ISOCOM COMPONENTS

IS314P

DESCRIPTION

The IS314P 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/µs 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

Pin	Name
1	Anode
2	NC
3	Cathode
4	GND (V_{EE})
5	V_O
6	V_{CC}
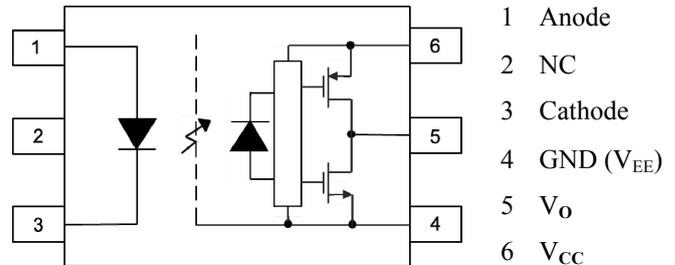
A 0.1µF bypass Capacitor must be connected between Pins 6 and 4.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

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 ≤ 1µs, 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 ≤ 0.3 µs, f ≤ 15 kHz	1.0A
Low Level Peak Output Current Exponential waveform. Pulse width ≤ 0.3 µs, f ≤ 15 kHz	1.0A
Supply Voltage ($V_{CC} - V_{EE}$)	35V
Output Voltage	V_{CC}
Power Dissipation	250mW

Total Package

Isolation Voltage	5000V$_{RMS}$
Total Power Dissipation	295mW
Operating Temperature	-40 to 105 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

Truth Table

LED	High Side	Low Side	V_O
OFF	OFF	ON	LOW
ON	ON	OFF	HIGH

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T_A	- 40	105	°C
Supply Voltage	$V_{CC} - V_{EE}$	10	30	V
Input Current (ON)	$I_{F(ON)}$	7	16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	-3.0	0.8	V

ELECTRICAL CHARACTERISTICS (Typical Values at $V_{CC} - V_{EE}$ = 10V to 30V and T_A = 25°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 = 10μA	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 = Open		1.9	3.0	mA
Low Level Supply Current	I_{CCL}	V_F = − 3 to 0.8V V_O = Open		2.1	3.0	mA
High Level Output Current	I_{OH}	$V_O = V_{CC} - 1.5V$ Pulse Width = 50μs			− 0.3	A
		$V_O = V_{CC} - 3V$ Pulse Width = 10μs			− 0.8	
Low Level Output Current	I_{OL}	$V_O = V_{EE} + 1.5V$ Pulse Width = 50μs	0.3			A
		$V_O = V_{EE} + 3V$ Pulse Width = 10μs	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

ELECTRICAL CHARACTERISTICS (Typical Values at $V_{CC} - V_{EE}$ = 10V to 30V and T_A = 25°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 Rg = 47Ω, Cg = 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°C	20	25		kV/μs
Common Mode Transient Immunity at Low Output Level	CM_L	V_F = 0V, V_{CC} = 30V V_{CM} = 1500V, T_A = 25°C	20	25		kV/μs

IS314P

ELECTRICAL CHARACTERISTICS (Typical Values at $V_{CC} - V_{EE}$ = 10V to 30V and T_A = 25°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 ≤ 40% to 60%, t = 1 min, T_A = 25°C	5000			V
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		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 IS314P 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).
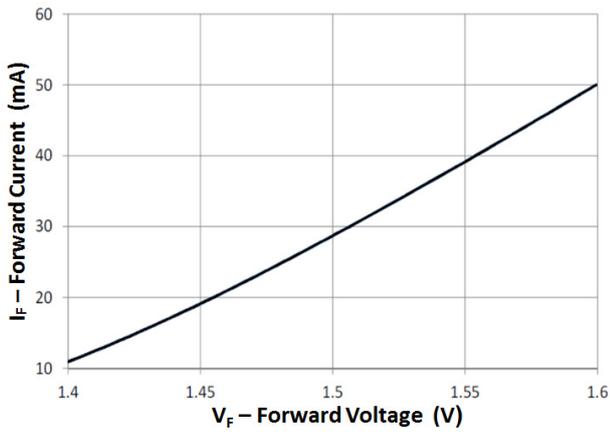
Fig 1 Forward Current vs Forward Voltage
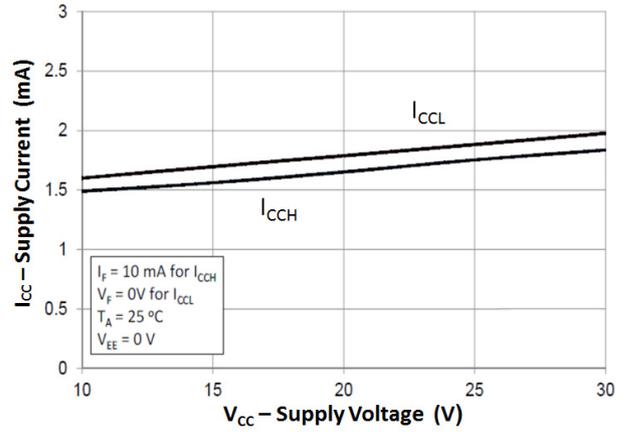
Fig 2 Supply Current vs Supply Voltage
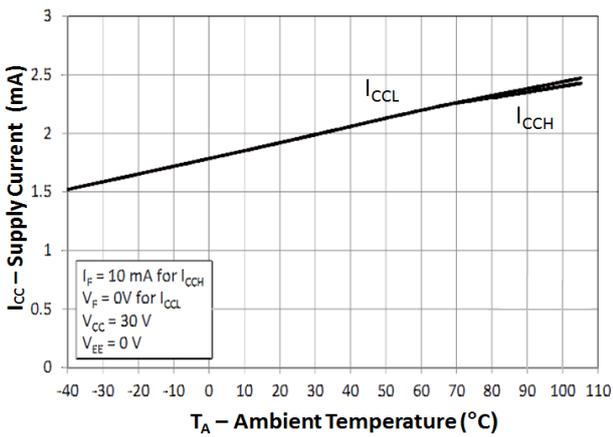

Fig 3 Supply Current vs Ambient Temperature
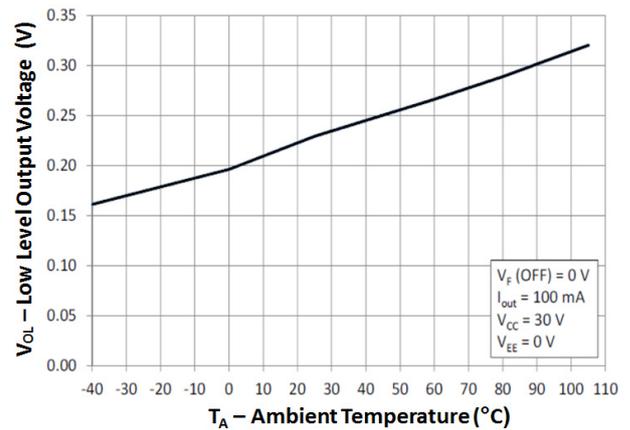

Fig 4 Low Level Output Voltage vs
   Ambient temperature
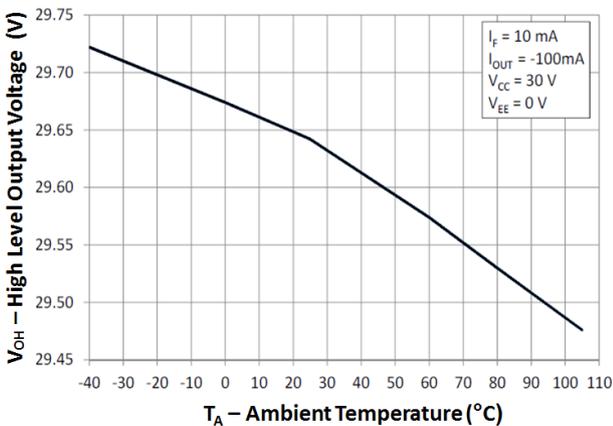
Fig 5 High Level Output Voltage vs
   Ambient Temperature
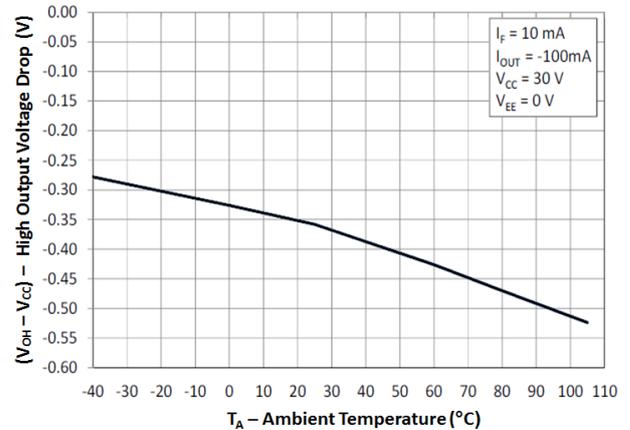
Fig 6 High Output Voltage Drop vs
   Ambient Temperature
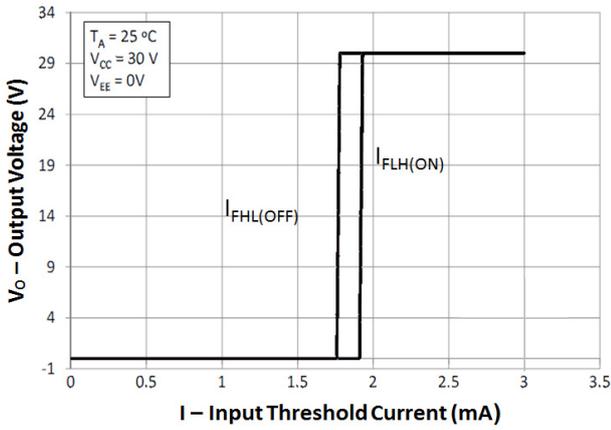
Fig 7 I_{FLH} Hysteresis
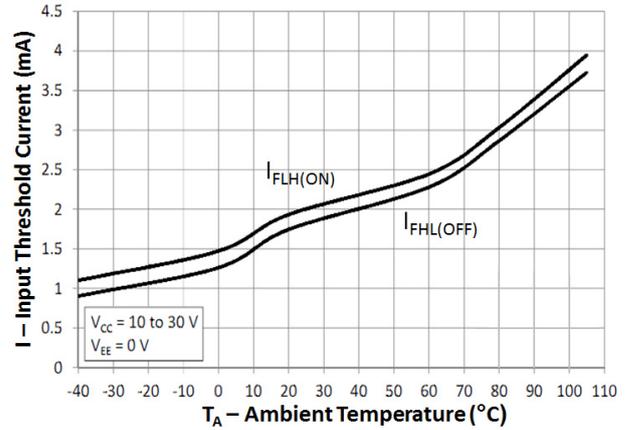
Fig 8 Input Threshold Current vs
Ambient Temperature
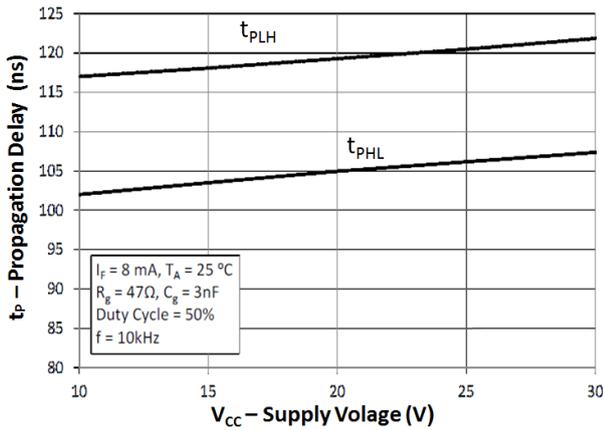

Fig 9 Propagation Delay vs Supply Voltage
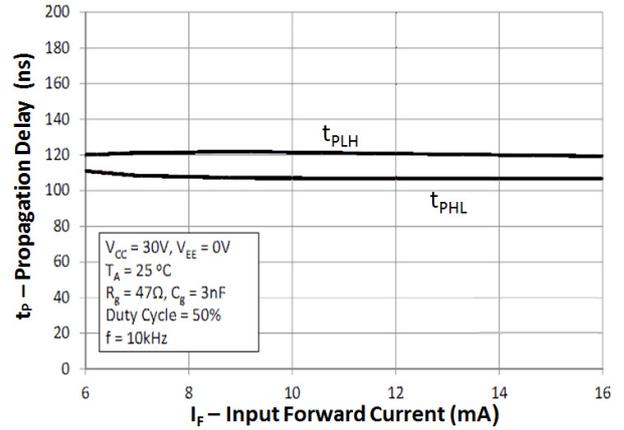
Fig 10 Propagation Delay vs Forward Current
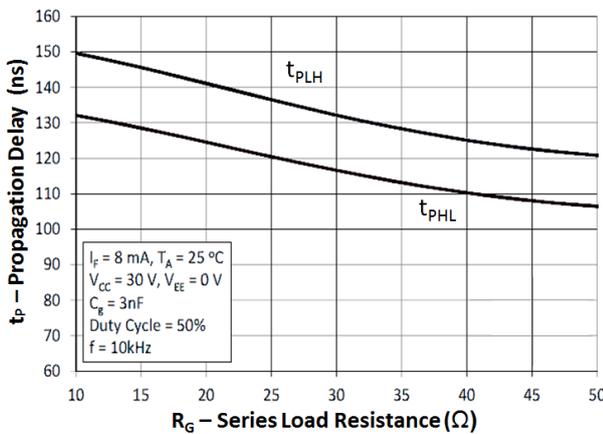
Fig 11 Propagation Delay vs Series Load Resistance
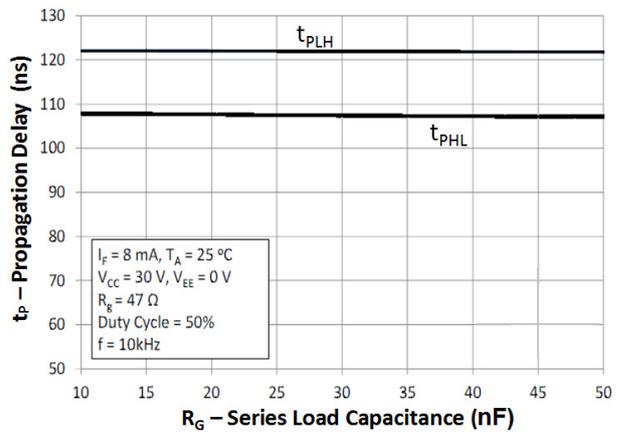
Fig 12 Propagation Delay vs Series Load Capacitance
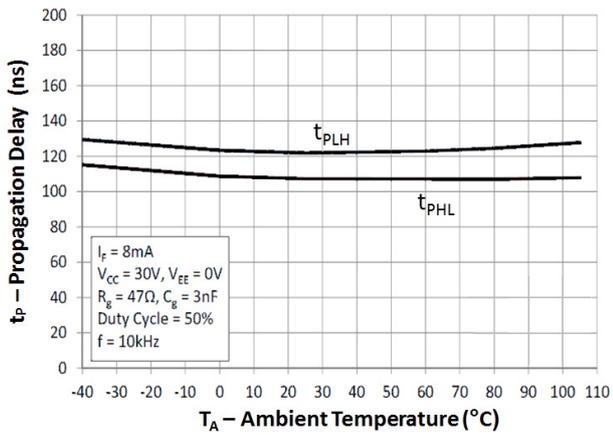
Fig 13 Propagation Delay vs Ambient Temperature
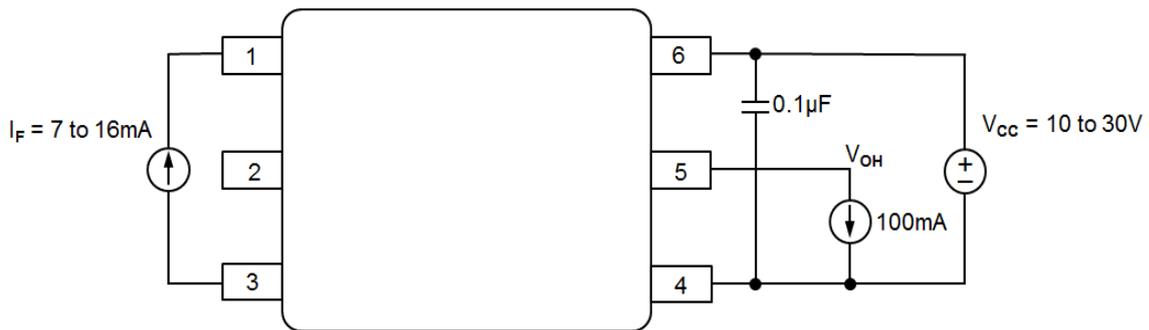
V$_{OH}$ Test Circuit
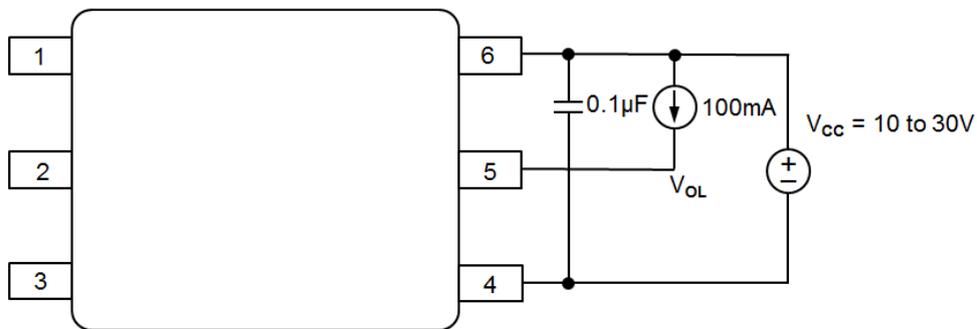
V$_{OL}$ Test Circuit

I_F = 7 to 16mA
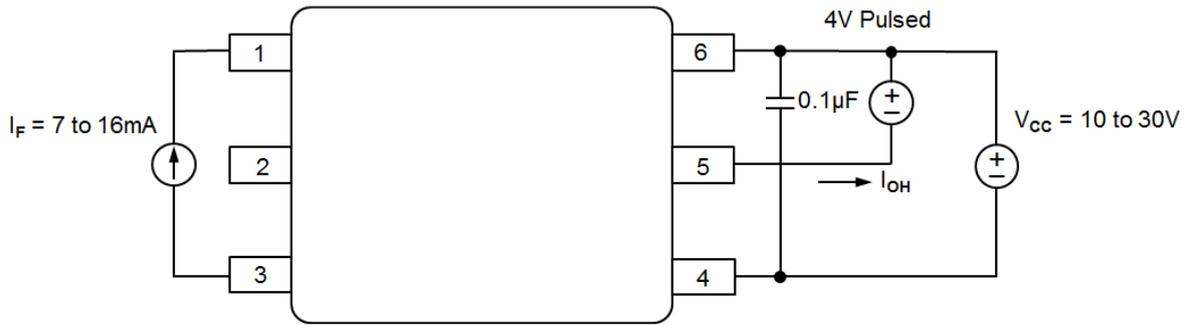
4V Pulsed

1

6

0.1µF

V_{CC} = 10 to 30V

2

5

I_{OH}

3

4

I_{OH} Test Circuit

1

6

0.1µF

V_{CC} = 10 to 30V

2

5

I_{OL}

3

4

2.5V Pulsed

I_{OL} Test Circuit

I_F

1

6

0.1µF

V_O > 5V

V_{CC} = 10 to 30V

2

5

3

4

I_{FLH} Test Circuit

I_F = 7 to 16mA

1		6
2		5
3		4

0.1µF

V_O > 5V

V_CC

UVLO Test Circuit

I_F = 7 to 16mA
20kHz
50% D.C.

1		6
2		5
3		4

0.1µF

V_O > 5V

47Ω

3nF

V_CC = 10 to 30V

I_F

tr   tf

V_OH
90%
50%
10%
V_OL

V_O

t_PLH   t_PHL
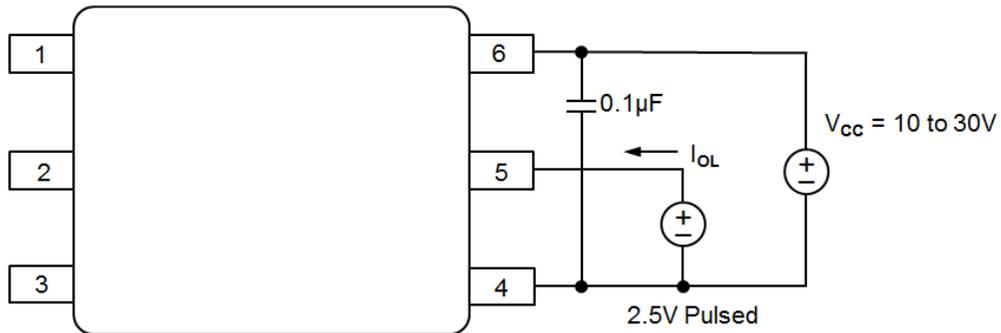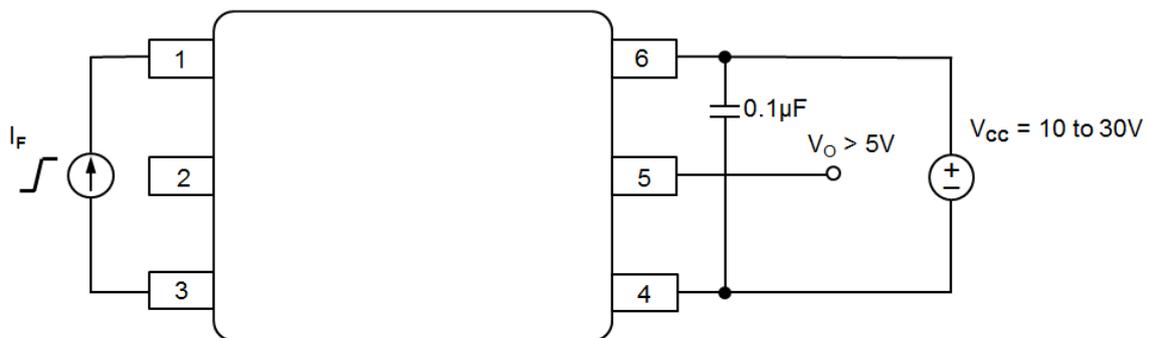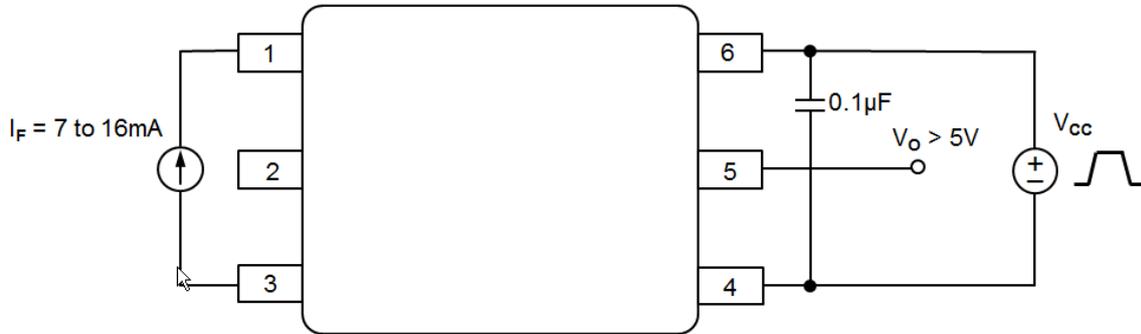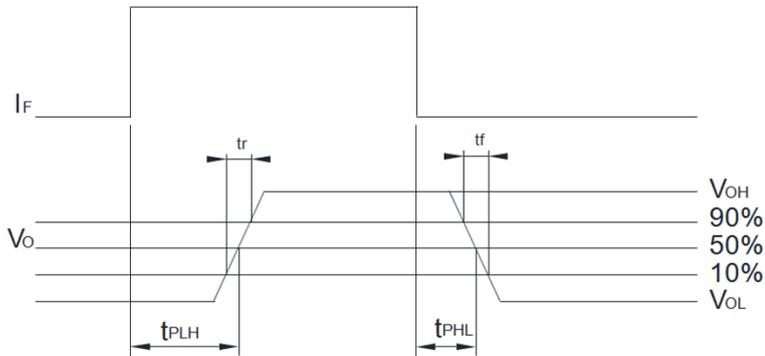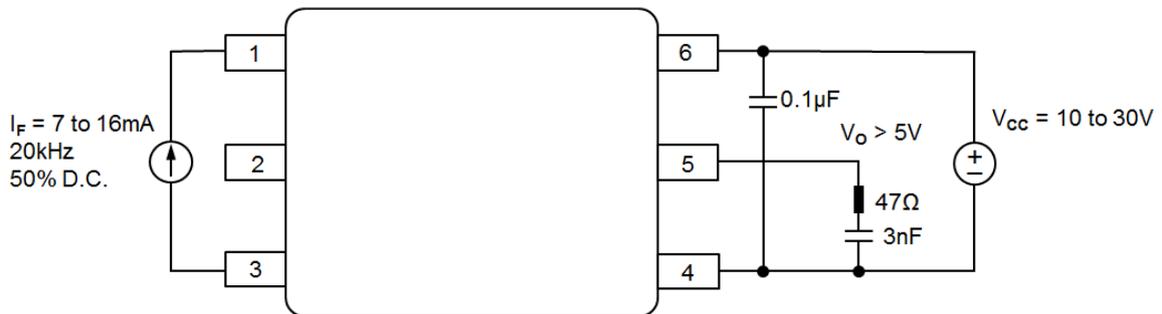
t_r, t_f, t_PLH and t_PHL Test Circuit and Waveform
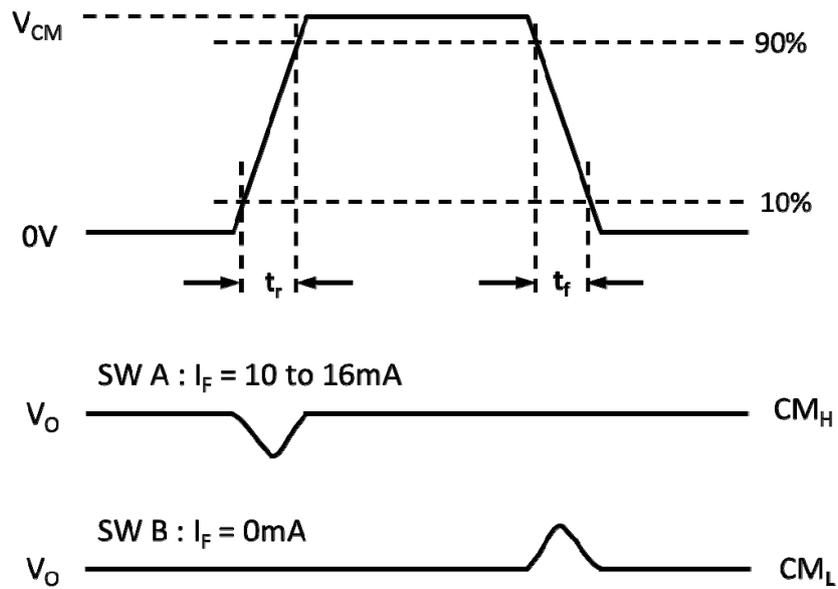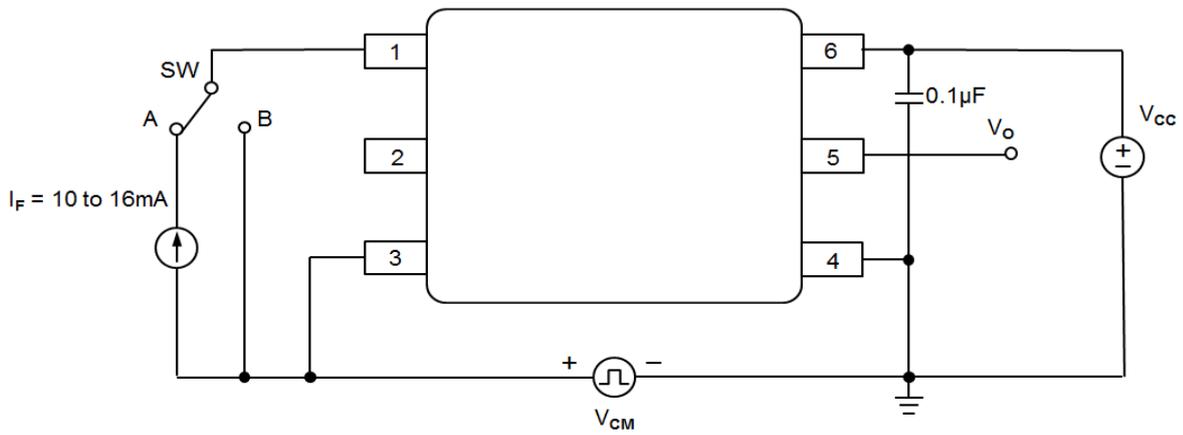
CMR Test Circuit and Waveform

ISOCOM COMPONENTS

IS314P

ORDER INFORMATION

IS314P			
After PN	**PN**	**Description**	**Packing quantity**
None	IS314P	Stretched SO6	1000 pcs per reel

DEVICE MARKING

IYYWW
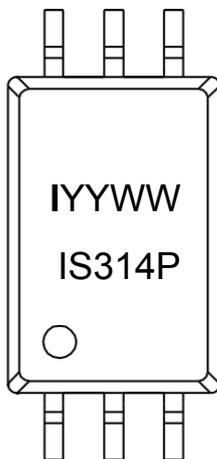
IS314P

IS314P   denotes Device Part Number

I   denotes Isocom

YY   denotes 2 digit Year code

WW   denotes 2 digit Week code

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

ISOCOM COMPONENTS
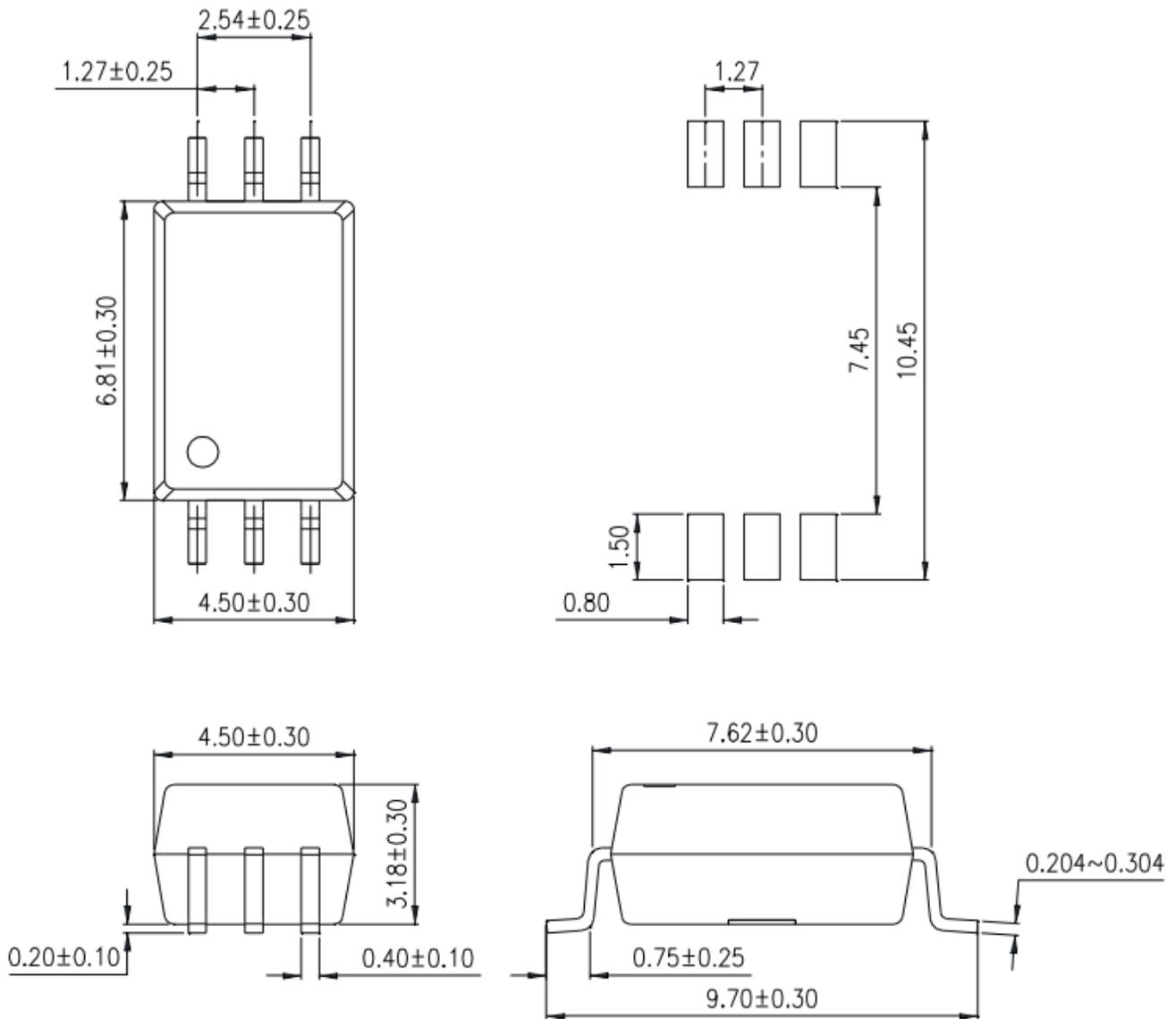
IS314P

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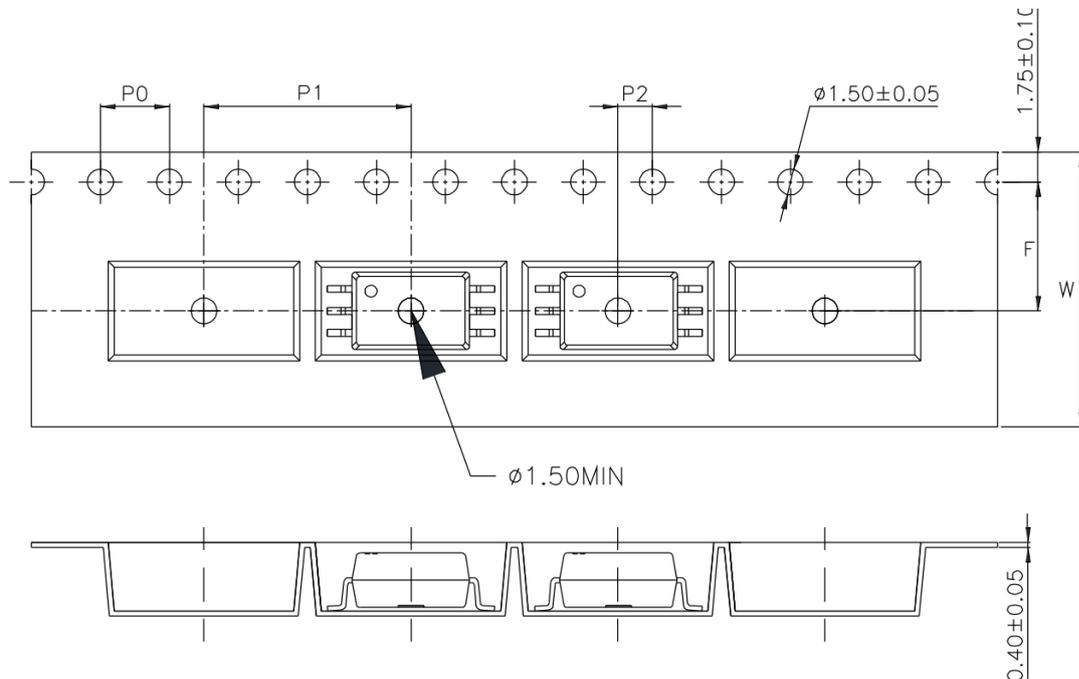
Description	Symbol	Dimension mm (inch)
Tape Width	W	16 ± 0.3 (0.63)
Pitch of Sprocket Holes	P_0	4 ± 0.1 (0.16)
Distance of Compartment to Sprocket Holes	F	7.5 ± 0.1 (0.3)
	P_2	2 ± 0.1 (0.079)
Distance of Compartment to Compartment	P_1	12 ± 0.1 (0.47)

IR REFLOW SOLDERING TEMPERATURE PROFILE
(One Time Reflow Soldering is Recommended)
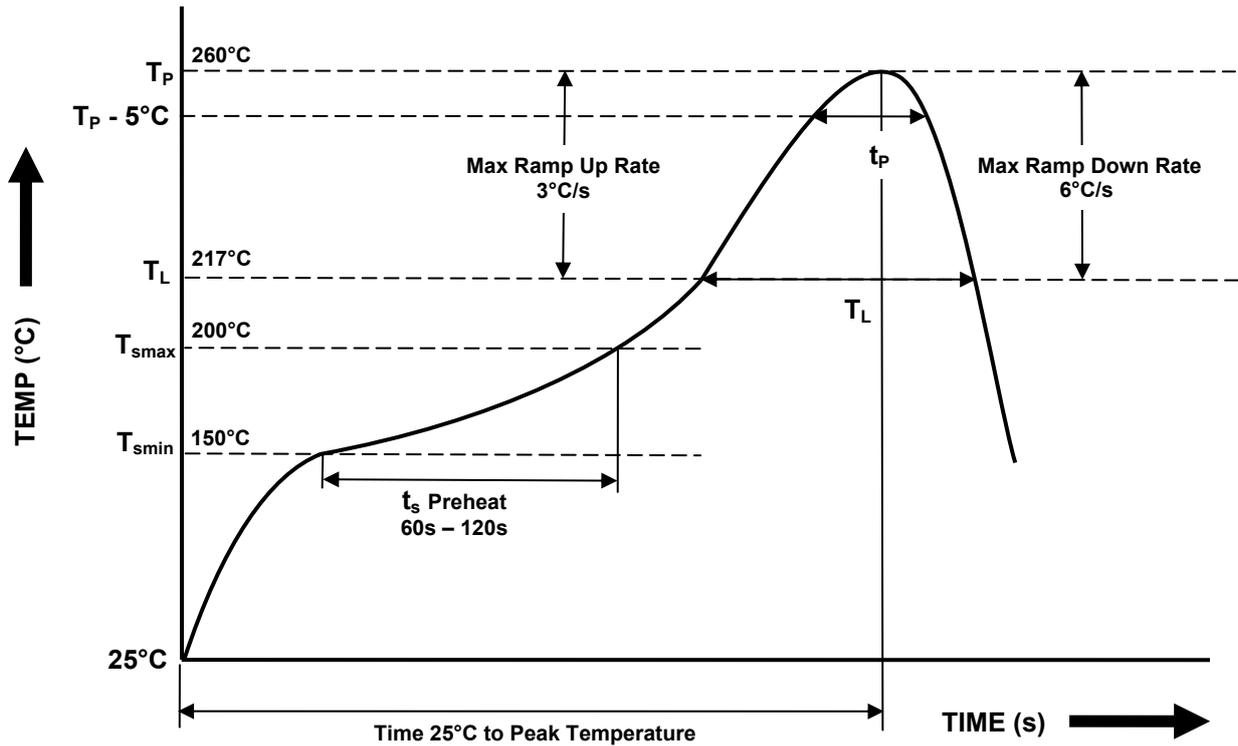
Profile Details	Conditions
Preheat - Min Temperature (T$_{SMIN}$) - Max Temperature (T$_{SMAX}$) - Time T$_{SMIN}$ to T$_{SMAX}$ (t$_s$)	 150°C 200°C 60s - 120s
Soldering Zone - Peak Temperature (T$_P$) - Time at Peak Temperature - Liquidous Temperature (T$_L$) - Time within 5°C of Actual Peak Temperature (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

DD93220

ISOCOM
COMPONENTS

IS314P

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.

DD93220

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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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