# ICPL0630, ICPL0631

## DESCRIPTION

The ICPL0630 and ICPL0631 dual channel devices each consists of an infrared emitting diode optically coupled to a high speed photo detector transistor.

These devices belong to Isocom Compact Range of optocouplers.

## FEATURES

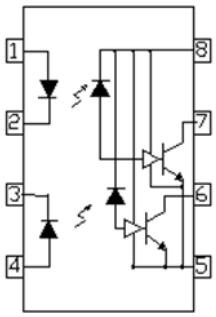
- High speed 10Mbit/s
- Half Pitch 1.27mm
- 10kV/µs min. Common Mode Transient Immunity
- (ICPL0631)
- High AC Isolation Voltage 3750$V_{RMS}$
- Guaranteed Performance from -40°C to 85°C
- Wide Operating Temperature Range
- -40°C to 100°C
- Pb Free and RoHS Compliant
- Halogen Free
- Safety Approvals Pending

## APPLICATIONS

- Line Receivers, Data Communication
- LSTTL to TTL, LSTTL or 5V CMOS
- Data Multiplexing
- Pulse Transformer Replacement
- Switch Mode Power Supplies
- Ground Loop Elimination
- Computer Peripheral Interface

## ORDER INFORMATION

- Available in Tape and Reel with 2000pcs per reel.




1. Anode (Channel1)
2. Cathode (Channel 1)
3. Cathode (Channel 2)
4. Anode (Channel 2)
5. GND
6. Vout 2
7. Vout 1
8. Vcc

A 0.1µF bypass capacitor must be connected between Vcc (pins 8) and GND (pin 5).

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C)

### Input Diode

| | |
|---|---|
| Forward Current | 20mA |
| Reverse Voltage | 5V |
| Power dissipation | 45mW |

### Output

| | |
|---|---|
| Output Current | 50mA |
| Output Voltage | 7V |
| Supply Voltage (max 1 min) | 7V |
| Power Dissipation | 60mW |

### Total Package

| | |
|---|---|
| Isolation Voltage | 3750$V_{RMS}$ |
| Total Power Dissipation | 80mW |
| Operating Temperature | -40 to 100 °C |
| Storage Temperature | -55 to 125 °C |
| Lead Soldering Temperature (10s) | 260°C |

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## Truth Table (Positive Logic)

| Input | Output |
|---|---|
| H | L |
| L | H |

## ELECTRICAL CHARACTERISTICS ($T_A$ = -40°C to 85°C unless otherwise specified)

### INPUT

| Parameter | Symbol | Test Condition | Min | Typ.* | Max | Unit |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_F$ | $I_F$ = 10mA | | 1.4 | 1.8 | V |
| Reverse Voltage | $V_R$ | $I_R$ = 10µA | 5.0 | | | V |
| Temperature Coefficient of $V_F$ | $\Delta V_F/\Delta T_A$ | $I_F$ = 10mA | | -1.8 | | mV/°C |
| Input Capacitance | $C_{IN}$ | $V_F$ = 0V, f = 1MHz | | 60 | | pF |

### OUTPUT

| Parameter | Symbol | Test Condition | Min | Typ.* | Max | Unit |
|---|---|---|---|---|---|---|
| High Level Supply Current | $I_{CCH}$ | $I_F$ = 0mA, $V_{CC}$ = 5.5V | | 13 | 18 | mA |
| Low Level Supply Current | $I_{CCL}$ | $I_F$ = 10mA, $V_{CC}$ = 5.5V | | 15 | 21 | mA |

### COUPLED

| Parameter | Symbol | Test Condition | Min | Typ.* | Max | Unit |
|---|---|---|---|---|---|---|
| High Level Output Current | $I_{OH}$ | $V_{CC}$ = 5.5V, $V_O$ = 5.5V<br>$I_F$ = 250µA | | | 100 | µA |
| Low Level Output Voltage | $V_{OL}$ | $V_{CC}$ = 5.5V, $I_F$ = 5mA,<br>$I_{OL}$ = 13mA | | | 0.6 | V |
| Input Threshold Current | $I_{FT}$ | $V_{CC}$ = 5.5V, $V_O$ = 0.6V,<br>$I_{OL}$ = 13mA | | | 5 | mA |

* Typical values at $T_A$ = 25°C

## ELECTRICAL CHARACTERISTICS ($T_A$ = -40°C to 85°C unless otherwise specified)

### Switching Characteristics ($T_A$ = -40°C to 85°C, $I_F$ = 7.5mA, $V_{CC}$ = 5V unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Typ.* | Max | Unit |
|---|---|---|---|---|---|---|
| Propagation Delay Time to Logic Low | $T_{PHL}$ | $R_L$ = 350Ω, $C_L$ = 15pF, $T_A$ = 25°C | | | 100 | ns |
| Propagation Delay Time to Logic High | $T_{PLH}$ | $R_L$ = 350Ω, $C_L$ = 15pF, $T_A$ = 25°C | | | 100 | ns |
| Pulse Width Distortion | $\|t_{PHL}-t_{PLH}\|$ | $R_L$ = 350Ω, $C_L$ = 15pF | | | 35 | ns |
| Output Rise Time | $t_r$ | $R_L$ = 350Ω, $C_L$ = 15pF | | 40 | | ns |
| Output Fall Time | $t_f$ | $R_L$ = 350Ω, $C_L$ = 15pF | | 10 | | ns |
| Common Mode Transient Immunity at Logic High | $CM_H$ | ICPL0630 $I_F$ = 0mA, $V_{OH}$ = 2.0V, $V_{CM}$ = 1kVp-p, $R_L$ = 350Ω, $T_A$ = 25°C | 5000 | | | V/µs |
| | | ICPL0631 $I_F$ = 0mA, $V_{OH}$ = 2.0V, $V_{CM}$ = 1kVp-p, $R_L$ = 350Ω, $T_A$ = 25°C | 10000 | | | |
| Common Mode Transient Immunity at Logic Low | $CM_L$ | ICPL0630 $I_F$ = 7.5mA, $V_{OL}$ = 0.8V, $V_{CM}$ = 1kVp-p, $R_L$ = 350Ω, $T_A$ = 25°C | 5000 | | | V/µs |
| | | ICPL0631 $I_F$ = 7.5mA, $V_{OL}$ = 0.8V, $V_{CM}$ = 1kVp-p, $R_L$ = 350Ω, $T_A$ = 25°C | 10000 | | | |

* Typical values at $T_A$ = 25°C

## ELECTRICAL CHARACTERISTICS

### Notes :

1. The $V_{CC}$ supply must be bypassed by a 0.1µF capacitor or larger with good high frequency characteristic and should be connected as close as possible to the package $V_{CC}$ and GND pins.

2. $t_{PLH}$ – Propagation delay is measured from the 3.75mA level on the HIGH to LOW transition of the input current pulse to the 1.5 V level on the LOW to HIGH transition of the output voltage pulse.

3. $t_{PHL}$ – Propagation delay is measured from the 3.75mA level on the LOW to HIGH transition of the input current pulse to the 1.5 V level on the HIGH to LOW transition of the output voltage pulse.

4 $t_r$ – Rise time is measured from the 10% to the 90% levels on the LOW to HIGH transition of the output pulse.

5. $t_f$ – Fall time is measured from the 90% to the 10% levels on the HIGH to LOW transition of the output pulse.

6. $CM_H$ – The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the HIGH state (i.e., $V_{OUT} > 2.0V$).

7. $CM_L$ – The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the LOW output state (i.e., $V_{OUT} < 0.8V$).

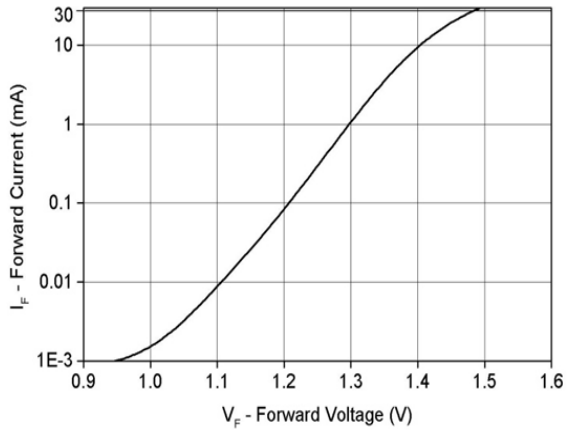



**Fig 1 Forward Current vs Forward Voltage**

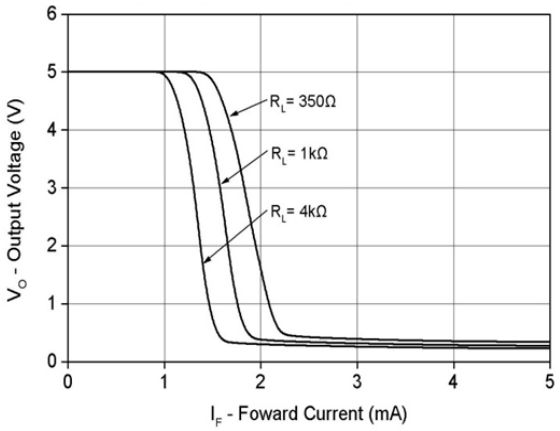



**Fig 2 Output Voltage vs Forward Current**

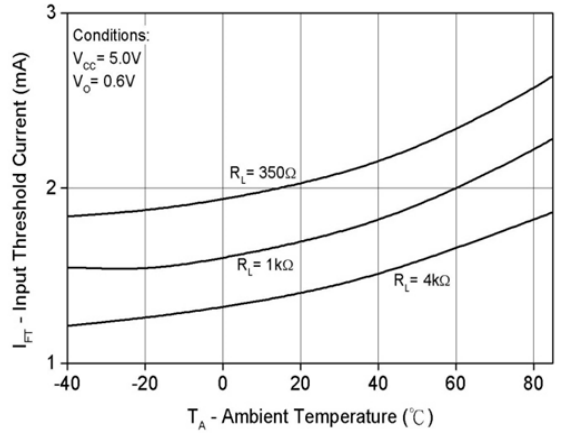



**Fig 3 Input Threshold Current vs $T_A$**

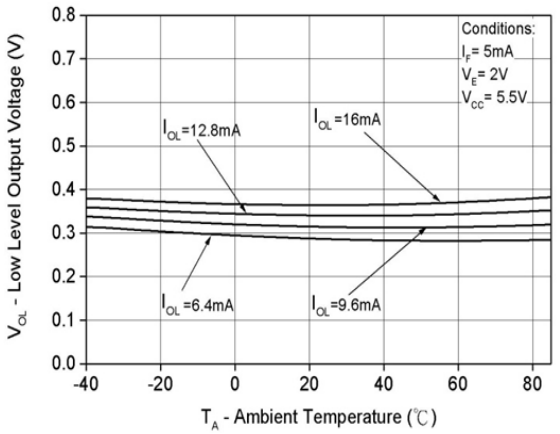



**Fig 4 Low Level Output Voltage vs $T_A$**

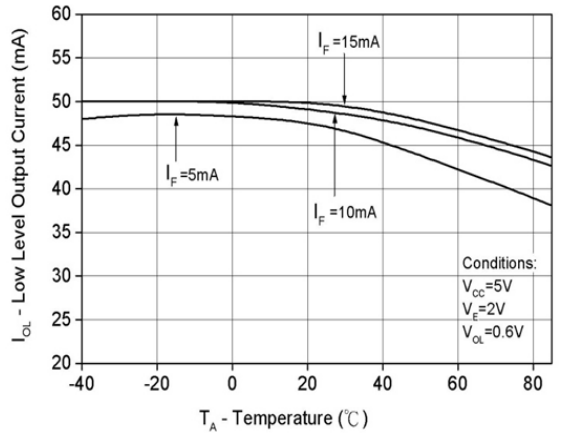



**Fig 5 Low Level Output Current vs $T_A$**

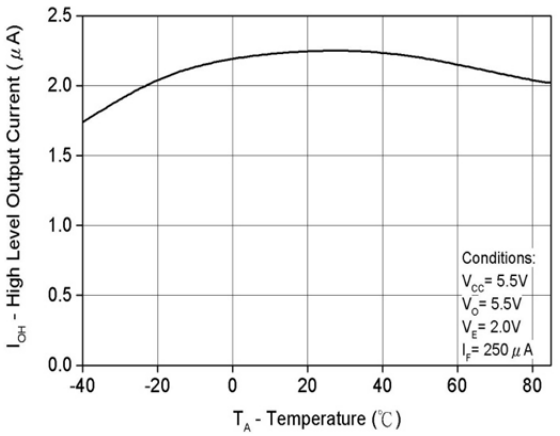



**Fig 6 High Level Output Current vs $T_A$**

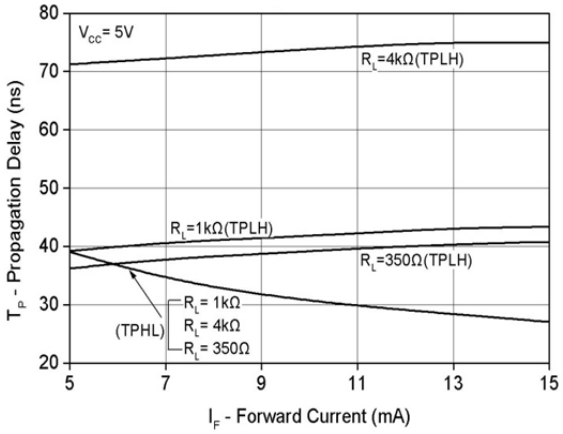



**Fig 7 Propagation Delay vs Forward Current**

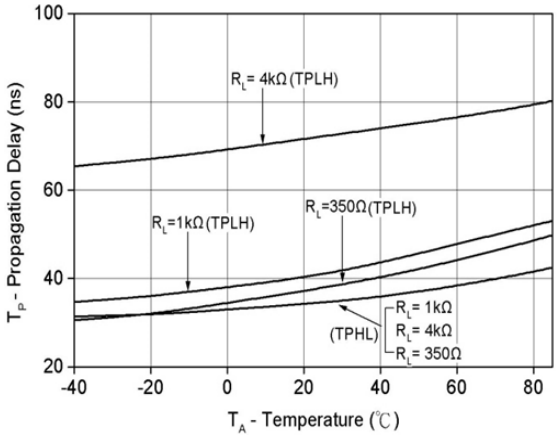



**Fig 8 Propagation Delay vs $T_A$**

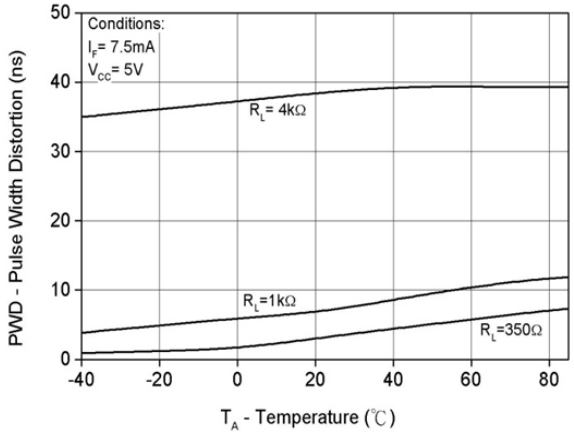



**Fig 9 Pulse Width Distortion vs $T_A$**

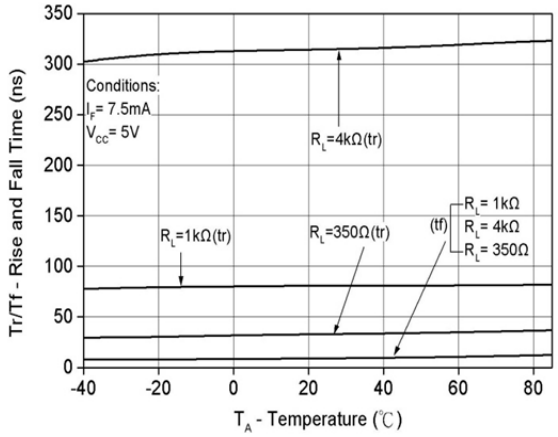



**Fig 10 Rise and Fall Time vs $T_A$**

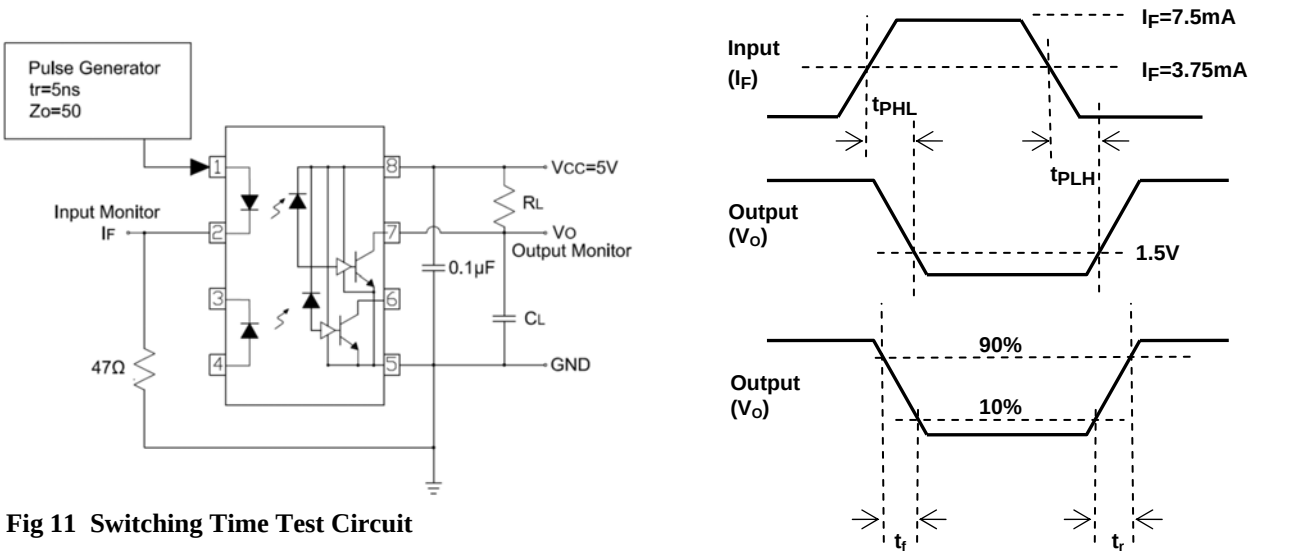



**Fig 11 Switching Time Test Circuit**

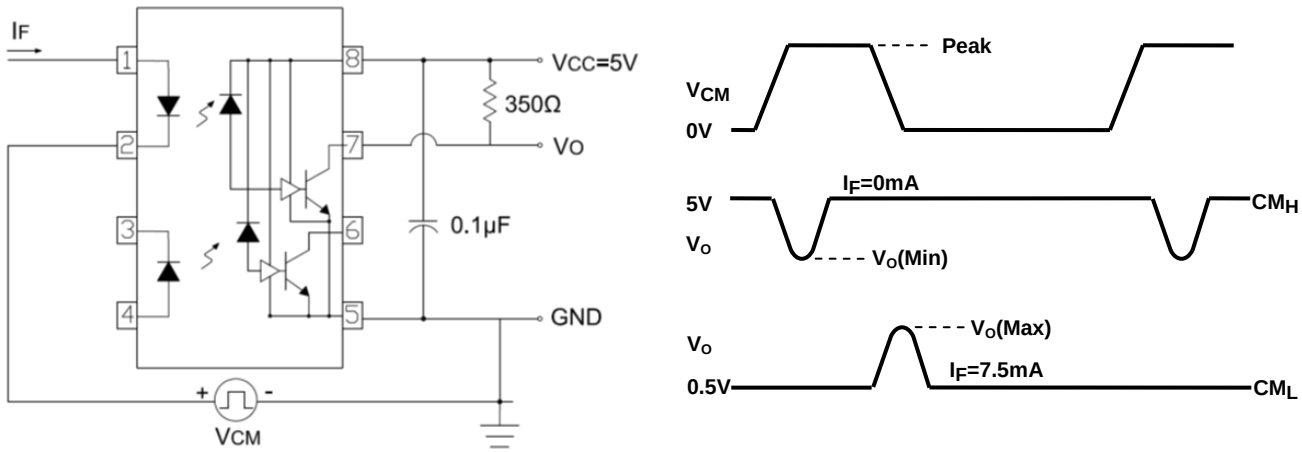



**Fig 12 Common Mode Transient Immunity Test Circuit**

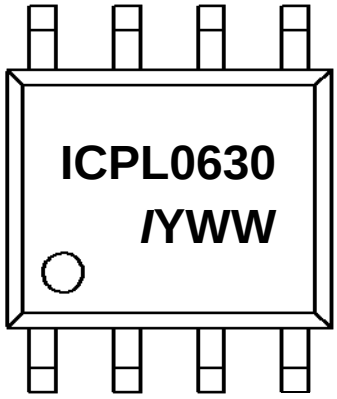
Common mode transient immunity in logic high level is the maximum tolerable (positive) $dV_{CM}/dt$ on the leading edge of the common mode pulse signal $V_{CM}$, to assure that the output will remain in a logic high state (i.e., $V_O > 2.0V$).

Common mode transient immunity in logic low level is the maximum tolerable (negative) $dV_{CM}/dt$ on the trailing edge of the common mode pulse signal, $V_{CM}$, to assure that the output will remain in a logic low state (i.e., $V_O < 0.8V$).

## ORDER INFORMATION

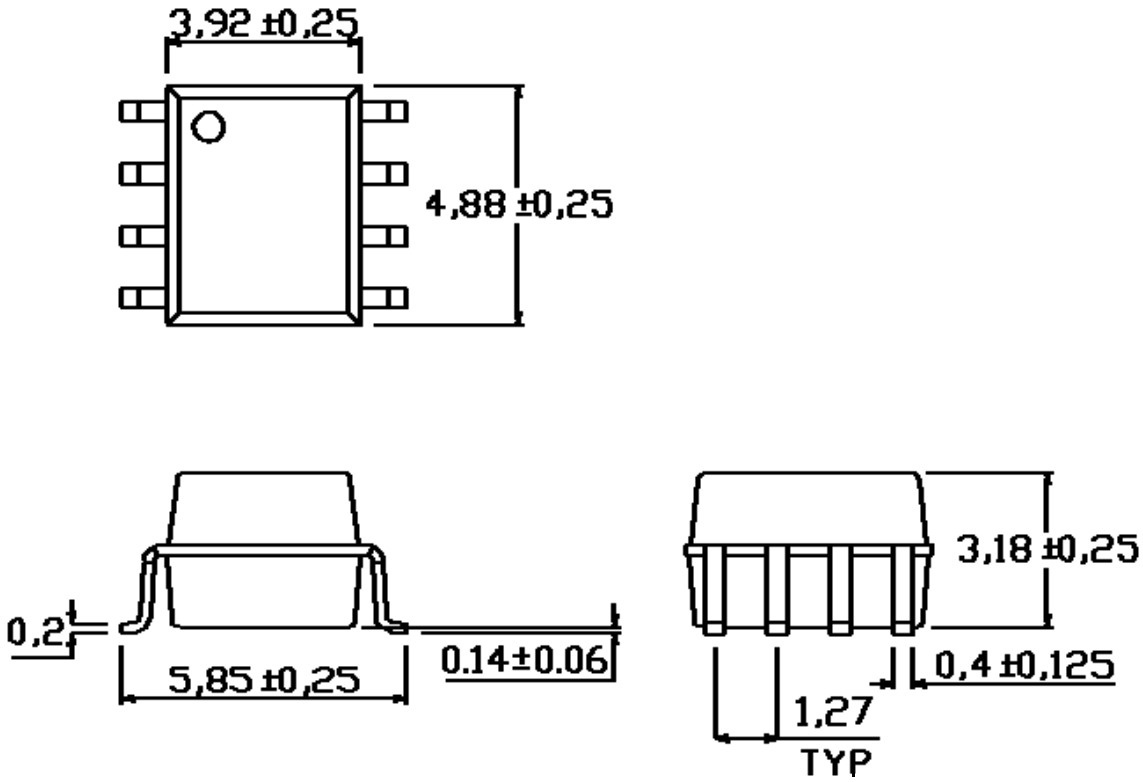
| ICPL0630, ICPL0631 | | | |
|---|---|---|---|
| **After PN** | **PN** | **Description** | **Packing quantity** |
| None | ICPL0630, ICPL0631 | Surface Mount Tape & Reel | 2000 pcs per reel |

## DEVICE MARKING

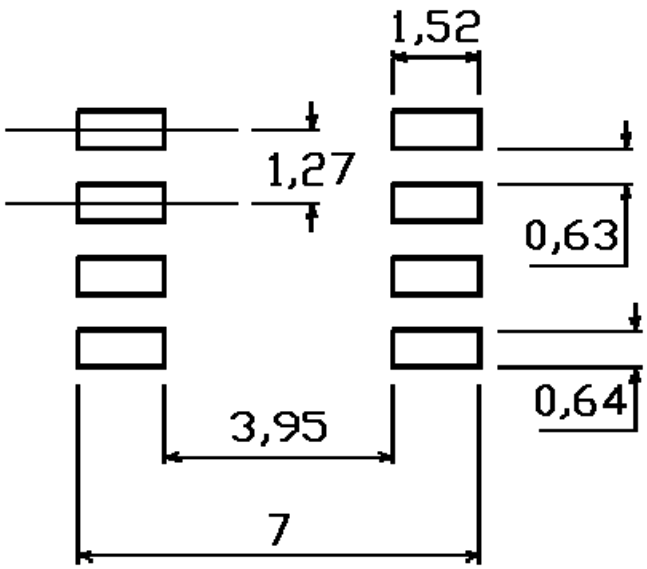



ICPL0630 denotes Device Part Number (ICPL0630 is used as example)
Y denotes 1 digit Year code
WW denotes 2 digit Week code
***/*** denotes Isocom

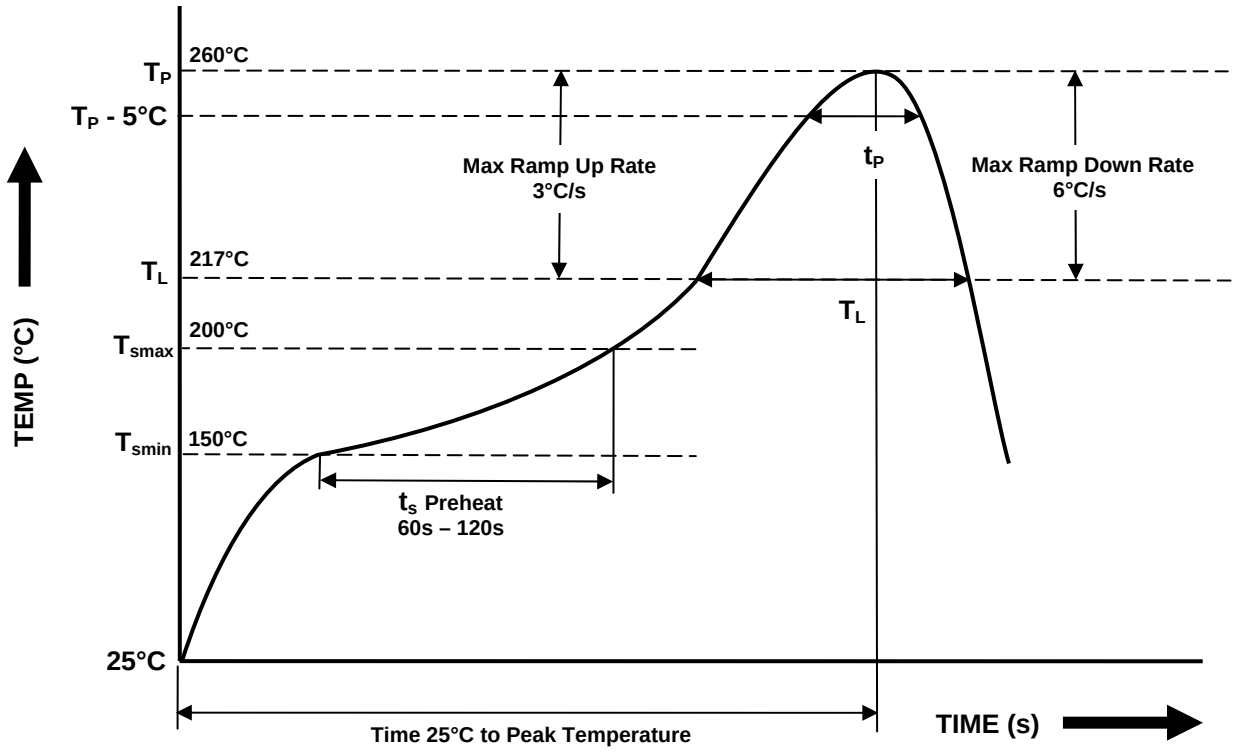
## PACKAGE DIMENSIONS (mm)




## RECOMMENDED PAD LAYOUT (mm)

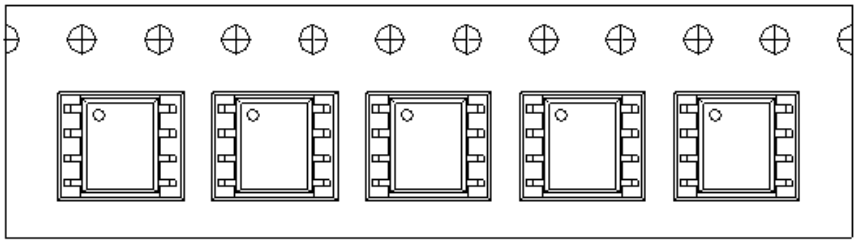


## IR REFLOW SOLDERING TEMPERATURE PROFILE
## (One Time Reflow Soldering is Recommended)

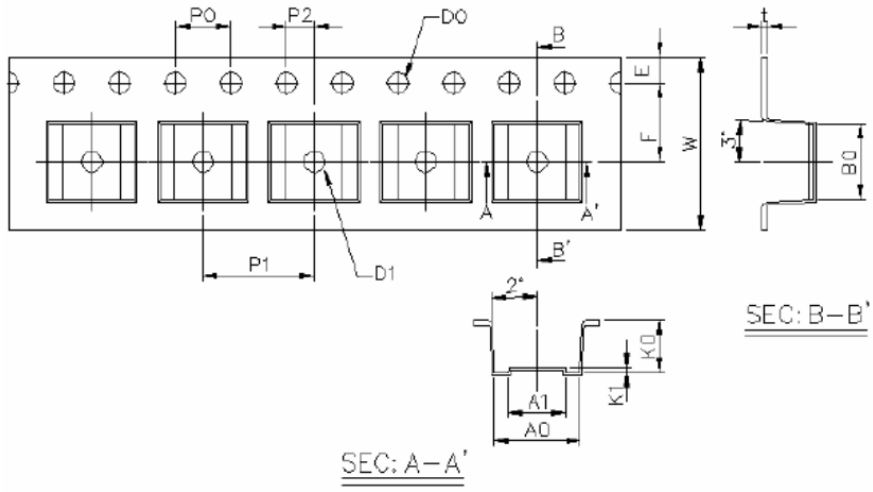



| Profile Details | Conditions |
|---|---|
| **Preheat**<br>- Min Temperature ($T_{SMIN}$)<br>- Max Temperature ($T_{SMAX}$)<br>- Time $T_{SMIN}$ to $T_{SMAX}$ ($t_s$) | <br>150°C<br>200°C<br>60s - 120s |
| **Soldering Zone**<br>- Peak Temperature ($T_P$)<br>- Liquidous Temperature ($T_L$)<br>- Time within 5°C of Actual Peak Temperature ($T_P$ – 5°C)<br>- Time maintained above $T_L$ ($t_L$)<br>- Ramp Up Rate ($T_L$ to $T_P$)<br>- Ramp Down Rate ($T_P$ to $T_L$) | <br>260°C<br>217°C<br>30s<br>60s - 100s<br>3°C/s max<br>6°C/s max |
| Average Ramp Up Rate ($T_{smax}$ to $T_P$) | 3°C/s max |
| Time 25°C to Peak Temperature | 8 minutes max |

## TAPE AND REEL PACKAGING



Direction of feed from reel




| Dimension No. | **A0** | **A1** | **B0** | **D0** | **D1** | **E** | **F** |
|---|---|---|---|---|---|---|---|
| Dimension (mm) | 6.2±0.1 | 4.1±0.1 | 5.28±0.1 | 1.5±0.1 | 1.5±0.3 | 1.75±0.1 | 5.5±0.1 |
| Dimension No. | **Po** | **P1** | **P2** | **t** | **W** | **K0** | **K1** |
| Dimension (mm) | 4.0±0.1 | 8.0±0.1 | 2.0±0.1 | 0.4±0.1 | 12.0 +0.3/-0.1 | 3.7±0.1 | 0.3±0.1 |

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- Do not immerse device body in solder paste.

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