



## DESCRIPTION

The IS181 series of optocoupler consists of an infrared light emitting diode optically coupled to an NPN silicon photo transistor in a space efficient Mini Flat Package.

## FEATURES

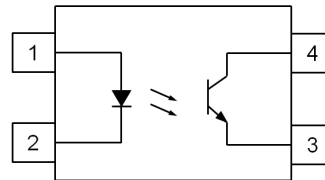
- Low Profile Package
- AC Isolation Voltage 3750V<sub>RMS</sub>
- CTR Selections Available
- Wide Operating Temperature Range -55°C to +110°C
- Lead Free and RoHS Compliant
- UL File E91231 model "FPT1" and "FPT2"

## APPLICATIONS

- Computer Terminals
- Industrial System Controllers
- Measuring Instruments
- Signal Transmission between Systems of Different Potentials and Impedance

## ORDER INFORMATION

- Available in Tape and Reel with 3000 pieces 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> | 6V    |
| Collector Current                              | 50mA  |
| Power Dissipation                              | 150mW |

### Total Package

|                                  |                      |
|----------------------------------|----------------------|
| Isolation Voltage                | 3750V <sub>RMS</sub> |
| Total Power Dissipation          | 170mW                |
| Operating Temperature            | -55 to 110 °C        |
| Storage Temperature              | -55 to 150 °C        |
| Lead Soldering Temperature (10s) | 260°C                |

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## IS181

### 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 | $C_t$  | $V = 0\text{V}, f = 1\text{KHz}$ |     | 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 | $BV_{ECO}$ | $I_E = 10\mu\text{A}, I_F = 0\text{mA}$ | 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           | $I_F = 5\text{mA}, V_{CE} = 5\text{V}$                  | 50  |      | 600 | %             |
|                                      |               | Optional CTR Grades                                     |     |      |     |               |
|                                      |               | IS181A  | 80  |      | 160 |               |
|                                      |               | IS181B  | 130 |      | 260 |               |
|                                      |               | IS181C  | 200 |      | 400 |               |
|                                      |               | IS181D  | 300 |      | 600 |               |
|                                      |               | IS181GR   | 100 |      | 300 |               |
| IS181GB                              | 100           |   | 600 |      |     |               |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_F = 20\text{mA}, I_C = 1\text{mA}$                   |     |      | 0.2 | V             |
| Floating Capacitance                 | $C_f$         | $V = 0\text{V}, f = 1\text{MHz}$                        |     | 0.6  | 1   | pF            |
| Output Rise Time                     | $t_r$         | $V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ |     | 4    | 18  | $\mu\text{s}$ |
| Output Fall Time                     | $t_f$         | $V_{CE} = 2\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$ |     | 3    | 18  | $\mu\text{s}$ |

#### ISOLATION

| Parameter                 | Symbol    | Test Condition                                   | Min                | Typ. | Max | Unit     |
|---------------------------|-----------|--|--------------------|------|-----|----------|
| Insulation Voltage        | $V_{ISO}$ | $RH = 40\% \text{ to } 60\%, t = 1 \text{ min},$ | 3750               |      |     | V        |
| Input - Output Resistance | $R_{I-O}$ | $V_{I-O} = 500\text{VDC}$                        | $5 \times 10^{10}$ |      |     | $\Omega$ |

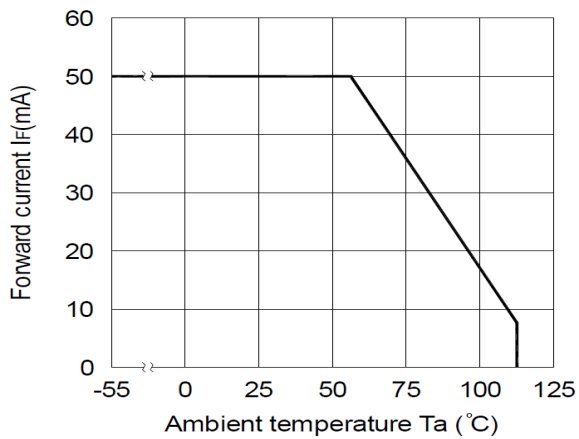


Fig 1 Forward Current vs  $T_A$

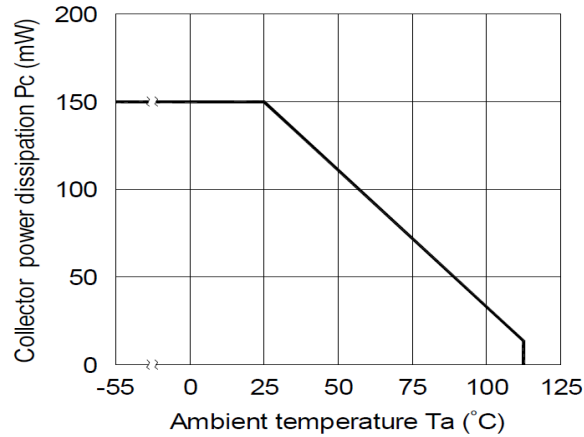


Fig 2 Collector Power Dissipation vs  $T_A$

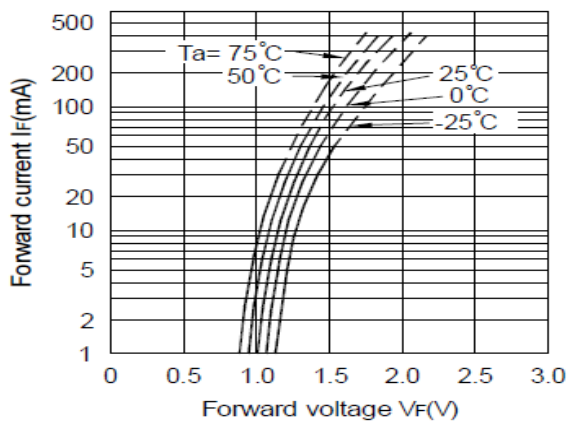


Fig 3 Forward Current vs Forward Voltage

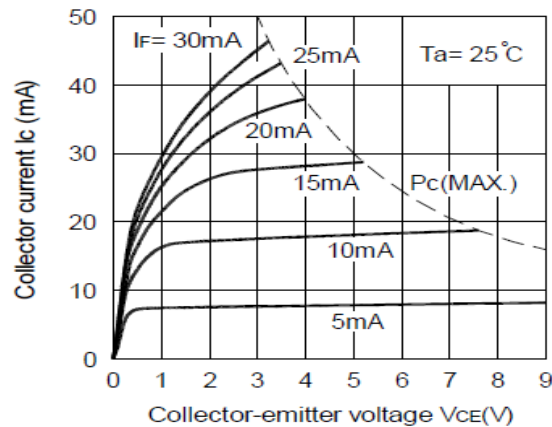


Fig 4 Collector Current vs Collector-Emitter Voltage

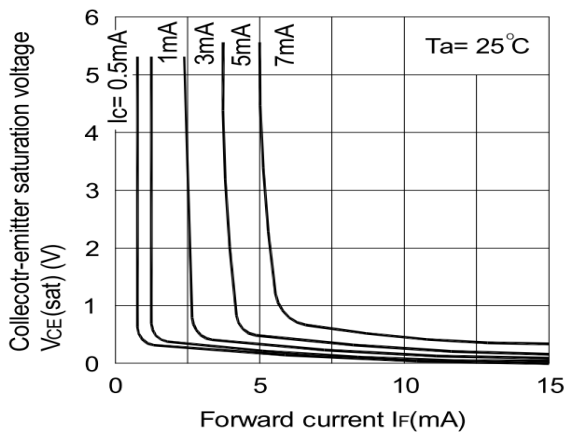


Fig 5 Collector-Emitter Saturation Voltage vs Forward Current

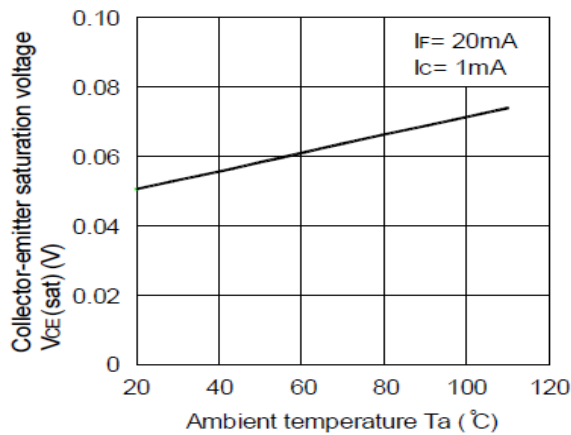


Fig 6 Collector-Emitter Saturation Voltage vs  $T_A$

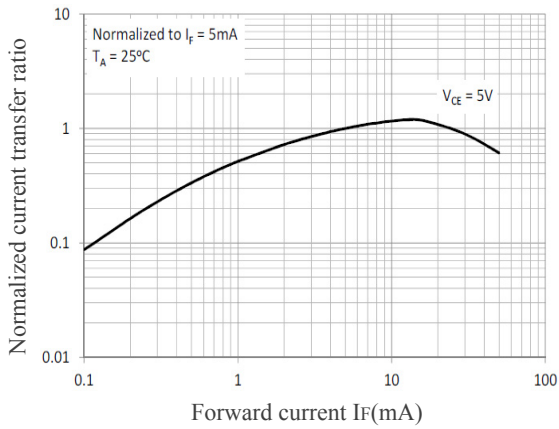


Fig 7 Normalized Current Transfer Ratio vs Forward Current

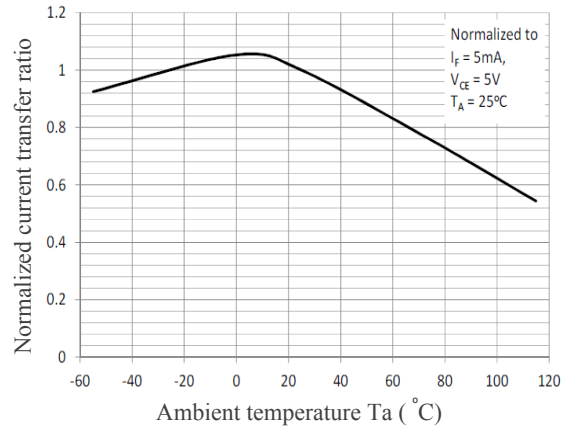


Fig 8 Normalized Current Transfer Ratio vs T<sub>A</sub>

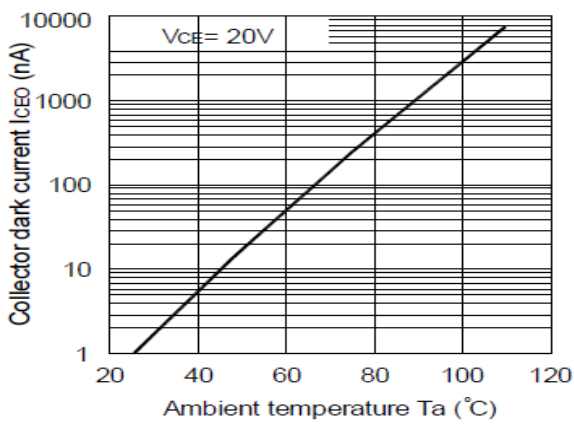


Fig 9 Collector Dark Current vs T<sub>A</sub>

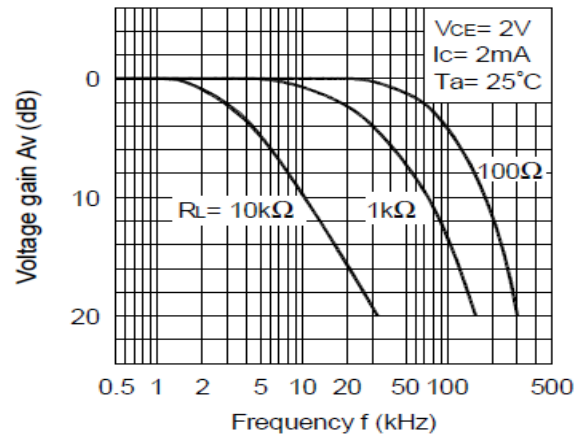


Fig 10 Frequency response

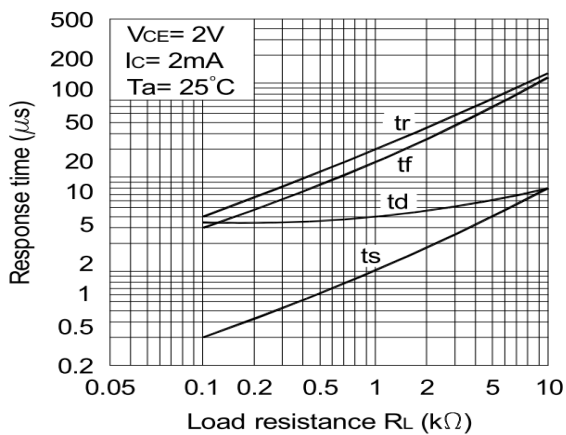
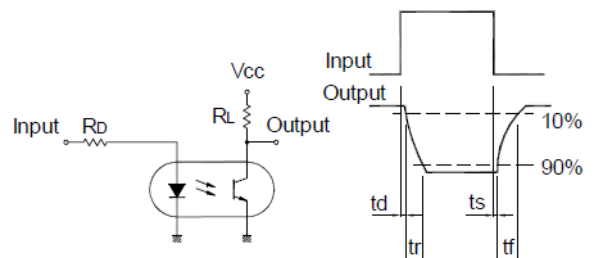


Fig 11 Response Time vs Load Resistance

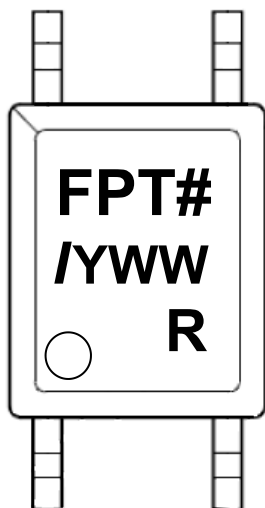


## IS181

### ORDER INFORMATION

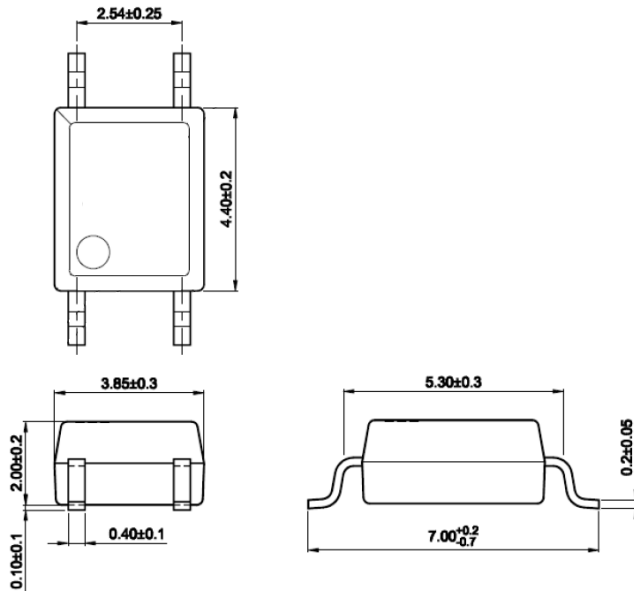
| IS181  |  |                           |                   |
|--|--|---------------------------|-------------------|
| After PN   | PN   | Description               | Packing quantity  |
| None   | IS181  | Surface Mount Tape & Reel | 3000 pcs per reel |
| Any CTR Grade  | IS181A, IS181B, IS181C, IS181D, IS181GR, IS181GB | Surface Mount Tape & Reel | 3000 pcs per reel |
| <b>NOTE : Multiple Grades may be supplied to meet the requested specification.</b> |  |                           |                   |

### DEVICE MARKING

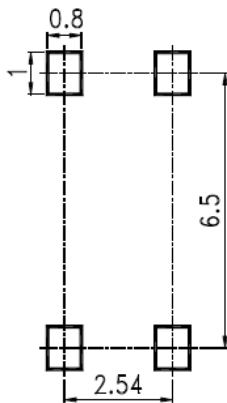


- FPT# denotes Device Part Number where “#” is internal control number which can be “1” or “2”
- / denotes Isocom
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- R denotes CTR Grade

**PACKAGE DIMENSIONS (mm)**

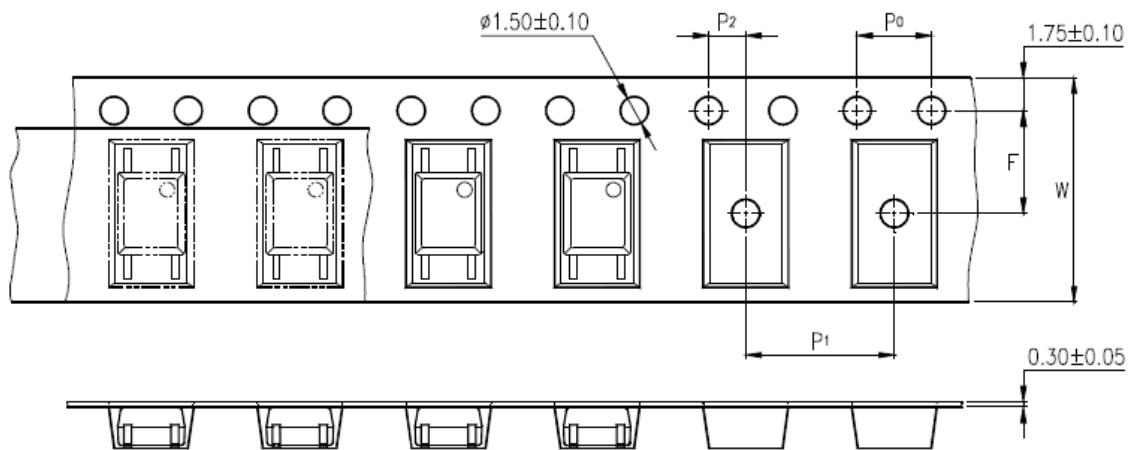


**RECOMMENDED SOLDER PAD LAYOUT (mm)**



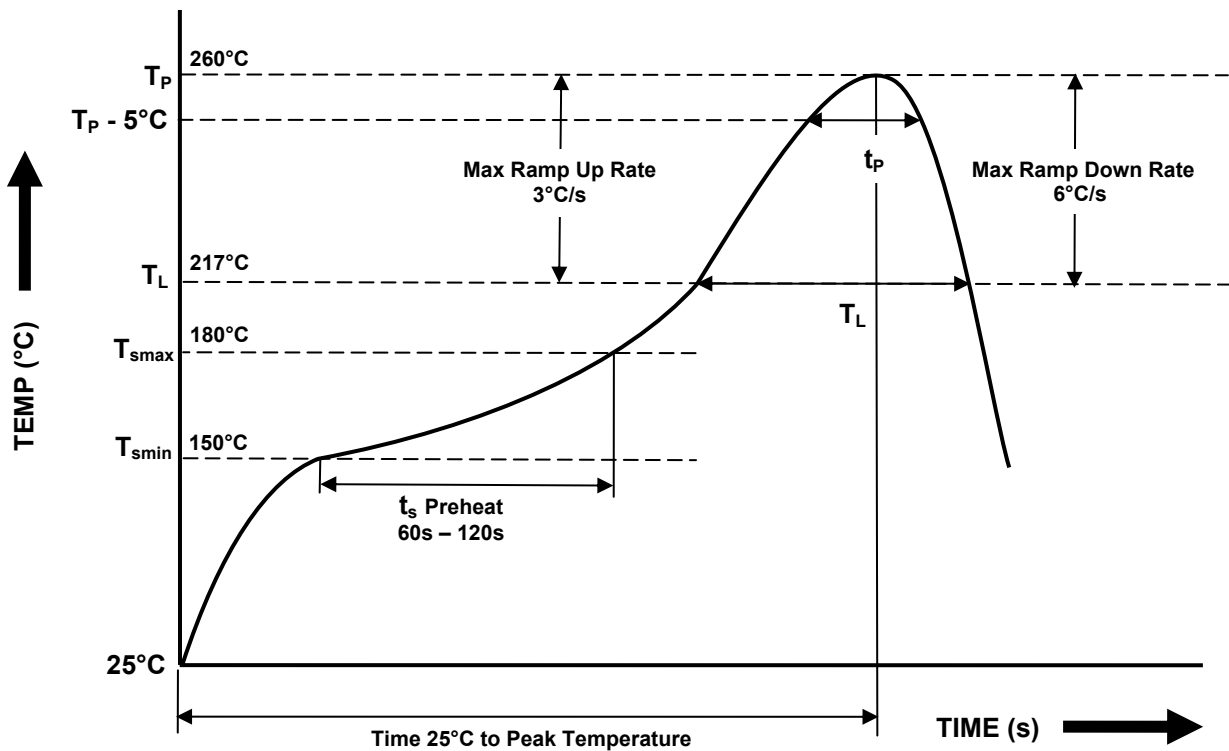
# IS181

## TAPE AND REEL PACKAGING



| Description                               | Symbol | Dimension<br>mm (inch) |
|---|--------|------------------------|
| Tape Width                                | $W$    | $12 \pm 0.3$ (0.47)    |
| Pitch of Sprocket Holes                   | $P_0$  | $4 \pm 0.1$ (0.15)     |
| Distance of Compartment to Sprocket Holes | $F$    | $5.5 \pm 0.1$ (0.217)  |
|   | $P_2$  | $2 \pm 0.1$ (0.079)    |
| Distance of Compartment to Compartment    | $P_1$  | $8 \pm 0.1$ (0.315)    |

**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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