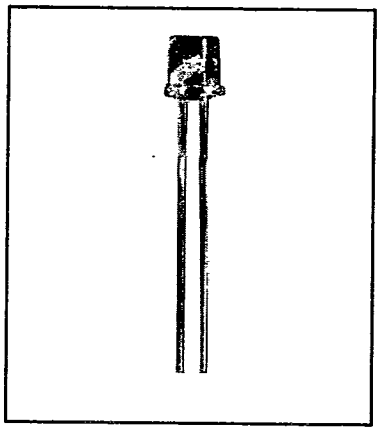
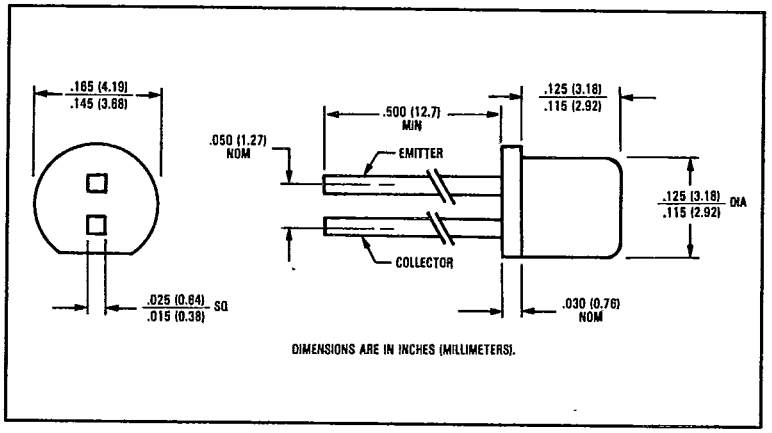
Optoelectronics Division
TRW Electronic Components Group

Product Bulletin 5095
January 1985

NPN Silicon Phototransistor
Type OP500W





Features
- Flat lensed for wide acceptance angle
- .050" lead spacing
- Low cost plastic miniature plastic end-looking T-1 package.

Description
The OP500W consists of an NPN silicon phototransistor mounted in a flat lensed, clear plastic, end-looking package. The flat lens allows an acceptance half angle of 45° measured from the optical axis to the half power point. The OP500W is mechanically and spectrally matched to the OP160W infrared emitting diodes.

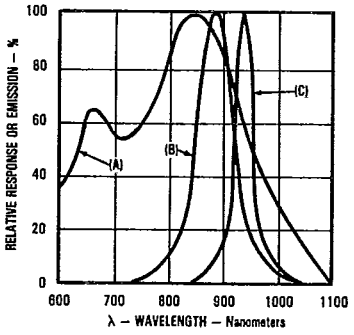
Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

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.

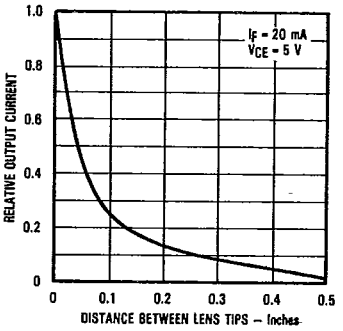
Typical Performance Curves

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 OP160W and OP500W



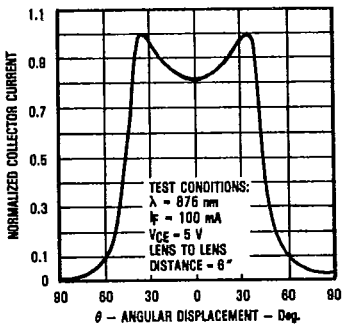
Type OP500W

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

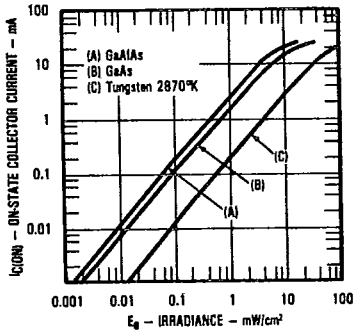
Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_{C(ON)}$[3]	On-State Collector Current	0.50			mA	V_{CE} = 5.0 V, E_e = 20 mW/cm²[4]
$\Delta I_C/\Delta T$	Relative I_C Changes with Temperature		1.00		%/°C	V_{CE} = 5.0 V, E_e = 1.00 mW/cm², λ = 875 nm
I_{CEO}[5]	Collector Dark Current			100	nA	V_{CE} = 15.0 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 = 250 μA, E_e = 20 mW/cm²[4]

Typical Performance Curves

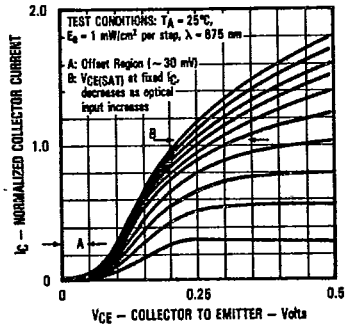
Normalized Collector Current vs. Angular Displacement



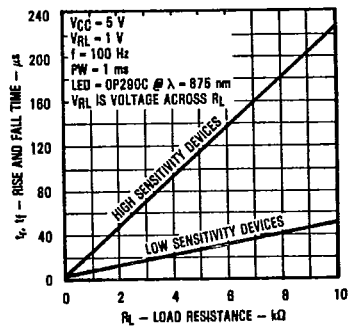
On-State Collector Current vs. Irradiance



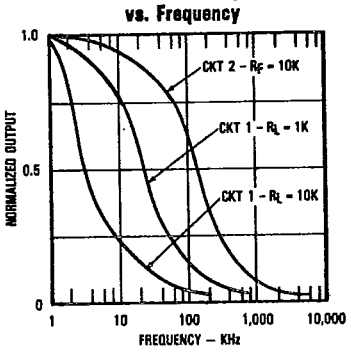
Normalized Collector Current vs. Collector to Emitter Voltage



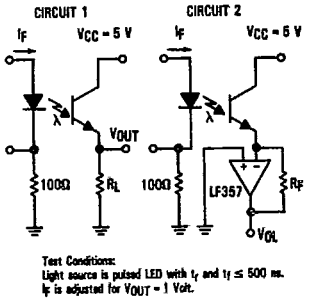
Rise and Fall Time vs. Load Resistance



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.

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