

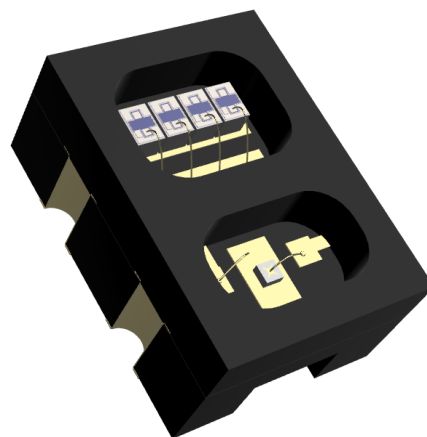
General Description

The OIER30 reflective sensor consists in an infrared emitting diode as emitter and an array of silicon phototransistors as receiver. The components together are integrated side by side in a plastic black SMD housing. The black opaque package avoids optical cross talk and behaves as a barrier between led and photoreceivers.

The phototransistors react to radiation emitted from the LED only if a reflective object surface is within the field of view of the detector.

The cavity on backside permit to mount the device also across a standard 1.6mm thickness PCB.

The number of parallel phototransistors can be customized, giving flexibility on sensitive area and output current capability. The emitter part can be also customized using different wavelength, power and size.

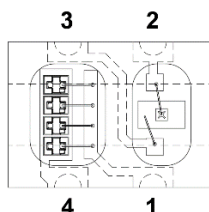
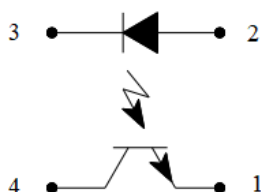


Applications

- Scanning
- Automated transaction systems
- Metering systems
- Motion control systems
- Non invasive medical equipment
- Low distance metering

Pin Functions

No.	Name	Function
1	EE	Phototransistor common emitter
2	A	Led anode
3	K	LED Cathode
4	CC	Phototransistor common collector



Features

- Milling on the backside for assembly flexibility
- Unfocused for sensing diffused surface
- SMT compact package
- Available with 2 or 4 phototransistors
- High uniformity
- Very stable measurements
- High gain phototransistor
- No contact surface sensing
- Low profile
- Low cost
- Customization on request

Ordering Information

OIER30-2	Receiver with 2 parallel phototransistors
OIER30-4	Receiver with 4 parallel phototransistors

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min	Max	Unit
T_A	Operating Temperature Range	-20	80	°C
T_S	Storage Temperature	-25	85	°C
Emitter				
I_F	Continuous forward current		50	mA
V_r	Reverse voltage		5	V
Receiver				
V_{CE0}	Collector-emitter voltage		30	V
P_d	Power dissipation		100	mW
I_c	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.

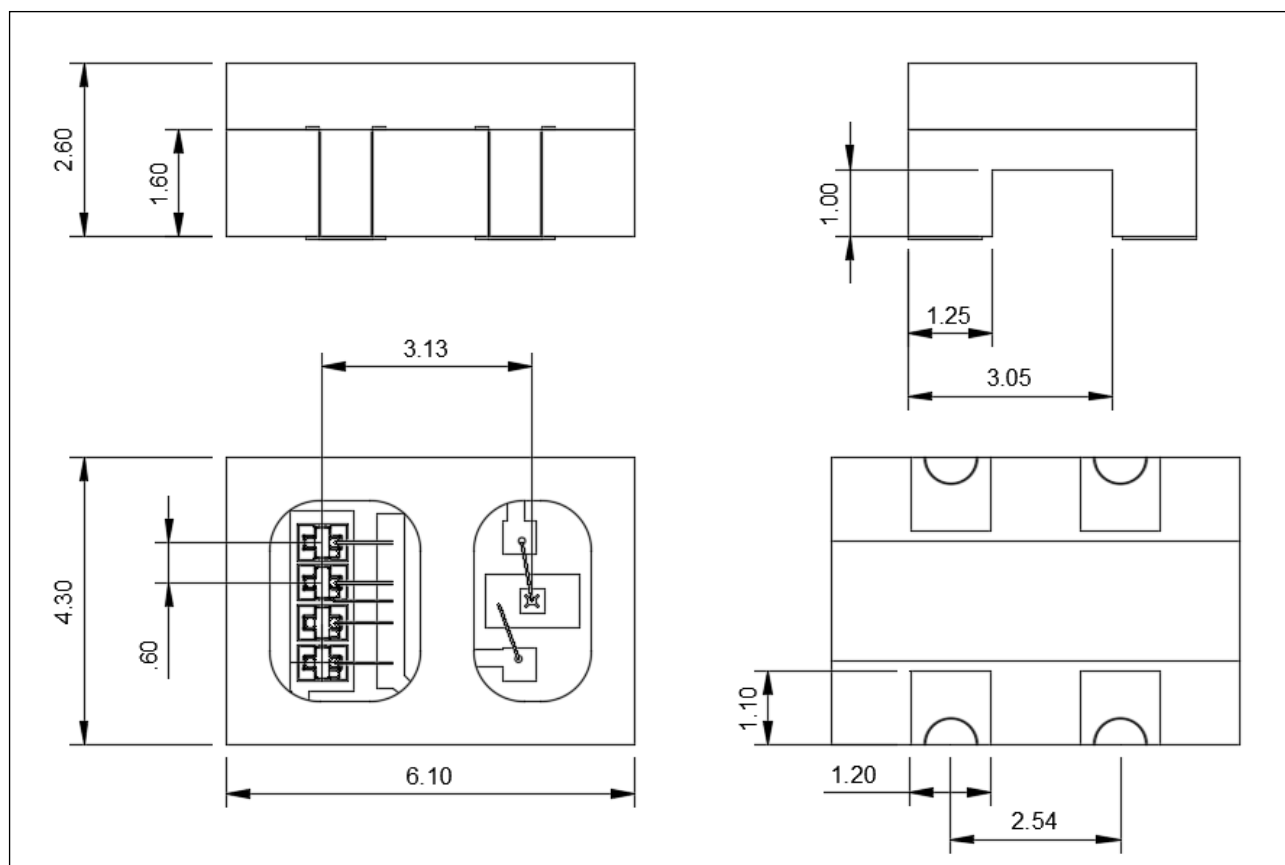
ELECTRICAL/OPTICAL CHARACTERISTICS

$T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Emitter						
V_F	Forward voltage	$I_F=5\text{mA}$		1.25		V
		$I_F=20\text{mA}$		1.30		
		$I_F=50\text{mA}$		1.35		
I_F	Recommended current for best performances		-	5	20	mA
λ_p	Peak wavelength	$I_F=20\text{mA}$		880		nm
$\Delta\lambda$	Spectral bandwidth at 50%	$I_F=20\text{mA}$		27		nm
t_{e_r}	Emitter Rise Time	$I_F=20\text{mA}$		1		μs
t_{e_f}	Emitter Fall Time	$I_F=20\text{mA}$		1		μs
Receiver						
I_{CE0}	Collector dark current	$V_{CE}=10\text{V}$		10	100	nA
$V_{(BR)CE0}$	Collector-emitter breakdown voltage		50			V
t_{r_f}	Receiver Rise time OIER30-2	$h_{fe}=1k$ $R_I=1k\Omega$ $I_c=2\text{mA}$		27		μs
t_{r_f}	Receiver Fall time OIER30-2	$h_{fe}=1k$ $R_I=1k\Omega$ $I_c=2\text{mA}$		24		
t_{r_f}	Receiver Rise time OIER30-4	$h_{fe}=1k$ $R_I=1k\Omega$ $I_c=4\text{mA}$		48		
t_{r_f}	Receiver Fall time OIER30-4	$h_{fe}=1k$ $R_I=1k\Omega$ $I_c=4\text{mA}$		41		
H_{fe}	Phototransistor's gain		500	1000	1500	-
Coupled						
I_c	Collector current (reflective white surface @ $D=1.3\text{mm}$)	OIER30-2 $I_F=20\text{mA}$		2		mA
		OIER30-4 $I_F=20\text{mA}$		4		
		OIER30-2 $I_F=5\text{mA}$		0.5		
		OIER30-4 $I_F=5\text{mA}$		1		
V_{Cesat}	Collector-emitter saturation voltage	$I_F=20\text{mA}$ $V_{CE}=5\text{V}$ $D=1.3\text{mm}$		0.15	0.3	V
D	Optimal distance to reflective surface†			1.3		mm

PACKAGE CHARACTERISTICS

Symbol	Parameter	Value	Unit
S_F	Pad Surface Finishing	GOLD	
S_L	Pad Shelf Life	6	months
MSL	Moisture Sensitive Level	3	level

MECHANICAL DIMENSIONSUnit: mm Tolerance: ± 0.2 mm**MECHANICAL CHARACTERISTICS**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
A	OIER30-2	Receiver part	0.18			mm ²
	OIER30-4		0.36			
L	Length of the device		5.9	6.1	6.3	mm
W	Width of the device		4.1	4.3	4.5	mm
H	Height of the device		2.3	2.6	2.9	mm
S	Slot depth for side mounting		1			mm

TYPICAL PERFORMANCE CURVES

Figure 1 – OIER30-X contrast on black/white bars Vs bar thickness L direction

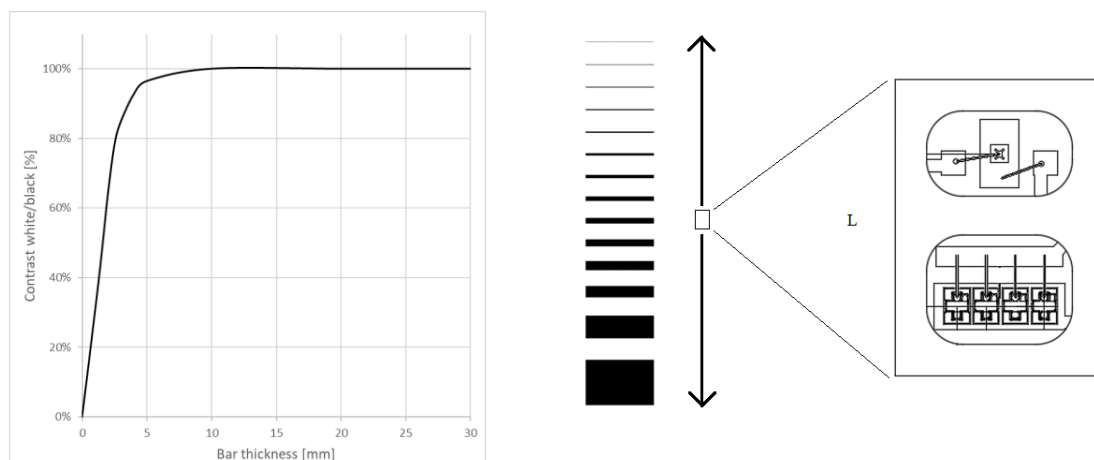


Figure 2 – OIER30-X contrast on black/white bars Vs bar thickness W direction

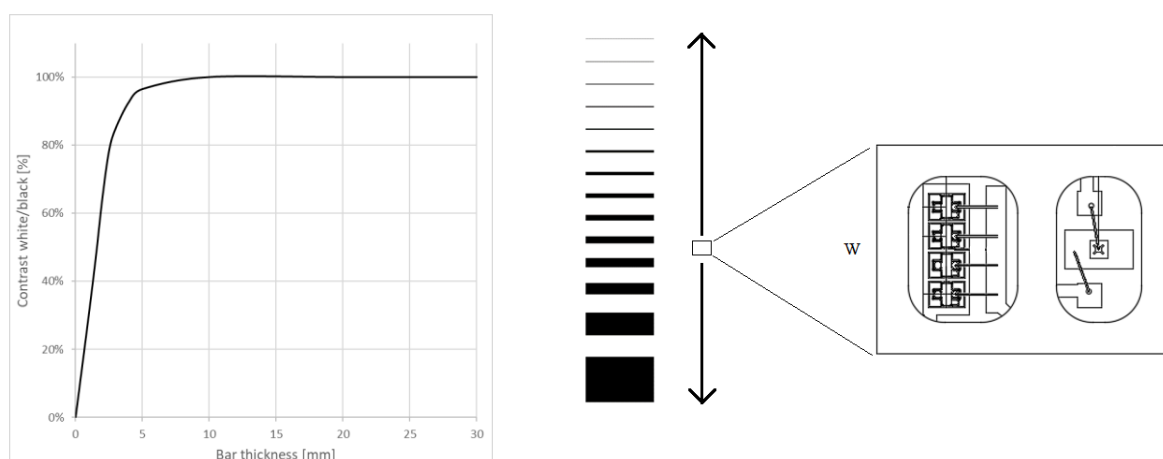


Figure 3 – OIER30-X collector current Vs focus distance 0-10mm

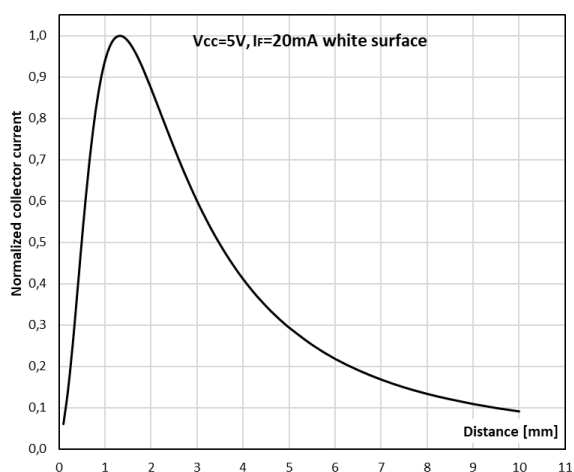


Figure 4 – OIER30-X collector current Vs focus distance 0-3mm

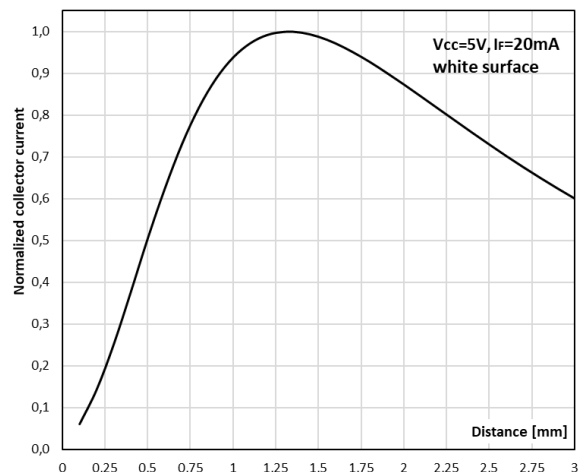


Figure 5 – OIER30-X led I-V direct (emitter)

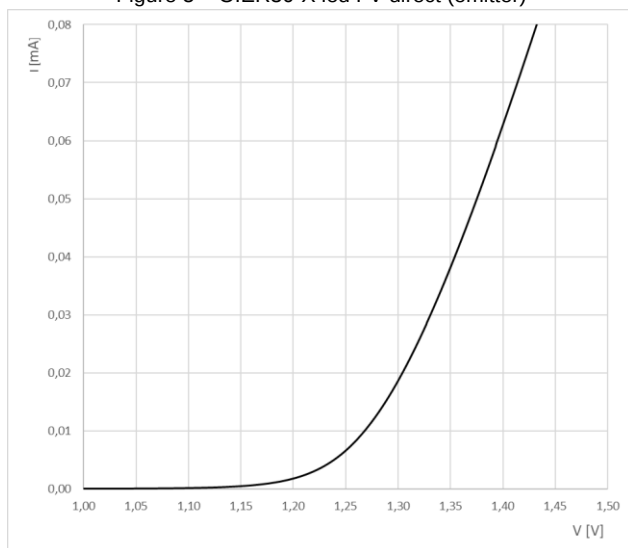


Figure 6 – OIER30-X avg drift Vs temperature (coupled)

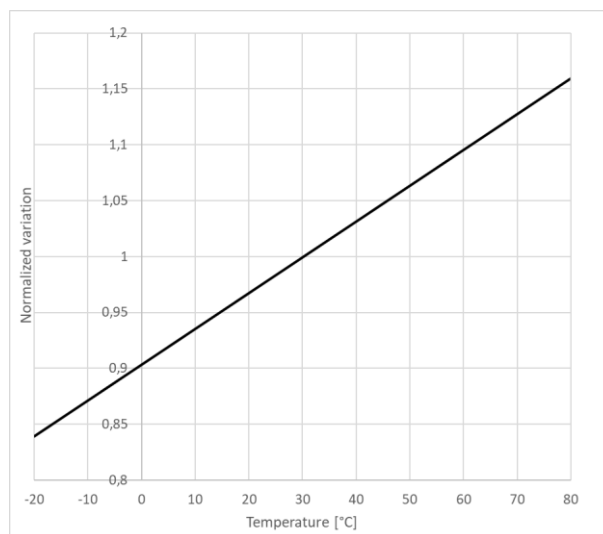


Figure 7 – OIER30-2 rise time (1mA for each phototransistor)

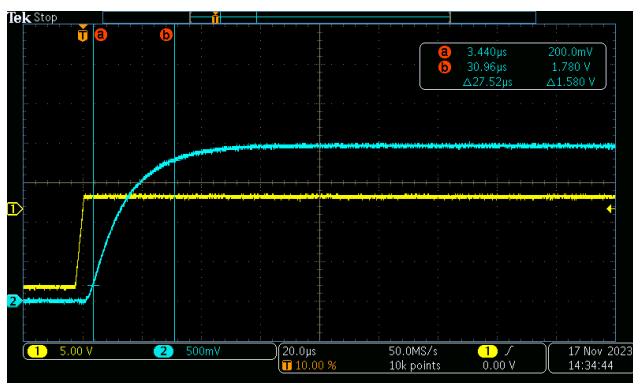


Figure 8 – OIER30-2 fall time (1mA for each phototransistor)

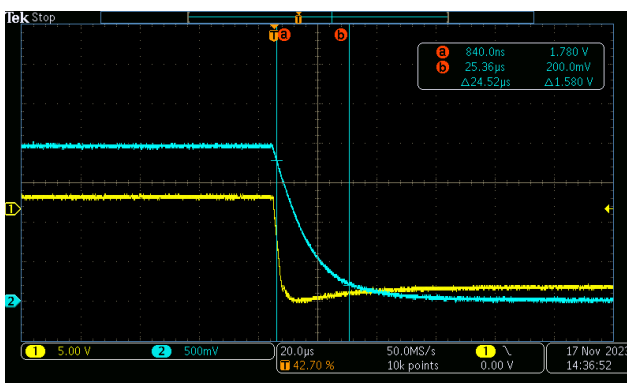


Figure 9 – OIER30-4 rise time (1mA for each phototransistor)

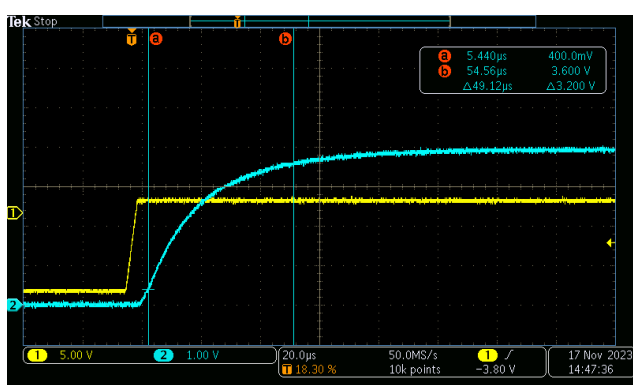
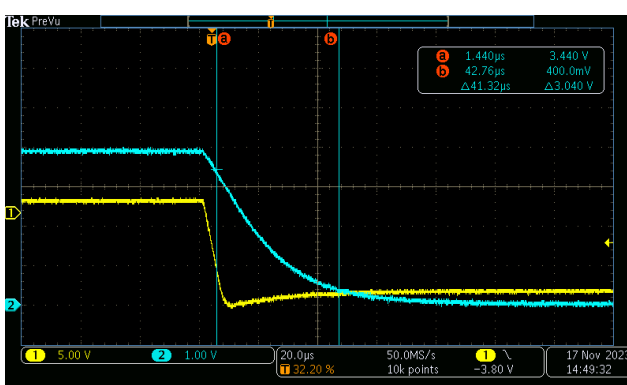


Figure 8 – OIER30-4 fall time (1mA for each phototransistor)



TYPICAL APPLICATION INTERFACE

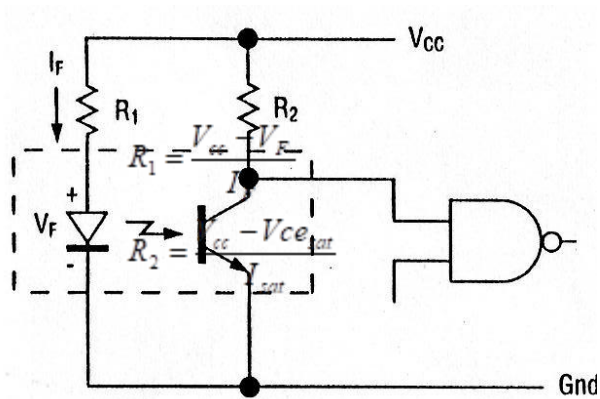
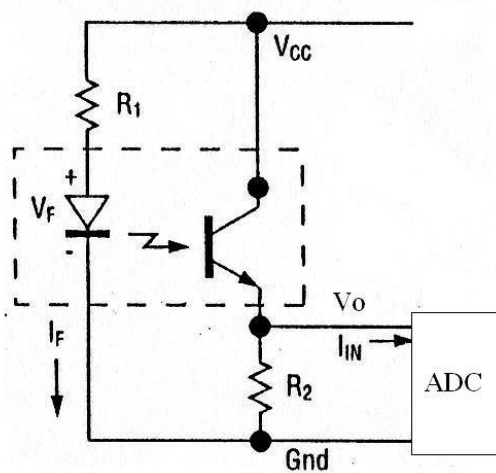
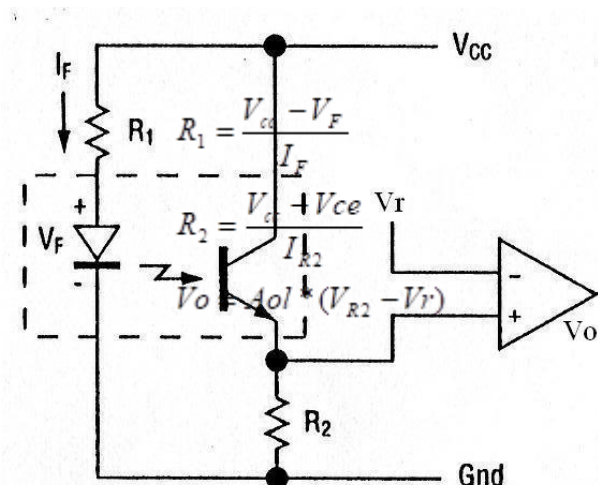


Figure 2 – Digital interface



I_{IN} input current required for AD conversion
 V_O output analog voltage
 (the voltage gain is given by R_2 and I_F)

Figure 3 –Linear signal conversion to digital



V_r voltage threshold
 V_O voltage digital output

Figure 4 – Threshold comparator