ICPL2530, ICPL2531

HIGH SPEED DUAL CHANNEL OPTICALLY COUPLED ISOLATOR PHOTOTRANSISTOR OUTPUT

APPROVALS

- UL recognised, File No. E91231

DESCRIPTION

These dual channel diode-transistor optocouplers use a light emitting diode and an integrated photon detector to provide 2500Volts $_{RMS}$ electrical isolation between input and output. Seperate connection for the photodiode bias and output transistor collector improve the speed up to a hundred times that of a conventional photo-transistor coupler by reducing the base-collector capacitance.

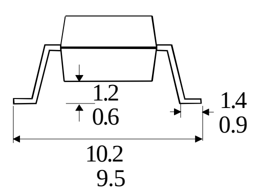
FEATURES

- High speed - 1 MBits/s
- High Common Mode Transient Immunity 1000V/µs
- TTL Compatible
- 3 MHz Bandwidth
- Open Collector Outputs
- 2500V $_{RMS}$ Withstand Test Voltage,1 Min
- ICPL2531 has improved noise shield which gives superior common mode rejection
- Options :-
  10mm lead spread - add G after part no.
  Surface mount - add SM after part no.
  Tape&reel - add SMT&R after part no.
- All electrical parameters 100% tested
- Custom electrical selections available

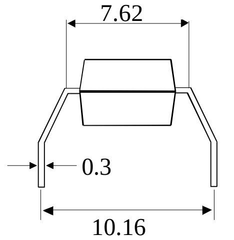
APPLICATIONS

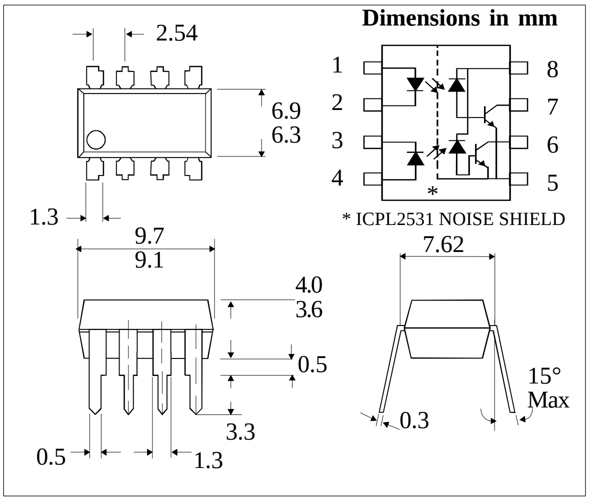
- Line receivers
- Pulse transformer replacement
- Wide bandwidth analog coupling
- Output interface to CMOS-LSTTL-TTL

OPTION SM
SURFACE MOUNT



OPTION G





ABSOLUTE MAXIMUM RATINGS
(25°C unless otherwise specified)

Storage Temperature	-55°C to + 125°C
Operating Temperature	-55°C to + 100°C
Lead Soldering Temperature (1/16 inch (1.6mm) from case for 10 secs)	260°C

INPUT DIODE

Average Forward Current	25mA (1)
Peak Forward Current (50% duty cycle, 1ms pulse width)	50mA (2)
Peak Transient Current (equal to or less than 1µs P.W., 300 pps)	1.0A
Reverse Voltage	5V
Power Dissipation	45mW(3)

DETECTOR

Average Output Current	8mA
Peak Output Current	16mA
Supply Voltage	-0.5 to +30V
Output Voltage	-0.5 to +20V
Power Dissipation	35mW(4)

ISOCOM COMPONENTS LTD
Unit 25B, Park View Road West,
Park View Industrial Estate, Brenda Road
Hartlepool, Cleveland, TS25 1YD
Tel: (01429) 863609 Fax :(01429) 863581

ISOCOM INC
1024 S. Greenville Ave, Suite 240,
Allen, TX 75002 USA
Tel: (214) 495-0755 Fax: (214) 495-0901
e-mail info@isocom.com
http://www.isocom.com

ELECTRICAL CHARACTERISTICS (T_A= 0°C to 70°C Unless otherwise noted)

PARAMETER	SYM	DEVICE	MIN	TYP*	MAX	UNITS	TEST CONDITION
Current Transfer Ratio (note 5,6)	CTR	ICPL2530 ICPL2531	7 19	18		% %	I_F = 16mA, V_O = 0.5V V_{CC} = 4.5V, T_A= 25°C
		ICPL2530 ICPL2531	5 15	13		% %	I_F = 16mA, V_O = 0.5V V_{CC} = 4.5V
Logic Low Output Voltage (note 5)	V_{OL}	ICPL2530		0.1	0.5	V	I_F = 16mA, I_O=1.1mA V_{CC} = 4.5V, T_A= 25°C
		ICPL2531		0.1	0.5	V	I_F = 16mA, I_O=2.4mA V_{CC} = 4.5V, T_A= 25°C
Logic High Output Current (note 5)	I_{OH}			0.02 0.01	500 10	nA µA	I_{F1} = I_{F2}= 0mA,T_A= 25°C V_{O1} = V_{O2} = V_{CC} = 5.5V I_{F1} = I_{F2}= 0mA V_{O1} = V_{O2} = V_{CC} = 15V
Logic Low Supply Current	I_{CCL}			80		µA	I_{F1}= I_{F2}=16mA,V_{CC}=15V V_{O1} = V_{O2} = open
Logic High Supply Current	I_{CCH}			0.01	4	µA	I_{F1}= I_{F2}= 0mA,V_{CC}=15V V_{O1} = V_{O2} = open
Input Forward Voltage (note 5)	V_F			1.5	1.7	V	I_F = 16mA, T_A= 25°C
Temperature Coefficient of Forward Voltage (note 5)	$\frac{\Delta V_F}{\Delta T_A}$			-1.6		mV/°C	I_F = 16mA
Input Reverse Voltage (note 5)	V_R		5			V	I_R = 10µA,T_A= 25°C
Input Capacitance (note 5)	C_{IN}			60		pF	f = 1MHz, V_F = 0
Input-output Isolation Voltage (note 7)	V_{ISO}		2500	5000		V_{RMS}	R.H.equal to or less than 50%, t = 1min. T_A= 25°C
Resistance (Input to Output) (note 7)	R_{IO}			10^{12}		Ω	V_{IO} = 500V dc
Capacitance (Input to Output) (note 7)	C_{IO}			0.6		pF	f = 1MHz
Input-Input Insulation Leakage Current (note 8)	I_{I-I}			0.005		µA	45 % Relative Humidity t = 5s, V_{I-I} = 500V dc
Resistance (Input to Input)(note8)	R_{I-I}			10^{11}		Ω	V_{I-I} = 500V dc
Capacitance (Input to Input)(note8)	C_{I-I}			0.25		pF	f = 1MHz

* All typicals at T_A= 25°C

SWITCHING SPECIFICATIONS AT T_A = 25°C (V_{CC} = 5V, I_F = 16mA Unless otherwise noted)

PARAMETER	SYM	DEVICE	MIN	TYP	MAX	UNITS	TEST CONDITION
Propagation Delay Time to Logic Low at Output (fig 1)	t_{PHL}	ICPL2530 ICPL2531		0.5 0.2	1.5 0.8	µs µs	R_L= 4.1kΩ,(note11) R_L= 1.9kΩ,(note10)
Propagation Delay Time to Logic High at Output (fig 1)	t_{PLH}	ICPL2530 ICPL2531		0.5 0.2	1.5 0.8	µs µs	R_L= 4.1kΩ,(note11) R_L= 1.9kΩ,(note10)
Common Mode Transient Immunity at Logic High Level Output (fig 2)	CM_H	ICPL2530		1000		V/µs	I_F = 0mA, V_{CM} = $10V_{PP}$ R_L= 4.1kΩ,(note9,11)
		ICPL2531		1000		V/µs	I_F = 0mA, V_{CM} = $10V_{PP}$ R_L = 1.9kΩ,(note9,10)
Common Mode Transient Immunity at Logic Low Level Output (fig 2)	CM_L	ICPL2530		-1000		V/µs	V_{CM} = $10V_{PP}$ R_L = 4.1kΩ,(note9,11)
		ICPL2531		-1000		V/µs	V_{CM} = $10V_{PP}$ R_L = 1.9kΩ,(note9,10)
Bandwidth	BW			3		MHz	R_L = 100Ω, (note 12)

NOTES:-

1. Derate linearly above 70°C free air temperature at a rate of 0.8 mA/°C.
2. Derate linearly above 70°C free air temperature at a rate of 1.6 mA/°C.
3. Derate linearly above 70°C free air temperature at a rate of 0.9 mW/°C.
4. Derate linearly above 70°C free air temperature at a rate of 1.0 mW/°C.
5. Each channel.
6. CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I_O , to the forward LED input current, I_F times 100%.
7. Device considered a two-terminal device: pins 1,2,3, and 4 shorted together and pins 5,6,7 and 8 shorted together.
8. Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.
9. Common mode transient immunity in Logic High level is the maximum tolerable (positive) dVcm/dt on the leading edge of the common mode pulse V_{CM} to assure that the output will remain in a Logic High state (i.e. V_O > 2.0V). Common mode transient immunity in Logic Low level is the maximum tolerable (negative) dVcm/dt on the trailing edge of the common mode pulse signal, V_{CM} to assure that the output will remain in Logic Low state (i.e. V_O< 0.8V).
10. The 1.9kΩ load represents 1 TTL unit load of 1.6mA and the 5.6kΩ pull-up resistor.
11. The 4.1kΩ load represents 1 LSTTL unit load of 0.36mA and the 6.1kΩ pull-up resistor.
12. The frequency at which the a.c. output voltage is 3dB below the low frequency asymptote.

FIG.1 SWITCHING TEST CIRCUIT

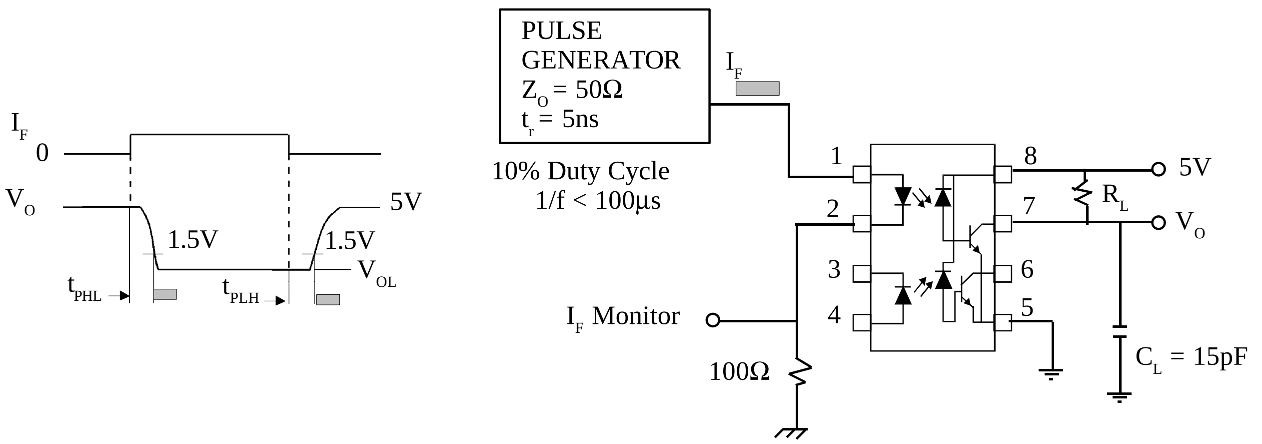
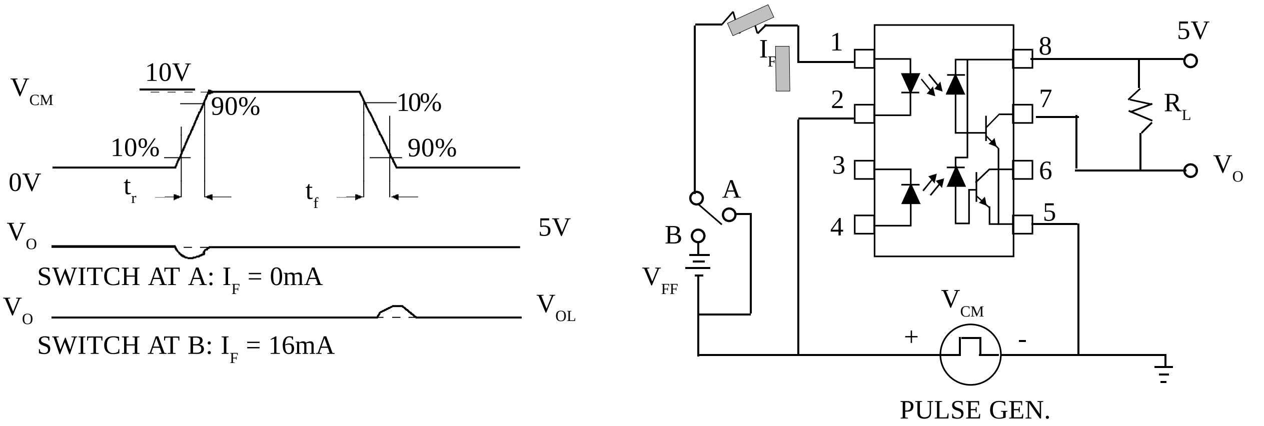
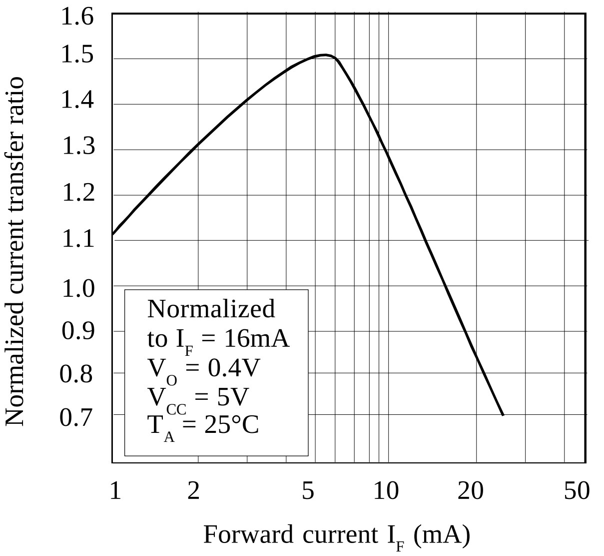


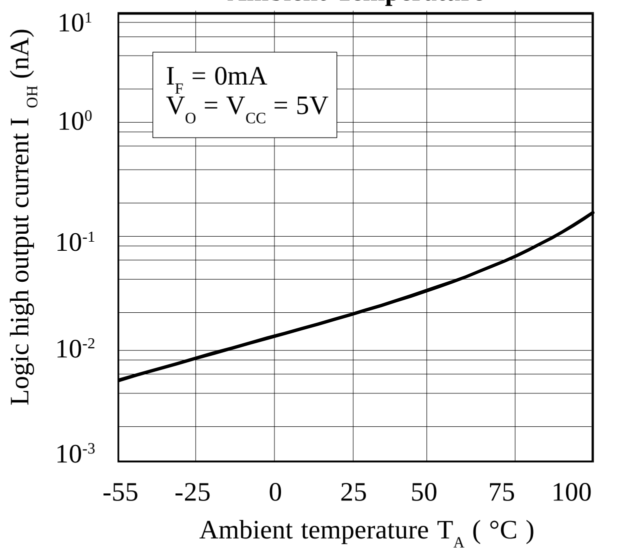
FIG. 2 TEST CIRCUIT FOR TRANSIENT IMMUNITY AND TYPICAL WAVEFORMS



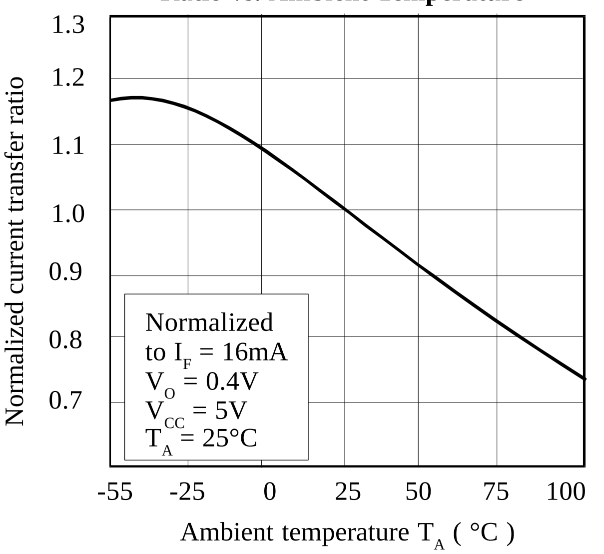
Normalized Current Transfer Ratio vs. Forward Current



Logic High Output Current vs. Ambient Temperature



Normalized Current Transfer Ratio vs. Ambient Temperature



Normalized Propagation Delay vs. Ambient Temperature