

DATA SHEET

OLF400: Low-Input Current Hermetic Surface Mount Optocoupler

Features

- Hermetic SMT package
- Electrical parameters guaranteed over -55°C to +125°C ambient temperature range
- 1000 V_{DC} electrical isolation
- Low input current, 0.5 mA
- Low output V_{SAT}, 0.1 V typical
- High current transfer ration
- Similar to industry standard parts
- 6N138/6N139 in plastic and 6N140 in hermetic DIP packages
- Radiation tolerant
- Offers 100 high reliability screenings

Description

The OLF400 has high current transfer ratio at very low input currents making it ideal for applications such as MOS, CMOS, and low power logic interfacing or RS232C data transmission systems. Each OLF400 and LED integrated photodiode Darlington detector IC mounted and coupled in a custom 8-pin hermetic flat-pack package, providing 1000 V_{DC} electrical isolation between input and output. The Darlington detector has an integrated base-emitter resistor for superior high temperature performance. The split Darlington design permits lower output saturation voltage and higher switching speed operation than possible with conventional photodarlington design. The internal shield provides excellent common mode immunity performance.

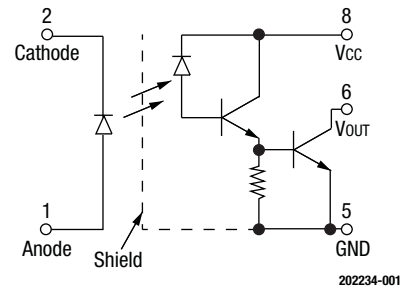


Figure 1. OLF400 Block Diagram

Figure 1 shows the OLF400 functional block diagram. Table 1 provides the OLF400 absolute maximum ratings. Table 2 provides the OLF400 electrical specifications.

Figures 2 through 5 illustrate the OLF400 typical performance characteristics. Figure 6 shows the OLF400 switching test circuit. Figure 7 provides the OLF400 package dimensions.

Table 1. OLF400 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
<i>Coupled</i>				
Input to output isolation voltage	V _{DC}		±1000	V
Storage temperature	T _{STG}		+150	°C
Operating temperature	T _A	-65	+125	°C
Lead temperature (1.6 mm from case for 10 seconds)		-55	+240	°C
<i>Input Diode</i>				
Average input current	I _{DD}		20	mA
Peak forward current (≤ 1 ms duration)	I _F		40	mA
Reverse voltage	V _R		5	V
Power dissipation	P _D		36	mW
<i>Output Detector</i>				
Average output current			+40	mA
Supply voltage	V _{CC}	- 0.5	+20.0	V
Output voltage	V _{OUT}	- 0.5	+20.0	V
Power dissipation	P _D		+50	mW

CAUTION: *Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.*

Table 2. OLF400 Electrical Specifications ¹
(T_A = 55 °C + 125 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Current Transfer Ratio (CTR) ²	CTR	I _F = 0.5 mA, V _O = 0.4V, V _{CC} = 4.5 V	300			%
		I _F = 1.6 mA, V _O = 0.4V, V _{CC} = 4.5 V	300			%
		I _F = 5.0 mA, V _O = 0.4V, V _{CC} = 4.5 V	200			%
Logic low output voltage	V _{OL}	I _F = 0.5 mA, I _{OL} = 1.5 mA, V _{CC} = 4.5 V		0.1	0.4	V
		I _F = 5 mA, I _{OL} = 10 mA, V _{CC} = 4.5 V		0.2	0.4	V
Logic high output current	I _{OH}	I _F = 0 mA, V _O = V _{CC} = 18 V		0.005	250	μA
Logic low supply current	I _{CCL}	I _F = 1.6 mA, V _{CC} = 18 V		0.6	2	mA
Logic high supply current	I _{CCH}	I _F = 0 mA, V _{CC} = 18 V		0.01	40	μA
Input forward voltage	V _F	I _F = 1.6 mA		1.65	2	V
Input reverse breakdown voltage	B _{VR}	I _R = 10 μA	3			V
Input to output leakage current ³	I _{I_O}	Relative humidity ≤ 50%, T _A = 25 °C V _{I_O} = 1000 V _{DC}			1	μA
Propagation Delay Time: Logic high to low	t _{PHL}	I _F = 0.5 mA, R _L = 4.7 KΩ, V _{CC} = 5 V, T _A = 25 °C		26	100	μs
		I _F = 5 mA, R _L = 680 KΩ, V _{CC} = 5 V, T _A = 25 °C		2	10	μs
Logic low to high	t _{PLH}	I _F = 0.5 mA, R _L = 4.7 KΩ, V _{CC} = 5 V, T _A = 25 °C		28	60	μs
		I _F = 5 mA, R _L = 680 KΩ, V _{CC} = 5 V, T _A = 25 °C		10	30	μs
Common mode transient immunity Logic high level	C _{MH}	I _F = 0 mA, V _{CC} = 5 V, T _A = 25 °C	500	≥ 2 K		V/μs
		I _F = 1.6 mA, R _L = 1.5 KΩ, V _{CC} = 50 V, T _A = 25 °C	500	≥ 2 K		V/μs

¹ Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to the device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

² Current transfer ration is defined as the ratio of the output collector current I_C to the forward LED current I_F, multiplied by 100%.

³ Measured between pins 1, 2, 3, and 4 shorted together, and pins 5, 6, 7, and 8 shorted together. T_A = 25 °C and duration = 1 second.

Typical Performance Characteristics

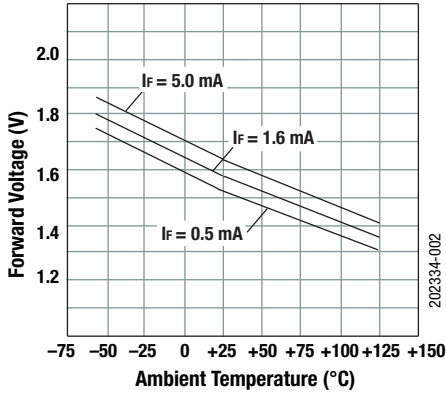


Figure 2. LED Forward Voltage vs Temperature

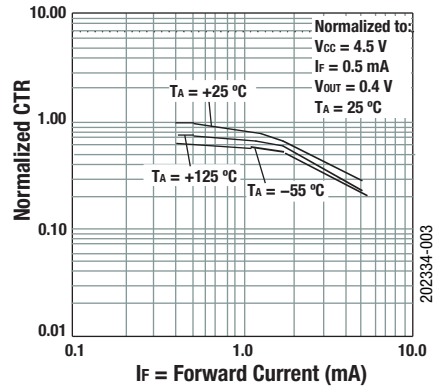


Figure 3. Normalized CTR vs Input Diode Forward Current

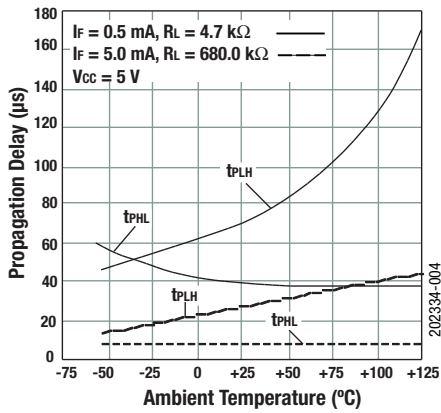


Figure 4. Propagation Delay vs Temperature

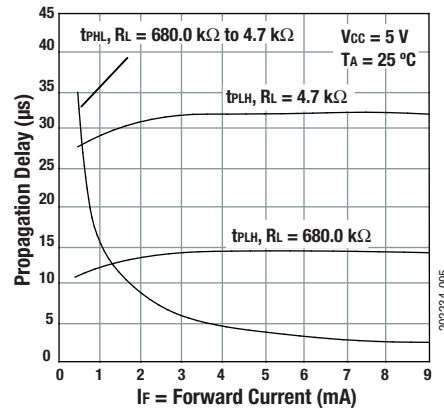


Figure 5. Propagation Delay vs Input Diode Current

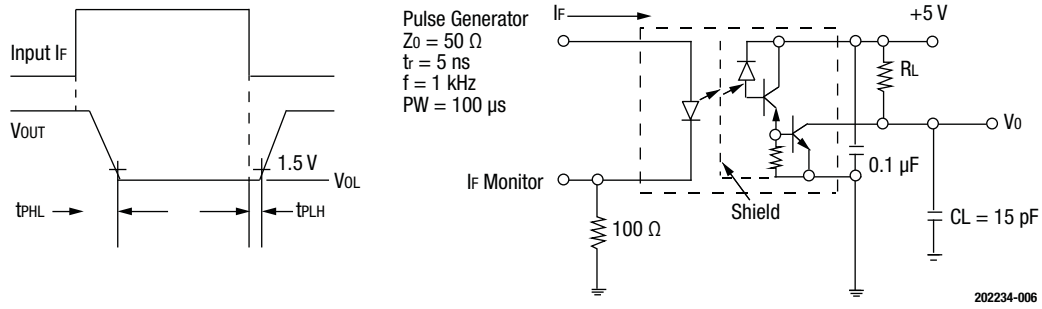


Figure 6. OLF400 Switching Test Circuit

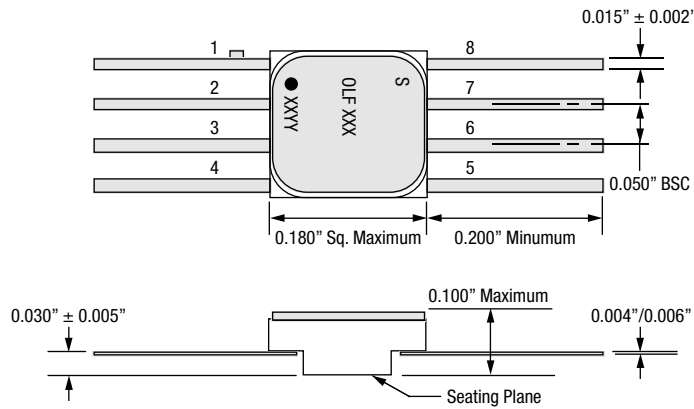


Figure 7. OLF400 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
OLF400 Low Input Current Hermetic Surface Mount Optocoupler	OLF400

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