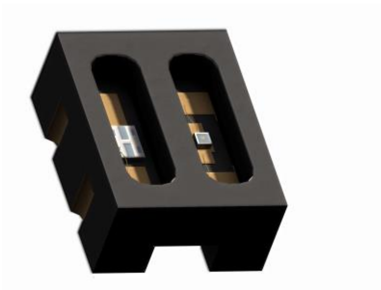
OIER3

Reflective sensor

General Description

The OIER3 reflective sensor consists in an infrared emitting diode and a double NPN silicon phototransistor. The components together are mounted side by side in a plastic black SMD housing. The black package avoids light reflections, noise and behaves as a barrier between led and photoreceivers.
The phototransistors respond to radiation emitted from the diode only if a reflective object surface is within the field of view of the detector.



Applications

Scanning

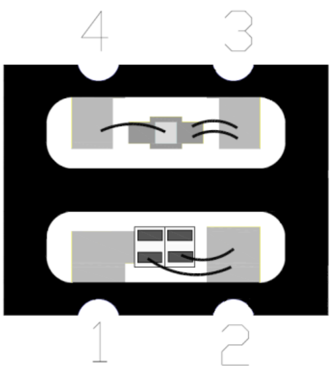
Automated transaction systems

Metering systems

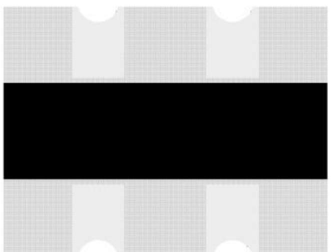
Motion control systems

Non invasive medical equipment

Low distance metering



Top view



Bottom view

Features

- **Unfocused for sensing diffused surface**
- **SMT package**
- **High uniformity**
- **Very stable measurements**
- **High gain phototransistor**
- **No contact surface sensing**
- **Low profile**
- **Low cost**
- **Milling on the backside for side PCB mounting**

Pin Functions

No.	Name	Function
1	C	Phototransistor Collector
2	E	Phototransistor Emitter
3	A	LED Anode
4	K	LED Cathode

Ordering information

OIER3	Reflective Sensor with Infrared LED

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min	Max	Unit
T_A	Operating Temperature Range	-25	85	°C
Ts	Storage temperature	-40	85	°C
Tsol	Lead temperature (solder) s		270	°C
	Emitter			
I_F	Continuous forward current		50	mA
Vr	Reverse voltage		4	V
	Receiver			
V_{CE0}	Collector-emitter voltage		30	V
Pd	Power dissipation		100	mW
Ic	Collector DC current		30	mA

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

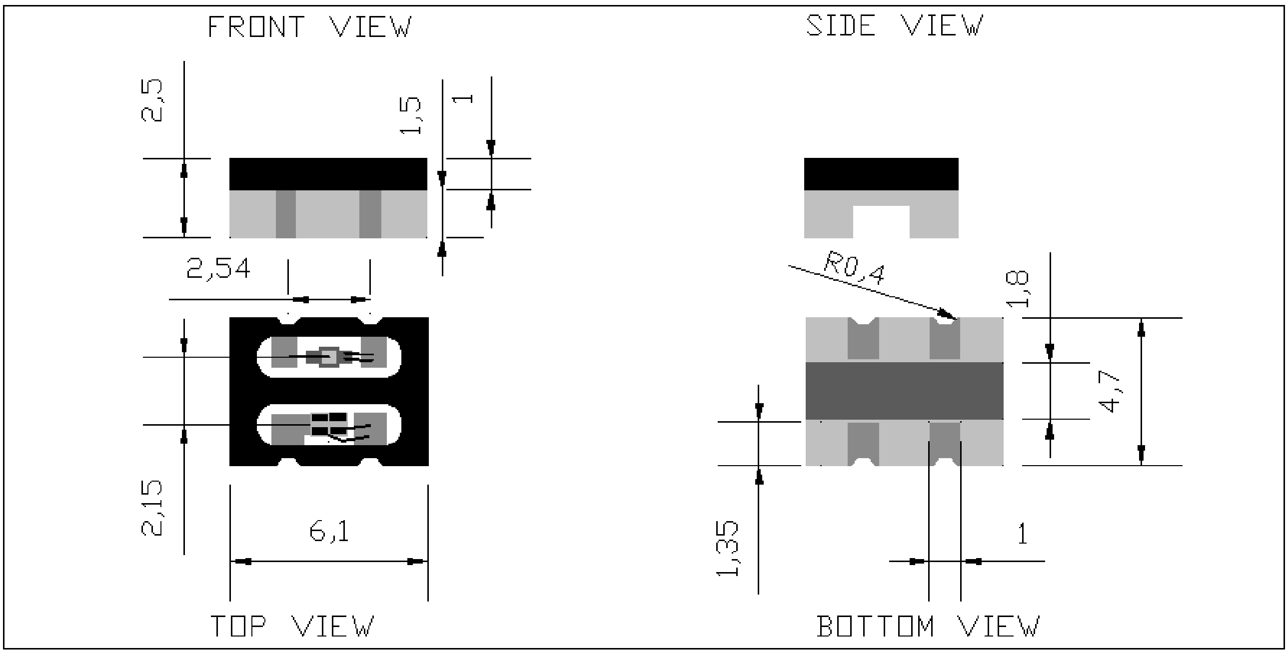
ELECTRICAL/OPTICAL CHARACTERISTICS

T_A = 25°C unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
	Emitter					
V_F	Forward voltage	I_F=10µA		1.1		V
		I_F=20mA		1.3		V
λ_p	Peak wavelength	I_F=20mA		880		nm
$\Delta\lambda$	Spectral bandwidth at 50%	I_F=20mA		27		nm
	Receiver					
I_{CE0}	Collector dark current	V_{CE}=10V		10	100	nA
$V_{(BR)CE0}$	Collector-emitter breakdown voltage		50			V
Tr	Rise time	Rl=1kΩ V_{CE}=5V Ic=1mA		30		µs
Tf	Fall time	Rl=1kΩ V_{CE}=5V Ic=1mA		40		µs
Hfe	Phototransistor's gain		500	1000	1500	
	Coupled					
Ic	Collector current (reflective surface @ D=1mm)	V_{CE}=5V I_F=20mA	1	3		mA
V_{Cesat}	Collector-emitter saturation voltage	I_F=20mA V_{CE}=5V D=1mm		0.175	0.3	V
D	Optimal distance to reflective surface*			1.1		mm

MECHANICAL CHARACTERISTICS

Unit: mm Tolerance: ± 0.2 mm



** See Figure 1*

TYPICAL PERFORMANCE CURVES

Figure 1 – Normalized collector current VS Distance to reflective surface [mm] §

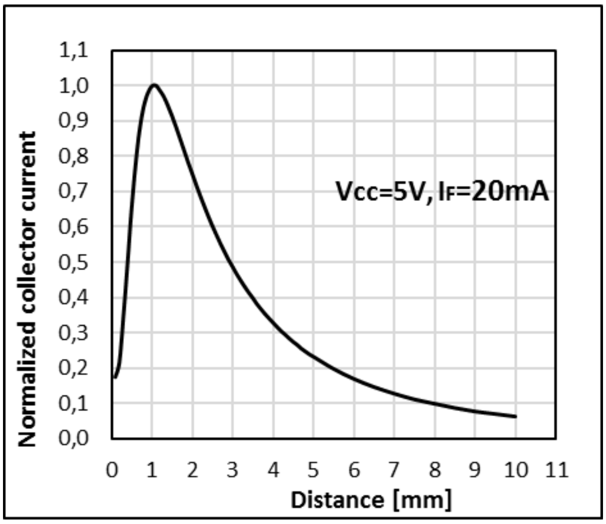


Figure 3 – Forward led current [mA] VS Forward led voltage [V] §

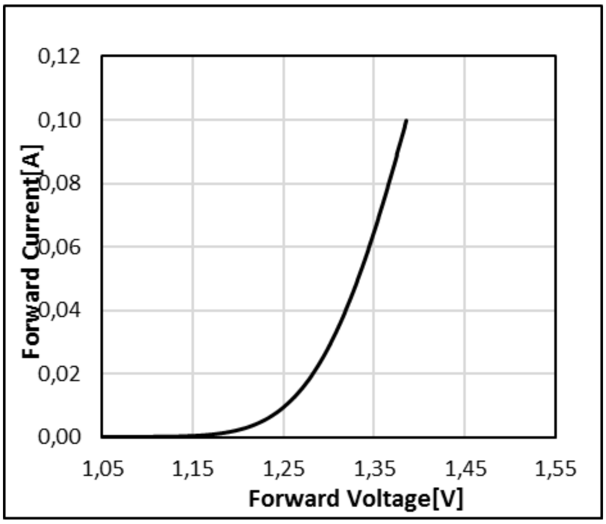
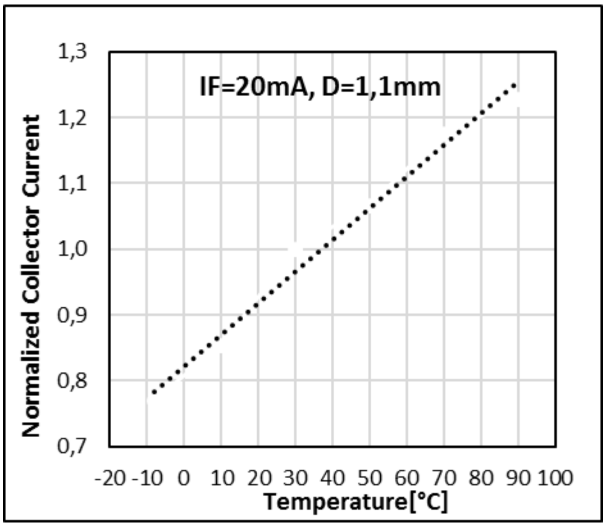
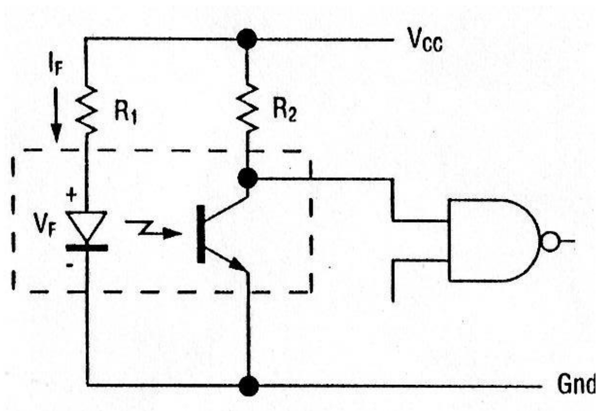


Figure 2 – Normalized collector current (@Ta=30°C) typical drift VS temperature [°C]



§ Ta=25°C unless otherwise noted

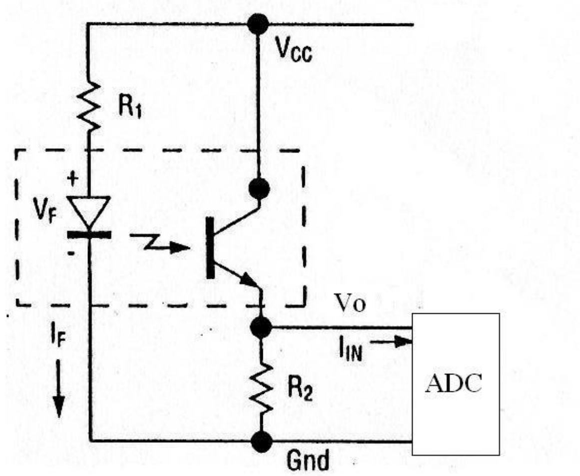
TYPICAL APPLICATION INTERFACE



$$R_1 = \frac{V_{cc} - V_F}{I_F}$$

$$R_2 = \frac{V_{cc} - Vce_{sat}}{I_{sat}}$$

Figure 4 – Digital interface



$$R_1 = \frac{V_{cc} - V_F}{I_F}$$

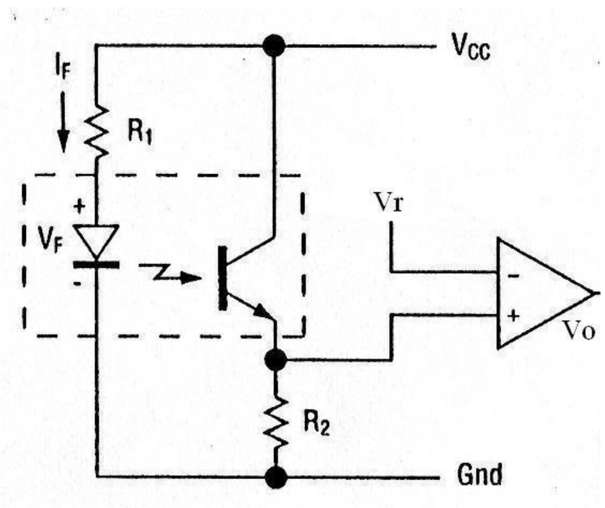
$$R_2 = \frac{V_{cc} - Vce}{I_{R2}}$$

I_{IN} input current required for AD conversion

Vo output analog voltage

(the voltage gain is given by R2 and I_F)

Figure 5 –Linear signal conversion to digital



$$R_1 = \frac{V_{cc} - V_F}{I_F}$$

$$R_2 = \frac{V_{cc} - Vce}{I_{R2}}$$

$$Vo = Aol * (V_{R2} - Vr)$$

Vr voltage threshold

Vo voltage digital output

Figure 6 – Threshold comparator