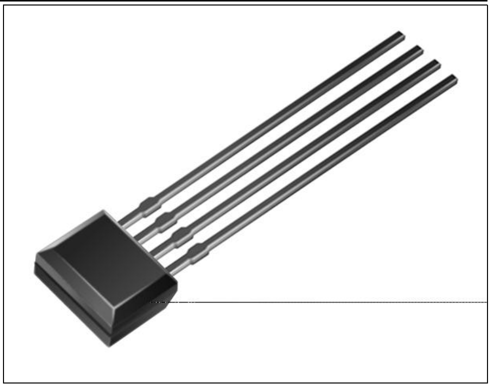
HLC2701

Encoder Detector

FEATURES

- Side-looking plastic package
- TTL/LSTTL/CMOS compatible
- Inverting logic output
- Linear or rotary encoder applications
- Resolution to 0.009 in.(.229 mm)
- Sensitivity versus temperature compensation
- Mechanically and spectrally matched to SEP8506 and SEP8706 infrared emitting diodes



INFRA-74.TIF

DESCRIPTION

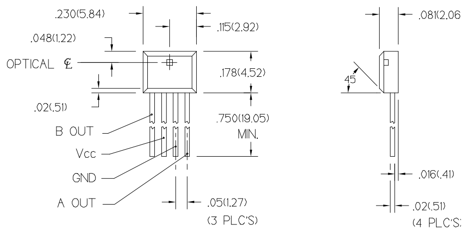
The HLC2701 detector is designed to sense speed and direction of mechanical motion. Applications include rotary and linear encoders; the device is especially well suited for the encoding function in an optical mouse. The detector is a monolithic IC, consisting of two narrow adjacent photodiodes, amplifiers, and Schmitt trigger output stages. The outputs are NPN collectors with internal 10 kΩ (nominal) pull- up resistors to V_{CC} which can directly drive TTL loads. It incorporates circuitry to compensate the sensitivity for the output power versus temperature characteristics of an IRED. The IC is encapsulated in a molded, unlensed black plastic package which is transmissive to IR energy, yet provides shielding from visible light.

In a typical application, the HLC2701 is used in conjunction with an IRED and an encoder disk or linear encoder strip attached to an element for which speed and direction of movement is to be sensed. As the interruptive pattern moves, the sensor provides two phase shifted output signals (active low) which can be processed to provide the speed and direction information.

The sensing areas of the IC are each 0.008 in.(.203 mm) in width and in .015in.(.381 mm) in height with a 0.001 in.(.0254 mm) separation, for center- to- center spacing of 0.009 in.(.203 mm), and outside edge to edge distance of 0.017 in.(.432 mm).

OUTLINE DIMENSIONS in inches (mm)

Tolerance	3 plc decimals	±0.005(0.12)
	2 plc decimals	±0.020(0.51)



DIM_030.cdr

Honeywell

HLC2701

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ELECTRICAL CHARACTERISTICS (-40°C to +85°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Operating Supply Voltage	V_{CC}	4.5		5.5	V	
Turn-on Threshold Irradiance [2]	$E_{eT(+)}$				mW/cm²	V_{CC}=5 V
HLC2701-001		0.05		2.0		T_A=25°C
Hysteresis [3]	HYST		28		%	
Supply Current	I_{CC}			7.0	mA	V_{CC}=5.25 V
High Level Output Voltage (A and B)	V_{OH}	2.4			V	V_{CC}=5 V I_{OH}=0, E_e=0
Low Level Output Voltage (A and B)	V_{OL}			0.4	V	V_{CC}=5 V, I_{OL}=1.6 mA E_e=2.0 mW/cm²
Internal Pull-Up Resistor	R_{INT}	5.0	10.0	20.0	kΩ	
Operate Point Temperature Coefficient	O_{PTC}		-0.76		%/°C	Emitter @ Constant Temperature
Output Rise Time, Output Fall Time	t_r, t_f		100		ns	V_{CC}=5 V R_L=1 kΩ T_A=25°C
Propagation Delay, Low-High, High-Low	t_{PLH}, t_{PHL}		5.0		µs	V_{CE}=5 V R_L=1 kΩ T_A=25°C

Notes

1. It is recommended that a bypass capacitor, 0.1 µF typical, be added between V_{CC} and GND near the device in order to stabilize power supply line.
2. The radiation source is an IRED with a peak wavelength of 880 nm.
3. Hysteresis is defined as the difference between the operating and release threshold intensities, expressed as a percentage of the operate threshold intensity.

ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Duration of Output	
Short to V_{CC} or Ground	1.0 sec.
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

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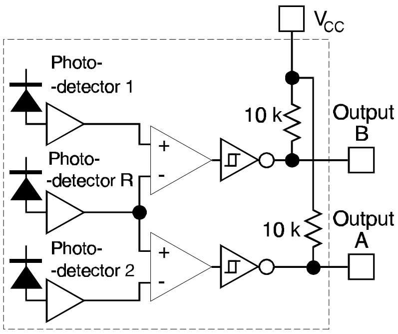
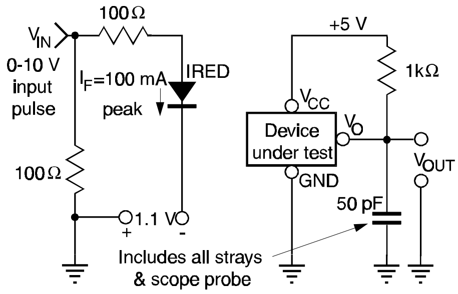
FUNCTIONAL BLOCK DIAGRAM

SCH_045.cdr



SWITCHING TIME TEST CIRCUIT

cir_014.cdr



SWITCHING WAVEFORM

cir_011.cdr

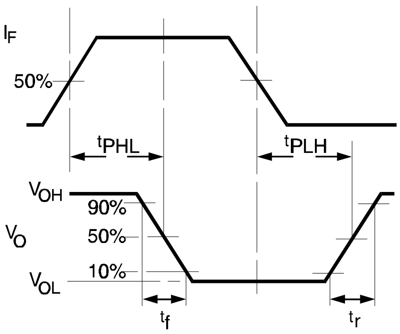


Fig. 1 Responsivity vs Angular Displacement

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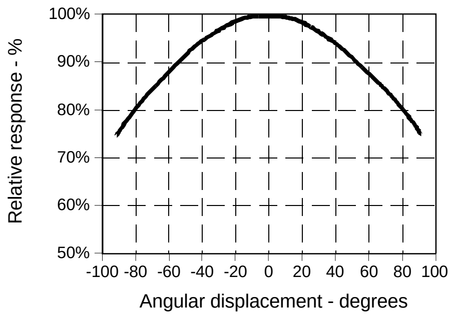

Fig. 2 Threshold Irradiance vs Temperature

gra_060.ds4

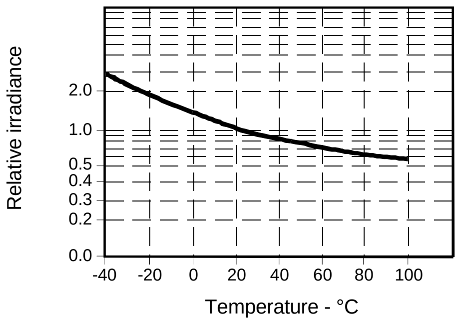

Fig. 3 Output Rise Time (t_r) and Output Fall Time (t_f) vs Temperature

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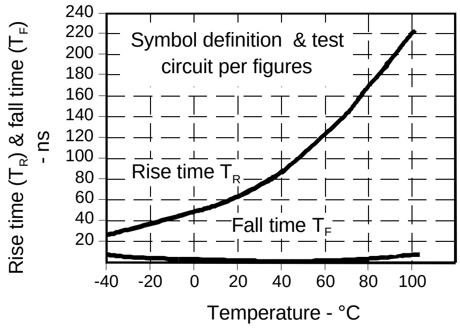


Fig. 4 Delay Time vs Temperature

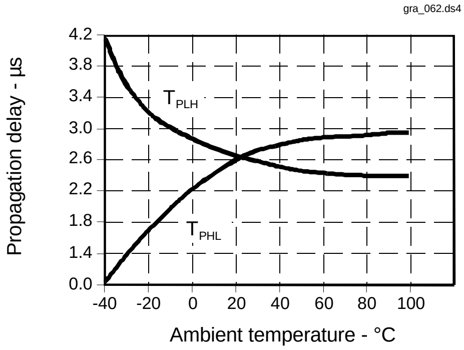
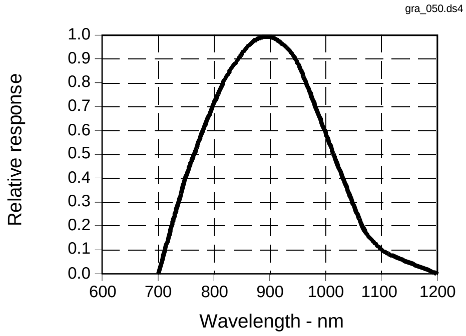


Fig. 5 Spectral Responsivity



All Performance Curves Show Typical Values