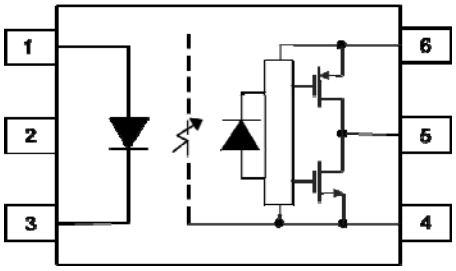
ISOCOM COMPONENTS

IS341W

DESCRIPTION

The IS341W 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 high peak output current of 3.0A is capable to direct drive IGBT with ratings up to 1200 V/100 A. For IGBTs with higher ratings, IS341W can be used to drive a discrete power stage which drives the IGBT gate.

The device is supplied in Stretched SO6 package with wide lead separation.



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.

FEATURES

- 3.0A Maximum Peak Output Current
- 2.5A 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} 15 to 30 V
- 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
- Industrial Inverters
- Switching Power Supplies
- AC Brushless and DC Motor Drives

ORDER INFORMATION

- Supplied in Tape & Reel

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	3.0A
Low Level Peak Output Current Exponential waveform. Pulse width ≤ 0.3 µs, f ≤ 15 kHz	3.0A
Supply Voltage (V_{CC} – V_{EE})	35V
Output Voltage	V_{CC}
Power Dissipation	700mW
Total Package	
Isolation Voltage	5000V_{RMS}
Total Power Dissipation	745mW
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_{CC} – GND (Turn ON, +ve going)	V_{CC} – GND (Turn OFF –ve going)	V_O
OFF	0 – 30V	0 – 30V	LOW
ON	0 – 11.0V	0 – 9.5V	LOW
ON	11.0 – 13.5V	9.5 – 12.0V	TRANSITION
ON	13.5 – 30V	12 – 30V	HIGH

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T_A	- 40	105	°C
Supply Voltage	$V_{CC} - V_{EE}$	15	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 $V_{CC} - V_{EE}$ = 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_{CC} = 30V V_O > 5V		1.8	5	mA
Input Threshold Voltage (High to Low)	V_{FHL}	V_{CC} = 30V V_O < 5V	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 = 10mA, V_{CC} = 30V V_O = Open		2.4	3.5	mA
Low Level Supply Current	I_{CCL}	I_F = 0mA, V_{CC} = 30V V_O = Open		2.5	3.5	mA
High Level Output Current	I_{OH}	$V_O = V_{CC} - 1.5V$ Pulse Width = 50µs			− 1.0	A
		$V_O = V_{CC} - 4V$ Pulse Width = 10µs			− 2.5	
Low Level Output Current	I_{OL}	$V_O = V_{EE} + 1.5V$ Pulse Width = 50µs	1.0			A
		$V_O = V_{EE} + 4V$ Pulse Width = 10µs	2.5			
High Level Output Voltage	V_{OH}	I_F = 10mA, I_O = -100mA	V_{CC} − 0.3	V_{CC} − 0.1		V
Low Level Output Voltage	V_{OL}	I_F = 0mA, I_O = 100mA		V_{EE} + 0.1	V_{EE} +0.25	V
UVLO Threshold	V_{UVLO+}	V_O > 5V, I_F = 10mA	11.0	12.7	13.5	V
	V_{UVLO-}	V_O < 5V, I_F = 10mA	9.5	11.2	12.0	V
UVLO Hysteresis	$UVLO_{HYS}$			1.5		V

ELECTRICAL CHARACTERISTICS (Typical Values at $V_{CC} - V_{EE}$ = 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 = 10Ω, Cg = 25nF, f = 10kHz, Duty Cycle = 50%	50	130	200	ns
Propagation Delay Time to Low Output Level	t_{PHL}		50	130	200	
Pulse Width Distortion $\|t_{PHL} - t_{PLH}\|$ for any given Device	PWD			5	70	
Propagation Delay Difference 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

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 Propagation Delays between any two IS341W 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).

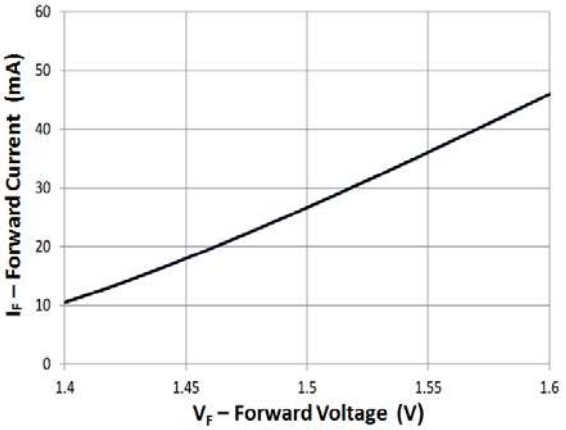


Fig 1 Forward Current vs Forward Voltage

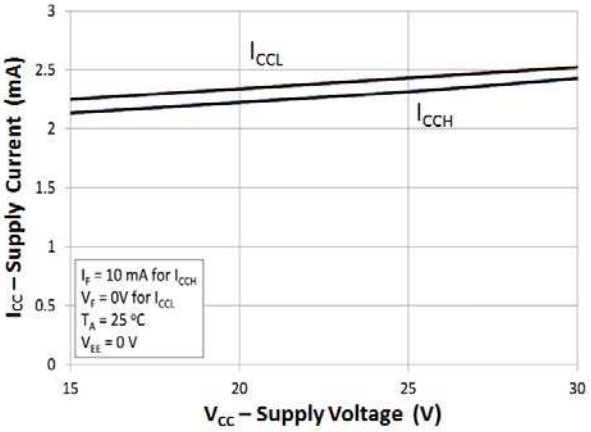


Fig 2 Supply Current vs Supply Voltage

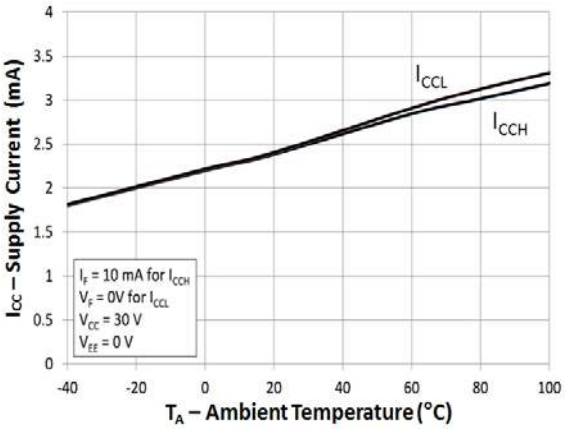


Fig 3 Supply Current vs Ambient Temperature

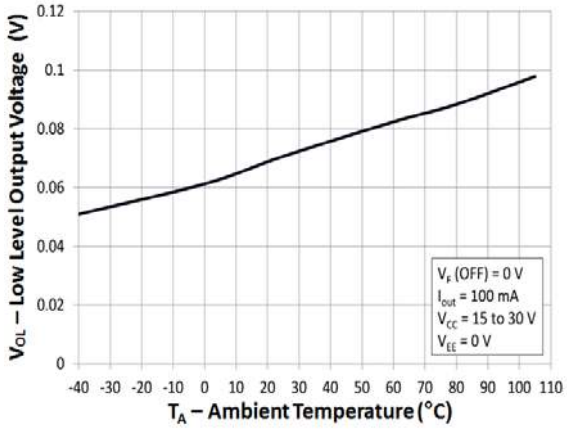


Fig 4 Low Level Output Voltage vs Ambient temperature

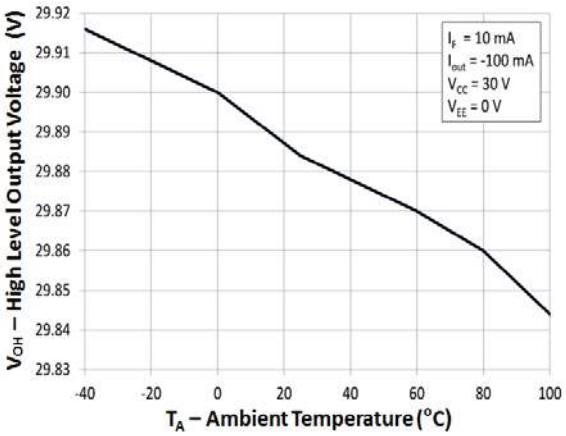


Fig 5 High Level Output Voltage vs Ambient Temperature

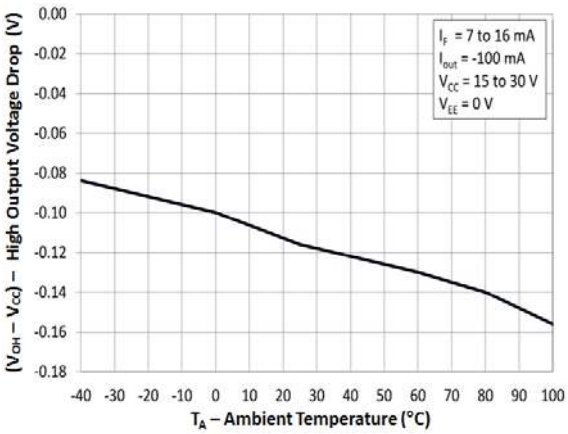


Fig 6 High Output Voltage Drop vs Ambient Temperature

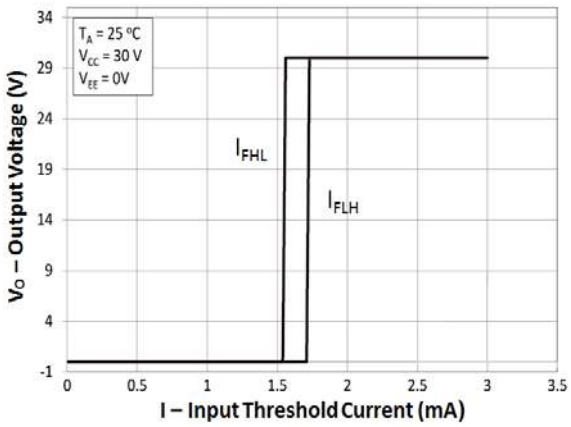


Fig 7 I_{FLH} Hysteresis

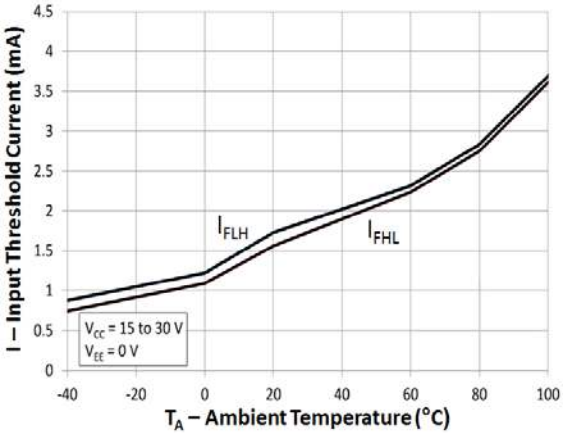


Fig 8 Input Threshold Current vs Ambient Temperature

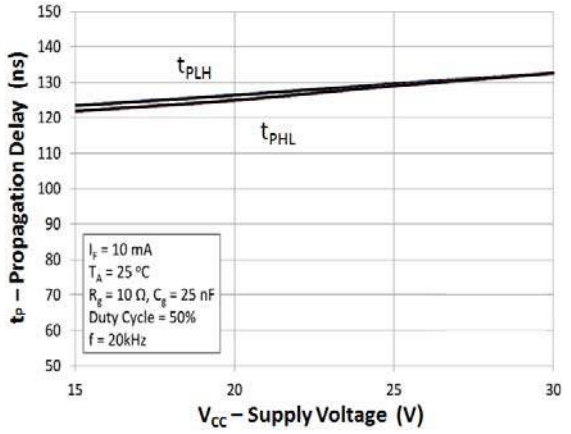


Fig 9 Propagation Delay vs Supply Voltage

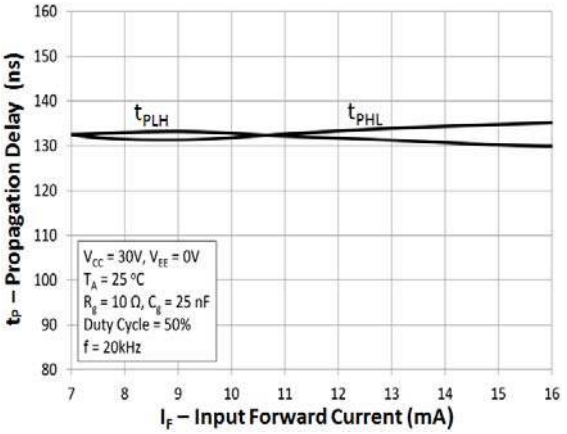


Fig 10 Propagation Delay vs Forward Current

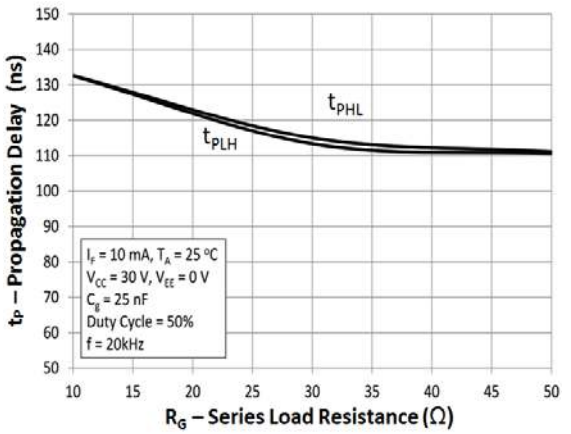


Fig 11 Propagation Delay vs Series Load Resistance

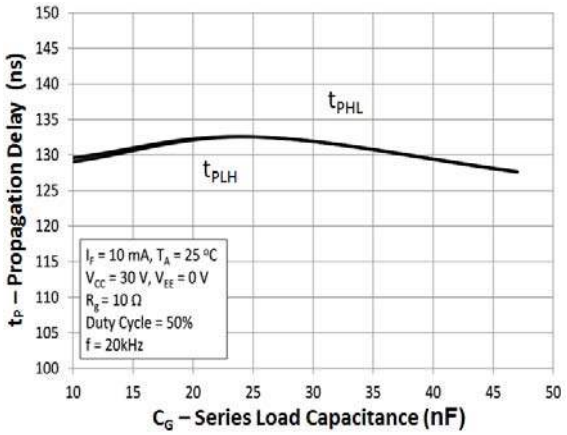


Fig 12 Propagation Delay vs Series Load Capacitance

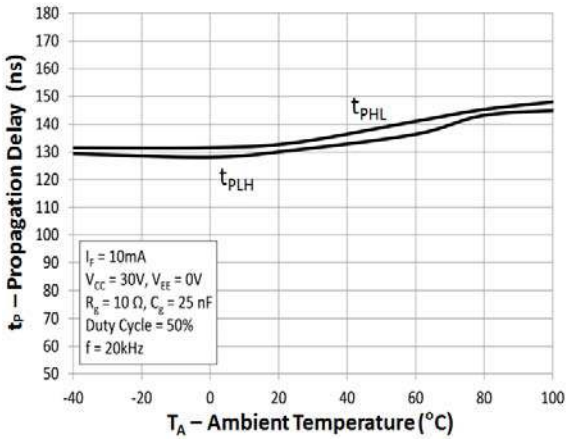
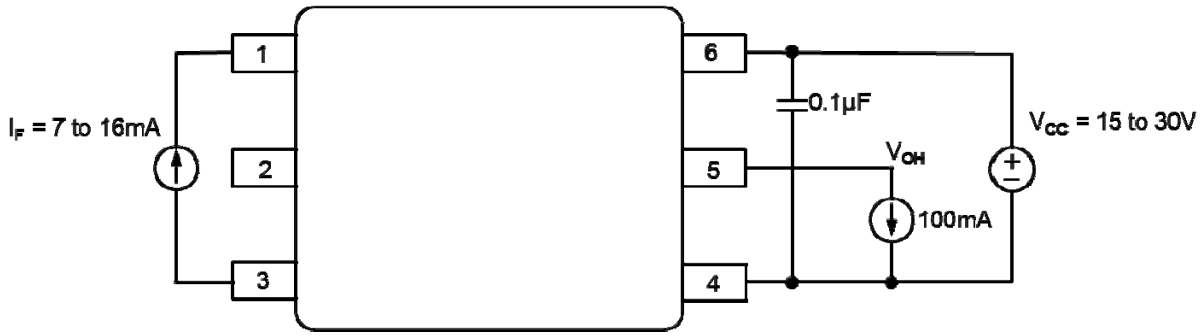
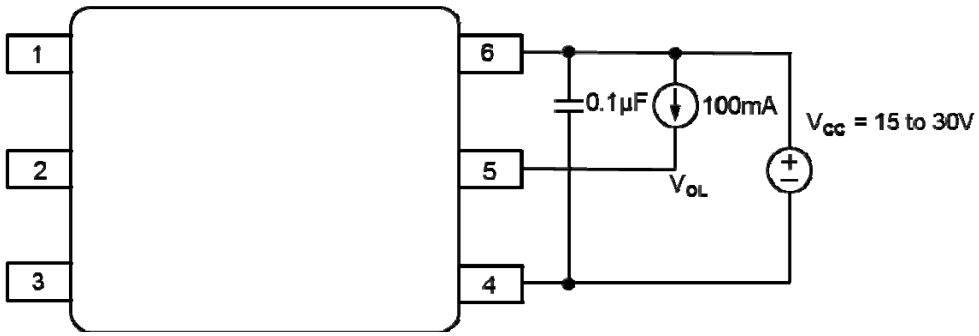


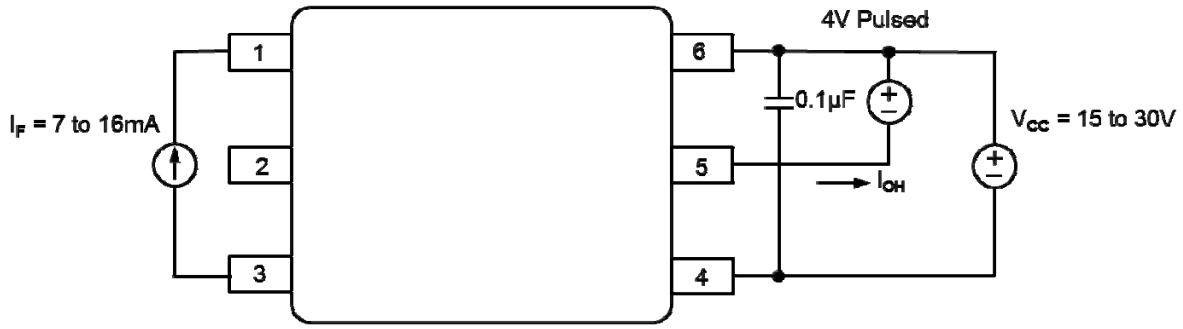
Fig 13 Propagation Delay vs Ambient Temperature



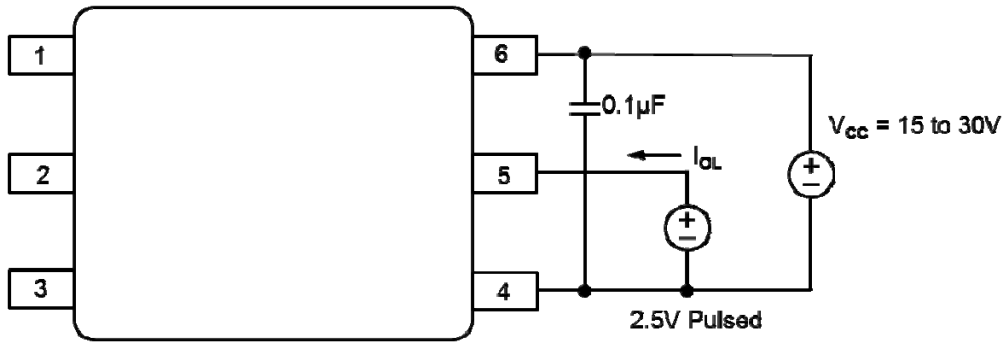
V_{OH} Test Circuit



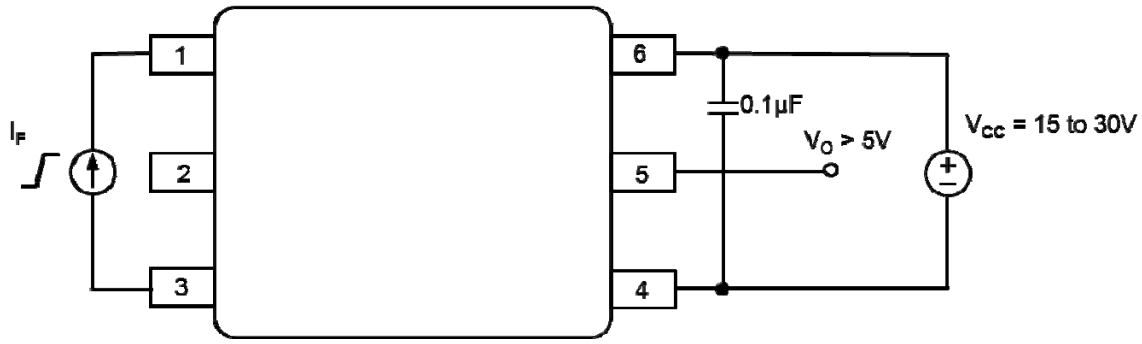
V_{OL} Test Circuit



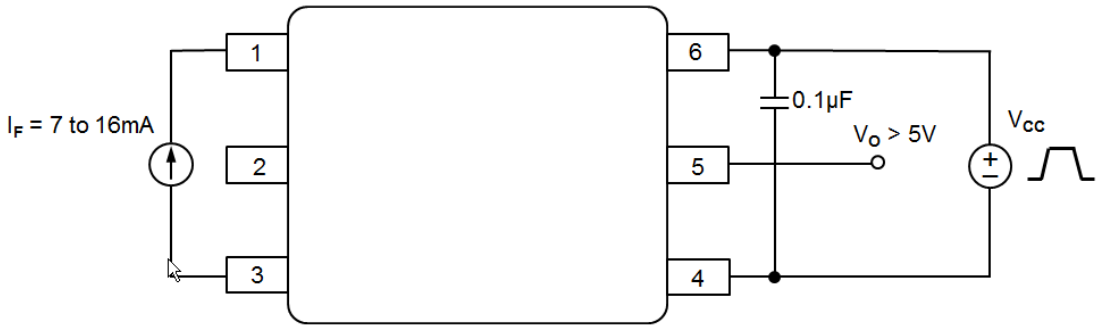
I_{OH} Test Circuit



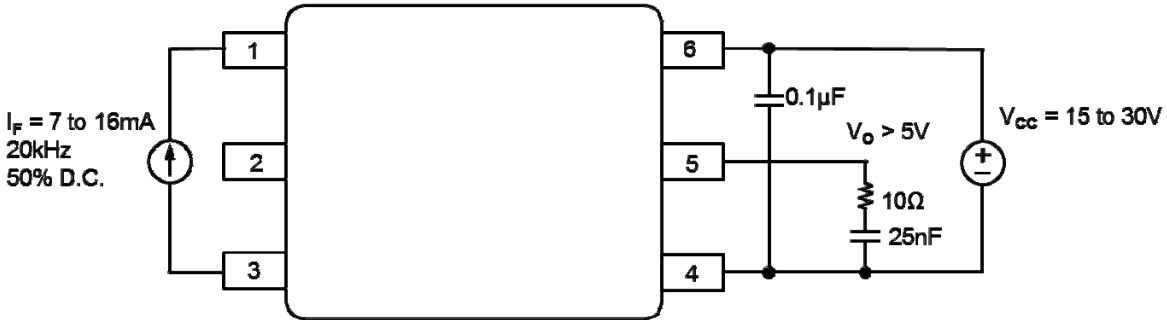
I_{OL} Test Circuit

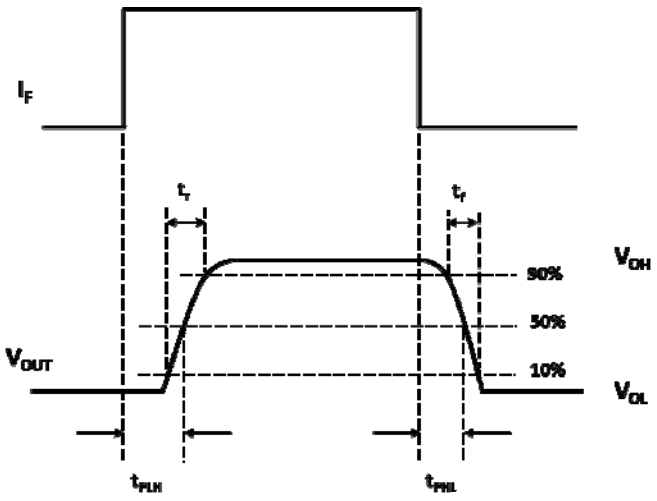


I_{FLH} Test Circuit

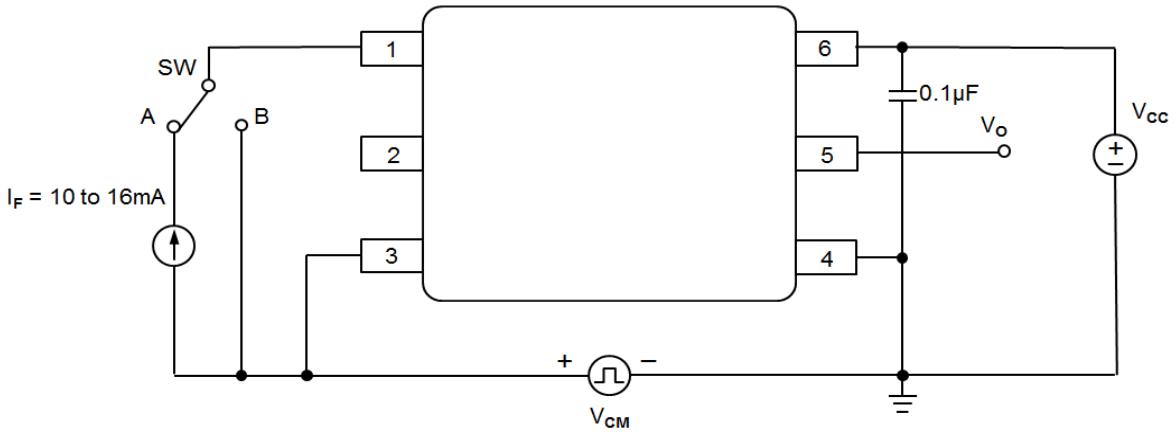


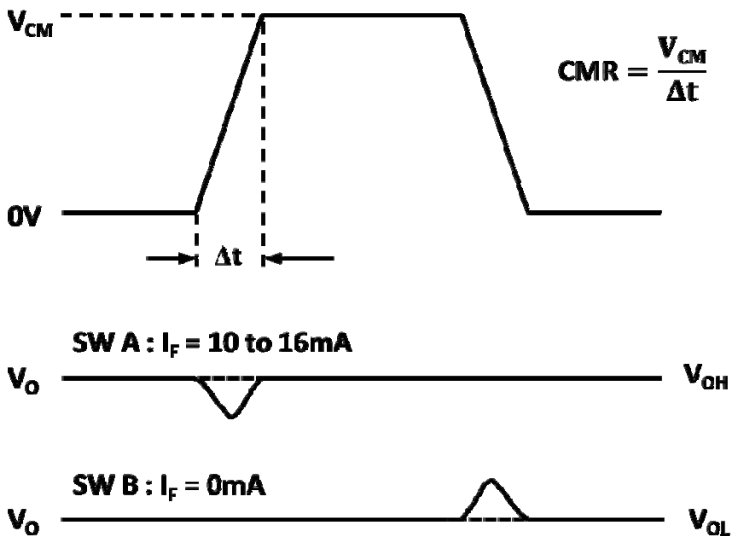
UVLO Test Circuit





t_r, t_f, t_{PLH} and t_{PHL} Test Circuit and Waveform





CMR Test Circuit and Waveform

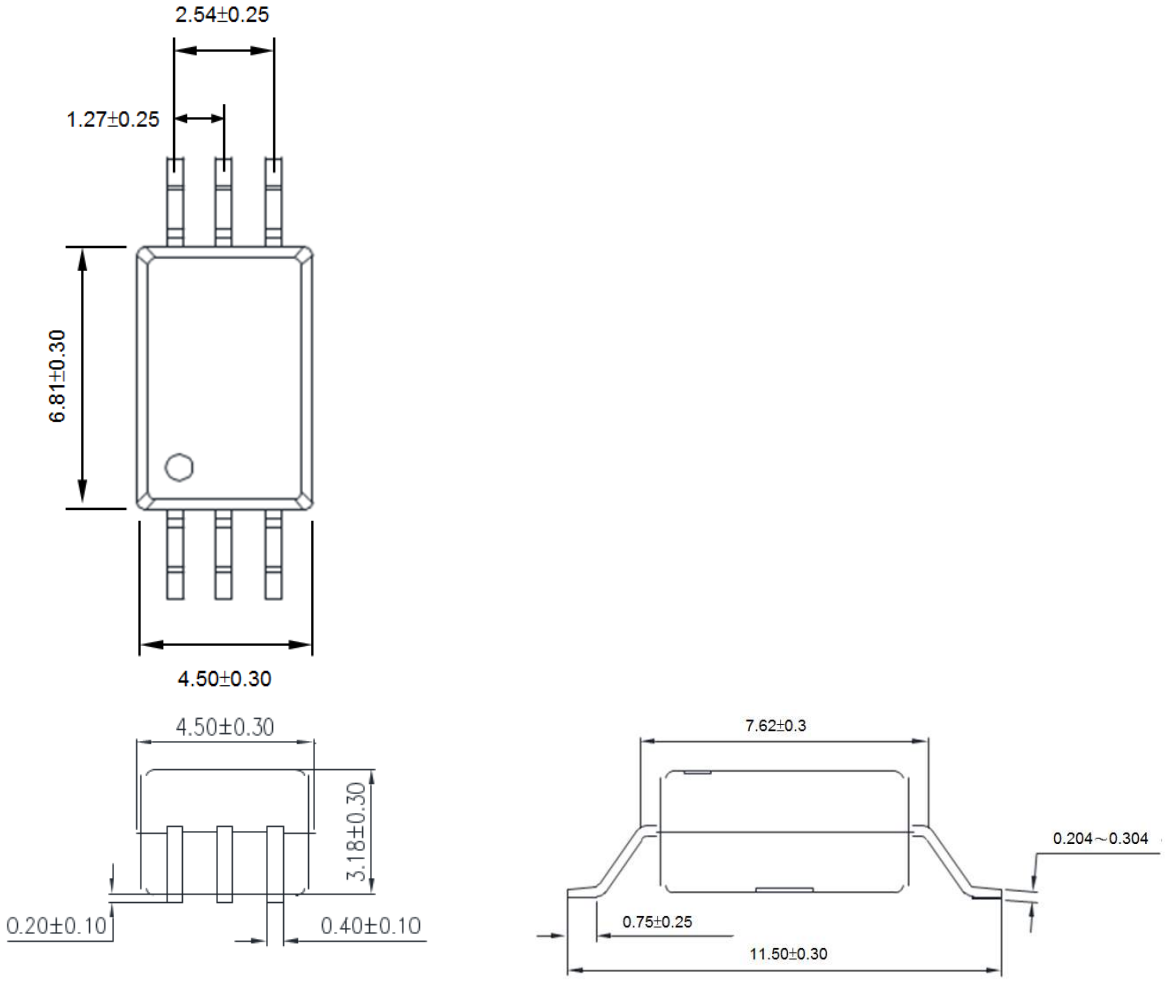
ORDER INFORMATION

IS341W			
After PN	**PN**	**Description**	**Packing quantity**
None	IS341W	Stretched SO6 Wide Lead Separation	1000 pcs per reel

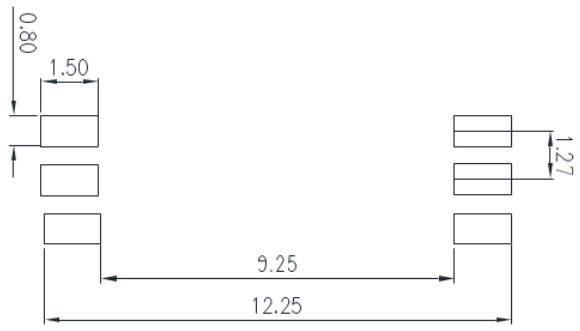
DEVICE MARKING

IS341W	denotes Device Part Number
I	denotes Isocom
YY	denotes 2 digit Year code
WW	denotes 2 digit Week code

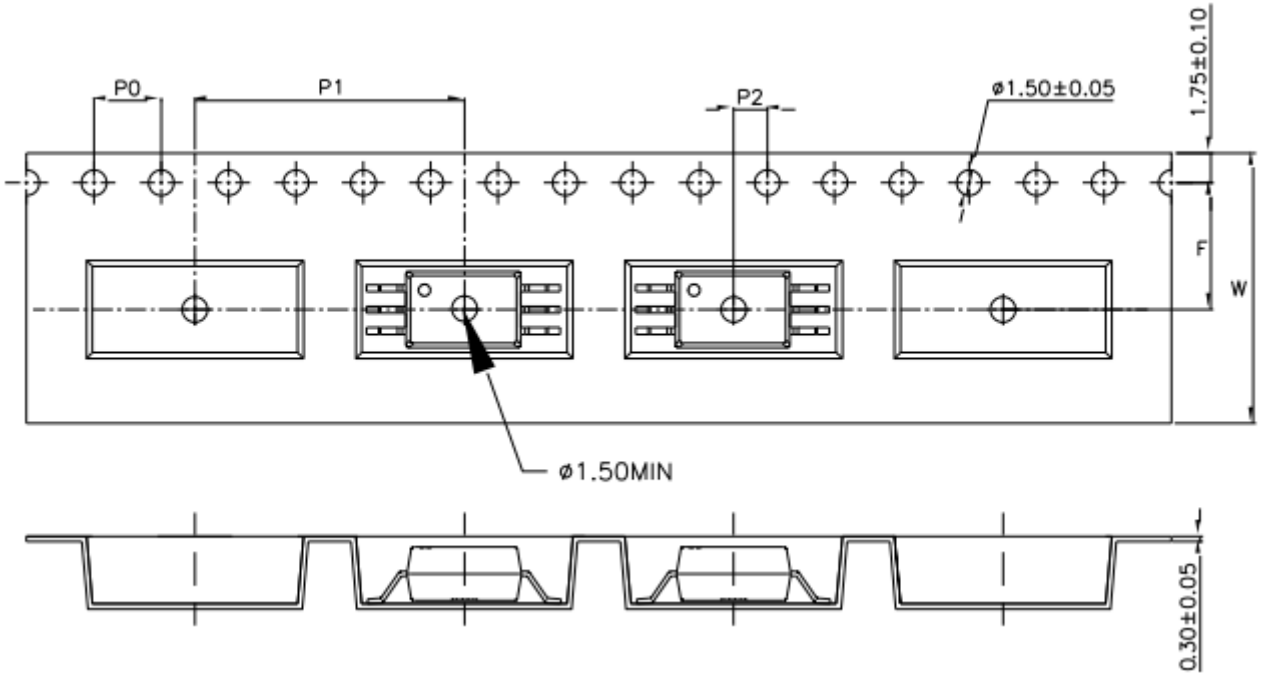
PACKAGE DIMENSIONS (mm)



RECOMMENDED PAD LAYPUT (mm)

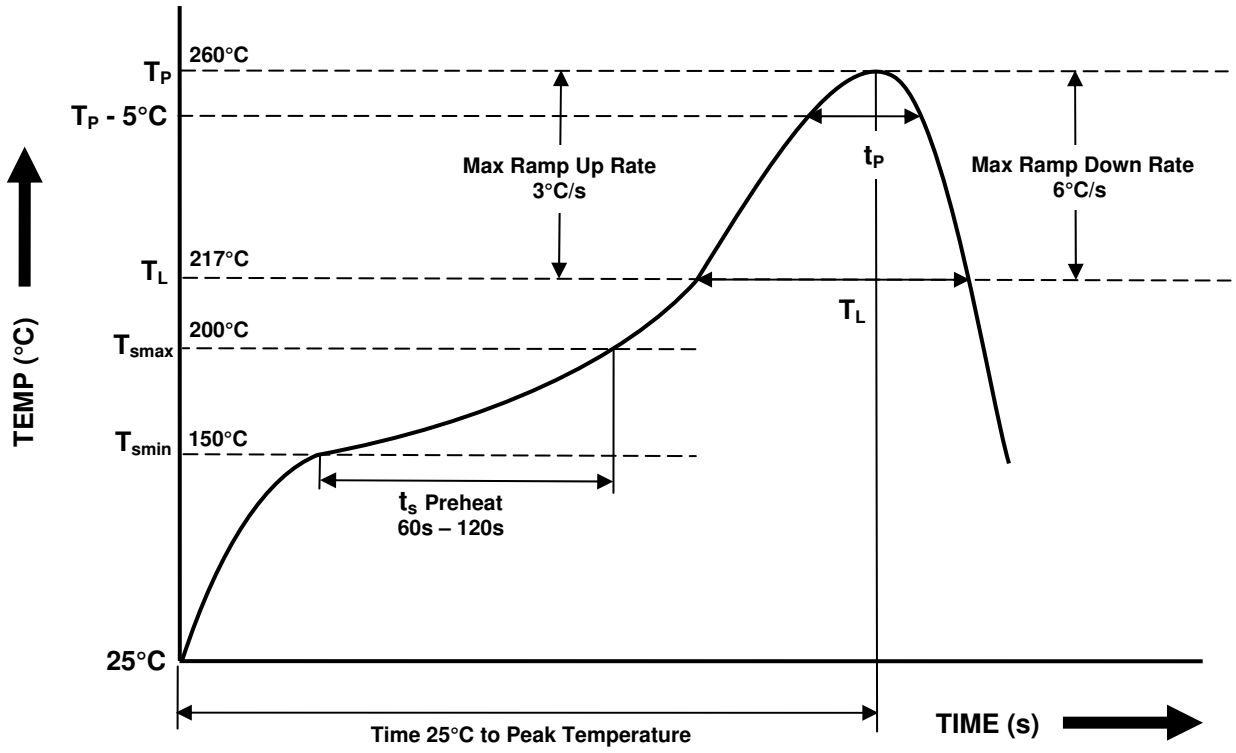


TAPE AND REEL PACKAGING



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

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.

ISOCOM
COMPONENTS

DISCLAIMER

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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__ The information contained herein is subject to change without notice.