

JOC343 Series
4.0A, Gate Driver Photo Coupler
Description

The JOC343 series Photocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications and inverters in power supply system. It contains an LED optically coupled to an integrated circuit with a power output stage.

The 4.0A peak output current is capable of directly driving most IGBTs. For IGBTs with higher ratings, the JOC343 series can be used to drive a discrete power stage which drives the IGBT gate.

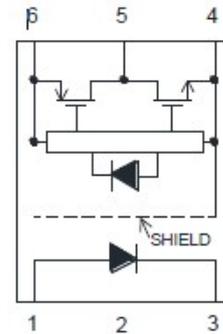
The Photocoupler operational parameters are guaranteed over the temperature range from -40°C ~ +110°C.

Features

- 4.0 A maximum peak output current
- Rail-to-rail output voltage
- 110 ns maximum propagation delay
- Under Voltage Lock-Out protection (UVLO) with hysteresis
- Wide operating range: 15 to 30 Volts (V_{CC})
- Guaranteed performance over temperature -40°C ~ +110°C.

Applications

- IGBT/MOSFET gate drive
- Uninterruptible power supply (UPS)
- Industrial Inverter
- AC/Brushless DC motor drives
- Switching power suppliers

SCHEMATIC

PIN DEFINITION

1.Anode	4.VSS
3.Cathode	5.VO
	6.VCC

PACKAGE


TRUTH TABLE

LED	V _{CC} -V _{SS} (Turn-ON, +ve going)	V _{CC} -V _{SS} (Turn-OFF, -ve going)	V _o
OFF	0 - 30 V	0 - 30 V	Low
ON	0 - 11.0 V	0 - 9.5 V	Low
ON	11.0 - 13.5 V	9.5 - 12 V	Transition
ON	13.5 - 30 V	12 - 30 V	High

Note: A 0.1 μ F bypass capacitor must be connected between Pin 4 and 6.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	Min	Max	UNIT	Note
Storage Temperature	T _{stg}	-55	125	°C	-
Operating Temperature	T _{opr}	-40	110	°C	-
Output IC Junction Temperature	T _J	-	125	°C	-
Total Output Supply Voltage	(V _{CC} -V _{SS})	0	35	V	-
Average Forward Input Current	I _F	-	20	mA	-
Reverse Input Voltage	V _R	-	5	V	-
“High” Peak Output Current	I _{OH} (PEAK)		4.0	A	1
“Low” Peak Output Current	I _{OL} (PEAK)		4.0	A	1
Output Voltage	V _O (PEAK)	-0.5	V _{CC}	V	-
Power Dissipation	P _I	-	45	mW	-
Output IC Power Dissipation	P _O	-	700	mW	-
Lead Solder Temperature	T _{sol}	-	260	°C	-

Note: Ambient temperature = 25°C, unless otherwise specified. 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.

Note 1: Exponential waveform. Pulse width $\leq 10 \mu$ s, $f \leq 15$ kHz

RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Temperature	T _A	-40	110	°C
Supply Voltage	V _{CC}	15	30	V
Input Current (ON)	I _F (ON)	7	16	mA
Input Voltage (OFF)	V _F (OFF)	-3.0	0.8	V

ELECTRICAL OPTICAL CHARACTERISTICS							
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT CHARACTERISTICS							
Input Forward Voltage	V_F	1.6	1.9	2.4	V	$I_F=10\text{mA}$	-
Input Forward Voltage Temperature Coefficient	$\Delta V_F/\Delta T$	-	-1.237	-	mV/°C	$I_F=10\text{mA}$	-
Input Reverse Voltage	BV_R	5	-	-	V	$I_R = 10\mu\text{A}$	-
Input Threshold Current (Low to High)	I_{FLH}	-	0.9	2	mA	$V_O > 5\text{V}, I_O = 0\text{A}$	-
Input Threshold Voltage (High to Low)	V_{FHL}	0.8	-	-	V	$V_{CC} = 30\text{V}, V_O < 5\text{V}$	-
Input Capacitance	C_{IN}	-	60	-	pF	$f = 1\text{MHz}, V_F = 0\text{V}$	-
OUTPUT CHARACTERISTICS							
High Level Supply Current	I_{CCH}	-	1.70	3	mA	$I_F = 10\text{mA}, V_{CC} = 30\text{V}, V_O = \text{Open}, R_g = 10\Omega, C_g = 6\text{nF}$	-
Low Level Supply Current	I_{CCL}	-	2.11	3	mA	$I_F = 0\text{mA}, V_{CC} = 30\text{V}, V_O = \text{Open}, R_g = 10\Omega, C_g = 6\text{nF}$	-
High level output current	I_{OH}	3.0	-	-	A	$I_F = 10\text{mA}, V_{CC} = 30\text{V}, V_O = V_{CC} - 4$	1
Low level output current	I_{OL}	3.0	-	-	A	$I_F = 0\text{mA}, V_{CC} = 30\text{V}, V_O = V_{SS} + 4$	1
High level output voltage	V_{OH}	29.7	29.88	-	V	$I_F = 10\text{mA}, I_O = -100\text{mA}$	2,3
Low level output voltage	V_{OL}	-	0.1	0.3	V	$I_F = 0\text{mA}, I_O = 100\text{mA}$	-
UVLO Threshold	VUVLO+	11.0	12.6	13.5	V	$V_O > 5\text{V}, I_F = 10\text{mA}$	-
	VUVLO-	9.5	11.2	12.0	V	$V_O < 5\text{V}, I_F = 10\text{mA}$	-

All Typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} - V_{SS} = 30\text{V}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Note 1: Maximum pulse width = 10 μs .

Note 2: In this test V_{OH} is measured with a dc load current. When driving capacitive loads, V_{OH} will approach V_{CC} as I_{OH} approaches zero amps.

Note 3: Maximum pulse width = 1 ms.

SWITCHING SPECIFICATION

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition	Note
Propagation Delay Time to High Output Level	t_{PLH}	-	61.3	110	ns	$R_g = 10 \Omega$, $C_g = 25 \text{ nF}$, $f = 10 \text{ kHz}$, Duty Cycle = 50% $I_F = 10 \text{ mA}$, $V_{CC} = 30 \text{ V}$	-
Propagation Delay Time to Low Output Level	t_{PHL}	-	74.5	110			-
Pulse Width Distortion	PWD	-	22	70			-
Propagation Delay Difference Between Any Two Parts	PDD ($t_{PHL} - t_{PLH}$)	-100	-	+100			-
Output Rise Time (10 to 90%)	t_r	-	20	-			-
Output Fall Time (90 to 10%)	t_f	-	15	-			-
Common mode transient immunity at high level output	$ CM_H $	20	40	-	kV/ μs	$I_F = 7 \text{ to } 16 \text{ mA}$ $V_{CC} = 30 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $V_{CM} = 1 \text{ kV}$	1,2
Common mode transient immunity at low level output	$ CM_L $	20	40	-	kV/ μs	$I_F = 0 \text{ mA}$ $V_{CC} = 30 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $V_{CM} = 1 \text{ kV}$	1,3

All Typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} - V_{SS} = 30 \text{ V}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Note 1: Pin 2 needs to be connected to LED common.

Note 2: Common mode transient immunity in the high state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in the high state (meaning $V_O > 15.0 \text{ V}$).

Note 3: Common mode transient immunity in a low state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in a low state (meaning $V_O < 1.0 \text{ V}$).

ISOLATION CHARACTERISTIC								
Parameter	Symbo	Device	Min.	Typ.	Max.	Unit	Test Condition	Note
Withstand Insulation Test Voltage	V _{ISO}	JOC343SL	5000	-	-	V	RH ≤ 40%-60%, t = 1min, T _A = 25 °C	1,2
		JOC343SLM						
Input-Output Resistance	R _{I-O}	-	-	10 ¹²	-	Ω	V _{I-O} = 500V DC	1

All Typical values at T_A = 25°C and V_{CC} – V_{SS} = 30 V, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

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

Note 2: According to UL1577, each photocoupler is tested by applying an insulation test voltage 6000VRMS for one second. This test is performed before the 100% production test for partial discharge.

TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

Fig.1 High output rail voltage vs. Temperature

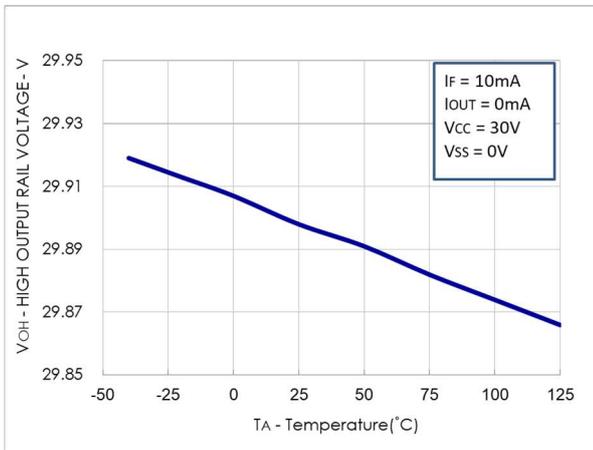


Fig.2 VoH vs. Temperature

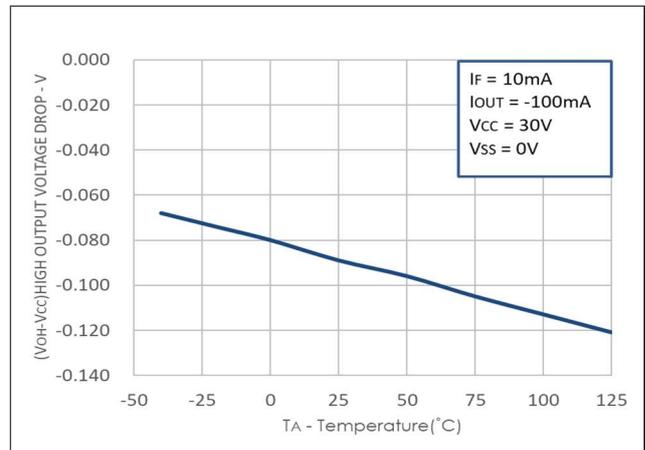


Fig.3 VoL vs. Temperature

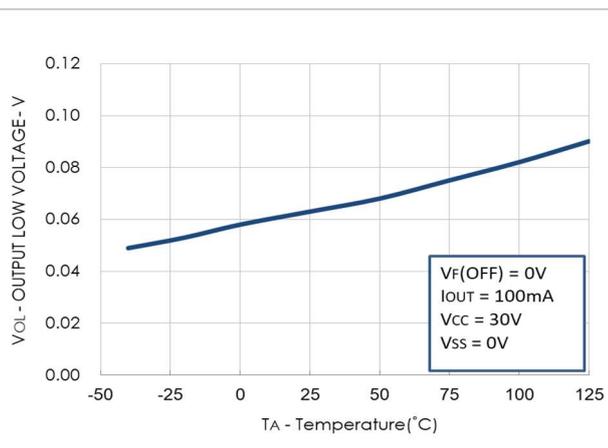


Fig.4 Icc vs. Temperature

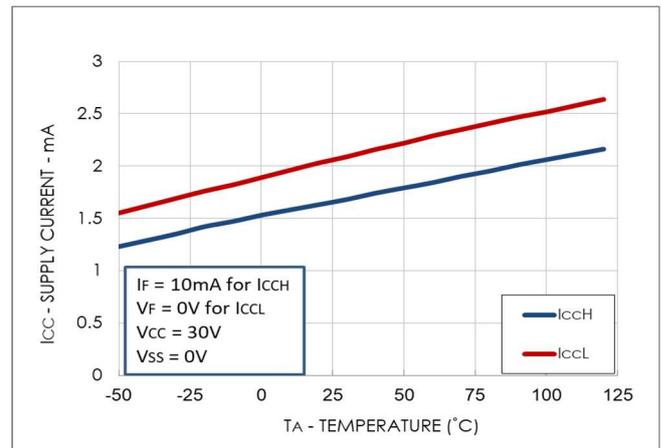


Fig.5 Icc vs. Vcc

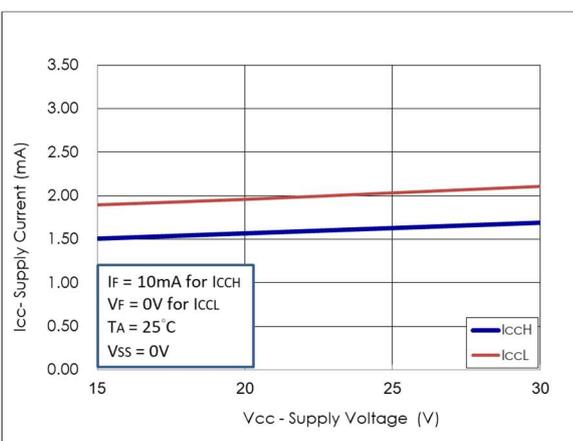


Fig.6 IFLH vs. Hysteresis

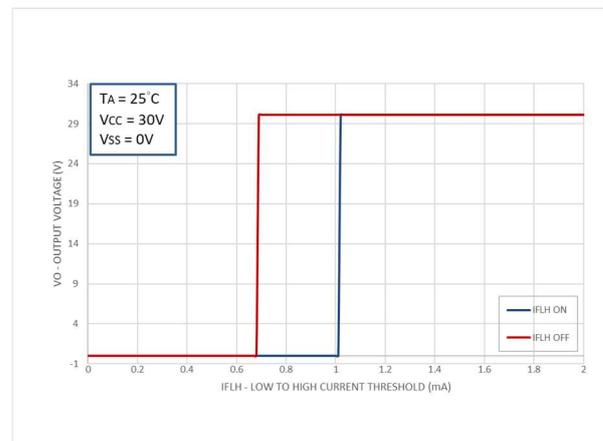


Fig.7 I_{FH} vs. Temperature

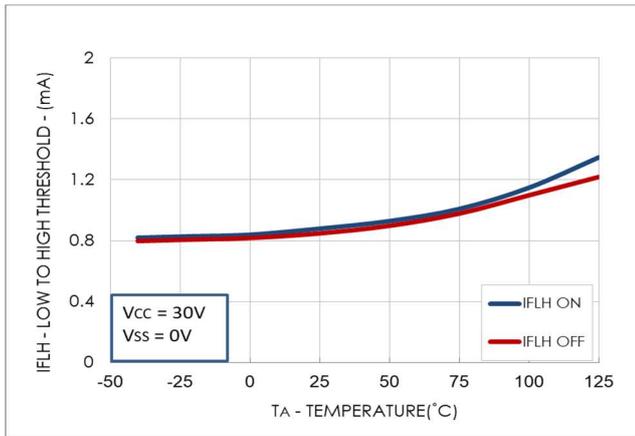


Fig.8 Propagation Delays vs. V_{cc}

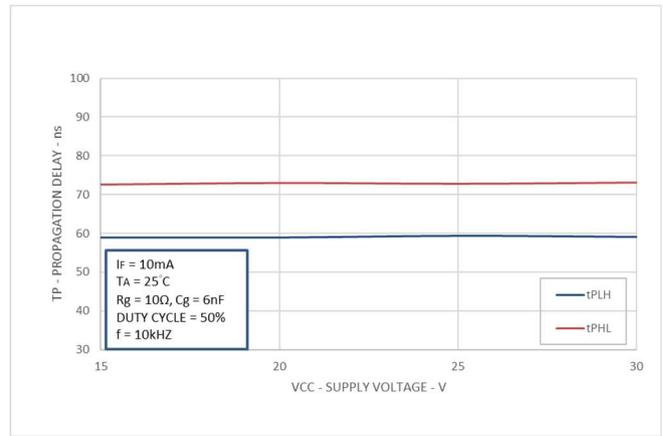


Fig.9 Propagation Delays vs. I_f

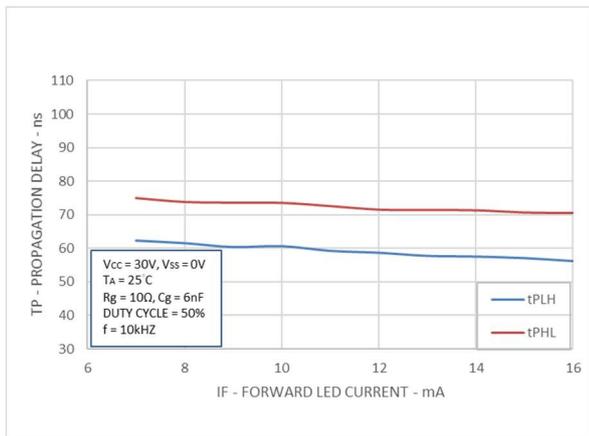


Fig.10 Propagation Delays vs. Temperature

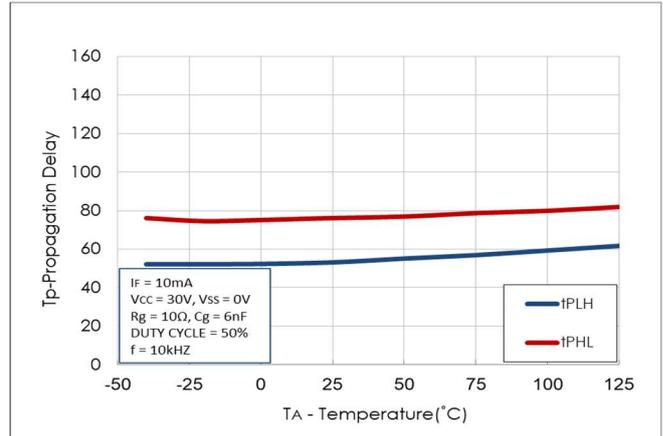


Fig.11 Propagation Delays vs. R_g

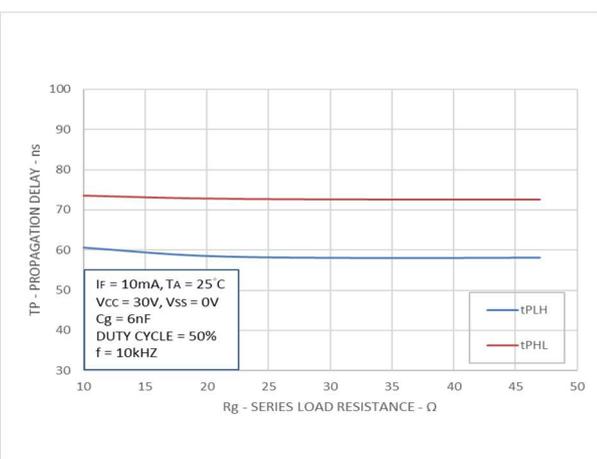


Fig.12 Propagation Delays vs. C_g

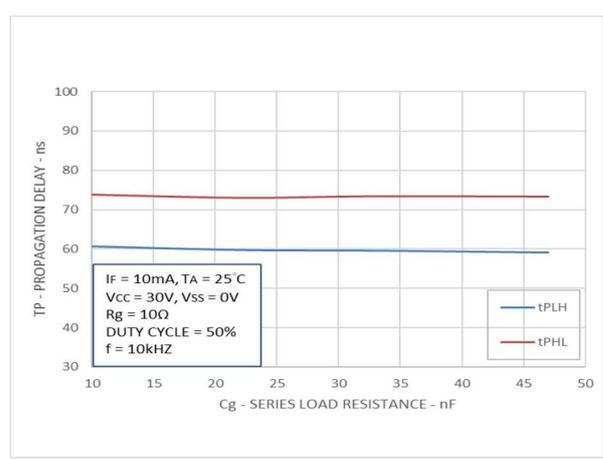


Fig.13 Input Current vs. Forward Voltage

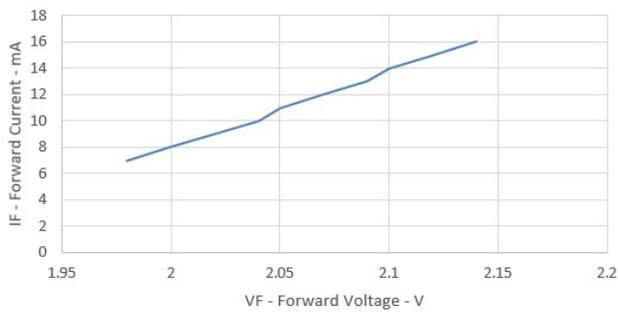


Fig.14 I_{OH} Test Circuit

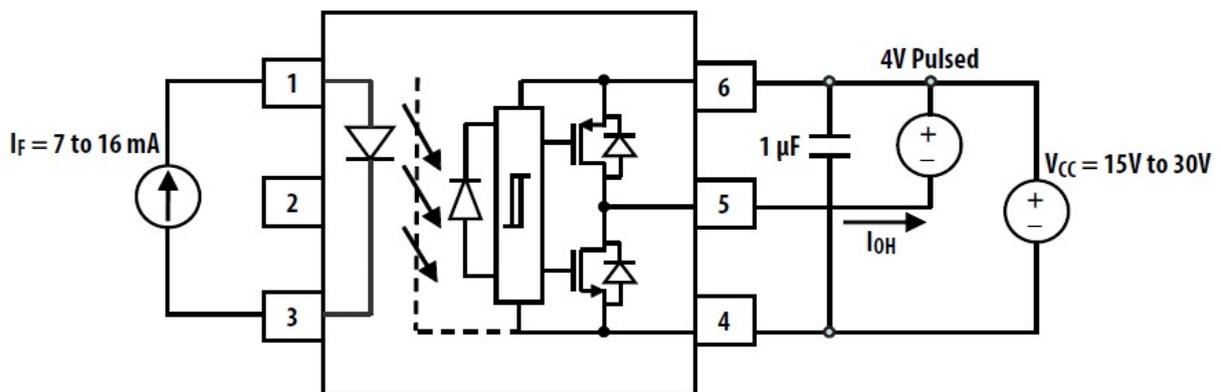


Fig.15 I_{OL} Test Circuit

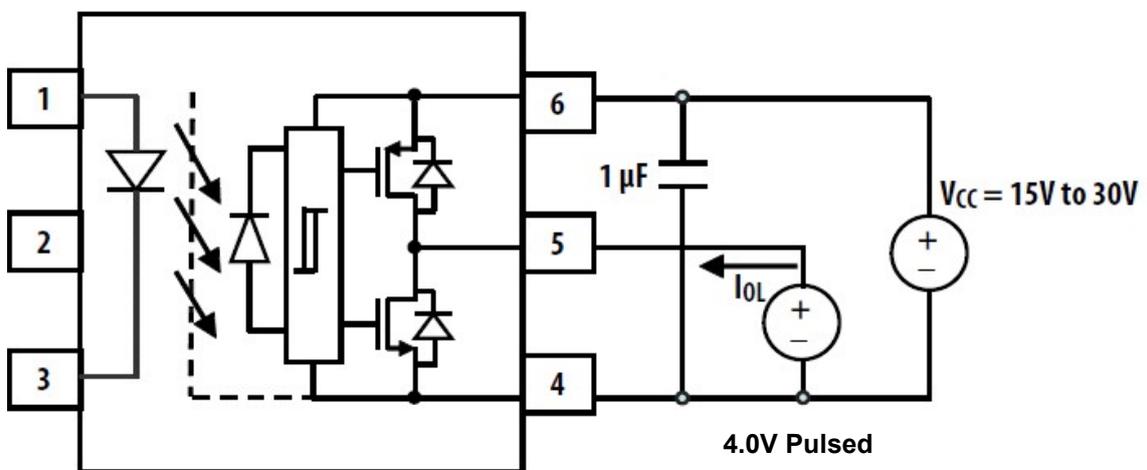


Fig.16 V_{OH} Test Circuit

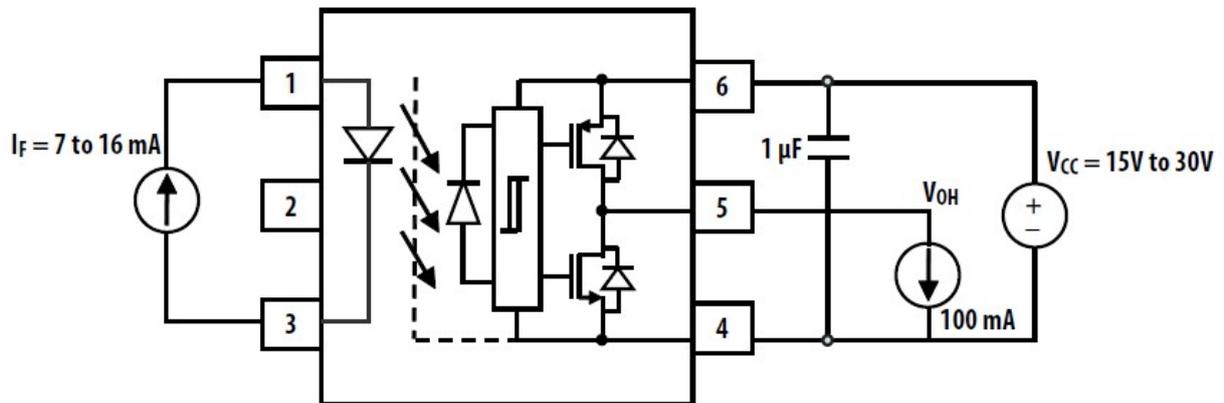


Fig.17 V_{OL} Test Circuit

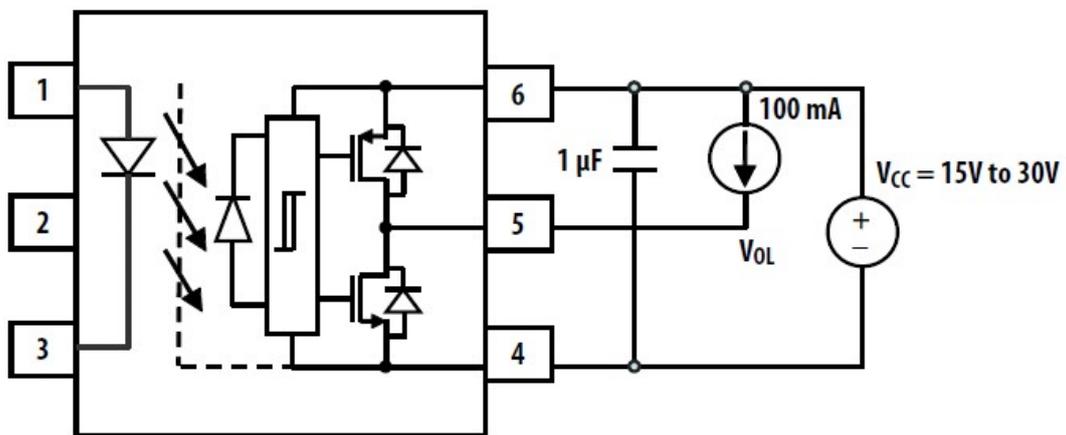


Fig.18 I_{FLH} Test Circuit

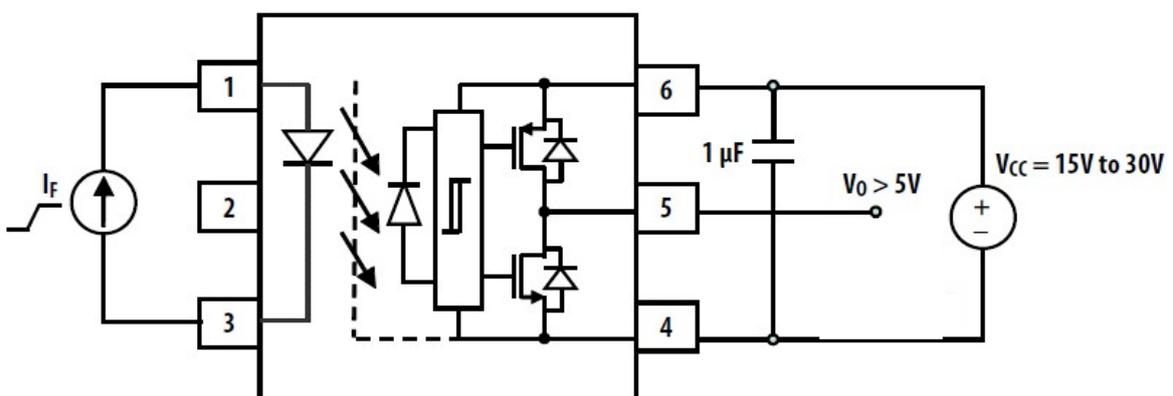


Fig.19 UVLO Test Circuit

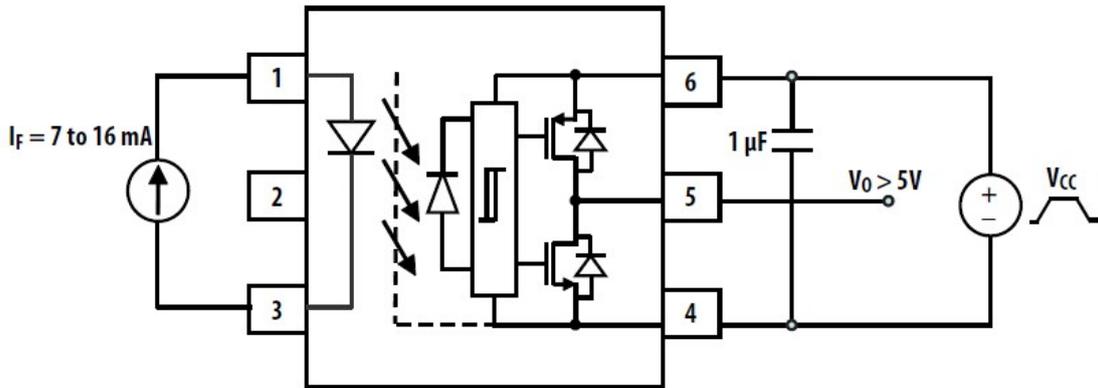


Fig.20 t_{PHL}, t_{PLH}, t_r and t_f Test Circuit and Waveforms

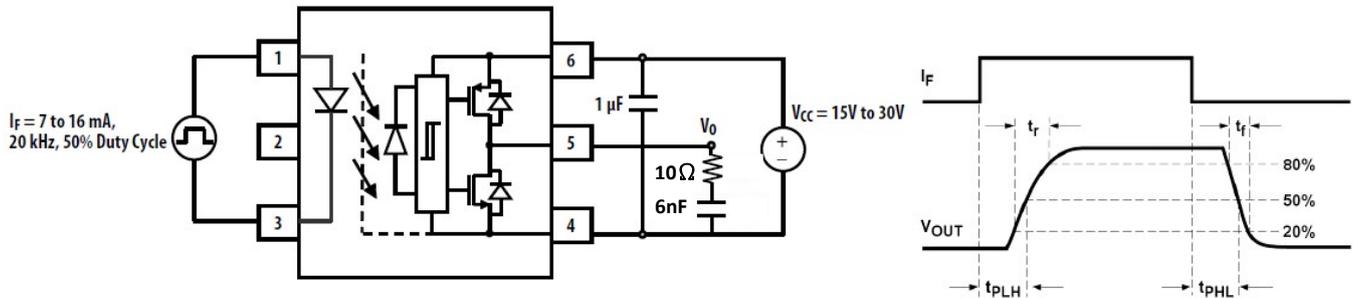
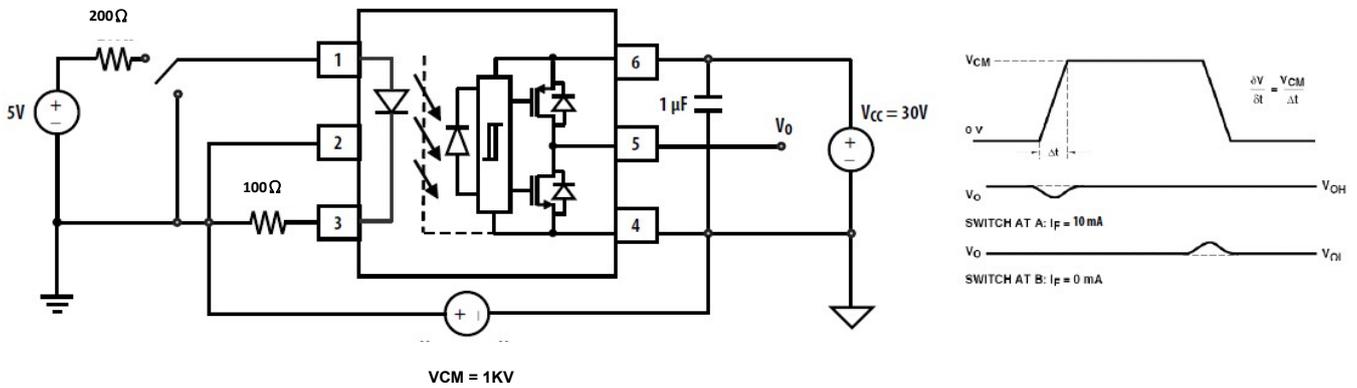


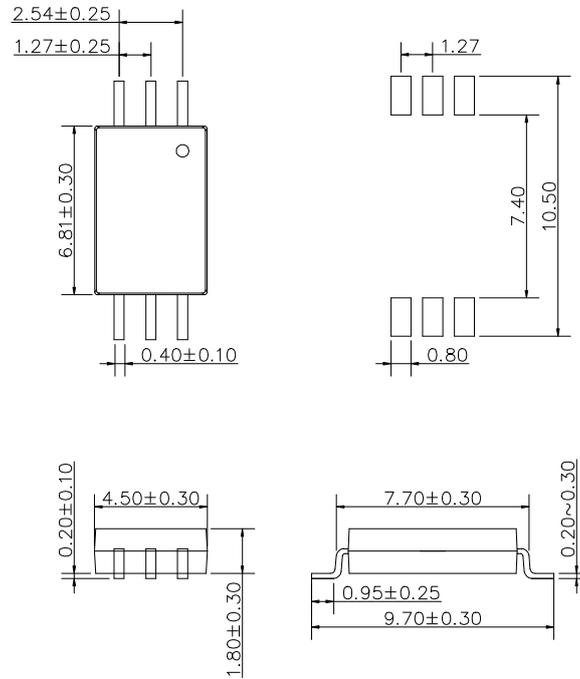
Fig.21 CMR Test Circuit with Split Resistors Network and Waveforms



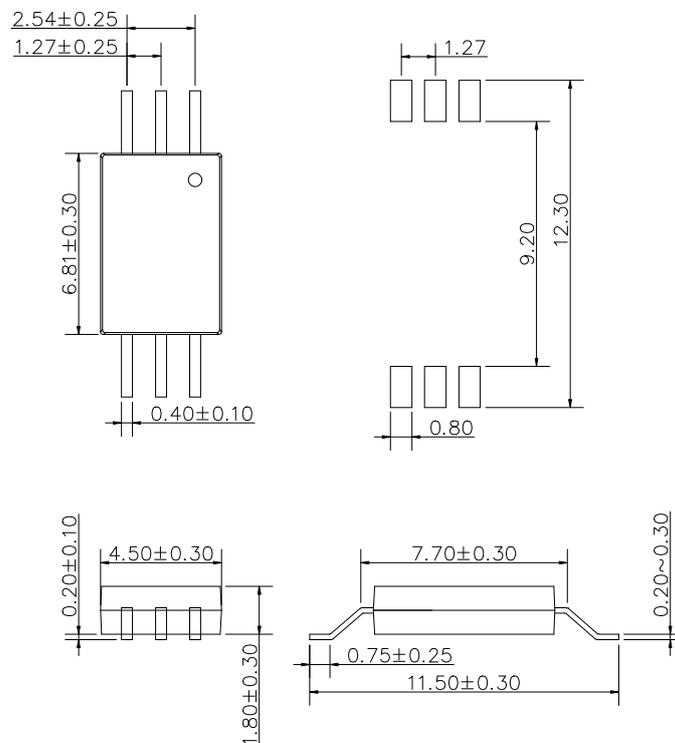
PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)

Surface Mount Lead Forming

SL type Dimension

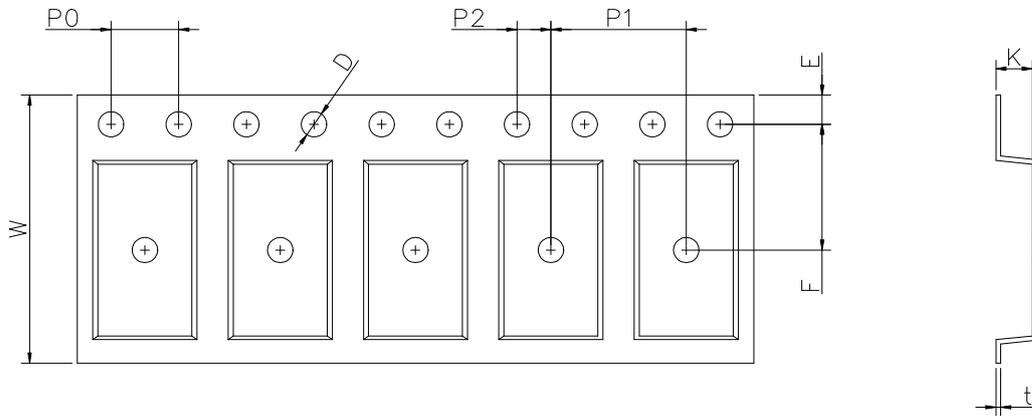


SLM type Dimension



TAPING DIMENSIONS (Dimensions in mm unless otherwise stated)

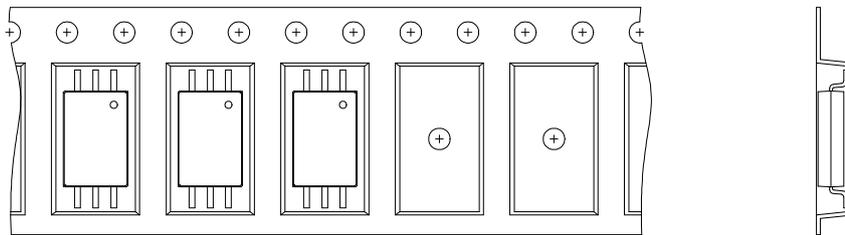
SL type Taping Dimensions



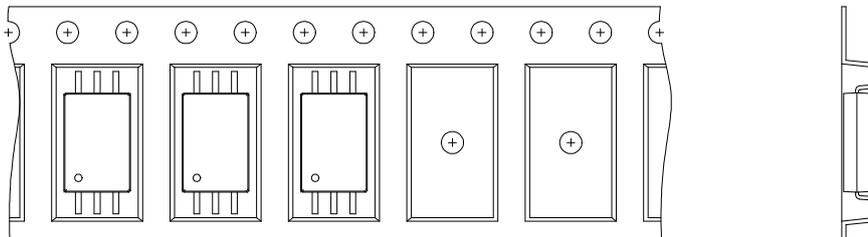
Dimension Symbol	D	E	F	P0	P1	P2	t	W	K
Dimension (mm)	1.5±0.1	1.75±0.1	7.5±0.1	4.0±0.1	8.0±0.1	2.0±0.1	0.3±0.1	16.0±0.3	2.15±0.1

Tape & Reel Packing Specifications

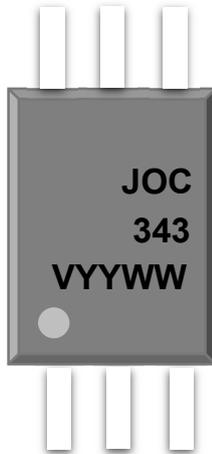
Option T1



Option T2



MARKING INFORMATION



JOC : Company Abbr.
343 : Part Number & Rank
V : VDE Option
Y : Manufacturing Code
WW : Work Week

ORDERING INFORMATION

JOC343(Y)(Z)-GV

JOC– Company Abbr.
 343 – Part Number
 Y – Lead Form Option
 Z – Tape and Reel Option (T1/T2)
 G – Green
 V – VDE Option (V or None)

DISCLAIMER

- JIEJIE is continually improving the quality, reliability, function and design. JIEJIE reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
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- This product is not intended to be used for military, aircraft, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact JIEJIE sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify JIEJIE's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.