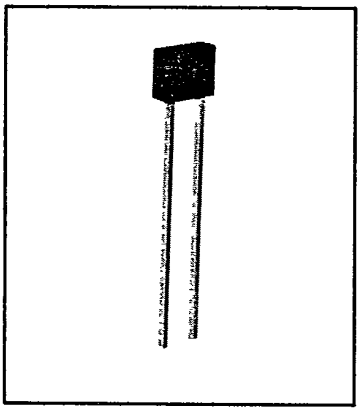
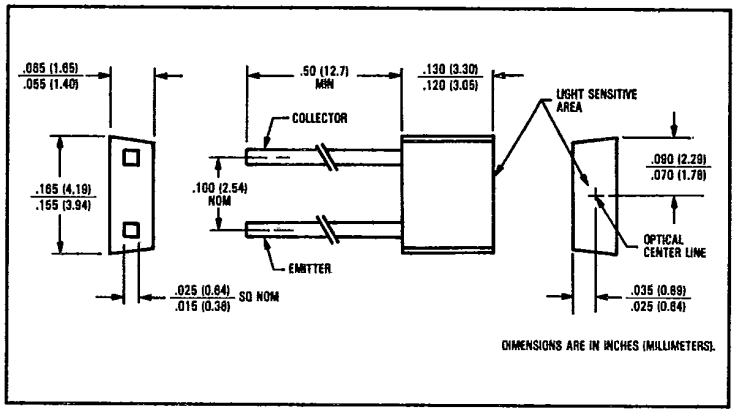
Optoelectronics Division
TRW Electronic Components Group

Product Bulletin 5112
January 1986

T-41-61

NPN Silicon Phototransistors
Types OP508FC, OP508FB, OP508FA





Features
- Flat lensed for wide acceptance angle
- Can be mounted on 0.100" (2.54 mm) hole centers
- Low cost plastic package
- Mechanically and spectrally matched to the OP168F and OP268F infrared emitting diodes.

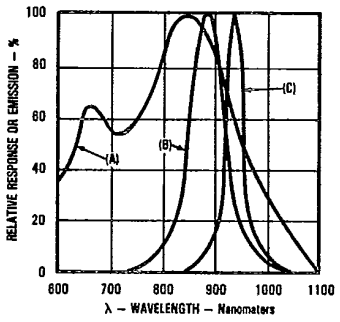
Description
The OP508F series consist of NPN silicon phototransistors mounted in flat, black plastic, end looking packages. The flat sensing surface allows an acceptance half angle of 60° measured from the optical axis to the half power point. The black plastic package significantly reduces ambient light noise. These devices can be mounted on 0.100" (2.54 mm) hole centers making them an ideal low cost alternate to hermetic pill discretes.

Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)
Collector-Emitter Voltage ..... 30 V
Emitter-Collector Voltage ..... 5.0 V
Storage and Operating Temperature Range ..... −40°C to +100°C
Lead Soldering Temperature (1/16 inch (1.6 mm) from case for 5 sec. with soldering iron)[1] ..... 240°C
Power Dissipation ..... 100 mW[2]

Notes:
(1) RMA flux is recommended. Duration can be extended to 10 sec. max. when wave soldering.
(2) Derate linearly 1.33 mW/°C above 25°C.
(3) Junction temperature maintained at 25°C.
(4) Light source is an unfiltered tungsten bulb operating at CT = 2870°K or equivalent infrared source.
(5) To calculate typical collector dark current in μA, use the formula $I_{CEO} = 10^{(0.040\ T_A - 3.4)}$ where T_A is ambient temperature in °C.

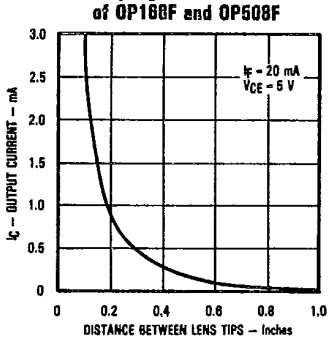
Typical Performance Curves

Photosensor Spectral Response vs. GaAlAs and GaAs



Test Conditions (LED): $T_A = T_J = 25°C$, I_F = 100 mA, DC = 0.1%, PW = 100 μs
Peak Wavelength – λp: (A) XSTR – 850 ± 30 nm, (B) LED GaAlAs – 875 ± 20 nm, (C) LED GaAs – 930 ± 15 nm

Coupling Characteristics of OP168F and OP508F



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

Symbol	Parameter		Min.	Typ.	Max.	Units	Test Conditions
$I_{C(ON)}$	On-State Collector Current	OP508FC	0.60			mA	V_{CE} = 5.0 V, E_e = 20 mW/cm²[4]
		OP508FB	1.20		8.4	mA	V_{CE} = 5.0 V, E_e = 20 mW/cm²[4]
		OP508FA	3.6			mA	V_{CE} = 5.0 V, E_e = 20 mW/cm²[4]
$I_C/\Delta T$	Relative I_C Changes with Temperature			1.00		%/°C	V_{CE} = 5.0 V, E_e = 1.00 mW/cm², λ = 875 nm
I_{CEO}[5]	Collector Dark Current				100	nA	V_{CE} = 10.0 V, E_e = 0
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage		30			V	I_C = 100 μA
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage		5.0			V	I_E = 100 μA
$V_{CE(SAT)}$[3]	Collector-Emitter Saturation Voltage				0.40	V	I_C = 1.00 mA, E_e = 20 mW/cm²[4]

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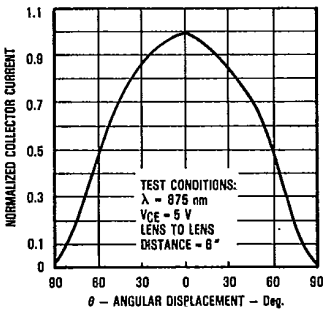
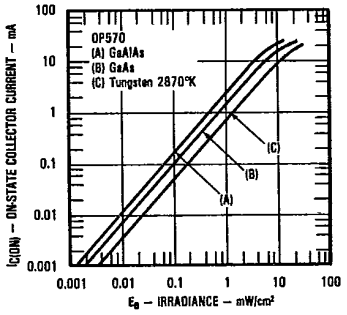
Typical Performance Curves

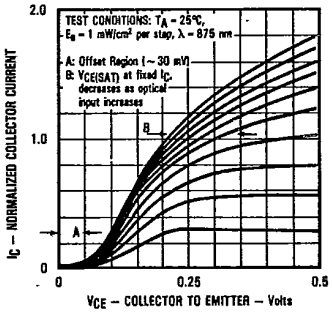
Normalized Collector Current vs. Angular Displacement



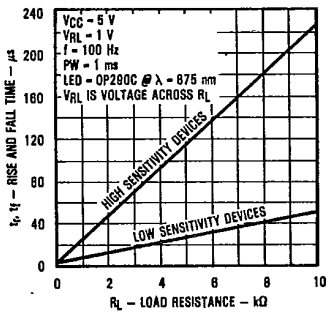
On-State Collector Current vs. Irradiance



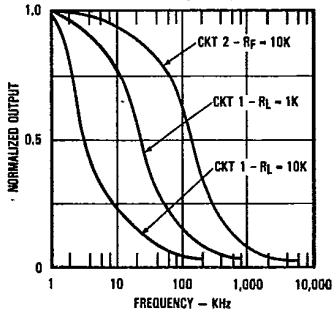
Normalized Collector Current vs. Collector to Emitter Voltage



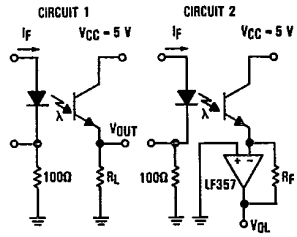
Rise and Fall Time vs. Load Resistance



Normalized Output vs. Frequency



Switching Time Test Circuit



Test Conditions:
Light source is pulsed LED with t_r and $t_f \leq 500$ ns.
I_F is adjusted for V_{OUT} = 1 Volt.