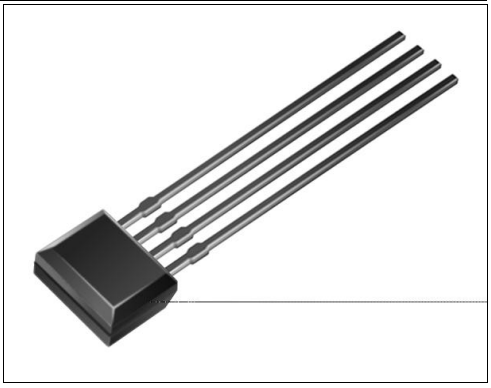
HLC2705

Encoder Detector

FEATURES

- Side-looking plastic package
- TTL/LSTTL/CMOS compatible
- On-chip quadrature logic which provides tach and direction outputs
- Linear or rotary encoder applications
- Resolution to 0.018 in.(.457)
- Sensitivity versus temperature compensation
- Mechanically and spectrally matched to SEP8506 and SEP8706 infrared emitting diodes



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DESCRIPTION

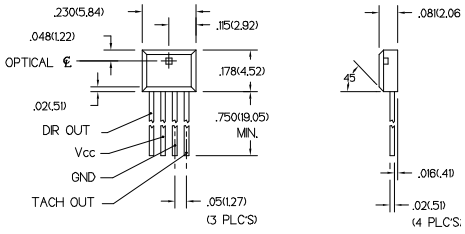
The HLC2705 detector is designed to sense speed and direction of mechanical motion. Applications include rotary and linear encoders; the device is especially well suited for the encoding function in an optical mouse. The detector is a monolithic IC, consisting of two narrow adjacent photodiodes, amplifier stages, and quadrature logic which provides two outputs. One is a fixed duration, low level active tachometer (counting) pulse. It is generated whenever the "A" channel illumination passes through the threshold level. The second is a direction output which is set to a logic high or a logic low depending upon which channel is illuminated first. The sensor also has sensitivity compensation circuitry for the output power versus temperature characteristic 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.

The tachometer output is an NPN collector, internally connected to V_{CC} through a 10 kΩ (nominal) resistor. The direction output is a totem-pole configuration. Both are capable of directly driving TTL loads.

The tachometer pulse is generated at both the increasing and decreasing illumination thresholds of the "A" channel, resulting in two tachometer pulses for each mechanical period of the interrupter. The HLC2705 is designed to work with a mechanical period as small as 0.036 in.(0.914 mm), providing resolution to 0.018 in.(0.457 mm).

OUTLINE DIMENSIONS in inches (mm)

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



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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 HLC2705-001	$E_{eT(+)}$	0.05		2.0	mW/cm²	V_{CC}=5 V, T_A=25°C (1)
Supply Current	I_{CC}			12.0	mA	V_{CC}=5.25 V
Tach Output, inactive	$V_{OL,TACH}$	4.5			V	V_{CC}=5 V, I_{OH}=0
Tach Pulse Level, active				0.4	V	V_{CC}=5 V, I_{OL}=1.6 mA
Direction Output, B leads A	$V_{OH,DIR}$	2.4			V	V_{CC}=5 V, I_{OH}=10 µA
Direction Output, A leads B	$V_{OL,DIR}$			0.4	V	V_{CC}=5 V, I_{OL}=1.6 mA
Tach Pulse Width	T_{PW}	3.0		20	µs	V_{CC}=5 V, I_{OL}=1.6 mA
Operate Point Temperature Coefficient	O_{PTC}		-0.76		%/°C	Emitter @ Constant Temperature

Notes
1. The radiation source is an IRED with a peak wavelength of 880 nm.

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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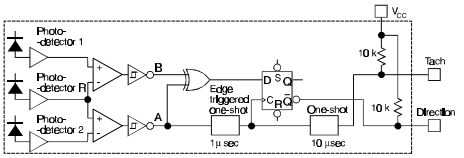
FUNCTIONAL BLOCK DIAGRAM

SCH_046.cdr



OUTPUT TIMING DIAGRAM

cir_012.cdr

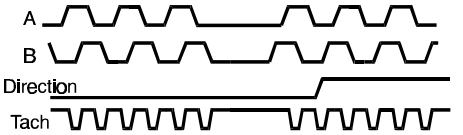


Fig. 1 Responsivity vs Angular Displacement

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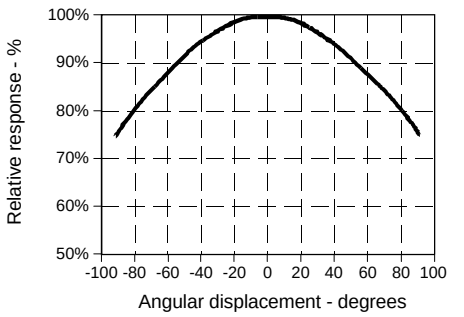

Fig. 2 Threshold Irradiance vs Temperature

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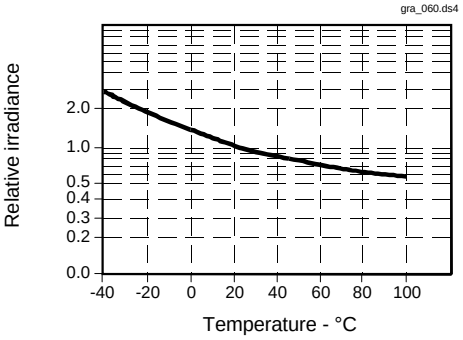

All Performance Curves Show Typical Values

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