ISOCOM COMPONENTS

ICPLW50L

DESCRIPTION

The ICPLW50L 1MBd digital optocoupler consists of a high efficient AlGaAs Light Emitting Diode and a high speed optical detector. The output of the optical detector features an open collector Schottky clamped transistor. The internal shield ensures high common mode transient immunity.

The device is in Stretched SO6 package.

FEATURES

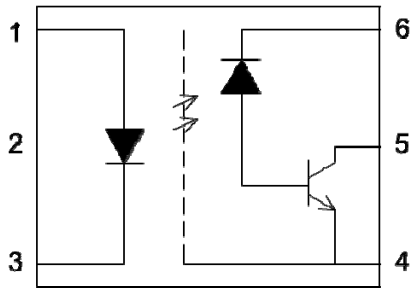
- High speed – 1MBd typical
- Stretched SO6 Package
- Wide Operating Voltage Range Vcc 2.7V to 24V
- Low Drive Current 3mA
- Package Clearance / Creepage 8mm
- 15kV/µs Minimum Common Mode Rejection at V_{CM} = 1500V
- Guarantee Performance over Temperature Range: -40°C to 105°C
- TTL Compatible
- Open collector output
- Lead Free and RoHS Compliant
- Safety Approvals Pending

APPLICATIONS

- Digital Signal Isolation
- Communications Interface
- Micro-controller Interface
- Digital Isolation for A/D, D/A Conversion
- Switching Power Supplies

ORDER INFORMATION

- Supplied in Tape and Reel



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.

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C unless otherwise specified.
Stresses exceeding the absolute maximum ratings can cause permanent damage to the device.
Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

Input

Forward Current	20mA
Forward Peak Current (Pulse Width = 1ms, 50% Duty Cycle)	40mA
Forward Peak Transient Current (Pulse Width = 1µs, 300pps)	1.0A
Reverse Voltage	5V
Power dissipation	36mW

Output

Output Collector Current	8mA
Peak Output Current	16mA
Supply Voltage	-0.5 to 30V
Output Collector Voltage	-0.5 to 20V
Power Dissipation	100mW

Total Package

Isolation Voltage	$5000V_{RMS}$
Operating Temperature	-40 to 105 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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Truth Table

LED	V_O
OFF	HIGH
ON	LOW

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T_A	- 40	105	°C
Supply Voltage	V_{CC}	2.7	24	V
Input Current (ON)	I_{FH}	3	10	mA
Input Voltage (OFF)	$V_{F(OFF)}$		0.8	V

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.7 to 24V, I_F = 3mA and T_A = -40°C to 105°C, unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	V_F	I_F = 3mA	1.2	1.4	1.8	V
Reverse Voltage	V_R	I_R = 10µA	5			V

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
High Level Supply Current	I_{CCH}	I_F = 0mA, V_{CC} = 30V, V_O = Open, T_A = 25°C			2	µA
Low Level Supply Current	I_{CCL}	I_F = 3mA, V_{CC} = 30V V_O = Open		60	100	µA
High Level Output Current	I_{OH}	I_F = 0mA, V_O = V_{CC} = 5.5V, T_A = 25°C			0.5	µA
		I_F = 0mA, V_{CC} = 30V, V_O = 20V, T_A = 25°C			1	
		I_F = 0mA, V_{CC} = 30V, V_O = 20V			80	
Low Level Output Voltage	V_{OL}	I_F = 3mA, V_{CC} = 3.3V or 5V, I_O = 3mA, T_A = 25°C		0.25	0.4	V
		I_F = 3mA, V_{CC} = 3.3V or 5V, I_O = 1.6mA, T_A = 25°C		0.25	0.5	

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Current Transfer Ratio	CTR	I_F = 3mA, V_{CC} = 3.3V or 5V, V_O = 0.4V, T_A = 25°C	90	125	200	%
		I_F = 3mA, V_{CC} = 3.3V or 5V, V_O = 0.5V,	53			

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.7 to 24V, I_F = 3mA and T_A = -40°C to 105°C, unless otherwise specified)

SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Propagation Delay Time to High Output Level	t_{PLH}	f = 10kHz, Duty Cycle = 50%, I_F = 3mA, V_{CC} = 3.3V, R_L=1.8KΩ, C_L = 15pF, V_{THLH} = 2V		0.4	1.4	µs
		f = 10kHz, Duty Cycle = 50%, I_F = 3mA, V_{CC} = 5.0V, R_L=2.9KΩ, C_L = 15pF, V_{THLH} = 2V		0.4	1	
Propagation Delay Time to Low Output Level	t_{PHL}	f = 10kHz, Duty Cycle = 50%, I_F = 3mA, V_{CC} = 3.3V, R_L=1.8KΩ, C_L = 15pF, V_{THHL} = 1.5V		0.3	1	
		f = 10kHz, Duty Cycle = 50%, I_F = 3mA, V_{CC} = 5.0V, R_L=2.9KΩ, C_L = 15pF, V_{THHL} = 1.5V		0.3	1	
Pulse Width Distortion $\|t_{PHL} - t_{PLH}\|$ for any given device	PWD	f = 10kHz, Duty Cycle = 50%, I_F = 3mA, V_{CC} = 3.3V, R_L=1.8KΩ, C_L = 15pF, V_{THLH} = 2V V_{THHL} = 1.5V		0.1	1.4	
		f = 10kHz, Duty Cycle = 50%, I_F = 3mA, V_{CC} = 5.0V, R_L=2.9KΩ, C_L = 15pF, V_{THLH} = 2V V_{THHL} = 1.5V		0.1	1	
Common Mode Transient Immunity at High Output Level	CM_H	I_F = 0mA, V_{CC} = 3.3V or 5V, V_{CM} = 1500V p-p R_L=1.8KΩ or 2.9kΩ, T_A = 25°C	15			kV/µs
Common Mode Transient Immunity at Low Output Level	CM_L	I_F = 3mA, V_{CC} = 3.3V or 5V, V_{CM} = 1500V p-p, R_L=1.8KΩ or 2.9kΩ, T_A = 25°C	15			kV/µs

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.7 to 24V, I_F = 3mA and T_A = -40°C to 105°C, unless otherwise specified)

ISOLATION

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

Note :

1. A 0.1uF bypass capacitor must be connected across pin 6 and pin 4.
2. CM_H, Common Mode Transient Immunity in High stage is the maximum tolerable positive dV_{CM}/dt on the leading edge of the common mode impulse signal, V_{CM}, to assure that the output will remain high (V_O > 2.0V).
3. CM_L, Common Mode Transient Immunity in Low stage is the maximum tolerable negative dV_{CM}/dt on the trailing edge of the common mode impulse signal, V_{CM}, to assure that the output will remain low (V_O < 0.8V).

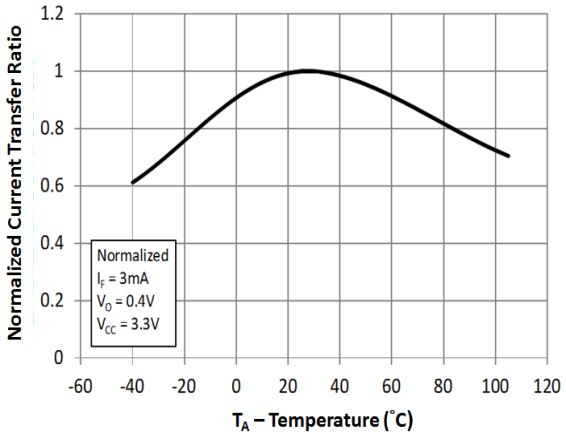


Fig 1 Normalized Current Transfer Ratio vs Ambient Temperature (Vcc=3.3V)

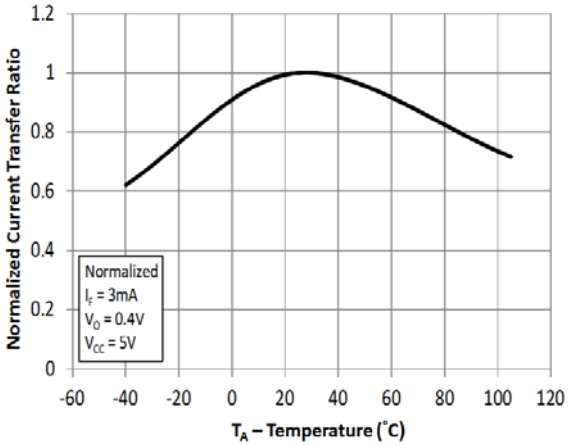


Fig 2 Normalized Current Transfer Ratio vs Ambient Temperature (Vcc=5V)

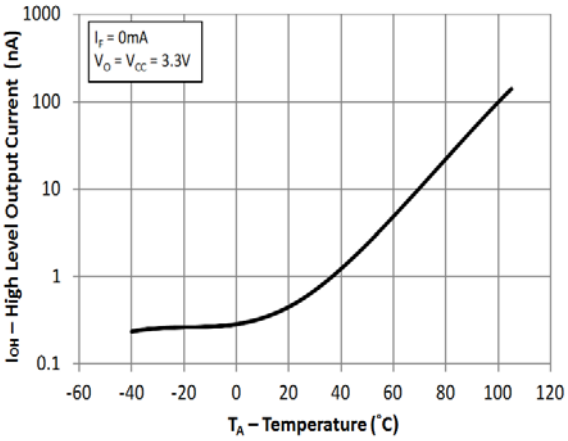


Fig 3 Typical High Level Output Curent vs Ambient Temperature (Vo=Vcc=3.3V)

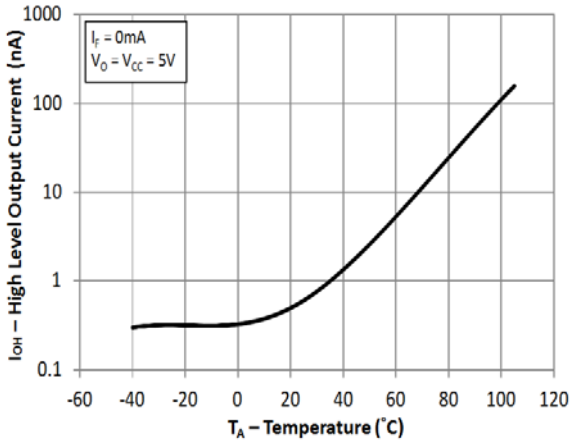


Fig 4 Typical High Level Output Current vs Ambient temperature (Vo=Vcc=5V)

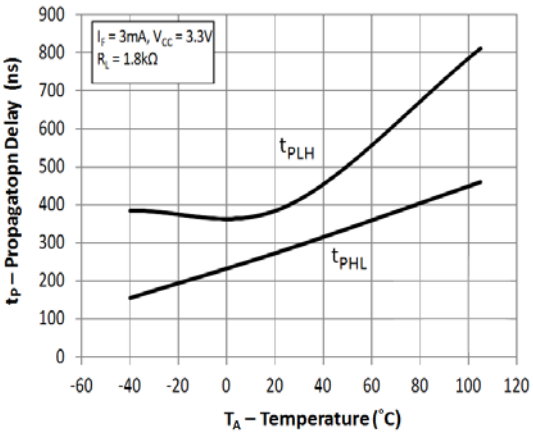


Fig 5 Typical Propagation Delay vs Ambient Temperature (Vcc=3.3V R_L=1.8kΩ)

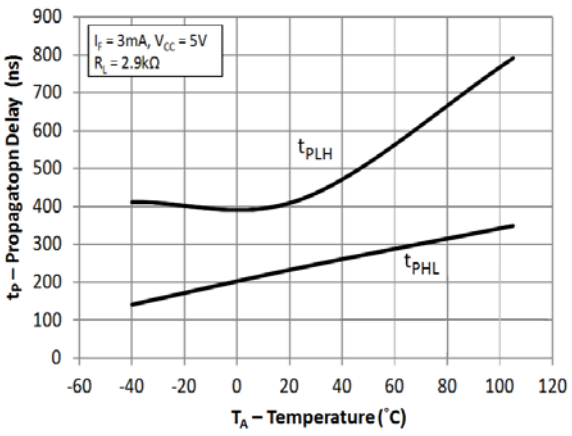


Fig 6 Typical Propagation Delay vs Ambient Temperature (Vcc=5V R_L=2.9kΩ)

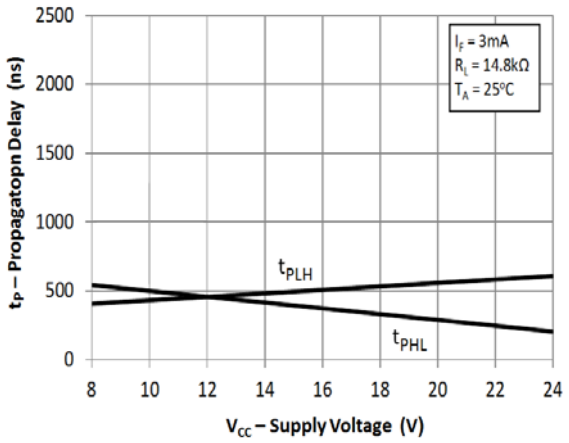


Fig 7 Typical Propagation Delay vs Supply Voltage

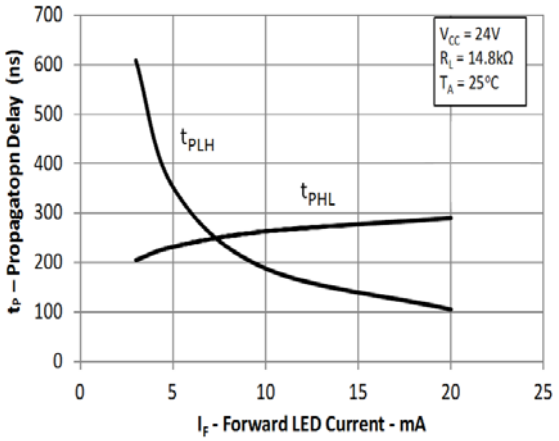


Fig 8 Typical Propagation Delay vs Forward Current

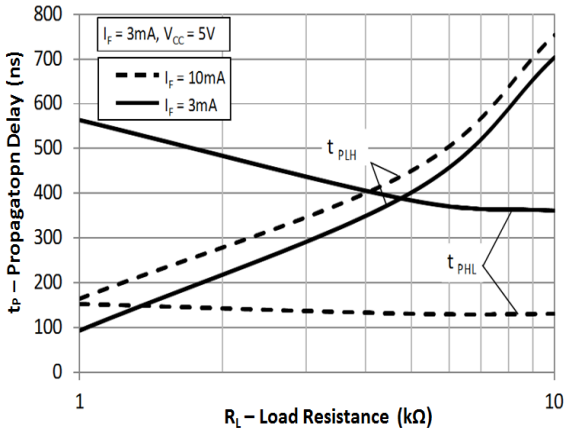


Fig 9 Typical Propagation Delay vs Load Resistance

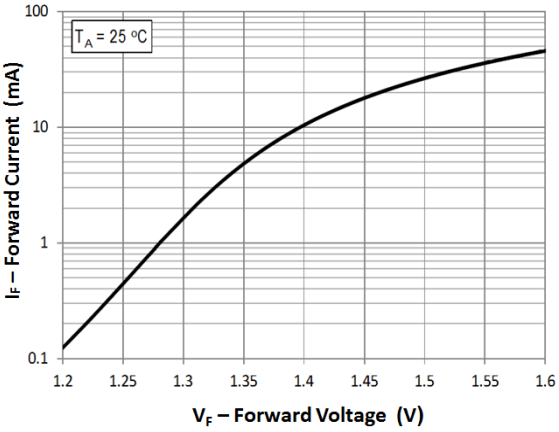
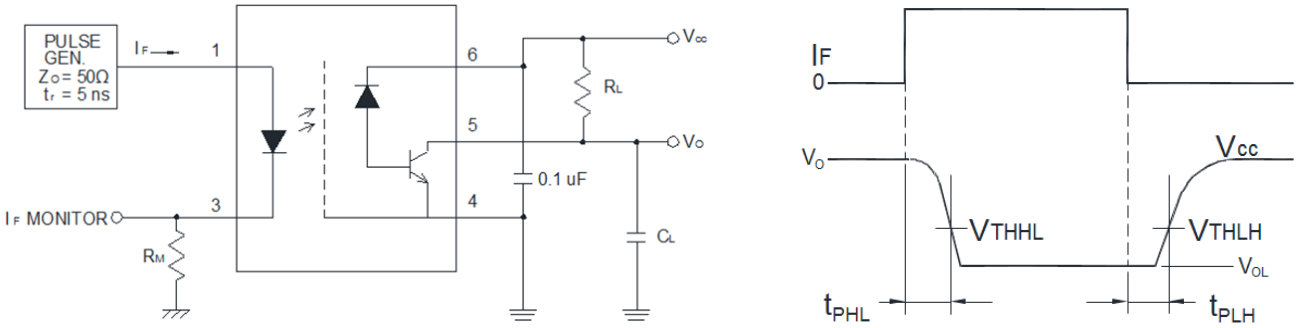
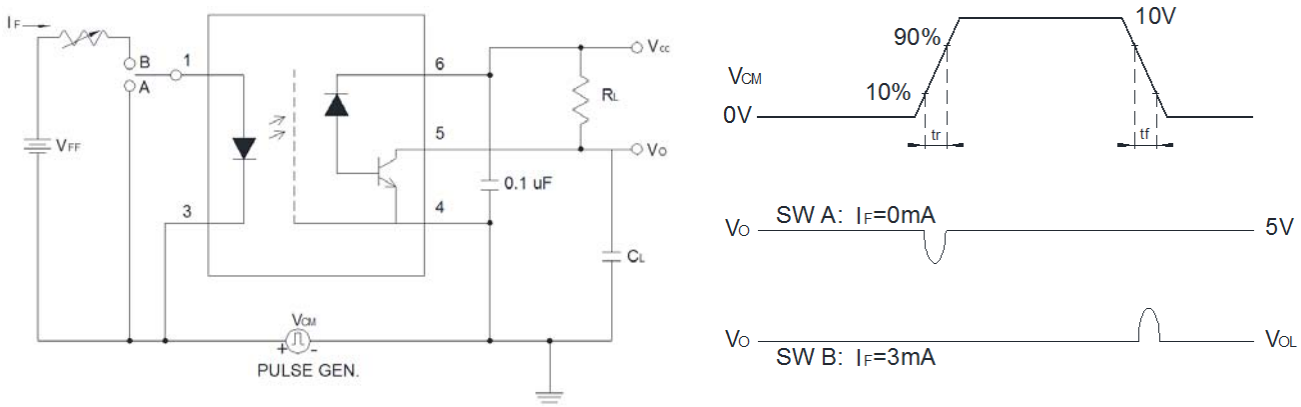


Fig 10 Forward Current vs Forward Voltage



Switching Test Circuit and Waveforms



CMR Test Circuit and Waveforms

ICPLW50L

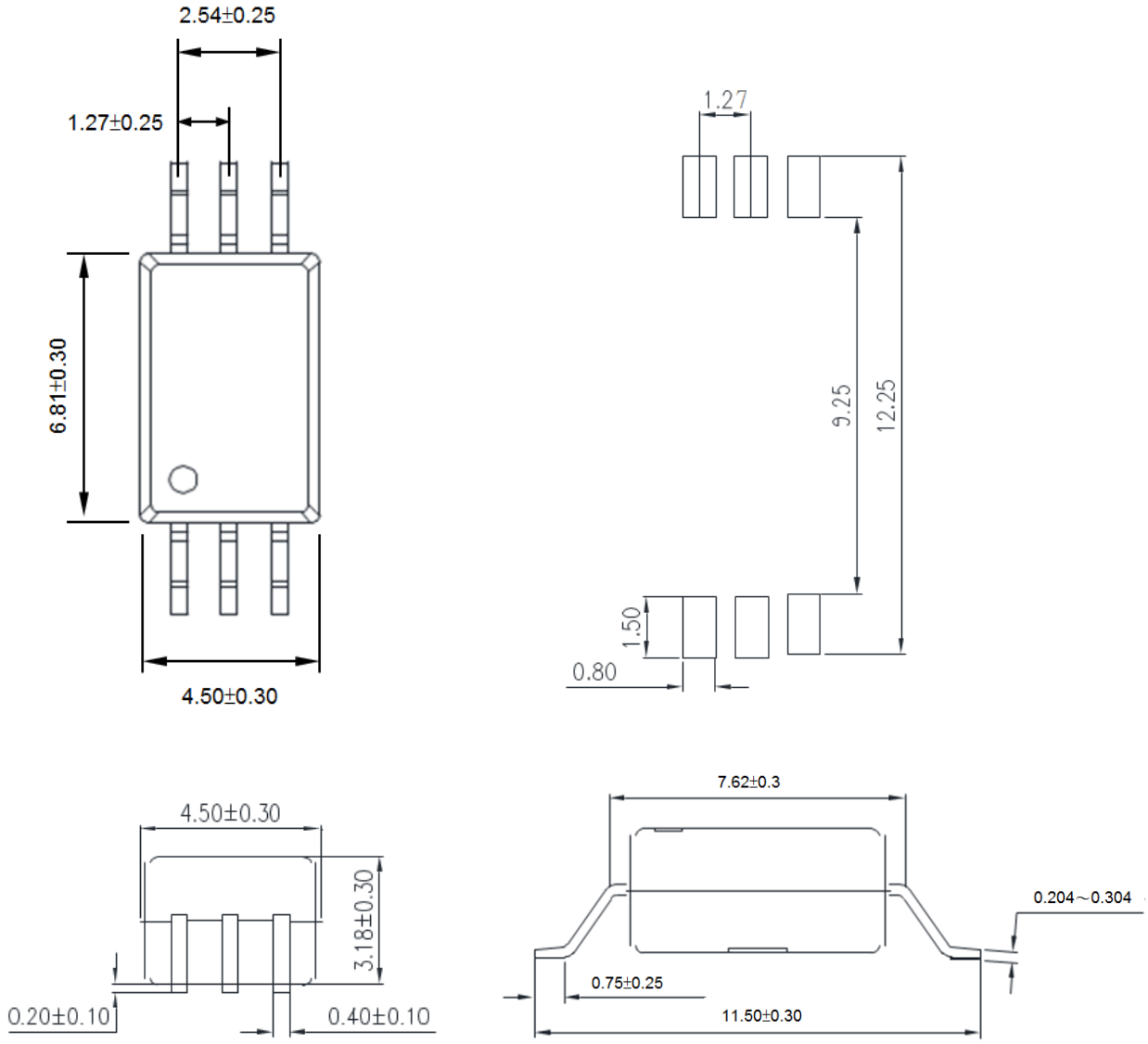
ORDER INFORMATION

ICPLW50L			
After PN	**PN**	**Description**	**Packing quantity**
None	ICPLW50L	Stretched SO6	1000 pcs per reel

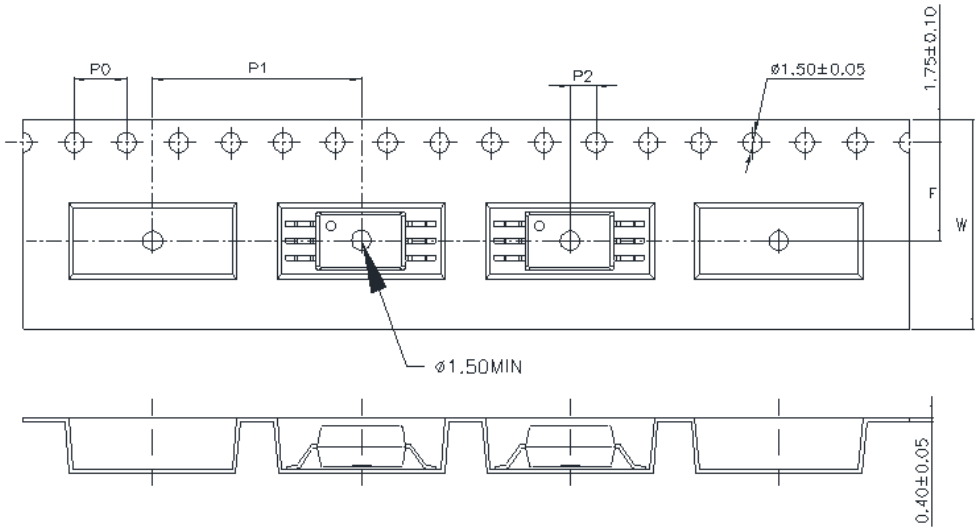
DEVICE MARKING

W501 L — denotes Device Part Number
/ — denotes Isocom
YY — denotes 2 digit Year code
WW — denotes 2 digit Week code

PACKAGE DIMENSIONS and Recommended PCB Pad Layout in mm (inch)

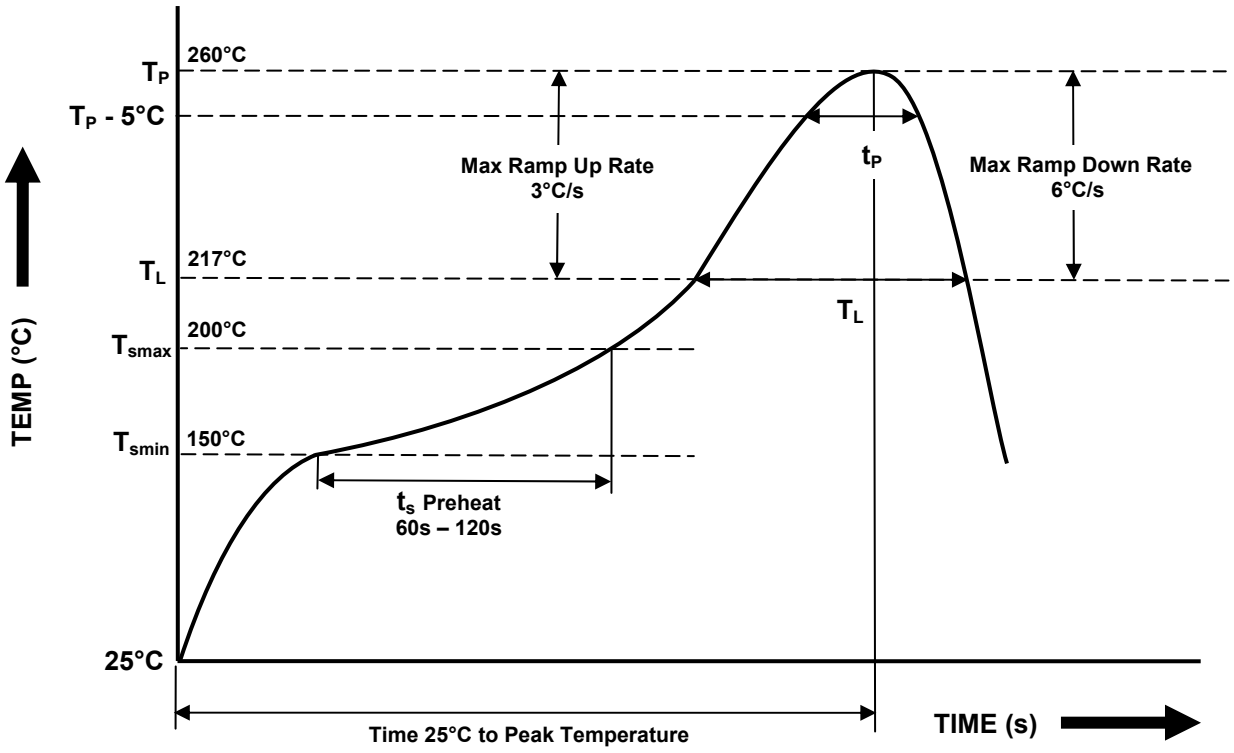


TAPE AND REEL PACKAGING



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	16 ± 0.1 (0.63)

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

ICPLW50L

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- 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.

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