



**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**

**DESCRIPTION**

The ICPL0452, ICPL0453, ICPL0500 and ICPL0501 devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor. A separate connection for the photodiode bias and output-transistor collector increase the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance of the input transistor.

These devices belong to Isocom Compact Range of optocouplers.

**FEATURES**

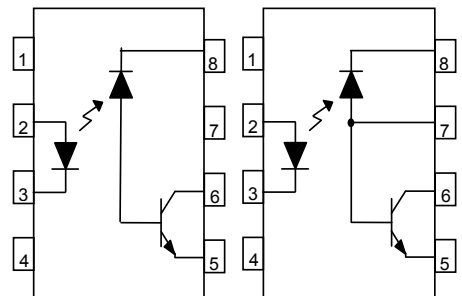
- Half Pitch 1.27mm
- High speed 1Mbit/s
- 15kV/μs min. Common Mode Transient Immunity (ICPL0453)
- High AC Isolation Voltage 3750V<sub>rms</sub>
- Guaranteed Performance from 0°C to 70°C
- Wide Operating Temperature Range -55°C to 100°C
- Pb Free and RoHS Compliant
- Halogen Free
- Safety Approvals Pending

**APPLICATIONS**

- Line Receivers
- Telecommunication Equipments
- Power Transistor Isolation in Motor Drives
- Replacement of Low Speed Phototransistor Optocouplers
- Feedback Loop in Switch Mode Power Supplies
- High Speed Logic Ground Isolation
- Home Appliances

**ORDER INFORMATION**

- Add T&R after PN for Surface Mount Tape & Reel



ICPL0452 / ICPL0453

ICPL0500 / ICPL0501

1. NC
2. Anode
3. Cathode
4. NC
5. Gnd
6. Vout
7. VB  
(ICPL0500/  
ICPL0501)  
NC  
(ICPL0452/  
ICPL0453)
8. Vcc

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)**

**Input Diode**

Forward Current	25mA
Peak Forward Current (50% duty cycle, 1ms pulse width)	50mA
Peak Transient Current (≤1μs pulse width, 300pps)	1A
Reverse Voltage	5V
Power dissipation	45mW

**Output**

Output Current	8mA
Peak Output Current	16mA
Emitter-Base Reverse Voltage (ICPL0500 and ICPL0501 only)	5V
Base Current (ICPL0500 and ICPL0501 only)	5mA
Output Voltage	-0.5 to 20V
Supply Voltage	-0.5 to 30V
Power Dissipation	100mW

**Total Package**

Isolation Voltage	3750V <sub>rms</sub>
Operating Temperature	-55 to 100 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$  unless otherwise specified)

**INPUT**

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	$V_F$	$I_F = 16\text{mA}$		1.5	1.8	V
Reverse Voltage	$V_R$	$I_R = 10\mu\text{A}$	5.0			V
Temperature Coefficient of $V_F$	$\Delta V_F / \Delta T_A$	$I_F = 16\text{mA}$		-1.6		mV/°C

**OUTPUT**

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Logic High Output Current	$I_{OH}$	$I_F = 0\text{mA}, V_O = V_{CC} = 5.5\text{V}, T_A = 25^\circ\text{C}$		0.001	0.5	$\mu\text{A}$
		$I_F = 0\text{mA}, V_O = V_{CC} = 15\text{V}, T_A = 25^\circ\text{C}$		0.01	1	
		$I_F = 0\text{mA}, V_O = V_{CC} = 15\text{V}$			50	
Logic Low Supply Current	$I_{CCL}$	$I_F = 16\text{mA}, V_O = \text{Open}, V_{CC} = 15\text{V}$		140	200	$\mu\text{A}$
Logic High Supply Current	$I_{CCH}$	$I_F = 0\text{mA}, V_O = \text{Open}, V_{CC} = 15\text{V}, T_A = 25^\circ\text{C}$		0.01	1	$\mu\text{A}$
		$I_F = 0\text{mA}, V_O = \text{Open}, V_{CC} = 15\text{V}$			2	

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



**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**

**ELECTRICAL CHARACTERISTICS ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$  unless otherwise specified)**

**COUPLED**

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Current Transfer Ratio	CTR	ICPL0500 ICPL0452/ ICPL0453 / ICPL0501  $I_F = 16\text{mA}$ , $V_O = 0.4\text{V}$ $V_{CC} = 4.5\text{V}$ , $T_A = 25^\circ\text{C}$	7 19		50 50	%
		ICPL0500 ICPL0452/ ICPL0453 / ICPL0501  $I_F = 16\text{mA}$ , $V_O = 0.5\text{V}$ $V_{CC} = 4.5\text{V}$	5 15			
Logic Low Output Voltage	$V_{OL}$	ICPL0500  $I_F = 16\text{mA}$ , $I_O = 1.1\text{mA}$ , $V_{CC} = 4.5\text{V}$ , $T_A = 25^\circ\text{C}$		0.18	0.4	V
		ICPL0452/ ICPL0453 / ICPL0501  $I_F = 16\text{mA}$ , $I_O = 3\text{mA}$ , $V_{CC} = 4.5\text{V}$ , $T_A = 25^\circ\text{C}$		0.18	0.4	
		ICPL0500  $I_F = 16\text{mA}$ , $I_O = 0.8\text{mA}$ , $V_{CC} = 4.5\text{V}$			0.5	
		ICPL0452/ ICPL0453 / ICPL0501  $I_F = 16\text{mA}$ , $I_O = 2.4\text{mA}$ , $V_{CC} = 4.5\text{V}$			0.5	

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



**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**

**ELECTRICAL CHARACTERISTICS ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$  unless otherwise specified)**

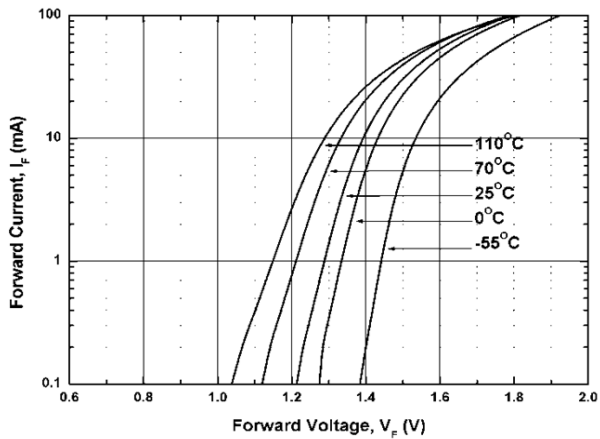
**Switching Characteristics ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$ ,  $I_F = 16\text{mA}$ ,  $V_{CC} = 5\text{V}$  unless otherwise specified)**

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to Logic Low	$T_{PHL}$	ICPL0500 $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 4.1\text{k}\Omega$			1.5 2.0	$\mu\text{s}$
		ICPL0452/ ICPL0453 / ICPL0501 $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 1.9\text{k}\Omega$			0.8 1.0	
Propagation Delay Time to Logic High	$T_{PLH}$	ICPL0500 $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 4.1\text{k}\Omega$			1.5 2.0	$\mu\text{s}$
		ICPL0452/ ICPL0453 / ICPL0501 $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 1.9\text{k}\Omega$			0.8 1.0	
Common Mode Transient Immunity at Logic High	$CM_H$	ICPL0500 $I_F = 0\text{mA}$ , $V_{CM} = 10\text{Vp-p}$ , $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$		1000		$\text{V}/\mu\text{s}$
		ICPL0452/ ICPL0501 $I_F = 0\text{mA}$ , $V_{CM} = 10\text{Vp-p}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$		1000		
		ICPL0453 $I_F = 0\text{mA}$ , $V_{CM} = 1500\text{Vp-p}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$	15000			
Common Mode Transient Immunity at Logic Low	$CM_L$	ICPL0500 $I_F = 16\text{mA}$ , $V_{CM} = 10\text{Vp-p}$ , $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$		1000		$\text{V}/\mu\text{s}$
		ICPL0452/ ICPL0501 $I_F = 16\text{mA}$ , $V_{CM} = 10\text{Vp-p}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$		1000		
		ICPL0453 $I_F = 16\text{mA}$ , $V_{CM} = 1500\text{Vp-p}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$	15000			

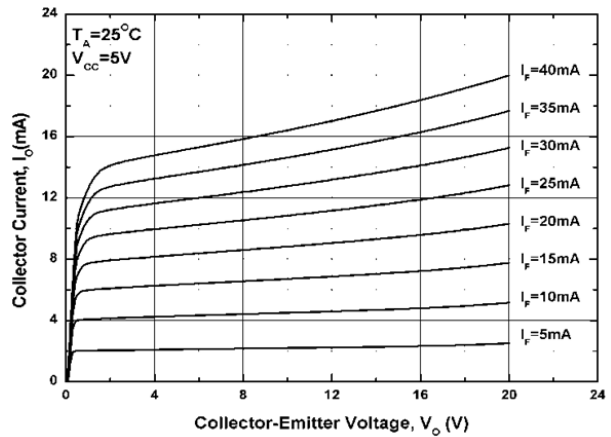
\* Typical values at  $T_A = 25^\circ\text{C}$



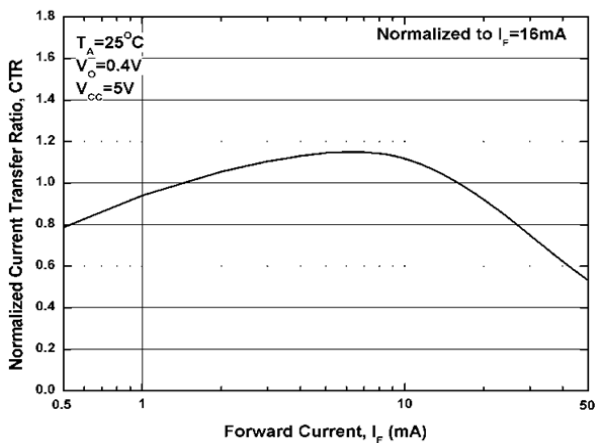
**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**



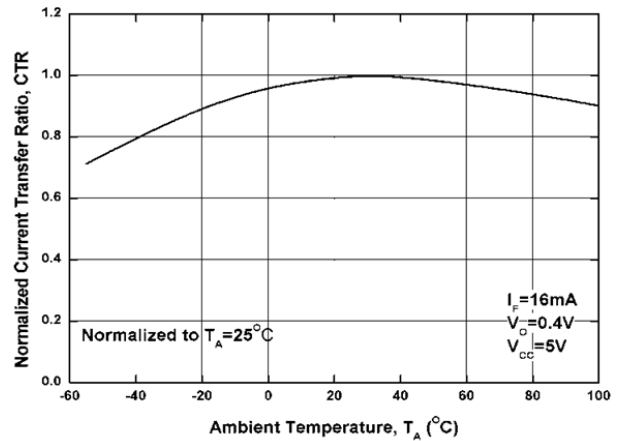
**Fig 1 Forward Current vs Forward Voltage**



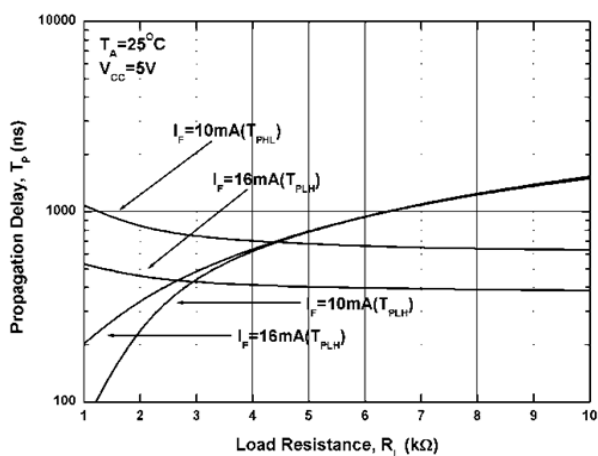
**Fig 2 Output Current vs Output Voltage**



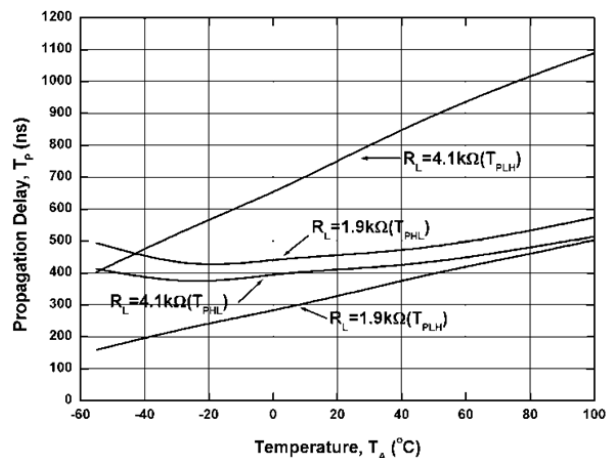
**Fig 3 Normalized CTR vs Forward Current**



**Fig 4 Normalized CTR vs T<sub>A</sub>**



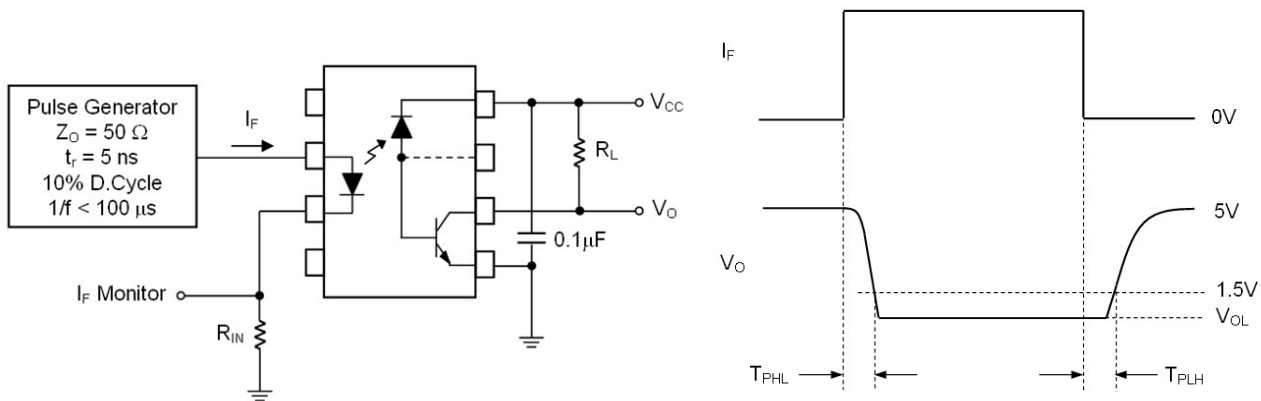
**Fig 5 Propagation Delay vs Load Resistance**



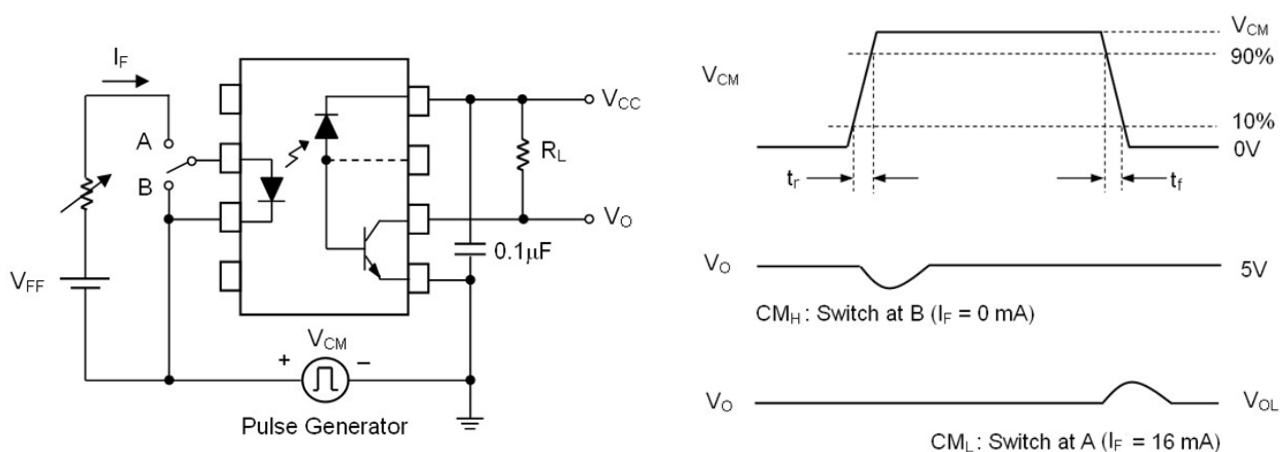
**Fig 6 Propagation Delay vs T<sub>A</sub>**



**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**



**Fig 7 Switching Time Test Circuit**



**Fig 8 Common Mode Transient Immunity Test Circuit**

**Note:**

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.,  $V_O > 2.0V$ ).

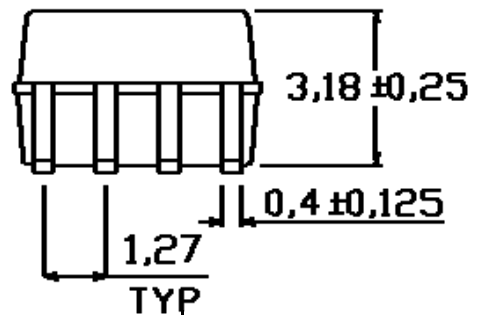
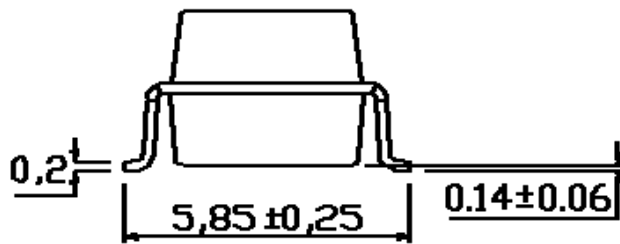
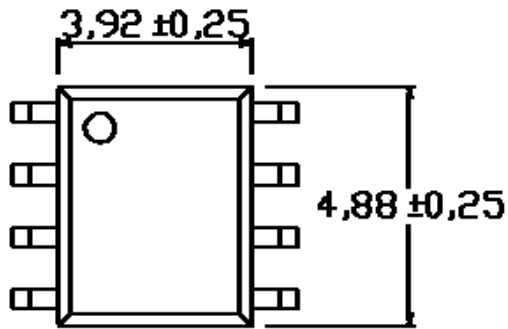
Common mode transient immunity in logic low level is the maximum tolerable (negative)  $dV_{CM}/dt$  on the trailing edge of the common mode pulse signal,  $V_{CM}$ , to assure that the output will remain in a logic low state (i.e.,  $V_O < 0.8V$ ).



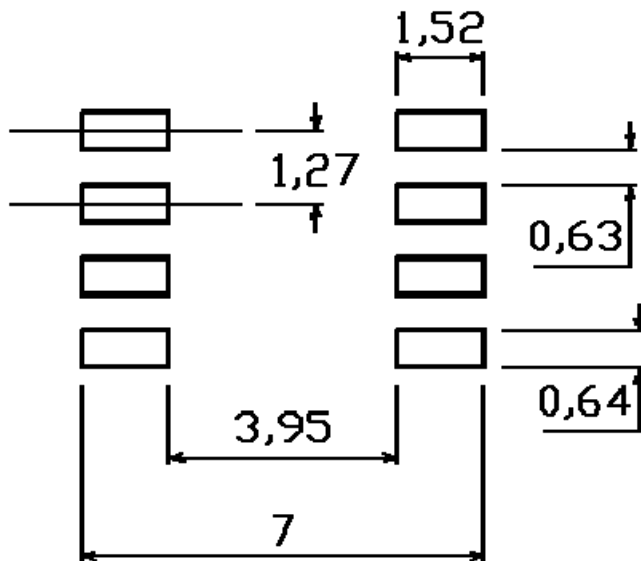


**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**

**PACKAGE DIMENSIONS (mm)**



**Recommended Pad Layout**

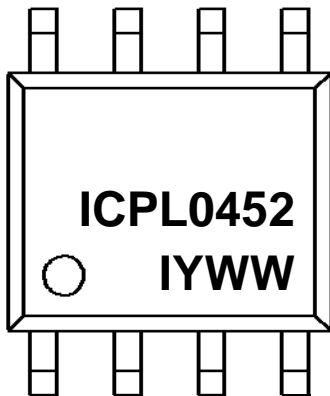






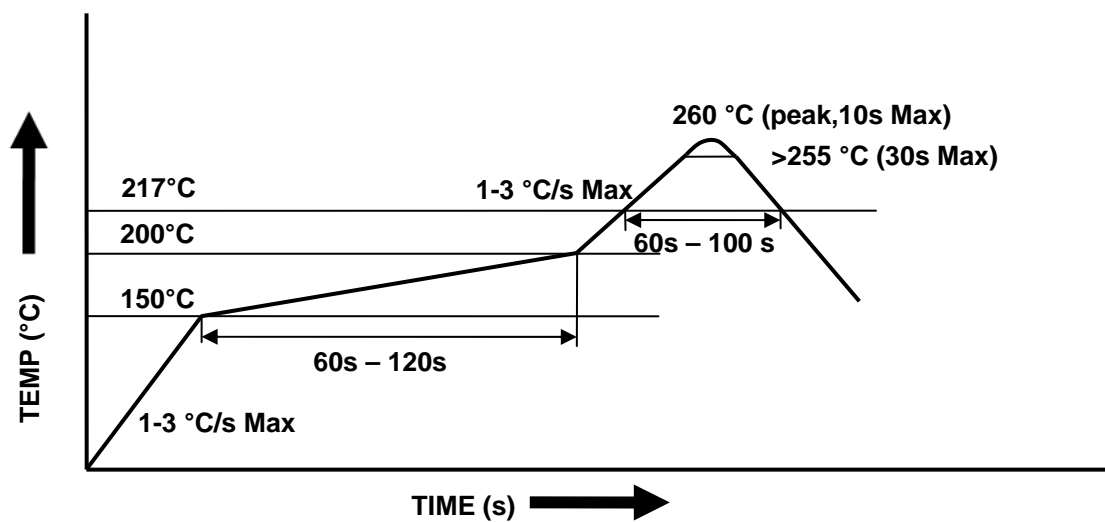
**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**

**Device Marking (Example ICPL0452)**



ICPL0452 denotes Device Part Number  
Y denotes 1 digit Year code  
WW denotes 2 digit Week code  
I denotes Isocom

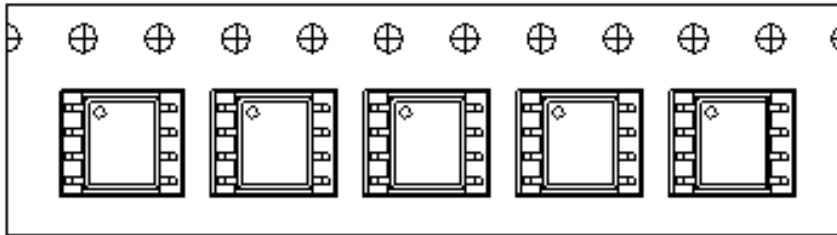
**REFLOW SOLDERING TEMPERATURE PROFILE**



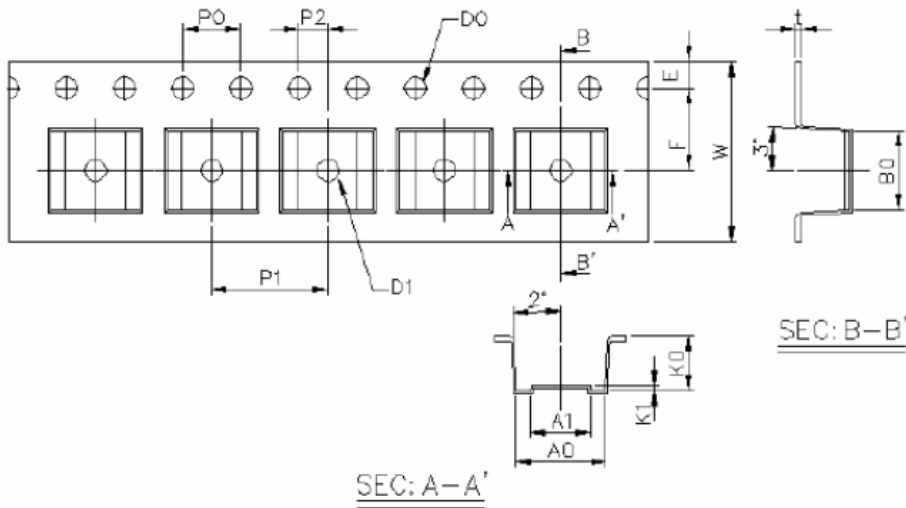


**ICPL0452 / ICPL0453 / ICPL0500 / ICPL0501**

**Tape and Reel Packaging**



Direction of feed from reel



Dimension No.	<b>A0</b>	<b>A1</b>	<b>B0</b>	<b>D0</b>	<b>D1</b>	<b>E</b>	<b>F</b>
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.	<b>Po</b>	<b>P1</b>	<b>P2</b>	<b>t</b>	<b>W</b>	<b>K0</b>	<b>K1</b>
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