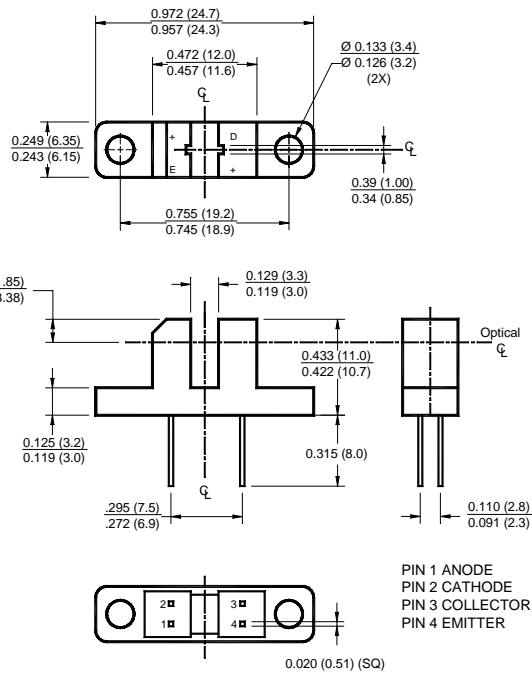


# H21A1 / H21A2 / H21A3

## PHOTOTRANSISTOR OPTICAL INTERRUPTER SWITCH

### PACKAGE DIMENSIONS

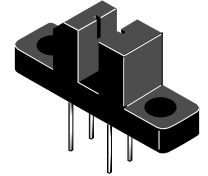


**NOTES:**

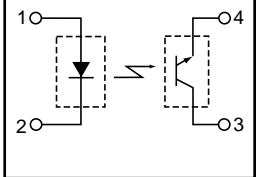
- Dimensions for all drawings are in inches (mm).
- Tolerance of  $\pm .010$  (.25) on all non-nominal dimensions unless otherwise specified.

### DESCRIPTION

The H21A1, H21A2 and H21A3 consist of a gallium arsenide infrared emitting diode coupled with a silicon phototransistor in a plastic housing. The packaging system is designed to optimize the mechanical resolution, coupling efficiency, ambient light rejection, cost and reliability. The gap in the housing provides a means of interrupting the signal with an opaque material, switching the output from an "ON" to an "OFF" state.



### SCHEMATIC



### FEATURES

- Opaque housing
- Low cost
- .035" apertures
- High  $I_{C(ON)}$

- Derate power dissipation linearly 1.33 mW/°C above 25°C.
- RMA flux is recommended.
- Methanol or isopropyl alcohols are recommended as cleaning agents.
- Soldering iron tip 1/16" (1.6mm) minimum from housing.

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Rating	Unit
Operating Temperature	$T_{OPR}$	-55 to +100	°C
Storage Temperature	$T_{STG}$	-55 to +100	°C
Soldering Temperature (Iron) <sup>(2,3 and 4)</sup>	$T_{SOL-I}$	240 for 5 sec	°C
Soldering Temperature (Flow) <sup>(2 and 3)</sup>	$T_{SOL-F}$	260 for 10 sec	°C
<b>INPUT (EMITTER)</b>			
Continuous Forward Current	$I_F$	50	mA
Reverse Voltage	$V_R$	6	V
Power Dissipation <sup>(1)</sup>	$P_D$	100	mW
<b>OUTPUT (SENSOR)</b>			
Collector to Emitter Voltage	$V_{CEO}$	30	V
Emitter to Collector Voltage	$V_{ECO}$	4.5	V
Collector Current	$I_C$	20	mA
Power Dissipation ( $T_C = 25^\circ\text{C}$ ) <sup>(1)</sup>	$P_D$	150	mW

<b>ELECTRICAL / OPTICAL CHARACTERISTICS</b> (T <sub>A</sub> = 25°C)(All measurements made under pulse condition)							
PARAMETER	TEST CONDITIONS	SYMBOL	DEVICES	MIN	TYP	MAX	UNITS
<b>INPUT (EMITTER)</b>							
Forward Voltage	I <sub>F</sub> = 60 mA	V <sub>F</sub>	All	—	—	1.7	V
Reverse Breakdown Voltage	I <sub>R</sub> = 10 μA	V <sub>R</sub>	All	6.0	—	—	V
Reverse Leakage Current	V <sub>R</sub> = 3 V	I <sub>R</sub>	All	—	—	1.0	μA
<b>OUTPUT (SENSOR)</b>							
Emitter to Collector Breakdown	I <sub>F</sub> = 100 μA, E <sub>e</sub> = 0	BV <sub>ECO</sub>	All	6.0	—	—	V
Collector to Emitter Breakdown	I <sub>C</sub> = 1 mA, E <sub>e</sub> = 0	BV <sub>CEO</sub>	All	30	—	—	V
Collector to Emitter Leakage	V <sub>CE</sub> = 25 V, E <sub>e</sub> = 0	I <sub>CEO</sub>	All	—	—	100	nA
<b>COUPLED</b>							
On-State Collector Current	I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V	I <sub>C(ON)</sub>	H21A1	0.15	—	—	mA
			H21A2	0.30	—	—	
			H21A3	0.60	—	—	
	I <sub>F</sub> = 20 mA, V <sub>CE</sub> = 5 V		H21A1	1.0	—	—	
			H21A2	2.0	—	—	
			H21A3	4.0	—	—	
	I <sub>F</sub> = 30 mA, V <sub>CE</sub> = 5 V		H21A1	1.9	—	—	
			H21A2	3.0	—	—	
			H21A3	5.5	—	—	
Saturation Voltage	I <sub>F</sub> = 20 mA, I <sub>C</sub> = 1.8 mA	V <sub>CE(SAT)</sub>	H21A2/3	—	—	0.40	V
	I <sub>F</sub> = 30 mA, I <sub>C</sub> = 1.8 mA		H21A1	—	—	0.40	V
Turn-On Time	I <sub>F</sub> = 30 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 2.5 KΩ	t <sub>on</sub>	All	—	8	—	μs
Turn-Off Time	I <sub>F</sub> = 30 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 2.5 KΩ	t <sub>off</sub>	All	—	50	—	μs

Figure 1. Output Current vs. Input Current

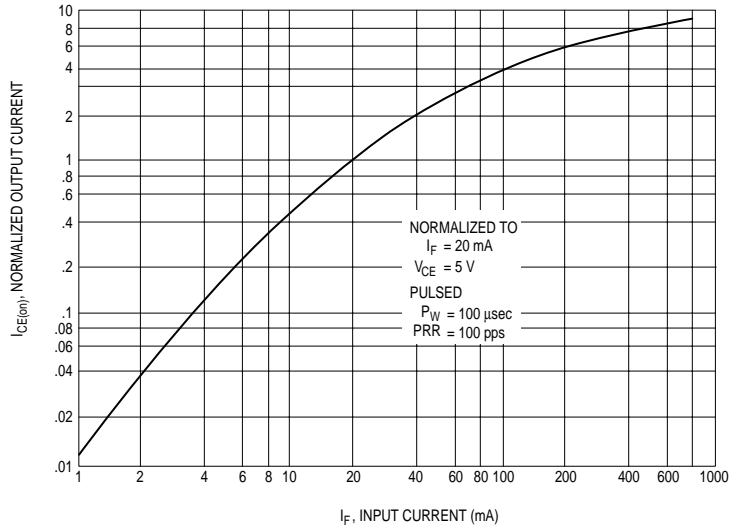


Figure 2. Output Current vs. Temperature

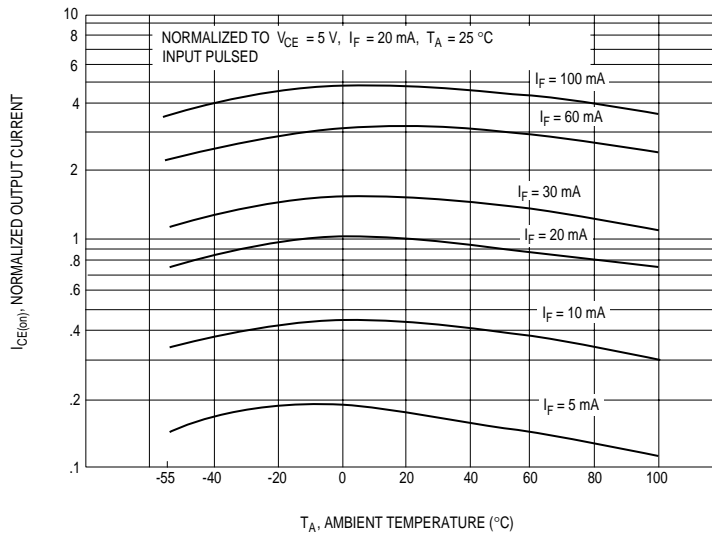


Figure 3.  $V_{CE(SAT)}$  vs. Temperature

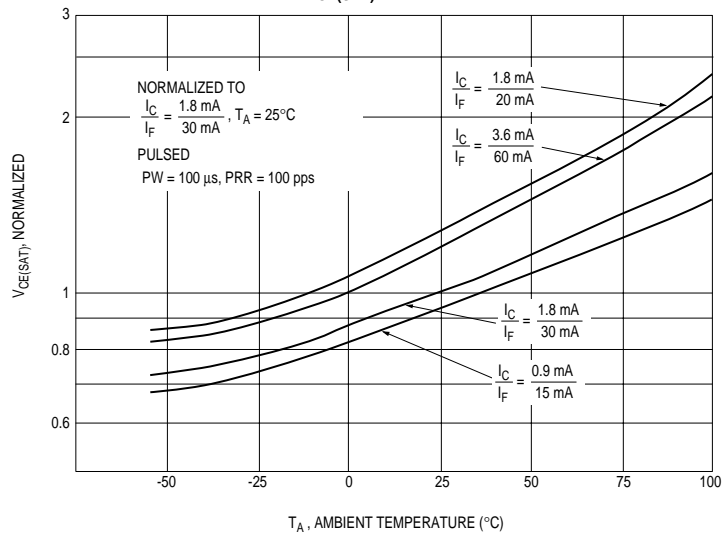


Figure 4. Leakage Current vs. Temperature

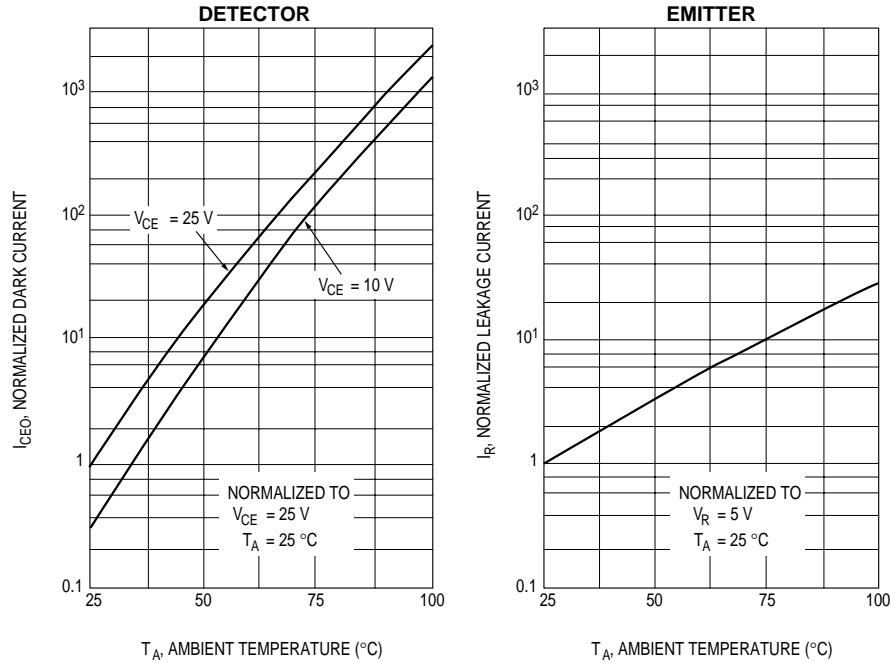


Figure 5. Switching Speed vs.  $R_L$

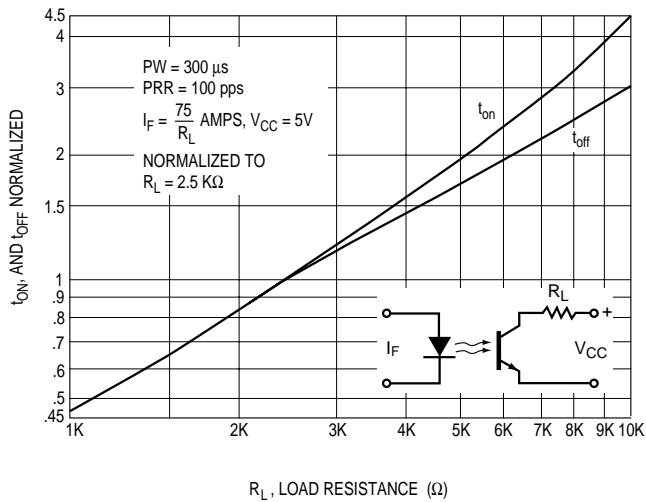
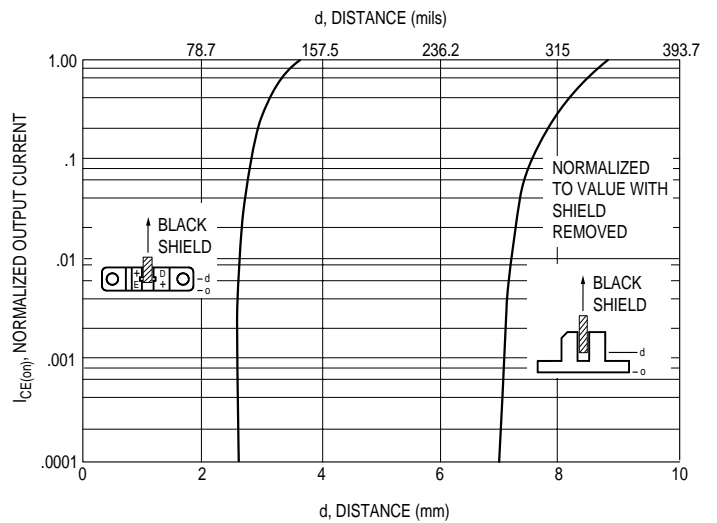


Figure 6. Output Current vs. Distance



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