

ICPLW137, ICPLW2601, ICPLW2611

DESCRIPTION

The ICPLW137, ICPLW2601 and ICPLW2611 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 wide body package range optocouplers.

FEATURES

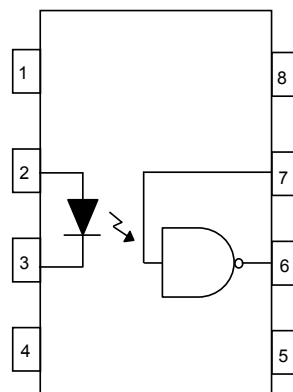
- High Speed 10Mbit/s
- Wide Body Package
- 10kV/ μ s min. Common Mode Transient Immunity (ICPLW2611)
- High AC Isolation Voltage 5000V_{RMS}
- Guaranteed Performance from -40°C to +85°C
- Storable Logic Gate Output
- Pb Free and RoHS Compliant
- Safety Approvals Pending

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 SM after PN for Surface Mount,
- Add SMT&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 0.1 μ F bypass capacitor must be connected between pins 8 and 5.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Input Diode

Forward Current	50mA
Reverse Voltage	5V
Power dissipation	100mW

Output

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

Total Package

Isolation Voltage (R.H. 40 - 60%, 1 min, Pins 1, 2, 3 & 4 shorted together, Pins 5, 6, 7 & 8 shorted together)	5000V _{RMS}
Operating Temperature	-40 to +85 °C
Storage Temperature	-55 to +125 °C
Lead Soldering Temperature (10s)	260°C

ISOCOM COMPONENTS 2004 LTD

Unit 25B, Park View Road West, Park View Industrial Estate
 Hartlepool, Cleveland, TS25 1UD, United Kingdom
 Tel: +44 (0)1429 863 609 Fax : +44 (0)1429 863 581
 e-mail: sales@isocom.co.uk
<http://www.isocom.com>

ISOCOM COMPONENTS ASIA LTD

Hong Kong Office,
 Block A, 8/F, Wah Hing Industrial mansion,
 36 Tai Yau Street, San Po Kong, Kowloon, Hong Kong.
 Tel: +852 2995 9217 Fax : +852 8161 6292
 e-mail: sales@isocom.com.hk

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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 ($T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ 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	$I_R = 100\mu\text{A}$, $T_A = 25^{\circ}\text{C}$	5.0			V
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_A$	$I_F = 10\text{mA}$		-1.9		mV/ $^{\circ}\text{C}$
Input Capacitance	C_{IN}	$V_F = 0\text{V}$, $f = 1\text{MHz}$		70		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
High Level Supply Current	I_{CCH}	$I_F = 0\text{mA}$, $V_E = 0.5\text{V}$, $V_{CC} = 5.5\text{V}$		6.5	10	mA
Low Level Supply Current	I_{CCL}	$I_F = 10\text{mA}$, $V_E = 0.5\text{V}$, $V_{CC} = 5.5\text{V}$		8	13	mA
High Level Enable Current	I_{EH}	$V_E = 2.0\text{V}$, $V_{CC} = 5.5\text{V}$		-0.6	-1.6	mA
Low Level Enable Current	I_{EL}	$V_E = 0.5\text{V}$, $V_{CC} = 5.5\text{V}$		-0.8	-1.6	mA
High Level Enable Voltage	V_{EH}	$I_F = 10\text{mA}$, $V_{CC} = 5.5\text{V}$	2.0			V
Low Level Enable Voltage	V_{EL}	$I_F = 10\text{mA}$, $V_{CC} = 5.5\text{V}$			0.8	V

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

COUPLED

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
High Level Output Current	I_{OH}	$V_{CC} = 5.5\text{V}$, $V_E = 2.0\text{V}$, $V_O = 5.5\text{V}$, $I_F = 250\mu\text{A}$		2.1	100	μA
Low Level Output Voltage	V_{OL}	$V_{CC} = 5.5\text{V}$, $V_E = 2.0\text{V}$, $I_F = 5\text{mA}$, $I_{OL} = 13\text{mA}$		0.35	0.6	V
Input Threshold Current	I_{FT}	$V_{CC} = 5.5\text{V}$, $V_E = 2.0\text{V}$, $V_O = 0.6\text{V}$, $I_{OL} = 13\text{mA}$		3.0	5	mA

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Propagation Delay Time to Output High Level	t_{PLH}	$C_L = 15\text{pF}$, $R_L = 350\Omega$, $T_A = 25^{\circ}\text{C}$		35	100	ns
Propagation Delay Time to Output Low level	t_{PHL}	$C_L = 15\text{pF}$, $R_L = 350\Omega$, $T_A = 25^{\circ}\text{C}$		40	100	ns
Pulse Width Distortion	$ t_{PHL} - t_{PLH} $	$C_L = 15\text{pF}$, $R_L = 350\Omega$		5	40	ns
Output Rise Time	t_r	$C_L = 15\text{pF}$, $R_L = 350\Omega$		40		ns
Output Fall Time	t_f	$C_L = 15\text{pF}$, $R_L = 350\Omega$		10		ns
Enable Propagation Delay Time to Output High Level	t_{ELH}	$I_F = 7.5\text{mA}$, $V_{EH} = 3.5\text{V}$, $C_L = 15\text{pF}$, $R_L = 350\Omega$		15		ns
Enable Propagation Delay Time to Output Low Level	t_{EHL}	$I_F = 7.5\text{mA}$, $V_{EH} = 3.5\text{V}$, $C_L = 15\text{pF}$, $R_L = 350\Omega$		15		ns

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

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Common Mode Transient Immunity at Logic High	CM_H	ICPLW137 (Fig 14) $I_F = 0\text{mA}$, $V_{OH}(\text{Min}) = 2\text{V}$, $R_L = 350\Omega$, $V_{CM} = 10\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$		5000		$\text{V}/\mu\text{s}$
		ICPLW2601 (Fig 14) $I_F = 0\text{mA}$, $V_{OH}(\text{Min}) = 2\text{V}$, $R_L = 350\Omega$, $V_{CM} = 50\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$	5000			
		ICPLW2611 (Fig 14) $I_F = 0\text{mA}$, $V_{OH}(\text{Min}) = 2\text{V}$, $R_L = 350\Omega$, $V_{CM} = 400\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$	10000			
		ICPLW2611 (Fig 15) $I_F = 0\text{mA}$, $V_{OH}(\text{Min}) = 2\text{V}$, $R_L = 350\Omega$, $V_{CM} = 400\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$	20000			
Common Mode Transient Immunity at Logic Low	CM_L	ICPLW137 (Fig 14) $I_F = 7.5\text{mA}$, $V_{OL}(\text{Max}) = 0.8\text{V}$, $R_L = 350\Omega$, $V_{CM} = 10\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$		5000		$\text{V}/\mu\text{s}$
		ICPLW2601 (Fig 14) $I_F = 7.5\text{mA}$, $V_{OL}(\text{Max}) = 0.8\text{V}$, $R_L = 350\Omega$, $V_{CM} = 50\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$	5000			
		ICPLW2611 (Fig 14) $I_F = 7.5\text{mA}$, $V_{OL}(\text{Max}) = 0.8\text{V}$, $R_L = 350\Omega$, $V_{CM} = 400\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$	10000			
		ICPLW2611 (Fig 15) $I_F = 7.5\text{mA}$, $V_{OL}(\text{Max}) = 0.8\text{V}$, $R_L = 350\Omega$, $V_{CM} = 400\text{Vp-p}$, $T_A = 25^{\circ}\text{C}$	20000			



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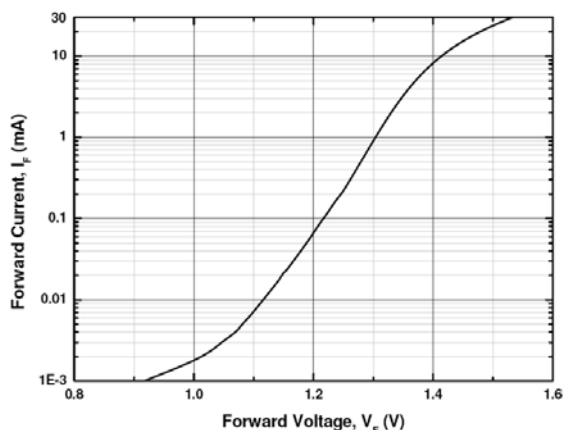


Fig 1 Forward Current vs Forward Voltage

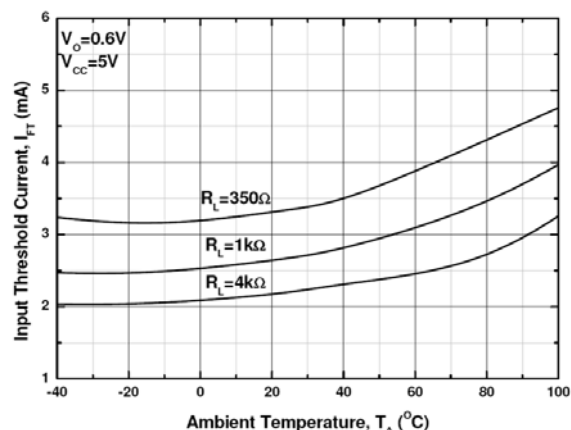


Fig 2 Input Threshold Current vs T_A

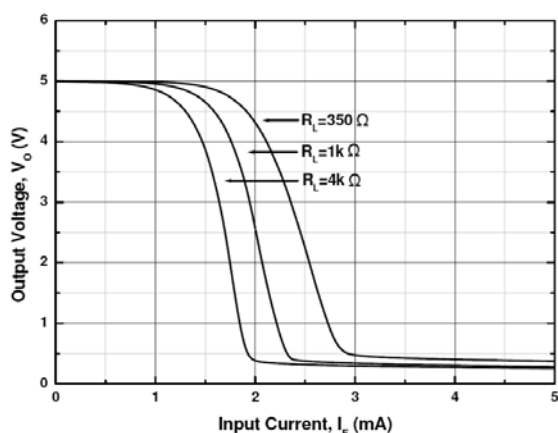


Fig 3 Input Current vs Output Voltage

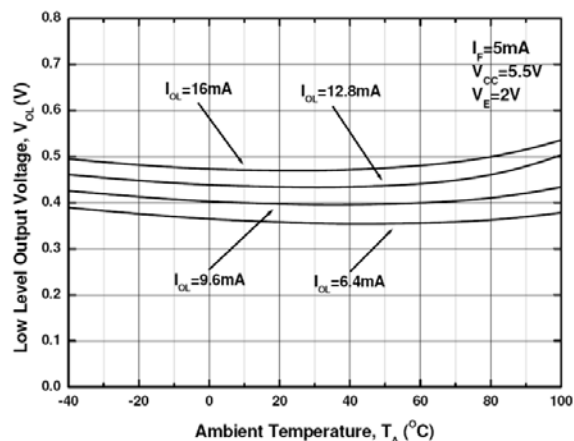


Fig 4 Low Level Output Voltage vs T_A

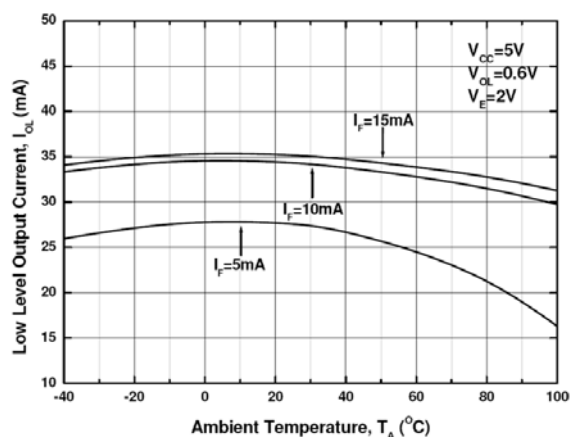


Fig 5 Low Level Output Current vs T_A

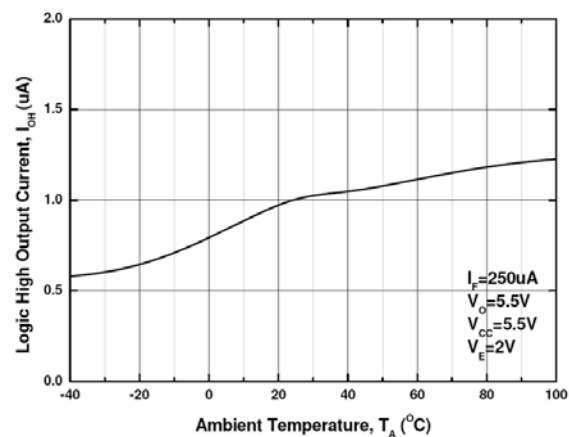


Fig 6 High Level Output Current vs T_A



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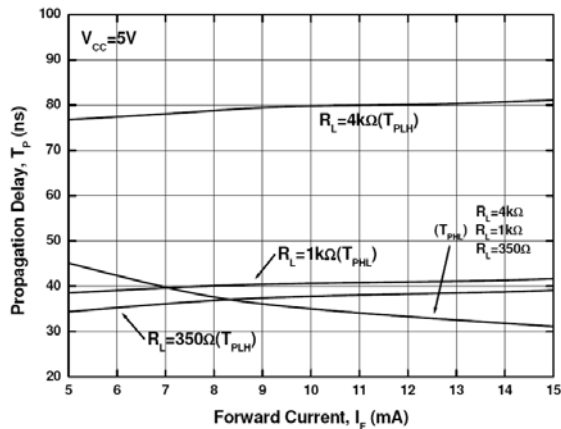


Fig 7 Propagation Delay Time vs Forward Current

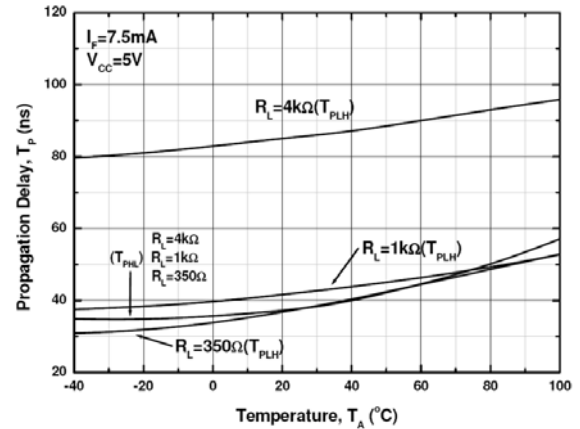


Fig 8 Propagation Delay Time vs T_A

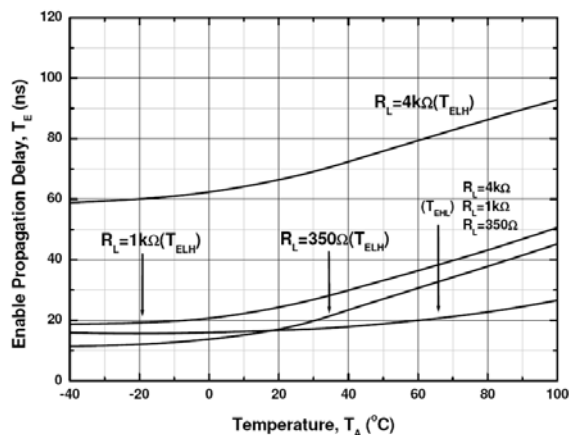


Fig 9 Enable Propagation Delay Time vs T_A

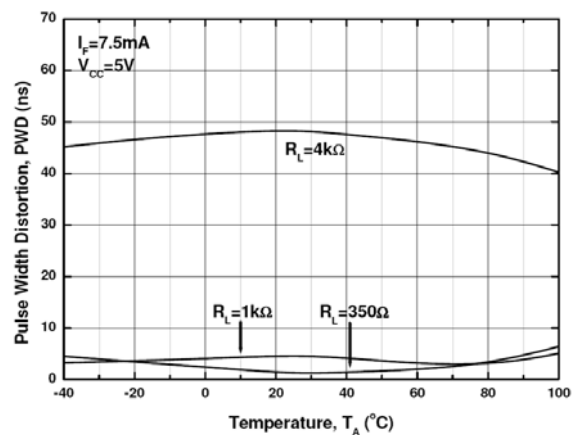


Fig 10 Pulse Width Distortion vs T_A

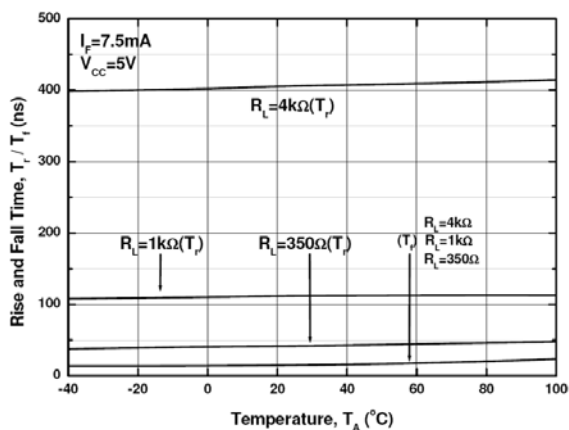


Fig 11 Rise Time / Fall Time vs T_A



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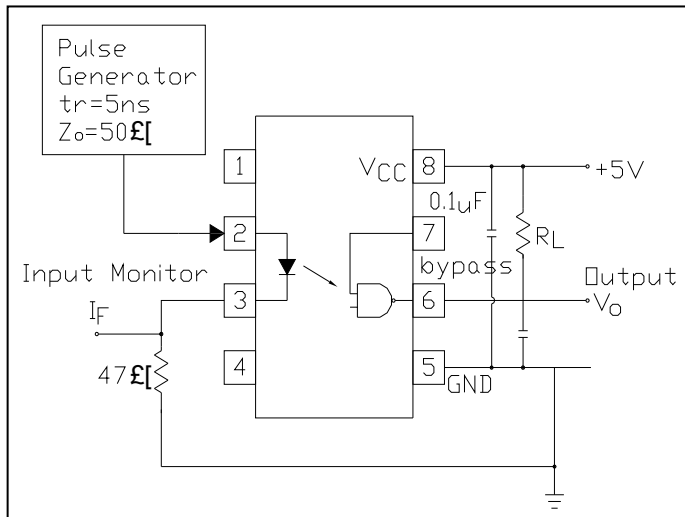


Fig 12 t_{PHL} , t_{PLH} , t_r and t_f Test Circuit

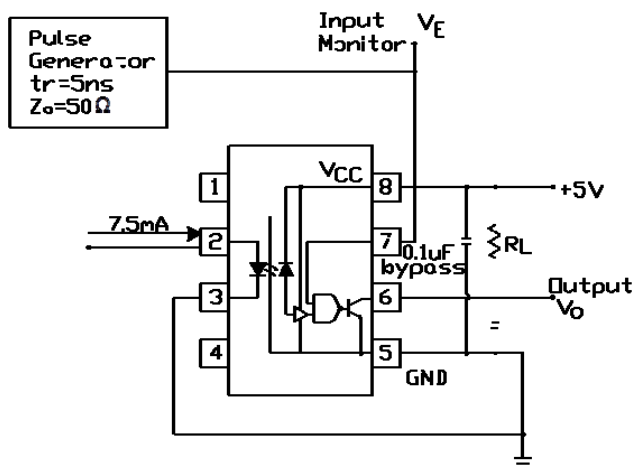
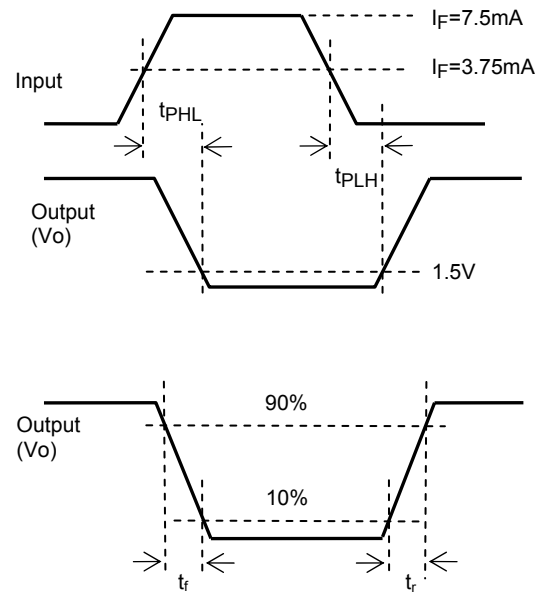
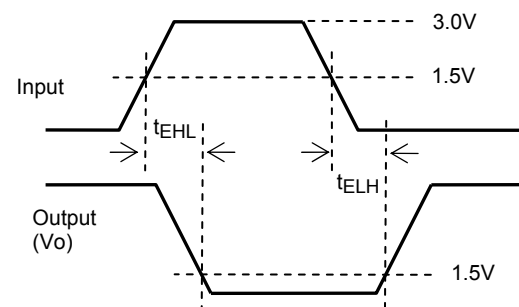


Fig 13 t_{EHL} and t_{ELH} Test Circuit





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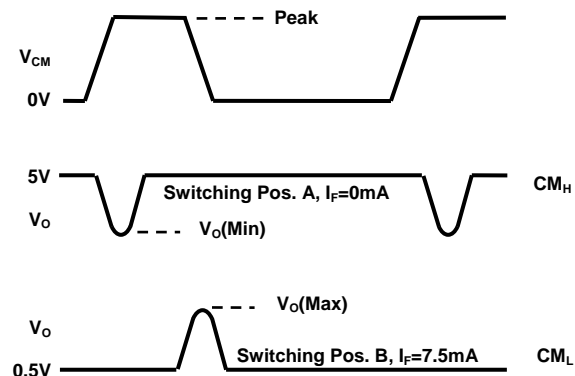
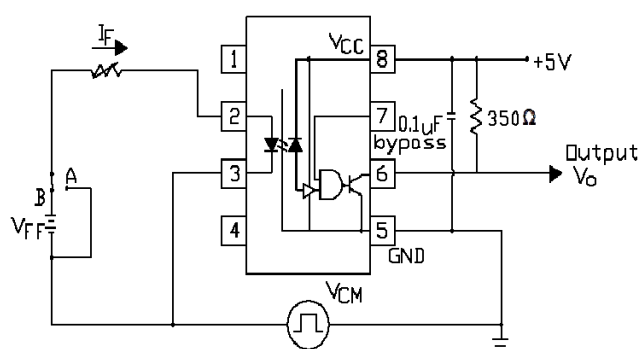


Fig 14 Common Mode Transient Immunity Test Circuit

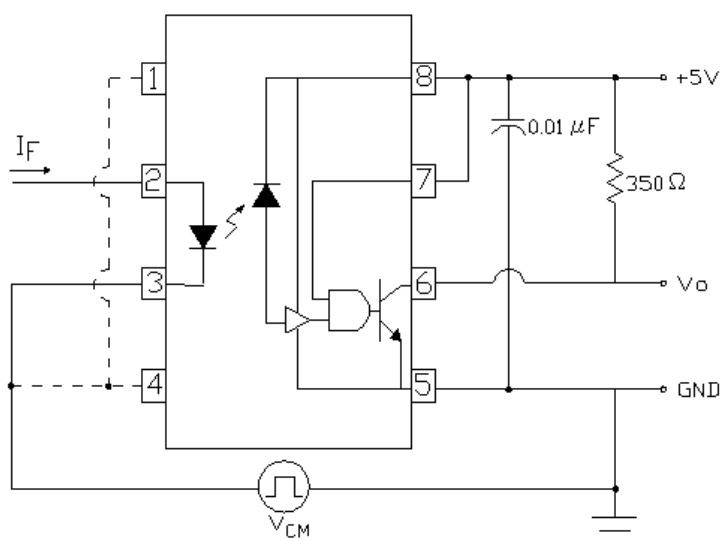


Fig 15 Recommended Drive Circuit for ICPLW2611 for High Common Mode Transient Immunity

CM_H : 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., $V_O > 2.0V$).

CM_L : 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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NOTES :

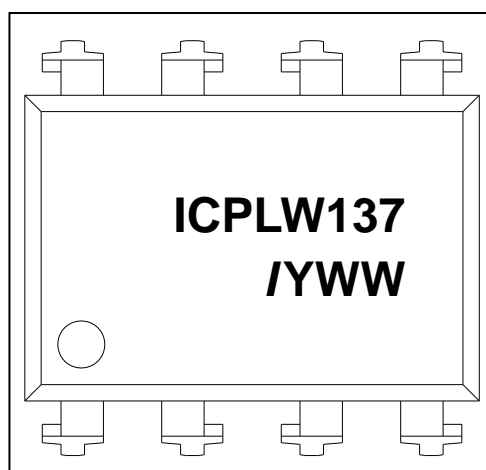
- The V_{CC} supply must be bypassed by a $0.1\mu F$ capacitor or larger with good high frequency characteristic and should be connected as close as possible to the package V_{CC} and GND pins.
- Enable Input – No pull up resistor required as the device has an internal pull up resistor.
- t_{PLH} is 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 state (i.e., $V_O < 0.8V$).

ICPLW137, ICPLW2601, ICPLW2611

ORDER INFORMATION

ICPLW137, ICPLW2601, ICPLW2611			
After PN	PN	Description	Packing quantity
None	ICPLW137, ICPLW2601, ICPLW2611	Standard DIP	40 pcs per tube
SM	ICPLW137SMT&R, ICPLW2601SMT&R, ICPLW2611SMT&R	Surface Mount Tape and Reel	500 pcs per reel

DEVICE MARKING



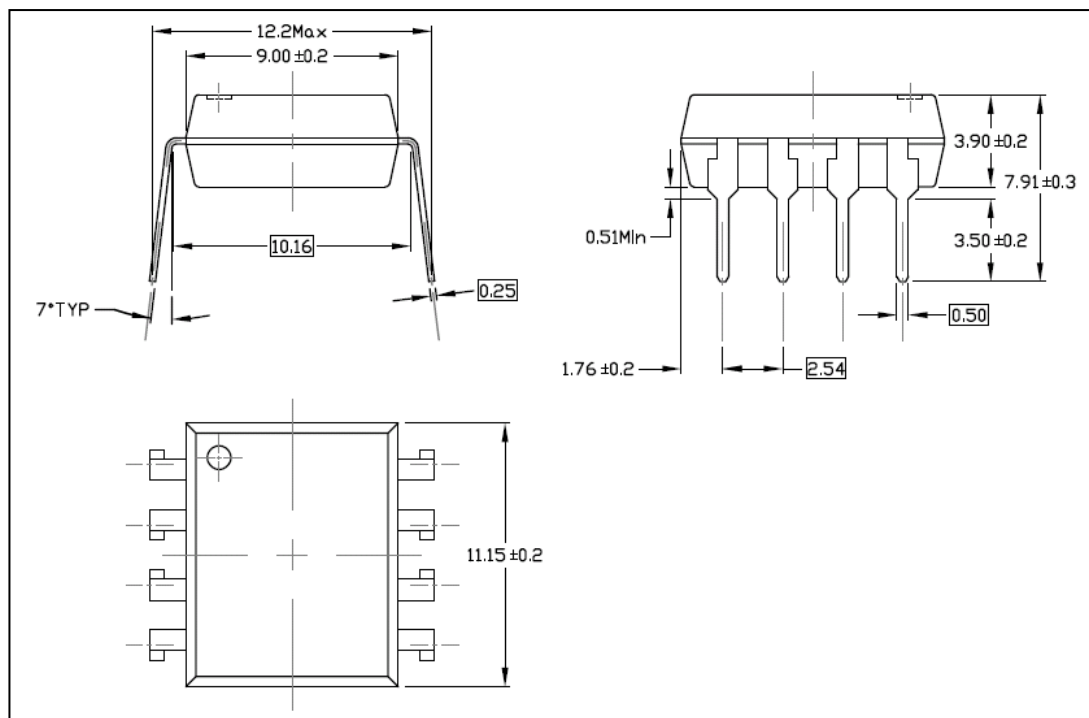
ICPLW137 denotes Device Part Number (ICPLW137 is used as example)
 Y denotes 1 digit Year code
 WW denotes 2 digit Week code
 / denotes Isocom



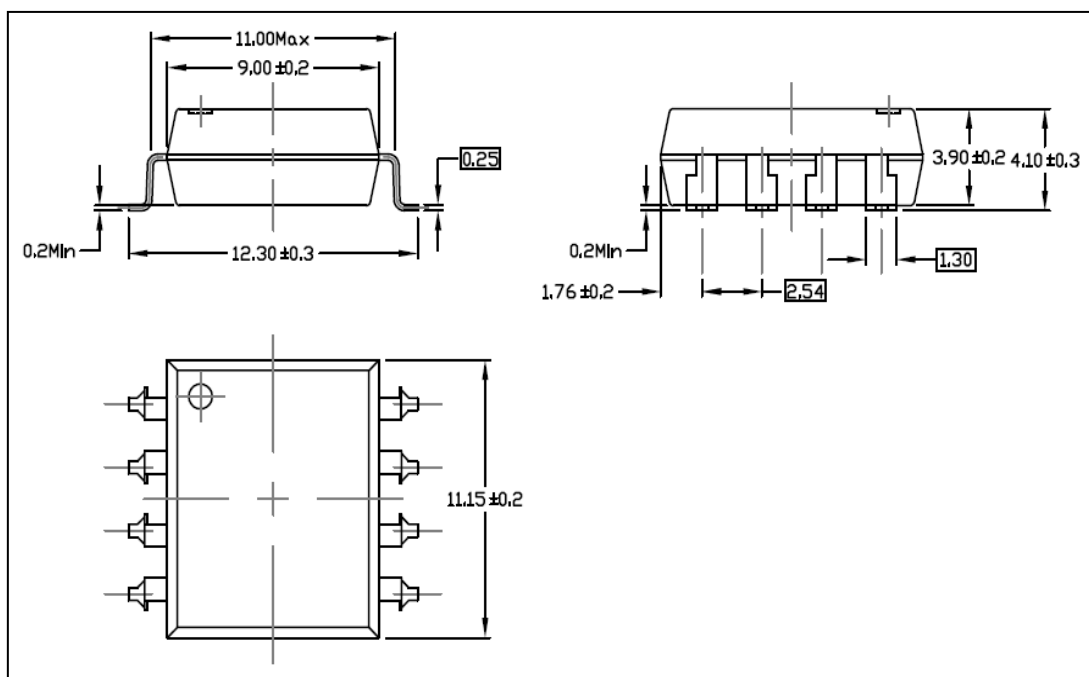
ICPLW137, ICPLW2601, ICPLW2611

PACKAGE DIMENSIONS (mm)

DIP



SMD

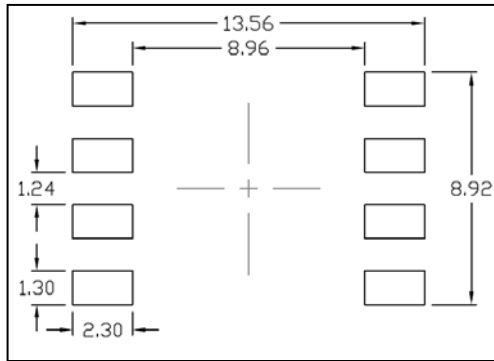




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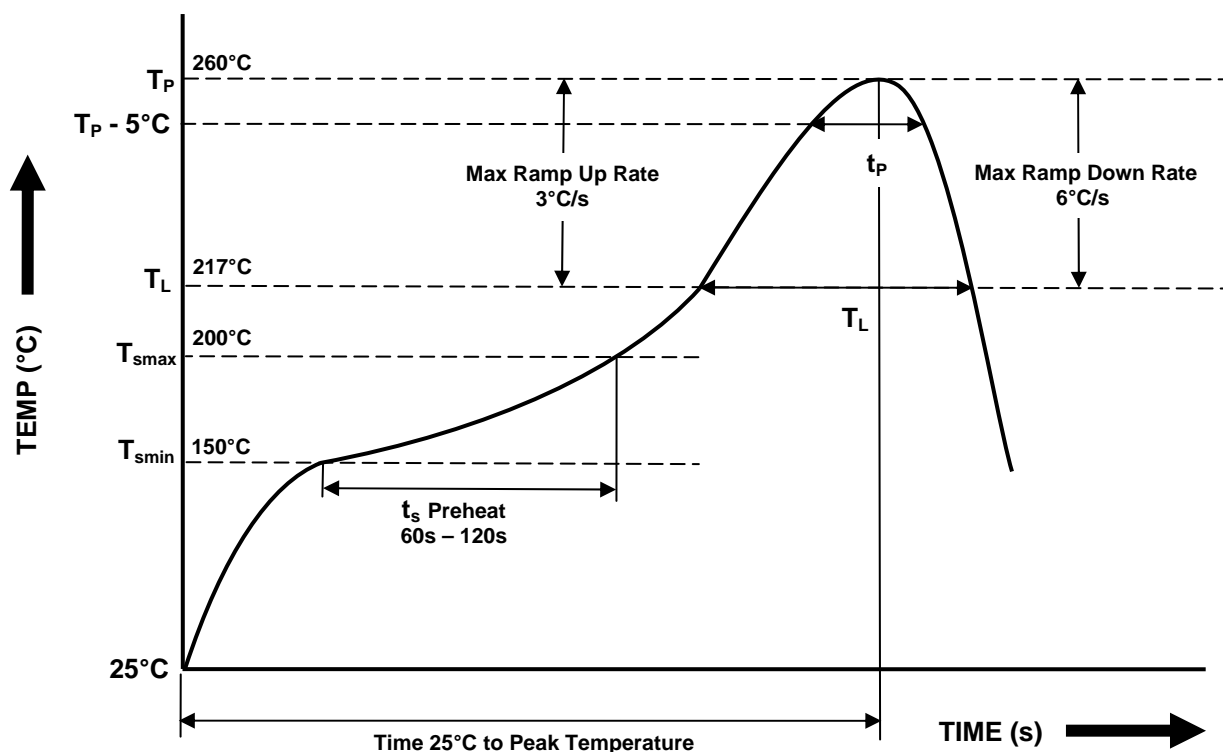
RECOMMENDED PAD LAYOUT FOR SMD (mm)



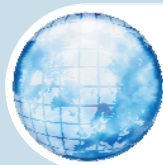


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IR REFLOW SOLDERING TEMPERATURE PROFILE (One Time Reflow Soldering is Recommended)

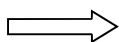
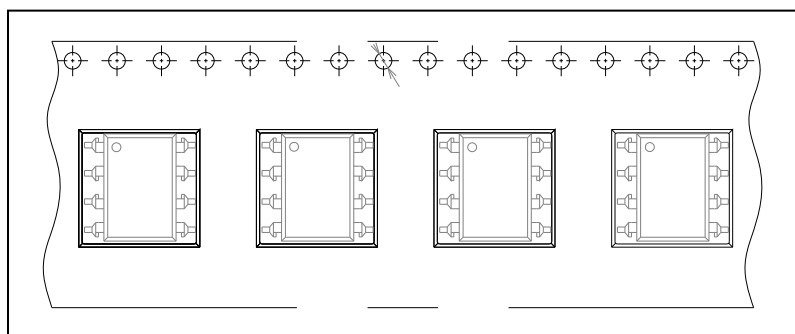


Profile Details	Conditions
Preheat <ul style="list-style-type: none">- Min Temperature (T_{SMIN})- Max Temperature (T_{SMAX})- Time T_{SMIN} to T_{SMAX} (t_s)	150°C 200°C 60s - 120s
Soldering Zone <ul style="list-style-type: none">- Peak Temperature (T_P)- Liquidous Temperature (T_L)- Time within 5°C of Actual Peak Temperature ($T_P - 5^\circ\text{C}$)- 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

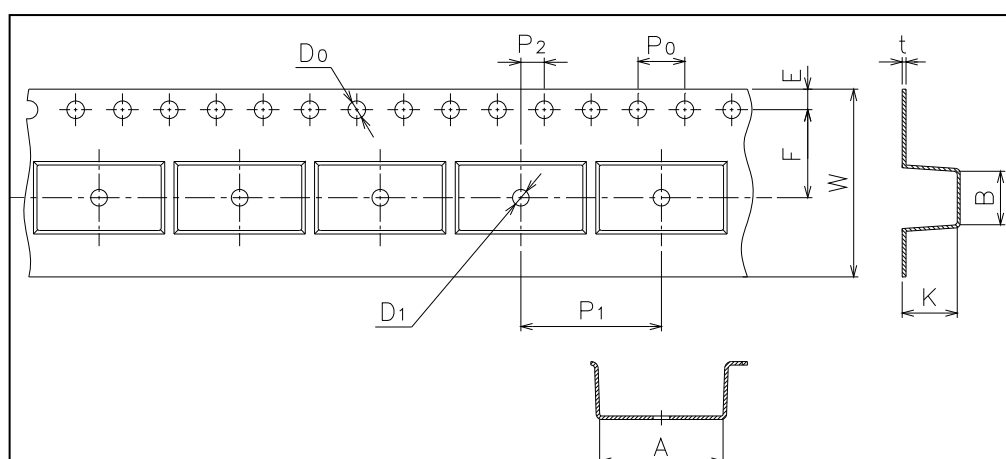


ICPLW137, ICPLW2601, ICPLW2611

TAPE AND REEL PACKAGING



Direction of feed from reel



Dimension No.	A	B	Do	D1	E	F
Dimension(mm)	12.7±0.1	11.45±0.1	1.5±0.1	1.5±0.1	1.75±0.1	11.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.1	16.0±0.1	2.0±0.1	0.4±0.05	24.00±0.3	4.6±0.1



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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.



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ISOCOM is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing ISOCOM products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such ISOCOM products could cause loss of human life, bodily injury or damage to property.

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.

___ The ISOCOM products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These ISOCOM products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation Instruments, traffic signal instruments, combustion control instruments, medical Instruments, all types of safety devices, etc.. Unintended Usage of ISOCOM products listed in this document shall be made at the customer's own risk.

___ Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.

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

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