



# THE DATASHEET OF IS281C



## 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.

## FEATURES

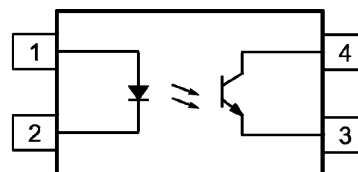
- Half Pitch 1.27mm
- High AC Isolation voltage 3750V<sub>RMS</sub>
- CTR Selections Available
- Wide Operating Temperature Range -55°C to 110°C
- Pb Free and RoHS Compliant
- UL Approval E91231, Model "THP"

## 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



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

## 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                     | $t_r$         | $V_{CE} = 2\text{V}$ , $I_C = 2\text{mA}$ ,<br>$R_L = 100\Omega$ |     | 6    | 18  | $\mu\text{s}$ |
| Output Fall Time                     | $t_f$         | $V_{CE} = 2\text{V}$ , $I_C = 2\text{mA}$ ,<br>$R_L = 100\Omega$ |     | 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.

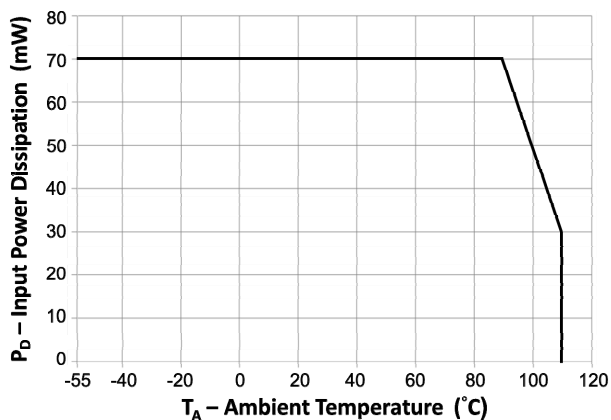


**Fig 1 Input Power Dissipation vs Ambient Temperature**

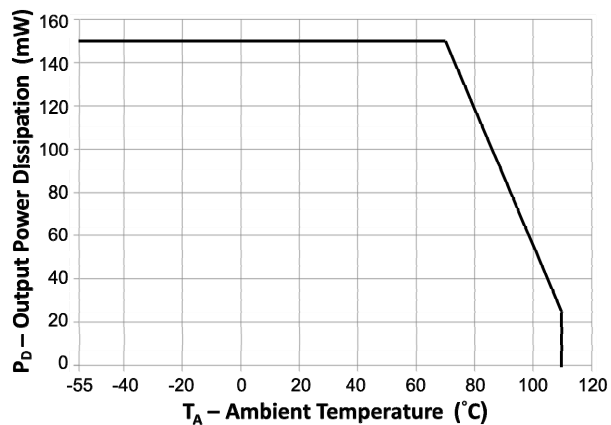


**Fig 2 Output Power Dissipation vs Ambient Temperature**

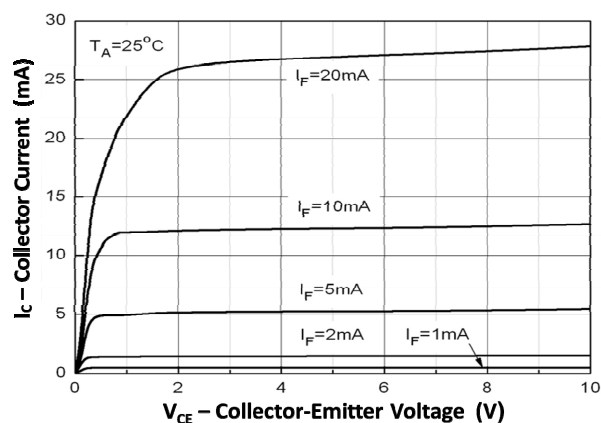


**Fig 3 Collector Current vs Collector-Emitter Voltage (1)**

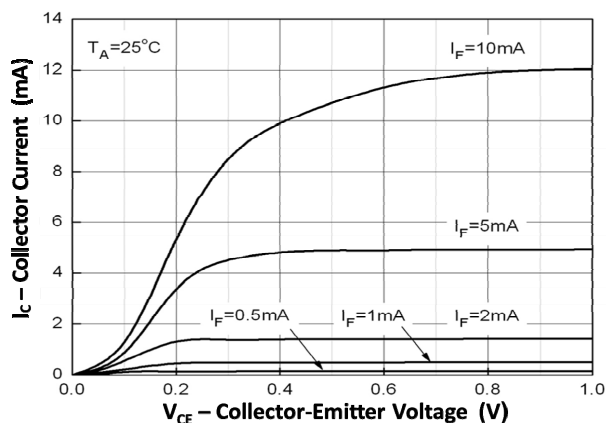


**Fig 4 Collector Current vs Collector-Emitter Voltage (2)**

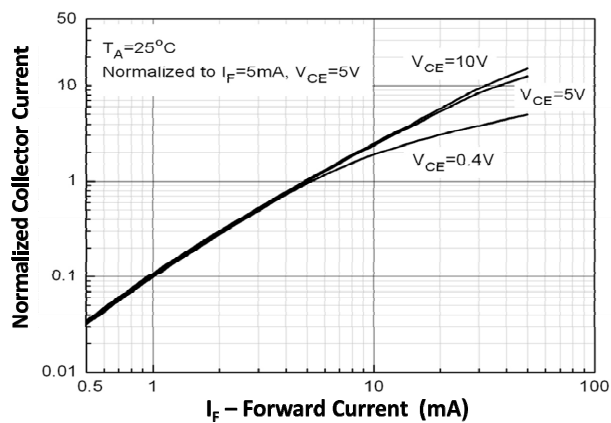


**Fig 5 Normalized Collector Current vs Forward Voltage**

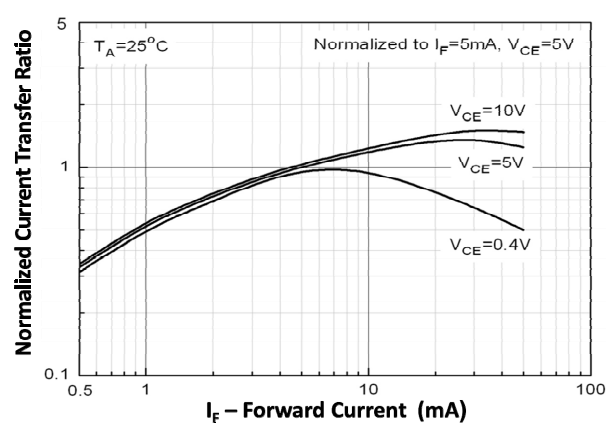


**Fig 6 Collector Current Transfer Ratio vs Forward Current**

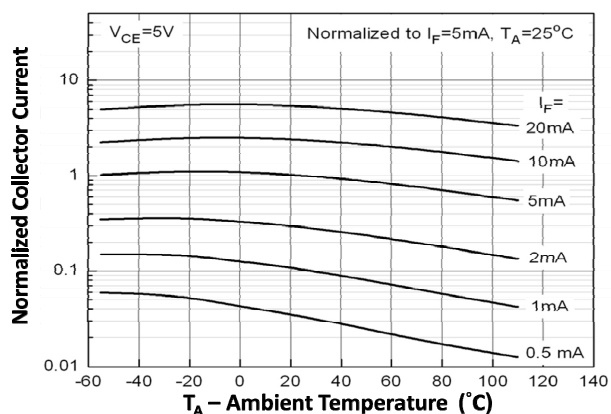


**Fig 7 Normalized Collector Current vs Ambient Temperature**

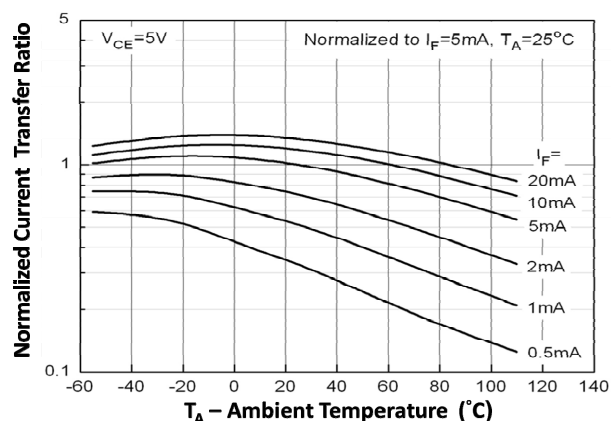


**Fig 8 Normalized Current Transfer Ratio vs Ambient Temperature**

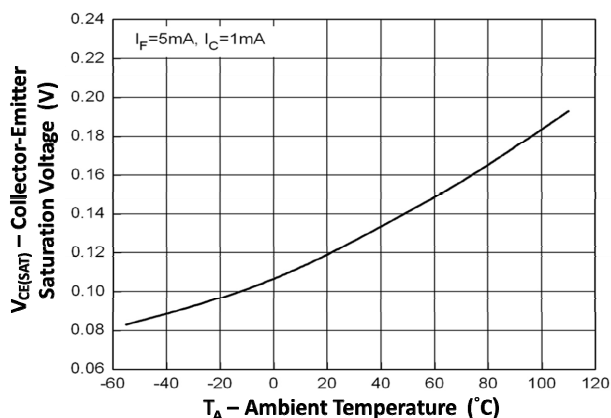


**Fig 9 Collector-Emitter Voltage vs Ambient Temperature**

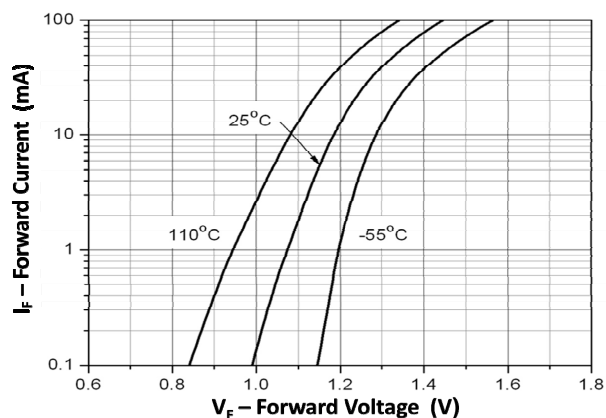


**Fig 10 Forward Current vs Forward Voltage**

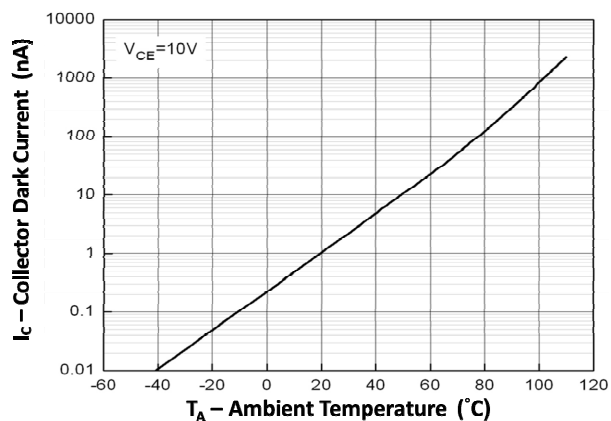


**Fig 11 Collector Dark Current vs Ambient Temperature**

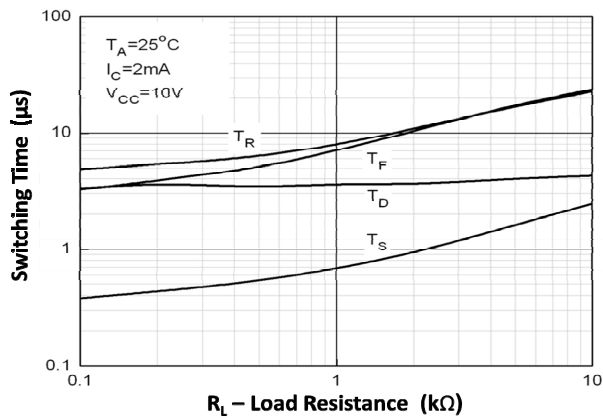
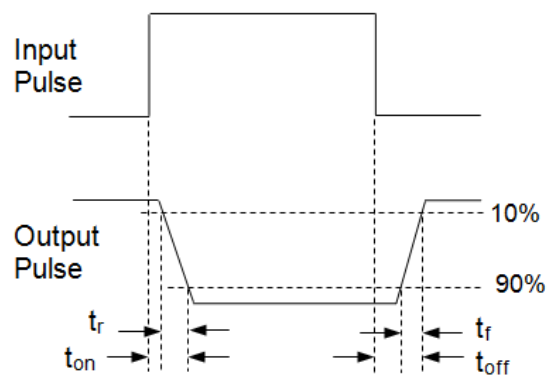
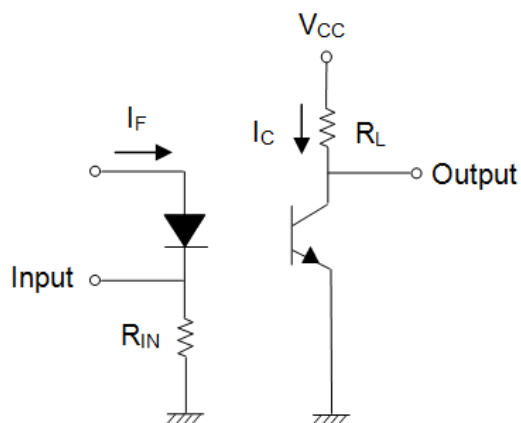


Fig 12 Switching Time vs Load Resistance



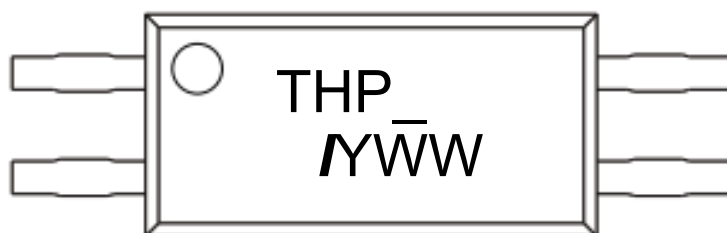
Switching Time Test Circuit

## 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 |
| <b>NOTE : Multiple Grades may be supplied to meet the requested specification</b> |                                                                                                  |                           |                   |

### DEVICE MARKING



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

I denotes Isocom

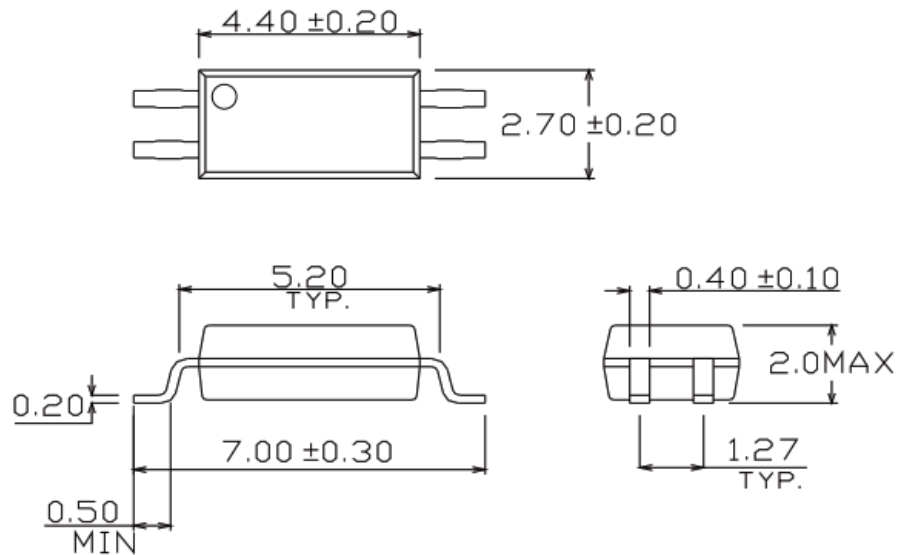
Y denotes 1 digit Year code

WW denotes 2 digit Week code

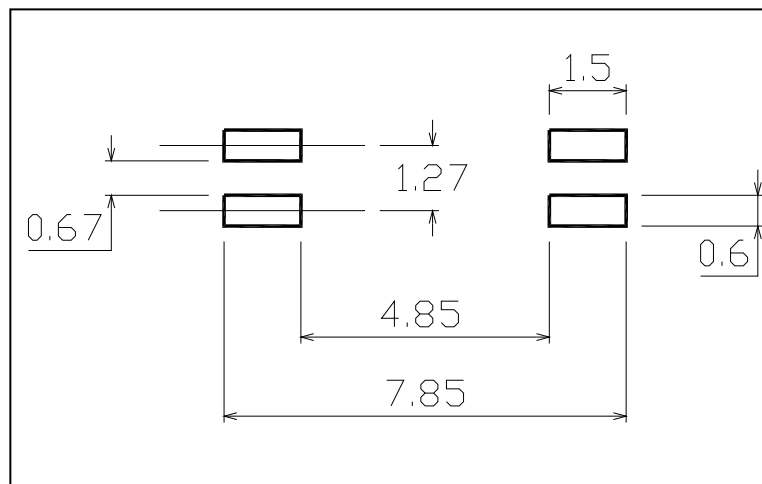
| Note : | Device | Optional Marking |
|--------|--------|------------------|
|        | IS281  | THP1             |
|        | IS281B | THP3             |
|        | IS281F | THP10            |

## IS281

### PACKAGE DIMENSIONS (mm)

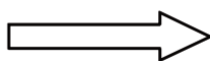
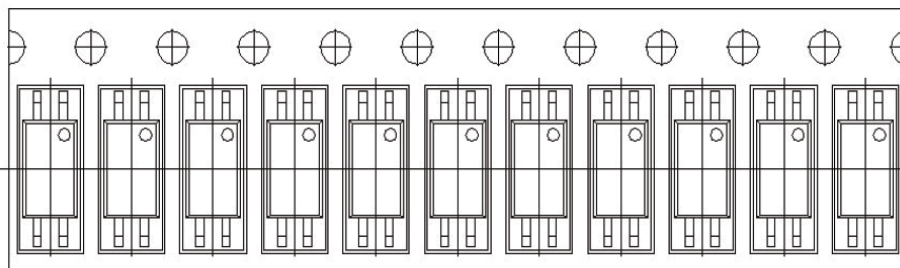


### RECOMMENDED SOLDER PAD LAYOUT (mm)

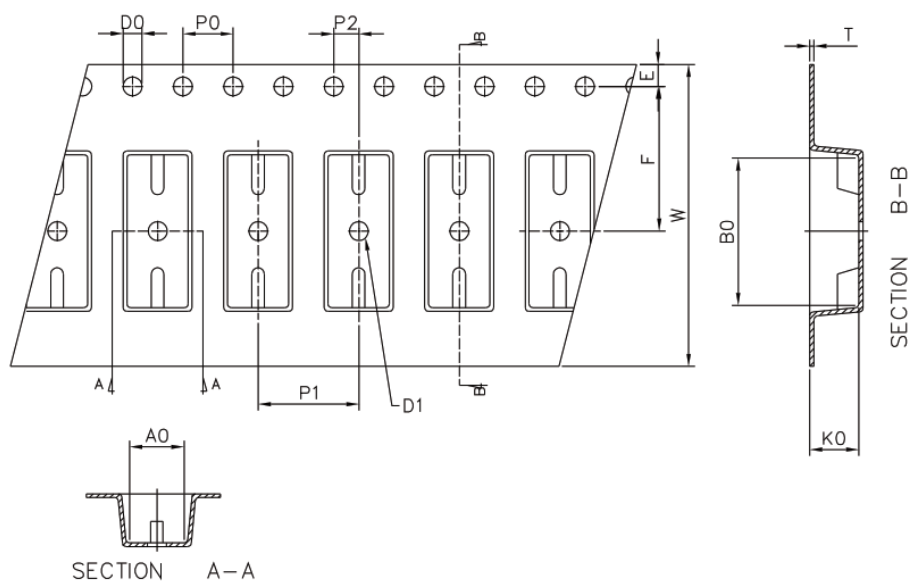




## Tape and Reel Packaging



Direction of feed from reel



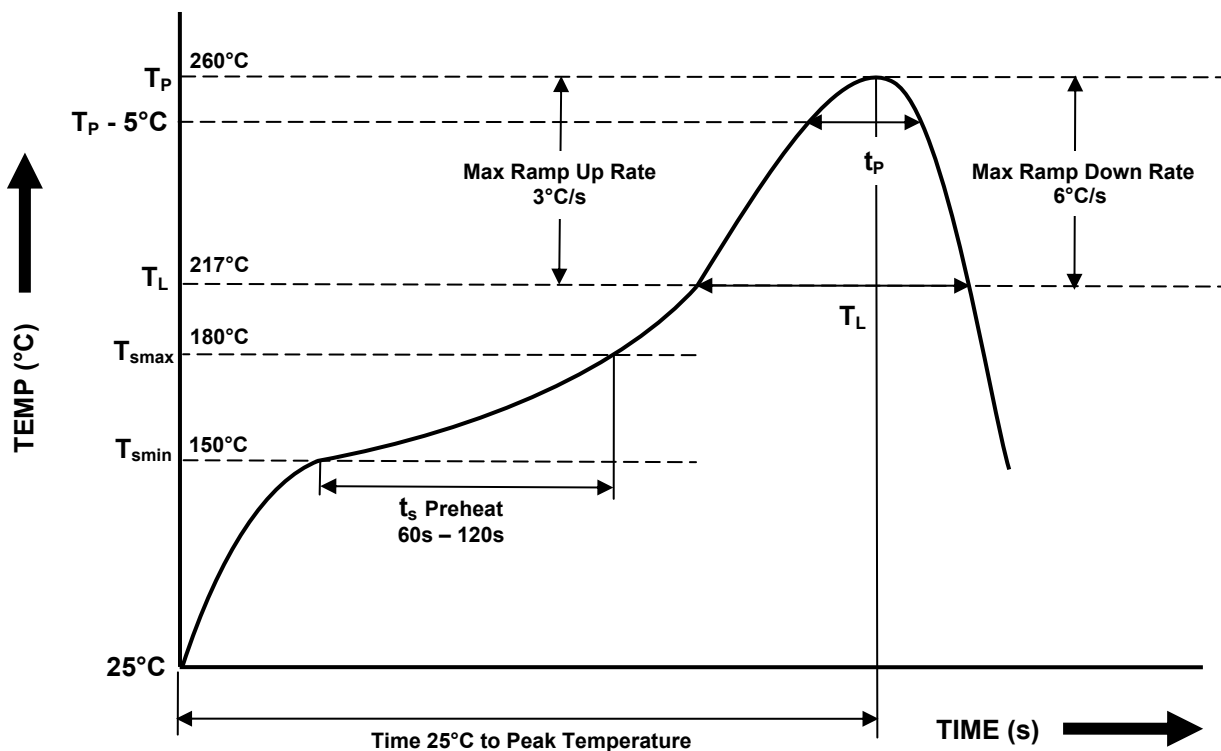
| Dimension No.  | A0        | B0        | D0          | D1        | E         | F        |
|----------------|-----------|-----------|-------------|-----------|-----------|----------|
| Dimension( mm) | 3.00±0.10 | 7.45±0.10 | 1.50+0.1/-0 | 1.50±0.10 | 1.75±0.10 | 5.5±0.10 |
| Dimension No.  | P0        | P1        | P2          | t         | W         | K0       |
| 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> <ul style="list-style-type: none"><li>- Min Temperature (<math>T_{SMIN}</math>)</li><li>- Max Temperature (<math>T_{SMAX}</math>)</li><li>- Time <math>T_{SMIN}</math> to <math>T_{SMAX}</math> (<math>t_s</math>)</li></ul>                                                                                                                                                                                                                | 150°C<br>180°C<br>60s - 120s                           |
| <b>Soldering Zone</b> <ul style="list-style-type: none"><li>- Peak Temperature (<math>T_P</math>)</li><li>- Liquidous Temperature (<math>T_L</math>)</li><li>- Time within 5°C of Actual Peak Temperature (<math>T_P - 5^\circ\text{C}</math>)</li><li>- Time maintained above <math>T_L</math> (<math>t_L</math>)</li><li>- Ramp Up Rate (<math>T_L</math> to <math>T_P</math>)</li><li>- Ramp Down Rate (<math>T_P</math> to <math>T_L</math>)</li></ul> | 260°C<br>217°C<br>20s<br>60s<br>3°C/s max<br>3 - 6°C/s |
| Average Ramp Up Rate ( $T_{smax}$ to $T_P$ )                                                                                                                                                                                                                                                                                                                                                                                                               | 3°C/s max                                              |
| Time 25°C to Peak Temperature                                                                                                                                                                                                                                                                                                                                                                                                                              | 8 minutes max                                          |

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