Light in Motion

H21A1 H21A2 H21A3
Phototransistor Optical Interrupter Switch

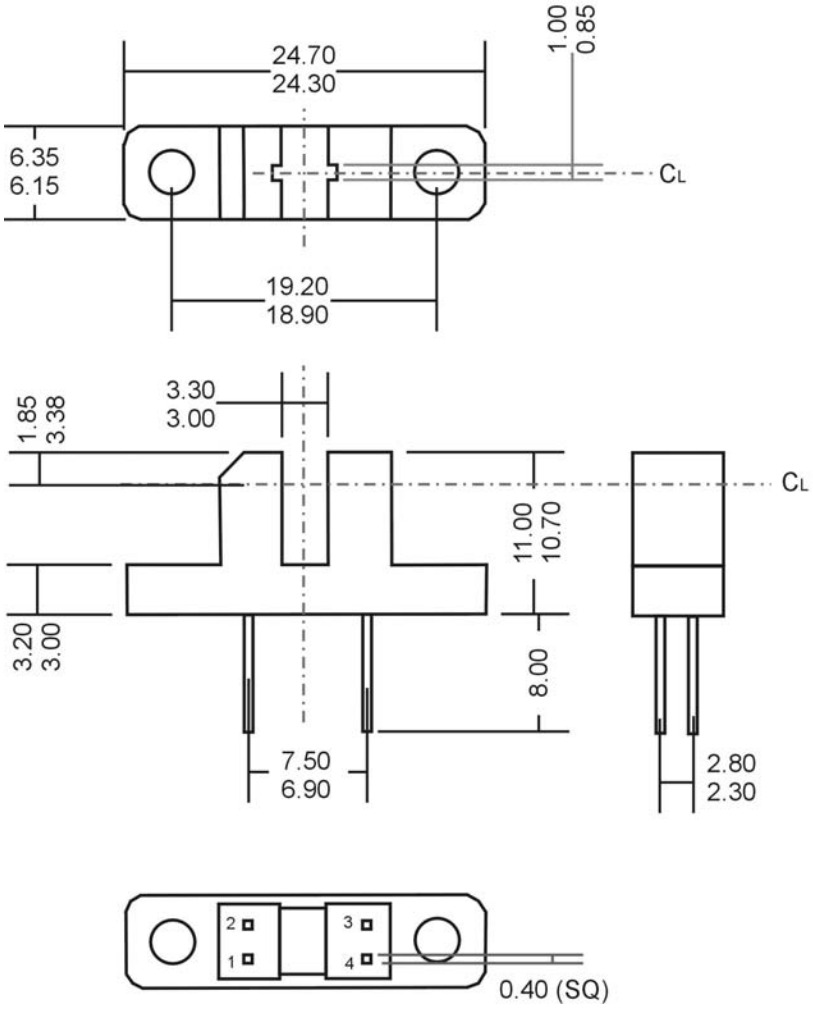
Features

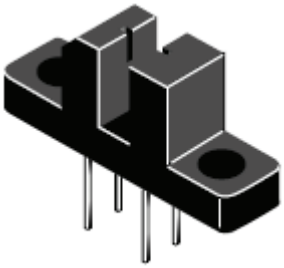
- No Contact Sensing
- 1mm Aperture
- High $I_{C(ON)}$
- PCB mount
- Transistor output

Description

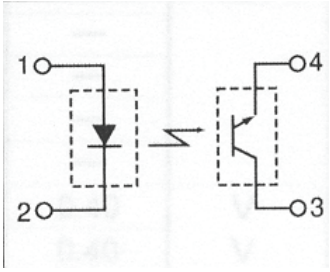
The H21AX products consist of a infrared light emitting diode coupled to an NPN silicon phototransistor packaged in a injection molded housing. The package is designed to optimize the mechanical resolution, coupling efficiency, ambient light rejection, and reliability. Inserting/removing an opaque material into the gap when the LED is operating, switches the transistor on/off.

Package Dimensions





Schematic



Pin 1 Anode
Pin 2 Cathode
Pin 3 Collector
Pin 4 Emitter

Notes

1. Dimensions for all drawings are in millimeters.

2. Tolerance of +/- 0.25 on all non nominal dimensions unless otherwise specified

Absolute Maximum Ratings (T_A = 25^O C unless otherwise specified)
Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In Addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating	Units
T_{OPR}	Operating Temperature	-55 to +100	^{O}C
T_{STG}	Storage Temperature	-55 to +100	^{O}C
T_{SOL-I}	Soldering Temperature (Iron) (2,3,4,5)	240 for 5 sec	^{O}C
T_{SOL-F}	Soldering Temperature (Flow) (2,3,5)	260 for 10 sec	^{O}C
Emitter			
I_F	Continuous Forward Current (6)	50	mA
V_R	Reverse Voltage	6	V
P_D	Power Dissipation (1)	100	mW
Sensor			
V_{CEO}	Collector-Emitter Voltage	30	V
V_{ECO}	Emitter-Collector Voltage	4.5	V
I_C	Collector Current	20	mA
P_D	Power Dissipation (1)	150	mW

Notes:
1. Derate power dissipation linearly, on Sensor, 1.33 mW/^{O}C above 25^{O}C.
2. RMA Flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron tip 1.6mm from housing.
5. As long as leads are not under stress or spring tension

Electrical/Optical Characteristics (T_A = 25^O C)

EMITTER

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Forward Voltage	I_F = 50mA			1.7	V
V_R	Reverse Breakdown Voltage	I_R = 10µA	6			V
I_R	Reverse Leakage Current	V_R = 3V			100	nA

SENSOR

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C = 1mA, Ee = 0	30			V
BV_{ECO}	Emitter-Collector Breakdown Voltage	I_{EC} = 100uA, Ee = 0	6			V
I_{CEO}	Collector-Emitter Leakage	V_{CE} = 10V, I_F = 0			100	nA

Electrical/Optical Characteristics Cont. ($T_A = 25^O$ C)

COUPLED						
Symbol	**Parameter**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
$t_{(ON)}$	Turn-on Time	I_F = 30mA, V_{CC} = 5V, R_L = 2.5kΩ		8		µs
$t_{(OFF)}$	Turn-Off Time	I_F = 30mA, V_{CC} = 5V, R_L = 2.5kΩ		50		µs

ON-STATE COLLECTOR CURRENT						
Symbol	**Device**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
$I_{C\ (ON)}$	H21A1	I_F = 5mA, V_{CE} = 5V	0.15			mA
	H21A2		0.30			
	H21A3		0.60			
	H21A1	I_F = 20mA, V_{CE} = 5V	1.0			mA
	H21A2		2.0			
	H21A3		4.0			
	H21A1	I_F = 30mA, V_{CE} = 5V	1.9			mA
	H21A2		3			
	H21A3		5.5			

COLLECTOR CURRENT SATURATION VOLTAGE						
Symbol	**Device**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
$V_{CE\ (SAT)}$	H21A1, H21A2, H21A3,	I_C = 1.8mA, I_F = 20mA			0.40	V
					0.40	V

Typical Performance Characteristics

Figure 1. Output Current vs. Input Current

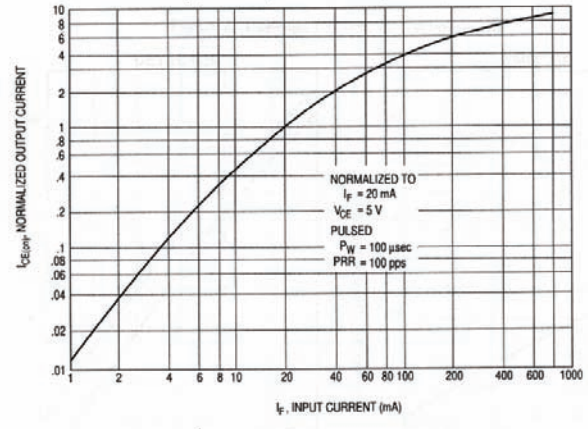
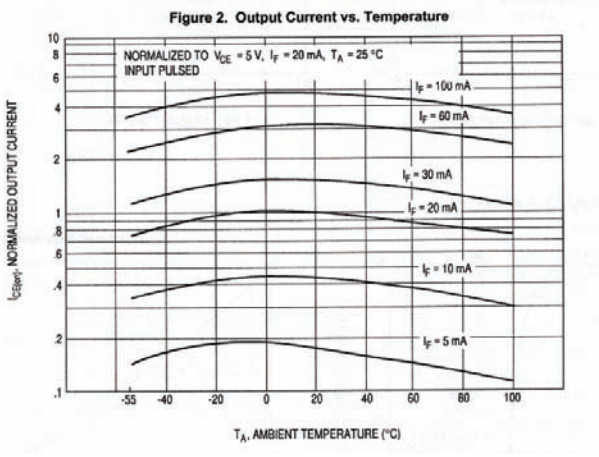


Figure 2. Output Current vs. Temperature



Typical Performance Characteristics

Figure 3. $V_{CE(SAT)}$ vs. Temperature

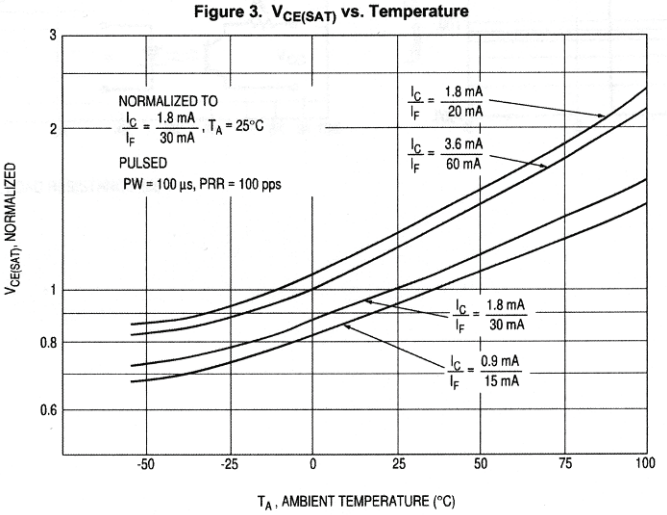


Figure 5. Switching Speed vs. RL

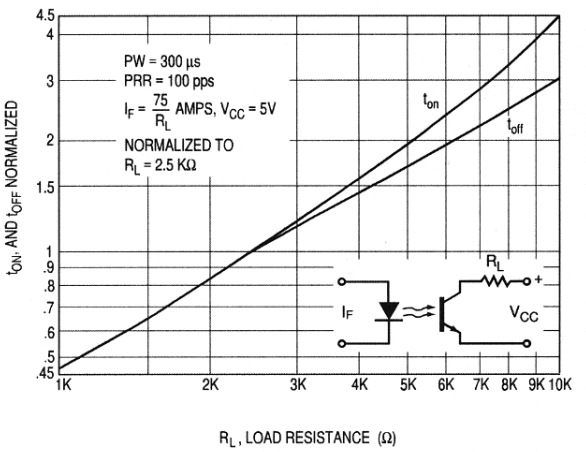


Figure 4. Leakage Current vs. Temperature

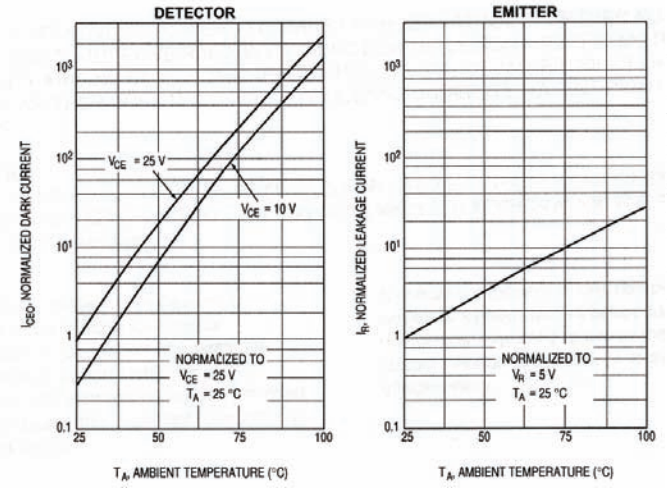
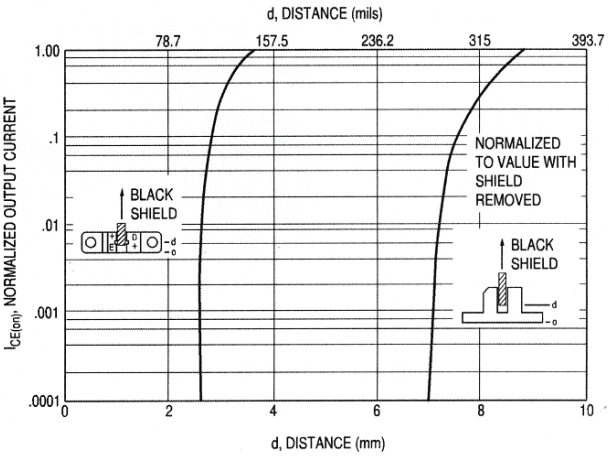


Figure 6. Output Current vs. Distance



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