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.

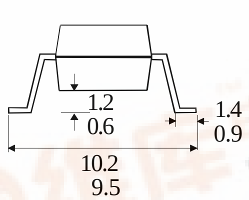
FEATURES

- 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

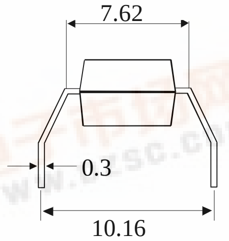
APPLICATIONS

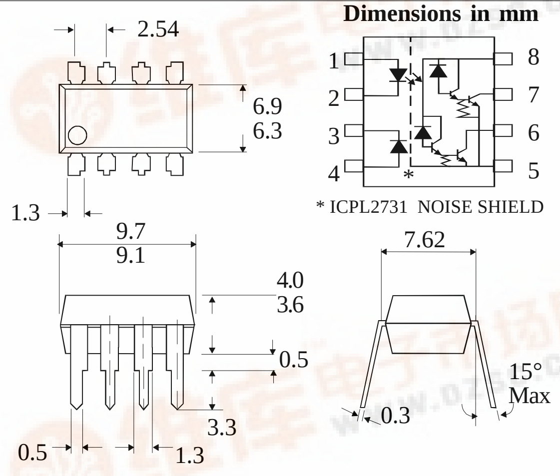
- Line receivers
- Digital logic ground isolation
- Telephone ring detector
- Current loop receiver

OPTION SM
SURFACE MOUNT



OPTION G





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°C (V_{CC} = 5V 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 ICPL2730/1 ICPL2730/1		25 0.5 4.0	100 2 20	µs µs µs	I_F = 0.5mA,R_L = 4.7kΩ I_F = 12mA,R_L = 270Ω I_F = 1.6mA,R_L = 2.2kΩ
Propagation Delay Time to Logic High at Output (fig 1)(note 5)	t_{PLH}	ICPL2731 ICPL2730/1 ICPL2730/1		20 4 12	60 10 35	µs µs µs	I_F = 0.5mA,R_L = 4.7kΩ I_F = 12mA,R_L = 270Ω I_F = 1.6mA,R_L = 2.2kΩ
Common Mode Transient Immunity at Logic High Level Output (fig 2)(note 9)	CM_H		1000	10000		V/µs	I_F = 0mA, V_{CM} = 10V_{PP} R_L = 2.2kΩ
Common Mode Transient Immunity at Logic Low Level Output (fig 2)(note 8)	CM_L		-1000	-10000		V/µs	I_F= 1.6mA,V_{CM}= 10V_{PP} R_L = 2.2kΩ

NOTES:-

1. Derate linearly above 70°C free air temperature at a rate of 0.5 mA/°C.
2. Derate linearly above 70°C free air temperature at a rate of 0.9 mW/°C.
3. Derate linearly above 70°C free air temperature at a rate of 0.6 mA/°C.
4. Derate linearly above 35°C free air temperature at a rate of 1.7 mW/°C.
   Output power = (Collector output) + (Supply output).
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. Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.
8. 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).Measured in volts per microsecond (V/µs).
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).Measured in volts per microsecond (V/µs).
10. 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

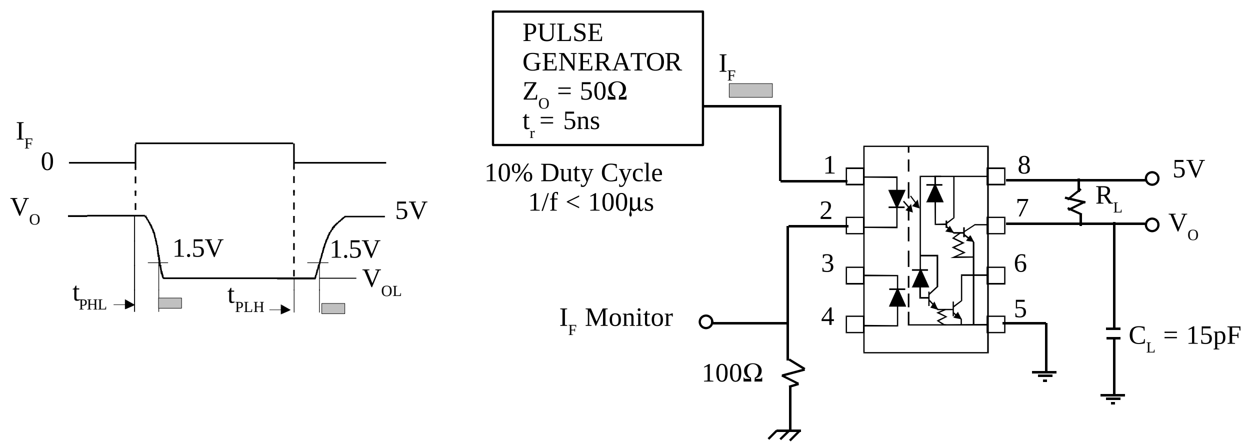
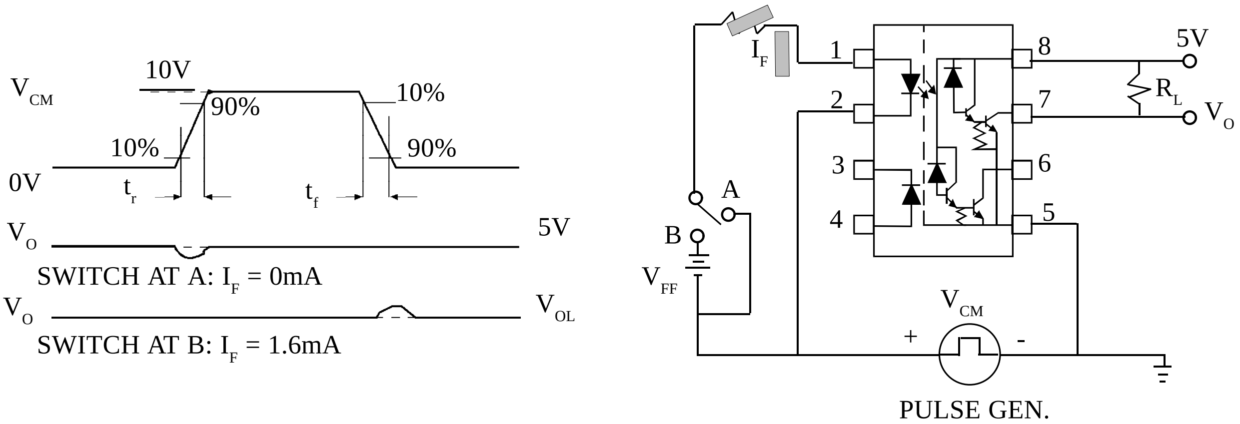
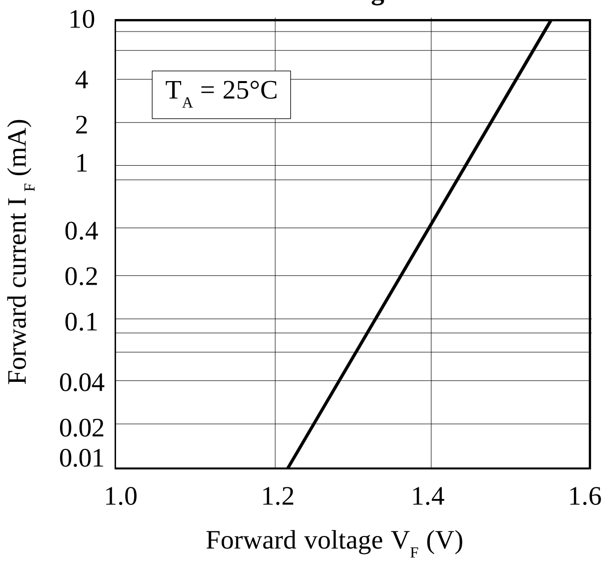


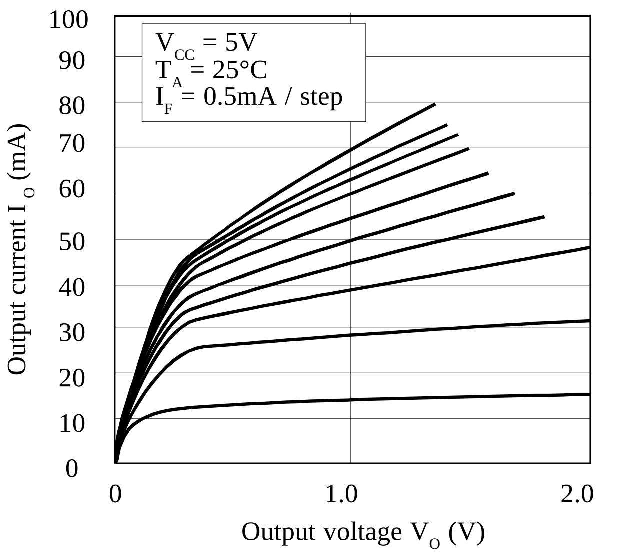
FIG. 2 TEST CIRCUIT FOR TRANSIENT IMMUNITY AND TYPICAL WAVEFORMS



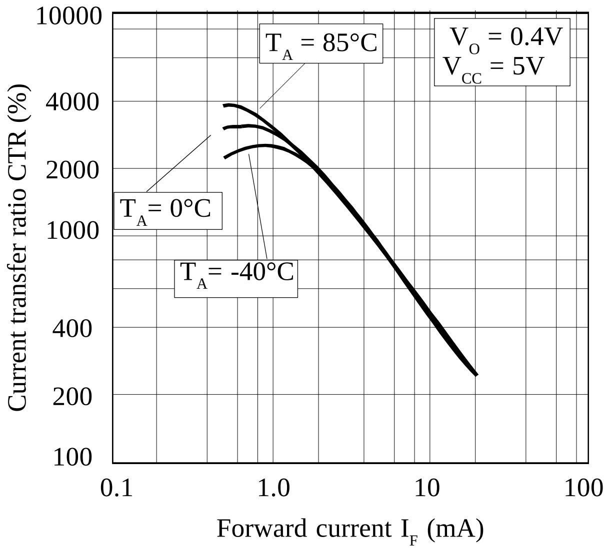
Forward Current vs. Forward Voltage



Output Current vs. Output Voltage



Current Transfer Ratio vs. Forward Current



Supply Current vs. Forward Current