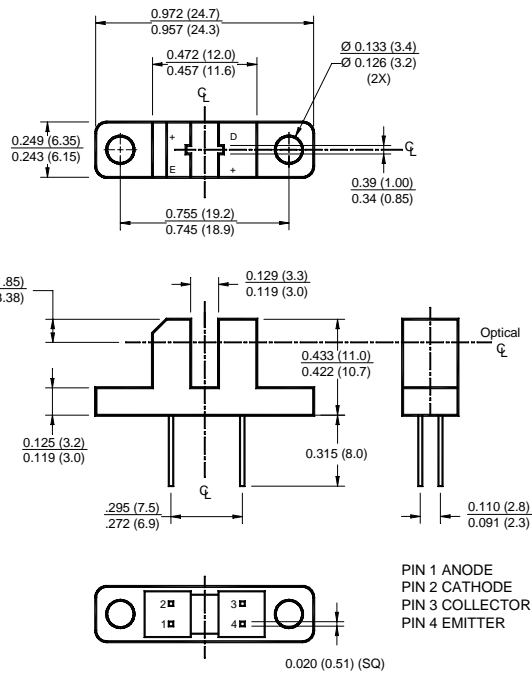


# H21A1 / H21A2 / H21A3

## PHOTOTRANSISTOR OPTICAL INTERRUPTER SWITCH

### PACKAGE DIMENSIONS

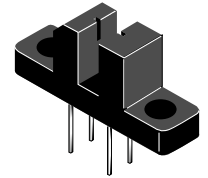


**NOTES:**

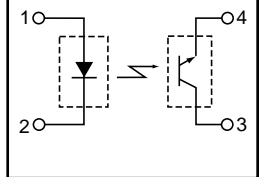
- Dimensions for all drawings are in inches (mm).
- Tolerance of  $\pm .010$  (.25) on all non-nominal dimensions unless otherwise specified.

### 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

# H21A1 / H21A2 / H21A3

## PHOTOTRANSISTOR

### OPTICAL INTERRUPTER SWITCH

<b>ELECTRICAL / OPTICAL CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ )(All measurements made under pulse condition)							
PARAMETER	TEST CONDITIONS	SYMBOL	DEVICES	MIN	TYP	MAX	UNITS
<b>INPUT (EMITTER)</b>							
Forward Voltage	$I_F = 60 \text{ mA}$	$V_F$	All	—	—	1.7	V
Reverse Breakdown Voltage	$I_R = 10 \mu\text{A}$	$V_R$	All	6.0	—	—	V
Reverse Leakage Current	$V_R = 3 \text{ V}$	$I_R$	All	—	—	1.0	$\mu\text{A}$
<b>OUTPUT (SENSOR)</b>							
Emitter to Collector Breakdown	$I_F = 100 \mu\text{A}, E_e = 0$	$BV_{ECO}$	All	6.0	—	—	V
Collector to Emitter Breakdown	$I_C = 1 \text{ mA}, E_e = 0$	$BV_{CEO}$	All	30	—	—	V
Collector to Emitter Leakage	$V_{CE} = 25 \text{ V}, E_e = 0$	$I_{CEO}$	All	—	—	100	nA
<b>COUPLED</b>							
On-State Collector Current	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	$I_{C(ON)}$	H21A1	0.15	—	—	mA
			H21A2	0.30	—	—	
			H21A3	0.60	—	—	
	$I_F = 20 \text{ mA}, V_{CE} = 5 \text{ V}$		H21A1	1.0	—	—	
			H21A2	2.0	—	—	
			H21A3	4.0	—	—	
	$I_F = 30 \text{ mA}, V_{CE} = 5 \text{ V}$		H21A1	1.9	—	—	
			H21A2	3.0	—	—	
			H21A3	5.5	—	—	
Saturation Voltage	$I_F = 20 \text{ mA}, I_C = 1.8 \text{ mA}$	$V_{CE(SAT)}$	H21A2/3	—	—	0.40	V
	$I_F = 30 \text{ mA}, I_C = 1.8 \text{ mA}$		H21A1	—	—	0.40	V
Turn-On Time	$I_F = 30 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 2.5 \text{ K}\Omega$	$t_{on}$	All	—	8	—	$\mu\text{s}$
Turn-Off Time	$I_F = 30 \text{ mA}, V_{CC} = 5 \text{ V}, R_L = 2.5 \text{ K}\Omega$	$t_{off}$	All	—	50	—	$\mu\text{s}$

Figure 1. Output Current vs. Input Current

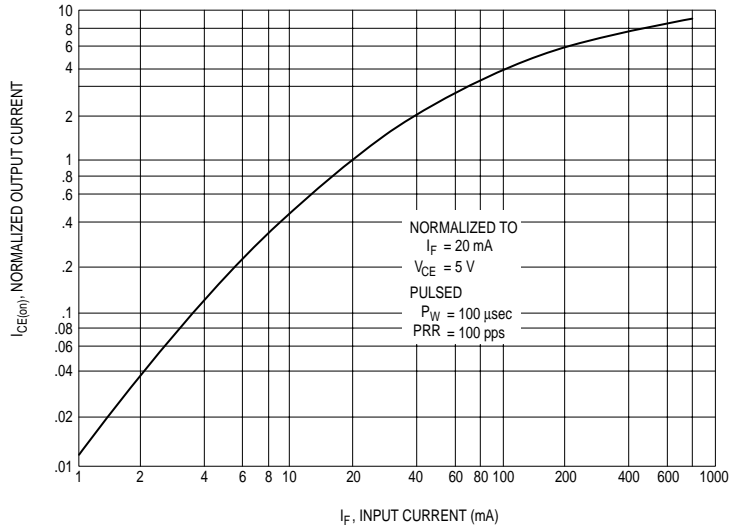


Figure 2. Output Current vs. Temperature

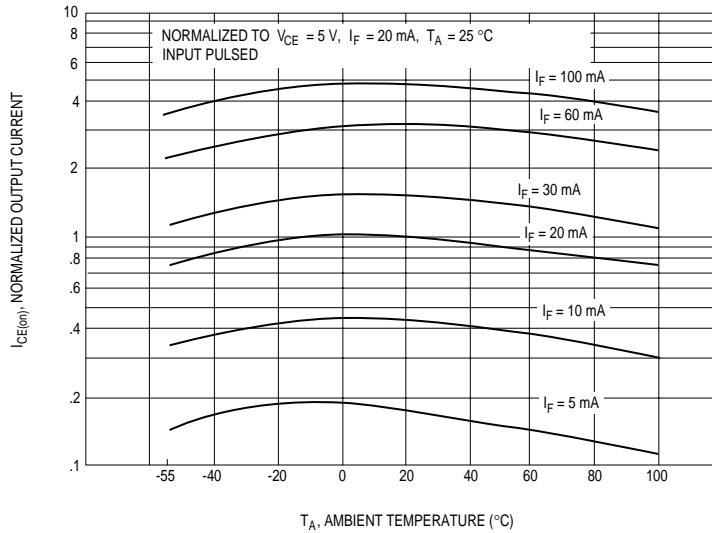


Figure 3.  $V_{CE(SAT)}$  vs. Temperature

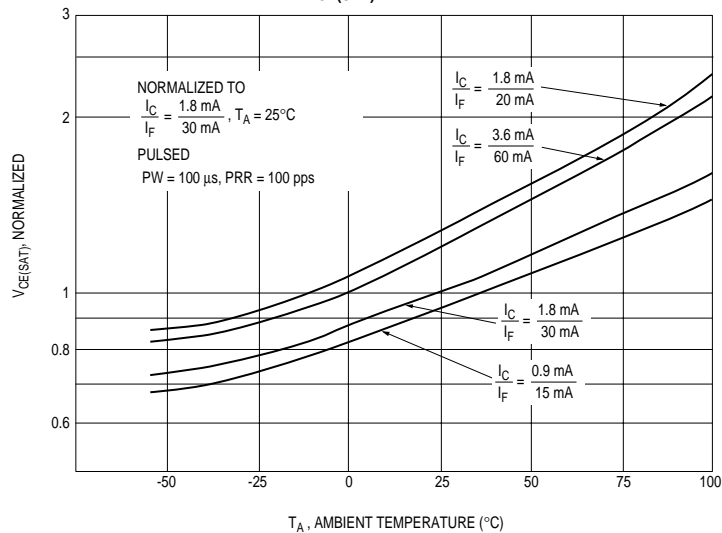


Figure 4. Leakage Current vs. Temperature

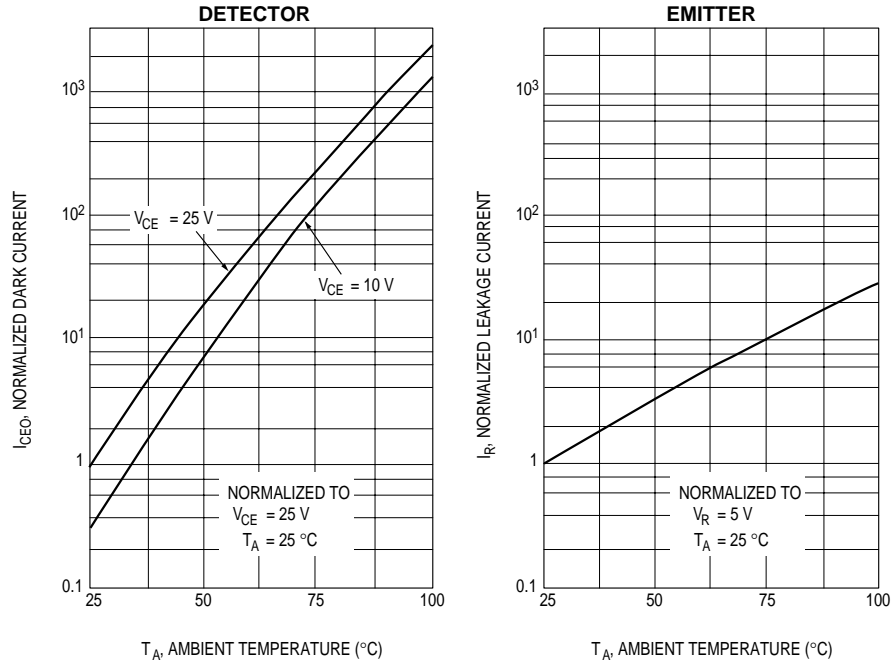


Figure 5. Switching Speed vs.  $R_L$

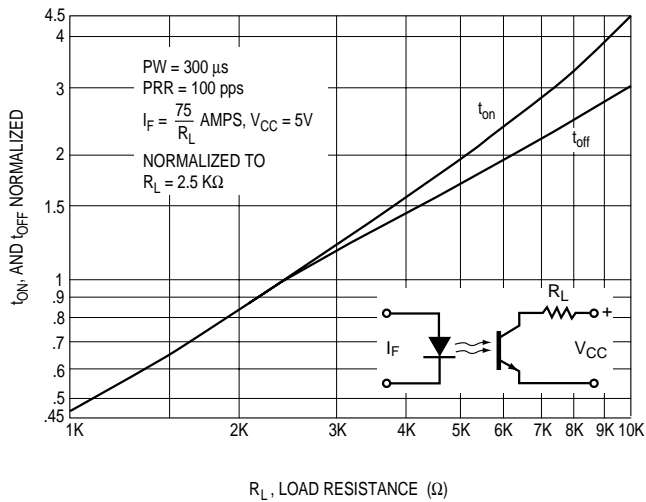
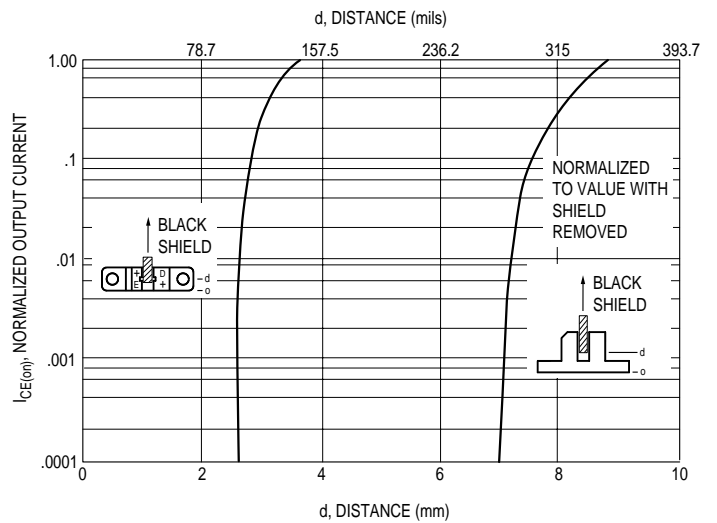


Figure 6. Output Current vs. Distance



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