

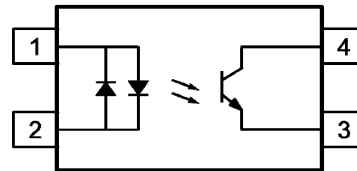
## IS1600



### DESCRIPTION

The IS1600 is an optically coupled isolator consists of two infrared emitting diodes in reverse parallel connection and optically coupled to an NPN silicon photo transistor.

This device belongs to Isocom Compact Range of Optocouplers.



- 1 Anode / Cathode
- 2 Cathode / Anode
- 3 Emitter
- 4 Collector

### FEATURES

- Half Pitch 1.27mm
- High AC Isolation voltage 3750V<sub>RMS</sub>
- Wide Operating Temperature Range -55°C to 100°C
- Pb Free and RoHS Compliant
- UL Approval E91231, Model AHP

### APPLICATIONS

- Ring Detection on Telephone Lines
- Industrial System Controllers
- Measuring Instruments
- Signal Transmission between Systems of Different Potentials and Impedances

### ORDER INFORMATION

- Available in Tape and Reel with 1000pcs per reel

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

#### Input

|   |       |
|---|-------|
| Forward Current                                   | ±50mA |
| Peak Forward Current (t=10µs)                     | ±1A   |
| Power Dissipation                                 | 70mW  |
| No Derating required up to T <sub>A</sub> = 100°C |       |

#### Output

|   |          |
|---|----------|
| Collector to Emitter Voltage V <sub>CEO</sub>                   | 80V      |
| Emitter to Collector Voltage V <sub>ECO</sub>                   | 6V       |
| Power Dissipation   | 150mW    |
| Power Dissipation Derating Factor (above T <sub>A</sub> = 80°C) | 3.7mW/°C |

#### Total Package

|                                  |                      |
|----------------------------------|----------------------|
| Isolation Voltage                | 3750V <sub>RMS</sub> |
| Total Power Dissipation          | 200mW                |
| Operating Temperature            | -55 to 100 °C        |
| Storage Temperature              | -55 to 125 °C        |
| Lead Soldering Temperature (10s) | 260°C                |

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## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

### INPUT

| Parameter            | Symbol   | Test Condition                   | Min | *Typ. | Max | Unit |
|----------------------|----------|----------------------------------|-----|-------|-----|------|
| Forward Voltage      | $V_F$    | $I_F = \pm 20\text{mA}$          |     | 1.2   | 1.4 | V    |
| Terminal Capacitance | $C_{IN}$ | $V = 0\text{V}, f = 1\text{KHz}$ |     | 50    | 250 | pF   |

### OUTPUT

| Parameter                           | Symbol     | Test Condition                          | Min | *Typ. | Max | Unit |
|-------------------------------------|------------|---|-----|-------|-----|------|
| Collector-Emitter Breakdown Voltage | $BV_{CEO}$ | $I_C = 0.1\text{mA}, I_F = 0\text{mA}$  | 80  |       |     | V    |
| Emitter-Collector Breakdown Voltage | $BV_{ECO}$ | $I_E = 0.01\text{mA}, I_F = 0\text{mA}$ | 6   |       |     | V    |
| Collector-Emitter Dark Current      | $I_{CEO}$  | $V_{CE} = 20\text{V}, I_F = 0\text{mA}$ |     |       | 100 | nA   |

### COUPLED

| Parameter                              | Symbol        | Test Condition  | Min | Typ. | Max | Unit          |
|--|---------------|---|-----|------|-----|---------------|
| Current Transfer Ratio                 | CTR           | $I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$              | 20  |      | 300 | %             |
| CTR Symmetry                           |               | $I_F = \pm 1\text{mA}, V_{CE} = 5\text{V}$              | 0.5 |      | 2.0 |               |
| Collector – Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F = \pm 20\text{mA}, I_C = 1\text{mA}$               |     | 0.1  | 0.2 | V             |
| Floating Capacitance                   | $C_f$         | $V = 0\text{V}, f = 1\text{MHz}$                        |     | 0.6  | 1.0 | pF            |
| Output Rise Time                       | $t_r$         | $V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ |     |      | 18  | $\mu\text{s}$ |
| Output Fall Time                       | $t_f$         |   |     |      | 18  |               |

### ISOLATION

| Parameter                            | Symbol    | Test Condition  | Min                | *Typ.              | Max | Unit      |
|--------------------------------------|-----------|---|--------------------|--------------------|-----|-----------|
| Input to Output Isolation Voltage    | $V_{ISO}$ | AC 1 minute, RH = 40% to 60%<br>Note 1                              | 3750               |                    |     | $V_{RMS}$ |
| Input to Output Isolation Resistance | $R_{ISO}$ | $V_{IO} = 500\text{V}, \text{RH} = 40\% \text{ to } 60\%$<br>Note 1 | $5 \times 10^{10}$ | $1 \times 10^{11}$ |     | $\Omega$  |

Note 1 : Measured with input leads shorted together and output leads shorted together, R.H 40% to 60%

\* : Typical Values at  $T_A = 25^\circ\text{C}$

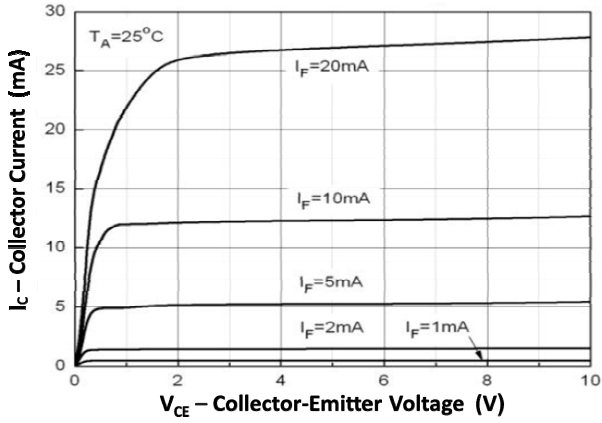


Fig 1 Collector Current vs Collector-Emitter Voltage (1)

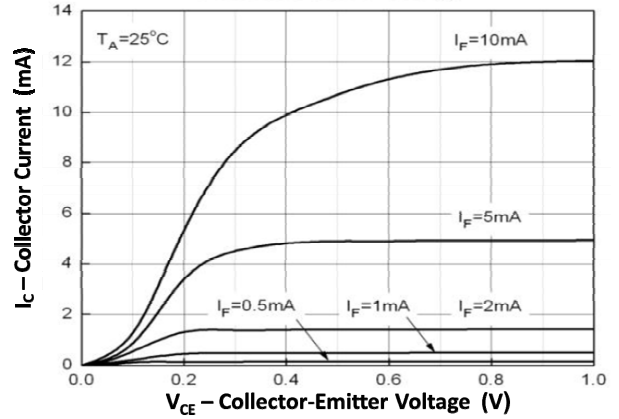


Fig 2 Collector Current vs Collector-Emitter Voltage (2)

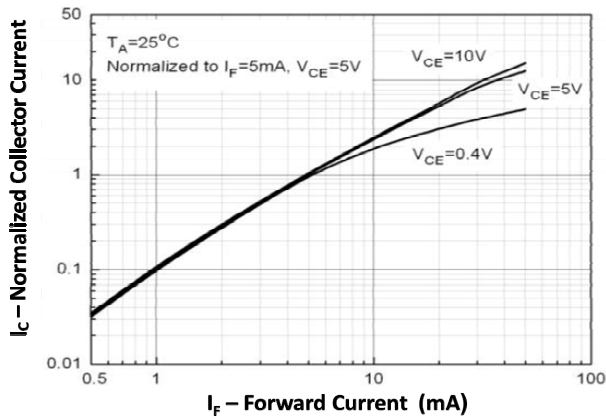


Fig 3 Normalized Collector Current vs Forward Current

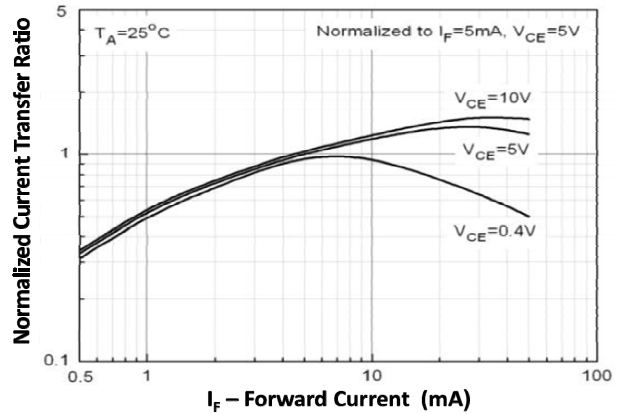


Fig 4 Normalized Current Transfer Ratio vs Forward Current

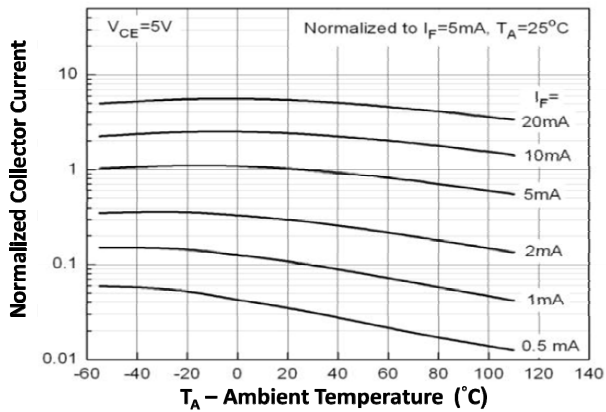


Fig 5 Normalized Collector Current vs Ambient Temperature

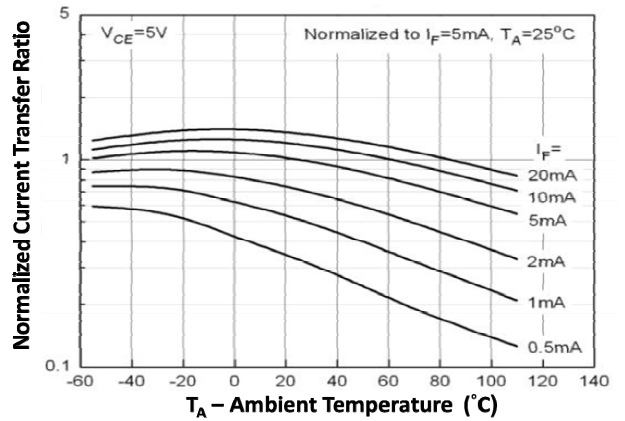


Fig 6 Normalized Current Transfer Ratio vs Ambient Temperature

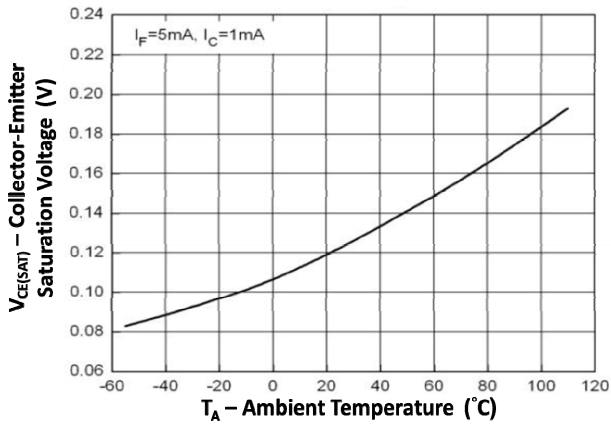


Fig 7 Collector-Emitter Saturation Voltage vs Ambient Temperature

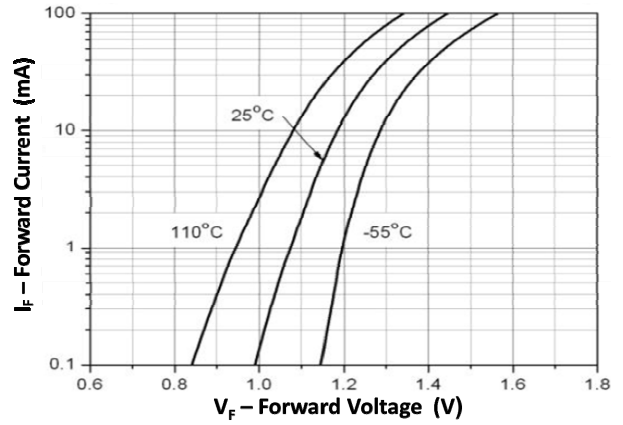


Fig 8 Forward Current vs Forward Voltage

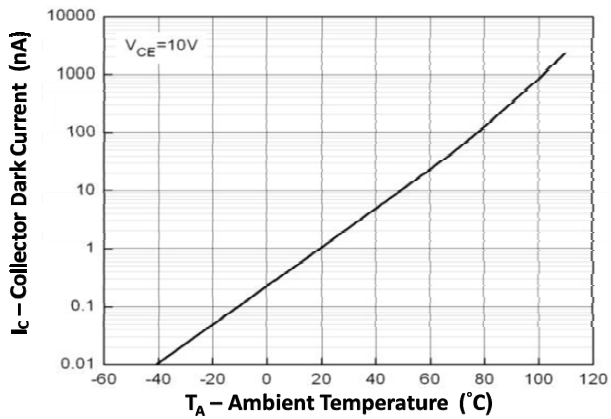


Fig 9 Collector Dark Current vs Ambient Temperature

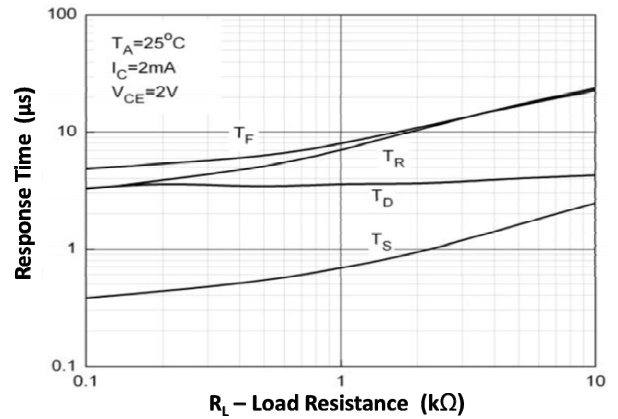
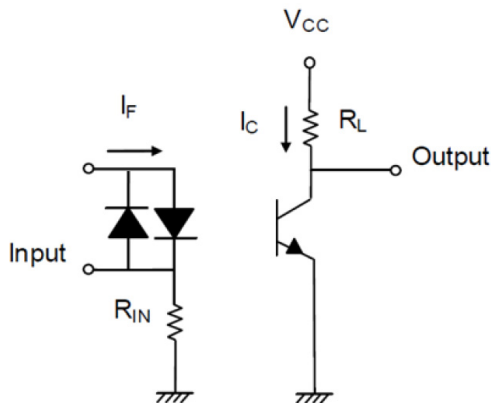
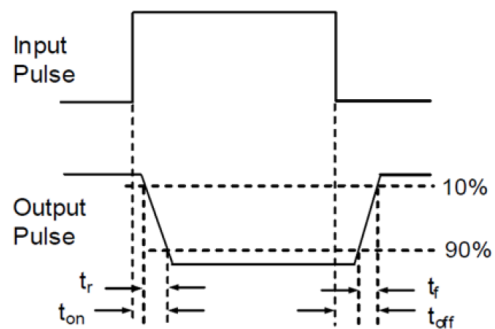


Fig 10 Response Time vs Load Resistance



Switching Time Test Circuit



## IS1600

### ORDER INFORMATION

| IS1600   |        |                           |                   |
|----------|--------|---------------------------|-------------------|
| After PN | PN     | Description               | Packing quantity  |
| None     | IS1600 | Surface Mount Tape & Reel | 1000 pcs per reel |

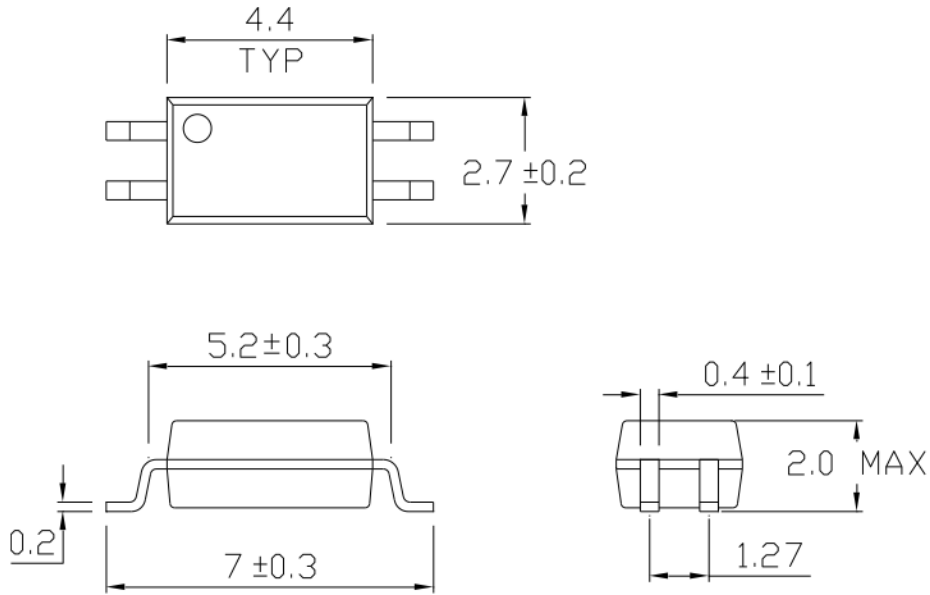
### DEVICE MARKING



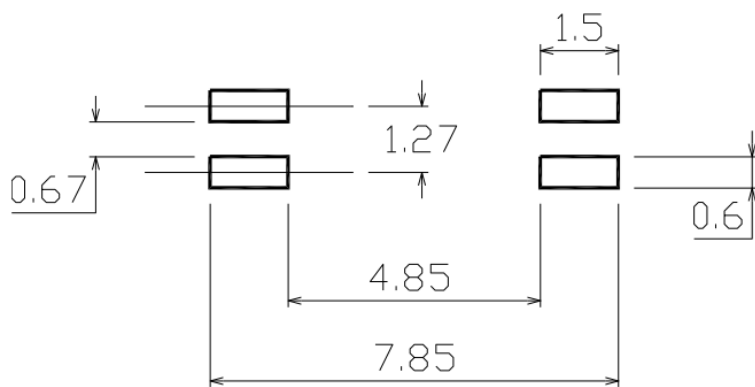
|      |                            |
|------|----------------------------|
| AHP1 | denotes Device Part Number |
| /    | denotes Isocom             |
| Y    | denotes 1 digit Year code  |
| WW   | denotes 2 digit Week code  |

## IS1600

### PACKAGE DIMENSIONS (mm)

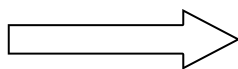
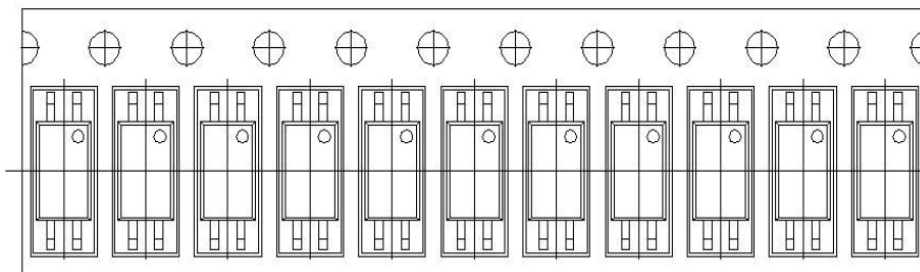


### RECOMMENDED SOLDER PAD LAYOUT (mm)

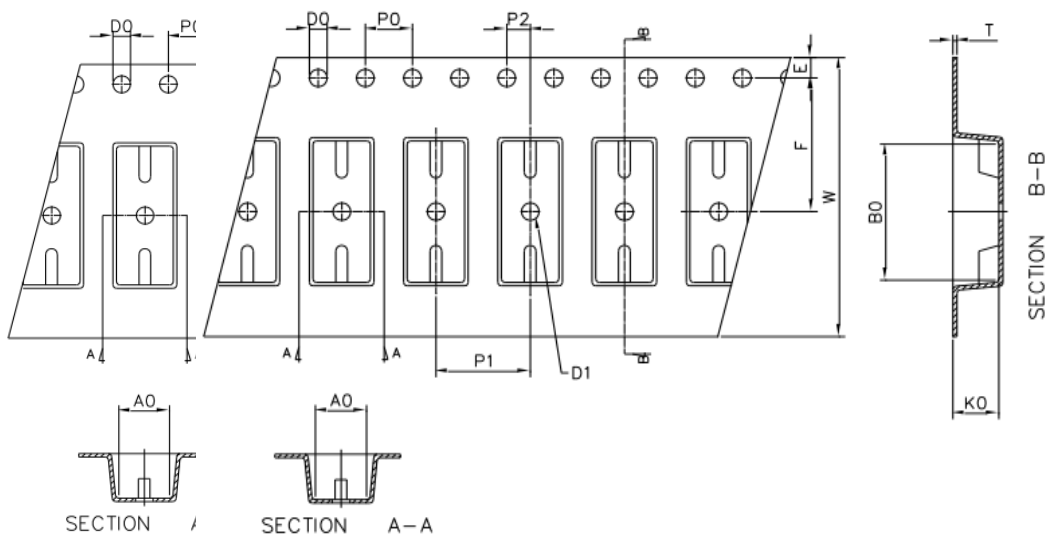




**TAPE AND REEL PACKAGING**



Direction of Feed from Reel

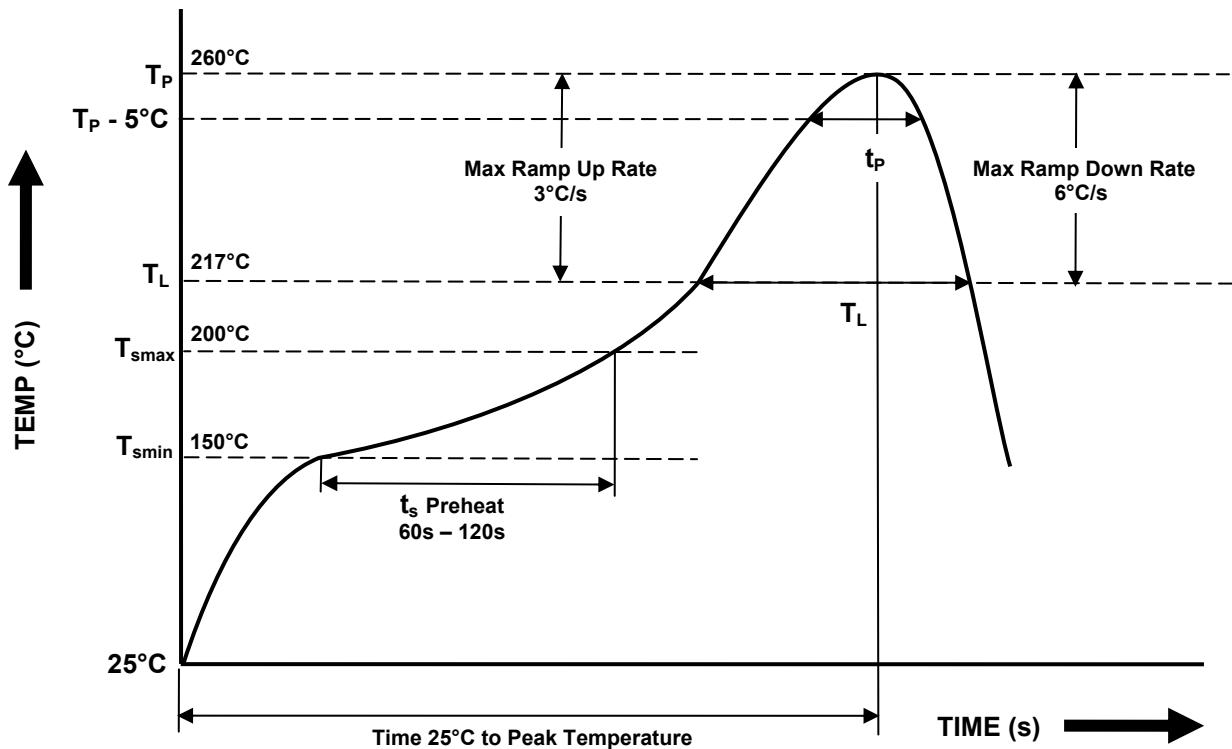


|                |           |           |             |           |           |           |
|----------------|-----------|-----------|-------------|-----------|-----------|-----------|
| Dimension No.  | <b>A0</b> | <b>B0</b> | <b>D0</b>   | <b>D1</b> | <b>E</b>  | <b>F</b>  |
| Dimension( mm) | 3.00±0.10 | 7.45±0.10 | 1.50+0.1/-0 | 1.50±0.10 | 1.75±0.10 | 5.5±0.10  |
| Dimension No.  | <b>P0</b> | <b>P1</b> | <b>P2</b>   | <b>t</b>  | <b>W</b>  | <b>K0</b> |
| Dimension (mm) | 4.00±0.15 | 4.00±0.10 | 2.00±0.10   | 0.30±0.05 | 12.1±0.2  | 2.45±0.1  |

**IR REFLOW SOLDERING TEMPERATURE PROFILE**

One Time Reflow Soldering is Recommended.

Do not immerse device body in solder paste.



| Profile Details   | Conditions   |
|---|--|
| <b>Preheat</b><br>- Min Temperature (T <sub>SMIN</sub> )<br>- Max Temperature (T <sub>SMAX</sub> )<br>- Time T <sub>SMIN</sub> to T <sub>SMAX</sub> (t <sub>s</sub> )   | 150°C<br>200°C<br>60s - 120s                           |
| <b>Soldering Zone</b><br>- Peak Temperature (T <sub>P</sub> )<br>- Liquidous Temperature (T <sub>L</sub> )<br>- Time within 5°C of Actual Peak Temperature (T <sub>P</sub> - 5°C)<br>- Time maintained above T <sub>L</sub> (t <sub>L</sub> )<br>- Ramp Up Rate (T <sub>L</sub> to T <sub>P</sub> )<br>- Ramp Down Rate (T <sub>P</sub> to T <sub>L</sub> ) | 260°C<br>217°C<br>30s<br>60s<br>3°C/s max<br>6°C/s max |
| Average Ramp Up Rate (T <sub>smax</sub> to T <sub>P</sub> )   | 3°C/s max  |
| Time 25°C to Peak Temperature   | 8 minutes max  |





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