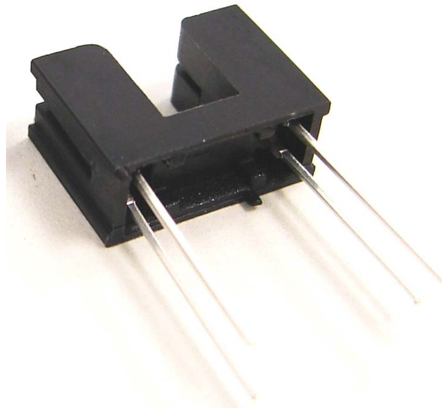
AEDS-9310

Transmissive Photointerrupter

Data Sheet



Description

The photointerrupter consists of a Gallium Arsenide infrared light emitting diode and a NPN silicon phototransistor built in a black plastic housing. It is a transmissive subminiature photointerrupter.

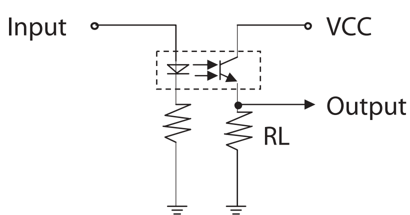


Figure 1: Illustrates Basic Configuration of Photointerrupter

Features

- Non-Contact Sensing
- Infra-Red Wavelength
- Fast Switching Speed
- Mounting Guide Pins
- Dual-in-line Socket Mounting
- RoHS Compliant

Applications

- Optical Switch
- ATM Machines
- Vending Machines
- Edge, Position Detections
- Office Automation Equipments

Theory of Operation

The photo-interrupter consists of an Infrared light source and a photo-diode in a single Dual-in-Line package. The photo-interrupter could be mounted onto a PC board with a current-limiting resistor in series externally with the Infrared Emitting Diode. With this, such input voltage for the emitting diode could share the same voltage level as VCC.

Regarding the photo-interrupter output, there will always be current output measured but with the external resistor, RL connected as shown in Figure1, analog voltage output could then be obtained.

With both the infrared light source and the photo diode in a single package, the photo-interrupter employs transmissive technology to sense obstacles existence, acts as on / off switchers or even to sense low-resolution rotary or linear motions. The photo-interrupter is specified for operation over -25 °C to +85 °C temperature range.

As a basic switcher, the photo-interrupter would have a position detecting characteristics as shown in Figure 2. These characteristic diagrams give the relationship between Relative Light Current, IL and Distance of displacement, d. Note that the slot (obstacle) introduced in between the emitting diode and the photo-diode could applied in two directions. One is of X-axis and another would be of Y-axis.

Therefore, with the presence of slot, the photo-interrupter would actually give a low logic output. Vice versa, the photo-interrupter will provide a high logic output without the existence of the slot. Refer to Figure 3. Typically, Rise Time, tr and Fall Time tf will have the same value, 20µs.

With special design of the slots, periodic presence and absence could be generated. Such output signal is useful in determining low-resolution (>0.5mm pitch) motor rotation positioning and motor spinning speed.

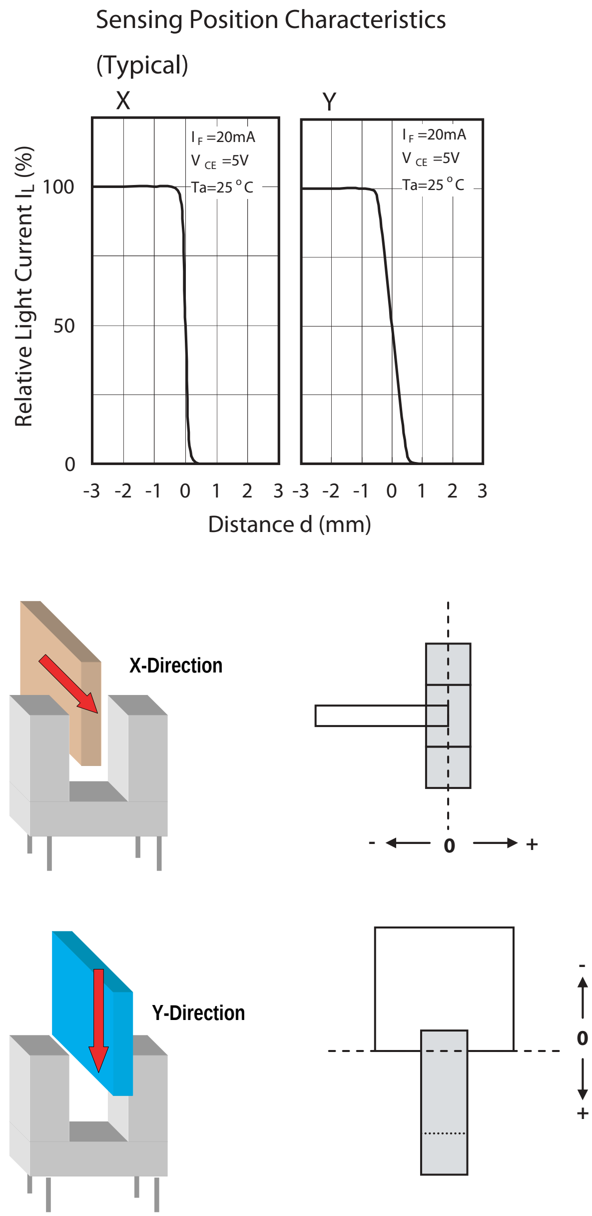


Figure 2: Illustrates Photo-Interrupter Positioning Sensing Characteristics. Obstacles (Slots) could interrupt along X-axis or Y-axis.

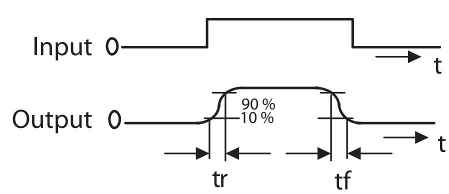


Figure 3: Response Time Measurement of Output Signal.

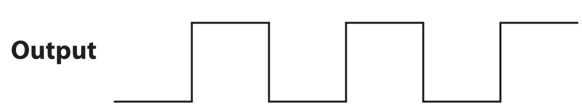


Figure 4: Periodical Output signal could be used to determine the Motor Spinning Speed and Rotation positioning.

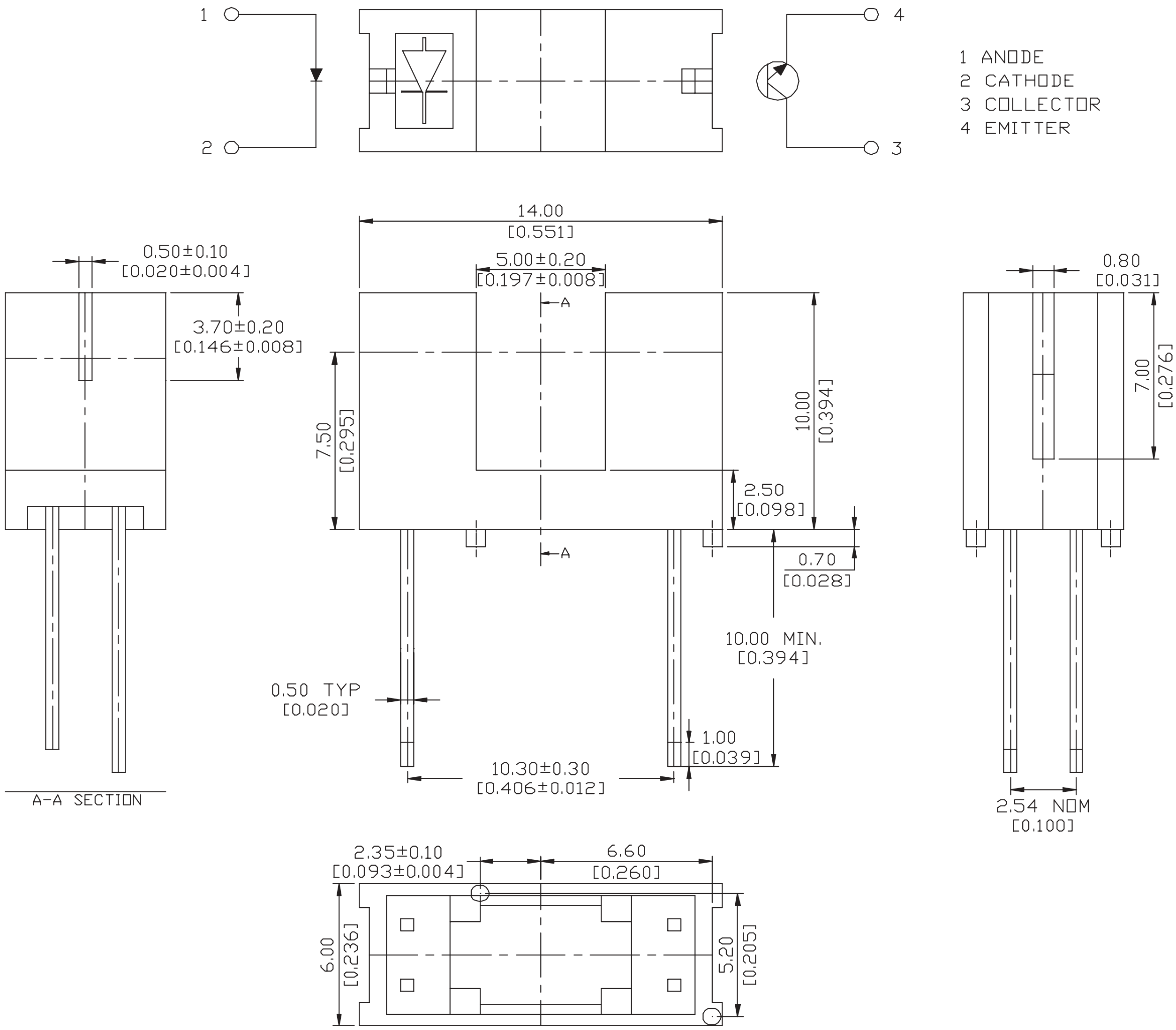
Absolute Maximum Ratings @ TA=25°C

Parameter	Maximum Rating	Unit
LED Reverse voltage V_R	5	V
LED Forward current I_F	50	mA
LED Power dissipation P_E	75	mW
Collector Emitter voltage V_{CEO}	30	V
Emitter Collector voltage V_{ECO}	5	V
Collector Power dissipation P_C	75	mW
Total Power dissipation P_{TOT}	100	mW
Operation temperature range T_A	-25°C to 85°C	
Storage temperature range	-40°C to 85°C	
Soldering temperature	260°C for 5 seconds	

Optical-Electrical Characteristics TA=25°C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
LED Forward voltage	V_F	-	1.2	1.4	V	I_F=20mA
LED Reverse Current	I_R	-	-	10	A	V_R= 5V
Collector Current	I_C	0.5	-	10	mA	I_F=20mA, V_{CE}=5V
Collector dark current	I_{CEO}	-	-	100	nA	V_{CE}=10V
Collector Emitter saturation voltage	$V_{CE(SAT)}$	-	-	0.4	V	I_e=0.1mA, E_e=0.1mW/cm^2
Rise time	T_r	-	20	100	µs	V_{CE}=5V, R_L=1kΩ, I_C=100mA, d=1mm
Fall time	T_f	-	20	100	µs	

Outline Drawing



Tolerance is +/- 0.25 mm (.006") unless otherwise specified
Unit: mm (inches)

Typical Optical-Electrical Curves

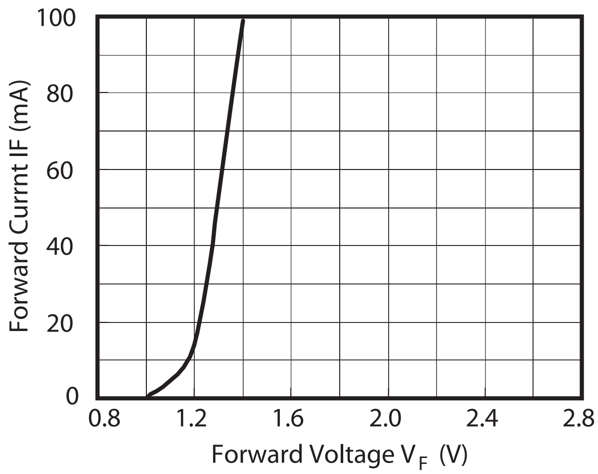


Figure 5: Forward Current Vs Forward Voltage

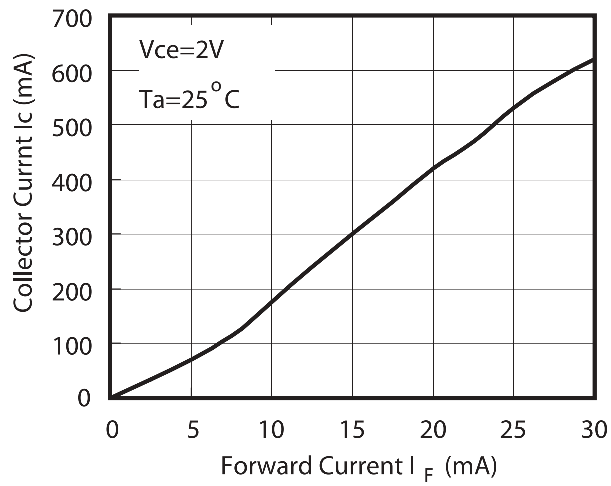


Figure 6: Collector Current Vs Forward Voltage

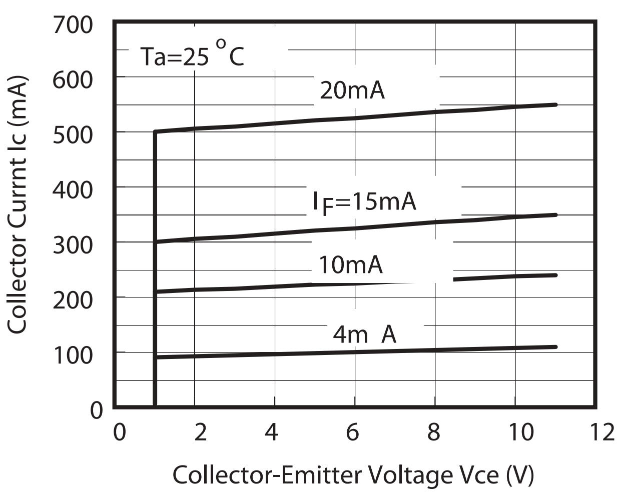


Figure 7: Collector Current Vs Vce

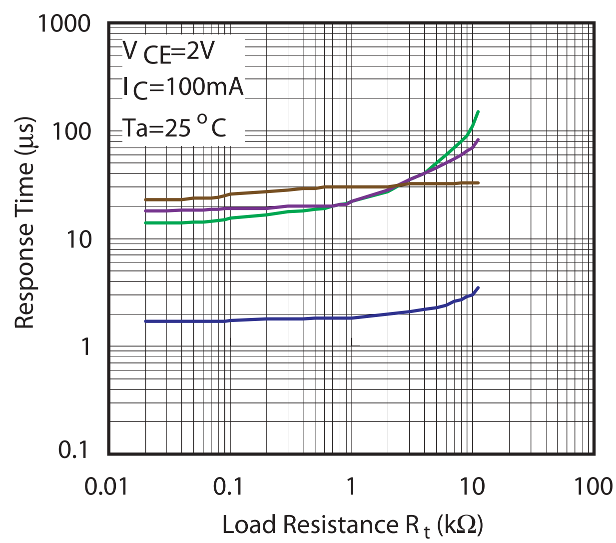


Figure 8: Response Time Vs Load Resistance

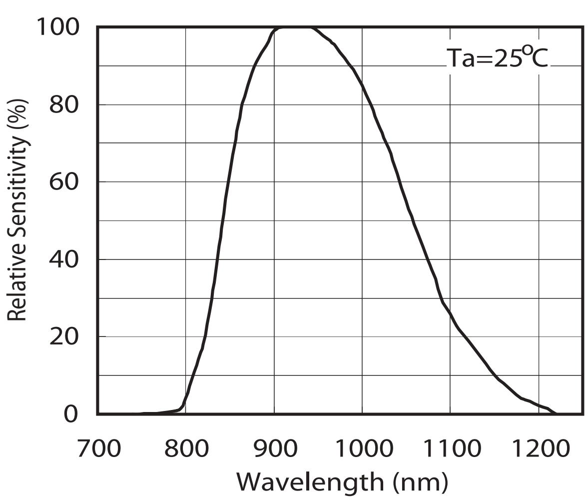


Figure 9: Spectral Sensitivity (Detecting Side)

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