



## IS314W

### DESCRIPTION

The IS314W Photocoupler is ideally suited for driving power IGBTs and MOSFETs used in inverters of motor control and of power supply system. It contains an AlGaAs LED optically coupled to an integrated circuit with a power output stage.

The device is in Stretched SO6 package.

### FEATURES

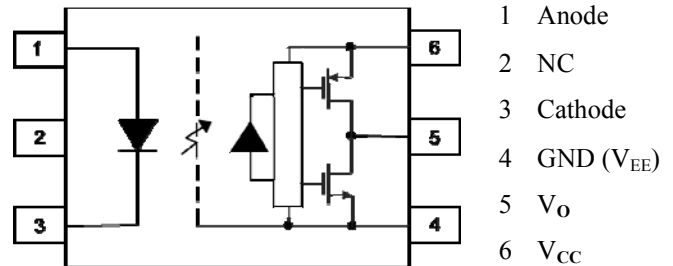
- 1.0A Maximum Peak Output Current
- 0.8A Minimum Peak Output Current
- Rail-to-Rail output voltage
- 20kV/ $\mu$ s Minimum Common Mode Rejection at  $V_{CM}$  1500V
- Maximum Propagation Delay 200ns
- Maximum Propagation Delay Difference 100ns
- Wide Operating Voltage Range  
 $V_{CC}$  10 to 30 V
- Maximum Supply Current  $I_{CC}$  3.0mA
- Under Voltage Lock Out (UVLO) Protection with Hysteresis
- Guaranteed Performance over Temperature Range - 40°C to +105°C
- MSL Level 1
- Lead Free and RoHS Compliant
- Safety Approvals Pending

### APPLICATIONS

- IGBT/MOSFET Gate Drive
- UPS
- Inverters
- Switching Power Supplies
- AC Brushless and DC Motor Drives

### ORDER INFORMATION

- Supplied in Tape & Reel



A 0.1 $\mu$ F bypass Capacitor must be connected between Pins 6 and 4.

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

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	25mA
Forward Peak Current (Pulse Width $\leq 1\mu$ s, 300pps)	1.0A
Reverse Voltage	5V
Forward Current Rise / Fall Time	500ns
Power dissipation	45mW

#### Output

High Level Peak Output Current Exponential waveform. Pulse width $\leq 0.3\mu$ s, $f \leq 15$ kHz	1.0A
Low Level Peak Output Current Exponential waveform. Pulse width $\leq 0.3\mu$ s, $f \leq 15$ kHz	1.0A
Supply Voltage ( $V_{CC} - V_{EE}$ )	35V
Output Voltage	$V_{CC}$
Power Dissipation	250mW

#### Total Package

Isolation Voltage	5000V <sub>RMS</sub>
Total Power Dissipation	295mW
Operating Temperature	-40 to 105 °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 1PE, 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



## IS314W

### Truth Table

LED	High Side	Low Side	V <sub>o</sub>
OFF	OFF	ON	LOW
ON	ON	OFF	HIGH

### Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T <sub>A</sub>	- 40	105	°C
Supply Voltage	V <sub>CC</sub> - V <sub>EE</sub>	10	30	V
Input Current (ON)	I <sub>F(ON)</sub>	7	16	mA
Input Voltage (OFF)	V <sub>F(OFF)</sub>	-3.0	0.8	V



## IS314W

**ELECTRICAL CHARACTERISTICS** (Typical Values at  $V_{CC} - V_{EE} = 10V$  to  $30V$  and  $T_A = 25^\circ C$ ,  
Minimum and Maximum Values at Recommended Operating Conditions,  
unless otherwise specified)

### INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	$V_F$	$I_F = 10mA$	1.2	1.37	1.8	V
Forward Voltage Temperature Coefficient	$\Delta V_F / \Delta T$	$I_F = 10mA$		-1.237		mV/°C
Reverse Voltage	$V_R$	$I_R = 10\mu A$	5			V
Input Threshold Current (Low to High)	$I_{FLH}$	$V_O > 5V, I_O = 0A$		1.9	5	mA
Input Threshold Voltage (High to Low)	$V_{FHL}$	$V_O < 5V, I_O = 0A$	0.8			V
Input Capacitance	$C_{IN}$	$V_F = 0V, f = 1MHz$		33		pF

### OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
High Level Supply Current	$I_{CCH}$	$I_F = 7$ to $16mA$ $V_O = \text{Open}$		1.9	3.0	mA
Low Level Supply Current	$I_{CCL}$	$V_F = -3$ to $0.8V$ $V_O = \text{Open}$		2.1	3.0	mA
High Level Output Current	$I_{OH}$	$V_O = V_{CC} - 1.5V$ Pulse Width = $50\mu s$			-0.3	A
		$V_O = V_{CC} - 3V$ Pulse Width = $10\mu s$			-0.8	
Low Level Output Current	$I_{OL}$	$V_O = V_{EE} + 1.5V$ Pulse Width = $50\mu s$	0.3			A
		$V_O = V_{EE} + 3V$ Pulse Width = $10\mu s$	0.8			
High Level Output Voltage	$V_{OH}$	$I_F = 10mA, I_O = -100mA$	$V_{CC} - 0.6$	$V_{CC} - 0.35$		V
Low Level Output Voltage	$V_{OL}$	$I_F = 0mA, I_O = 100mA$		$V_{EE} + 0.25$	$V_{EE} + 0.4$	V
UVLO Threshold	$V_{UVLO+}$	$V_O > 5V, I_F = 10mA$		7.8		V
	$V_{UVLO-}$	$V_O < 5V, I_F = 10mA$		6.7		V
UVLO Hysteresis	$UVLO_{HYS}$			1.1		V



## IS314W

**ELECTRICAL CHARACTERISTICS** (Typical Values at  $V_{CC} - V_{EE} = 10V$  to  $30V$  and  $T_A = 25^\circ C$ ,  
Minimum and Maximum Values at Recommended Operating Conditions,  
unless otherwise specified)

### SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Propagation Delay Time to High Output Level	$t_{PLH}$	$I_F = 7$ to $16mA$ , $V_{CC} = 15$ to $30V$ , $V_{EE} = 0V$ $R_g = 47\Omega$ , $C_g = 3nF$ , $f = 10kHz$ , Duty Cycle = $50\%$	50	120	200	ns
Propagation Delay Time to Low Output Level	$t_{PHL}$		50	110	200	
Pulse Width Distortion $ t_{PHL} - t_{PLH} $ for any given device	PWD			20	70	
Propagation Delay Difference ( $t_{PHL} - t_{PLH}$ ) between any two Devices	PDD		-100		100	
Output Rise Time (10% to 90%)	$t_r$				35	
Output Fall Time (90% to 10%)	$t_f$				35	
Common Mode Transient Immunity at High Output Level	$CM_H$	$I_F = 10$ to $16mA$ , $V_{CC} = 30V$ $V_{CM} = 1500V$ , $T_A = 25^\circ C$	20	25		kV/ $\mu s$
Common Mode Transient Immunity at Low Output Level	$CM_L$	$V_F = 0V$ , $V_{CC} = 30V$ $V_{CM} = 1500V$ , $T_A = 25^\circ C$	20	25		kV/ $\mu s$



## IS314W

**ELECTRICAL CHARACTERISTICS** (Typical Values at  $V_{CC} - V_{EE} = 10V$  to  $30V$  and  $T_A = 25^\circ C$ ,  
Minimum and Maximum Values at Recommended Operating Conditions,  
unless otherwise specified)

### ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Insulation Voltage	$V_{ISO}$	$RH \leq 40\%$ to $60\%$ , $t = 1$ min, $T_A = 25^\circ C$	5000			V
Input - Output Resistance	$R_{I-O}$	$V_{I-O} = 500VDC$		$10^{12}$		$\Omega$
Input - Output Capacitance	$C_{I-O}$	$f = 1MHz$ , $T_A = 25^\circ C$		0.92		pF

#### Note :

1. A 0.1uF or bigger bypass capacitor must be connected across pin 6 and pin 4.
2. PDD is the difference of  $t_{PHL}$  and  $t_{PLH}$  between any two IS314W devices under same test conditions.
3.  $CM_H$ , 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 ( $V_o > 15V$ ).
4.  $CM_L$ , 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 ( $V_o < 1V$ ).



## IS314W

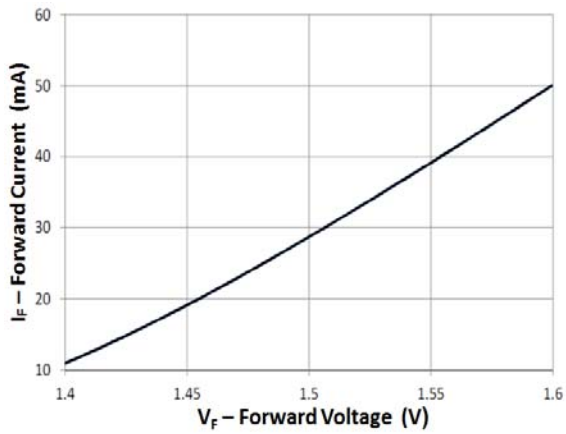


Fig 1 Forward Current vs Forward Voltage

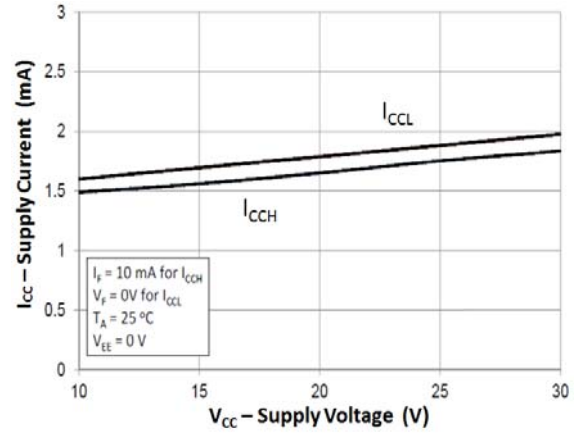


Fig 2 Supply Current vs Supply Voltage

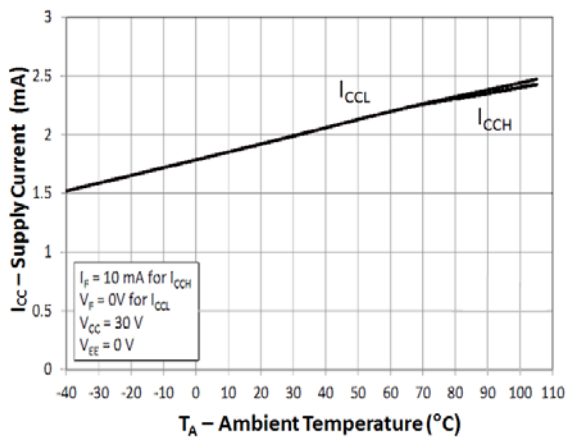


Fig 3 Supply Current vs Ambient Temperature

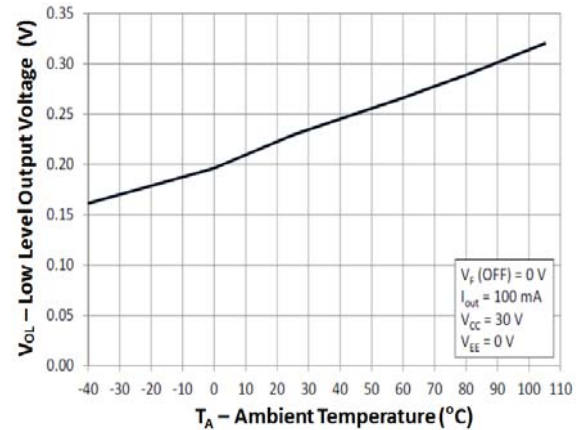


Fig 4 Low Level Output Voltage vs Ambient temperature

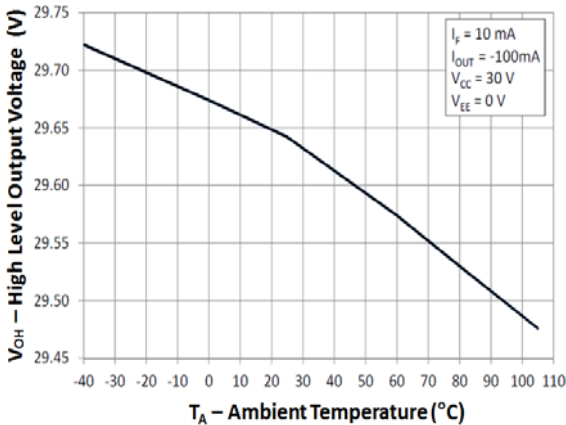


Fig 5 High Level Output Voltage vs Ambient Temperature

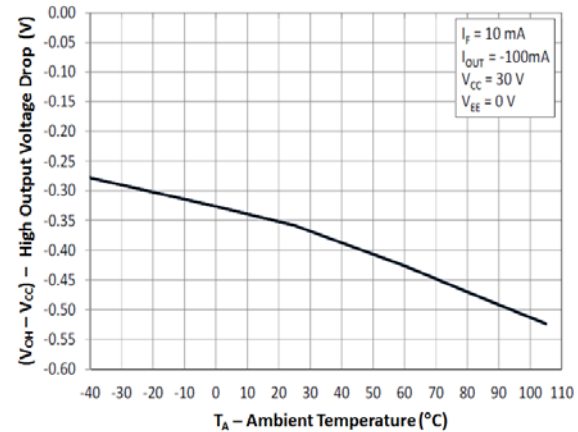


Fig 6 High Output Voltage Drop vs Ambient Temperature



**IS314W**

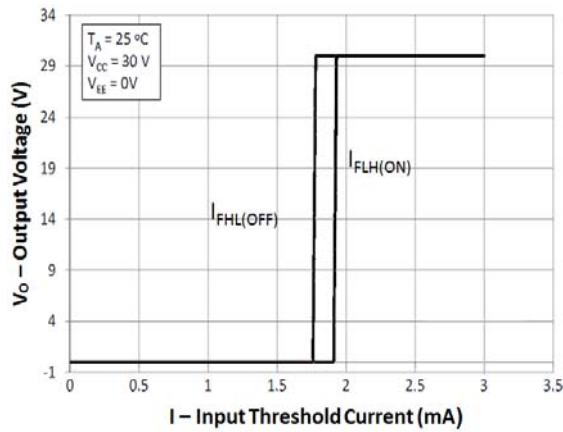


Fig 7  $I_{FLH}$  Hysteresis

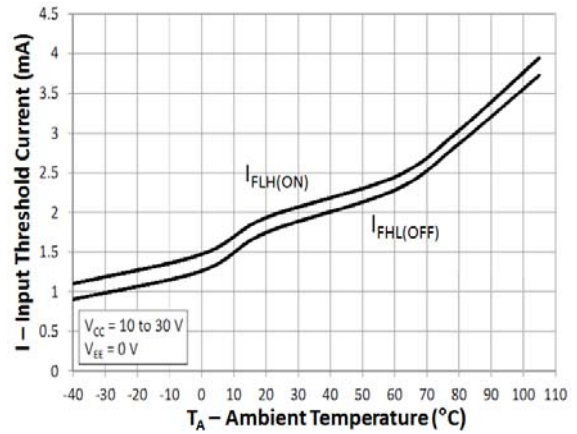


Fig 8 Input Threshold Current vs Ambient Temperature

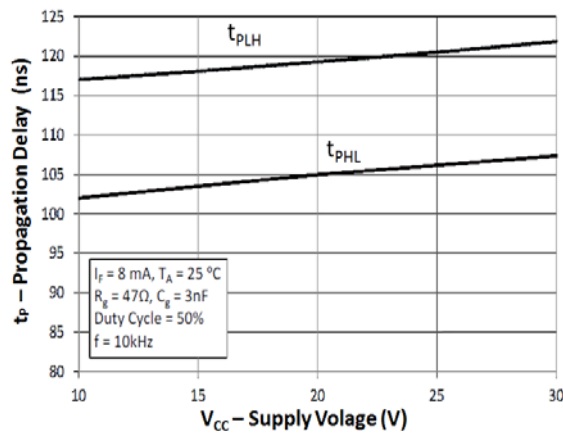


Fig 9 Propagation Delay vs Supply Voltage

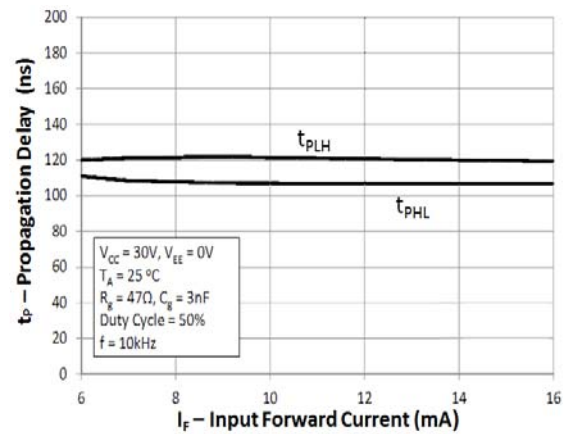


Fig 10 Propagation Delay vs Forward Current

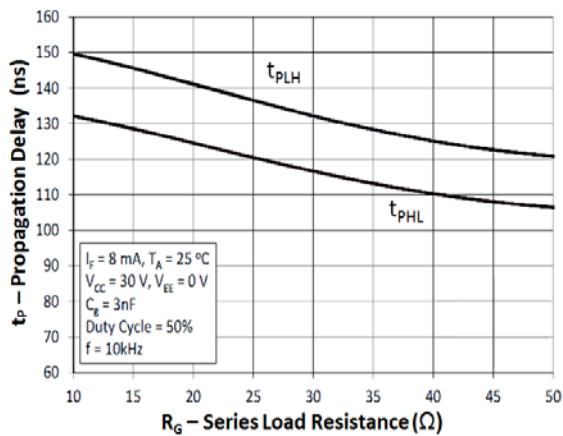


Fig 11 Propagation Delay vs Series Load Resistance

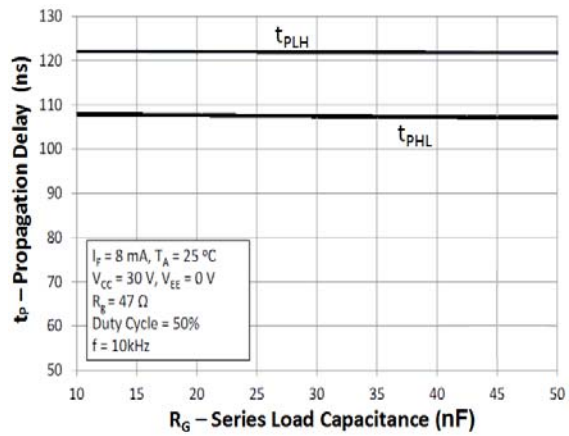
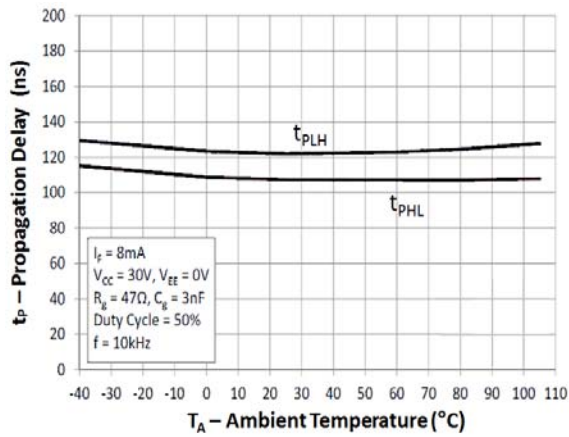


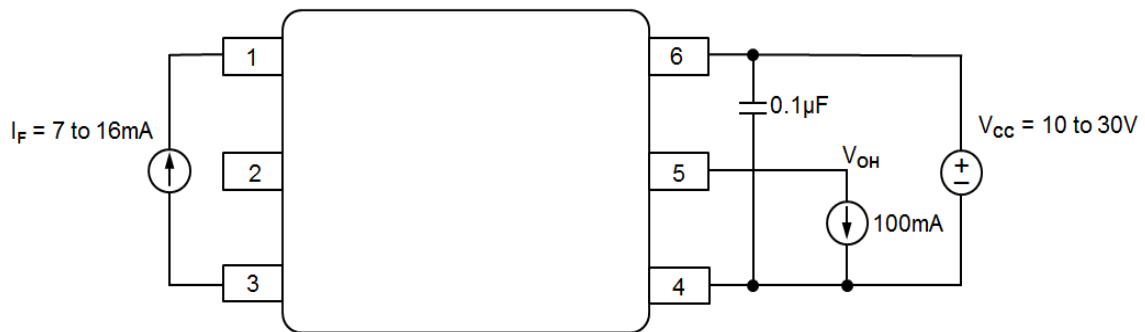
Fig 12 Propagation Delay vs Series Load Capacitance



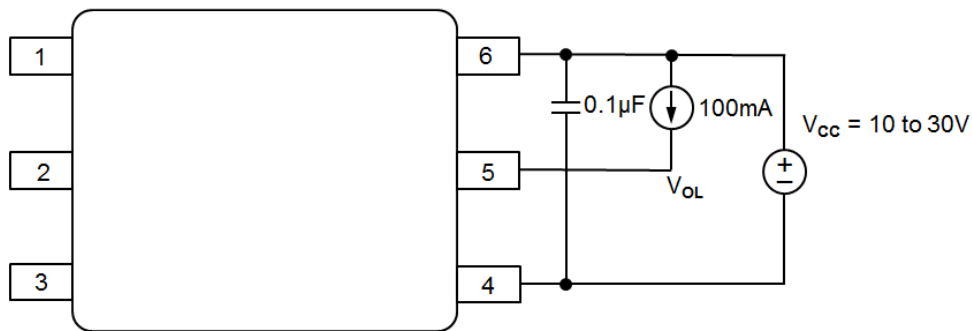
## IS314W



**Fig 13 Propagation Delay vs Ambient Temperature**



**$V_{OH}$  Test Circuit**

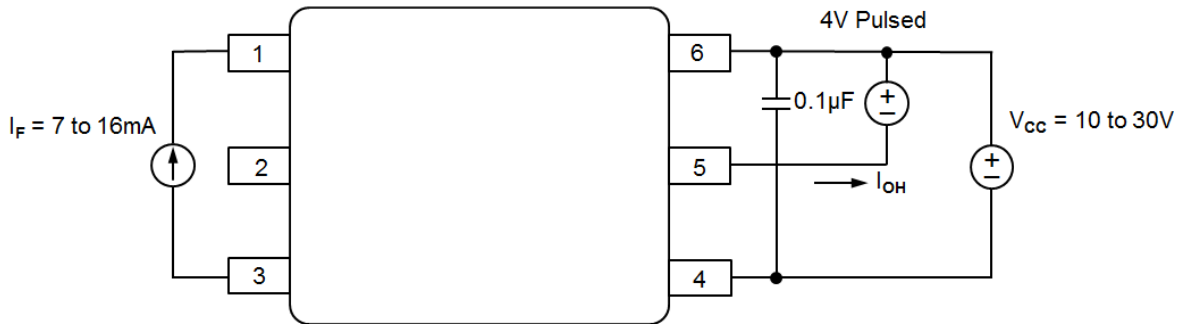


**$V_{OL}$  Test Circuit**

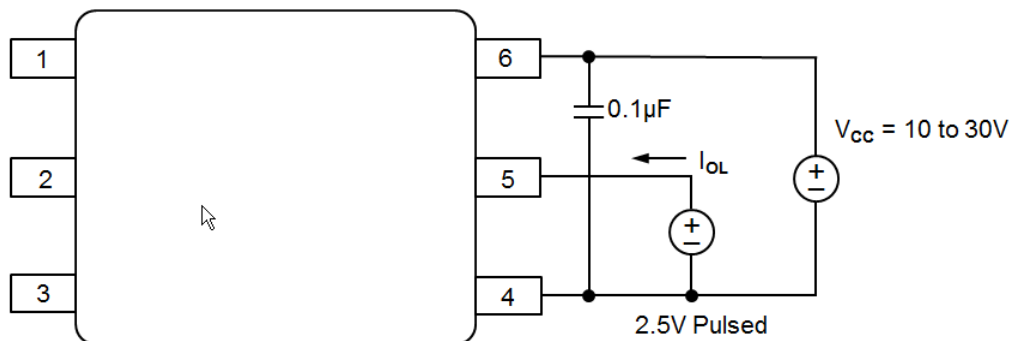




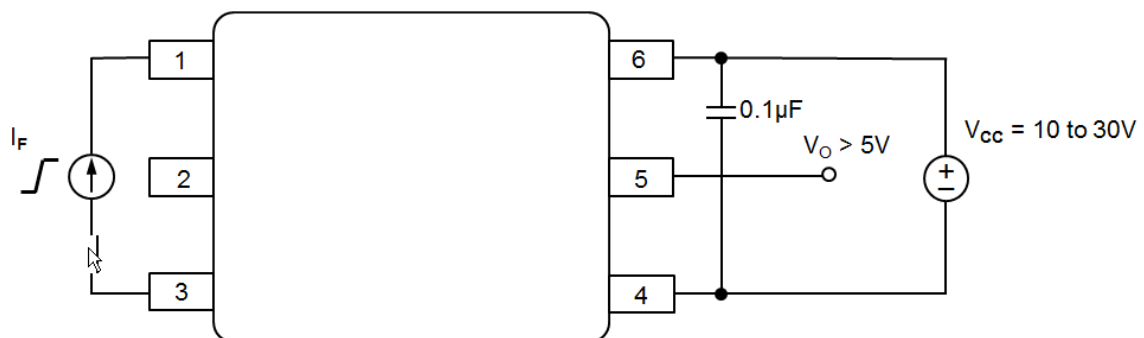
## IS314W



**$I_{OH}$  Test Circuit**



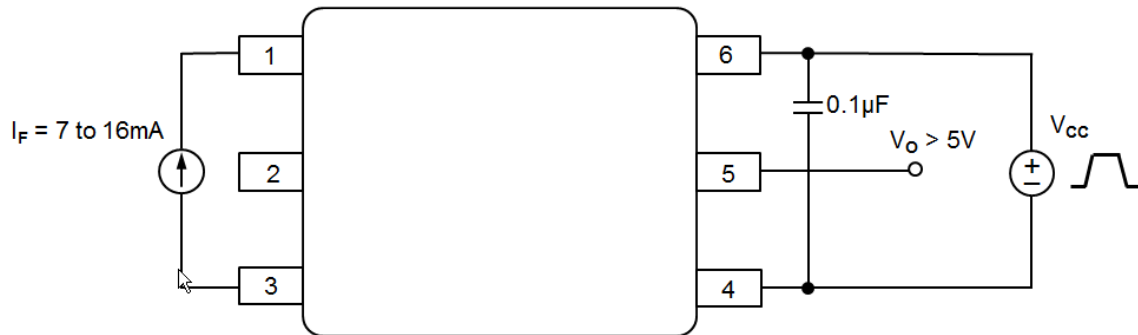
**$I_{OL}$  Test Circuit**



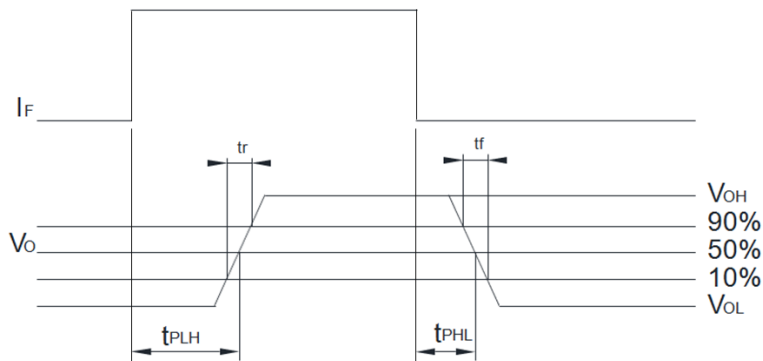
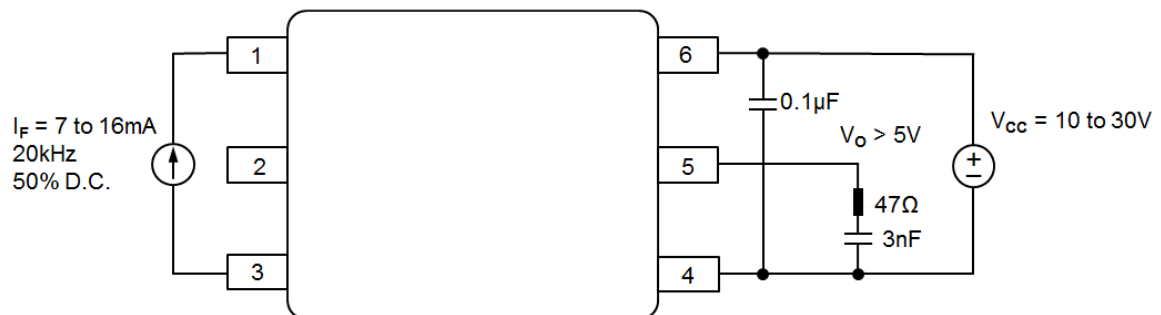
**$I_{FLH}$  Test Circuit**



## IS314W



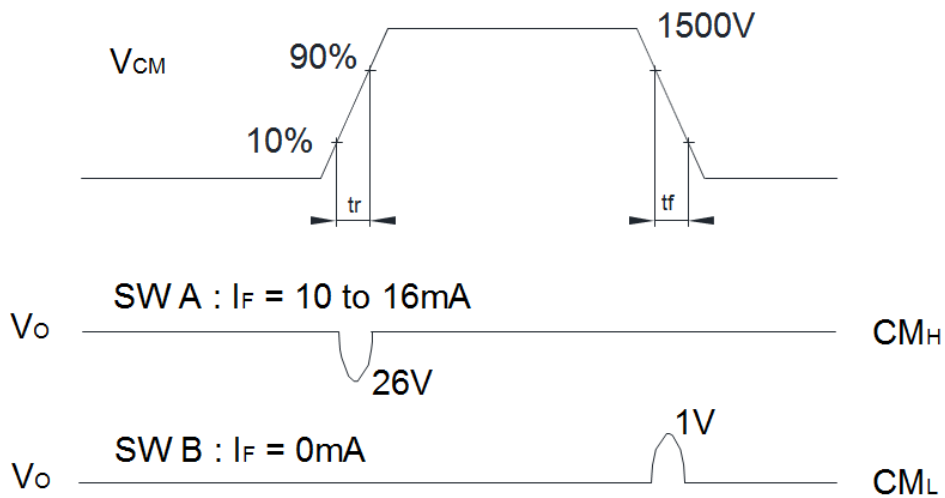
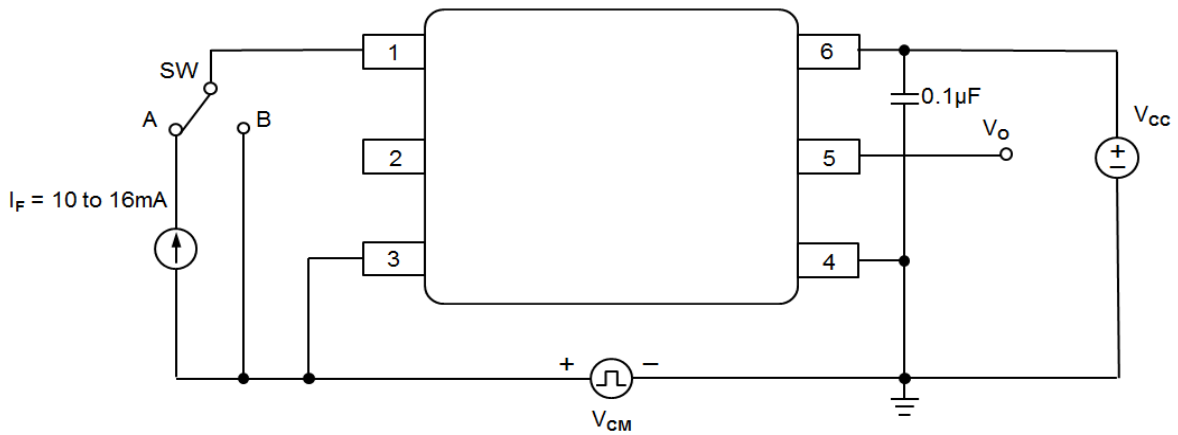
**UVLO Test Circuit**



**$t_r$ ,  $t_b$ ,  $t_{PLH}$  and  $t_{PHL}$  Test Circuit and Waveform**



## IS314W



CMR Test Circuit and Waveform

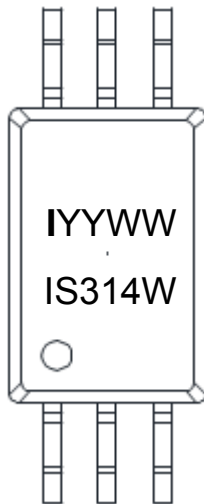


## IS314W

### ORDER INFORMATION

IS314W			
After PN	PN	Description	Packing quantity
None	IS314W	Stretched SO6	1000 pcs per reel

### DEVICE MARKING

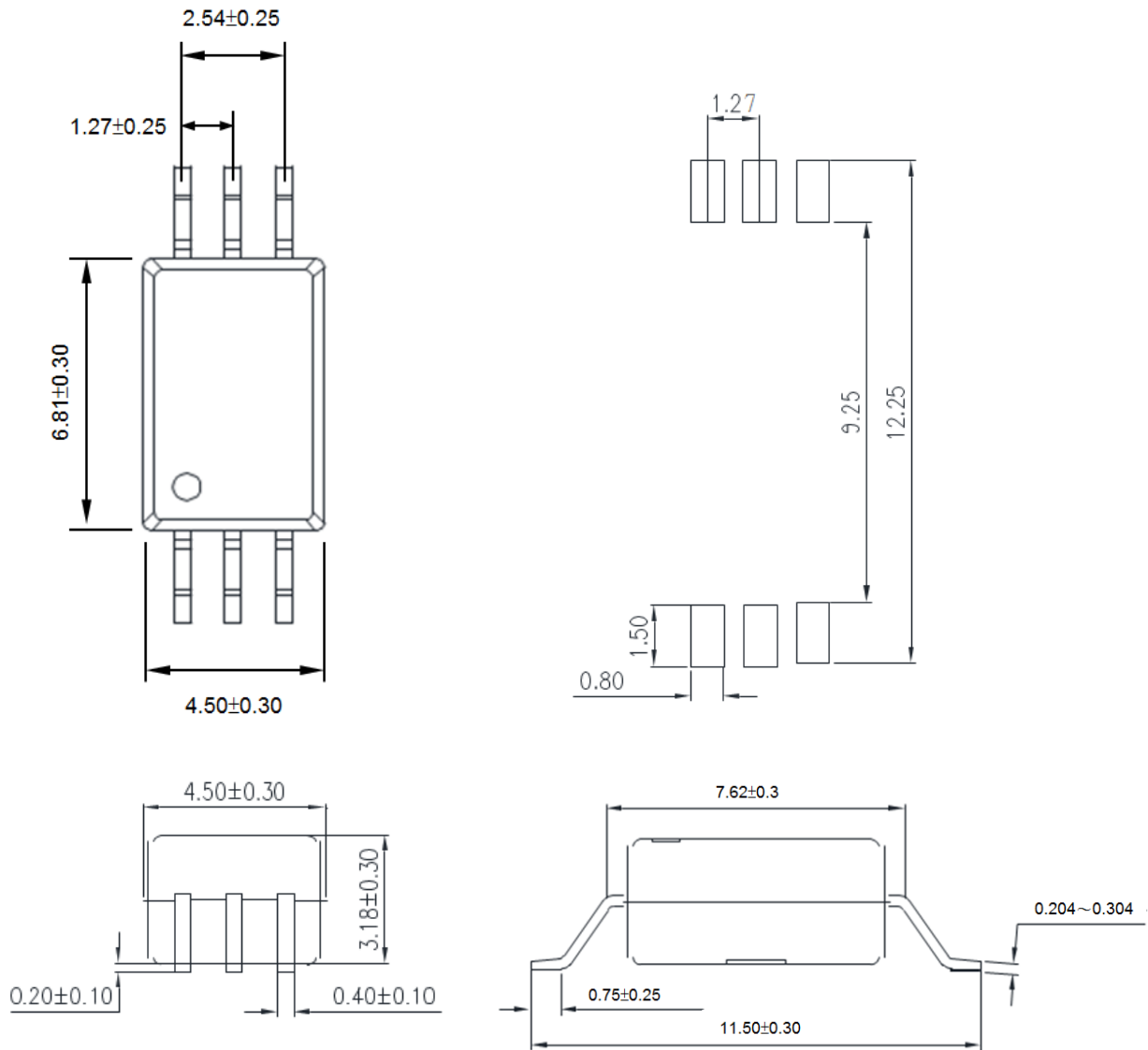


IS314W denotes Device Part Number  
I denotes Isocom  
YY denotes 2 digit Year code  
WW denotes 2 digit Week code



## IS314W

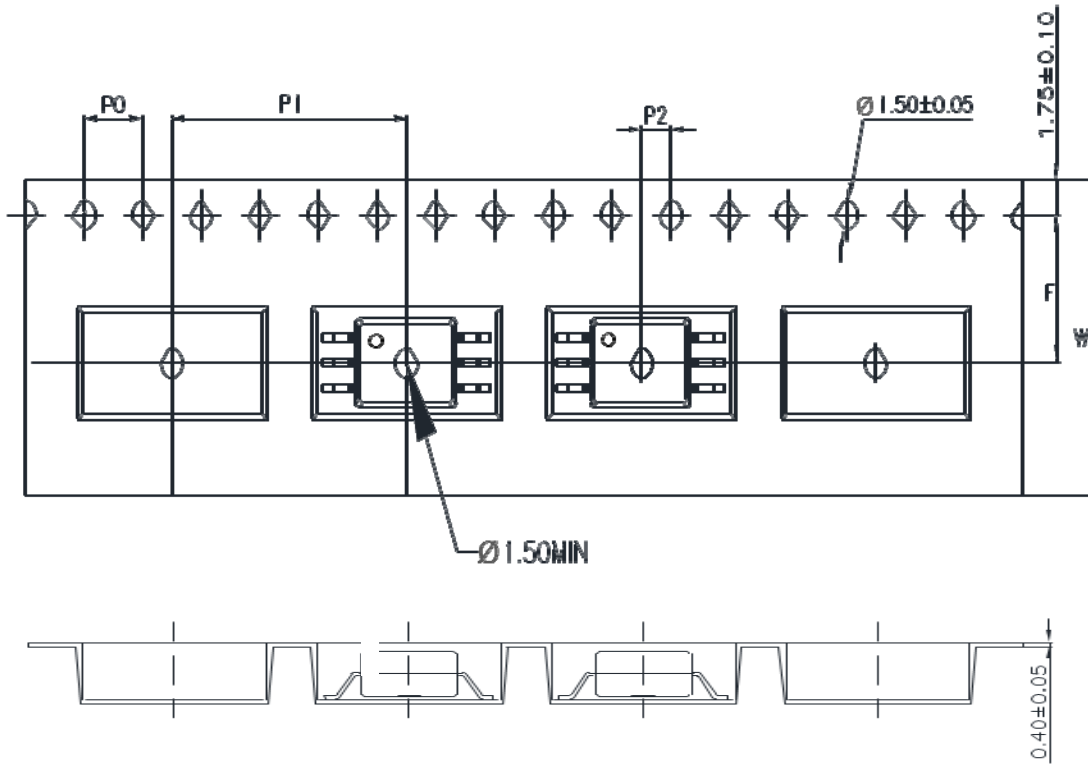
### PACKAGE DIMENSIONS and Recommended PCB Pad Layout in mm (inch)





**IS314W**

**TAPE AND REEL PACKAGING**

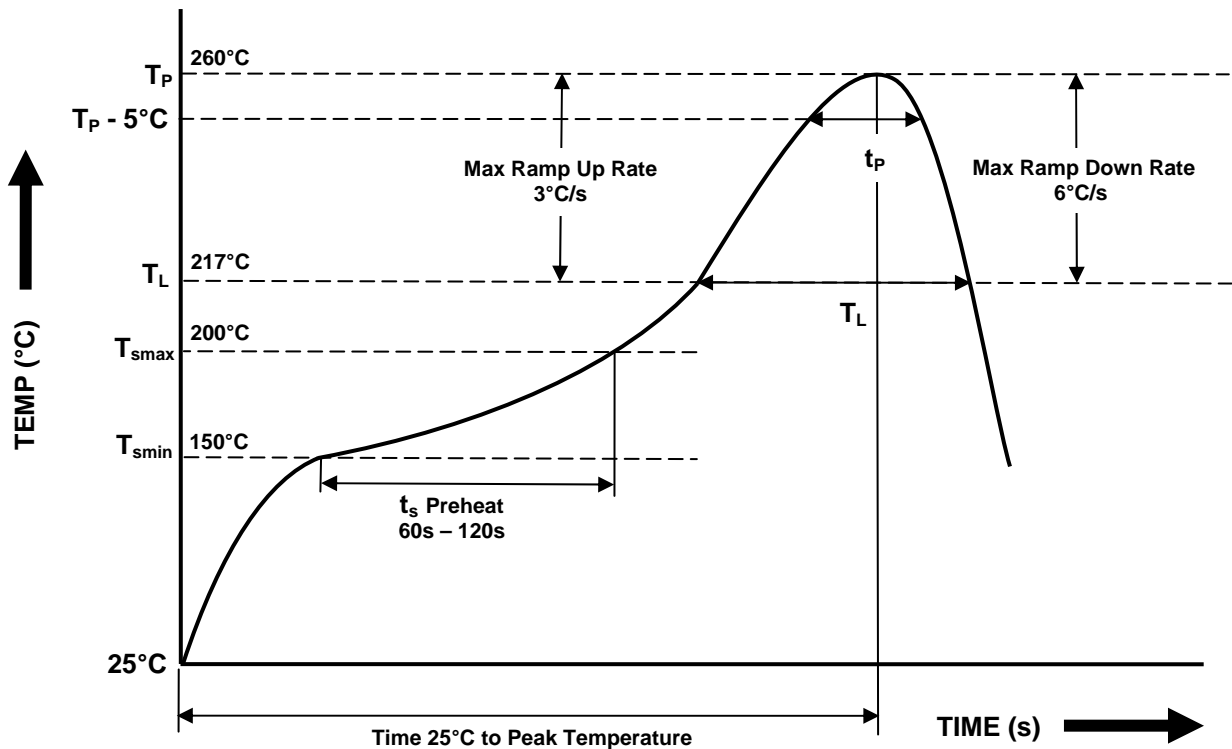


Description	Symbol	Dimension mm (inch)
Tape Width	W	$16 \pm 0.3$ (0.63)
Pitch of Sprocket Holes	$P_0$	$4 \pm 0.1$ (0.16)
Distance of Compartment to Sprocket Holes	F	$7.5 \pm 0.1$ (0.3)
	$P_2$	$2 \pm 0.1$ (0.079)
Distance of Compartment to Compartment	$P_1$	$16 \pm 0.1$ (0.63)



**IS314W**

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



Profile Details	Conditions
<b>Preheat</b> - Min Temperature (T <sub>SMIN</sub> ) - Max Temperature (T <sub>SMAX</sub> ) - Time T <sub>SMIN</sub> to T <sub>SMAX</sub> (t <sub>s</sub> )	150°C 200°C 60s - 120s
<b>Soldering Zone</b> - Peak Temperature (T <sub>P</sub> ) - Time at Peak Temperature - Liquidous Temperature (T <sub>L</sub> ) - Time within 5°C of Actual Peak Temperature (T <sub>P</sub> - 5°C) - Time maintained above T <sub>L</sub> (t <sub>L</sub> ) - Ramp Up Rate (T <sub>L</sub> to T <sub>P</sub> ) - Ramp Down Rate (T <sub>P</sub> to T <sub>L</sub> )	260°C 10s max 217°C 30s max 60s - 100s 3°C/s max 6°C/s max
Average Ramp Up Rate (T <sub>smax</sub> to T <sub>P</sub> )	3°C/s max
Time 25°C to Peak Temperature	8 minutes max



## IS314W

### 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.



