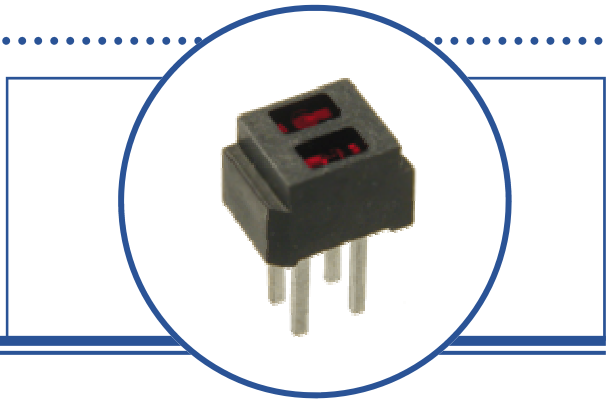
Reflective Object Sensor

TT electronics
Optek Technology

OPB608A/B/C, OPB608R, OPB608V

- **Phototransistor Output**
- **Unfocused for sensing diffuse surface**
- **Low Cost Plastic Housing**
- **Enhanced signal to noise ratio**
- **Reduced ambient light sensitivity**



The OPB608 is a reflective switch that consist of an infrared emitting device (LED or VCSEL) and an NPN silicon phototransistor mounted "side-by-side" on a parallel axis in a black opaque plastic housing. Both the emitting device and phototransistor are encapsulated in a visible filtering epoxy except the OPB608R. 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. The LED versions are designed for near field applications with the VCSEL version being designed for longer distances.

The OPB608A/B/C devices are designed for applications with reflective distances between 0.050" and 0.375" and when the light pattern is not to be seen by the human eye except for the OPB608R. By utilizing the night enhancement function of a camera, the near infrared light pattern can be seen. This allows the user to see the pattern shining on the reflective object.

The OPB608R device is designed for applications with reflective distances between 0.050" and 0.300" and when the light pattern is to be seen by the human eye. The efficiency of the sensor is lower for optical wavelengths in the visible range thus reducing the distance that can be used.

The OPB608V device is designed for applications with reflective distances between 0.050" and 1.5" and when the light pattern is not to be seen by the human eye. By utilizing the night enhancement function of a camera, the near infrared light pattern can be seen. This allows the user to see the pattern shining on the reflective object.

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 application.

Ordering Information

OPB608A—880nm LED, $I_{C(ON)}$ 2.0 mA min.
OPB608B—880nm LED, $I_{C(ON)}$ 1.0 mA min, 4.0 mA max.
OPB608C—880nm LED, $I_{C(ON)}$ 0.5 mA min

OPB608R—660nm LED, $I_{C(ON)}$ 1.0 mA min, 6.0 mA max.

OPB608V—850nm VCSEL, $I_{C(ON)}$ 5.0 mA min.

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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TT electronics plc
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Absolute Maximum Ratings

T_A = 25° C unless otherwise noted

Storage and Operating Temperature	-40° C to +85° C
Lead Soldering Temperature (1/16" (1.6mm) from case for 5 seconds with soldering iron)	260° C (1)

Infrared-LED (880nm) (OPB608A, OPB608B, OPB608C)

Forward DC Current	50 mA
Peak Forward Current (1µs pulse width, 300 pps)	3.0 A
Reverse DC voltage	2.0 V
Power Dissipation	75 mW (3)

Visible Red-LED (660nm) (OPB608R)

Forward DC Current	50 mA
Reverse DC voltage	5.0 V
Power Dissipation	100 mW (3)

Infrared-VCSEL (850nm) (OPB608V)

Forward DC Current	30 mA
Reverse DC voltage	5.0 V
Power Dissipation	75 mW (3)

Phototransistor

Collector-Emitter Voltage	30 V
Emitter Reverse Current	10 mA
Collector DC Current	25 mA
Power Dissipation	100 mW (3)

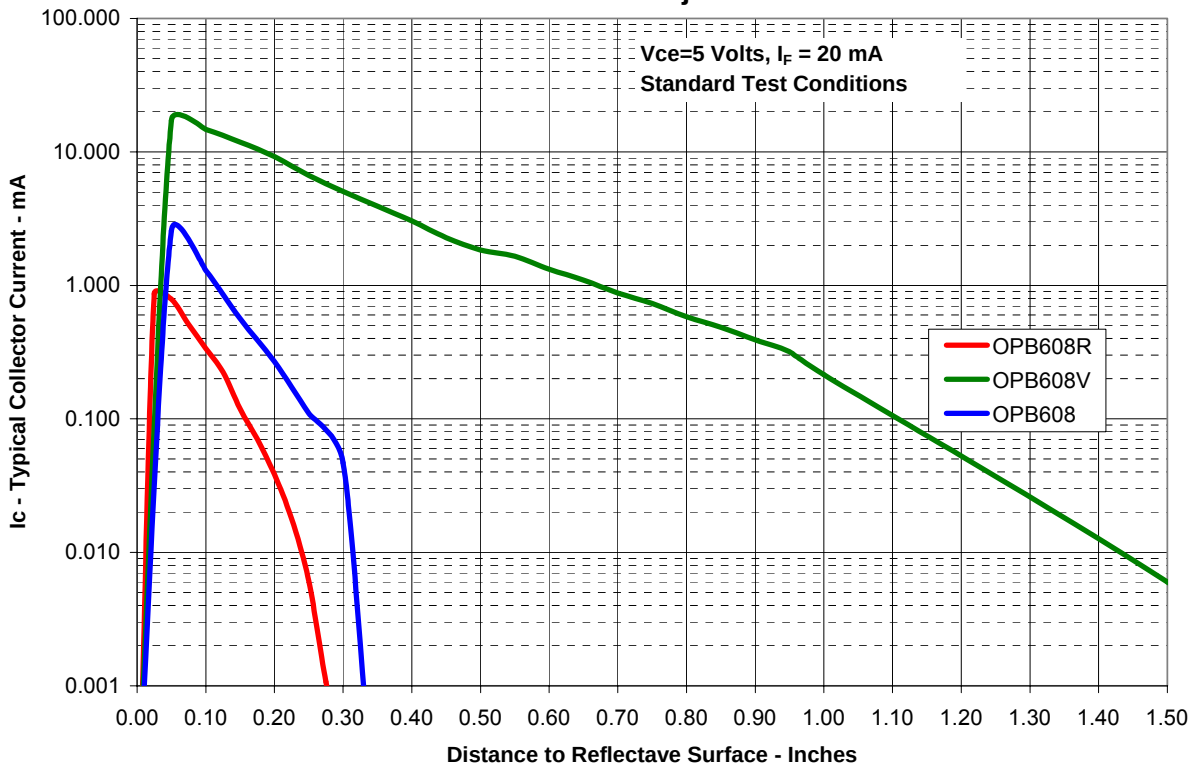
Notes:
(1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
(2) Methanol or isopropanol are recommended as cleaning agents. The plastic housing is soluble in chlorinated hydrocarbons and keytones.
(3) Derate Linearly 1.6 mW/°C above 25°C.

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

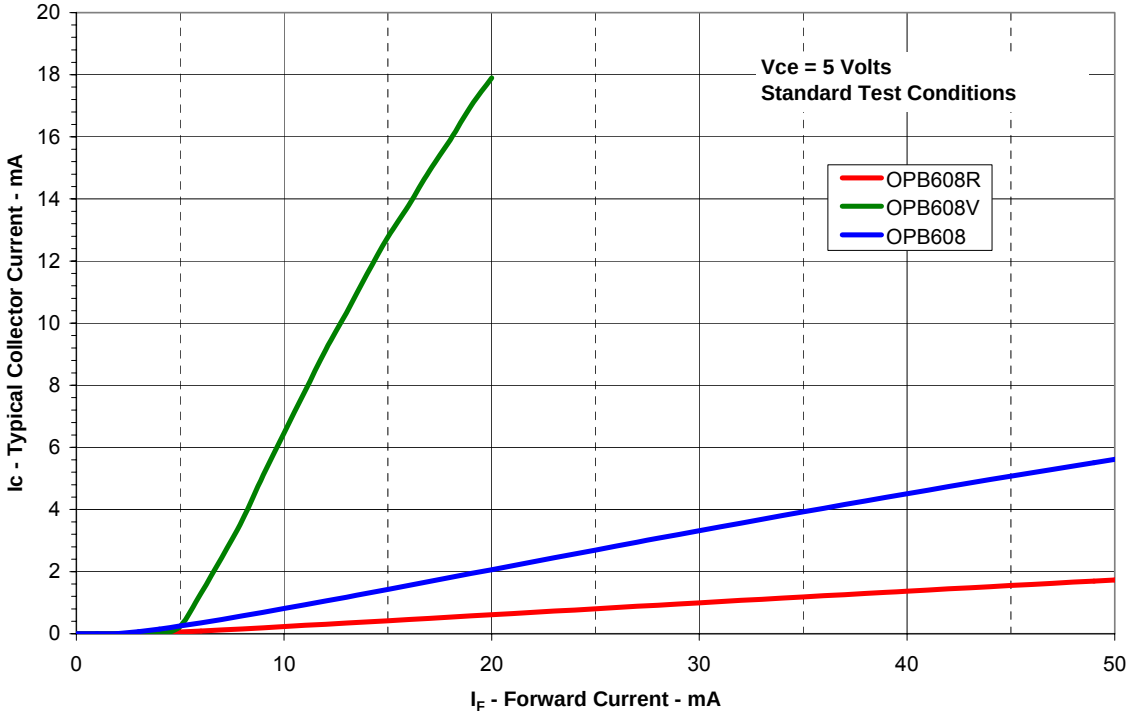
SYMBOL	PARAMETER	MIN	Typ.	MAX	UNITS	CONDITIONS
Infrared-LED (880nm)						
V_F	Forward Voltage	—		1.7	V	I_F = 20 mA
I_R	Reverse Current	—		100	µA	V_R = 2.0 V
Visible Red-LED (650nm)						
VF	Forward Voltage	—	1.9	2.5	V	I_F = 20 mA
V_R	Reverse Voltage	5.0			V	I_R = 10.0 µA
Infrared VCSEL (850)						
VF	Forward Voltage	—		2.15	V	I_F = 12 mA
I_R	Reverse Current	—		30	nA	V_R = 5 V
I_{TH}	Threshold Current	2.0		5.5	mA	
θ	Beam Divergence		12		Deg.	I_F = 12 mA
Phototransistor						
$V_{BR/CEO}$	Collector Emitter Breakdown Voltage	30		—	V	I_C = 100 µA
I_{ECO}	Emitter Collector Reverse Current	—		100	µA	V_{EC} = 0.4 Volts
I_{CEO}	Collector Emitter Dark Current	—		100	nA	V_{CE} = 5.0 V, Ee = ≤ 0.10 µW/cm^2, I_F=0
Combined						
$I_{C(ON)}$	On-State Collector Current					
	OPB608A	2.0		—	mA	
	OPB608B	1.0		4.0	mA	
	OPB608C	0.5		—	mA	V_{CE} = 5.0 V, I_F = 20 mA d = 0.110 inch (2.79 mm)[1][2]
	OPB608R	1.0		6.0	mA	
	OPB608V	5.0		—	mA	
$I_{C(OFF)}$	Off-State Collector Current	—		100	nA	V_{CE} = 5.0 V, I_F = 20 mA No reflective surface

NOTES:
(1) Distance from the measurement surface to reflective surface (see mechanical page outline).
(2) Measured using Eastman Kodak Gray card. The white side of the card uses as a 90% diffuse reflective surface. Reference Eastman Kodak catalog # E152 7795
(3) All parameters are tested using pulse techniques.

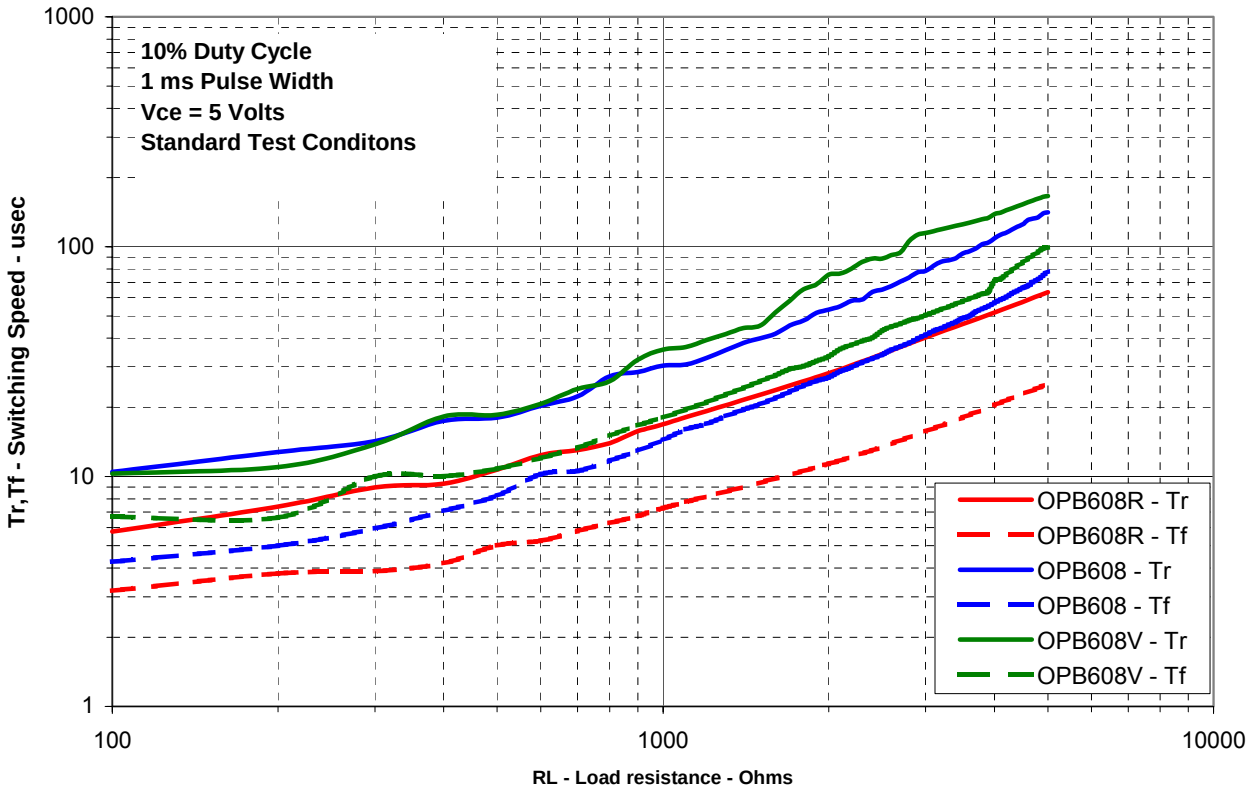
Collector Current vs Object Distance



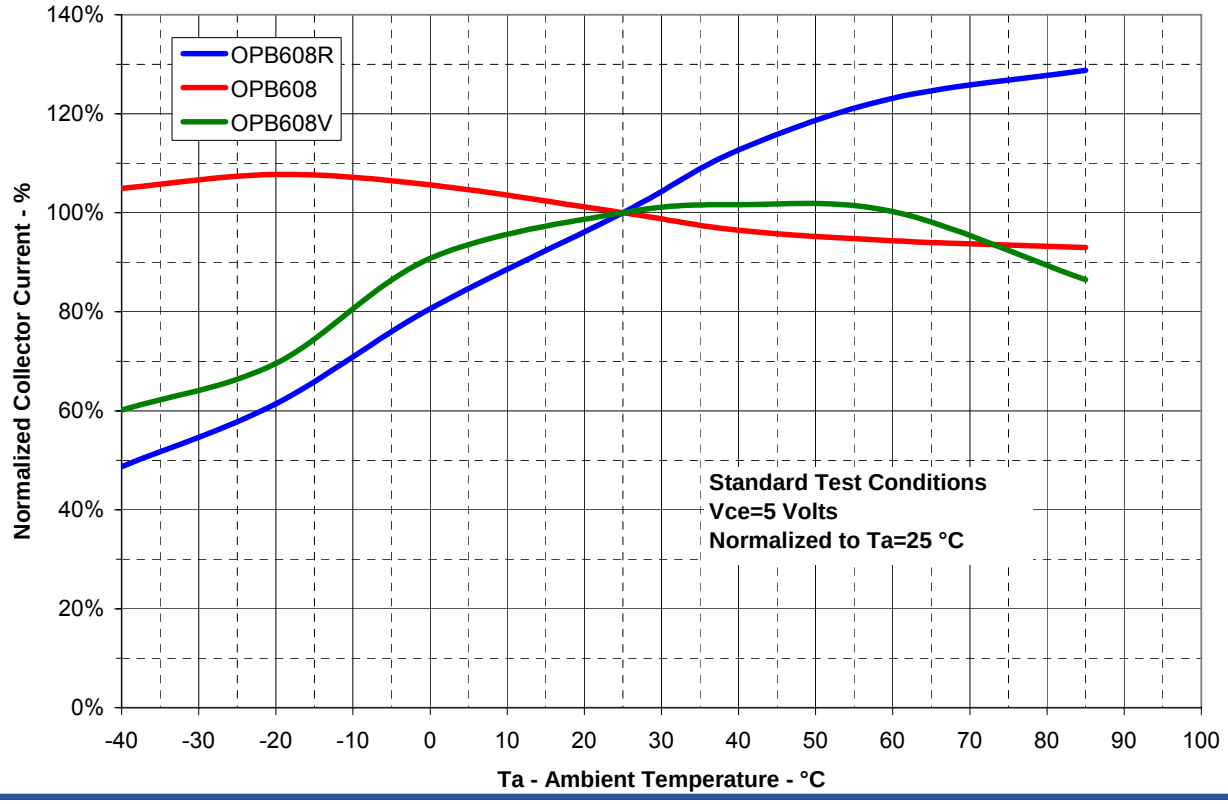
Collector Current vs Diode Forward Current



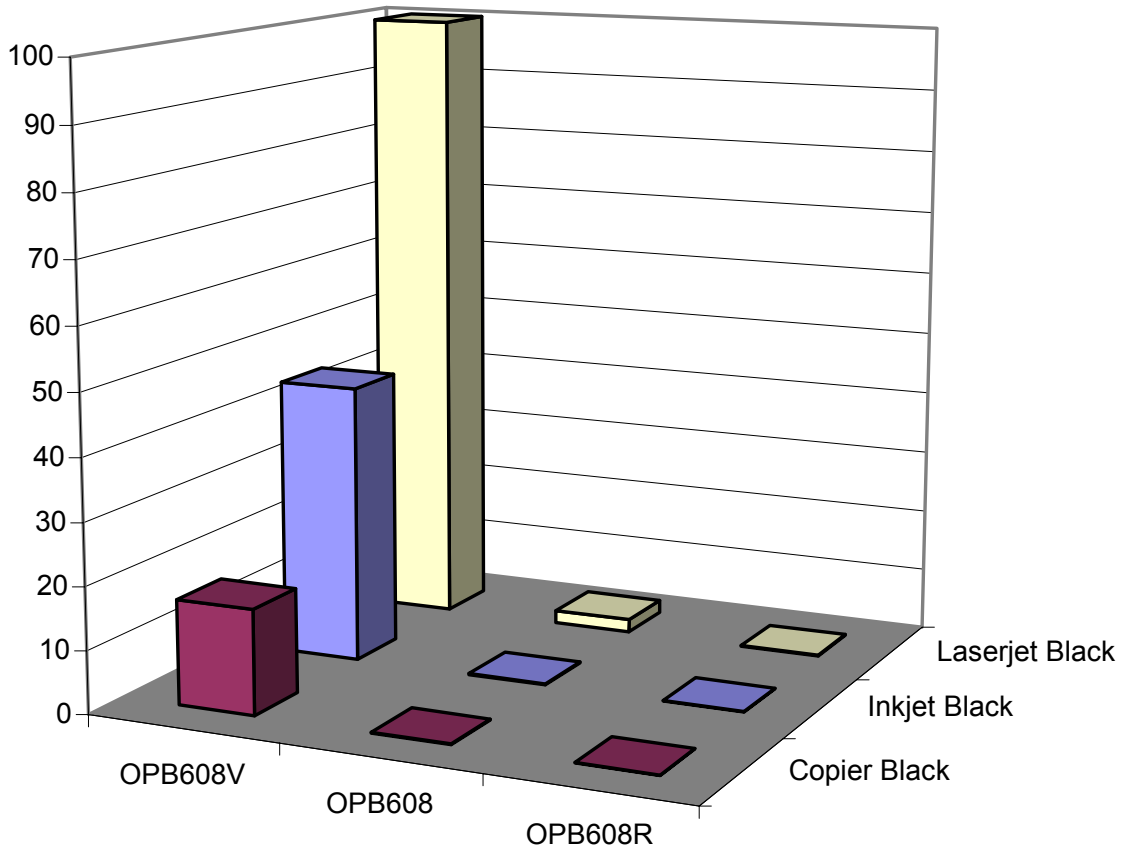
Rise and Fall vs Load Resistance

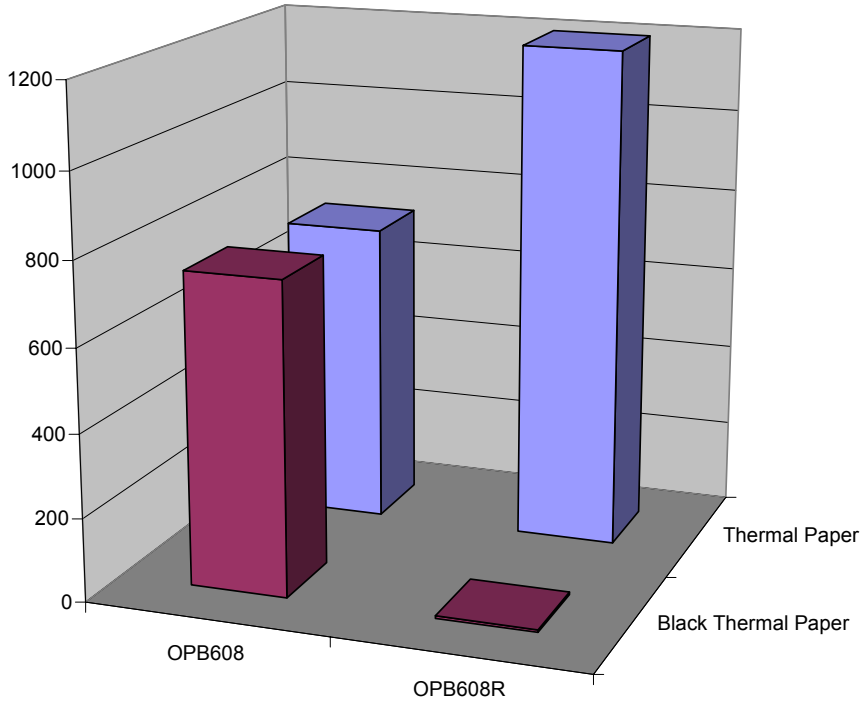


Normalized Collector Current vs Ambient Temperature



Reletive Response





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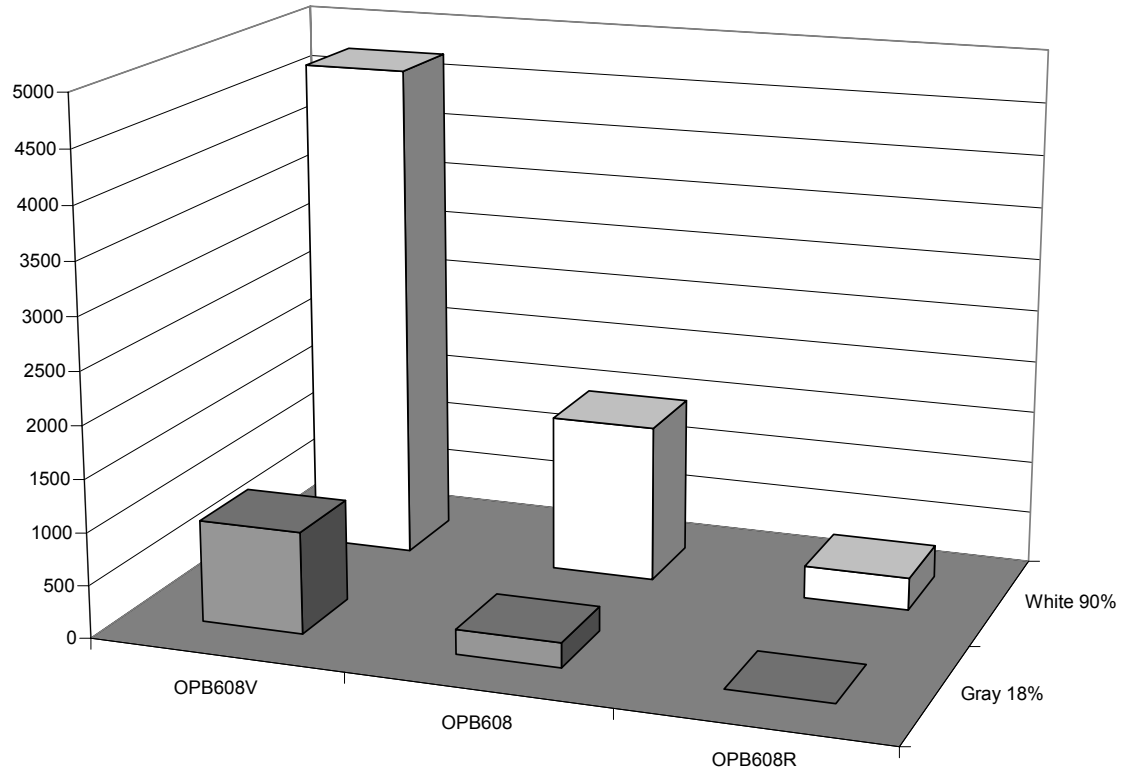

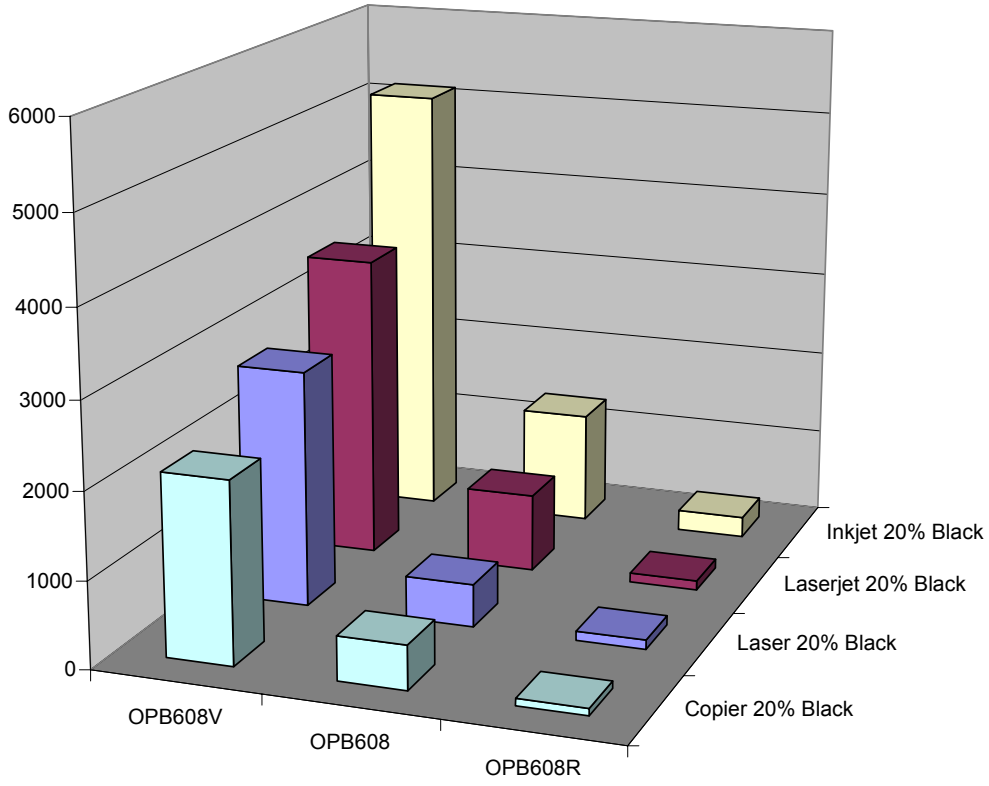

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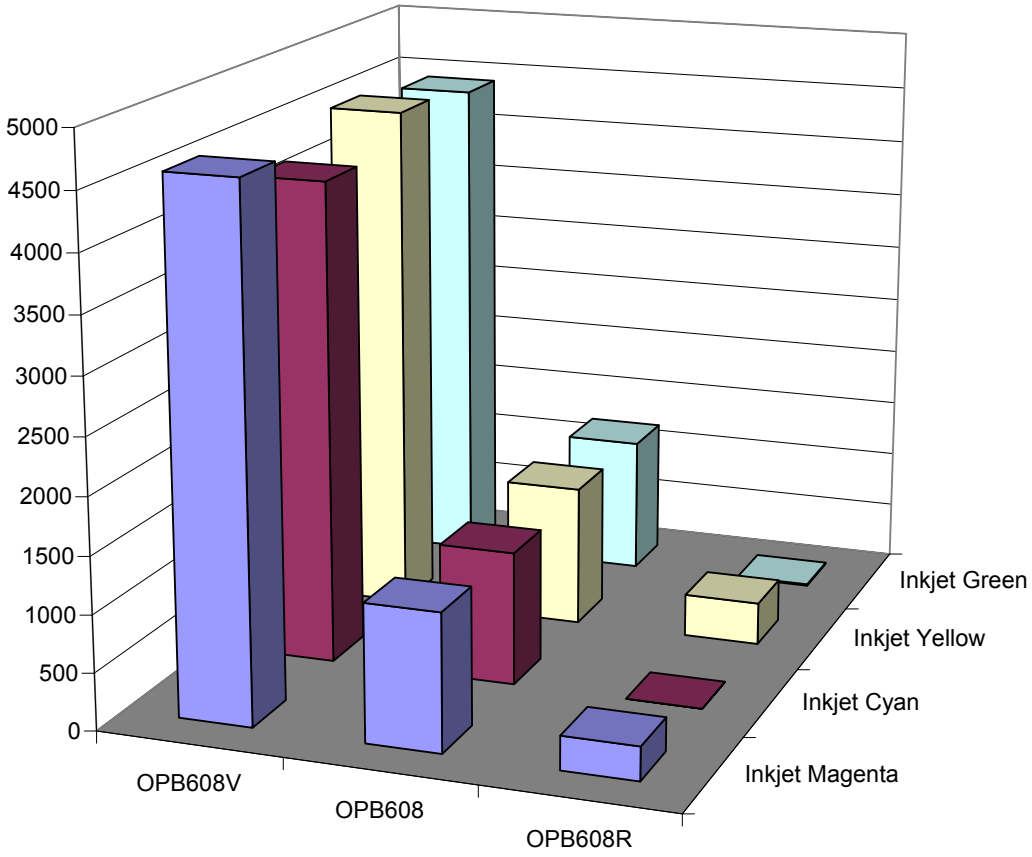

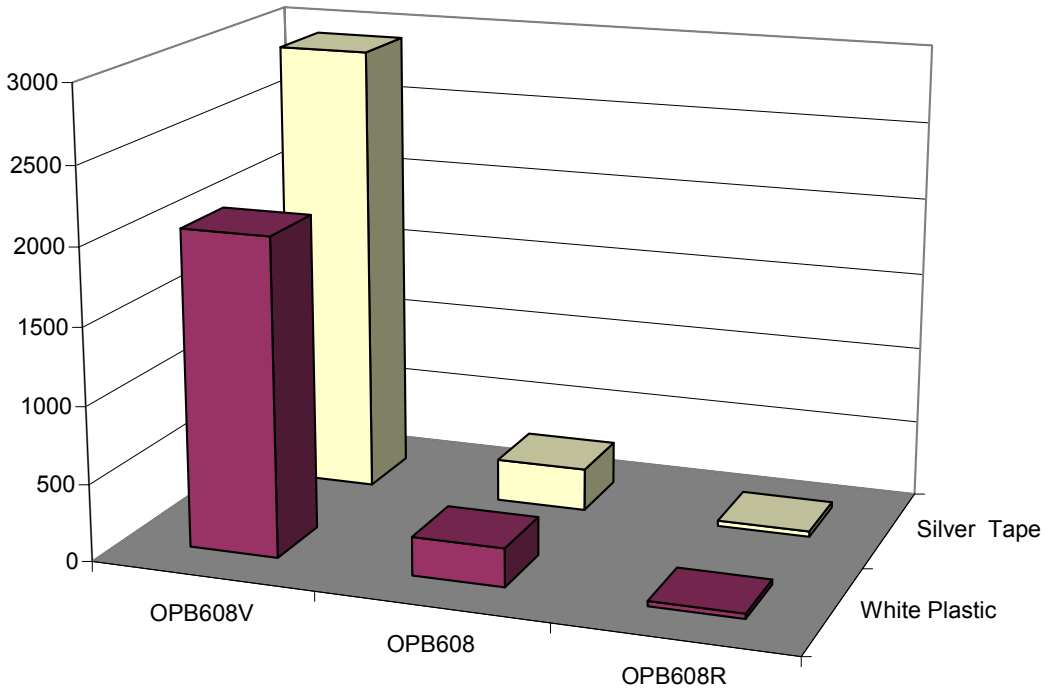

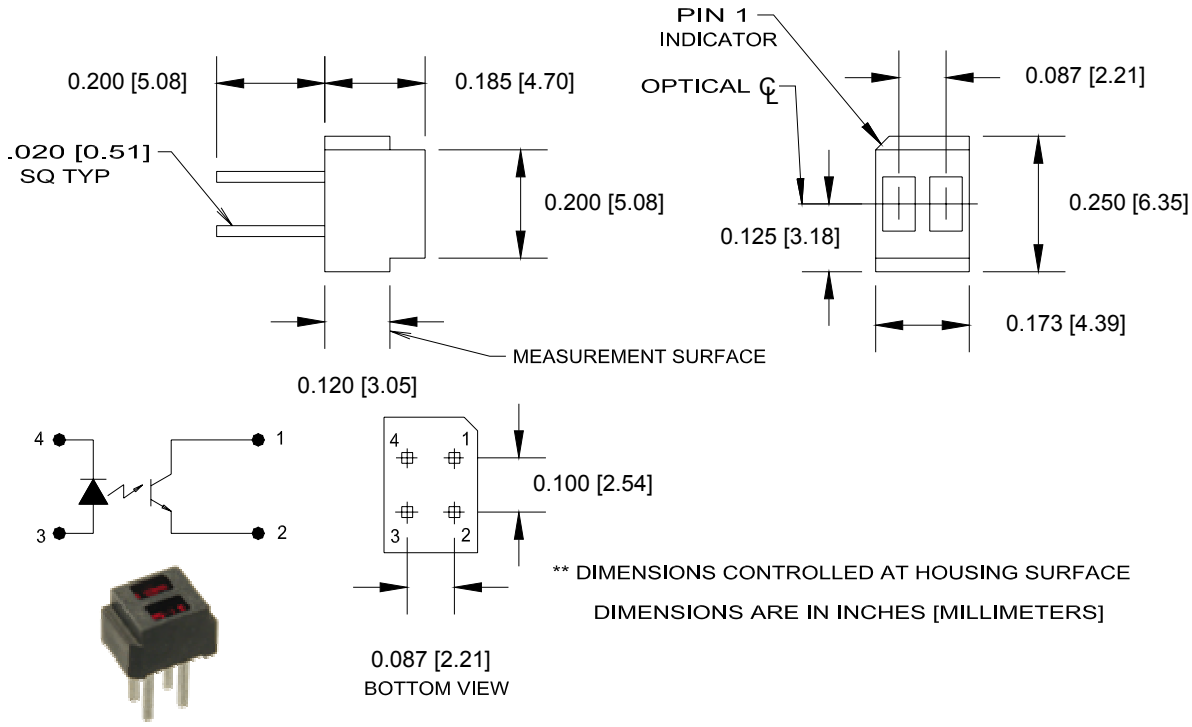

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OPB608R—650nm LED, $I_{C(ON)}$ 0.5 mA min, 6.0 mA max.

OPB608V—850nm VCSEL, $I_{C(ON)}$ 5.0 mA min.