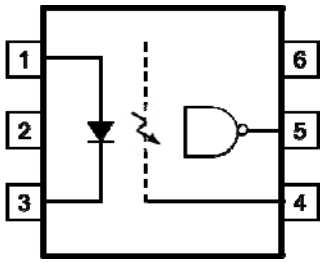
ICPLW60L

DESCRIPTION

The ICPLW60L consists of a high efficient AlGaAs light emitting diode and a high speed optical detector. This design provides excellent AC and DC isolation while achieving LVTTL/LVCMOS compatibility.
The output of the optical detector features an open collector Schottky clamped transistor.

The internal shield provides a guaranteed common mode transient immunity specification of 15 KV/us at 3.3V operation.

The device is in Stretched SO6 package.



1 Anode
2 NC
3 Cathode
4 GND
5 V_O
6 V_{CC}

A 0.1µF bypass Capacitor must be connected between Pins 6 and 4.

FEATURES

- High Speed 15Mbit/s Typical
- 3.3V/ 5V Dual Supply Voltages
- LVTTL / LVCMOS Compatible
- Low Input Current Capability 3mA
- Guaranteed Performance from -40°C to 105°C
- Minimum Common Mode Transient Immunity 15kV/µs at V_{CM} 1000V at 3.3V Operation
- High AC Isolation Voltage 5000V_{RMS}
- Pb Free and RoHS Compliant
- Safety Approvals Pending

APPLICATIONS

- Line Receivers
- Data Communication
- High Speed Logic Ground Isolation
- Pulse Transformer Replacement
- Switch Mode Power Supplies
- Ground Loop Elimination
- Computer Peripheral Interface

ORDER INFORMATION

- Supplied in Tape and Reel

ABSOLUTE MAXIMUM RATINGS (T_A = 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

Input	
Forward Current	20mA
Peak Forward Current Pulse Width ≤ 50ns, Average Current ≤ 20mA	50mA
Reverse Voltage	5V
Power dissipation	40mW
Output	
Output Current	50mA
Output Voltage	7V
Supply Voltage	7V
Power Dissipation	85mW
Total Package	
Isolation Voltage	5000V_{RMS}
Operating Temperature	-40 to 105 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

can adversely affect reliability.

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Truth Table

LED	Output
ON	L
OFF	H

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T_A	- 40	105	°C
Supply Voltage	V_{CC}	2.7	3.6	V
		4.5	5.5	
Input Current, High Level	$I_{F(ON)}$	6	15	mA
Input Current, Low Level	$I_{F(OFF)}$	0	250	µA
Output Pull-up Resistance	R_L	330	4000	Ω
Fan Out (R_L = 1kΩ per channel)	N		5	TTL Loads

ICPLW60L

ELECTRICAL CHARACTERISTICS (T_A = −40 to 105°C, 2.7V ≤ V_{CC} ≤ 3.6V, I_F = 7.5mA unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	I_F = 10mA		1.38	1.80	V
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	I_F = 10mA		−1.6		mV/°C
Reverse Voltage	V_R	I_R = 10µA	5.0			V
Input Capacitance	C_{IN}	V_F = 0V, f = 1MHz		34		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Supply Current	I_{CCH}	I_F = 0mA, V_{CC} = 3.3V		3.8	10	mA
Low Level Supply Current	I_{CCL}	I_F = 10mA, V_{CC} = 3.3V		5.8	13	mA
High Level Output Current	I_{OH}	I_F = 250µA, V_{CC} = 3.3V, V_O = 3.3V		5	100	µA
Low Level Output Voltage	V_{OL}	I_F = 5mA, V_{CC} = 3.3V, I_{OL} = 13mA		0.3	0.6	V

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Input Threshold Current	I_{TH}	V_{CC} = 3.3V, V_O = 0.6V I_{OL} = 13mA		1.5	5	mA

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to High Output Level	t_{PLH}	R_L = 350Ω, C_L = 15pF, T_A = 25°C		48	90	ns
Propagation Delay Time to Low Output Level	t_{PHL}			39	75	
Pulse Width Distortion	$\lvert t_{PHL} - t_{PLH} \rvert$			10	30	
Propagation Delay Skew	t_{PSK}				40	
Output Rise Time (10% to 90%)	t_r			16		
Output Fall Time (90% to 10%)	t_f			7		

ELECTRICAL CHARACTERISTICS (T_A = −40 to 105°C, 4.5V ≤ V_{CC} ≤ 5.5V, I_F = 7.5mA unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	I_F = 10mA		1.38	1.80	V
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	I_F = 10mA		−1.6		mV/°C
Reverse Voltage	V_R	I_R = 10µA	5.0			V
Input Capacitance	C_{IN}	V_F = 0V, f = 1MHz		34		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
High Level Supply Current	I_{CCH}	I_F = 0mA, V_{CC} = 5.5V		6	10	mA
Low Level Supply Current	I_{CCL}	I_F = 10mA, V_{CC} = 5.5V		8	13	mA
High Level Output Current	I_{OH}	I_F = 250µA, V_{CC} = 5.5V, V_O = 3.3V		3	100	µA
Low Level Output Voltage	V_{OL}	I_F = 5mA, V_{CC} = 5.5V, I_{OL} = 13mA		0.4	0.6	V

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Input Threshold Current	I_{TH}	V_{CC} = 5.5V, V_O = 0.6V I_{OL} ≥ 13mA		1.57	5	mA

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to High Output Level	t_{PLH}	R_L = 350Ω, C_L = 15pF, T_A = 25°C		40	75	ns
Propagation Delay Time to Low Output Level	t_{PHL}			35	75	
Pulse Width Distortion	$\lvert t_{PHL} - t_{PLH} \rvert$			5	35	
Propagation Delay Skew	t_{PSK}				40	
Output Rise Time (10% to 90%)	t_r			21		
Output Fall Time (90% to 10%)	t_f			7		

ELECTRICAL CHARACTERISTICS (T_A = −40 to 105°C unless otherwise specified)

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Common Mode Transient Immunity at Logic High	CM_H	V_{CC} = 3.3V I_F = 0mA, R_L = 350Ω, V_{CM} = 1000Vp-p, T_A = 25°C	15			kV/µs
		V_{CC} = 5V I_F = 0mA, R_L = 350Ω, V_{CM} = 1000Vp-p, T_A = 25°C	10			
Common Mode Transient Immunity at Logic Low	CM_L	V_{CC} = 3.3V I_F = 7.5mA, R_L = 350Ω, V_{CM} = 1000Vp-p, T_A = 25°C	15			
		V_{CC} = 5V I_F = 7.5mA, R_L = 350Ω, V_{CM} = 1000Vp-p, T_A = 25°C	10			

ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Isolation Voltage	V_{ISO}	RH ≤ 50%, T_A = 25°C t = 1 min,	5000			V_{RMS}
Leakage Current	I_{I-O}	RH = 45%, T_A = 25°C V_{I-O} = 3kVDC, t = 5s			1.0	µA
Input-Output Resistance	R_{I-O}	V_{I-O} = 500VDC		10^{12}		Ω
Input-Output Capacitance	C_{I-O}	f = 1MHz, T_A = 25°C		1.0		pF

* Typical values at T_A = 25°C

ELECTRICAL CHARACTERISTICS

NOTES

- 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.

- Peaking drive circuit may be used to speed up the LED. Peak driving current may go up to 50mA with maximum pulse width 50ns, provided average current does not exceed 20mA.

- t_{PLH} is measured from the 3.75 mA point on the falling edge of the input pulse to the 1.5 V point on the rising edge of the output pulse.

- t_{PHL} is measured from the 3.75 mA point on the rising edge of the input pulse to the 1.5 V point on the falling edge of the output 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.

- CM_H is the maximum tolerable rate of rise of the common mode voltage to assure that the output will remain in a high logic state (i.e., V_O > 2.0 V).

- CM_L is the maximum tolerable rate of fall of the common mode voltage to assure that the output will remain in a low logic state (i.e., V_O < 0.8 V).

- Isolation Test with device considered a two terminal device : pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

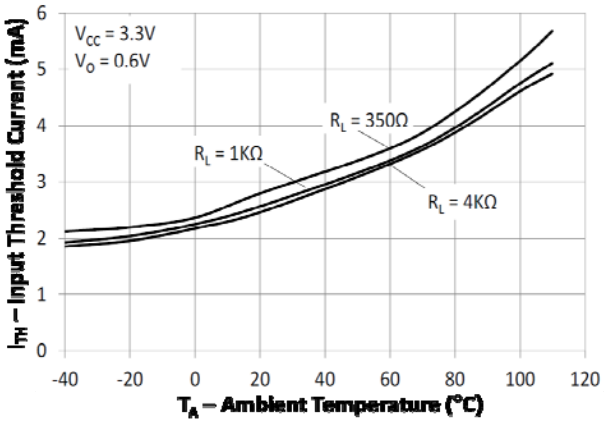


Fig 1 Input Threshold Current at V_{CC} 3.3V vs T_A

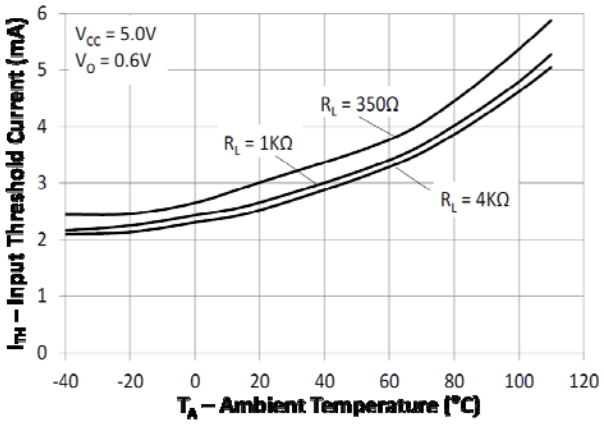


Fig 2 Input Threshold Current at V_{CC} 5.0V vs T_A

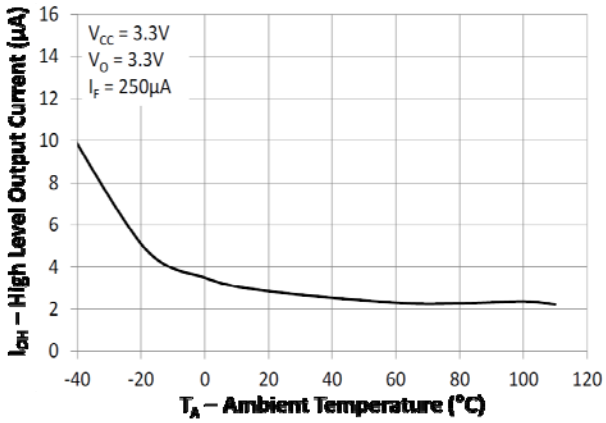


Fig 3 High Level Output Current at V_{CC} 3.3V vs T_A

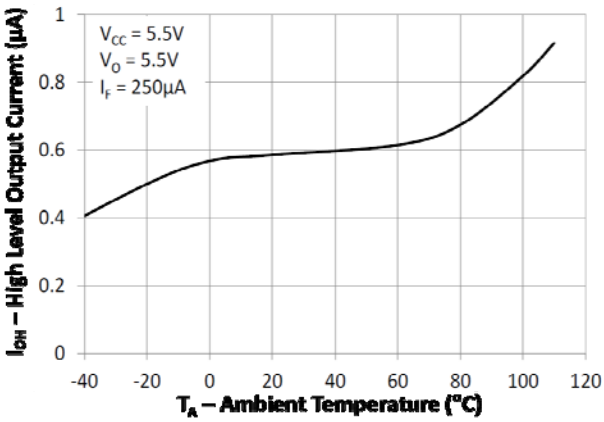


Fig 4 High Level Output Current at V_{CC} 5.5V vs T_A

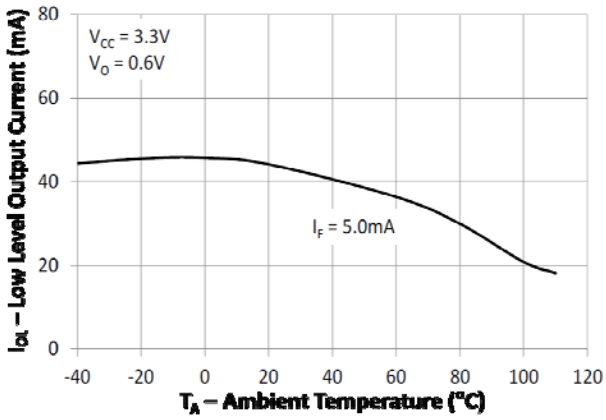


Fig 5 Low Level Output Current at V_{CC} 3.3V vs T_A

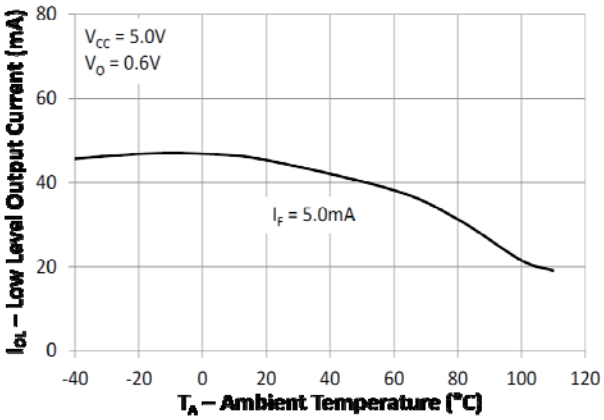


Fig 6 Low Level Output Current at V_{CC} 5.0V vs T_A

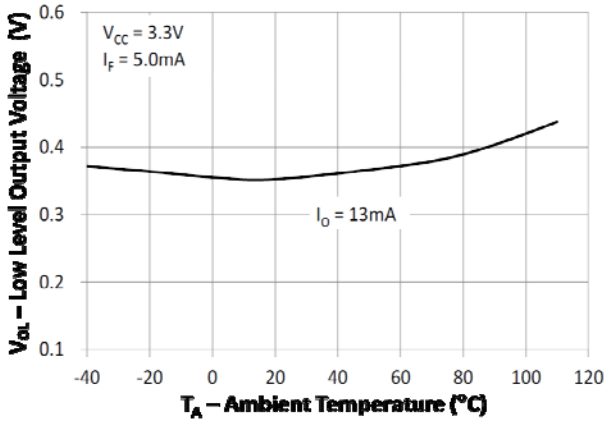


Fig 7 Low Level Output Voltage at V_{CC} 3.3V vs T_A

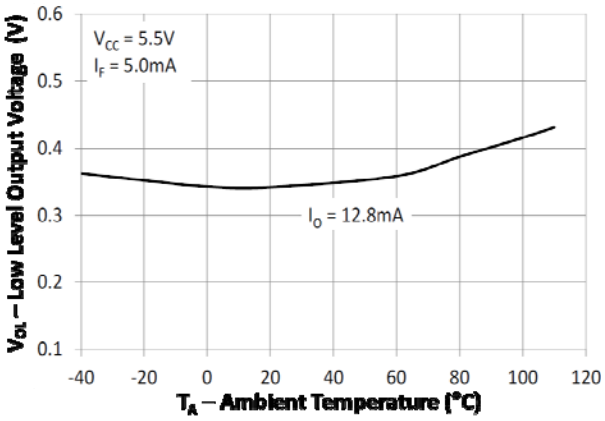


Fig 8 Low Level Output Voltage at V_{CC} 5.5V vs T_A

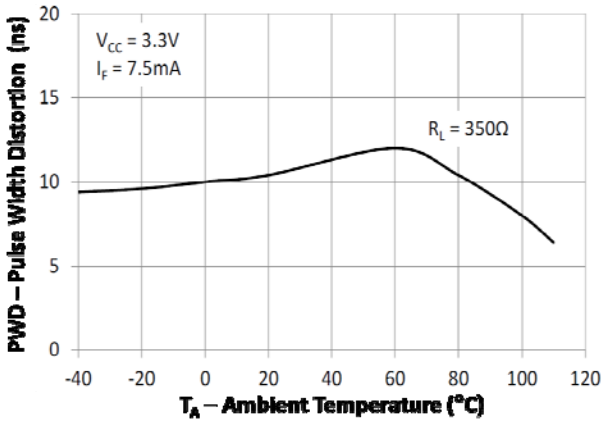


Fig 9 Pulse Width Distortion at V_{CC} 3.3V vs T_A

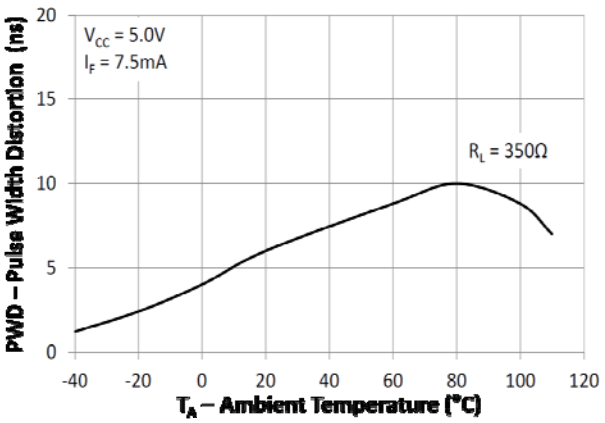


Fig 10 Pulse Width Distortion at V_{CC} 5.0V vs T_A

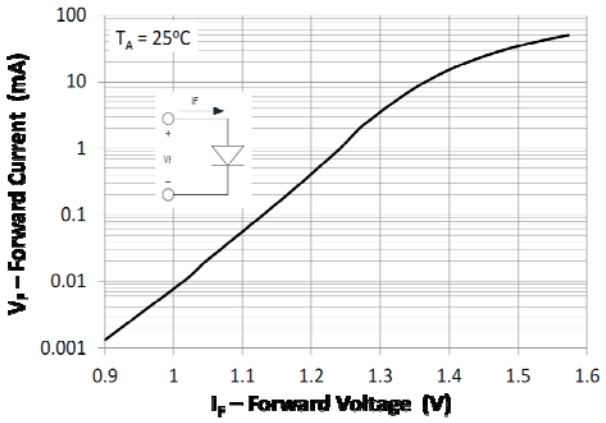


Fig 11 Forward Current vs Forward Voltage

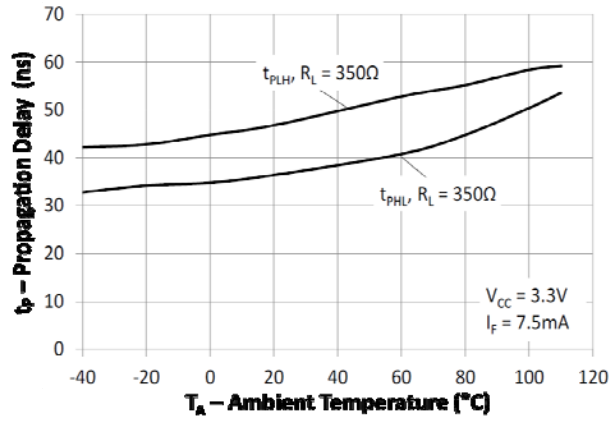


Fig 12 Propagation Delay at V_{CC} 3.3V vs T_A

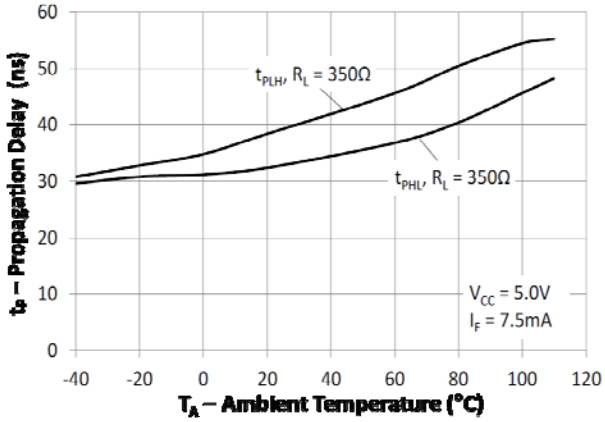
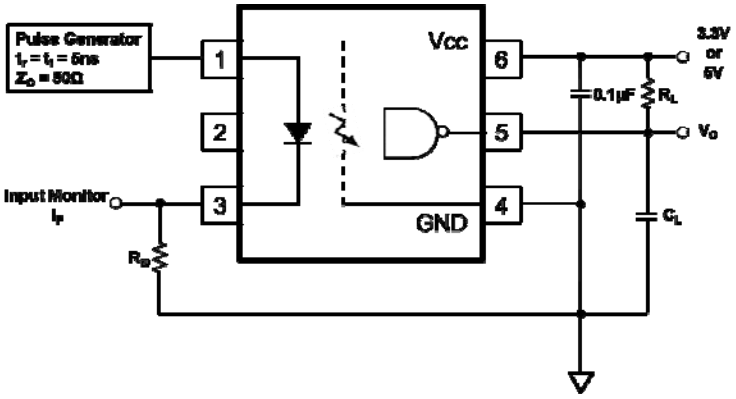
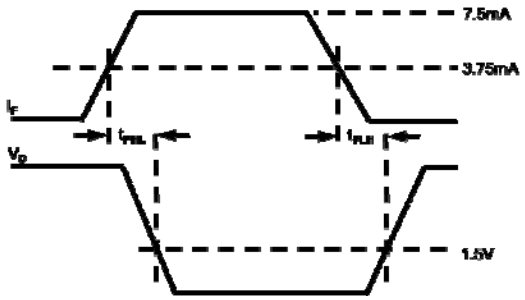
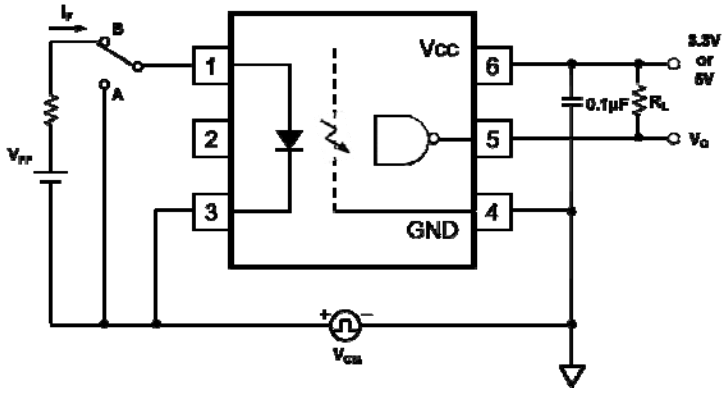


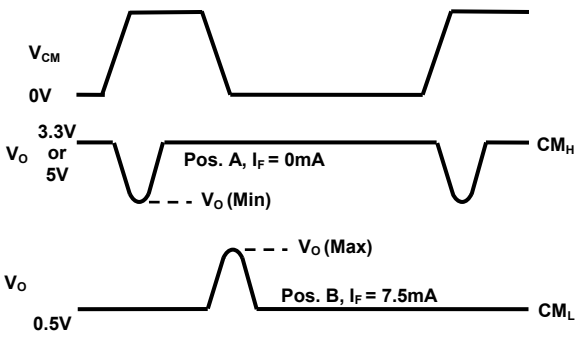
Fig 13 Propagation Delay at V_{CC} 5.0V vs T_A





Test Circuit for t_{PHL} and t_{PLH}





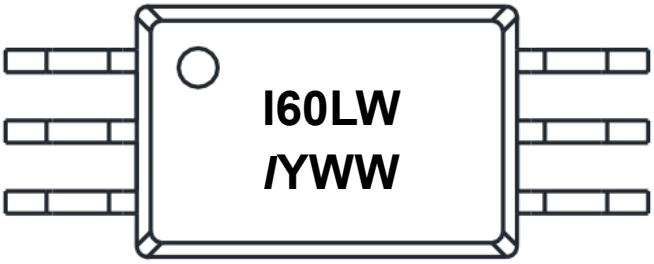
Test Circuit for Common Mode Transient Immunity

ICPLW60L

ORDER INFORMATION

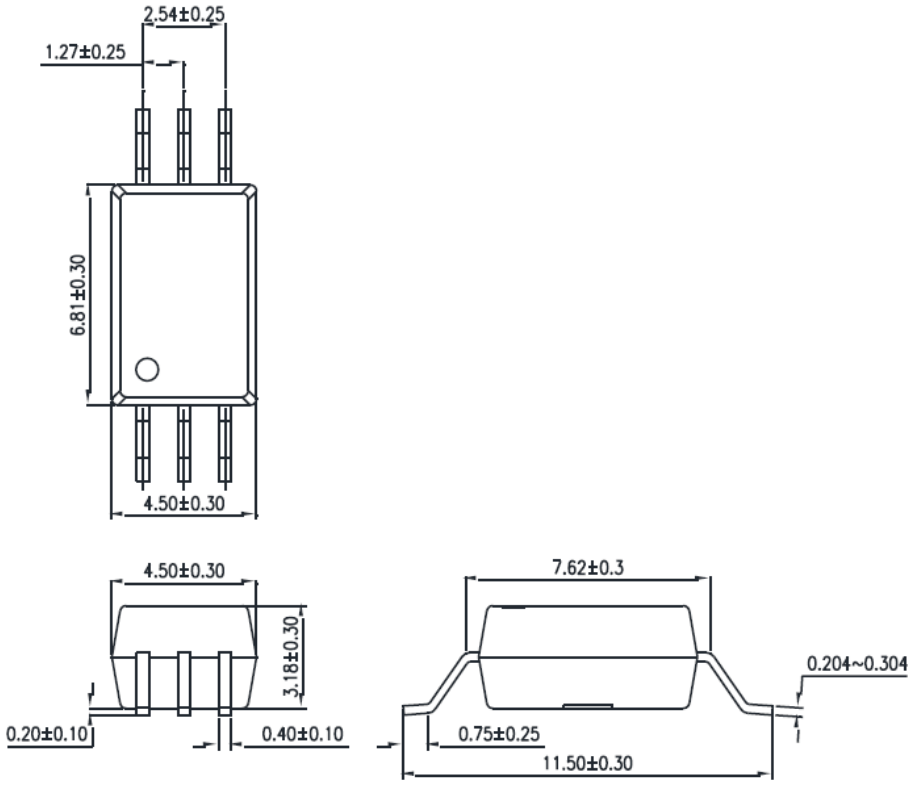
ICPLW60L			
After PN	**PN**	**Description**	**Packing quantity**
None	ICPLW60L	Surface Mount Tape and Reel	1000pcs per reel

DEVICE MARKING

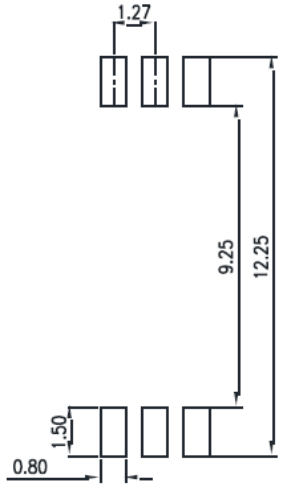


I60LW	denotes Device Part Number
I	denotes Isocom
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code

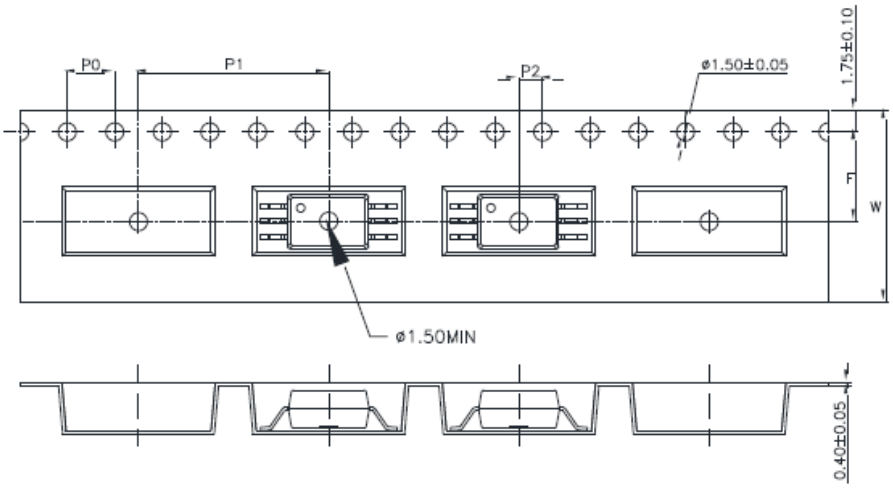
PACKAGE DIMENSIONS (mm)



RECOMMENDED PAD LAYOUT (mm)

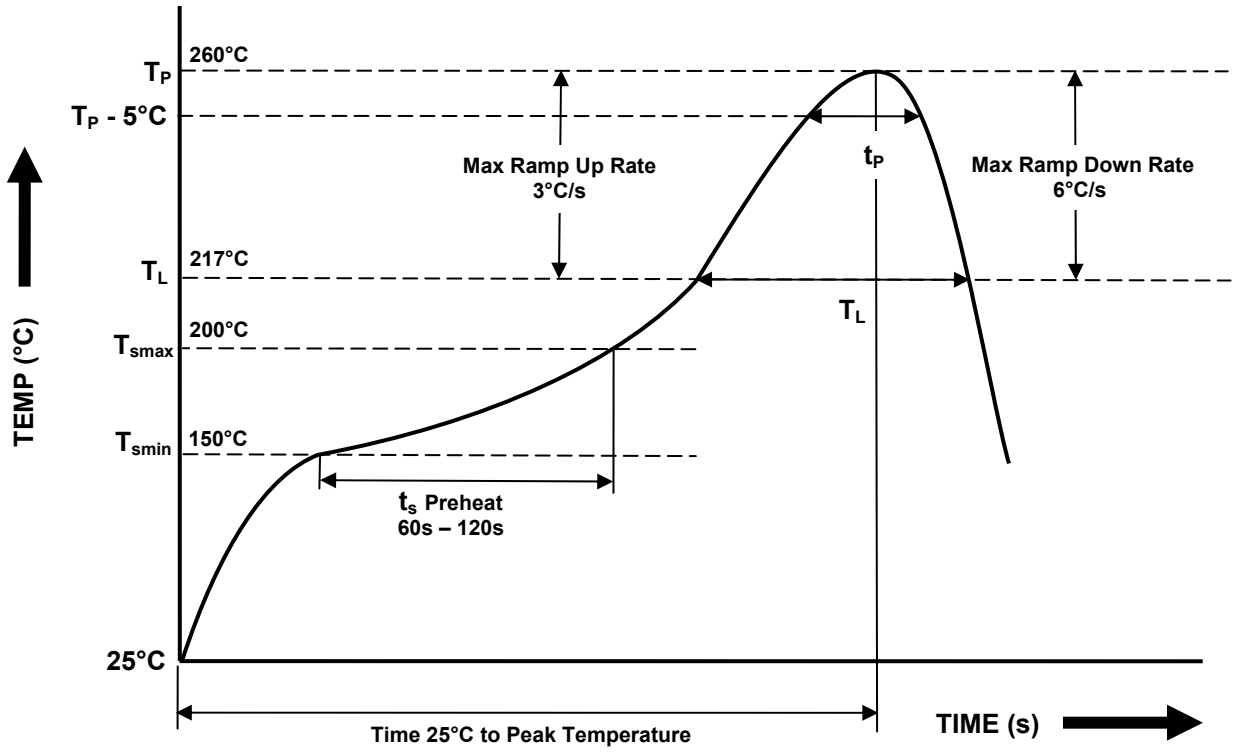


TAPE AND REEL PACKAGING



Description	Symbol	Dimension mm (inch)
Tape Width	W	16 ± 0.3 (0.63)
Pitch of Sprocket Holes	P_0	4 ± 0.1 (0.16)
Distance of Compartment to Sprocket Holes	F	7.5 ± 0.1 (0.3)
	P_2	2 ± 0.1 (0.079)
Distance of Compartment to Compartment	P_1	12 ± 0.1 (0.47)

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) - Time at Peak Temperature - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature (T_P – 5°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 10s max 217°C 30s max 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

ICPLW60L

NOTES :

- Isocom is continually improving the quality, reliability, function or design and Isocom reserves the right to make changes without further notices.

- The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation.

- For equipment/application where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc., please contact our sales representatives.

- When requiring a device for any ”specific” application, please contact our sales for advice.

- The contents described herein are subject to change without prior notice.

- Do not immerse device body in solder paste.

ISOCOM
COMPONENTS

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In developing your designs, please ensure that ISOCOM products are used within specified operating ranges as set forth in the most recent ISOCOM products specifications.

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__ The products described in this document are subject to the foreign exchange and foreign trade laws.

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__ The information contained herein is subject to change without notice.