ICPL0600 / ICPL0601 / ICPL0611

DESCRIPTION

The ICPL0600, ICPL0601 and ICPL0611 devices each consist of an infrared emitting diode, optically coupled to a high speed integrated photo detector logic gate with a strobable output.

These devices belong to Isocom Compact Range of Optocouplers.

FEATURES

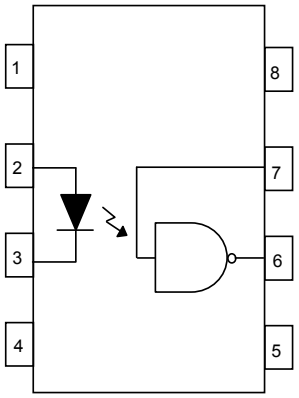
- Half Pitch 1.27mm
- High Speed 10Mbit/s
- 10kV/µs min. Common Mode Transient Immunity (ICPL0611)
- High AC Isolation voltage 3750V_{RMS}
- Guaranteed Performance from -40°C to 85°C
- Wide Operating Temperature Range -40°C to 100°C
- Logic Gate Output
- Pb Free and RoHS Compliant
- Halogen Free
- Safety 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

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



1. No Connection
2. Anode
3. Cathode
4. No Connection
5. Gnd
6. Vout
7. V_E
8. V_{CC}

A 0.1µF bypass capacitor must be connected between pins 8 and 5.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Input Diode

Forward Current	20mA
Reverse Voltage	5V
Power dissipation	40mW

Output

Output Current	50mA
Output Voltage	7.0V
Supply Voltage	7.0V
Enable Input Voltage (maximum 500mV above V_{CC})	5.5V
Enable Input Current	5mA
Power Dissipation	85mW

Total Package

Isolation Voltage	3750V_{RMS}
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	Enable	Output
H	H	L
L	H	H
H	L	H
L	L	H
H	NC	L
L	NC	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_E = 0.5V, V_{CC} = 5.5V			10	mA
Low Level Supply Current	I_{CCL}	I_F = 10mA, V_{CC} = 5.5V			13	mA
High Level Enable Current	I_{EH}	V_E = 2.0V, V_{CC} = 5.5V			-1.6	mA
Low Level Enable Current	I_{EL}	V_E = 0.5V, V_{CC} = 5.5V			-1.6	mA
High Level Enable Voltage	V_{EH}	I_F = 10mA, V_{CC} = 5.5V	2.0			V
Low Level Enable Voltage	V_{EL}	I_F = 10mA, V_{CC} = 5.5V			0.8	V

* Typical values at T_A = 25°C

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

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Output Current	I_{OH}	V_{CC} = 5.5V, V_E = 2.0V, V_O = 5.5V, I_F = 250µA			100	µA
Low Level Output Voltage	V_{OL}	V_{CC} = 5.5V, V_E = 2.0V, I_F = 5mA, I_{OL} = 13mA			0.6	V
Input Threshold Current	I_{FT}	V_{CC} = 5.5V, V_E = 2.0V, V_O = 0.6V, I_{OL} = 13mA			5	mA

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

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to Output High Level	t_{PHL}	C_L = 15pF, R_L = 350Ω, T_A = 25°C		35	75	ns
Propagation Delay Time to Output Low level	t_{PLH}	C_L = 15pF, R_L = 350Ω, T_A = 25°C		45	75	ns
Pulse Width Distortion	$\|t_{PHL}-t_{PLH}\|$	C_L = 15pF, R_L = 350Ω		10	35	ns
Output Rise Time	t_r	C_L = 15pF, R_L = 350Ω		30	40	ns
Output Fall Time	t_f	C_L = 15pF, R_L = 350Ω		10	20	ns
Enable Propagation Delay Time to Output High Level	t_{ELH}	I_F = 7.5mA, V_{EL} = 0V, V_{EH} = 3V, C_L = 15pF, R_L = 350Ω		30	40	ns
Enable Propagation Delay Time to Output Low Level	t_{EHL}			20	30	ns

* 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, V_{CC} = 5V, I_F = 7.5mA unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Common Mode Transient Immunity at Logic High	CM_H	ICPL0600 (Fig 14) I_F = 0mA, V_{OH} = 2V, R_L = 350Ω, V_{CM} = 10Vp-p, T_A = 25°C				V/µs
		ICPL0601 (Fig 14) I_F = 0mA, V_{OH} = 2V, R_L = 350Ω, V_{CM} = 50Vp-p, T_A = 25°C	5000			
		ICPL0611 (Fig 14) I_F = 0mA, V_{OH} = 2V, R_L = 350Ω, V_{CM} = 400Vp-p, T_A = 25°C	10000			
		ICPL0611 (Fig 15) I_F = 0mA, V_{OH} = 2V, R_L = 350Ω, V_{CM} = 400Vp-p, T_A = 25°C	15000			
Common Mode Transient Immunity at Logic Low	CM_L	ICPL0600 (Fig 14) I_F = 7.5mA, V_{OL} =0.8V, R_L = 350Ω, V_{CM} = 10Vp-p, T_A = 25°C				V/µs
		ICPL0601 (Fig 14) I_F = 7.5mA, V_{OL} =0.8V, R_L = 350Ω, V_{CM} = 50Vp-p, T_A = 25°C	5000			
		ICPL0611 (Fig 14) I_F = 7.5mA, V_{OL} = 0.8V, R_L = 350Ω, V_{CM} = 400Vp-p, T_A = 25°C	10000			
		ICPL0611 (Fig 15) I_F = 7.5mA, V_{OL} = 0.8V, R_L = 350Ω, V_{CM} = 400Vp-p, T_A = 25°C	15000			

* Typical values at T_A = 25°C

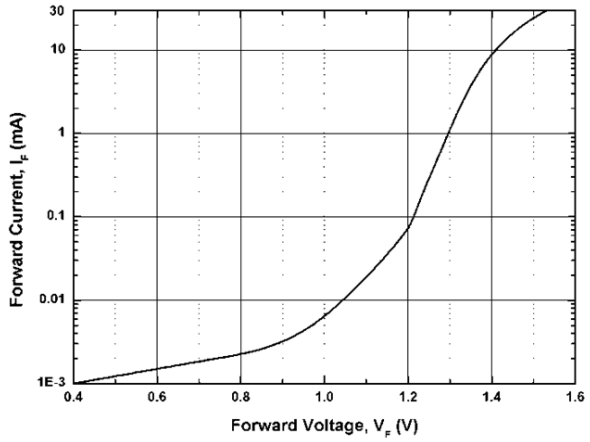


Fig 1 Forward Current vs Forward Voltage

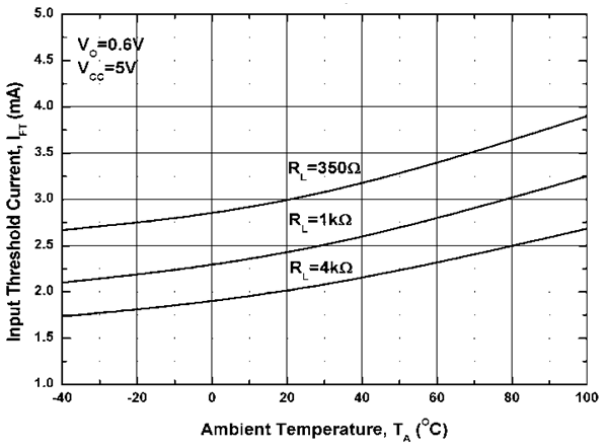


Fig 2 Input Threshold Current vs T_A

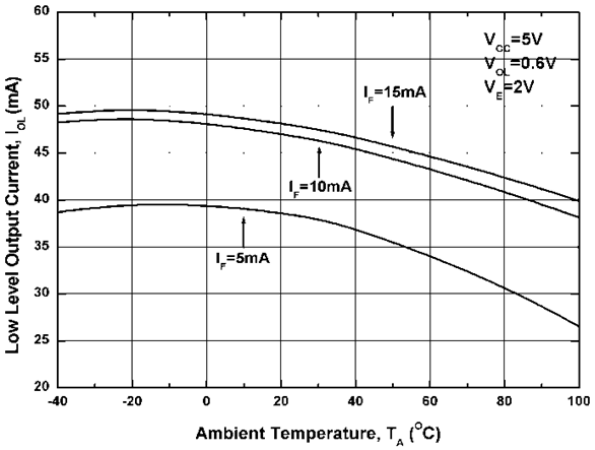


Fig 3 Low Level Output Current vs T_A

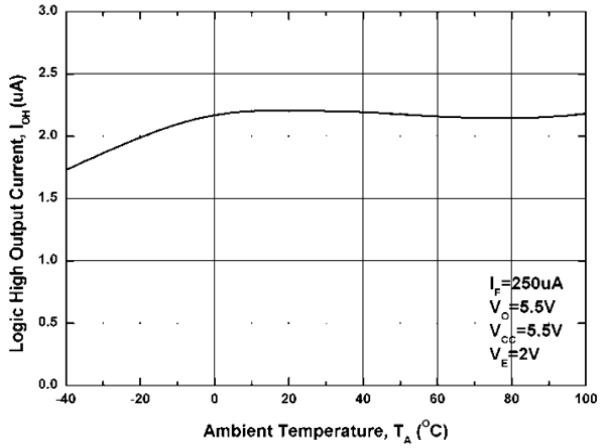


Fig 4 High Level Output Current vs T_A

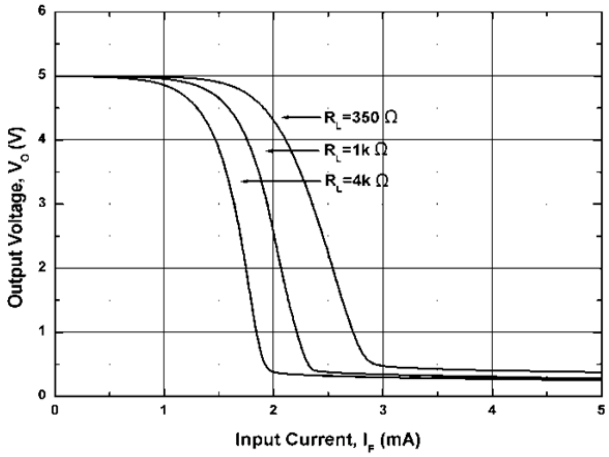


Fig 5 Output Voltage vs Input Forward Current

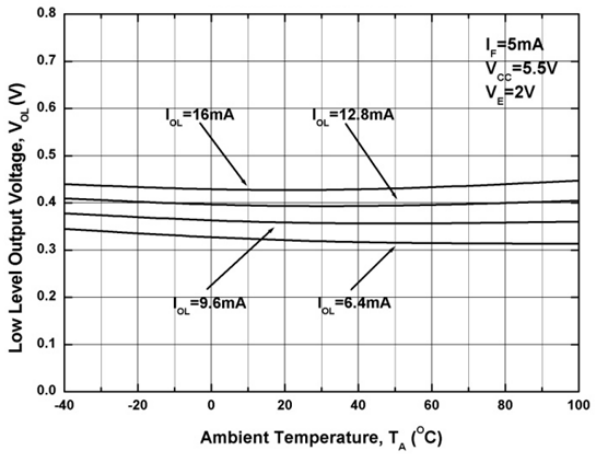


Fig 6 Low Level Output Voltage vs T_A

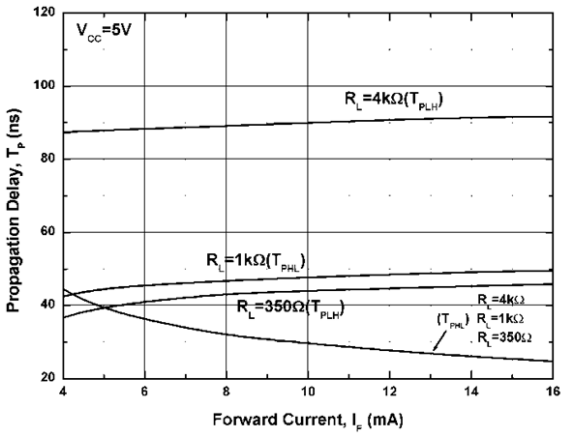


Fig 7 Propagation Delay Time vs Forward Current

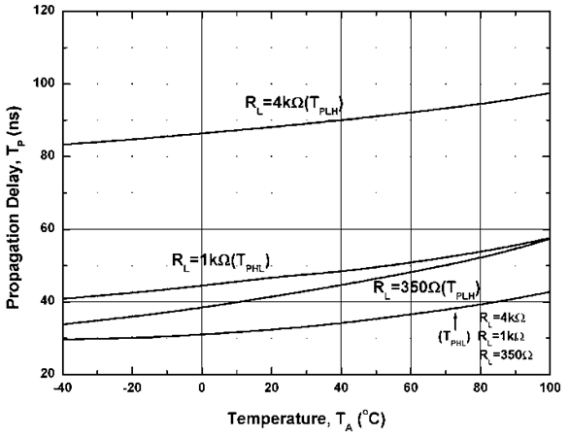


Fig 8 Propagation Delay Time vs T_A

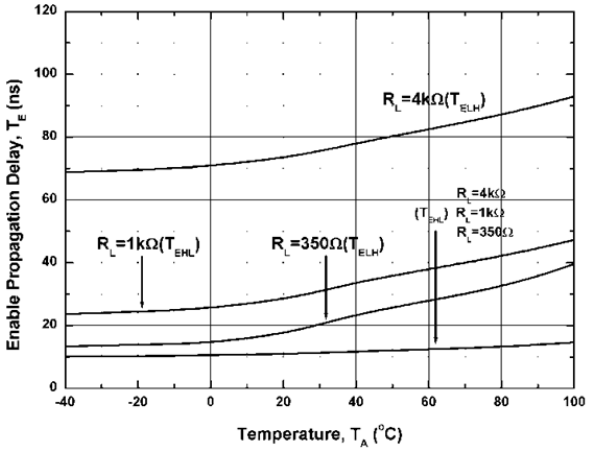


Fig 9 Enable Propagation Delay Time vs T_A

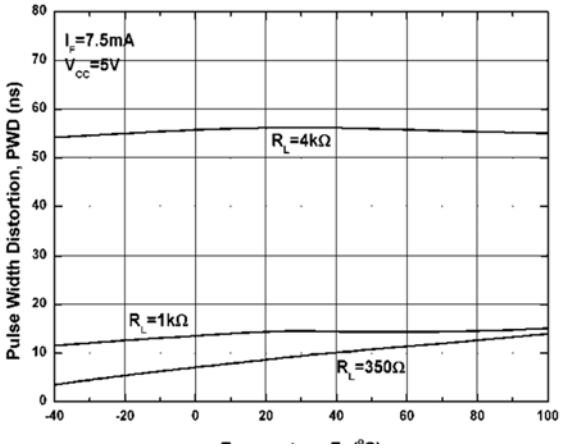


Fig 10 Pulse Width Distortion vs T_A

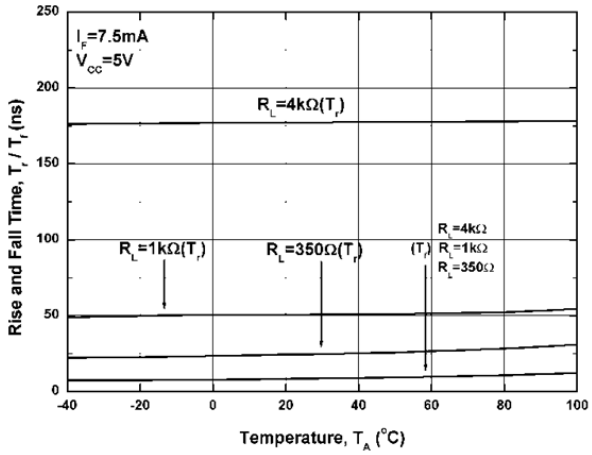


Fig 11 Rise Time / Fall Time vs T_A

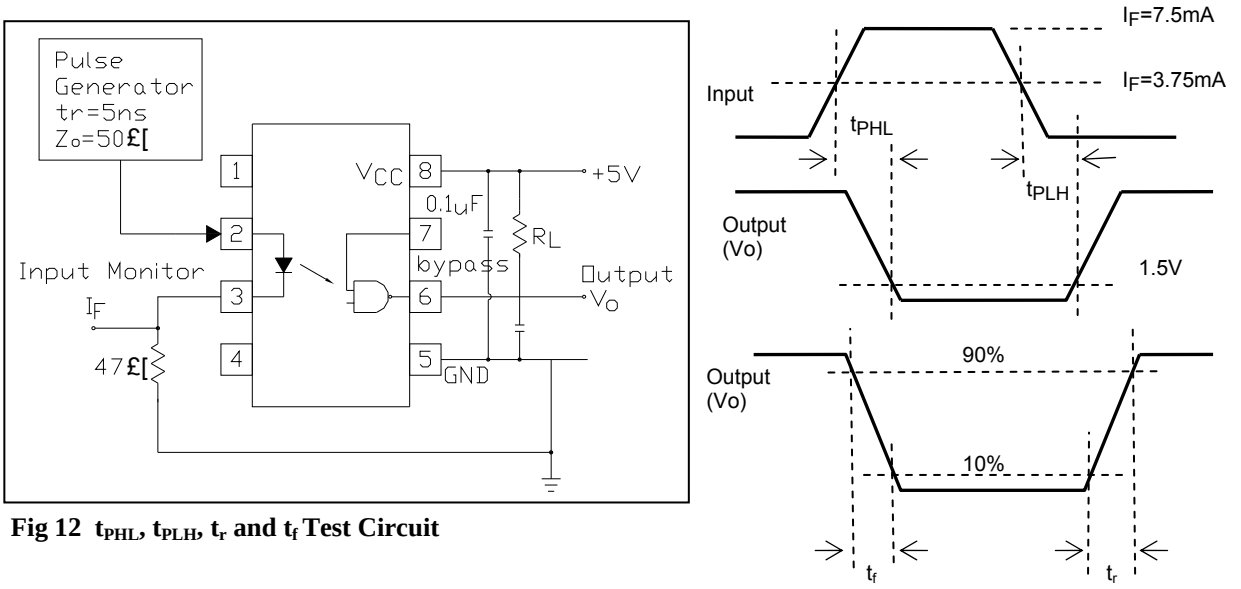


Fig 12 t_{PHL}, t_{PLH}, t_r and t_f Test Circuit

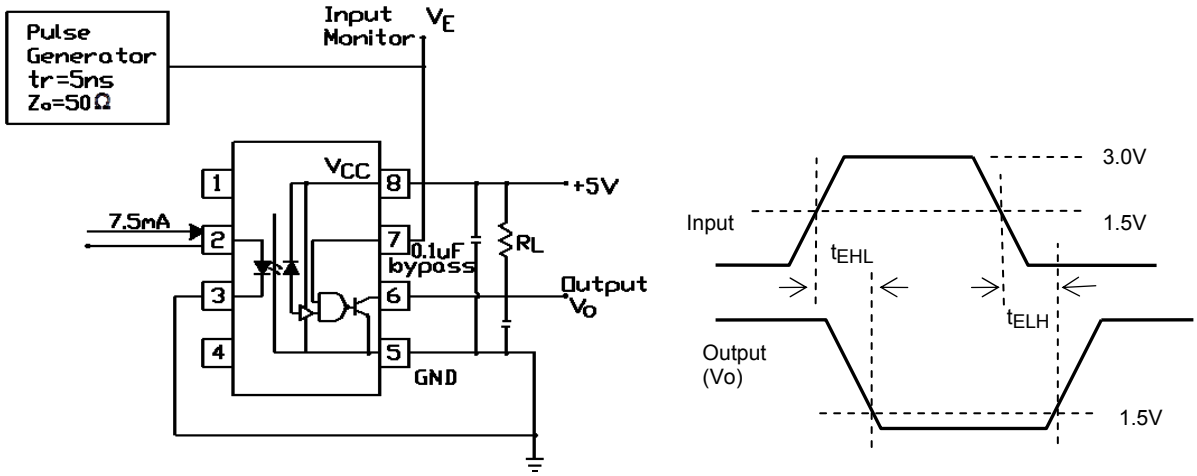


Fig 13 t_{EHL} and t_{ELH} Test Circuit

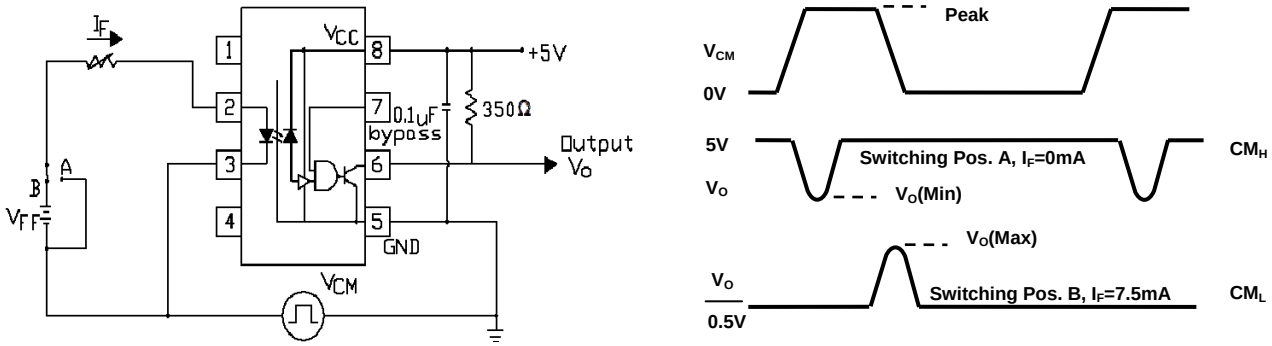


Fig 14 Common Mode Transient Immunity Test Circuit

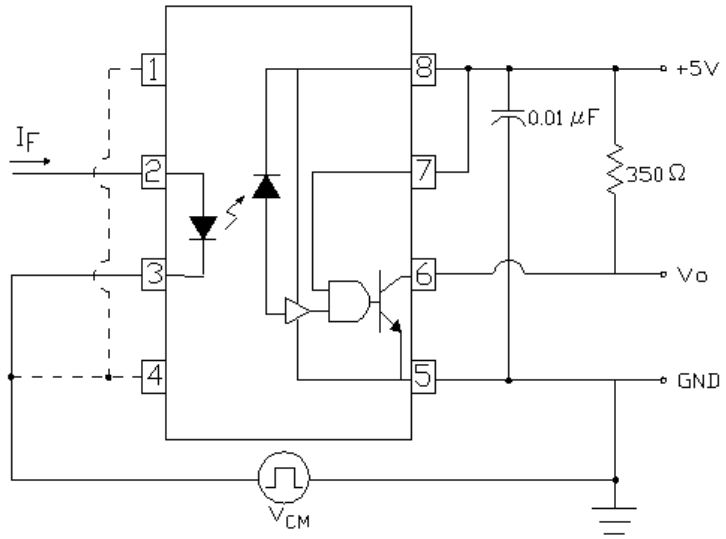


Fig 15 High Common Mode Transient Immunity Test Circuit

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., $V_O < 0.8V$).

Notes:

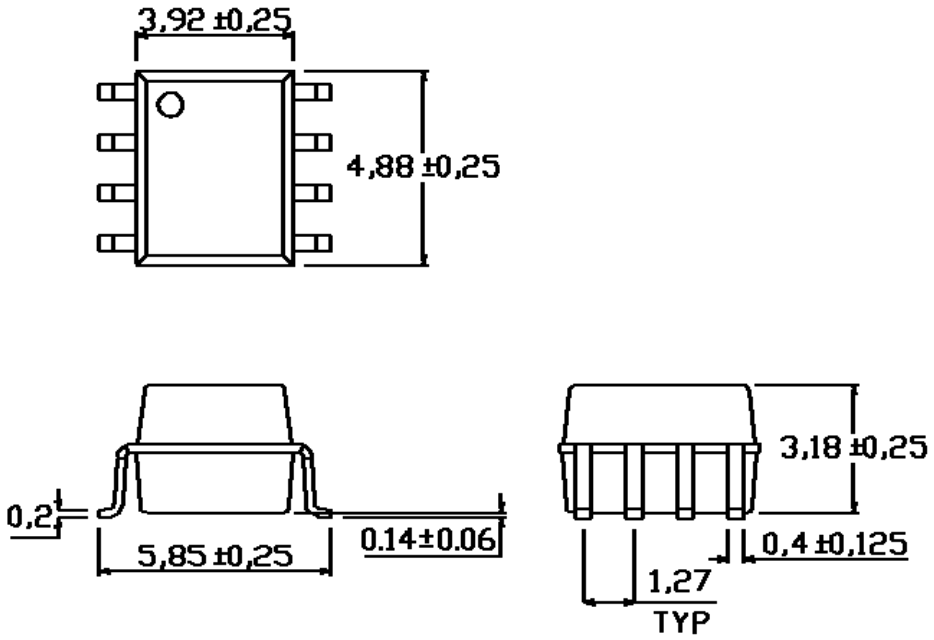
- The V_{CC} supply must be bypassed by a 0.1µF capacitor or larger with good high frequency characteristic and should be connected as close as possible to the package V_{CC} and GND pins.
- Enable Input – No pull up resistor required as the device has an internal pull up resistor.
- t_{PLH} is measured 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.
- t_{PHL} 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.
- t_r Rise time is measured from the 10% to the 90% levels on the LOW to HIGH transition of the output pulse.
- t_f Fall time is measured from the 90% to the 10% levels on the HIGH to LOW transition of the output pulse.
- t_{ELH} is measured from the 1.5V level on the HIGH to LOW transition of the input Enable voltage pulse to the 1.5V level on the LOW to HIGH transition of the output voltage pulse.
- t_{EHL} is measured from the 1.5V level on the LOW to HIGH transition of the input Enable voltage pulse to the 1.5V level on the HIGH to LOW transition of the output voltage pulse.
- 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., $V_O > 2.0V$).
- 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., $V_O < 0.8V$).

ORDER INFORMATION

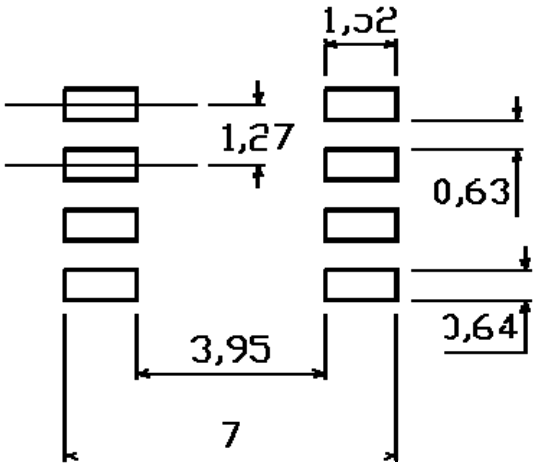
ICPL0600, ICPL0601, ICPL0611

After PN	Description	Packing quantity
None	Surface Mount Tube Packaging	100 pcs per tube
T&R	Surface Mount Tape & Reel	2000 pcs per reel

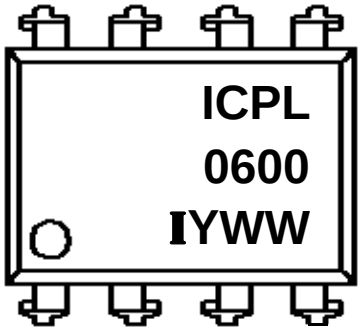
PACKAGE DIMENSIONS (mm)



Recommended Solder Pad Layout (mm)

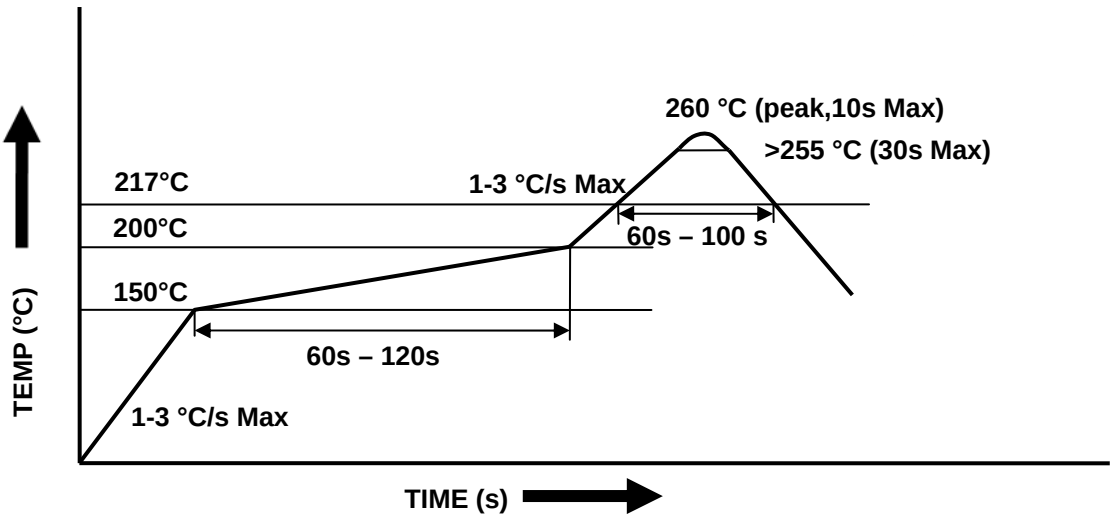


Device Marking (Example ICPL0600)

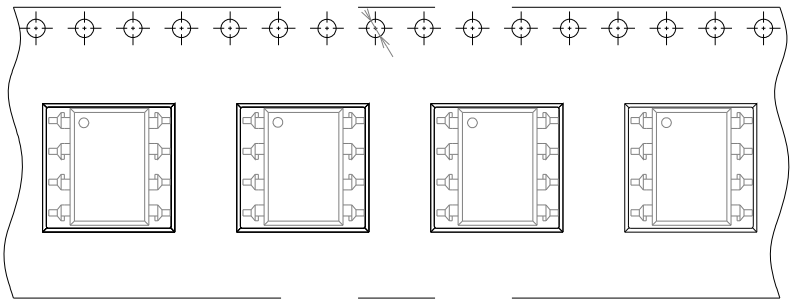


ICPL0600 denotes Device Part Number
Y denotes 1 digit Year code
WW denotes 2 digit Week code
I denotes Isocom

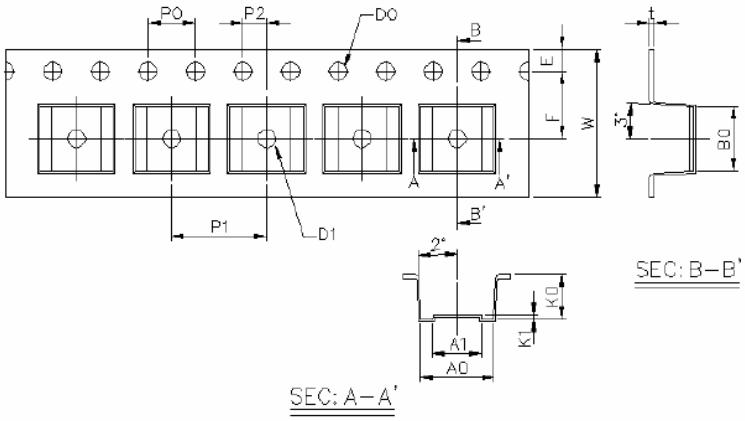
REFLOW SOLDERING TEMPERATURE PROFILE



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