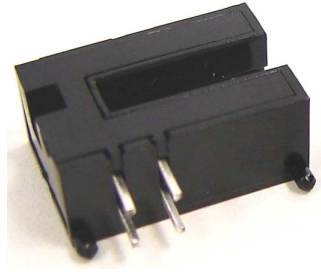


AEDS-9300

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.

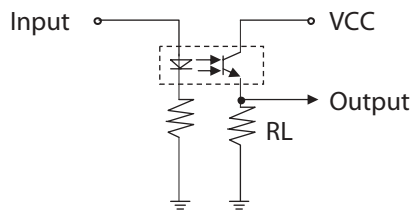


Figure 1: Illustrates Basic Configuration of Photointerrupter

Features

- Non-Contact Sensing
- Infra-Red Wavelength
- Fast Switching Speed
- Mounting Guide Pins
- RoHS Compliant
- -25 °C to +85 °C Operating Temp.

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.

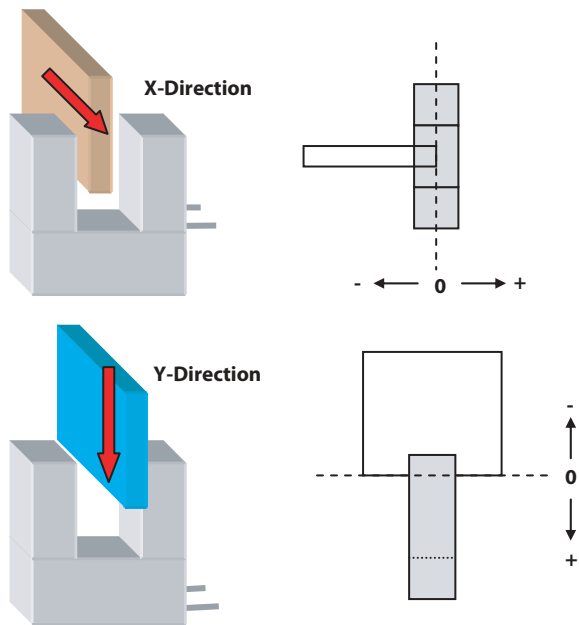
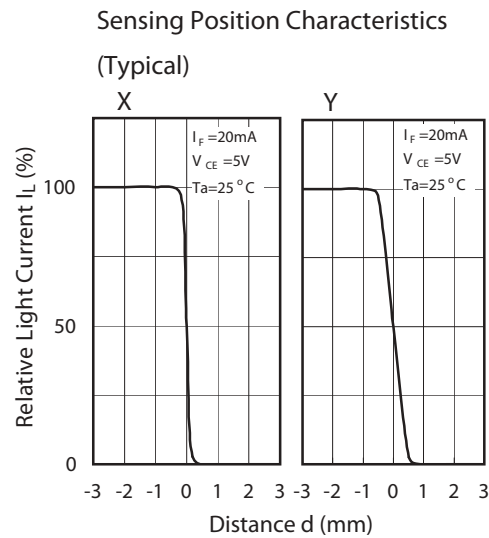


Figure 2: Illustrates Photo-Interrupter Positioning Sensing Characteristics. Obstacles (Slots) could interrupt along X-axis or Y-axis

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 $-25\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ 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, I_L and Distance of displacement, d . Note that the slot (obstacle) introduced in between the emitting diode and the photo-diode could be 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, t_r and Fall Time t_f will have the same value, $15\mu\text{s}$.

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

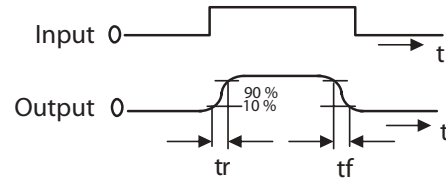


Figure 3: Response Time Measurement of Output Signal.

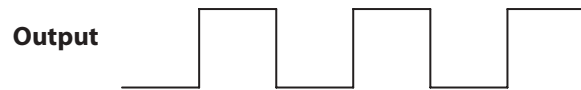


Figure 4: Periodical Output signal could be used to determine the Motor Spinning Speed and Rotation positioning.

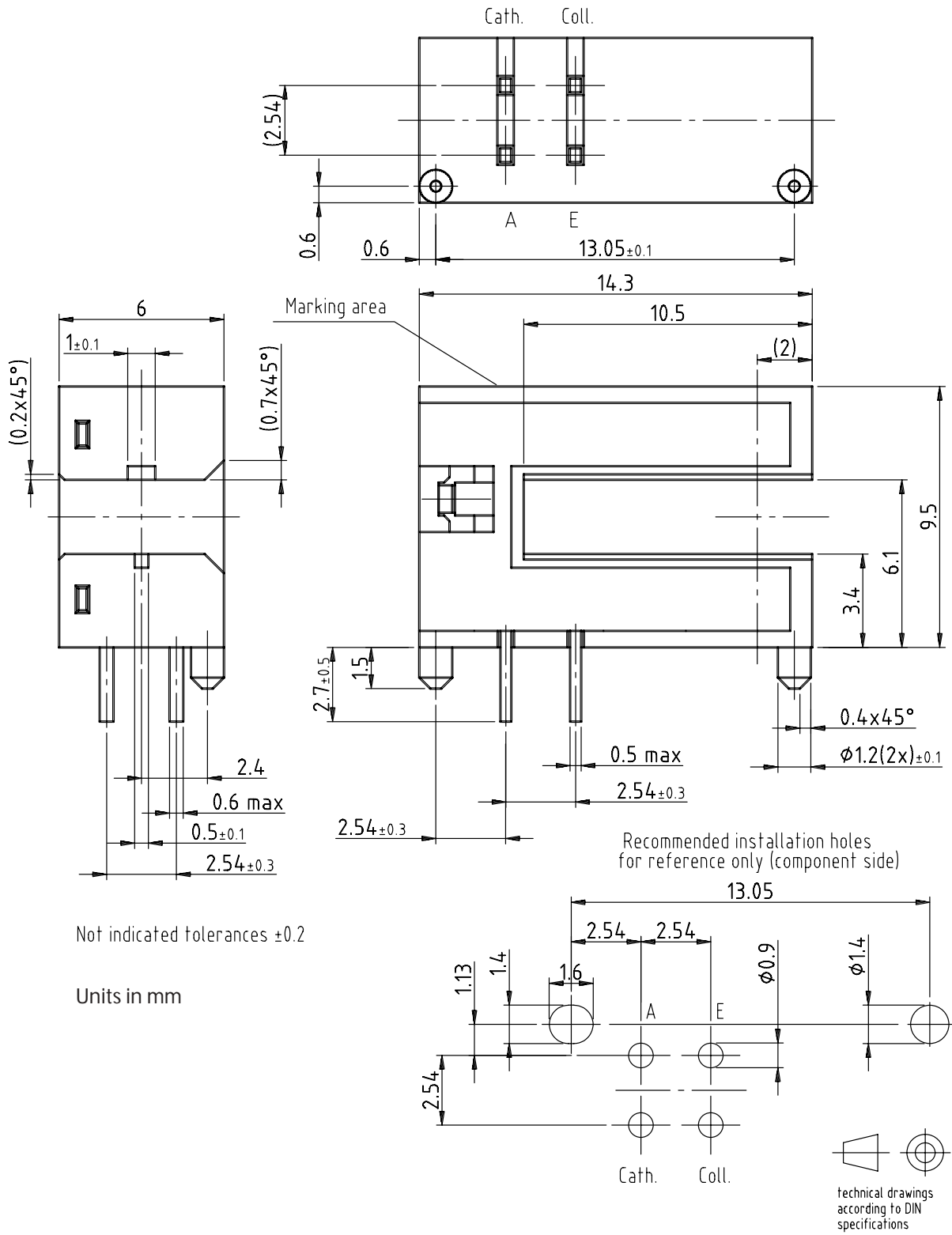
Absolute Maximum Ratings @ $T_A=25^\circ\text{C}$

Parameter	Maximum Rating	Unit
Reverse voltage	5	V
Forward current	50	mA
Forward surge current (10 μs pulse)	1	A
Collector Emitter voltage	30	V
Emitter Collector voltage	5	V
Power dissipation	175	mW
Operation temperature range	-25 $^\circ\text{C}$ to 85 $^\circ\text{C}$	
Storage temperature range	-40 $^\circ\text{C}$ to 85 $^\circ\text{C}$	
Soldering temperature	260 $^\circ\text{C}$ for 5 seconds	

Optical-Electrical Characteristics $T_A=25^\circ\text{C}$

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward voltage	V_F	-	1.2	1.35	V	$I_F=20\text{mA}$
Collector Current	I_C	0.8	-	10	mA	$I_F=20\text{mA}$, $V_{CE} = 5\text{V}$
Collector Emitter voltage	V_{CEO}	30	-	-	V	$I_e=0.1\text{mA}$, $E_e=0\text{mW}/\text{cm}^2$
Emitter Collector voltage	V_{ECO}	5	-	-	V	$I_e=0.1\text{mA}$, $E_e=0\text{mW}/\text{cm}^2$
Collector dark current	I_{CEO}	-	-	100	nA	$V_{CE}=10\text{V}$, $E_e=0\text{mW}/\text{cm}^2$
Collector Emitter saturation voltage	$V_{CE(SAT)}$	-	-	0.4	V	$I_e=0.5\text{mA}$, $E_e=0.1\text{mW}/\text{cm}^2$
Rising time	T_r	-	15	-	μs	$V_{CE}=5\text{V}$, $R_L=1\text{k}\Omega$, $I_C=1\text{mA}$
Falling time	T_f	-	15	-	μs	

Outline Drawing



Not indicated tolerances ±0.2

Units in mm

Typical Optical-Electrical Curves

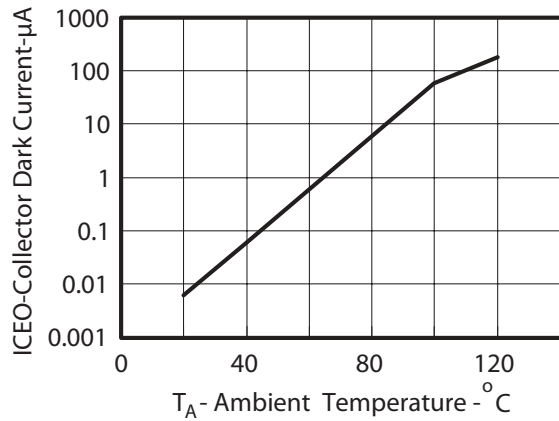


Figure 5: Collector Dark Current Vs Ambient Temperature

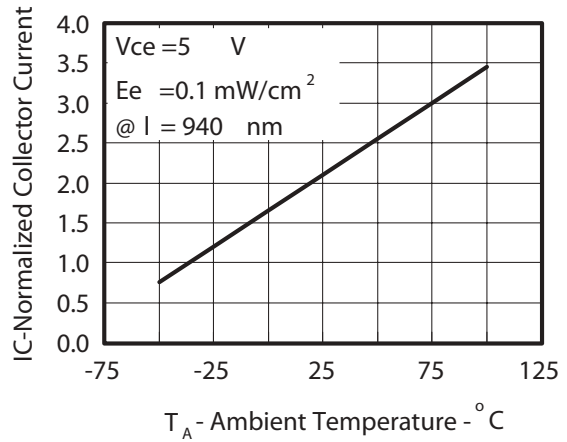


Figure 6: Normalized Collector Current Vs Ambient Temperature

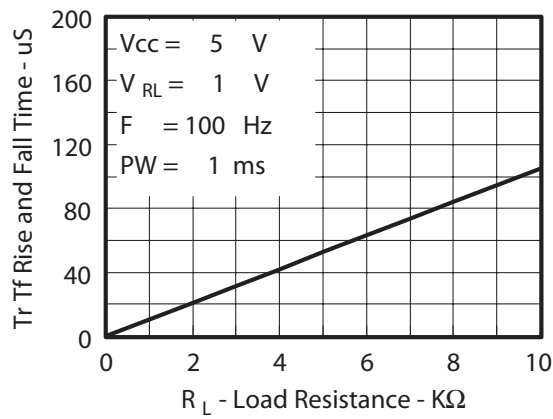


Figure 7: Rise and Fall Times Vs Load Resistance

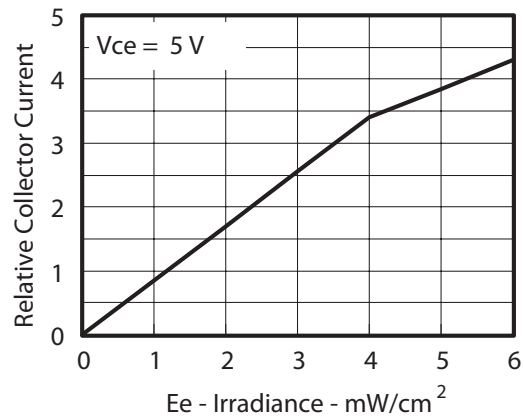


Figure 8: Relative Collector Current Vs Irradiance

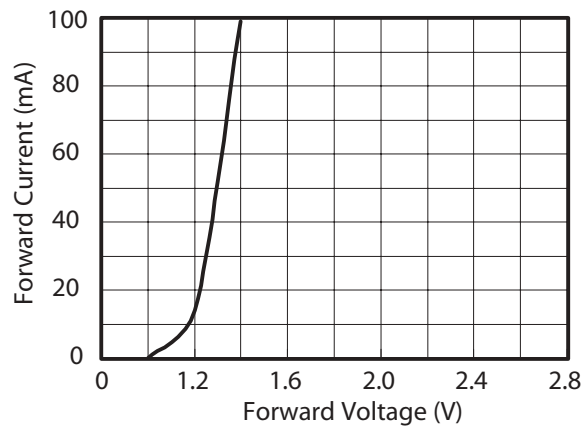


Figure 9: Forward Current Vs Forward Voltage

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