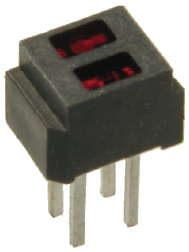
Sensing and Control

Reflective Object Sensor

OPB608A, OPB608B, OPB608C, OPB608R, OPB608V

Features:

- Phototransistor output
- Unfocused for sensing diffuse surface
- Low cost plastic housing
- Enhanced signal to noise ratio
- Reduced ambient light sensitivity



Description:

OPB608 reflective switches consist of an infrared emitting device (LED or VCSEL) and a NPN silicon phototransistor mounted "side-by-side" on a parallel axis in a black opaque plastic housing. All OPB608's **(*except* OPB608R)** have an emitting device and a phototransistor that are encapsulated in a visible filtering epoxy. The phototransistor responds to radiation from the emitter only when a reflective object passes within its field of view. The phototransistor has enhanced low current roll-off to improve the contrast ratio and immunity to background irradiance. LED versions are designed for near-field applications. The VCSEL version is designed for longer distances.

OPB608A, **OPB608B** and **OPB608C** devices are designed for applications with reflective distances between 0.050" (1.270 mm) and 0.375" (9.525 mm). **OPB608V** is designed for applications with reflective distances between 0.050" (1.270 mm) and 1.200" (30.480 mm). All of these are designed for light patterns not visible to the human eye. By utilizing the night enhancement function of a camera, the near infrared light pattern can be seen. This allows a user to see the pattern shining on the reflective object.

OPB608R is designed for applications with reflective distances between 0.050" (1.270 mm) and 0.300" (7.620 mm). It is designed for light patterns visible to the human eye. The efficiency of this sensor is lower for optical wavelengths in the visible range, thus reducing the distance that can be used.

Reflective distances are dependent upon the drive current for the light emitting device, the wavelength of the light source, and the type of reflective material; therefore, each application should be checked for the ability to meet each requirement.

Custom electrical, wire and cabling and connectors are available. Contact your local representative or OPTEK for more information.

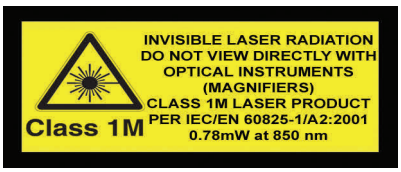
Applications:

- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor

Ordering Information

Part Number	LED Peak Wavelength	Sensor	Reflection Distance Inch (mm)	Lead Length
OPB608A	890 nm	Rbe Transistor	See Graph on Page 4	0.18" (Min)
OPB608B				
OPB608C				
OPB608R	650 nm			
OPB608V	850 nm			

Pb-Free (RoHS)



Additional laser safety information can be found on the Optek website. See application #221.

Classification is not marked on the device due to space limitations. See package outline for centerline of optical radiance. Operating devices beyond maximum rating may cause devices to exceed rated classification

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Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Storage Temperature Range		-40° C to +85° C
Operating Temperature Range	OPB608 A, B, C & R OPB608V	-40° C to +85° C 0° C to +70° C
Lead Soldering Temperature [1/16 inch (1.6mm) from the case for 5 sec. with soldering iron](1)		260° C
Total Power Dissipation		100 mW

OPB608A, OPB608B, OPB608C (Infrared-LED — 890 nm)

Forward DC Current	50 mA
Peak Forward Current (1 µs pulse width, 300 pps)	3 A
Reverse DC Voltage	2 V

OPB608R (Visible Red-LED — 650 nm)

Forward DC Current	50 mA
Reverse DC Voltage	5 V

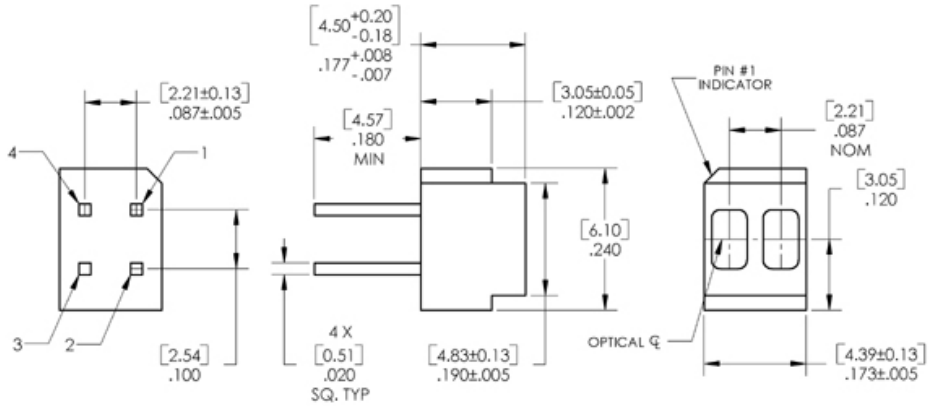
OPB608V (Infrared-VCSEL — 850 nm)

Forward DC Current	12 mA
Reverse DC Voltage	5 V

Phototransistor

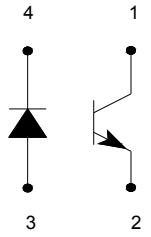
Collector-Emitter Voltage	30 V
Emitter Reverse Current	10 mA
Collector DC Current	25 mA

Notes:
(1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
(2) Methanol or isopropanol are recommended as cleaning agents. The plastic housing is soluble in chlorinated hydrocarbons and keytones.



DIMENSIONS ARE IN: [MILLIMETERS] INCHES

Pin #	LED	Pin #	Transistor
4	Cathode	1	Collector
3	Anode	2	Emitter



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Electrical Characteristics (T_A = 25°C unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Infrared-LED (880 nm) (See OP240 for additional information)						
V_F	Forward Voltage	-	-	1.7	V	I_F = 20 mA
I_R	Reverse Current	-	-	100	µA	V_R = 2 V
Infrared-LED (650 nm)						
V_F	Forward Voltage	-	1.9	2.5	V	I_F = 20 mA
V_R	Reverse Voltage	5	-	-	V	I_R = 10 µA
Infrared VCSEL (850 nm) (See OPV330 for additional information)						
V_F	Forward Voltage	-	-	2.2	V	I_F = 7 mA
I_R	Reverse Current	-	-	30	nA	V_R = 5 V
I_{TH}	Threshold Current	2	-	5.5	mA	-
Θ	Beam Divergence	-	12	-	Deg.	I_F = 12 mA
Phototransistor (See OP705 for additional information)						
$V_{(BR)CEO}$	Collector Emitter Breakdown Voltage	30	-	-	V	I_C = 100 µA, E_E = 0 µW/cm^2
$V_{(BR)ECO}$	Emitter Collector Breakdown Voltage	0.4	-	-	V	I_E = 100 µA, E_E = 0 µW/cm^2
$V_{CE(SAT)}$	Saturation Voltage	-	-	.40	V	I_C = 100 µA, I_F = 20 mA, d = 0.053”
I_{CEO}	Collector Emitter Dark Current	-	-	100	nA	V_{CE} = 5 V, E_E = ≤ .10 µW/cm^2, I_F = 0
Combined						
$I_{C(ON)}$	On-State Collector Current OPB608A OPB608B OPB608C OPB608R	 2 1 0.5 1	 - - - -	 - 4 - 6	mA	V_{CE} = 5 V, I_F = 20 mA, d = 0.053 inch (1.35 mm)[1][2]
	OPB608V	5	-	-		V_{CE} = 5 V, I_F = 10 mA, d = 0.053 inch (1.35 mm)[1][2]
$I_{C(OFF)}$	Off-State Collector Current LED VCSEL	 - -	 - -	 100 100	nA	No reflective surface, V_{CE} = 5 V I_F = 20 mA I_F = 10 mA

Notes:
(1) Distance from the front of the lens to reflective surface.
(2) Measured using Eastman Kodak gray card. The white side of the card is used as a 90% diffuse reflective surface. Reference Eastman Kodak catalog #E152 7795
(3) All parameters are tested using pulse techniques.

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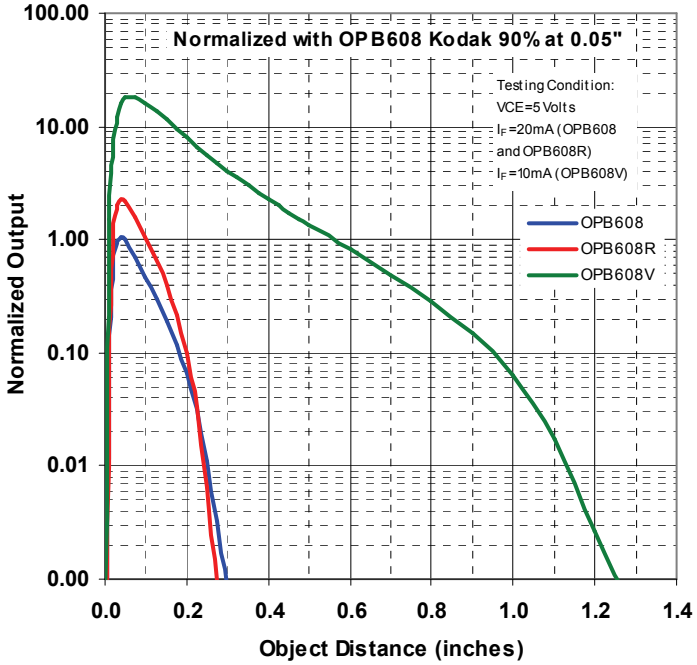
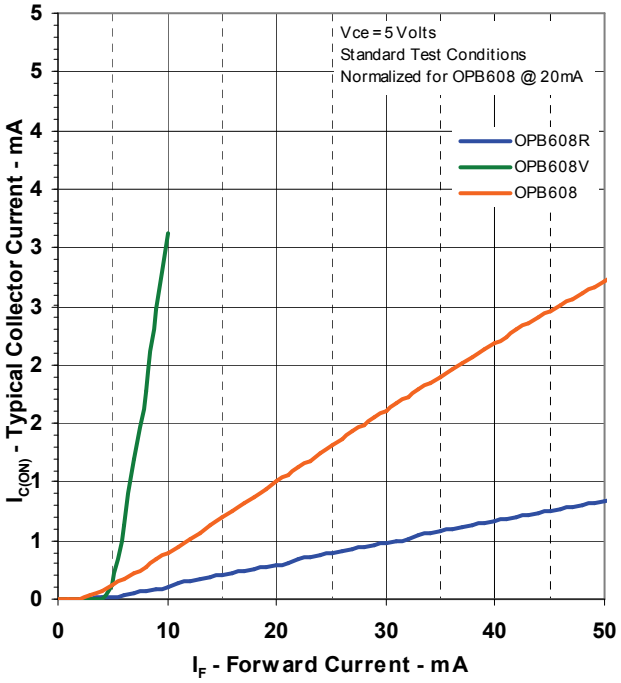
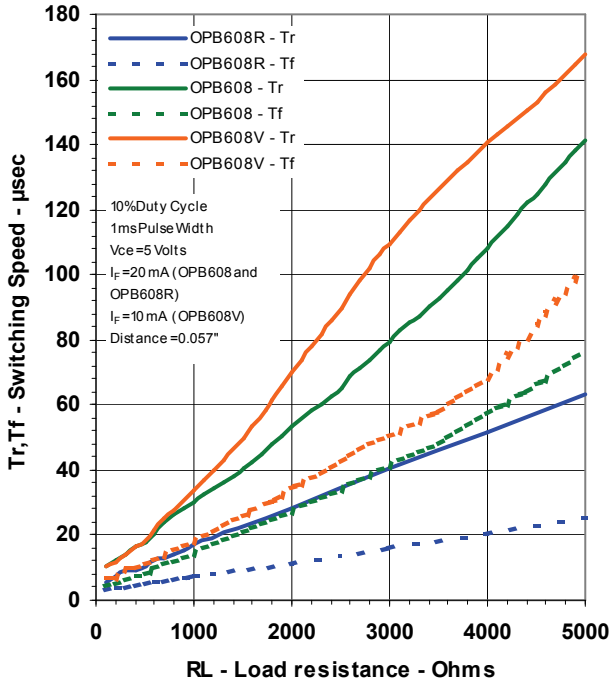
Kodak 90% Card Normalized Output vs Object Distance



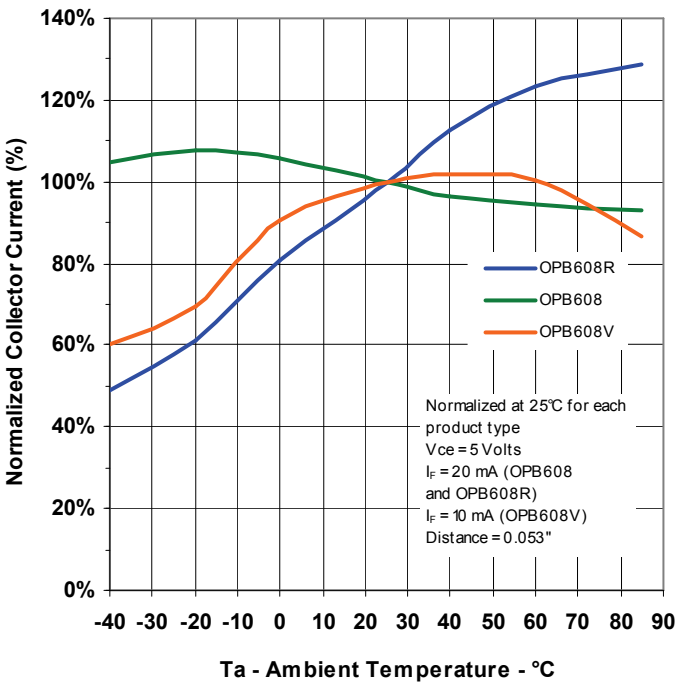
Collector Current vs Diode Forward Current



Rise and Fall vs Load Resistance



Collector Current vs Ambient Temp.



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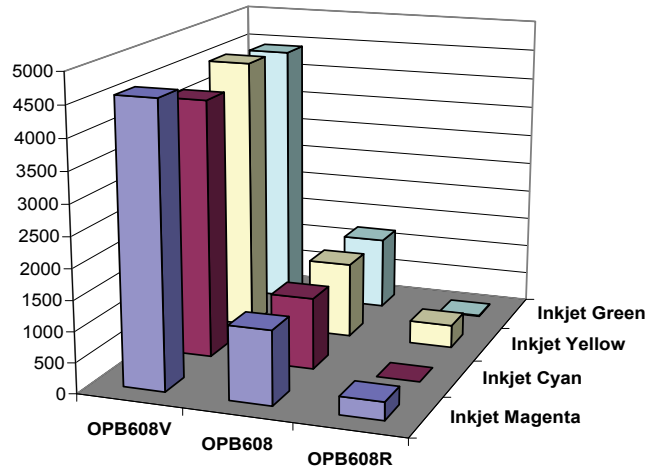
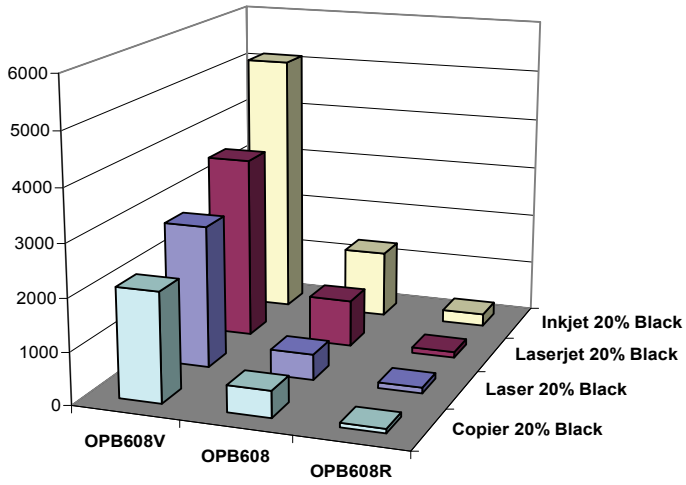
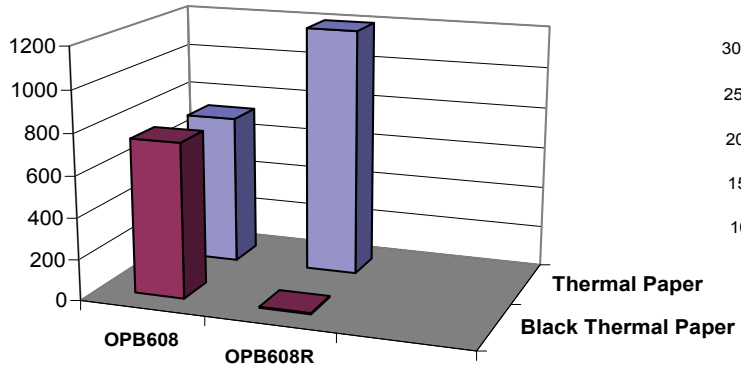
Reflective Response



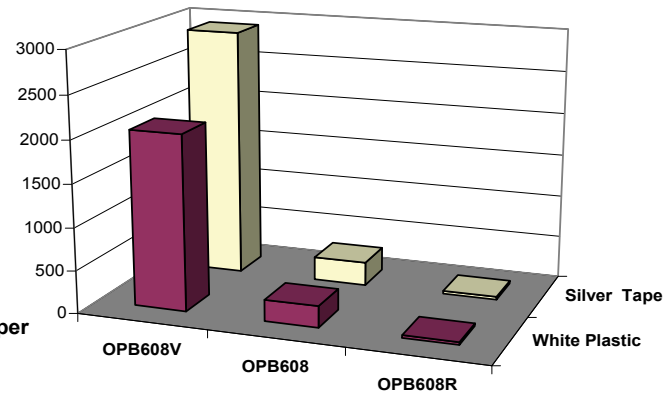
Reflective Response



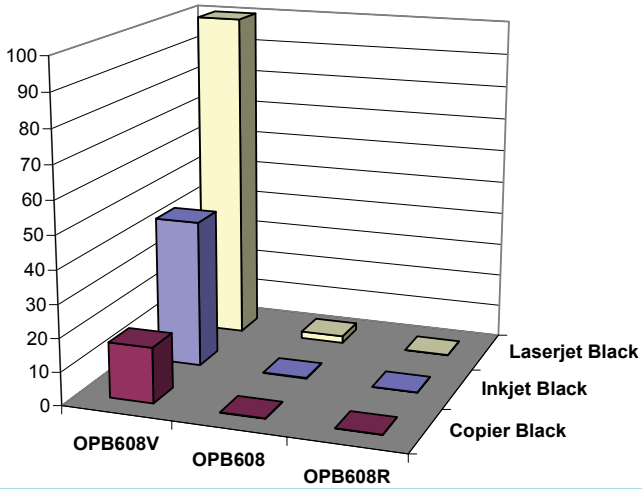
Reflective Response



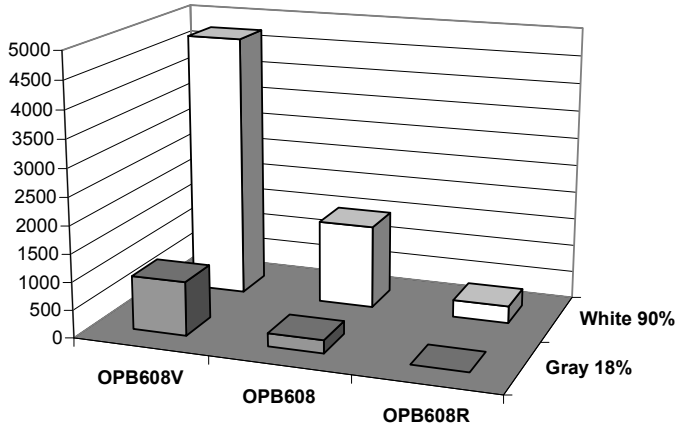
Reflective Response



Reflective Response



Relative Response



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