

ICPL2730
ICPL2731



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

APPROVALS

- UL recognised, File No. E91231

DESCRIPTION

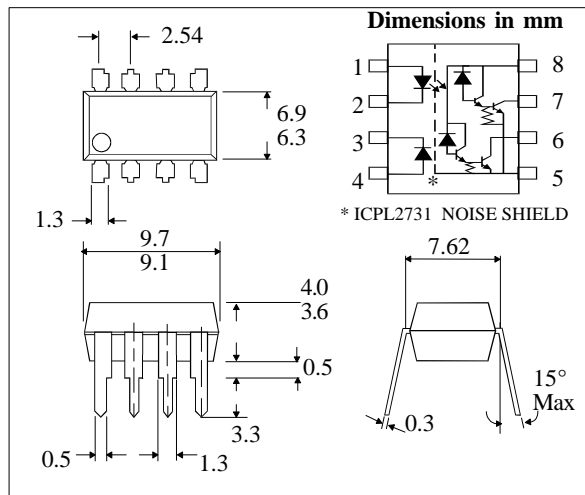
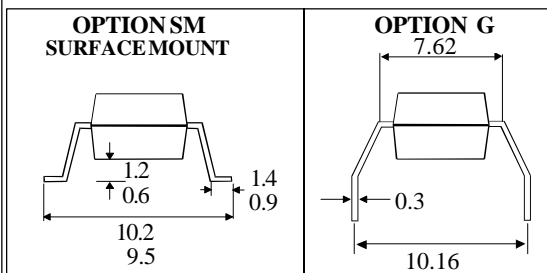
These dual channel diode-darlington optocouplers use a pair of light emitting diodes and an integrated high gain photon detectors to provide 2500Volts_{RMS} electrical isolation between input and output. Seperate connection for the photodiode bias and output darlington collector improve the speed up 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 _____ 40mA
(50% duty cycle, 1ms pulse width)
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 | | $\text{V}/\mu\text{s}$ | $I_F = 0\text{mA}, V_{CM} = 10\text{V}_{PP}$ $R_L = 2.2\text{k}\Omega$ |
| Common Mode Transient Immunity at Logic Low Level Output (fig 2)(note 8) | CM_L | | -1000 | -10000 | | $\text{V}/\mu\text{s}$ | $I_F = 1.6\text{mA}, V_{CM} = 10\text{V}_{PP}$ $R_L = 2.2\text{k}\Omega$ |

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

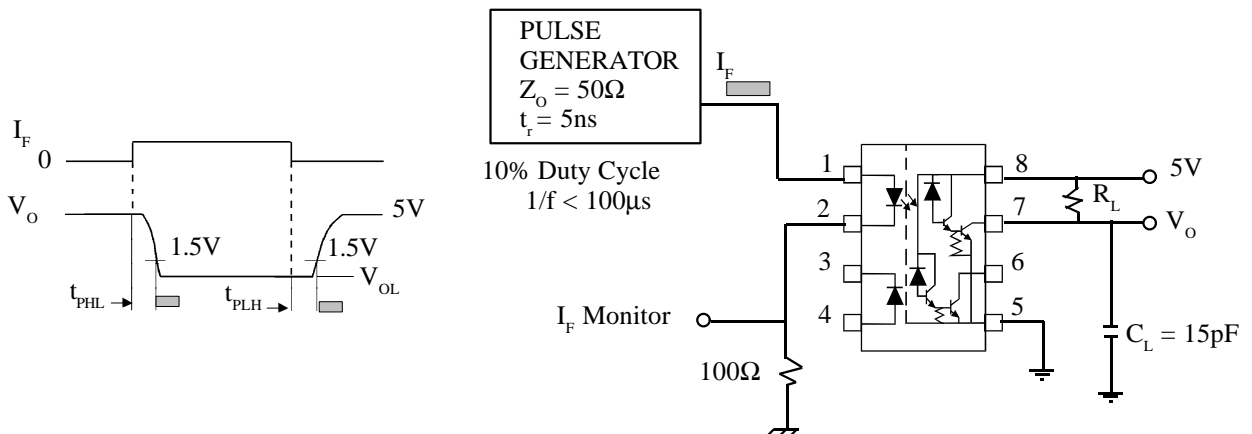


FIG. 2 TEST CIRCUIT FOR TRANSIENT IMMUNITY AND TYPICAL WAVEFORMS

