

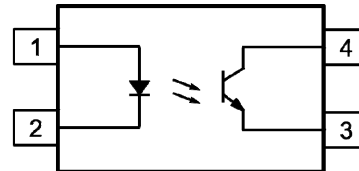
## IS281



### DESCRIPTION

The IS281 series optocoupler consists of an infrared emitting diode optically coupled to an NPN silicon photo transistor.

This device belongs to Isocom Compact Range of Optocouplers.



1 Anode  
2 Cathode  
3 Emitter  
4 Collector

### FEATURES

- Half Pitch 1.27mm
- High AC Isolation voltage 3750V<sub>RMS</sub>
- CTR Selections Available
- Wide Operating Temperature Range -55°C to 110°C
- Pb Free and RoHS Compliant
- UL Approval E91231, Model "THP"

### APPLICATIONS

- Switching Mode Power Supply
- 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 |
| Reverse Voltage   | 6V   |
| Power dissipation | 70mW |

#### Output

|  |       |
|--|-------|
| Collector to Emitter Voltage BV <sub>CEO</sub> | 80V   |
| Emitter to Collector Voltage BV <sub>ECO</sub> | 7V    |
| Collector Current                              | 50mA  |
| Power Dissipation                              | 150mW |

#### Total Package

|                                  |                      |
|----------------------------------|----------------------|
| Isolation Voltage                | 3750V <sub>RMS</sub> |
| Total Power Dissipation          | 200mW                |
| Operating Temperature            | -55 to 110 °C        |
| Storage Temperature              | -55 to 150 °C        |
| Lead Soldering Temperature (10s) | 260°C                |

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## IS281

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

#### INPUT

| Parameter            | Symbol   | Test Condition                   | Min | Typ. | Max | Unit          |
|----------------------|----------|----------------------------------|-----|------|-----|---------------|
| Forward Voltage      | $V_F$    | $I_F = 20\text{mA}$              |     | 1.2  | 1.4 | V             |
| Reverse Current      | $I_R$    | $V_R = 4\text{V}$                |     |      | 10  | $\mu\text{A}$ |
| Terminal Capacitance | $C_{IN}$ | $V = 0\text{V}, f = 1\text{KHz}$ |     | 30   | 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 | $BV_{ECO}$ | $I_E = 0.1\text{mA}, I_F = 0\text{mA}$  | 7   |      |     | V    |
| Collector-Emitter Dark Current      | $I_{CEO}$  | $V_{CE} = 20\text{V}, I_F = 0\text{mA}$ |     |      | 100 | nA   |

## IS281

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

#### COUPLED

| Parameter                            | Symbol        | Test Condition  | Min | Typ. | Max | Unit          |  |
|--------------------------------------|---------------|---|-----|------|-----|---------------|--|
| Current transfer ratio               | CTR           | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$                  |     |      |     | %             |  |
|                                      |               | IS281   | 50  |      | 600 |               |  |
|                                      |               | IS281A  | 80  |      | 160 |               |  |
|                                      |               | IS281B  | 130 |      | 260 |               |  |
|                                      |               | IS281C  | 200 |      | 400 |               |  |
|                                      |               | IS281D  | 300 |      | 600 |               |  |
|                                      |               | IS281E  | 100 |      | 200 |               |  |
|                                      |               | IS281F  | 150 |      | 300 |               |  |
|                                      |               | IS281GB   | 100 |      | 600 |               |  |
|                                      |               | $I_F = 10\text{mA}, V_{CE} = 5\text{V}$                 |     |      |     |               |  |
|                                      |               | IS281H  | 40  |      | 80  |               |  |
|                                      |               | IS281I  | 63  |      | 125 |               |  |
|                                      |               | IS281J  | 100 |      | 200 |               |  |
|                                      |               | IS281K  | 160 |      | 320 |               |  |
| IS281GR                              | 100           |   | 300 |      |     |               |  |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F = 10\text{mA}, I_C = 1\text{mA}$                   |     | 0.1  | 0.2 | V             |  |
| Floating Capacitance                 | $C_f$         | $V_F = 0\text{V}, f = 1\text{MHz}$                      |     | 0.3  |     | pF            |  |
| Output Rise Time                     | $t_r$         | $V_{CE} = 2\text{V}, I_c = 2\text{mA}, R_L = 100\Omega$ |     | 6    | 18  | $\mu\text{s}$ |  |
| Output Fall Time                     | $t_f$         | $V_{CE} = 2\text{V}, I_c = 2\text{mA}, R_L = 100\Omega$ |     | 6    | 18  | $\mu\text{s}$ |  |

#### ISOLATION

| Parameter                 | Symbol    | Test Condition   | Min                | Typ. | Max | Unit      |
|---------------------------|-----------|--|--------------------|------|-----|-----------|
| Isolation Voltage         | $V_{ISO}$ | R.H. = 40% to 60%, $t = 1\text{ min}$<br>Note 1          | 3750               |      |     | $V_{RMS}$ |
| Input - Output Resistance | $R_{I-O}$ | $V_{I-O} = 500\text{VDC}$<br>R.H. = 40% to 60%<br>Note 1 | $5 \times 10^{10}$ |      |     | $\Omega$  |

Note 1 : Measured with input leads shorted together and output leads shorted together.

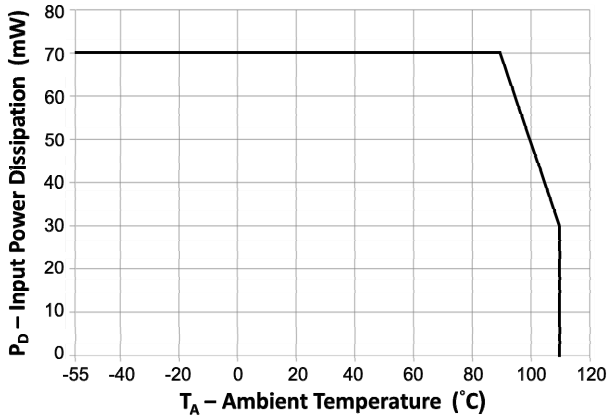


Fig 1 Input Power Dissipation vs Ambient Temperature

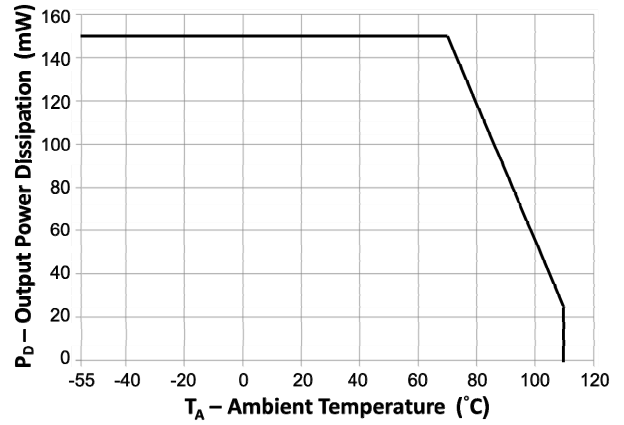


Fig 2 Output Power Dissipation vs Ambient Temperature

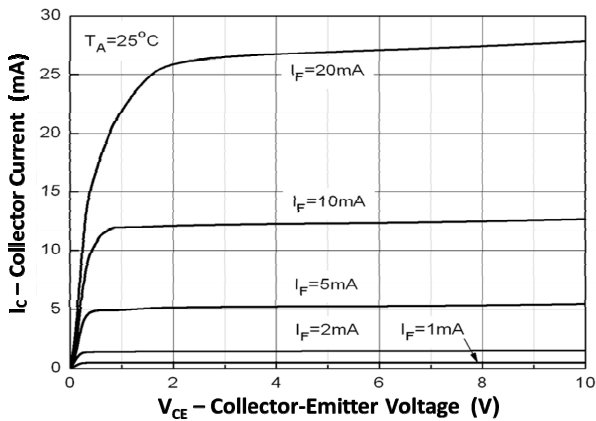


Fig 3 Collector Current vs Collector-Emitter Voltage (1)

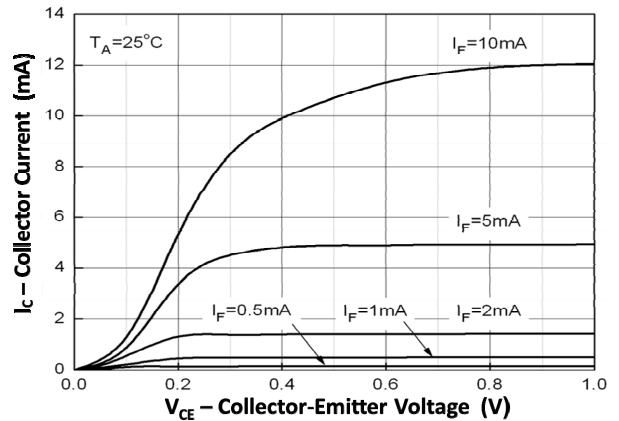


Fig 4 Collector Current vs Collector-Emitter Voltage (2)

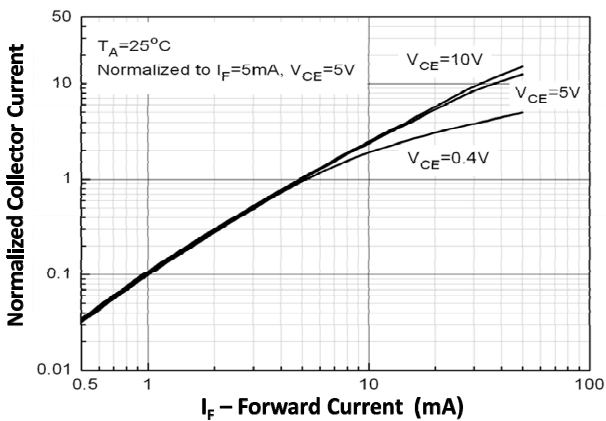


Fig 5 Normalized Collector Current vs Forward Voltage

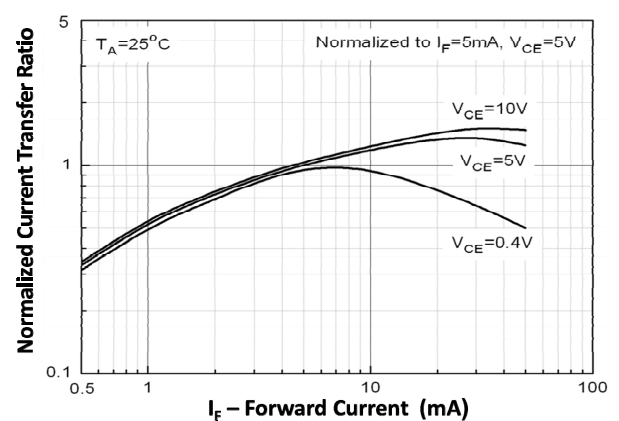


Fig 6 Collector Current Transfer Ratio vs Forward Current

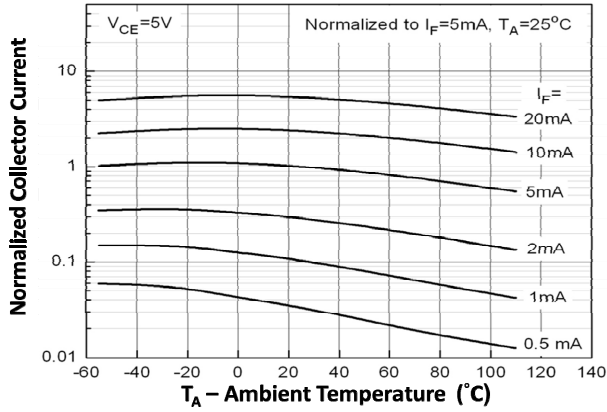


Fig 7 Normalized Collector Current vs Ambient Temperature

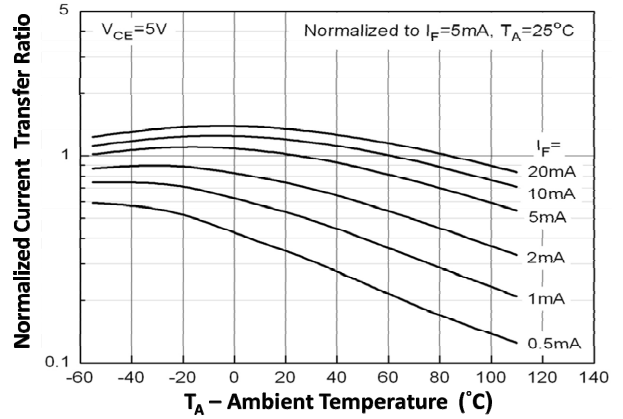


Fig 8 Normalized Current Transfer Ratio vs Ambient Temperature

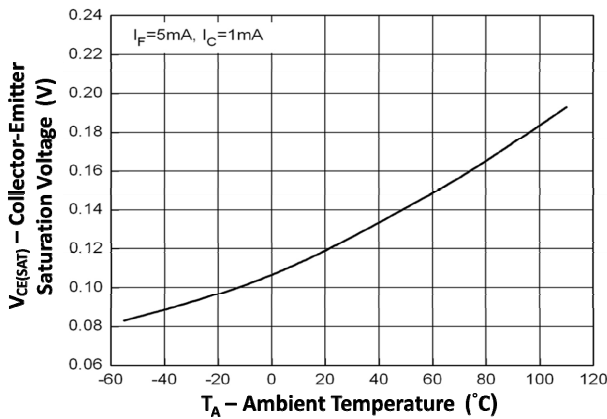


Fig 9 Collector-Emitter Voltage vs Ambient Temperature

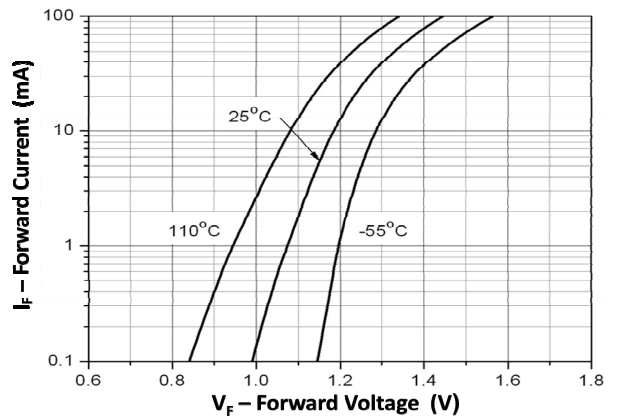


Fig 10 Forward Current vs Forward Voltage

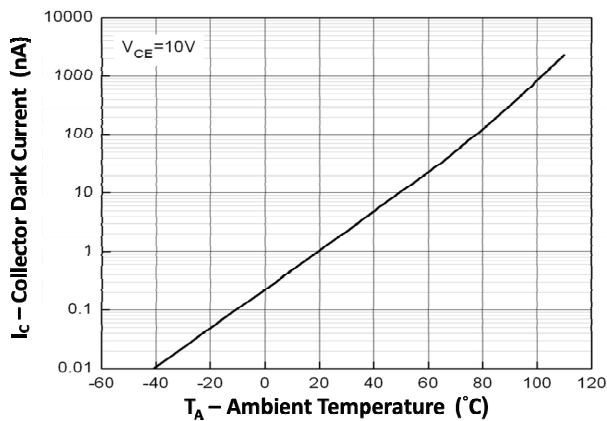


Fig 11 Collector Dark Current vs Ambient Temperature

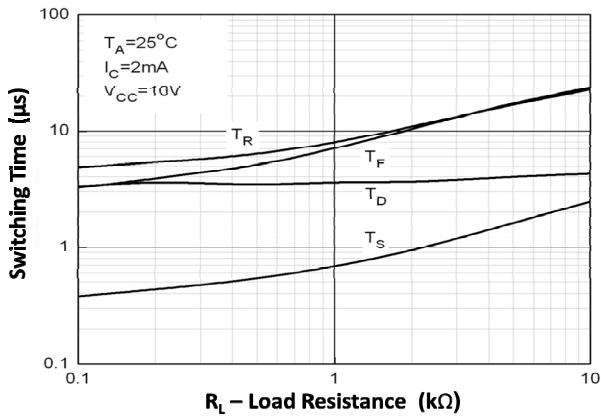
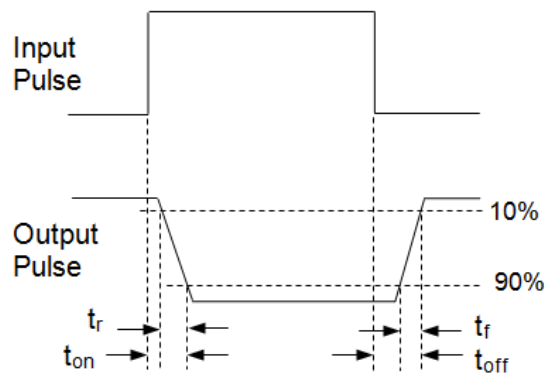
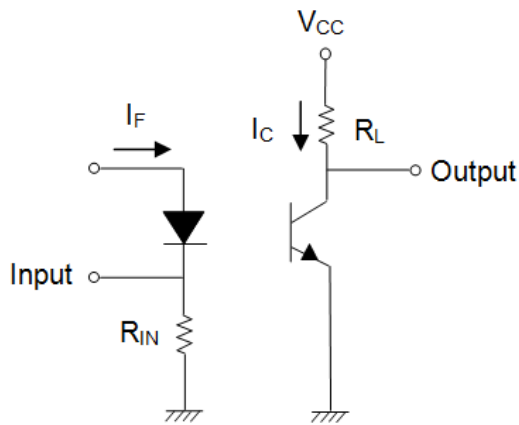


Fig 12 Switching Time vs Load Resistance



Switching Time Test Circuit

## IS281

### ORDER INFORMATION

| IS281         |  |                           |                   |
|---------------|--|---------------------------|-------------------|
| After PN      | PN   | Description               | Packing quantity  |
| None          | IS281  | Surface Mount Tape & Reel | 1000 pcs per reel |
| Any CTR Grade | IS281A, IS281B, IS281C, IS281D, IS281E, IS281F, IS281H, IS281I, IS281J, IS281K, IS281GR, IS281GB | Surface Mount Tape & Reel | 1000 pcs per reel |

**NOTE : Multiple Grades may be supplied to meet the requested specification**

### DEVICE MARKING



THP\_ denotes Device Part Number where “\_” denotes CTR Grade

I denotes Isocom

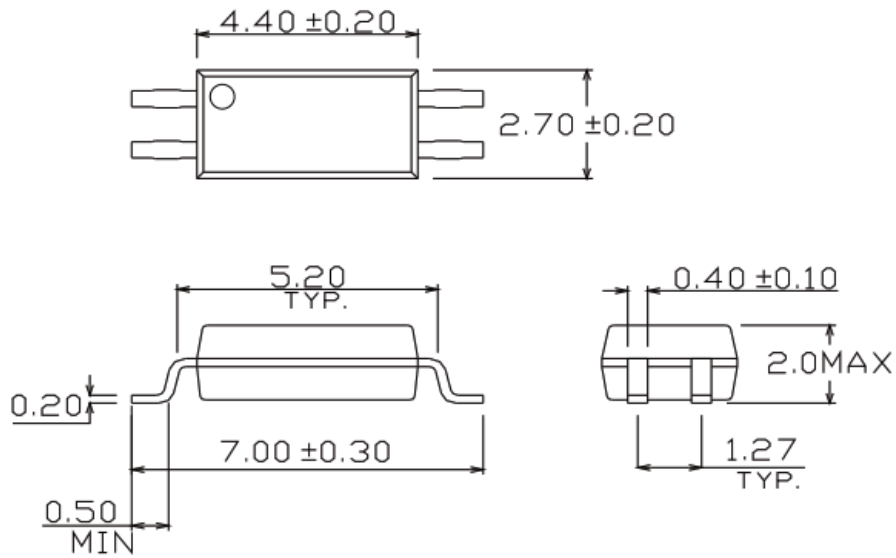
Y denotes 1 digit Year code

WW denotes 2 digit Week code

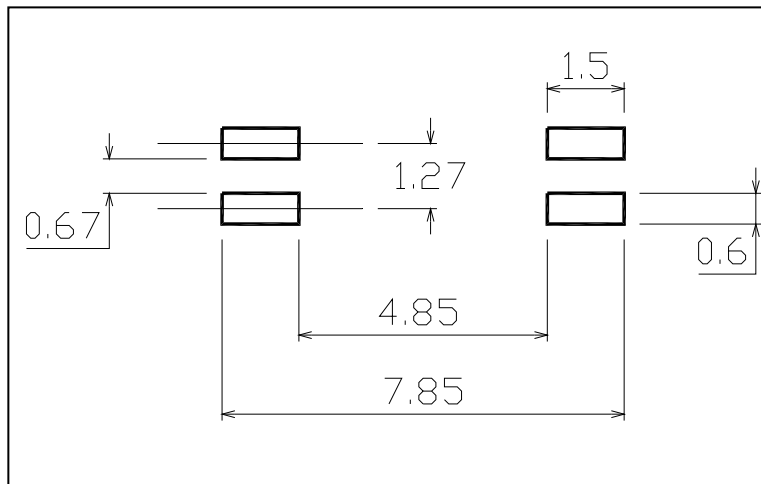
|               |               |                         |
|---------------|---------------|-------------------------|
| <b>Note :</b> | <b>Device</b> | <b>Optional Marking</b> |
|               | IS281         | THP1                    |
|               | IS281B        | THP3                    |
|               | IS281F        | THP10                   |

# IS281

## PACKAGE DIMENSIONS (mm)

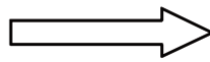
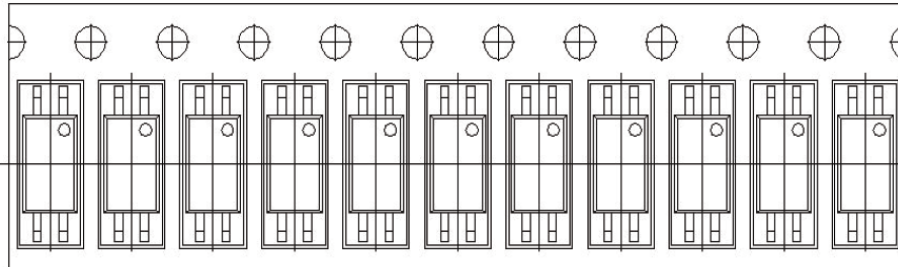


## RECOMMENDED SOLDER PAD LAYOUT (mm)

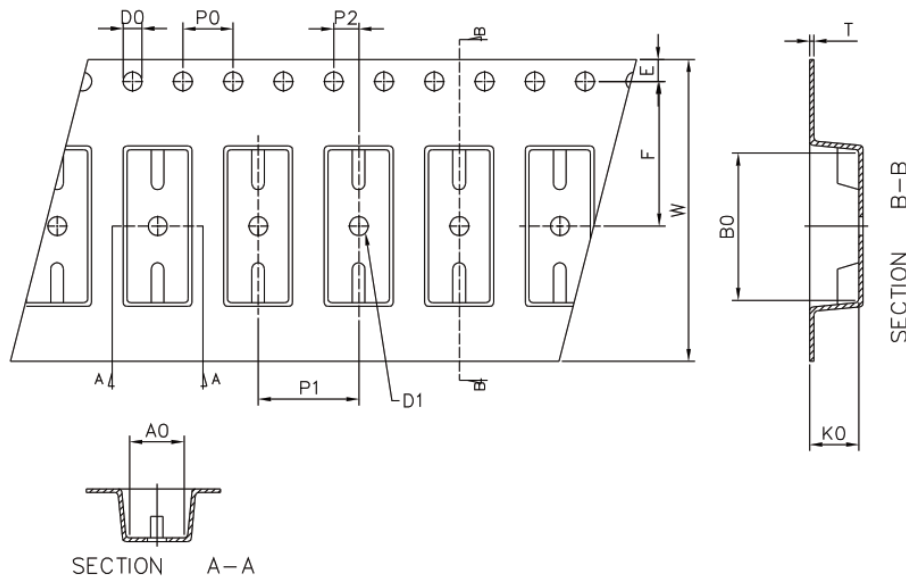




Tape and Reel Packaging



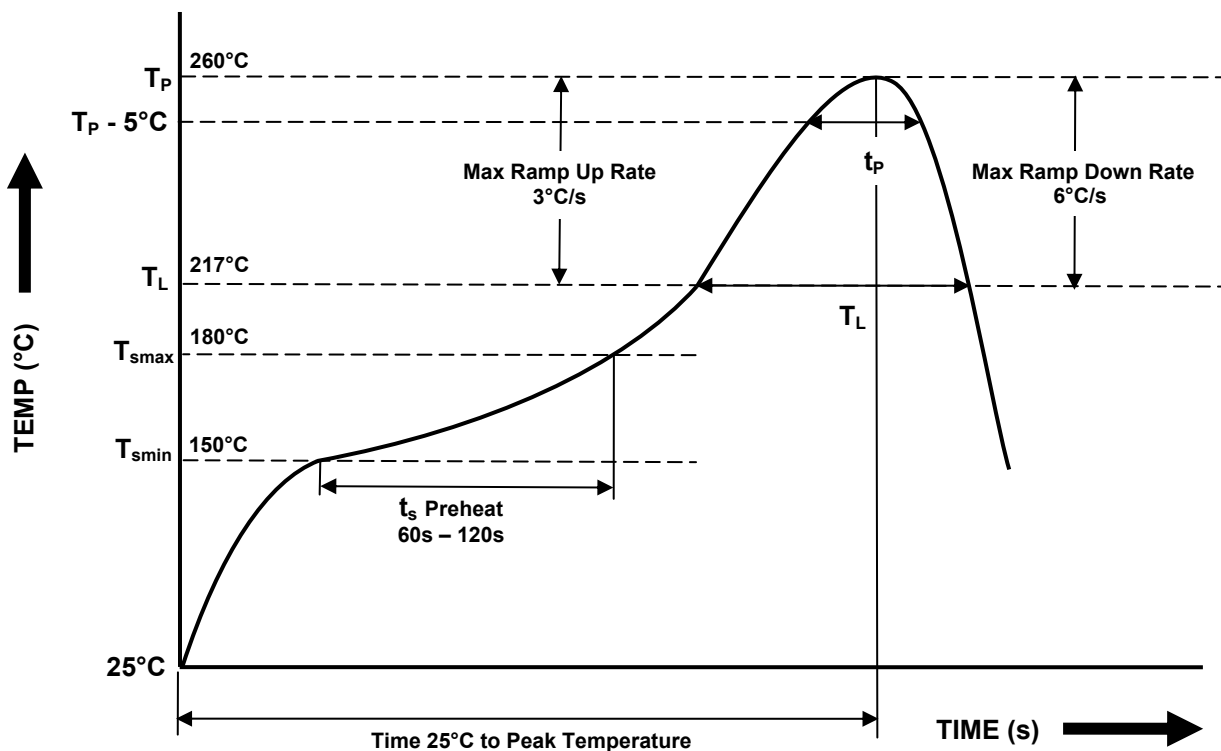
Direction of feed from reel



|                |           |           |             |           |           |           |
|----------------|-----------|-----------|-------------|-----------|-----------|-----------|
| 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>180°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>20s<br>60s<br>3°C/s max<br>3 - 6°C/s |
| 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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