

ICPL2730
ICPL2731



**HIGH SPEED DUAL CHANNEL
OPTICALLY COUPLED ISOLATOR
PHOTODARLINGTON OUTPUT**

APPROVALS

- UL recognised, File No. E91231

DESCRIPTION

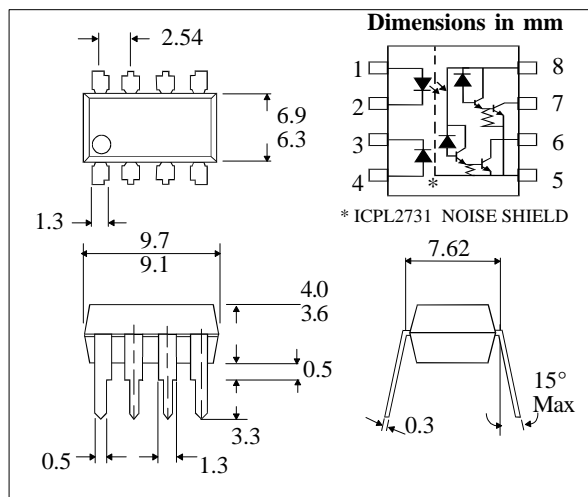
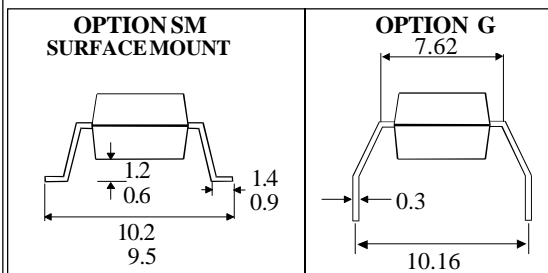
These dual channel diode-darlington optocouplers use a pair of light emitting diodes and an integrated high gain photon detectors to provide 2500Volts_{RMS} electrical isolation between input and output. Seperate connection for the photodiode bias and output darlington collector improve the speed up to a hundred times that of a conventional photo-darlington coupler by reducing the base-collector capacitance.

FEATURES

- High speed - DC to 200kBits/s operation
- High Common Mode Transient Immunity 10kV/μs typical
- TTL Compatible - 0.1V V_{OL} typical
- Low Input Current Requirement - 0.5mA
- High Current Transfer Ratio - 2000% typ.
- Open Collector Output
- 2500V_{RMS} Withstand Test Voltage, 1 min
- ICPL2731 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
- Digital logic ground isolation
- Telephone ring detector
- Current loop receiver



**ABSOLUTE MAXIMUM RATINGS
(25°C unless otherwise specified)**

Storage Temperature	-55°C to + 125°C
Operating Temperature	-40°C to + 85°C
Lead Soldering Temperature (1/16 inch (1.6mm) from case for 10 secs)	260°C

INPUT DIODE

Average Forward Current	20mA (1)
Peak Forward Current (50% duty cycle, 1ms pulse width)	40mA
Reverse Voltage	5V
Power Dissipation	35mW(2)

DETECTOR

Output Current	60mA (3)
Supply and Output Voltage	
ICPL2730	-0.5 to +7V
ICPL2731	-0.5 to +18V
Power Dissipation	100mW (4)

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ELECTRICAL CHARACTERISTICS (T_A = 0°C to 70°C, V_{CC} = 4.5V Unless otherwise noted)

PARAMETER	SYM	DEVICE	MIN	TYP*	MAX	UNITS	TEST CONDITION
Current Transfer Ratio (note 5, 6)	CTR	ICPL2731	400	2000		%	I _F = 0.5mA, V _O = 0.4V
		ICPL2731	500	2000		%	I _F = 1.6mA, V _O = 0.4V
		ICPL2730	300	2000		%	I _F = 1.6mA, V _O = 0.4V
Logic Low Output Voltage (note 5)	V _{OL}	ICPL2731		0.1	0.4	V	I _F = 0.5mA, I _O = 2mA
		ICPL2731		0.1	0.4	V	I _F = 1.6mA, I _O = 8mA
		ICPL2731		0.1	0.4	V	I _F = 5mA, I _O = 15mA
		ICPL2731		0.1	0.4	V	I _F = 12mA, I _O = 24mA
		ICPL2730		0.1	0.4	V	I _F = 1.6mA, I _O = 4.8mA
Logic High Output Current (note 5)	I _{OH}	ICPL2731		0.01	100	μA	I _F = 0mA V _O = V _{CC} = 18V
		ICPL2730		0.01	100	μA	I _F = 0mA V _O = V _{CC} = 7V
Logic Low Supply Current	I _{CCL}	ICPL2731		0.5		mA	I _{F1} = I _{F2} = 1.6mA, V _{CC} = 18V V _{O1} = V _{O2} = open
		ICPL2730		0.4		mA	I _{F1} = I _{F2} = 1.6mA, V _{CC} = 7V V _{O1} = V _{O2} = open
Logic High Supply Current	I _{CCH}	ICPL2731		5		nA	I _{F1} = I _{F2} = 0mA, V _{CC} = 18V V _{O1} = V _{O2} = open
		ICPL2730		4		nA	I _{F1} = I _{F2} = 0mA, V _{CC} = 18V V _{O1} = V _{O2} = open
Input Forward Voltage (note 5)	V _F			1.45	1.7	V	I _F = 1.6mA, T _A = 25°C
Temperature Coefficient of Forward Voltage (note 5)	$\frac{\Delta V_F}{\Delta T_A}$			-1.8		mV/°C	I _F = 1.6mA
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 10)	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 10)	R _{I-O}			10 ¹²		Ω	V _{I-O} = 500V dc
Capacitance (Input to Output) (note 10)	C _{I-O}			0.6		pF	f = 1MHz
Input-Input Insulation (note 7)	I _{I-I}			0.005		μA	R.H.equal to or less than 50%, t = 5sec. V _{I-I} = 500DC
Resistance (Input to Input) (note7)	R _{I-I}			10 ¹¹		Ω	V _{I-I} = 500V dc
Capacitance (Input to Input) (note7)	C _{I-I}			0.25		pF	f = 1MHz

* All typicals at T_A = 25°C

SWITCHING SPECIFICATIONS AT $T_A = 25^\circ\text{C}$ ($V_{CC} = 5\text{V}$ Unless otherwise noted)

PARAMETER	SYM	DEVICE	MIN	TYP	MAX	UNITS	TEST CONDITION
Propagation Delay Time to Logic Low at Output (fig 1)(note 5)	t_{PHL}	ICPL2731		25	100	μs	$I_F = 0.5\text{mA}, R_L = 4.7\text{k}\Omega$
		ICPL2730/1		0.5	2	μs	$I_F = 12\text{mA}, R_L = 270\Omega$
		ICPL2730/1		4.0	20	μs	$I_F = 1.6\text{mA}, R_L = 2.2\text{k}\Omega$
Propagation Delay Time to Logic High at Output (fig 1)(note 5)	t_{PLH}	ICPL2731		20	60	μs	$I_F = 0.5\text{mA}, R_L = 4.7\text{k}\Omega$
		ICPL2730/1		4	10	μs	$I_F = 12\text{mA}, R_L = 270\Omega$
		ICPL2730/1		12	35	μs	$I_F = 1.6\text{mA}, R_L = 2.2\text{k}\Omega$
Common Mode Transient Immunity at Logic High Level Output (fig 2)(note 9)	CM_H		1000	10000		$\text{V}/\mu\text{s}$	$I_F = 0\text{mA}, V_{CM} = 10V_{PP}$ $R_L = 2.2\text{k}\Omega$
Common Mode Transient Immunity at Logic Low Level Output (fig 2)(note 8)	CM_L		-1000	-10000		$\text{V}/\mu\text{s}$	$I_F = 1.6\text{mA}, V_{CM} = 10V_{PP}$ $R_L = 2.2\text{k}\Omega$

NOTES:-

- Derate linearly above 70°C free air temperature at a rate of $0.5 \text{ mA}/^\circ\text{C}$.
- Derate linearly above 70°C free air temperature at a rate of $0.9 \text{ mW}/^\circ\text{C}$.
- Derate linearly above 70°C free air temperature at a rate of $0.6 \text{ mA}/^\circ\text{C}$.
- Derate linearly above 35°C free air temperature at a rate of $1.7 \text{ mW}/^\circ\text{C}$.
Output power = (Collector output) + (Supply output).
- Each channel.
- CURRENT TRANSFER RATIO is defined as the ratio of output collector current, I_O , to the forward LED input current, I_F times 100%.
- Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.
- Common mode transient immunity in Logic Low level is the maximum tolerable (negative) dV_{CM}/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. $V_O < 0.8\text{V}$). Measured in volts per microsecond ($\text{V}/\mu\text{s}$).
- Common mode transient immunity in Logic High level is the maximum tolerable (positive) dV_{CM}/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. $V_O > 2.0\text{V}$). Measured in volts per microsecond ($\text{V}/\mu\text{s}$).
- Device considered a two-terminal device: pins 1,2,3, and 4 shorted together and pins 5,6,7 and 8 shorted together.

FIG.1 SWITCHING TEST CIRCUIT

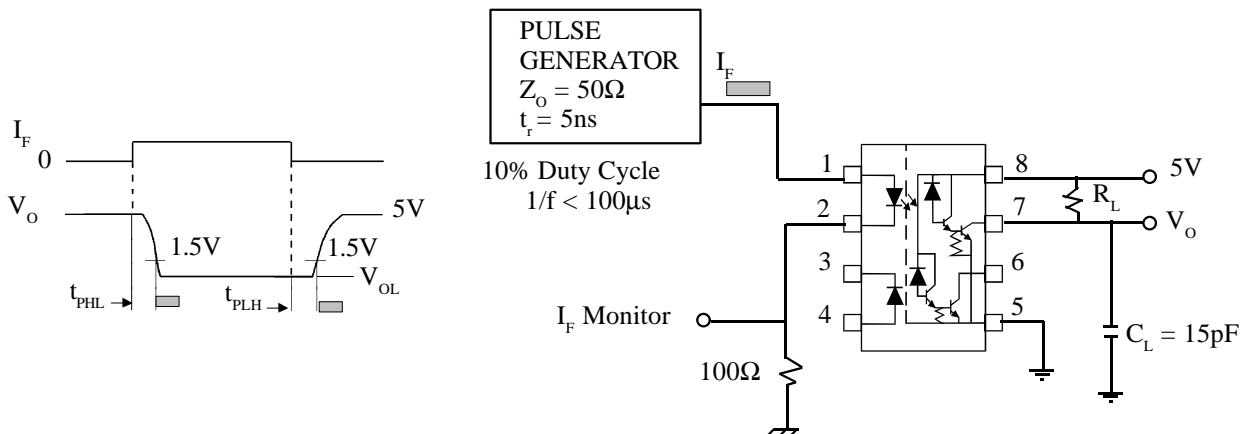


FIG. 2 TEST CIRCUIT FOR TRANSIENT IMMUNITY AND TYPICAL WAVEFORMS

