



## 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.

### FEATURES

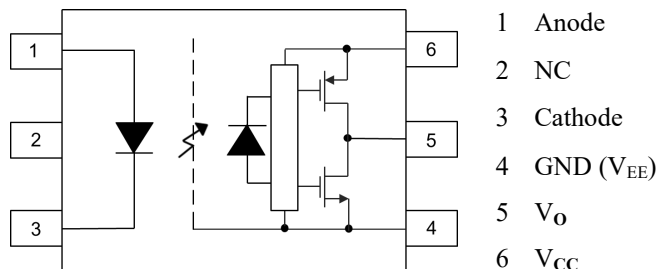
- 3.0A Maximum Peak Output Current
- Rail-to-Rail Output Voltage
- 35kV/ $\mu$ s Minimum Common Mode Rejection at  $V_{CM}$  1500V
- Maximum Propagation Delay 200ns
- Maximum Propagation Delay Difference 100ns
- Wide Operating Voltage Range  
 $V_{CC}$  15 to 30 V
- Under Voltage Lock Out (UVLO) Protection with Hysteresis
- Guaranteed Performance over Temperature Range  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- MSL Level 1
- RoHS Compliant
- UL E91231 Model "1341"

### APPLICATIONS

- IGBT/MOSFET Gate Drive
- UPS
- Industrial Inverters
- Switching Power Supplies
- AC and Brushless 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 $\leq 1\mu\text{s}$ , 300pps)	1.0A
Reverse Voltage	5V
Forward Current Rise / Fall Time	500ns
Junction Temperature	$125^{\circ}\text{C}$
Power dissipation	45mW

#### Output

High Level Peak Output Current Exponential waveform. Pulse width $\leq 0.3\mu\text{s}$ , $f \leq 15\text{ kHz}$	3.0A
Low Level Peak Output Current Exponential waveform. Pulse width $\leq 0.3\mu\text{s}$ , $f \leq 15\text{ kHz}$	3.0A
Supply Voltage ( $V_{CC} - V_{EE}$ )	35V
Output Voltage	$V_{CC}$
Junction Temperature	$125^{\circ}\text{C}$
Power Dissipation	700mW

#### Total Package

Isolation Voltage	5000V <sub>RMS</sub>
Total Power Dissipation	745mW
Operating Temperature	$-40$ to $125^{\circ}\text{C}$
Storage Temperature	$-55$ to $150^{\circ}\text{C}$
Lead Soldering Temperature (10s)	$260^{\circ}\text{C}$

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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	125	°C
Supply Voltage	$V_{CC} - V_{EE}$	15	30	V
Input Current (ON)	$I_{F(ON)}$	8	16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	-3.0	0.8	V
Operating Frequency	f		75	kHz

#### Notes :

Input Current (ON) : Rise and Fall times should be less than 500ns

$I_{OPH}$  : Exponential Waveform  $\geq -3.0A$  ( $\leq 0.3 \mu s$ ),  $T_A = 125^\circ C$

$I_{OPL}$  : Exponential Waveform  $\leq 3.0A$  ( $\leq 0.3 \mu s$ ),  $T_A = 125^\circ C$

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### ELECTRICAL CHARACTERISTICS

(Typical Values at  $V_{CC} - V_{EE} = 30V$  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	$\Delta V_F / \Delta T$	$I_F = 10mA$		-2.0		mV/ $^\circ C$
Reverse Voltage	$V_R$	$I_R = 10\mu A$	5			V
Input Threshold Current (Low to High)	$I_{FLH}$	$V_{CC} = 30V$ $V_O > 5V$		2.5	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	$I_{CCH}$	$I_F = 10mA, V_{CC} = 30V$ $V_O = \text{Open}$		1.7	3	mA
Low Level Supply Current	$I_{CCL}$	$I_F = 0mA, V_{CC} = 30V$ $V_O = \text{Open}$		2.0	3	mA
High Level Output Current	$I_{OH}$	$V_O = V_{CC} - 1.5V$ Pulse Width = 50 $\mu s$			-1.0	A
		$V_O = V_{CC} - 4.0V$ Pulse Width = 10 $\mu s$			-3.0	A
Low Level Output Current	$I_{OL}$	$V_O = V_{EE} + 1.5V$ Pulse Width = 50 $\mu s$	1.0			A
		$V_O = V_{EE} + 4V$ Pulse Width = 10 $\mu s$	3.0			A
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

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### ELECTRICAL CHARACTERISTICS (Typical Values at $V_{CC} - V_{EE} = 30V$ 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	$t_{PLH}$	$I_F = 8$ to $16mA$ $V_{CC} = 15$ to $30V$ $V_{EE} = 0V$ $R_g = 10\Omega$ $C_g = 10nF$ $f = 10kHz$ Duty Cycle = 50%	50		200	ns
Propagation Delay Time to Low Output Level	$t_{PHL}$		50		200	
Pulse Width Distortion $ t_{PHL} - t_{PLH} $ for any given Device	PWD			10	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 $16mA$ $V_{CC} = 30V$ $V_{CM} = 1500V$ $T_A = 25^\circ C$	35	50		kV/ $\mu s$
Common Mode Transient Immunity at Low Output Level	$ CM_L $	$V_F = 0V$ $V_{CC} = 30V$ $V_{CM} = 1500V$ $T_A = 25^\circ C$	35	50		kV/ $\mu s$

#### Notes :

1. A 0.1 $\mu F$  bypass capacitor must be connected across pin 6 and pin 4.
2. PDD is the difference between  $t_{PHL}$  and  $t_{PLH}$  between any two 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 ( $V_O < 1V$ ).

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### 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)

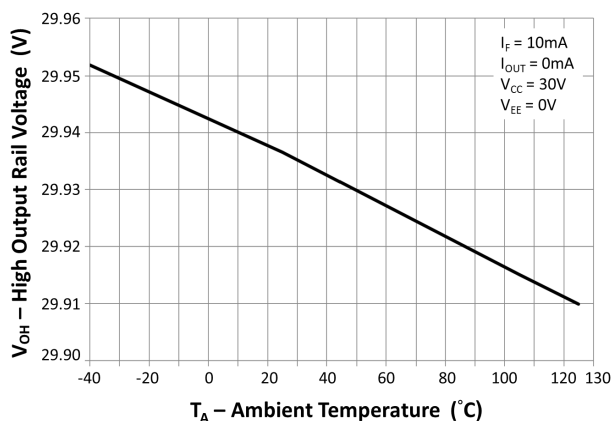
#### ISOLATION (Typical Values at $T_A = 25^\circ C$ )

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Insulation Voltage	$V_{ISO}$	$RH \leq 40\%$ to $60\%$ $t = 1 \text{ min}$ , $T_A = 25^\circ C$	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

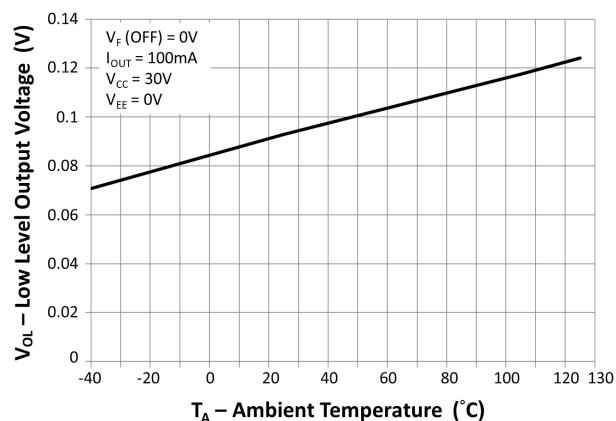
Device is considered a two terminal device: pins 1, 2, 3 are shorted together and pins 4, 5, 6 are shorted together.



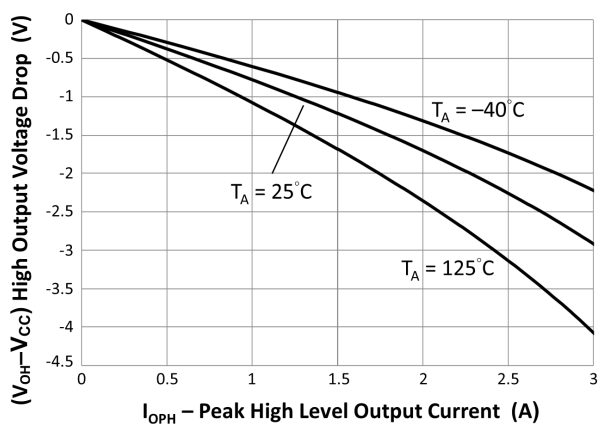
## IS341W



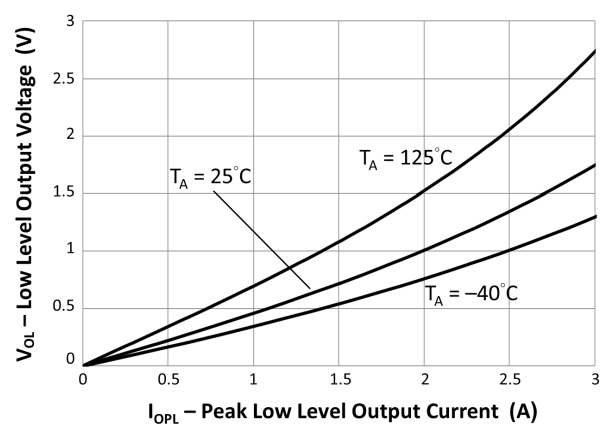
**Fig 1 High Output Rail Voltage vs Ambient Temperature**



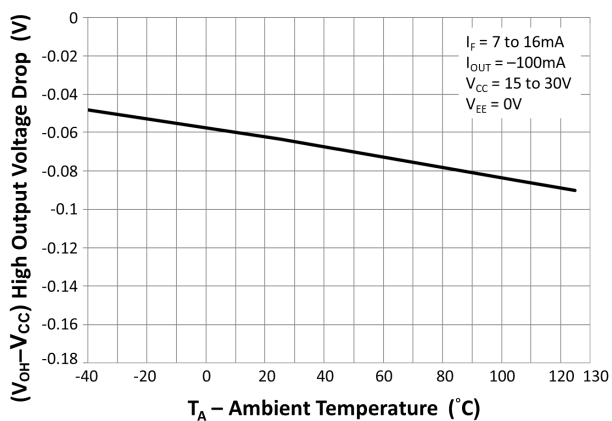
**Fig 2 Low Level Output Voltage vs Ambient Temperature**



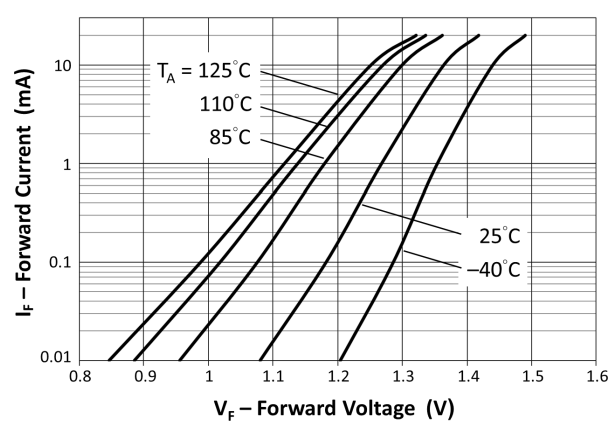
**Fig 3 High Output Voltage Drop vs Peak High Level Output Current**



**Fig 4 Low Level Output Voltage vs Peak Low Level Output Current**



**Fig 5 High Level Output Voltage Drop vs Ambient Temperature**



**Fig 6 Forward Current vs Forward Voltage**



## IS341W

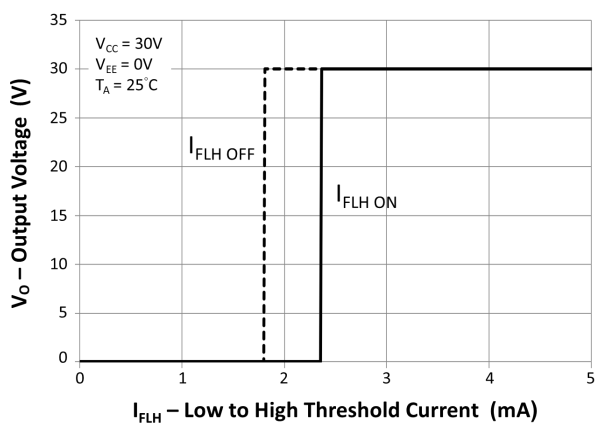


Fig 7  $I_{FLH}$  Hysteresis

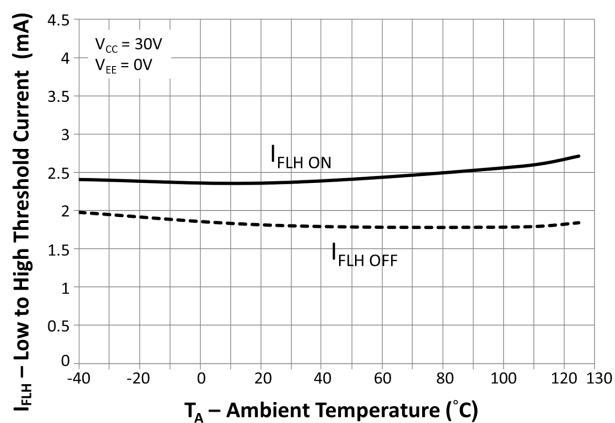


Fig 8  $I_{FLH}$  vs Ambient Temperature

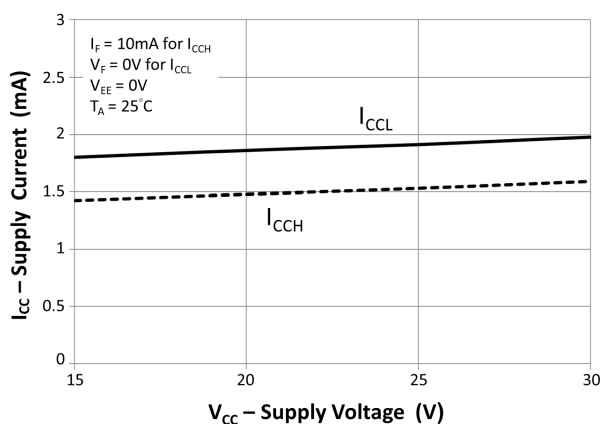


Fig 9 Supply Current vs Supply Voltage

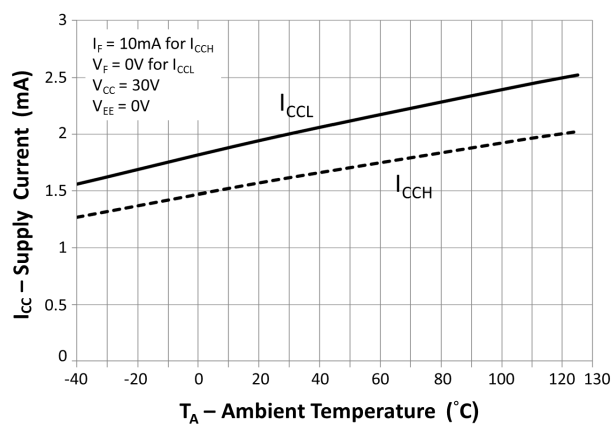


Fig 10 Supply Current vs Ambient Temperature

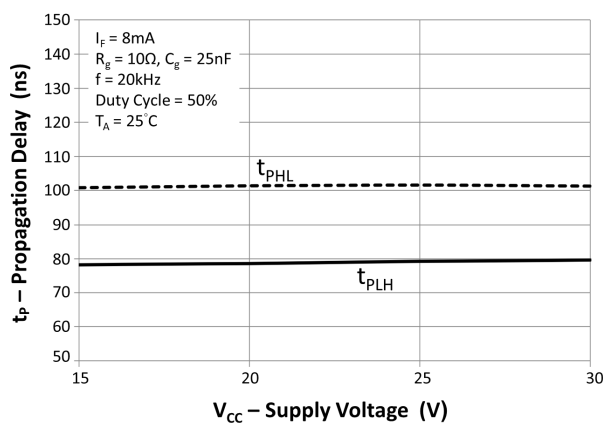


Fig 11 Propagation Delay vs Supply Voltage

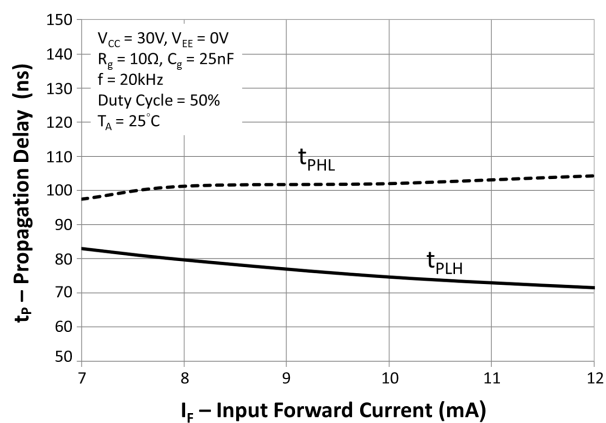


Fig 12 Propagation Delay vs Forward Current



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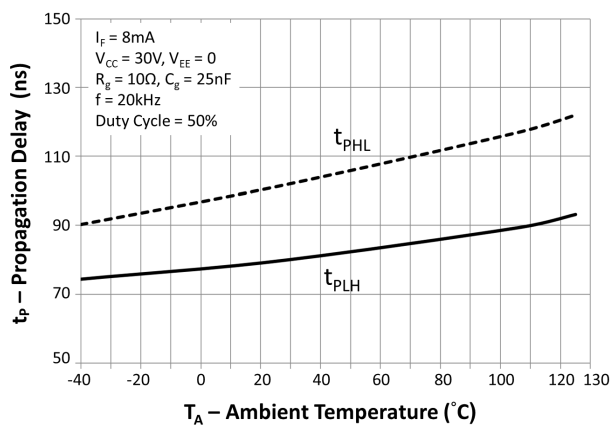
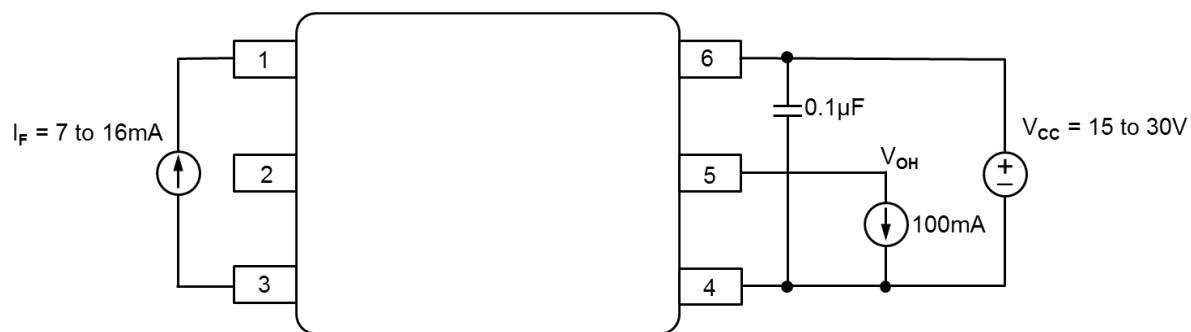
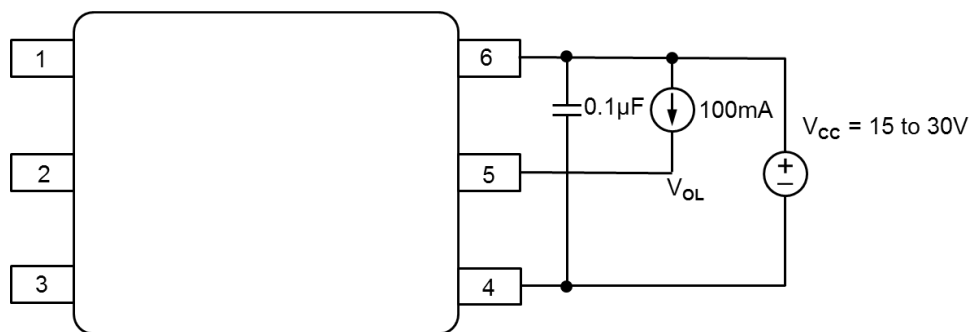


Fig 13 Propagation Delay vs Ambient Temperature



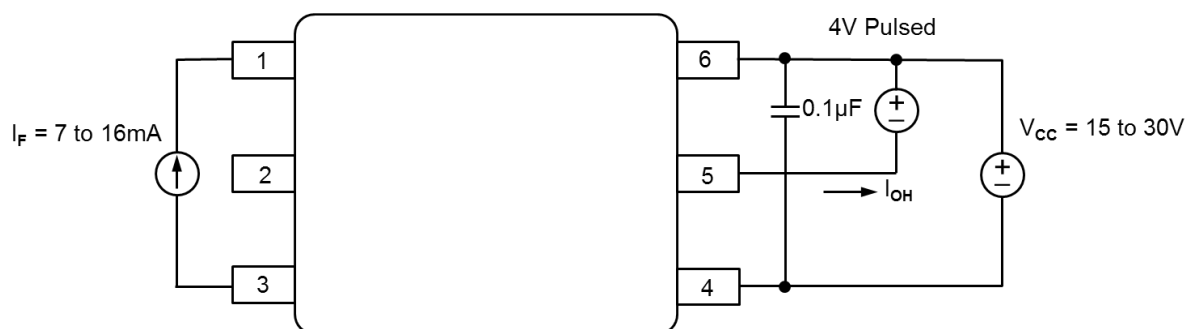
$V_{OH}$  Test Circuit



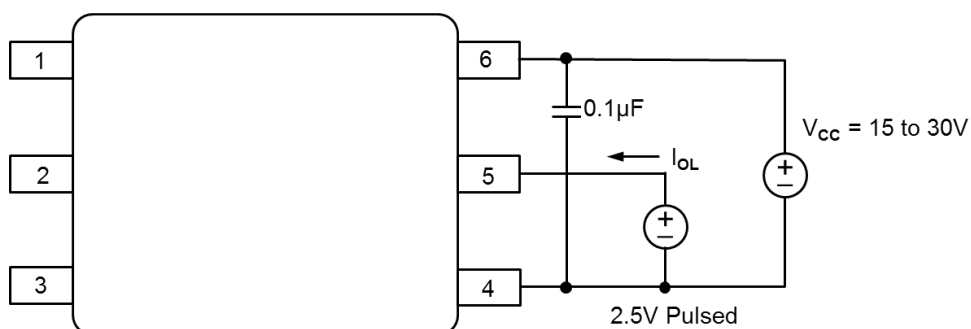
$V_{OL}$  Test Circuit



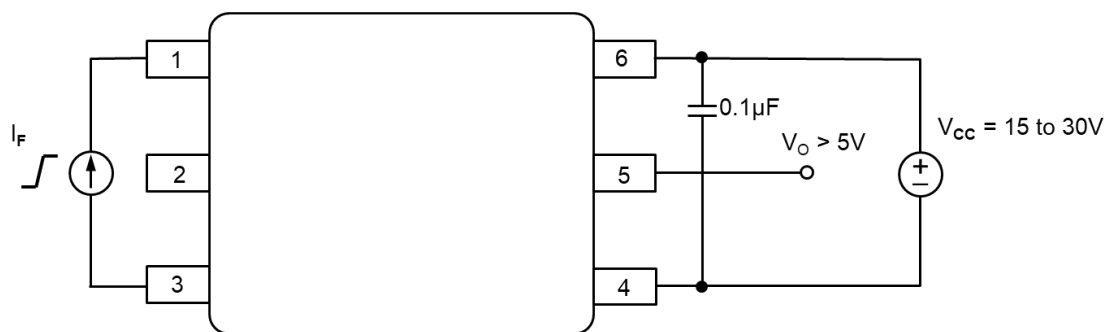
## IS341W



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



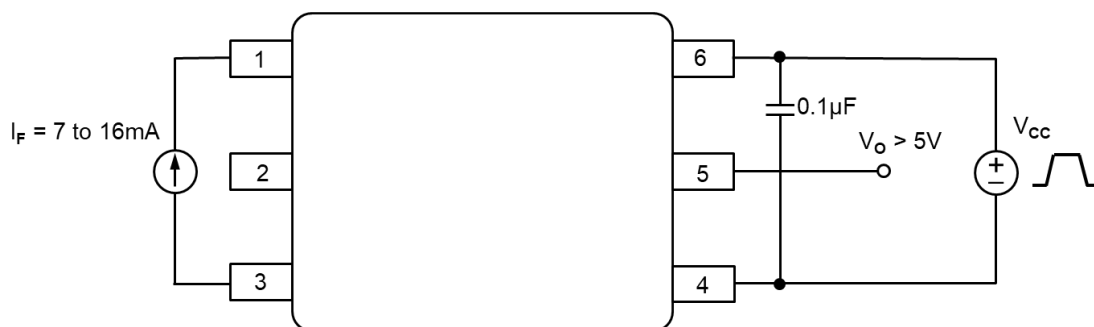
**$I_{OL}$  Test Circuit**



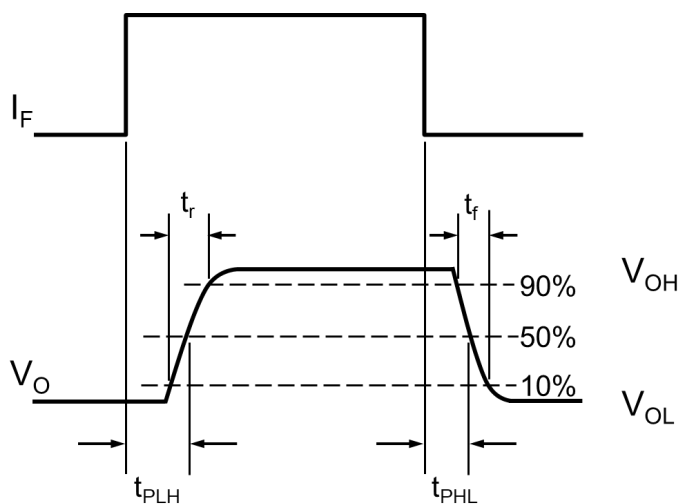
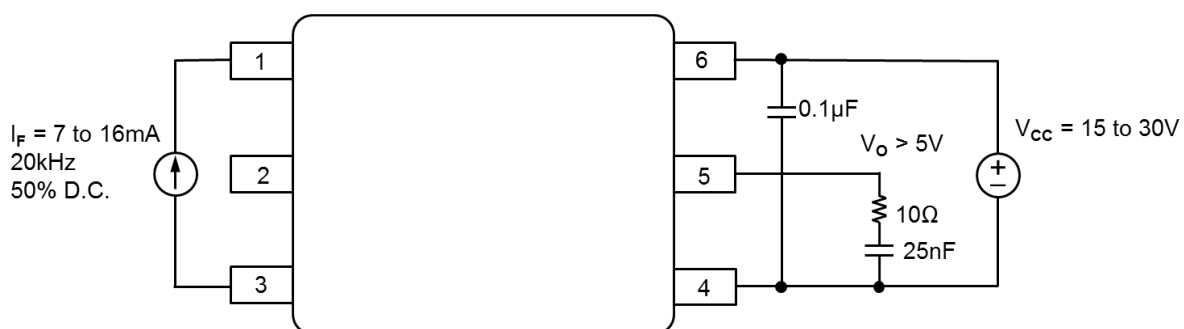
**$I_{FLH}$  Test Circuit**



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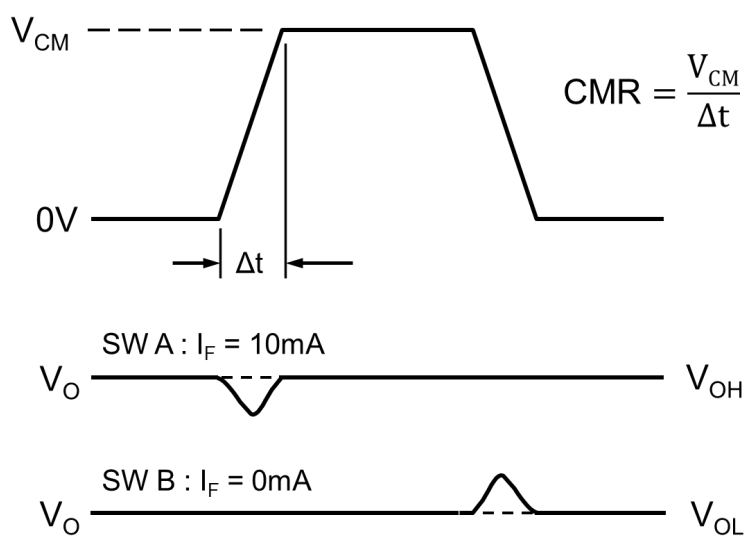
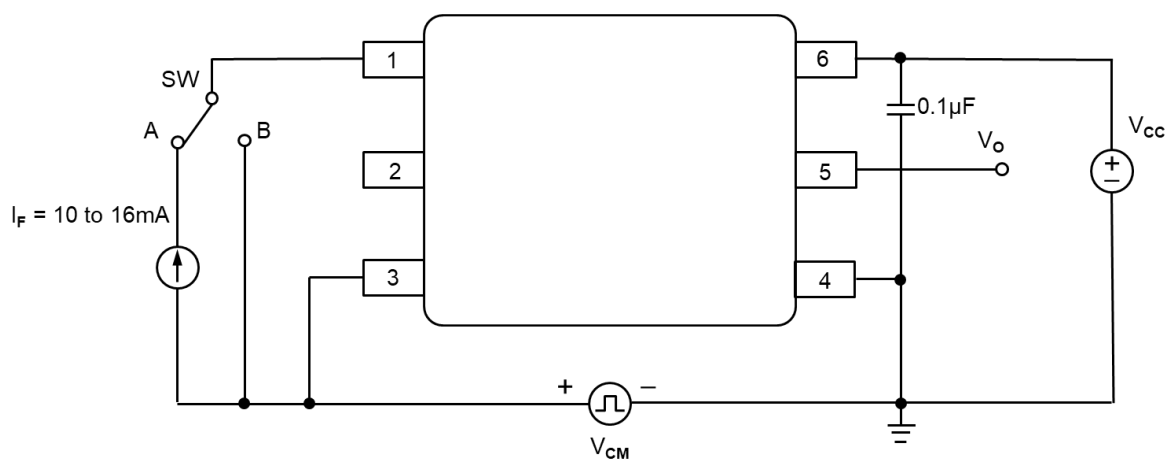
**UVLO Test Circuit**



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



## IS341W



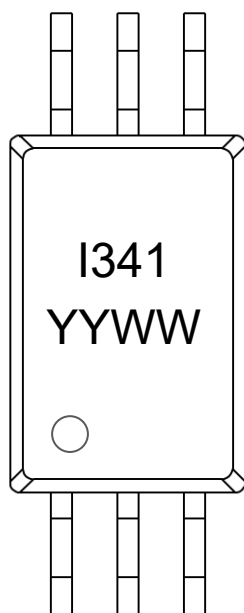
**CMR Test Circuit and Waveform**

## IS341W

### ORDER INFORMATION

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

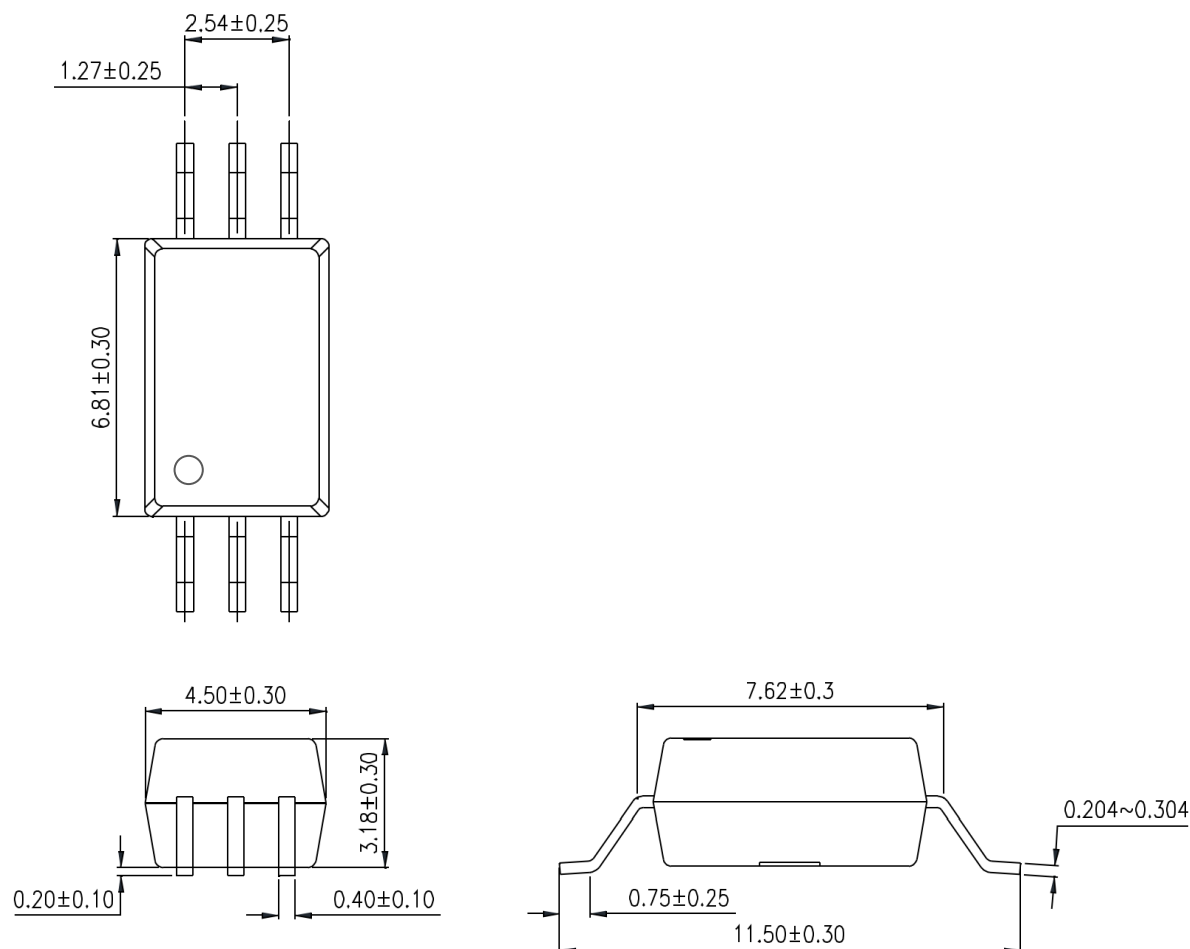
### DEVICE MARKING



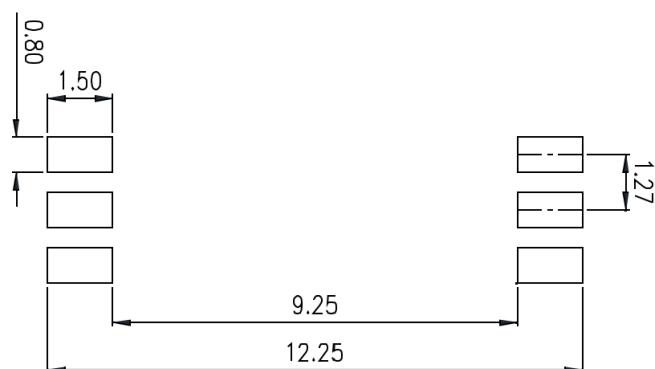
I341      denotes Device Part Number  
 YY        denotes 2 digit Year code  
 WW        denotes 2 digit Week code

## IS341W

### PACKAGE DIMENSIONS (mm)

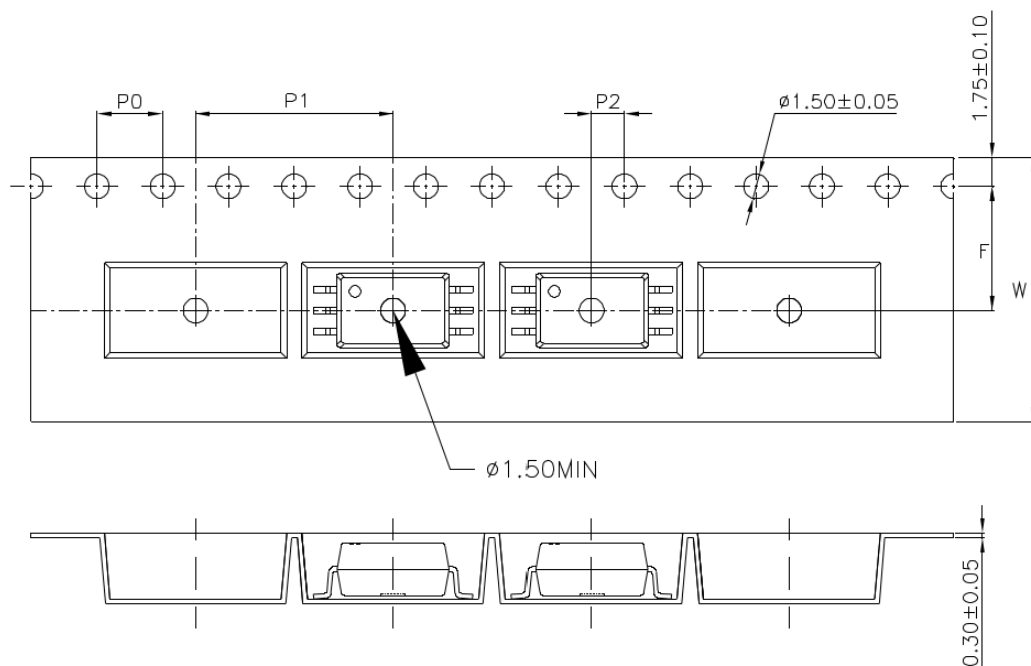


### RECOMMENDED PAD LAYOUT (mm)



## IS341W

### 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)

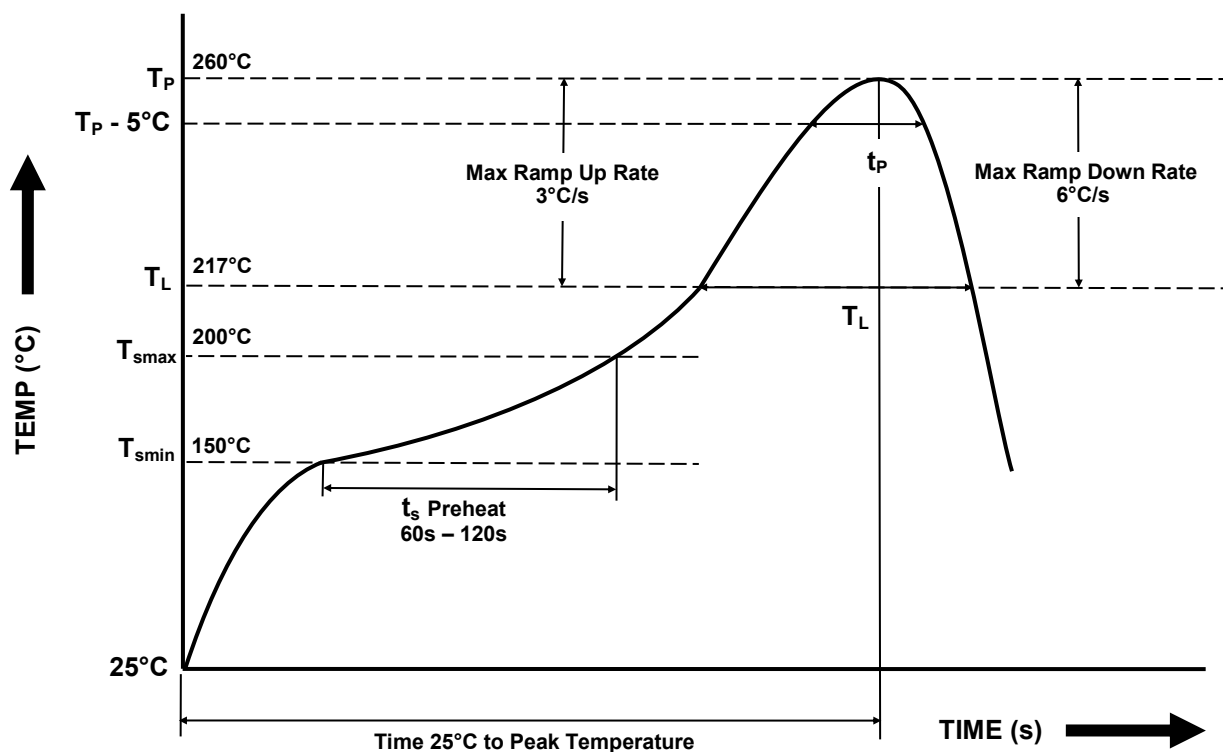


## IS341W

### IR REFLOW SOLDERING TEMPERATURE PROFILE

One Time Reflow Soldering is Recommended.

Do not immerse device body in solder paste.



Profile Details	Conditions
<b>Preheat</b> <ul style="list-style-type: none"><li>- Min Temperature (<math>T_{SMIN}</math>)</li><li>- Max Temperature (<math>T_{SMAX}</math>)</li><li>- Time <math>T_{SMIN}</math> to <math>T_{SMAX}</math> (<math>t_s</math>)</li></ul>	150°C 200°C 60s - 120s
<b>Soldering Zone</b> <ul style="list-style-type: none"><li>- Peak Temperature (<math>T_P</math>)</li><li>- Time at Peak Temperature</li><li>- Liquidous Temperature (<math>T_L</math>)</li><li>- Time within 5°C of Actual Peak Temperature (<math>T_P - 5^\circ\text{C}</math>)</li><li>- Time maintained above <math>T_L</math> (<math>t_L</math>)</li><li>- Ramp Up Rate (<math>T_L</math> to <math>T_P</math>)</li><li>- Ramp Down Rate (<math>T_P</math> to <math>T_L</math>)</li></ul>	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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