

## JOR21XD8 Series

Rev.A.1.0

### DESCRIPTION:

The products are 8-pin optical relays. The device consists of an AlGaAs infrared emitting diode input stage optically coupled to a high-voltage output detector circuit in a plastic DIP8 package with different lead forming options. The detector consists of a high-speed photovoltaic diode array and driver circuitry. The products are widely used in isolation in high-speed inspection machines, telephones equipment and computers.

### MAIN FEATURES

High isolation 5000 Vrms

Wide variation of load voltage 60V to 600V

Operating temperature range -40°C to 110°C

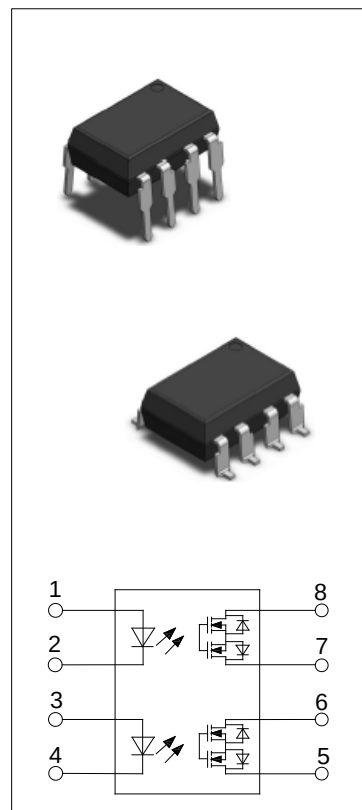
REACH & RoHS compliance

HBM: H3A; MM: M4; CDM: C3

CQC approved

VDE approved

UL approved



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

| Parameter               |                          |          | Symbol           | Value          | Unit |
|-------------------------|--------------------------|----------|------------------|----------------|------|
| Input                   | Forward Current          |          | I <sub>F</sub>   | 50             | mA   |
|                         | Peak Forward Current     |          | I <sub>FP</sub>  | 1 <sup>①</sup> | A    |
|                         | Reverse Voltage          |          | V <sub>R</sub>   | 6              | V    |
|                         | Input Power Dissipation  |          | P <sub>D</sub>   | 75             | mW   |
| Output                  | Load Voltage             | JOR212D8 | V <sub>O</sub>   | 60             | V    |
|                         |                          | JOR213D8 |                  | 100            |      |
|                         |                          | JOR214D8 |                  | 400            |      |
|                         |                          | JOR216D8 |                  | 600            |      |
|                         | Continuous load current  | JOR212D8 | I <sub>O</sub>   | 1.25           | A    |
|                         |                          | JOR213D8 |                  | 1.25           |      |
|                         |                          | JOR214D8 |                  | 0.1            |      |
|                         |                          | JOR216D8 |                  | 0.05           |      |
|                         | Output Power Dissipation |          | P <sub>O</sub>   | 600            | mW   |
| Total Power Dissipation |                          |          | P <sub>tot</sub> | 675            | mW   |

|                       |           |                   |      |
|-----------------------|-----------|-------------------|------|
| Isolation Voltage     | $V_{iso}$ | 5000 <sup>②</sup> | Vrms |
| Operating Temperature | $T_{opr}$ | -40~110           | °C   |
| Junction Temperature  | $T_j$     | 125               | °C   |
| Storage Temperature   | $T_{stg}$ | -40~125           | °C   |
| Soldering Temperature | $T_{sol}$ | 260               | °C   |

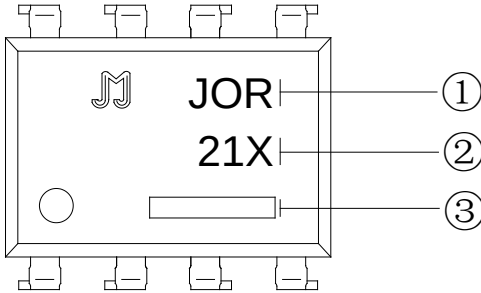
**NOTE1** : 100μs pulse, 100Hz frequency

**NOTE2** : AC for 1minute, R.H.=40~60%

### ELECTRICAL CHARACTERISTICS (Temperature=25°C)

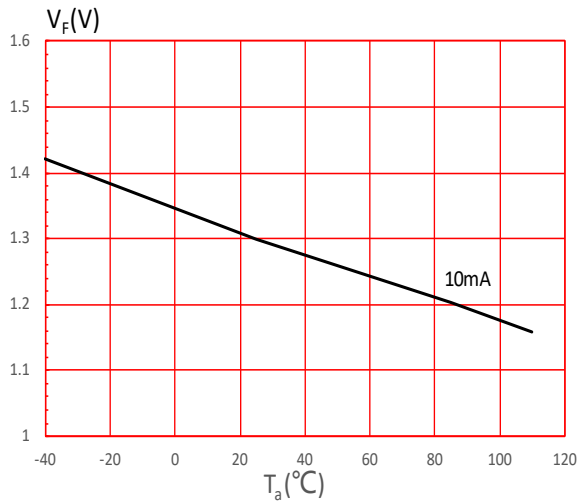
| Parameter                 |                           |          | Symbol       | Condition                                 | Min.      | Typ. | Max. | Unit |
|---------------------------|---------------------------|----------|--------------|-------------------------------------------|-----------|------|------|------|
| Input                     | Forward Voltage           |          | $V_F$        | $I_F=10mA$                                | -         | 1.3  | 1.5  | V    |
|                           | Reverse Current           |          | $I_R$        | $V_R=6V$                                  | -         | -    | 1    | μA   |
|                           | Action Current            |          | $I_{F(ON)}$  | $I_O=I_{O(MAX)}$                          | -         | 1.5  | 3    | mA   |
|                           | Reset Current             |          | $I_{F(OFF)}$ | $I_O=I_{O(MAX)}$                          | 0.4       | 0.8  | -    | mA   |
| Output                    | On Resistance             | JOR212D8 | $R_{on}$     | $I_F=5mA$ $I_O=Max.$<br>Within 1s on time | -         | 0.2  | 0.4  | Ω    |
|                           |                           | JOR213D8 |              |                                           | -         | 0.15 | 0.4  |      |
|                           |                           | JOR214D8 |              |                                           | -         | 20   | 30   |      |
|                           |                           | JOR216D8 |              |                                           | -         | 30   | 40   |      |
|                           | Off State Leakage Current |          | $I_{Leak}$   | $I_F=0mA$ ,<br>$V_O=Max.$                 | -         | -    | 1    | μA   |
|                           | Output Capacitance        |          | $C_{OFF}$    | $V_{OFF}=0V$ ,<br>$f_o=1MHz$              | 10        | -    | 1000 | pF   |
| Switching Characteristics | Isolation Resistance      |          | $R_{ISO}$    | DC500V<br>40~60%R.H.                      | $10^{12}$ | -    | -    | Ω    |
|                           | Floating Capacitance      |          | $C_{IO}$     | $V=0$ , $f=1MHz$                          | -         | 1.5  | -    | pF   |
|                           | Turn On Time              | JOR212D8 | $t_{on}$     | $I_F=5mA$ ,<br>$I_O=Max.$                 | -         | 0.6  | 2    | ms   |
|                           |                           | JOR213D8 |              |                                           | -         | 0.6  | 2    |      |
|                           |                           | JOR214D8 |              |                                           | -         | 0.21 | 0.5  |      |
|                           |                           | JOR216D8 |              |                                           | -         | 0.18 | 0.5  |      |
|                           | Turn Off Time             | JOR212D8 | $t_{off}$    | $I_F=5mA$ ,<br>$I_O=Max.$                 | -         | 0.2  | 1    | ms   |
|                           |                           | JOR213D8 |              |                                           | -         | 0.2  | 1    |      |
|                           |                           | JOR214D8 |              |                                           | -         | 0.2  | 1    |      |
|                           |                           | JOR216D8 |              |                                           | -         | 0.2  | 1    |      |

ORDERING AND MARKING INFORMATION

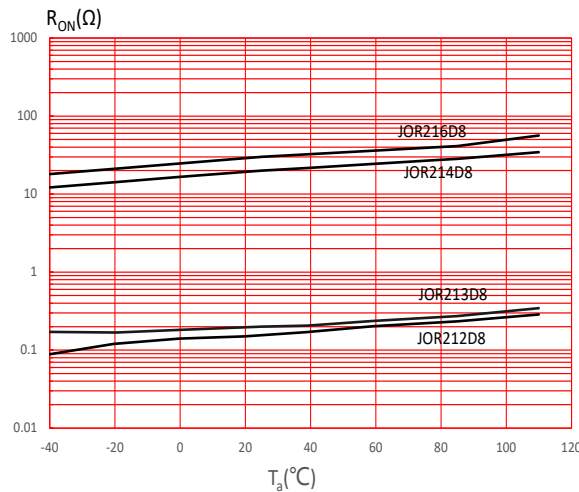
| MARKING INFORMATION                                                               |                 |                                                                                             |                                  |
|-----------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------|----------------------------------|
|  |                 | <p>① : Company Abbr.<br/>② : Part Number &amp; Rank<br/>③ : Production Information Code</p> |                                  |
| Packing Quantity                                                                  |                 |                                                                                             |                                  |
| Option                                                                            | Quantity        | Quantity – Inner box                                                                        | Quantity –Outer box              |
| DIP                                                                               | 50 Units/Tube   | 40 Tubes/Inner box                                                                          | 5 Inner box/Outer box =10k Units |
| SMD                                                                               | 1200 Units/Reel | 2 Reels/Inner box                                                                           | 5 Inner box/Outer box =12k Units |

## Characteristics Curves

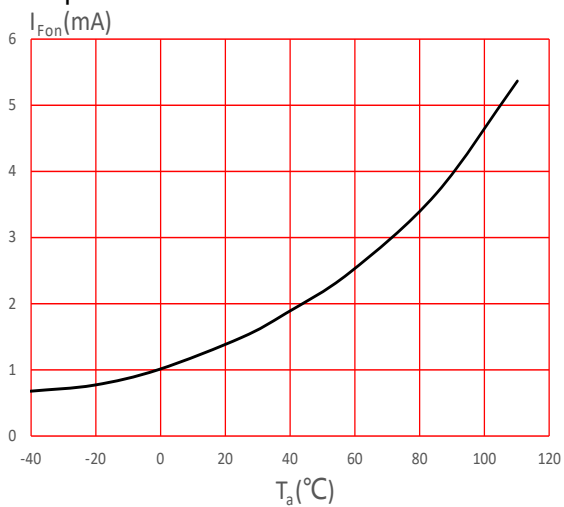
**FIG.1:** LED Dropout Voltage vs. Ambient Temperature



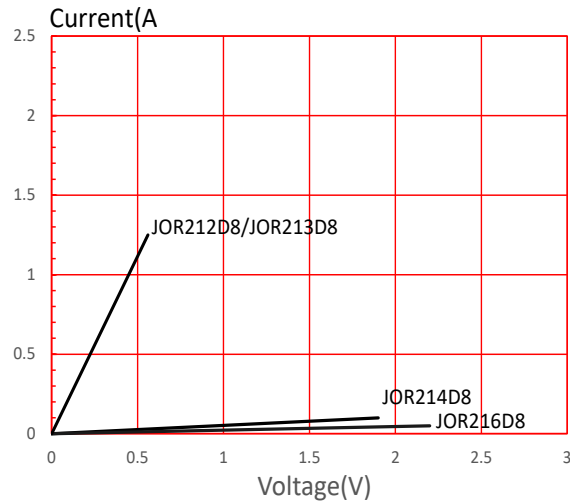
**FIG.3:** On Resistance vs. Ambient Temperature



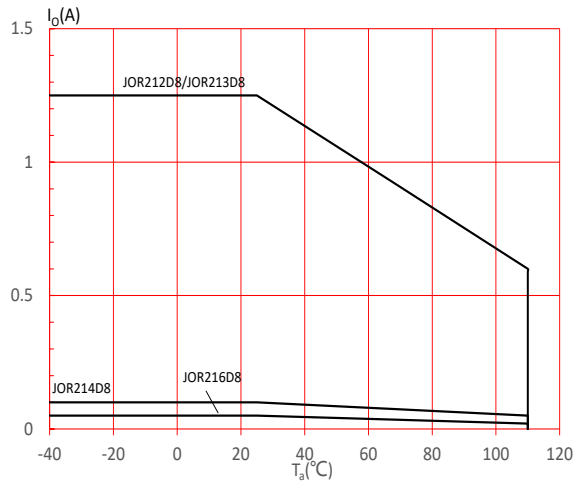
**FIG.5:** LED Operate Current vs. Ambient Temperature



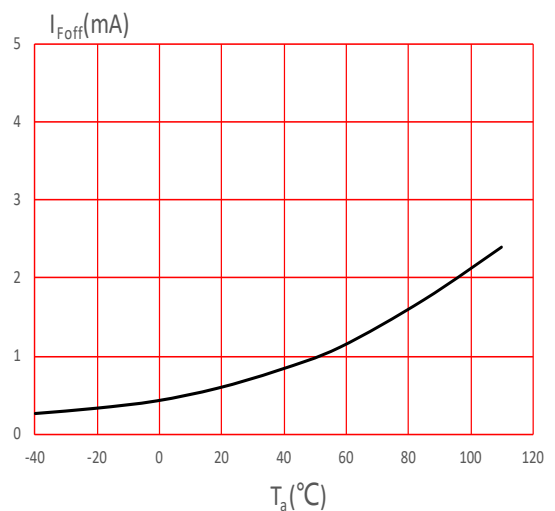
**FIG.2:** Output Current vs. Output Voltage



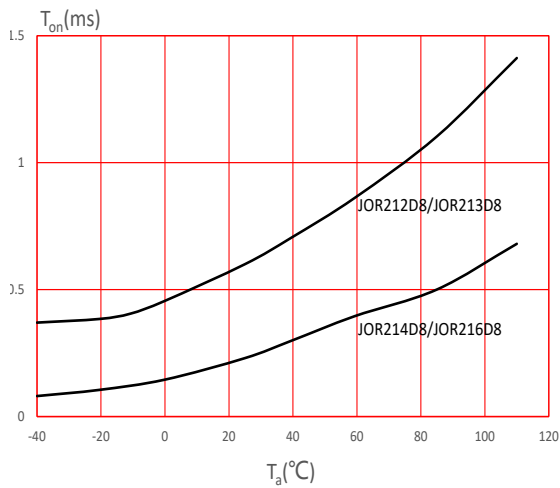
**FIG.4:** Load Current vs. Ambient Temperature



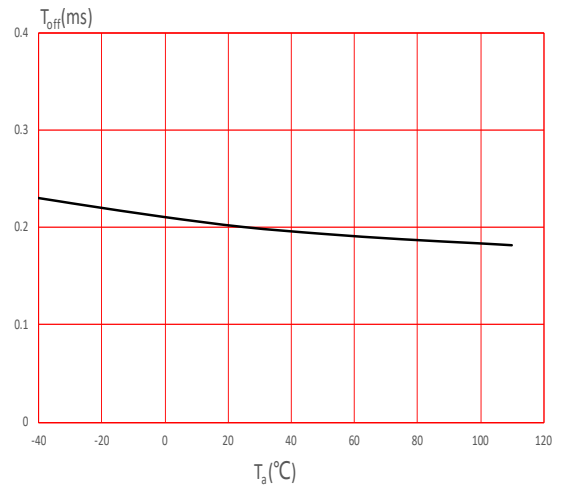
**FIG.6:** LED Turn Off Current vs. Ambient Temperature



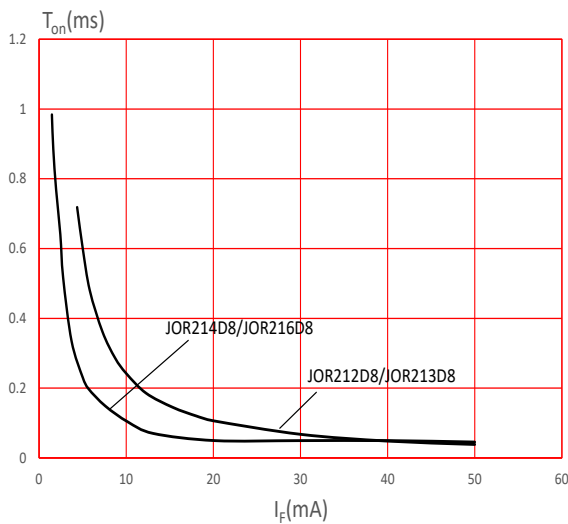
**FIG.7: Turn On Time vs. Ambient Temperature**



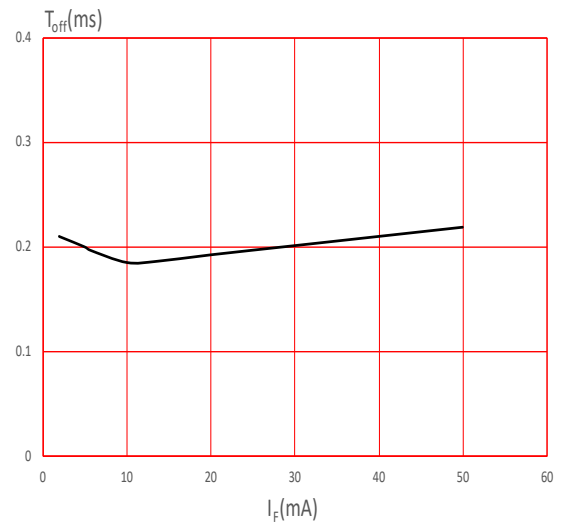
**FIG.8: Turn Off Time vs. Ambient Temperature**



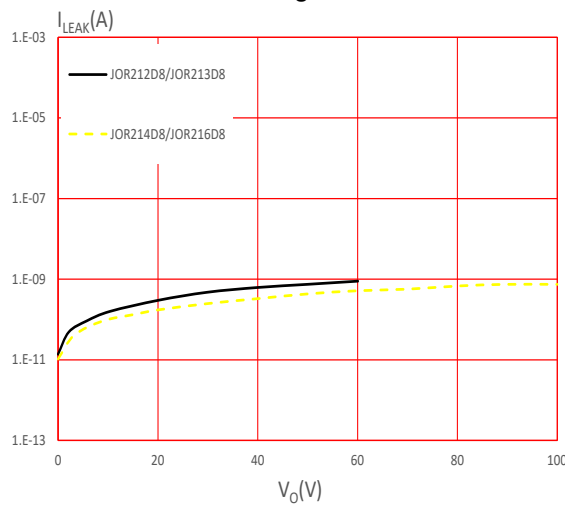
**FIG.9: Turn On Time vs. LED Forward Current**



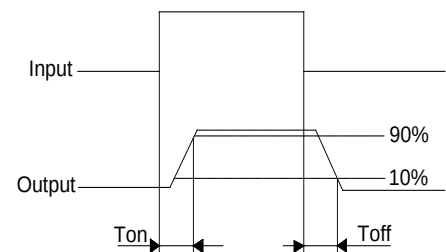
**FIG.10: Turn Off Time vs. LED Forward Current**



**FIG.11: Off State Leakage Current vs. Load Voltage**

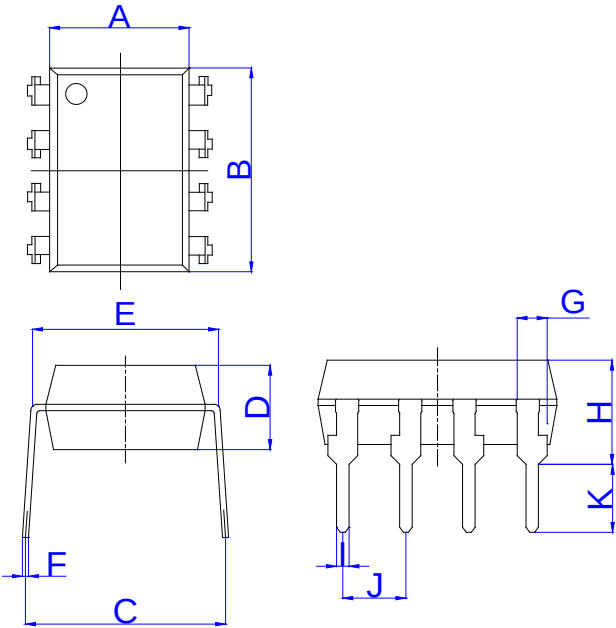


**Fig.12: Turn on/Turn off time**



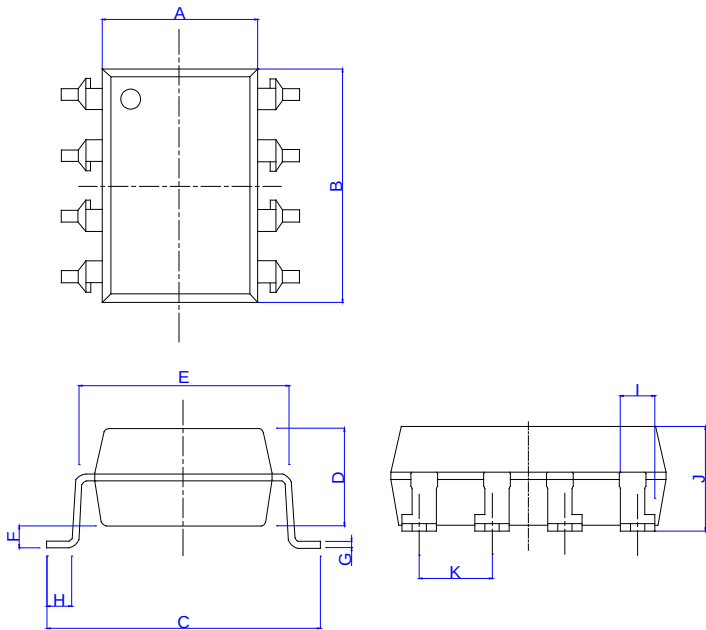
Package Dimension (Unit: mm)

Standard DIP Type:



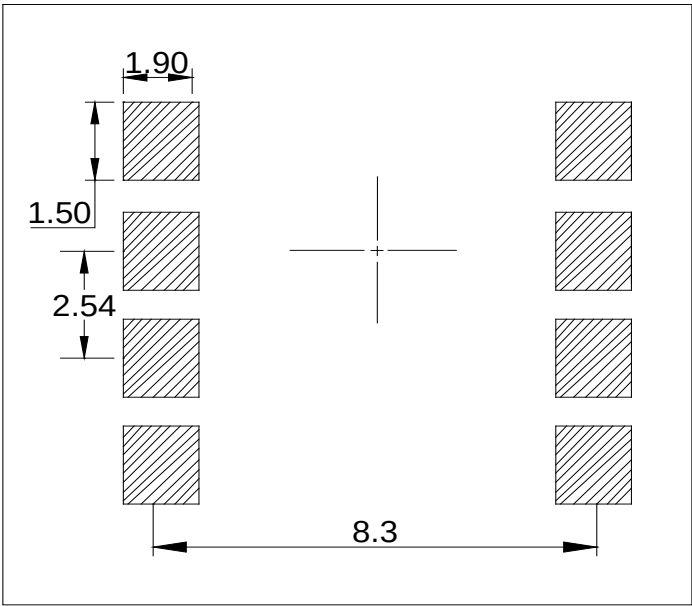
| Ref. | Dimensions  |      |      |        |      |       |
|------|-------------|------|------|--------|------|-------|
|      | Millimeters |      |      | Inches |      |       |
|      | Min.        | Typ. | Max. | Min.   | Typ. | Max.  |
| A    | 6.20        |      | 6.60 | 0.244  |      | 0.260 |
| B    | 9.40        |      | 9.80 | 0.370  |      | 0.386 |
| C    | 7.15        |      | 8.95 | 0.281  |      | 0.352 |
| D    | 3.20        |      | 3.60 | 0.126  |      | 0.142 |
| E    | 7.32        |      | 7.92 | 0.288  |      | 0.312 |
| F    | 0.15        |      | 0.35 | 0.006  |      | 0.014 |
| G    | 0.90        |      | 1.50 | 0.035  |      | 0.059 |
| H    | 3.90        |      | 4.50 | 0.154  |      | 0.177 |
| I    | 0.40        |      | 0.60 | 0.016  |      | 0.024 |
| J    | 2.29        |      | 2.79 | 0.090  |      | 0.110 |
| K    | 2.24        |      | 3.24 | 0.088  |      | 0.128 |

Option SMD Type:



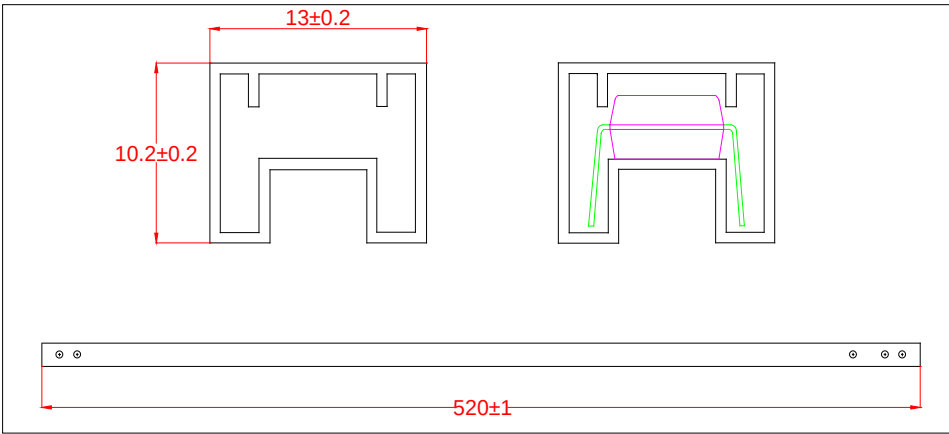
| Ref. | Dimensions  |      |       |        |      |       |
|------|-------------|------|-------|--------|------|-------|
|      | Millimeters |      |       | Inches |      |       |
|      | Min.        | Typ. | Max.  | Min.   | Typ. | Max.  |
| A    | 6.20        |      | 6.60  | 0.244  |      | 0.260 |
| B    | 9.40        |      | 9.80  | 0.370  |      | 0.386 |
| C    | 9.50        |      | 10.50 | 0.374  |      | 0.413 |
| D    | 3.20        |      | 3.60  | 0.126  |      | 0.142 |
| E    | 7.32        |      | 7.92  | 0.288  |      | 0.312 |
| F    | 0.05        |      | 0.35  | 0.002  |      | 0.014 |
| G    | 0.16        |      | 0.36  | 0.006  |      | 0.014 |
| H    | 0.60        |      | 1.40  | 0.024  |      | 0.055 |
| I    | 0.90        |      | 1.50  | 0.035  |      | 0.059 |
| J    | 3.30        |      | 3.90  | 0.130  |      | 0.154 |
| K    | 2.29        |      | 2.79  | 0.090  |      | 0.110 |

RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)



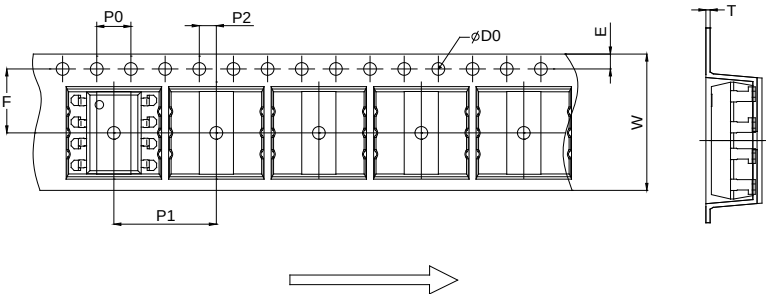
TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Standard DIP



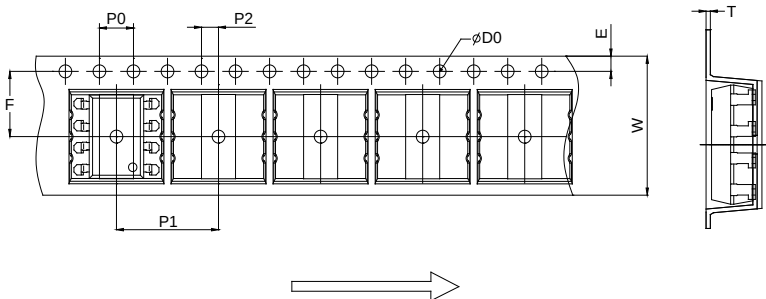
CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T3



| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| D0   |             | 1.50  | 1.60  |        | 0.059 | 0.063 |
| P0   | 3.90        | 4.00  | 4.10  | 0.154  | 0.157 | 0.161 |
| P1   | 11.90       | 12.00 | 12.10 | 0.469  | 0.472 | 0.476 |
| P2   | 1.90        | 2.00  | 2.10  | 0.075  | 0.079 | 0.083 |
| E    | 1.65        | 1.75  | 1.85  | 0.065  | 0.069 | 0.073 |
| F    | 7.40        | 7.50  | 7.60  | 0.291  | 0.295 | 0.299 |
| T    | 0.35        | 0.40  | 0.45  | 0.014  | 0.016 | 0.018 |
| W    | 15.90       | 16.00 | 16.20 | 0.626  | 0.630 | 0.638 |

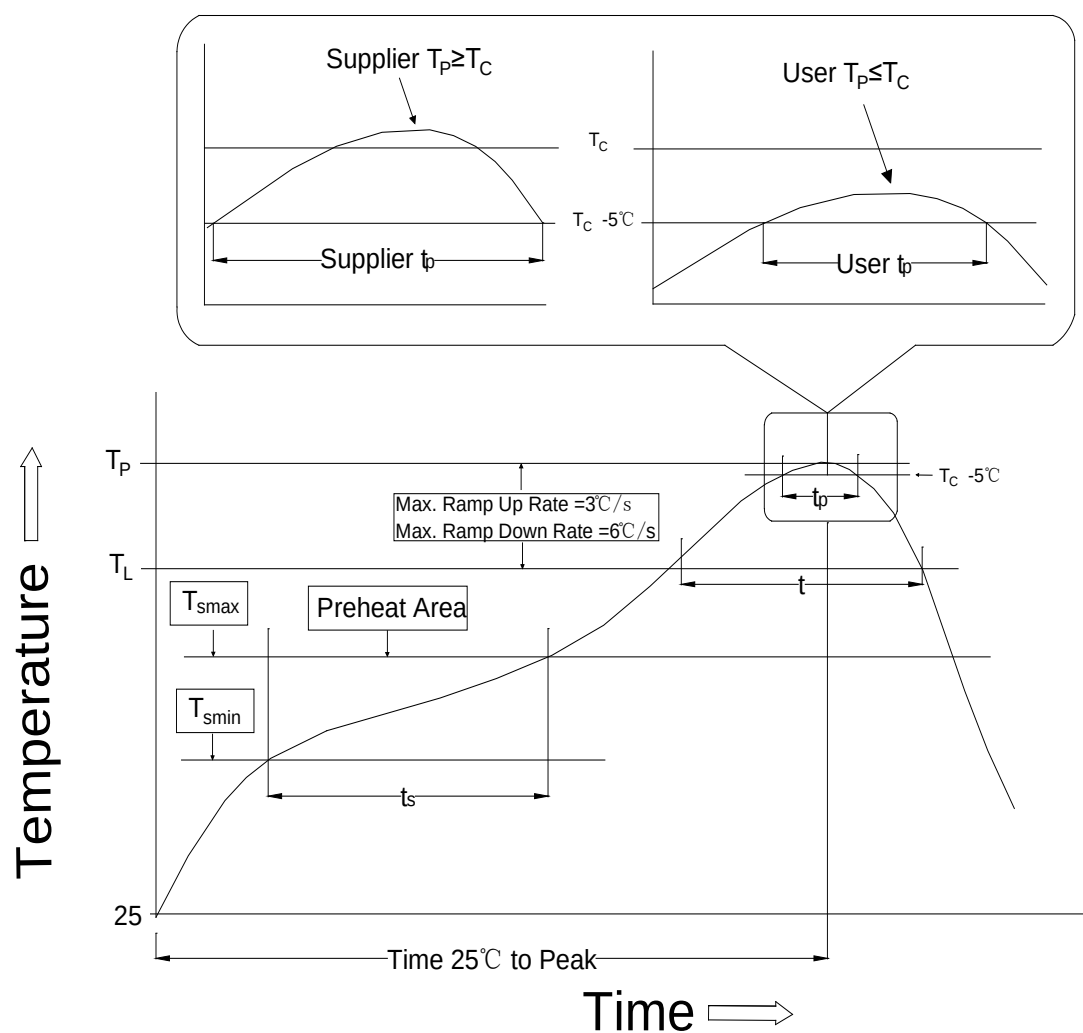
Option T4



| Ref. | Dimensions  |       |       |        |       |       |
|------|-------------|-------|-------|--------|-------|-------|
|      | Millimeters |       |       | Inches |       |       |
|      | Min.        | Typ.  | Max.  | Min.   | Typ.  | Max.  |
| D0   |             | 1.50  | 1.60  |        | 0.059 | 0.063 |
| P0   | 3.90        | 4.00  | 4.10  | 0.154  | 0.157 | 0.161 |
| P1   | 11.90       | 12.00 | 12.10 | 0.469  | 0.472 | 0.476 |
| P2   | 1.90        | 2.00  | 2.10  | 0.075  | 0.079 | 0.083 |
| E    | 1.65        | 1.75  | 1.85  | 0.065  | 0.069 | 0.073 |
| F    | 7.40        | 7.50  | 7.60  | 0.291  | 0.295 | 0.299 |
| T    | 0.35        | 0.40  | 0.45  | 0.014  | 0.016 | 0.018 |
| W    | 15.90       | 16.00 | 16.20 | 0.626  | 0.630 | 0.638 |

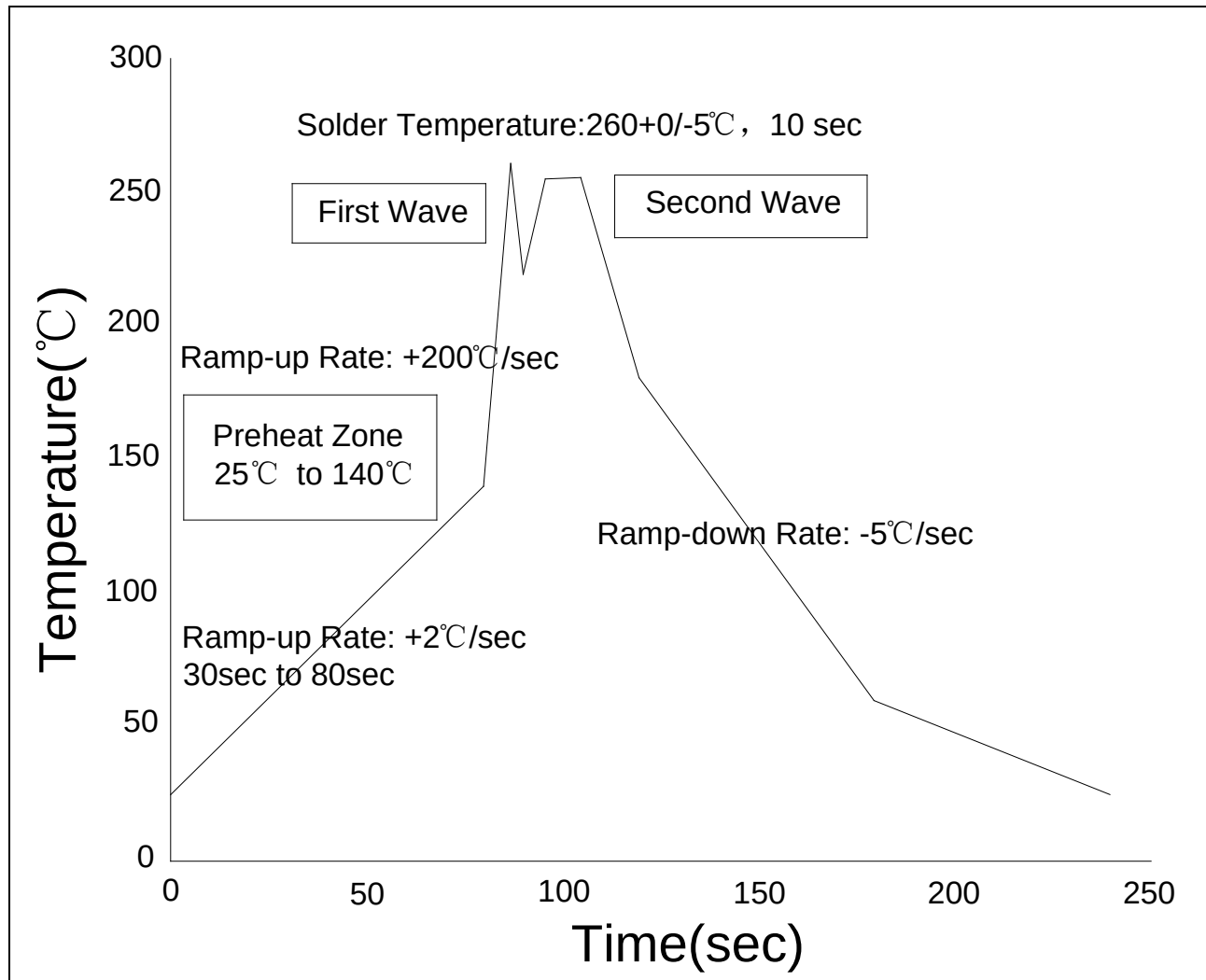


## REFLOW INFORMATION



| Profile Feature                                                | Sn-Pb Assembly Profile                                   | Pb-Free Assembly Profile                                 |
|----------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| Temperature Min. ( $T_{smin}$ )                                | $100^\circ\text{C}$                                      | $150^\circ\text{C}$                                      |
| Temperature Max. ( $T_{smax}$ )                                | $150^\circ\text{C}$                                      | $200^\circ\text{C}$                                      |
| Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )               | 60-120 seconds                                           | 60-120 seconds                                           |
| Ramp-up Rate ( $t_L$ to $t_P$ )                                | $3^\circ\text{C/second max.}$                            | $3^\circ\text{C/second max.}$                            |
| Liquidus Temperature ( $T_L$ )                                 | $183^\circ\text{C}$                                      | $217^\circ\text{C}$                                      |
| Time ( $t_L$ ) Maintained Above ( $T_L$ )                      | 60-150 seconds                                           | 60-150 seconds                                           |
| Peak Body Package Temperature                                  | $235^\circ\text{C} + 0^\circ\text{C} / -5^\circ\text{C}$ | $260^\circ\text{C} + 0^\circ\text{C} / -5^\circ\text{C}$ |
| Time ( $t_P$ ) within $5^\circ\text{C}$ of $260^\circ\text{C}$ | 10 seconds                                               | 10 seconds                                               |
| Ramp-down Rate ( $T_P$ to $T_L$ )                              | $3-6^\circ\text{C/second}$                               | $3-6^\circ\text{C/second}$                               |
| Time $25^\circ\text{C}$ to Peak Temperature                    | 6 minutes max.                                           | 8 minutes max.                                           |

## WAVE SOLDERING



## HAND SOLDERING BY SOLDERING IRON

|                       |                           |
|-----------------------|---------------------------|
| Soldering Temperature | $360 \pm 5^\circ\text{C}$ |
| Soldering Time        | 3s max.                   |

Note:

1. Reflow soldering is recommended at the temperatures and times shown, no more than three times.
2. Avoid direct contact between the epoxy body and any tools or surfaces exceeding its maximum storage temperature.
3. Application of pressure on the epoxy body is prohibited at elevated temperatures. In specific scenarios, any applied force must not exceed 2.5N.
4. Ensure the component has cooled to ambient temperature before proceeding with any subsequent manufacturing steps.
5. The component has a shelf life of one year when stored under standard conditions.
6. Recommend storage Temp.: 0~40°C;  
Recommend storage humidity: <60%;  
MSL level: MSL 1

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