



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

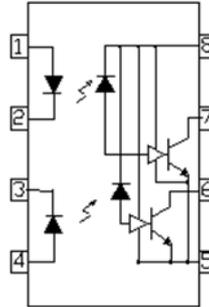
- High speed 10Mbit/s
- Half Pitch 1.27mm
- 10kV/ μ s min. Common Mode Transient Immunity (ICPL0631)
- High AC Isolation Voltage 3750V_{RMS}
- Guaranteed Performance from -40°C to 85°C
- Wide Operating Temperature Range
- -40°C to 100°C
- Pb Free and RoHS Compliant
- Halogen Free
- Safety Approvals Pending

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 0.1 μ F 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	3750V _{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 ($T_A = -40^\circ\text{C}$ to 85°C unless otherwise specified)

INPUT

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

OUTPUT

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

COUPLED

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

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



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ELECTRICAL CHARACTERISTICS ($T_A = -40^\circ\text{C}$ to 85°C unless otherwise specified)

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

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

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



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ELECTRICAL CHARACTERISTICS

Notes :

1. The V_{CC} supply must be bypassed by a $0.1\mu\text{F}$ 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., $V_{OUT} > 2.0\text{V}$).
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., $V_{OUT} < 0.8\text{V}$).



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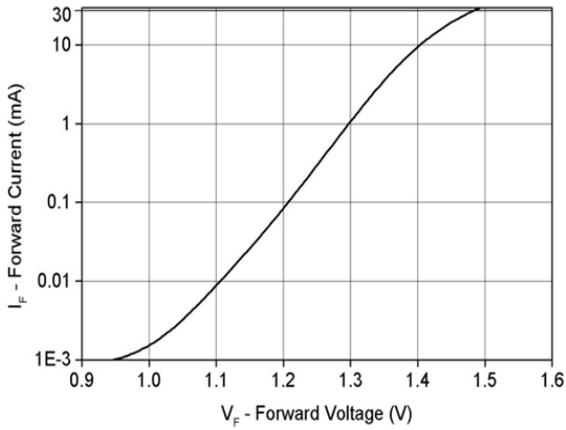


Fig 1 Forward Current vs Forward Voltage

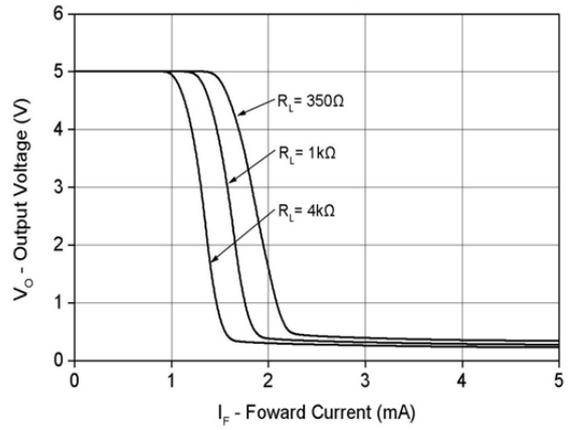


Fig 2 Output Voltage vs Forward Current

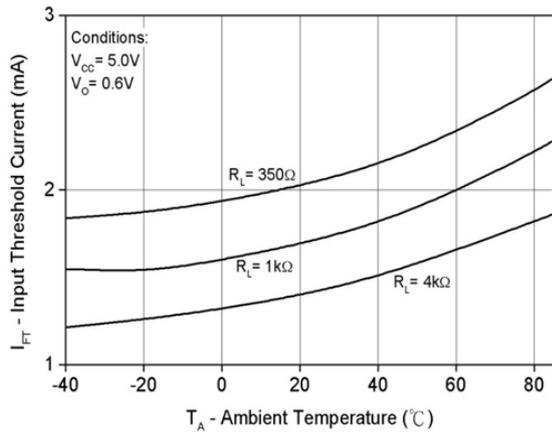


Fig 3 Input Threshold Current vs T_A

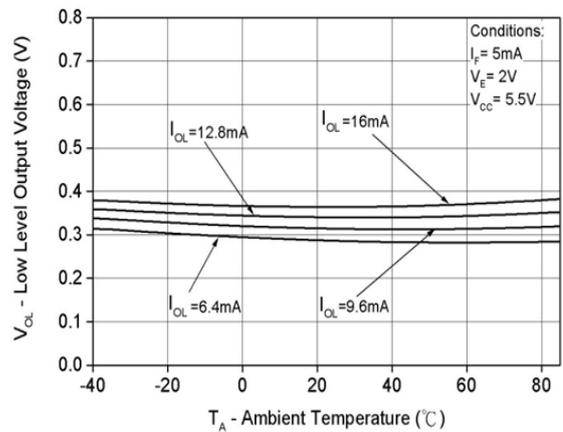


Fig 4 Low Level Output Voltage vs T_A

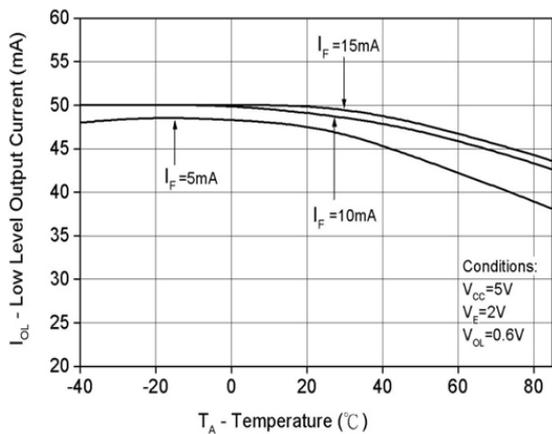


Fig 5 Low Level Output Current vs T_A

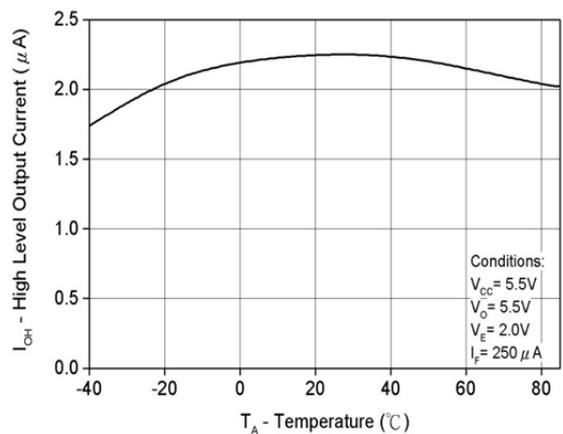


Fig 6 High Level Output Current vs T_A



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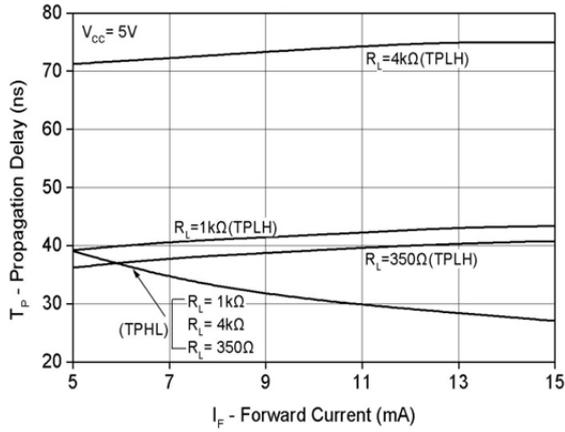


Fig 7 Propagation Delay vs Forward Current

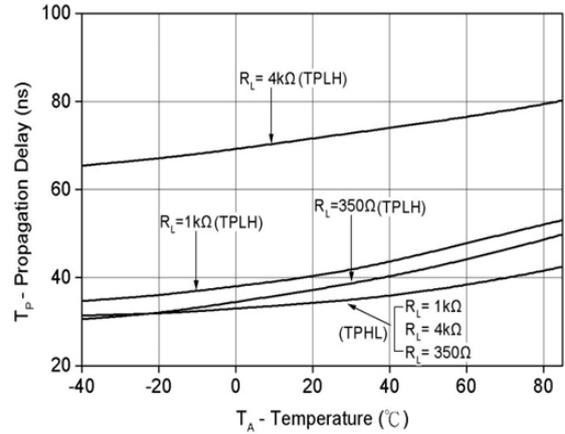


Fig 8 Propagation Delay vs T_A

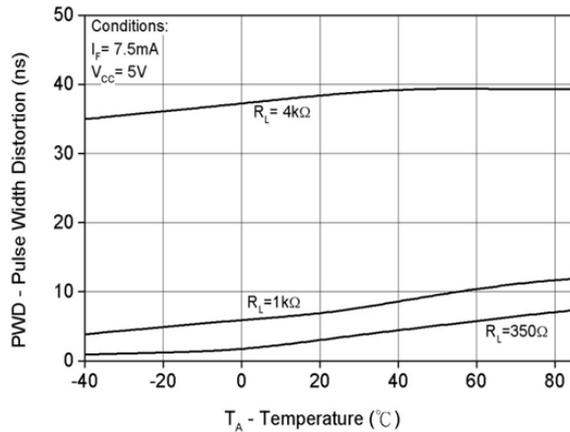


Fig 9 Pulse Width Distortion vs T_A

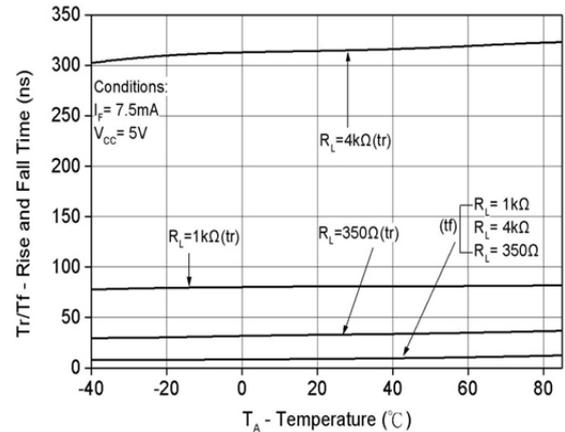


Fig 10 Rise and Fall Time vs T_A



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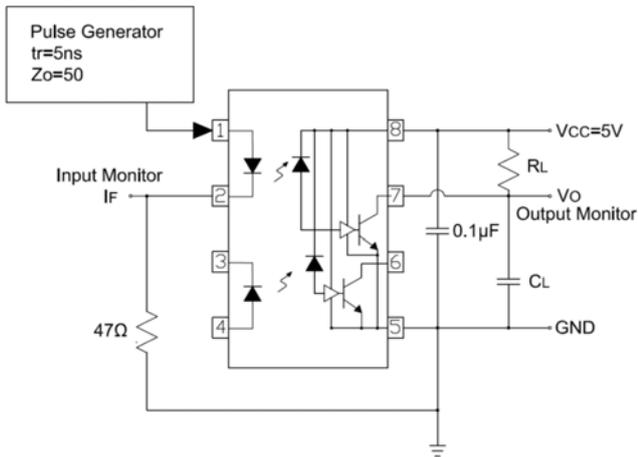


Fig 11 Switching Time Test Circuit

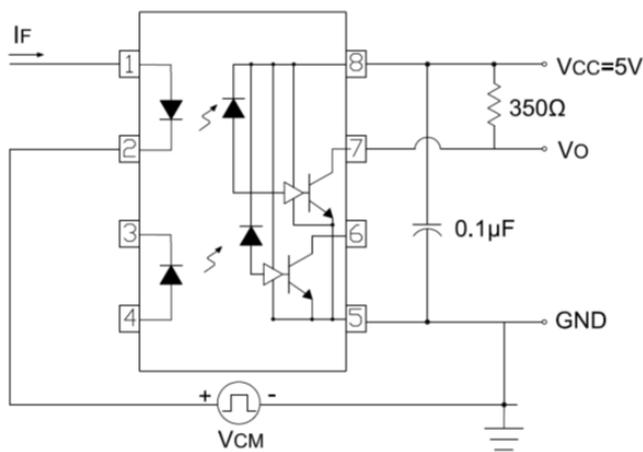
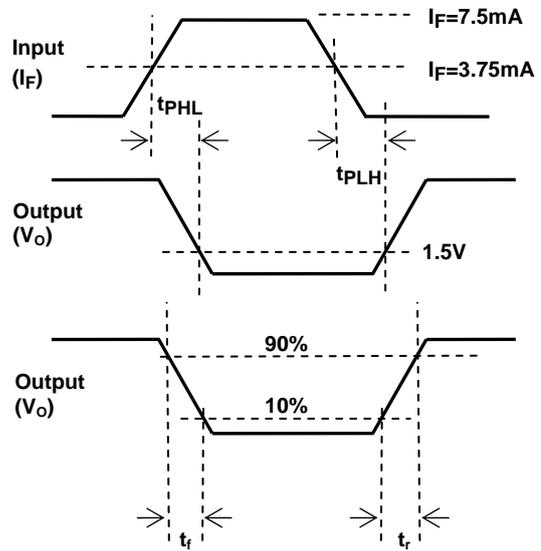
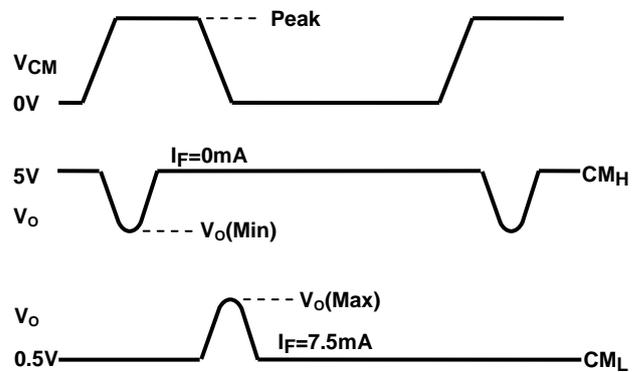


Fig 12 Common Mode Transient Immunity Test Circuit



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., $V_O < 0.8V$).

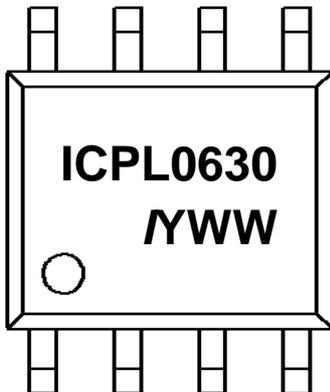


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ORDER INFORMATION

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

DEVICE MARKING

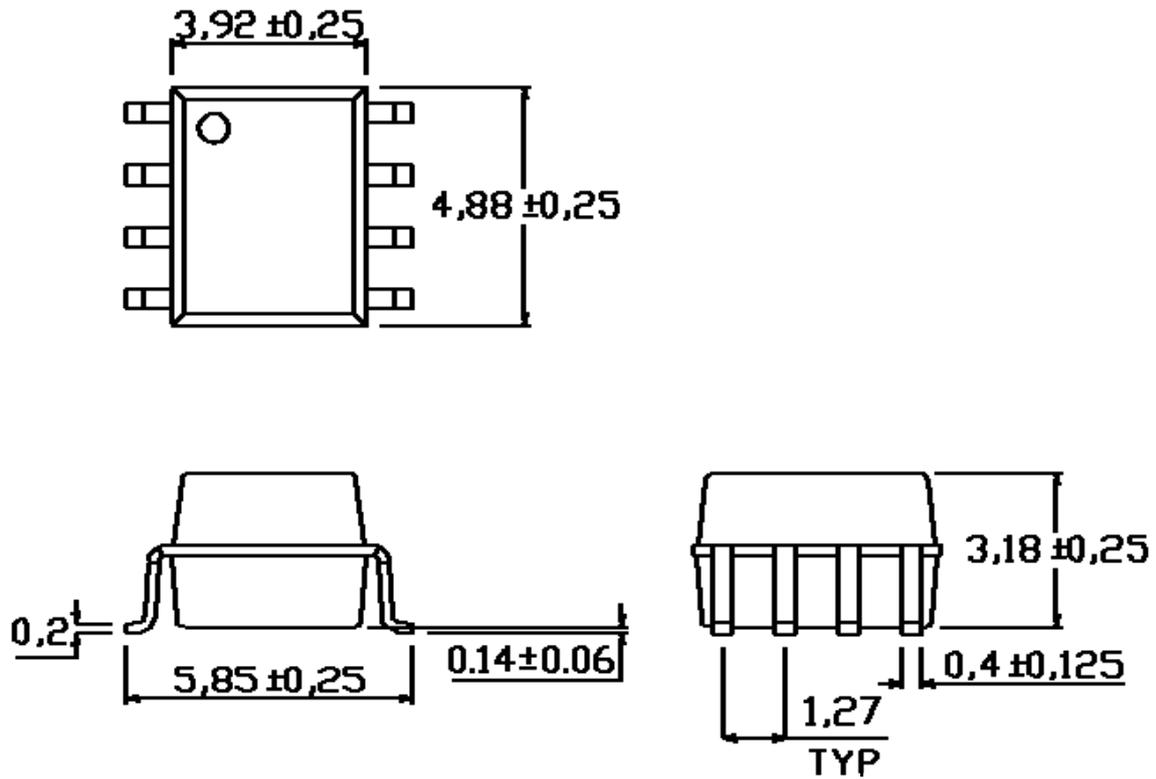


ICPL0630 denotes Device Part Number (ICPL0630 is used as example)
Y denotes 1 digit Year code
WW denotes 2 digit Week code
I denotes Isocom

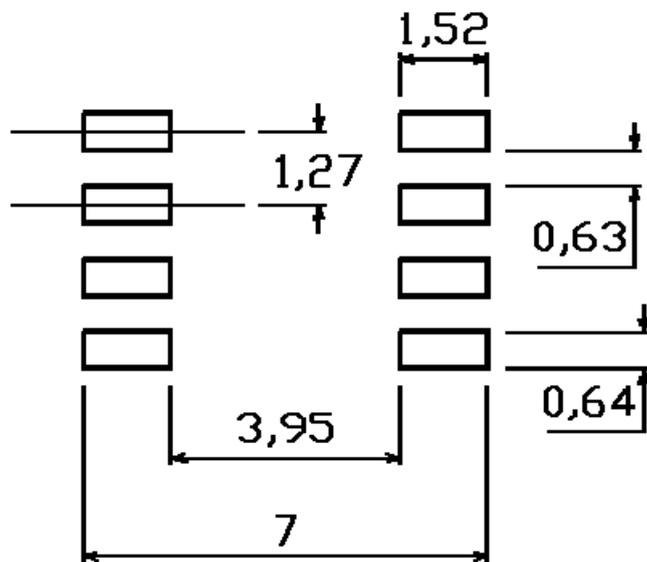


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PACKAGE DIMENSIONS (mm)



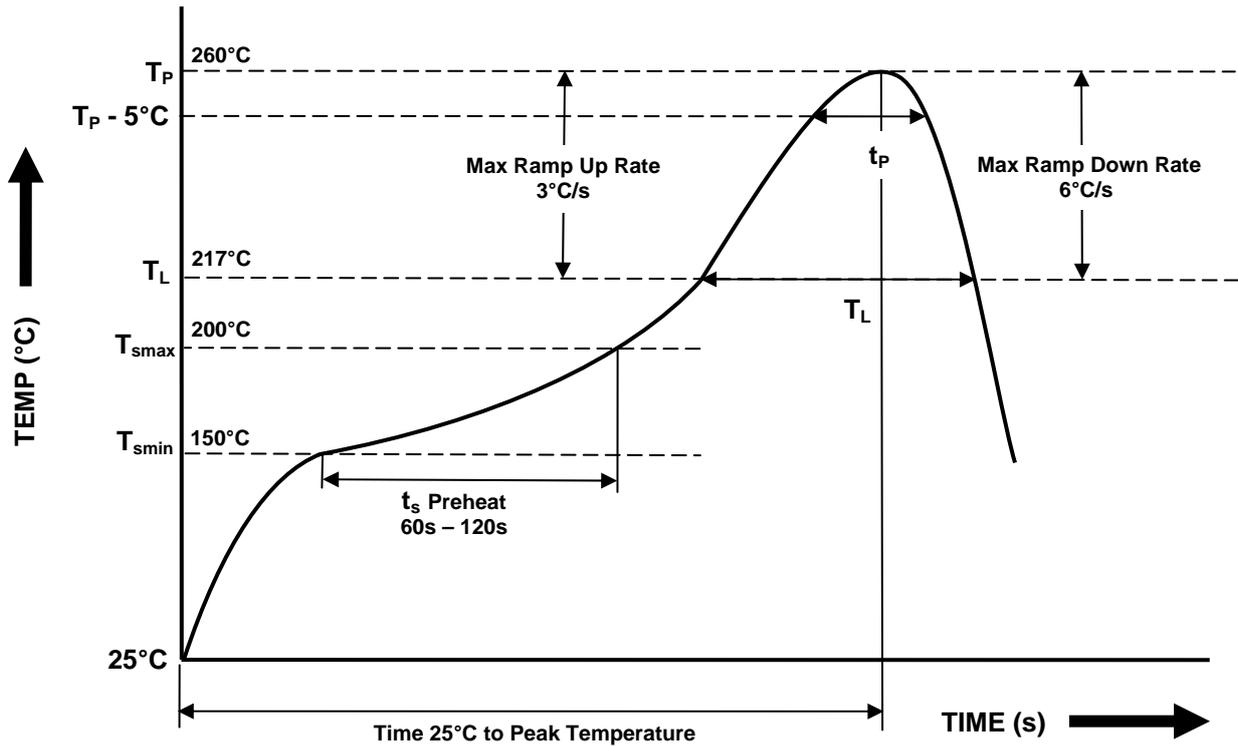
RECOMMENDED PAD LAYOUT (mm)





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

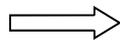
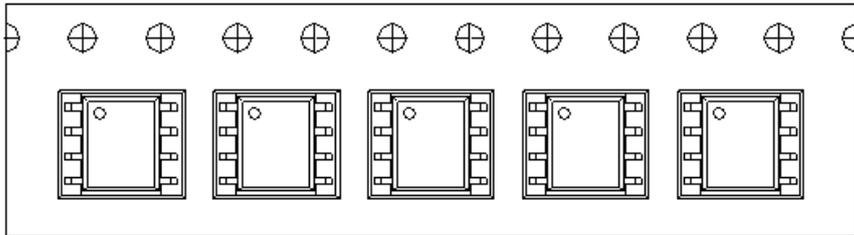


Profile Details	Conditions
Preheat - Min Temperature (T_{SMIN}) - Max Temperature (T_{SMAX}) - Time T_{SMIN} to T_{SMAX} (t_s)	150°C 200°C 60s - 120s
Soldering Zone - Peak Temperature (T_P) - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature ($T_P - 5^\circ C$) - Time maintained above T_L (t_L) - Ramp Up Rate (T_L to T_P) - Ramp Down Rate (T_P to T_L)	260°C 217°C 30s 60s - 100s 3°C/s max 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

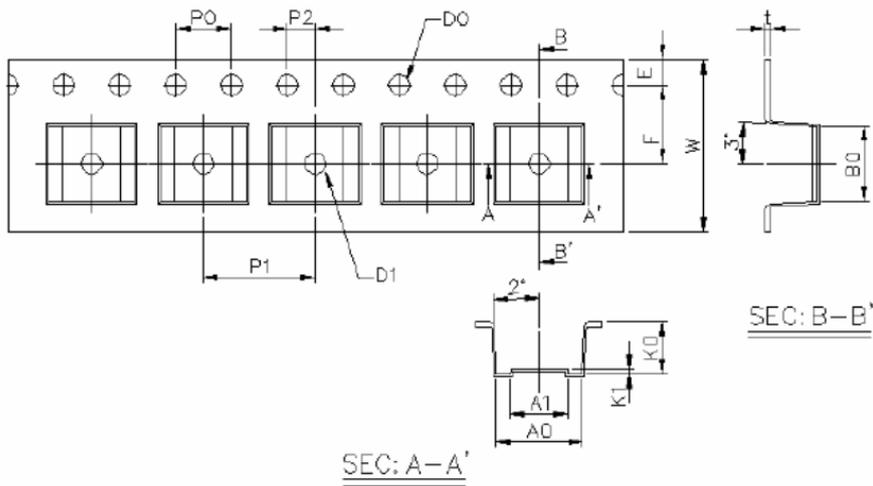


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TAPE AND REEL PACKAGING



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

