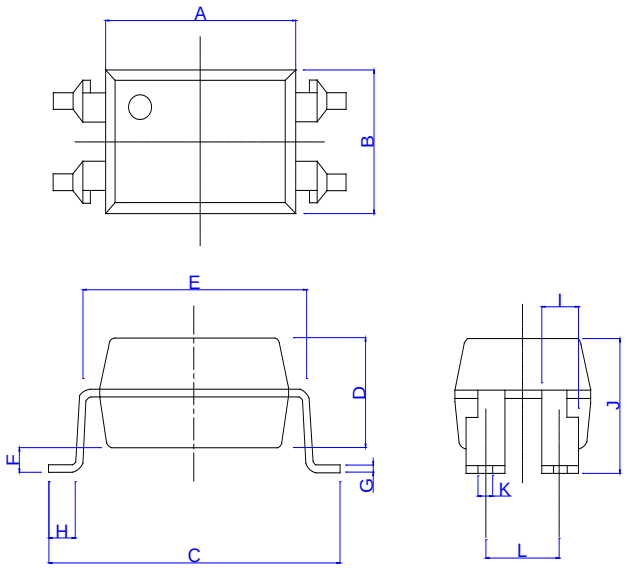

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 6.30 | | 6.70 | 0.249 | | 0.265 |
| B | 4.38 | | 4.78 | 0.173 | | 0.189 |
| C | 7.62 | | 9.50 | 0.301 | | 0.375 |
| D | 3.30 | | 3.70 | 0.130 | | 0.146 |
| 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:



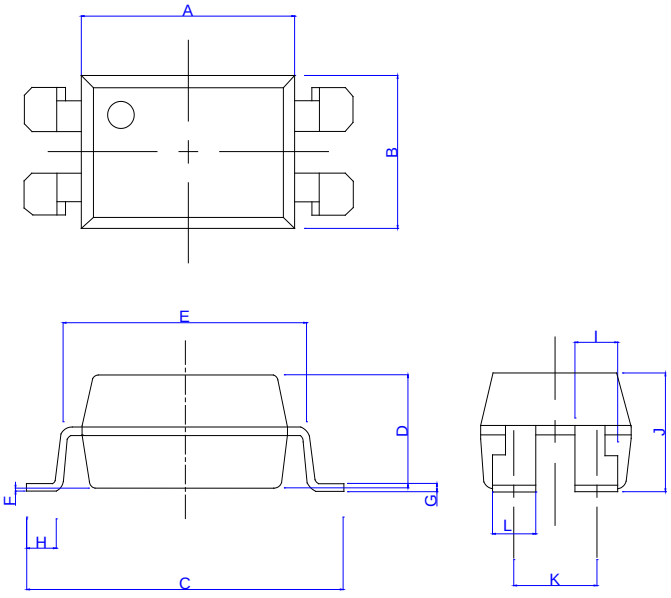

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 6.30 | | 6.70 | 0.249 | | 0.265 |
| B | 4.38 | | 4.78 | 0.173 | | 0.189 |
| C | 9.86 | | 10.46 | 0.390 | | 0.413 |
| D | 3.30 | | 3.70 | 0.130 | | 0.146 |
| 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 | |

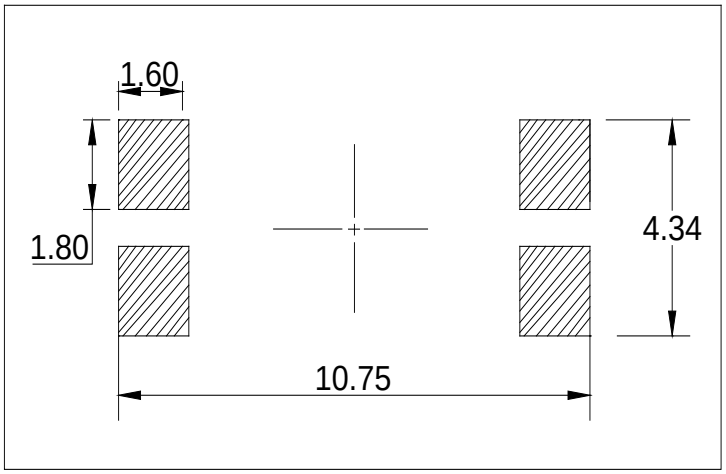
## Option SL Type:




| 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 | |

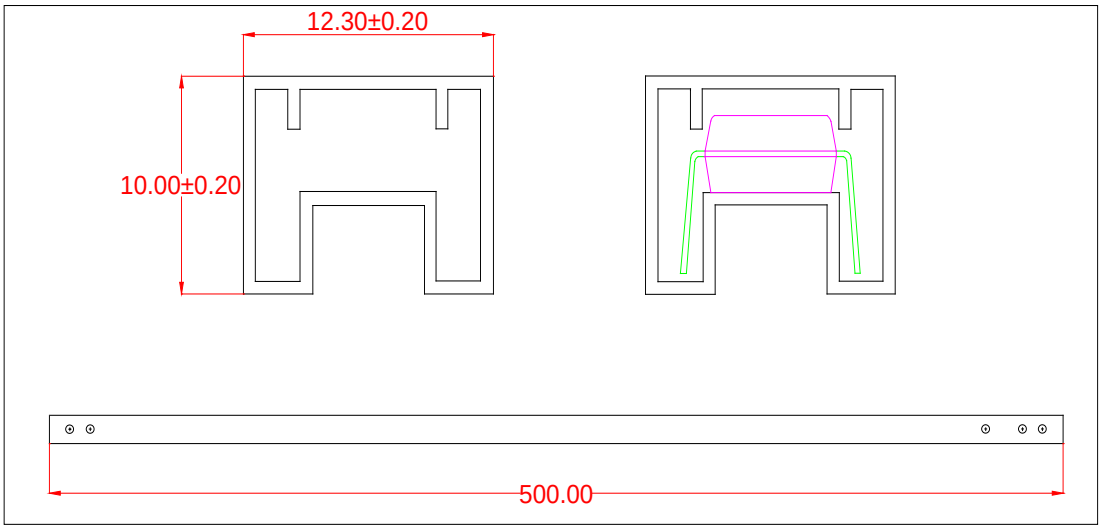
## RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

### Option S/SL

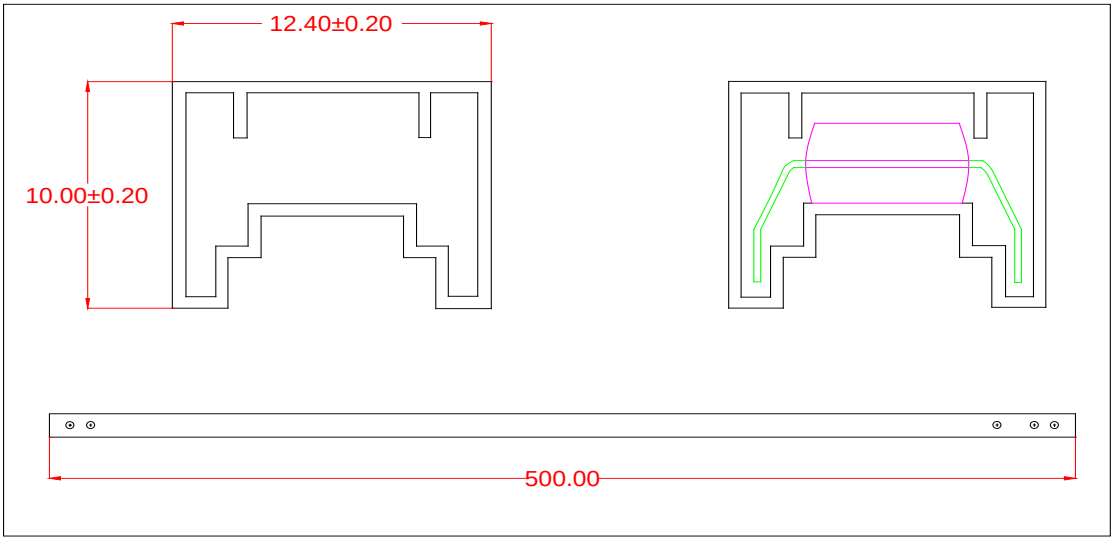


## TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

### Standard DIP

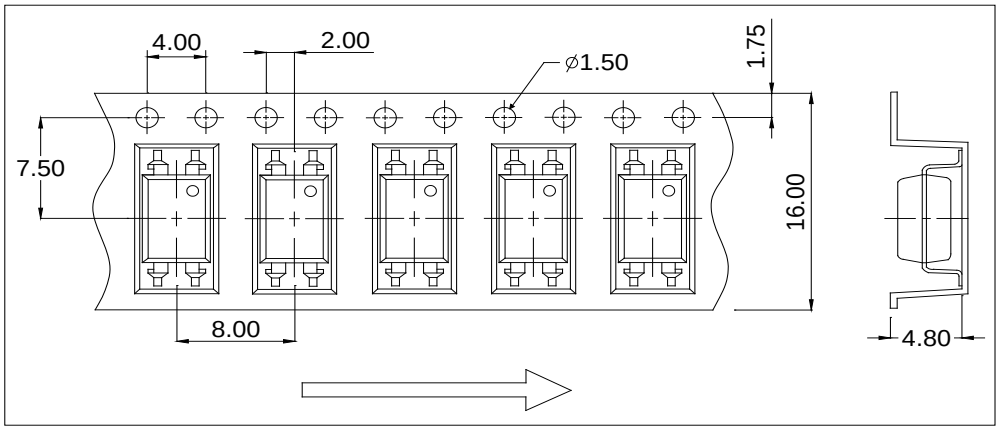



### Option M

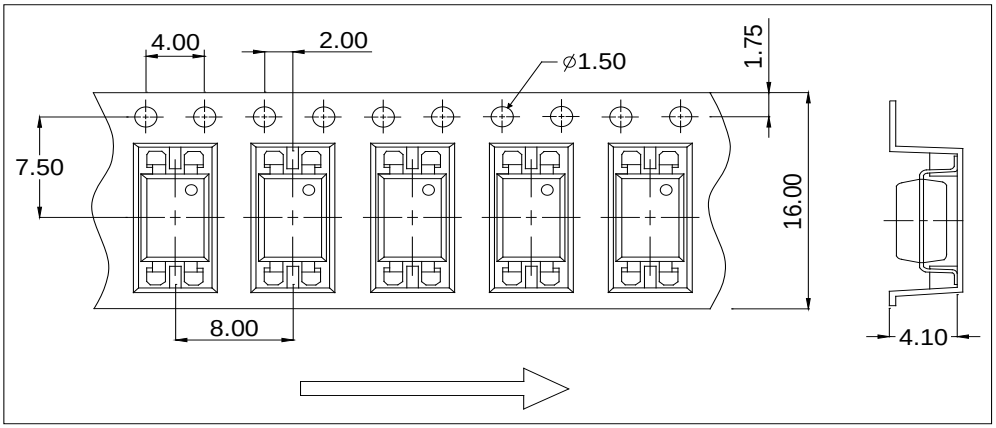


## CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

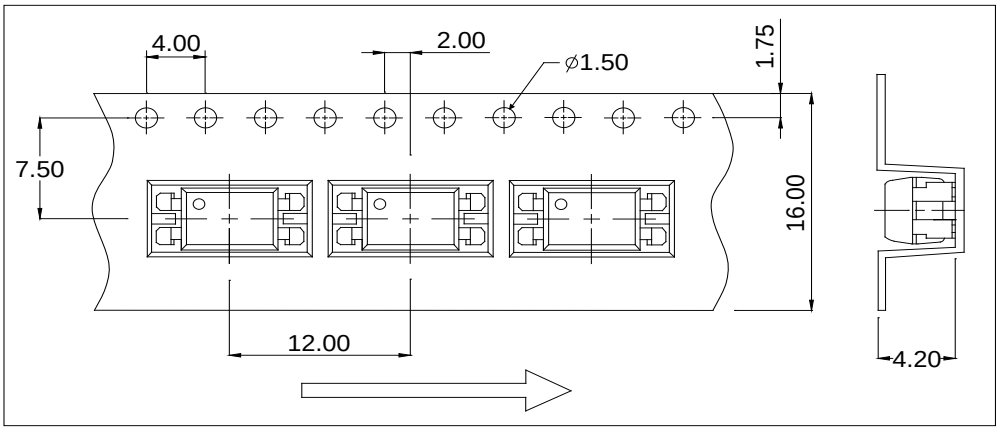
### Option S(T1)




### Option SL(T1)

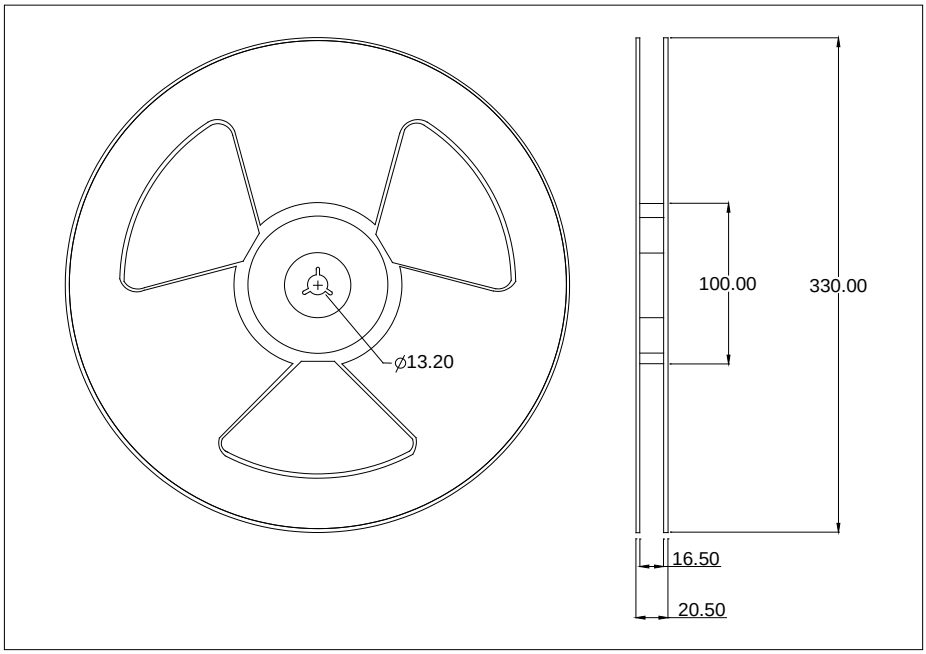



### Option SL(T3)

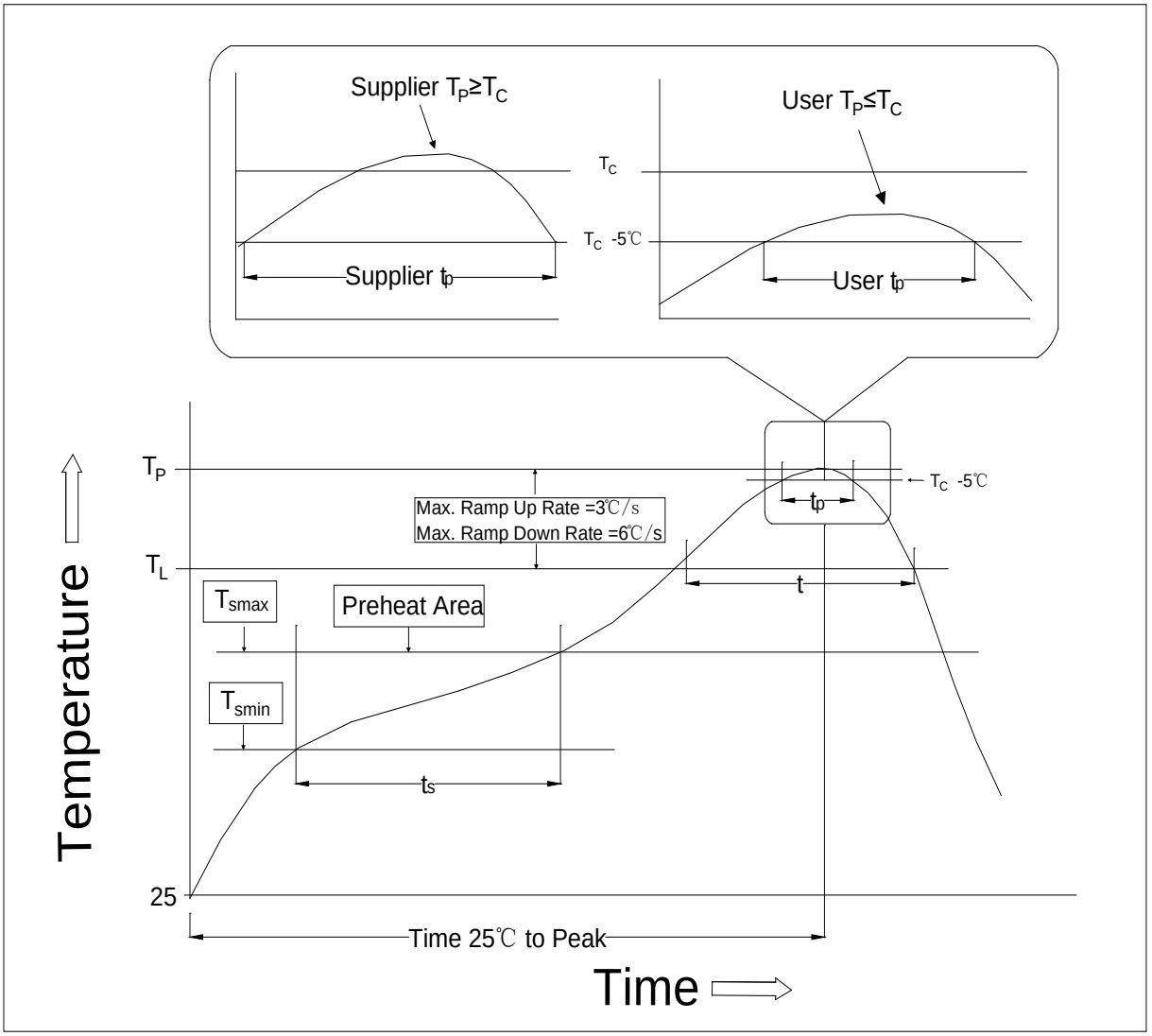


## REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)

### Option SL

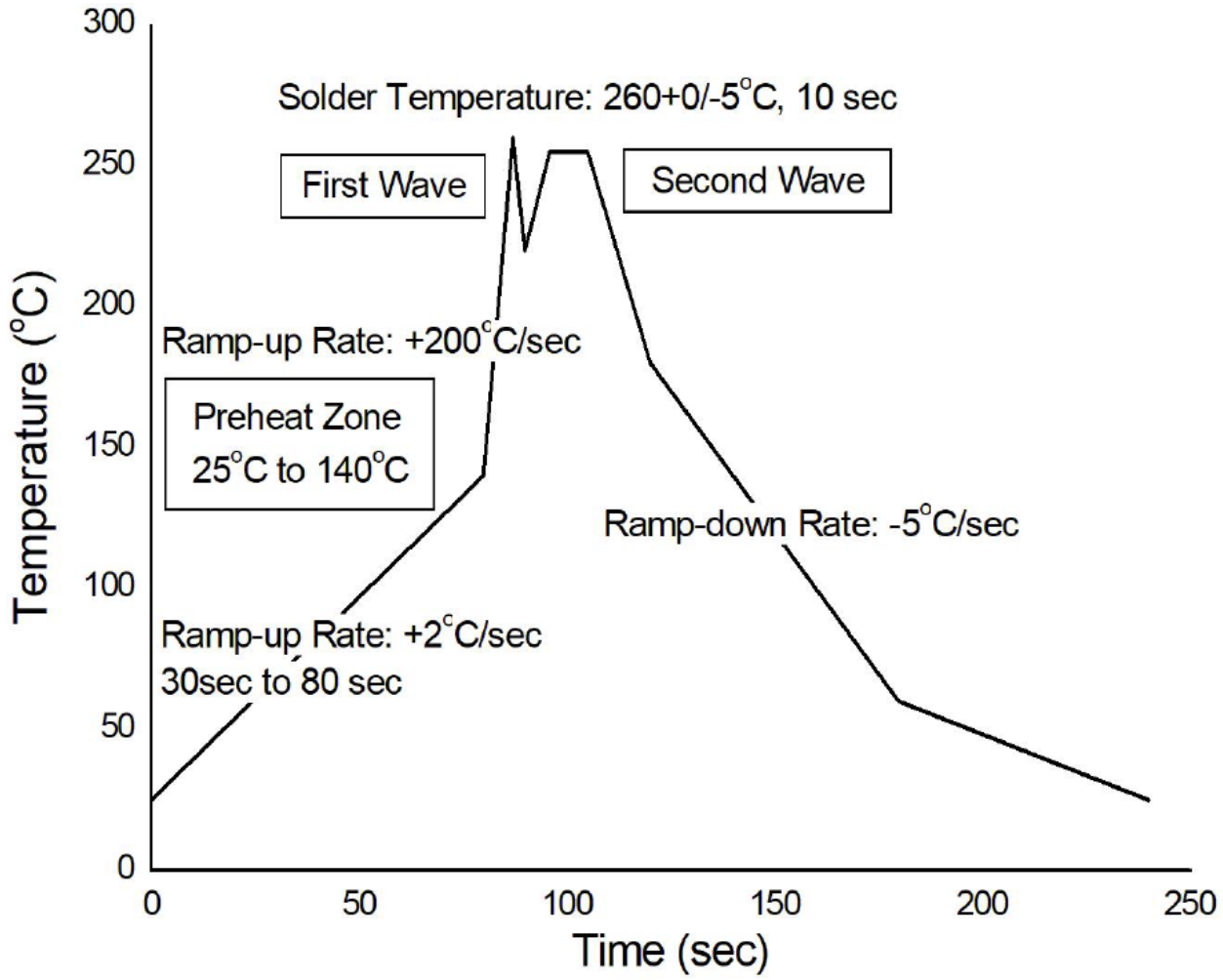


## REFLOW INFORMATION




| Profile Feature | Sn-Pb Assembly Profile | Pb-Free Assembly Profile |
|---|---|---|
| Temperature Min. (Tsmin) | 100 | 150℃ |
| Temperature Max. (Tsmax) | 150 | 200℃ |
| Time (ts) from (Tsmin to Tsmax) | 60-120 seconds | 60-120 seconds |
| Ramp-up Rate (tL to tP) | 3℃/second max. | 3℃/second max. |
| Liquidus Temperature (TL) | 183℃ | 217℃ |
| Time (tL) Maintained Above (TL) | 60-150 seconds | 60-150 seconds |
| Peak Body Package Temperature | 235℃+0℃/-5℃ | 260℃+0℃/-5℃ |
| Time (tP) within 5℃ of 260℃ | 20 seconds | 30 seconds |
| Ramp-down Rate (TP to TL) | 6℃/second max. | 6℃/second max. |
| Time 25℃ to Peak Temperature | 6 minutes max. | 8 minutes max. |

## WAVE SOLDERING




| HAND SOLDERING BY SOLDERING IRON | |
|---|---|
| Soldering Temperature | 360±5℃ |
| Soldering Time | 3s max. |

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