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.

FEATURES

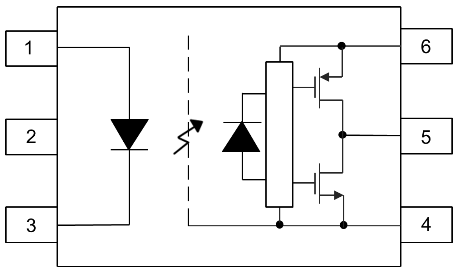
- 3.0A Maximum Peak Output Current
- Rail-to-Rail Output Voltage
- 35kV/μs Minimum Common Mode Rejection at V_{CM} 1500V
- Maximum Propagation Delay 200ns
- Maximum Propagation Delay Difference 100ns
- Wide Operating Voltage Range V_{CC} 15 to 30 V
- Under Voltage Lock Out (UVLO) Protection with Hysteresis
- Guaranteed Performance over Temperature Range −40°C to +125°C
- MSL Level 1
- RoHS Compliant
- UL E91231 Model "I341"

APPLICATIONS

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

ORDER INFORMATION

- Supplied in Tape & Reel



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
Junction Temperature	125°C
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}
Junction Temperature	125°C
Power Dissipation	700mW
Total Package	
Isolation Voltage	5000V_{RMS}
Total Power Dissipation	745mW
Operating Temperature	−40 to 125°C
Storage Temperature	−55 to 150°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	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 ≥ −3.0A (≤ 0.3 µs), T_A = 125°C

I_{OPL} : Exponential Waveform ≤ 3.0A (≤ 0.3 µs), T_A = 125°C

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		−2.0		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		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 = Open		1.7	3	mA
Low Level Supply Current	I_{CCL}	I_F = 0mA, V_{CC} = 30V V_O = Open		2.0	3	mA
High Level Output Current	I_{OH}	$V_O = V_{CC} - 1.5V$ Pulse Width = 50µs			−1.0	A
		$V_O = V_{CC} - 4.0V$ Pulse Width = 10µs			−3.0	A
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	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

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 = 8 to 16mA V_{CC} = 15 to 30V V_{EE} = 0V Rg = 10Ω Cg = 10nF f = 10kHz Duty Cycle = 50%	50		200	ns
Propagation Delay Time to Low Output Level	t_{PHL}		50		200	
Pulse Width Distortion $\lvert t_{PHL} - t_{PLH} \rvert$ 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	$\lvert CM_H \rvert$	I_F = 10 to 16mA V_{CC} = 30V V_{CM} = 1500V T_A = 25°C	35	50		kV/µs
Common Mode Transient Immunity at Low Output Level	$\lvert CM_L \rvert$	V_F = 0V V_{CC} = 30V V_{CM} = 1500V T_A = 25°C	35	50		kV/µs

Notes :

1. A 0.1uF 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).

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 (Typical Values at T_A = 25°C)

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

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

IS341W

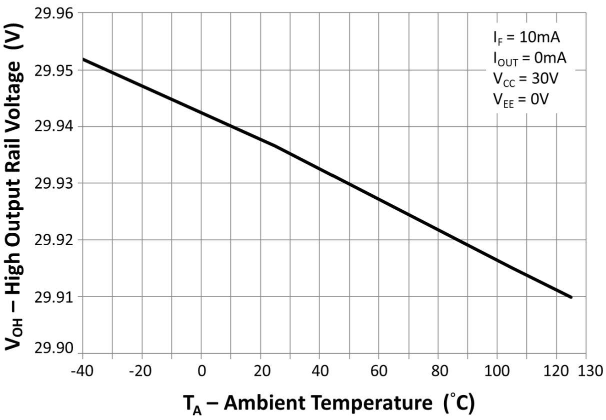


Fig 1 High Output Rail Voltage vs Ambient Temperature

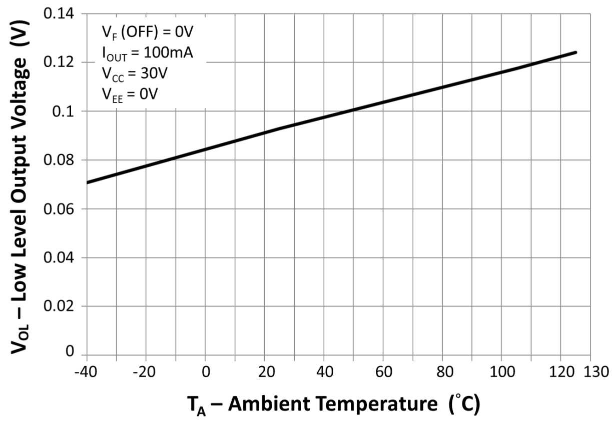


Fig 2 Low Level Output Voltage vs Ambient Temperature

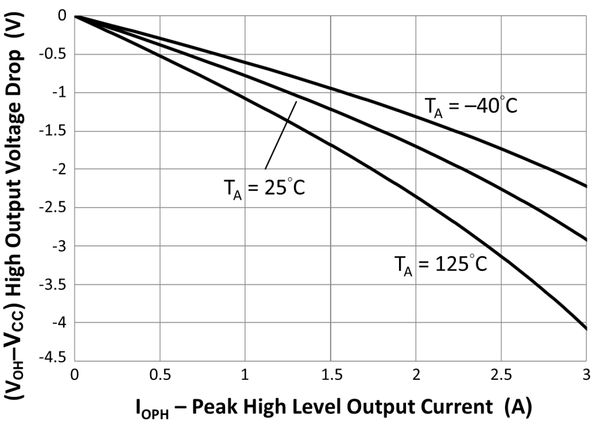


Fig 3 High Output Voltage Drop vs Peak High Level Output Current

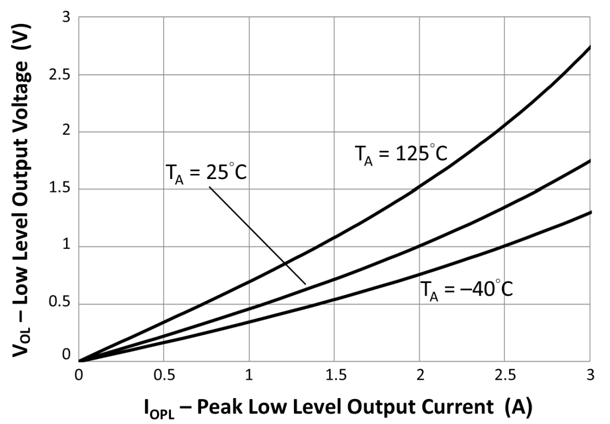


Fig 4 Low Level Output Voltage vs Peak Low Level Output Current

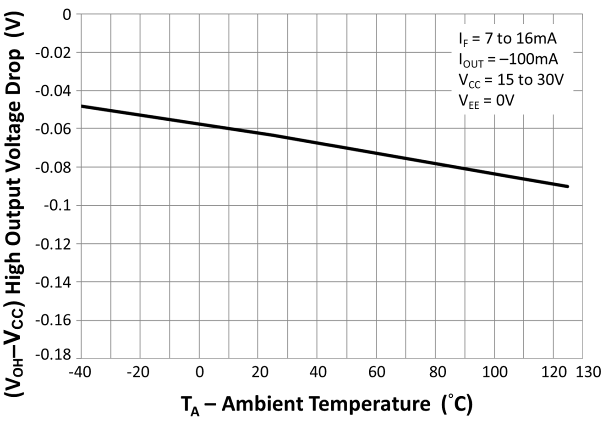


Fig 5 High Level Output Voltage Drop vs Ambient Temperature

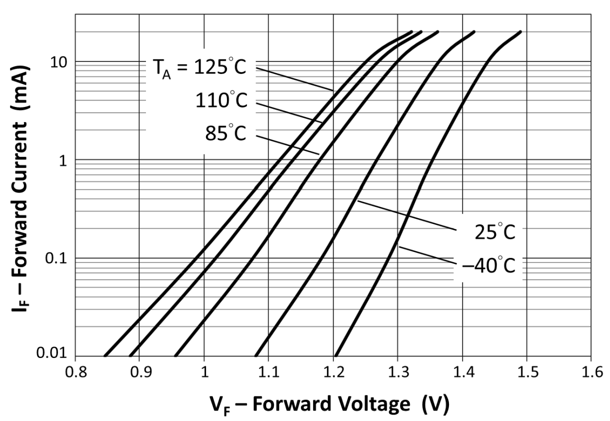


Fig 6 Forward Current vs Forward Voltage

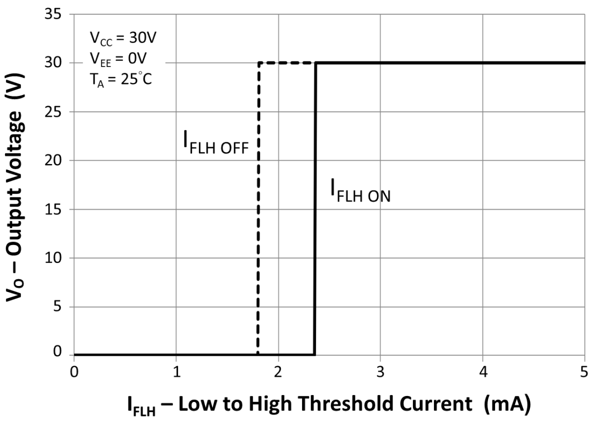


Fig 7 I_{FLH} Hysteresis

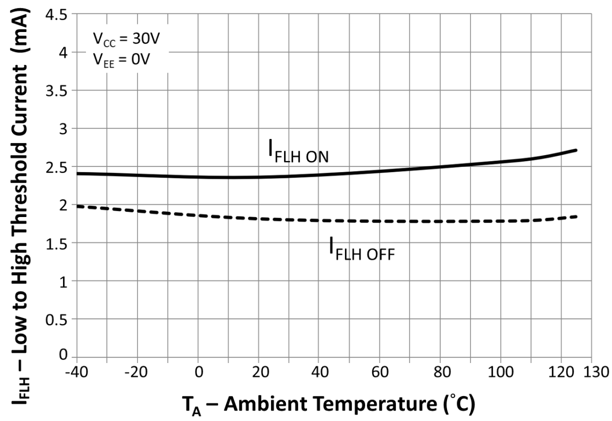


Fig 8 I_{FLH} vs Ambient Temperature

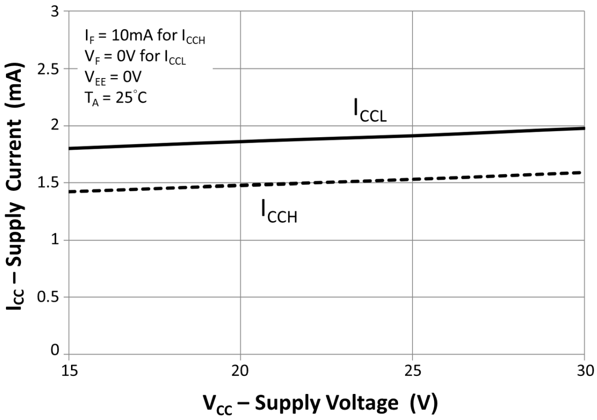


Fig 9 Supply Current vs Supply Voltage

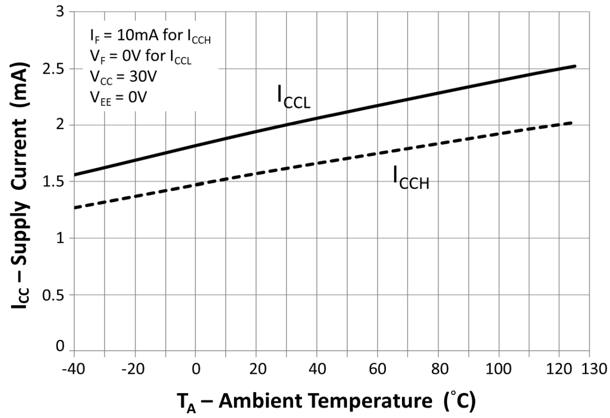


Fig 10 Supply Current vs Ambient Temperature

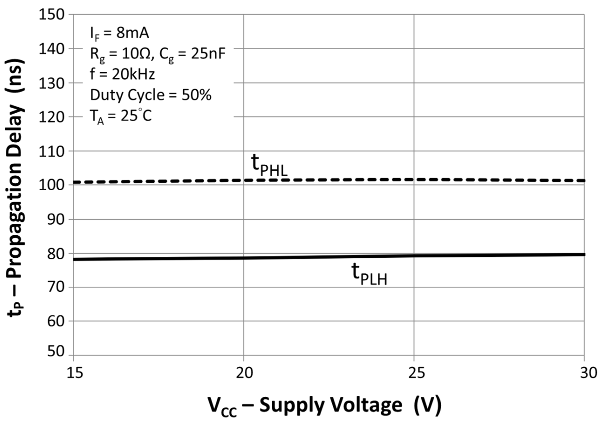


Fig 11 Propagation Delay vs Supply Voltage

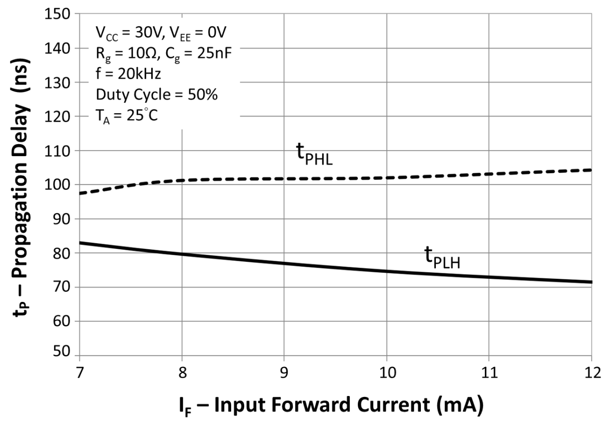


Fig 12 Propagation Delay vs Forward Current

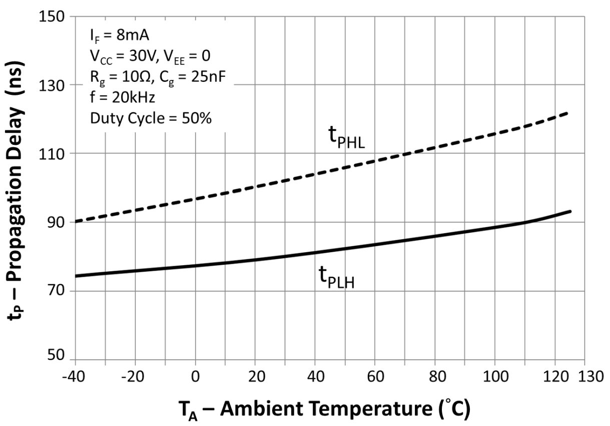
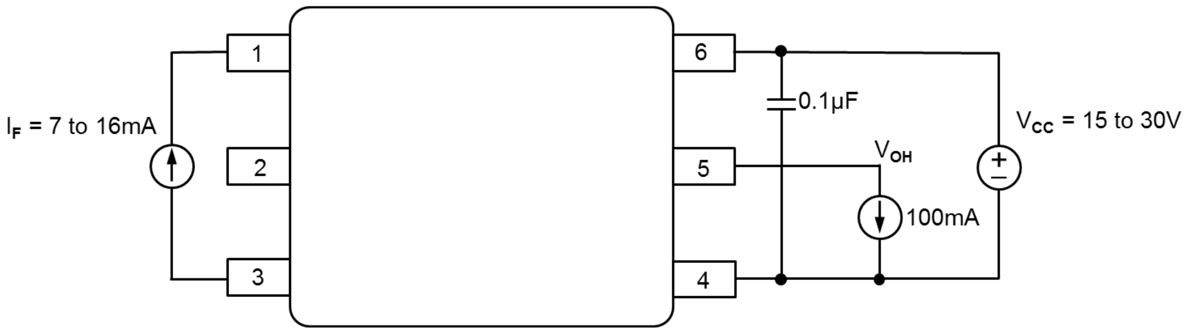
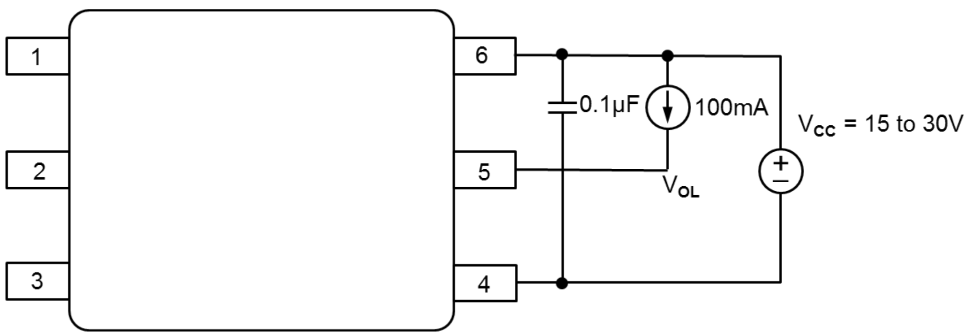


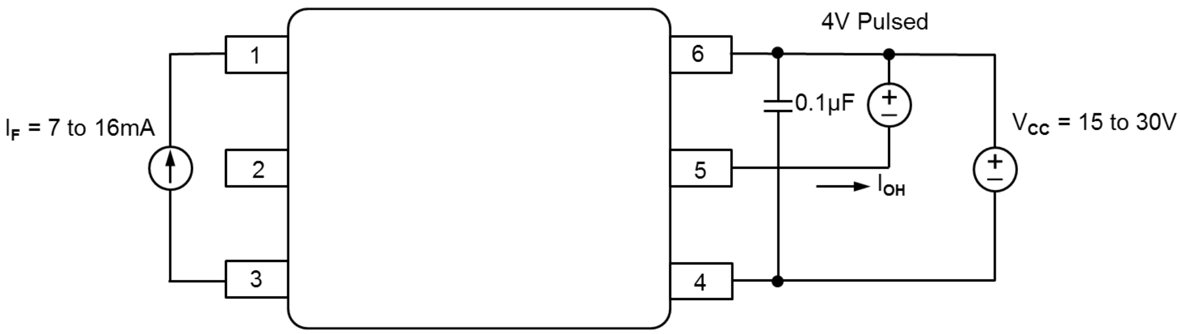
Fig 13 Propagation Delay vs Ambient Temperature



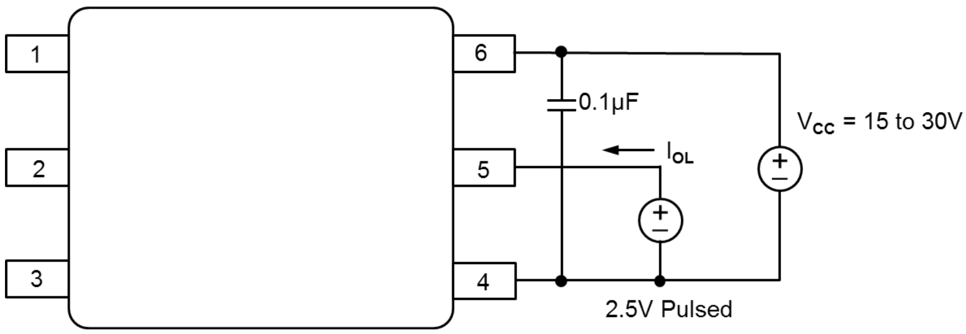
V_{OH} Test Circuit



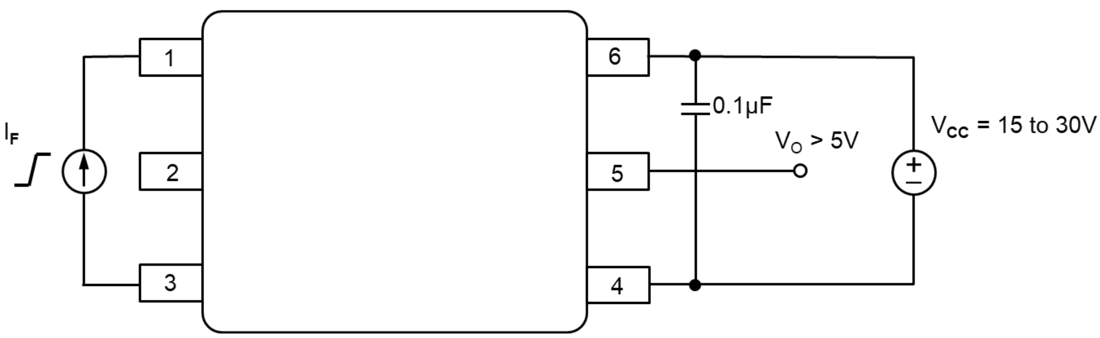
V_{OL} Test Circuit



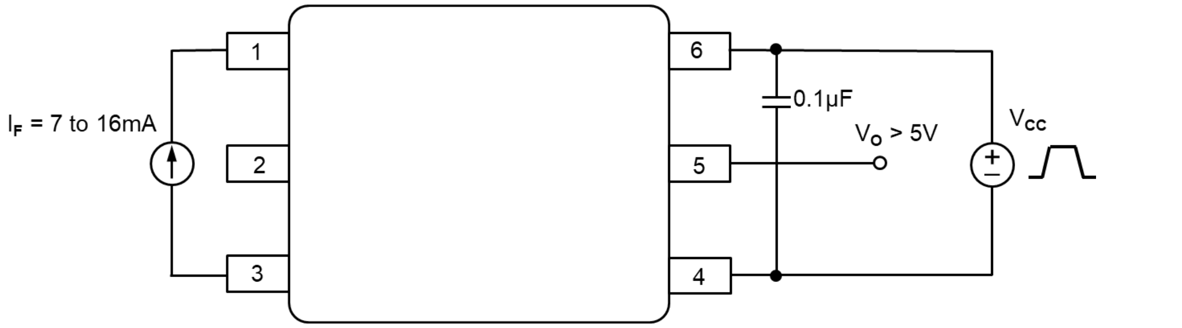
I_{OH} Test Circuit



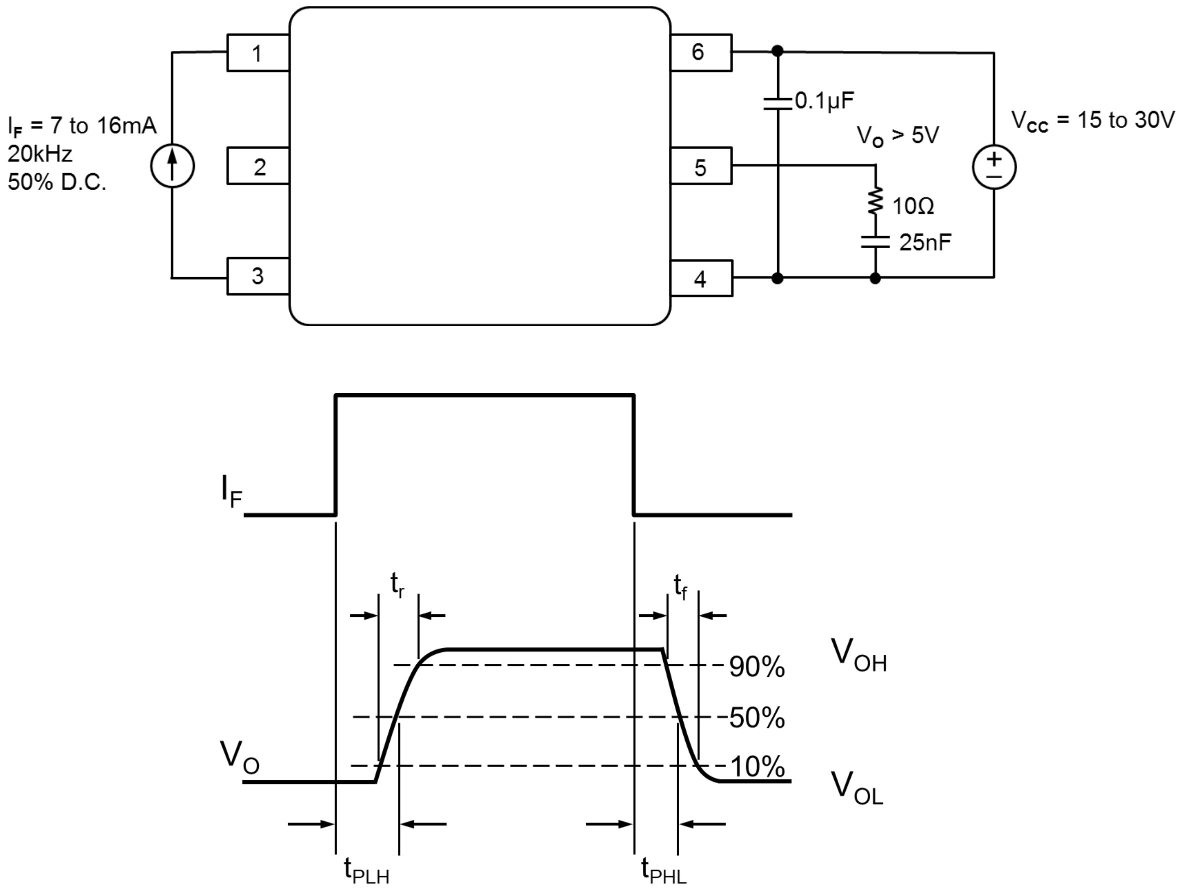
I_{OL} Test Circuit



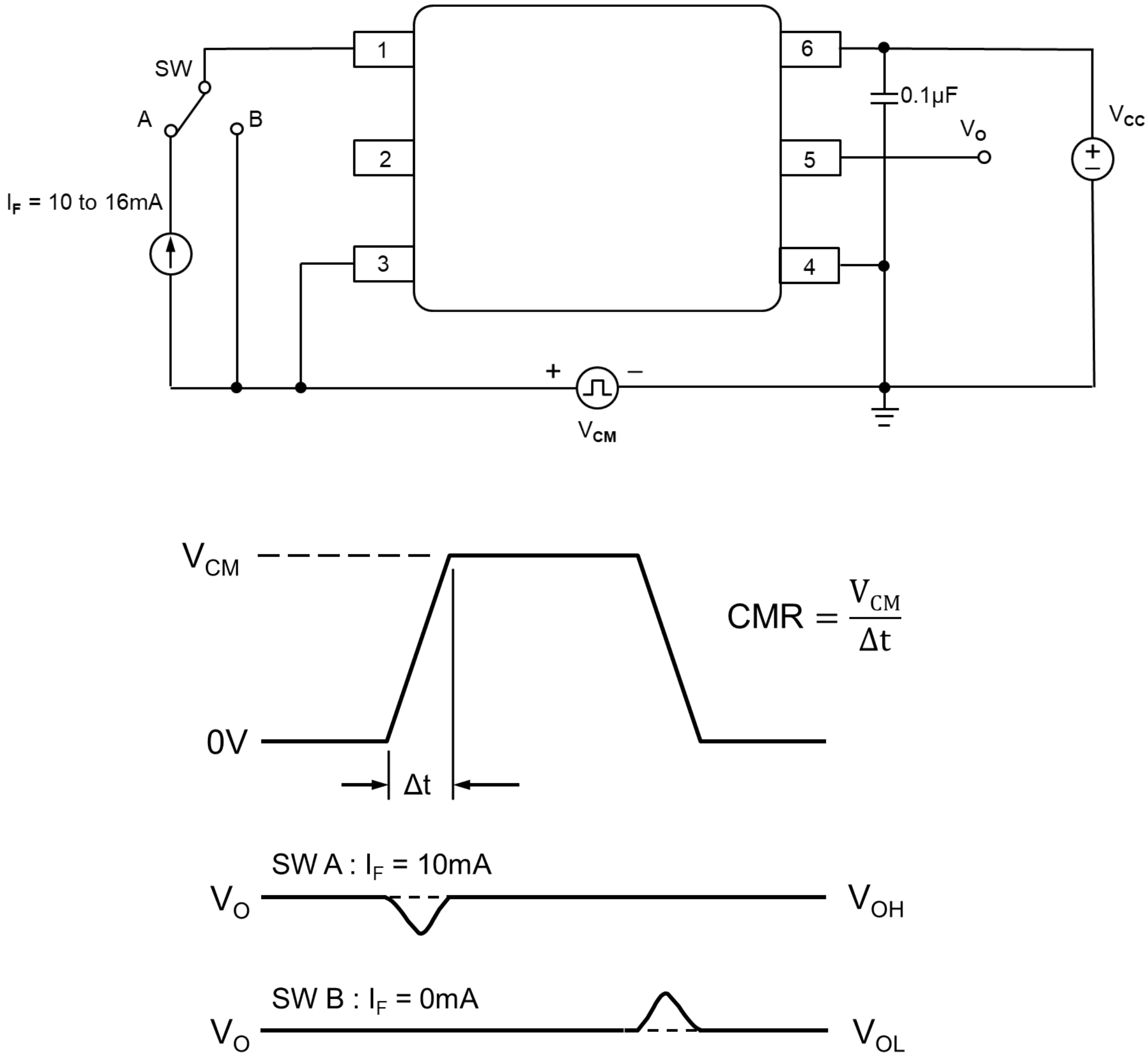
I_{FLH} Test Circuit



UVLO Test Circuit



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



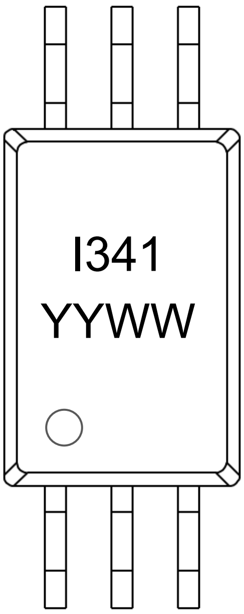
CMR Test Circuit and Waveform

IS341W

ORDER INFORMATION

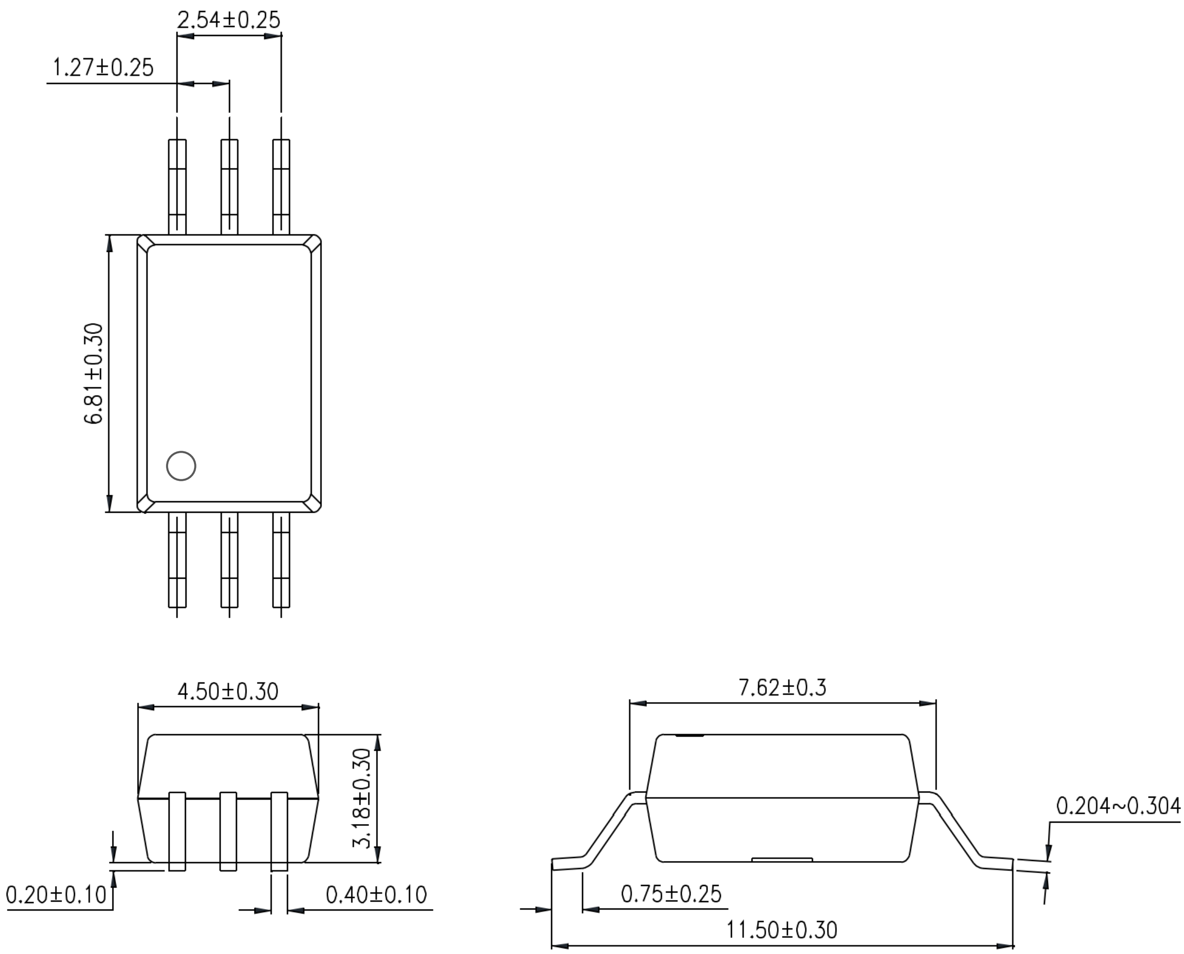
IS341W			
After PN	**PN**	**Description**	**Packing quantity**
None	IS341W	Stretched SO6 Wide Lead Separation	1000 pcs per reel

DEVICE MARKING

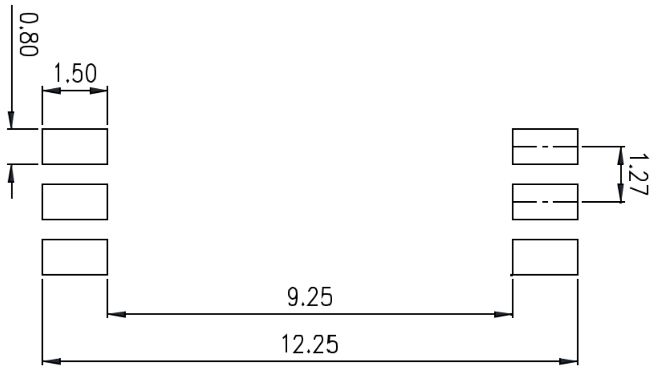


I341 Device Part Number
YY 2 digit Year code
WW 2 digit Week code

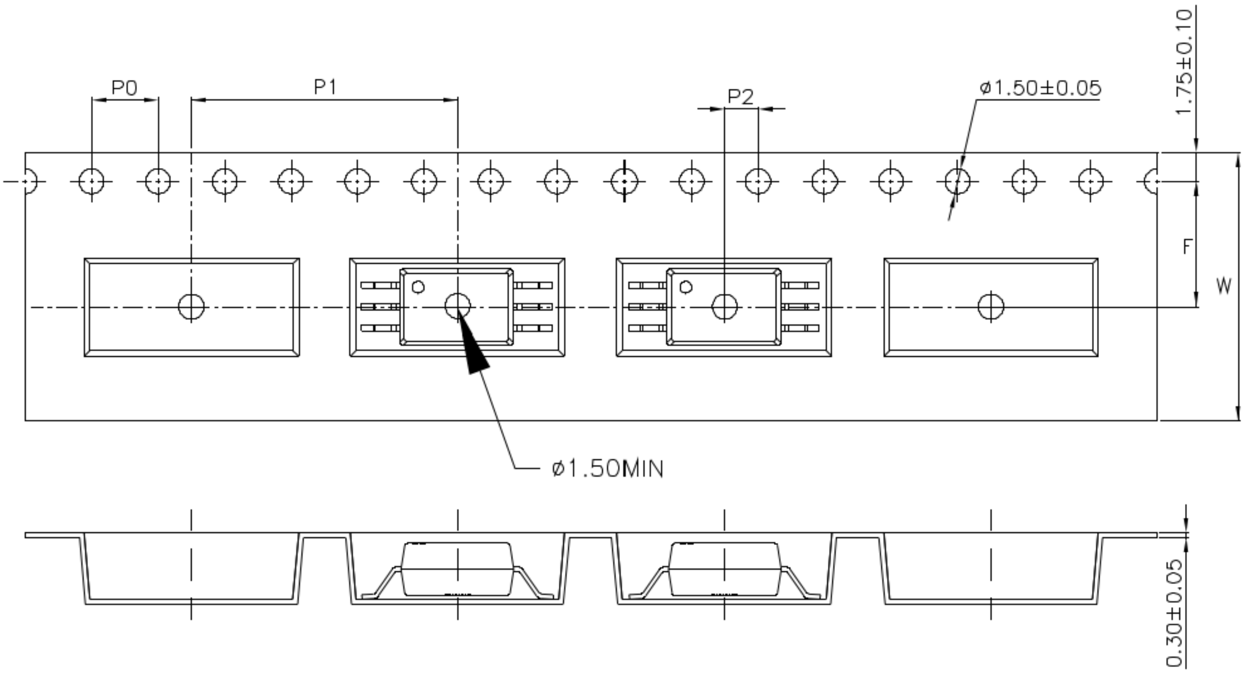
PACKAGE DIMENSIONS (mm)



RECOMMENDED PAD LAYOUT (mm)

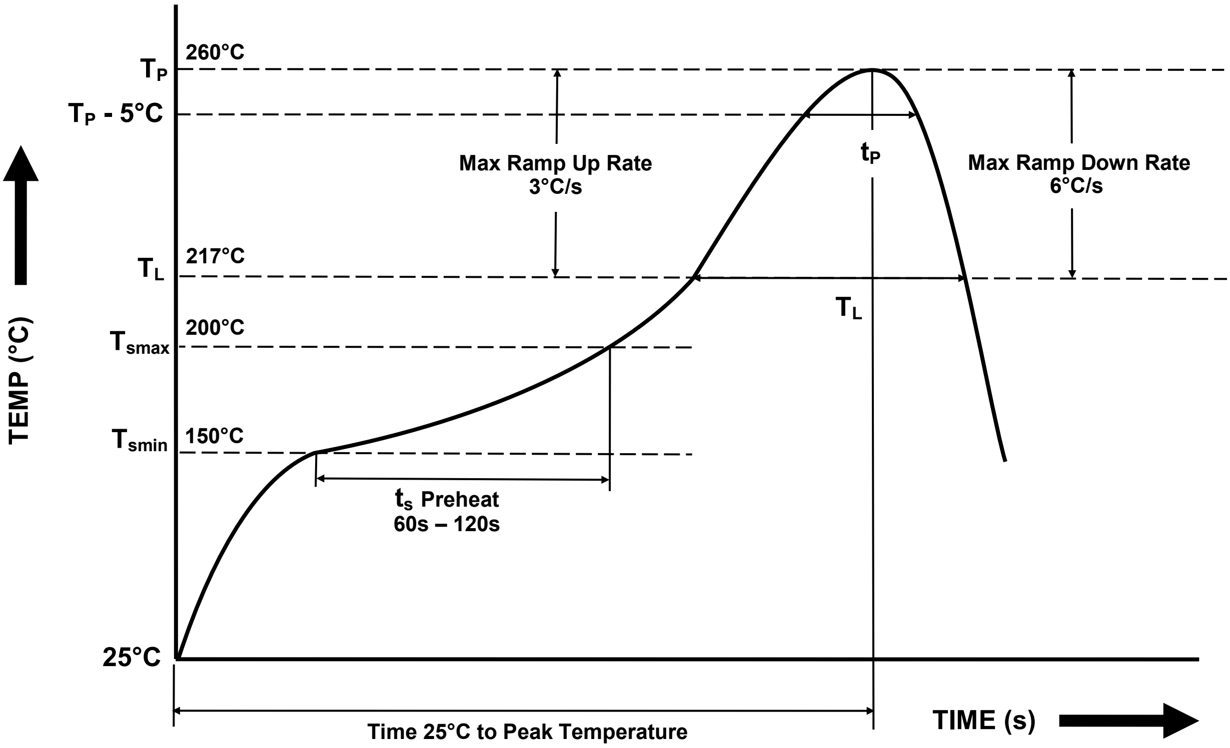


TAPE AND REEL PACKAGING



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.
Do not immerse device body in solder paste.



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

ISOCOM COMPONENTS

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