

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

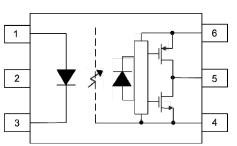
APPLICATIONS

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

ORDER INFORMATION

Supplied in Tape & Reel

ROHS V



- Anode
- 2 NC
- 3 Cathode
- 4 GND (V_{EE})
- V_0
- 6 V_{CC}

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

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

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	$5000V_{\text{RMS}}$
Total Power Dissipation	295mW
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	High Side	Low Side	Vo
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)	$V_{\text{F(OFF)}}$	-3.0	0.8	V



$\begin{tabular}{ll} \textbf{ELECTRICAL CHARACTERISTICS} & \textbf{(Typical Values at $V_{CC} - V_{EE}$ = 10V to 30V and T_A = 25°C,} \\ & \textbf{Minimum and Maximum Values at Recommended Operating Conditions,} \\ & \textbf{unless otherwise specified)} \\ \end{tabular}$

INPUT

Parameter	Symbol	Test Condition	Min	Тур.	Max	Unit
Forward Voltage	V_{F}	$I_F = 10 \text{mA}$	1.2	1.37	1.8	V
Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	$I_F = 10$ mA		-1.237		mV/°C
Reverse Voltage	V_R	$I_R = 10\mu A$	5			V
Input Threshold Current (Low to High)	I_{FLH}	$V_0 > 5V, I_0 = 0A$		1.9	5	mA
Input Threshold Voltage (High to Low)	$ m V_{FHL}$	$V_0 < 5V, I_0 = 0A$	0.8			V
Input Capacitance	C_{IN}	$V_F = 0V$, $f = 1MHz$		33		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Тур.	Max	Unit
High Level Supply Current	I _{CCH}	$I_F = 7 \text{ to } 16\text{mA}$ $V_O = \text{Open}$		1.9	3.0	mA
Low Level Supply Current	I _{CCL}	$V_F = -3 \text{ to } 0.8V$ $V_O = \text{Open}$		2.1	3.0	mA
High Level Output Current	I_{OH}	$V_O = V_{CC} - 1.5V$ Pulse Width = 50 μ s			- 0.3	A
		$V_{\rm O} = V_{\rm CC} - 3V$ Pulse Width = 10 μ s			- 0.8	
Low Level Output Current	I_{OL}	$V_{O} = V_{EE} + 1.5V$ Pulse Width = 50 μ s	0.3			A
		$V_{\rm O} = V_{\rm EE} + 3V$ Pulse Width = 10 μ s	0.8			
High Level Output Voltage	V _{OH}	$I_F = 10 \text{mA}, I_O = -100 \text{mA}$	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 $T_A = 25^{\circ}C$, Minimum and Maximum Values at Recommended Operating Conditions, unless otherwise specified)

SWITCHING

Parameter	Symbol	Test Condition	Min	Тур.	Max	Unit
Propagation Delay Time to High Output Level	$t_{\rm PLH}$	$I_F = 7 \text{ to } 16\text{mA},$ $V_{CC} = 15 \text{ to } 30\text{V},$ $V_{EE} = 0\text{V}$	50	120	200	ns
Propagation Delay Time to Low Output Level	$t_{\mathtt{PHL}}$	$Rg = 47\Omega,$ $Cg = 3nF,$	50	110	200	
Pulse Width Distortion t _{PHL} - t _{PLH} for any given device	PWD	f = 10kHz, Duty Cycle = 50%		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	$I_F = 10 \text{ to } 16\text{mA},$ $V_{CC} = 30\text{V}$ $V_{CM} = 1500\text{V},$ $T_A = 25^{\circ}\text{C}$	20	25		kV/μs
Common Mode Transient Immunity at Low Output Level	CM_L	$V_{F} = 0V,$ $V_{CC} = 30V$ $V_{CM} = 1500V,$ $T_{A} = 25^{\circ}C$	20	25		kV/μs



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	Тур.	Max	Unit
Insulation Voltage	$V_{\rm ISO}$	RH $\leq 40\%$ to 60%, t = 1 min, T _A = 25°C	5000			V
Input - Output Resistance	$R_{\text{I-O}}$	$V_{\text{I-O}} = 500 \text{VDC}$		10 ¹²		Ω
Input - Output Capacitance	$C_{\text{I-O}}$	$f = 1MHz$, $T_A = 25$ °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 $(V_0 > 15V)$.
- 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 $(V_O < 1V)$.



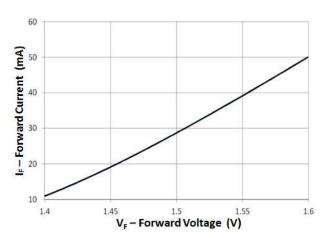


Fig 1 Forward Current vs Forward Voltage

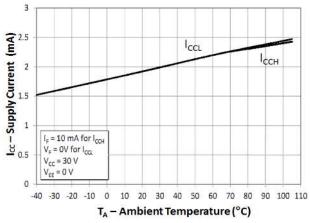


Fig 3 Supply Current vs Ambient Temperature

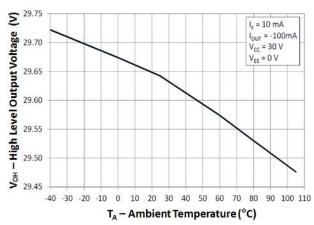


Fig 5 High Level Output Voltage vs Ambient Temperature

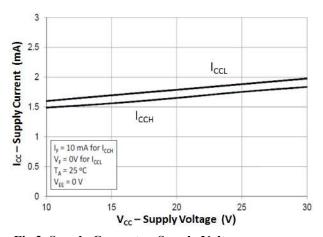


Fig 2 Supply Current vs Supply Voltage

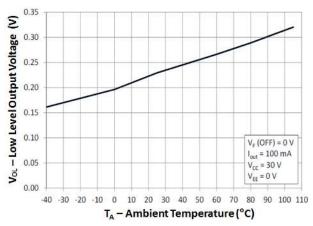


Fig 4 Low Level Output Voltage vs Ambient temperature

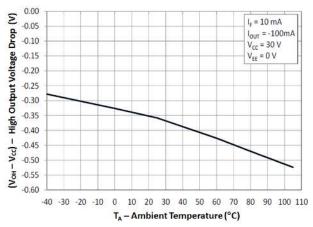


Fig 6 High Output Voltage Drop vs Ambient Temperature



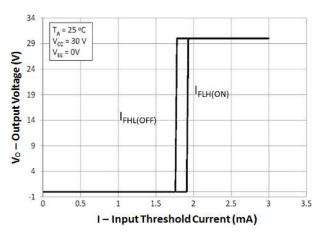


Fig 7 I_{FLH} Hysteresis

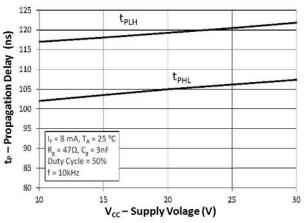


Fig 9 Propagation Delay vs Supply Voltage

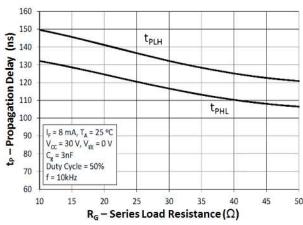


Fig 11 Propagation Delay vs Series Load Resistance

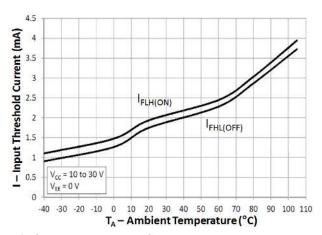


Fig 8 Input Threshold Current vs Ambient Temperature

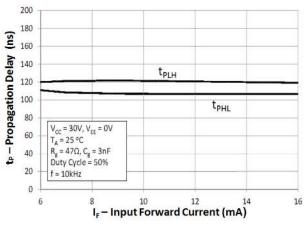


Fig 10 Propagation Delay vs Forward Current

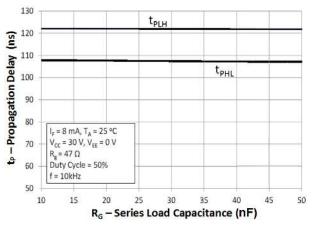


Fig 12 Propagation Delay vs Series Load Capacitance



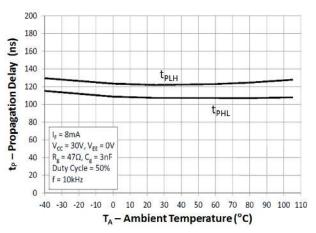
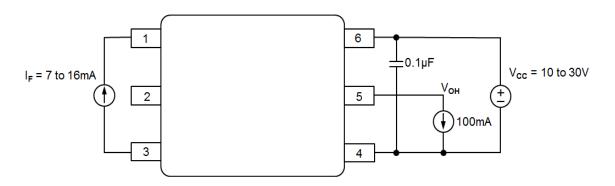
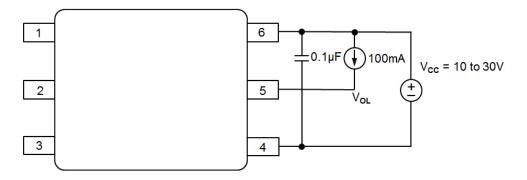


Fig 13 Propagation Delay vs Ambient Temperature

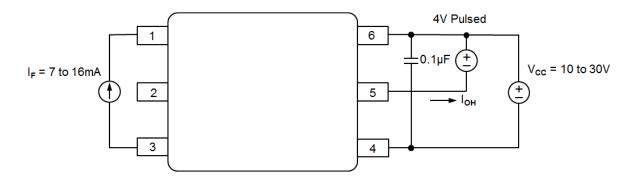


 $V_{OH} \ Test \ Circuit$

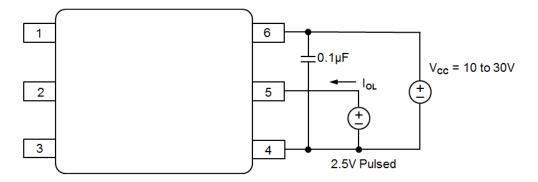


 $V_{OL} \ Test \ Circuit$

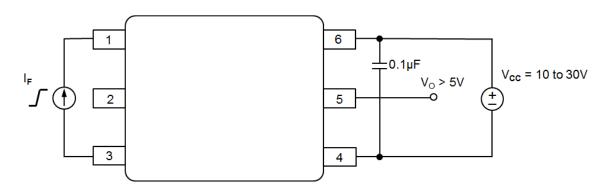




I_{OH} Test Circuit

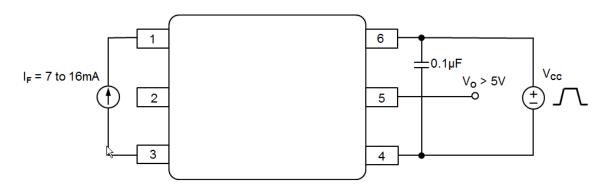


I_{OL} Test Circuit

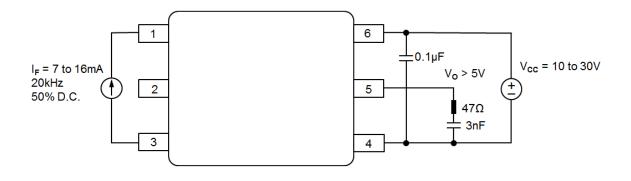


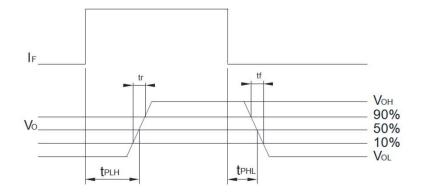
I_{FLH} Test Circuit





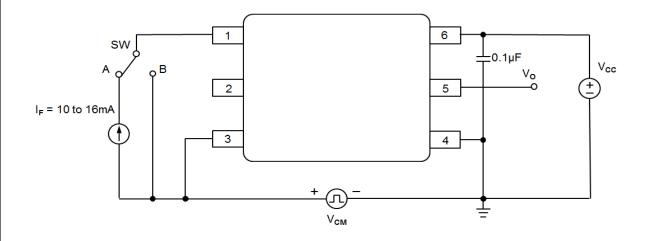
UVLO Test Circuit

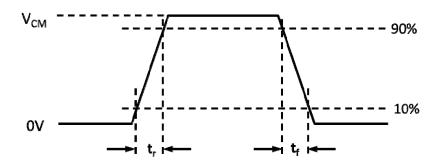


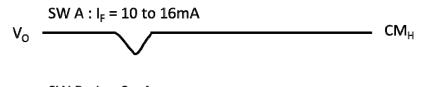


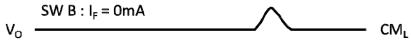
 $t_{r},\,t_{f},\,t_{PLH}$ and t_{PHL} Test Circuit and Waveform











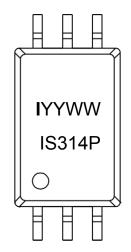
CMR Test Circuit and Waveform



ORDER INFORMATION

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

DEVICE MARKING



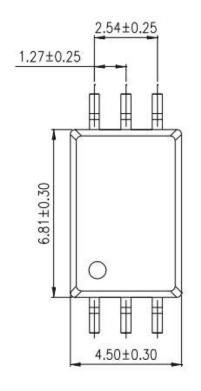
IS314P denotes Device Part Number

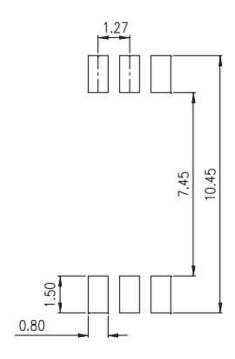
I denotes Isocom

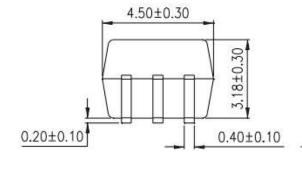
YY denotes 2 digit Year code WW denotes 2 digit Week code

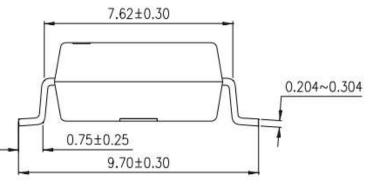


PACKAGE DIMENSIONS and Recommended PCB Pad Layout in mm (inch)



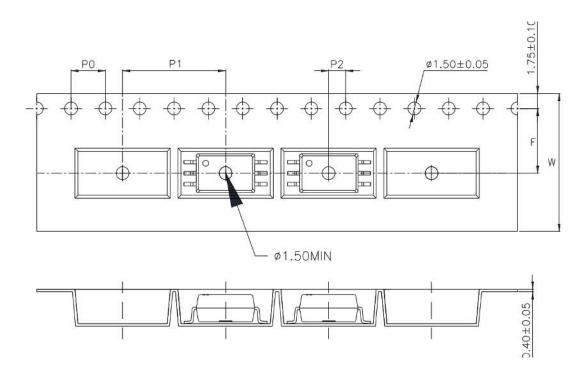








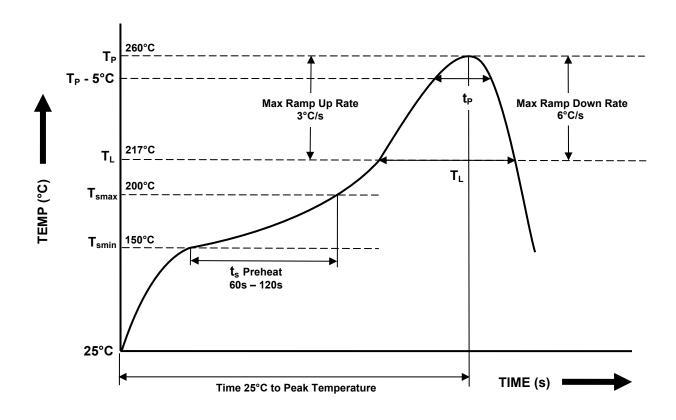
TAPE AND REEL PACKAGING



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)
Distance of Compartment to Sprocket Holes	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
$ \begin{array}{l} \textbf{Preheat} \\ \textbf{- Min Temperature } (T_{SMIN}) \\ \textbf{- Max Temperature } (T_{SMAX}) \\ \textbf{- Time } T_{SMIN} \text{ to } T_{SMAX} \left(t_s\right) \end{array} $	150°C 200°C 60s - 120s
$\begin{tabular}{ll} \textbf{Soldering Zone} \\ - & \begin{tabular}{ll} - & \begin{tabular}{ll} \textbf{Peak Temperature} & \begin{tabular}{ll} - & \begin{tabular}{ll} \textbf{Imperature} & \begin{tabular}{ll} \textbf{Peak Temperature} & \begin{tabular}{ll} \textbf{Imperature} & \begin{tabular}{ll} Imperature$	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



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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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