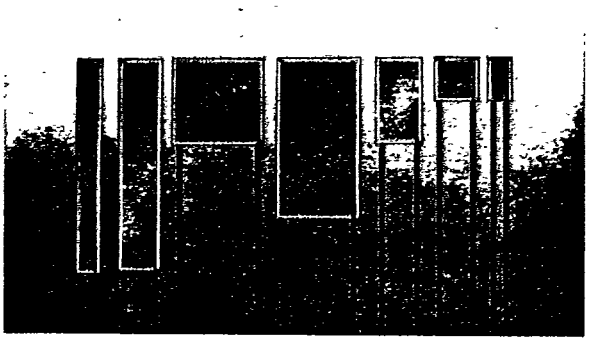
SILONEX INC

T-41-51

SILICON PHOTOVOLTAIC CELLS

FEATURES

- Fast response
- High reliability, long life
- Protective, humidity resistant coating
- Operating Temperature Range: −65°C to 125°C
- Ideal for moderate reverse bias voltage operation
- Short circuit current linear over wide ranges of illumination
- Low capacitance, high speed 800 material or high open circuit voltage, 700 material.



GENERAL DESCRIPTION

The Silonex series of open silicon photovoltaic cells feature low cost, high reliability and linear short circuit current over a wide range of illumination. These cells are widely used for light sensing and power generation because of their stability and high efficiency. They are particularly suited to power conversion applications due to their low internal impedance, relatively high shunt impedance, stability and humidity resistant characteristics. Open silicon cells also provide a reliable, inexpensive detector for instrumentation and light beam sensing applications. Silonex cells are generally of N on P construction but P on N devices can also be provided. Standard cells are offered with leads and a clear protective coating. Uncoated cells without leads are also available.

Silonex Part No.	Short Circuit Current (mA) @ H = 500 Ftc, 2870°K Tungsten (25 mW/cm²)		Open Circuit Voltage (V) @ H = 500 Ftc, 2870°K Tungsten (25 mW/cm²)		Dark Current (μA) @ V = 1 V		Capacitance (Zero Bias) Typical (nF)	Maximum Reverse Bias (V)	Active Area (cm²)	Output Current Scale Factor
	Min.	Typ.	Min.	Typ.	Max. @ T = 25°C	Typ. @ T = 55°C				
NSL-701	0.3	0.4	0.35	0.4	3.0	6.0	3.00	5	0.095	10.51
NSL-702	0.6	0.8	0.35	0.4	5.0	10.0	6.00	5	0.187	5.32
NSL-703	1.4	1.8	0.35	0.4	15.0	30.0	13.50	5	0.439	2.28
NSL-705	4.5	5.8	0.35	0.4	25.0	50.0	50.00	5	1.590	0.71
NSL-706	2.9	3.7	0.35	0.4	20.0	40.0	27.50	5	0.892	1.11
NSL-707	3.3	4.3	0.35	0.4	25.0	50.0	35.00	5	1.041	0.95
NSL-708	1.3	1.7	0.35	0.4	15.0	30.0	16.50	5	0.402	2.41
NSL-801	0.33	0.4	0.28	0.3	1.5	3.0	0.37	10	0.095	10.90
NSL-802	0.65	0.8	0.28	0.3	2.5	5.0	0.75	10	0.187	5.45
NSL-803	1.50	1.9	0.28	0.3	7.5	15.0	1.70	10	0.439	2.29
NSL-805	4.77	6.1	0.28	0.3	12.5	25.0	6.20	10	1.590	0.71
NSL-806	3.00	3.9	0.28	0.3	10.0	20.0	3.45	10	0.892	1.12
NSL-807	3.50	4.5	0.28	0.3	12.5	25.0	4.35	10	1.040	0.97
NSL-808	1.40	1.8	0.28	0.3	7.5	15.0	2.10	10	0.402	2.49

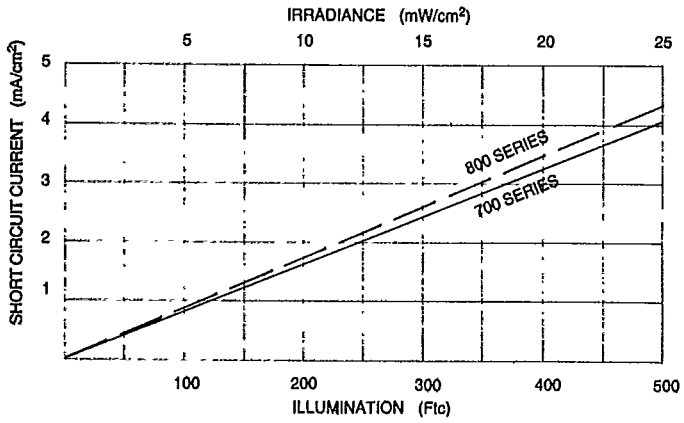


Fig. 1: SHORT CIRCUIT CURRENT CHARACTERISTICS
The short circuit current is extremely linear over wide ranges of illumination.

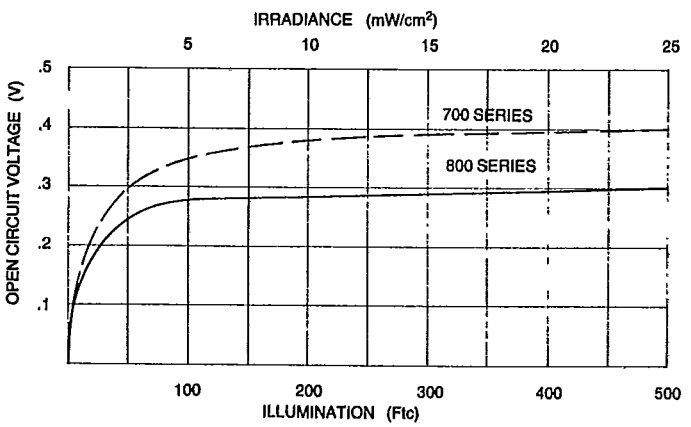


Fig. 2: OPEN CIRCUIT VOLTAGE CHARACTERISTICS
Open circuit voltage is generally independent of active area and varies logarithmically with linear variations of illumination.

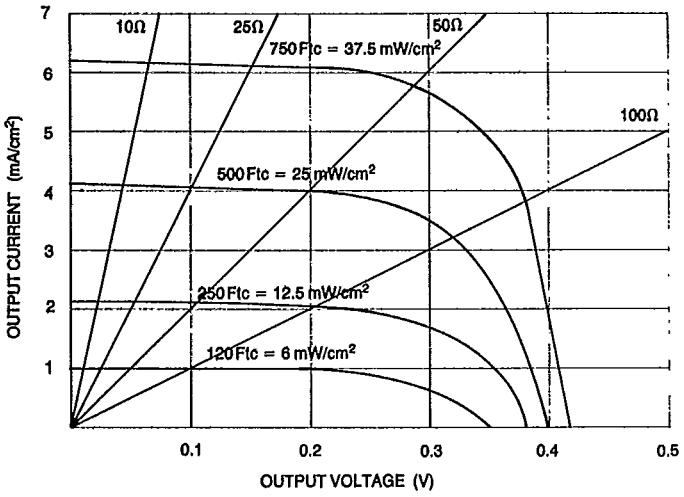


Fig. 3: 700 SERIES TYPICAL VOLTAGE/CURRENT CHARACTERISTICS

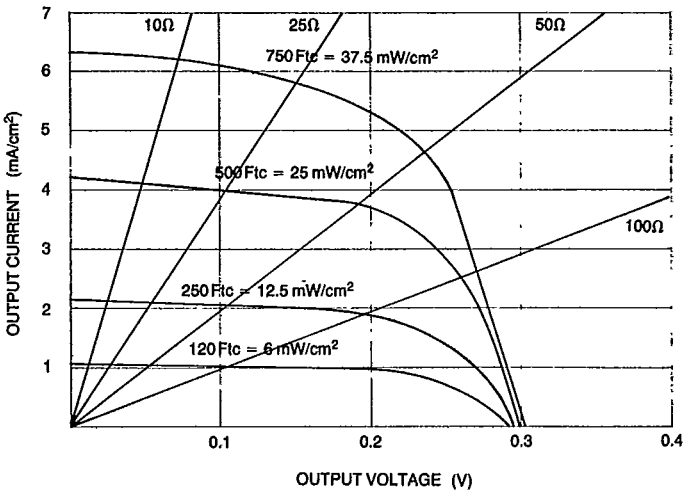


FIG. 4: 800 SERIES TYPICAL VOLTAGE/CURRENT CHARACTERISTICS

The output current developed into a load is a function of illumination level, the load resistance and photosensitive active area.

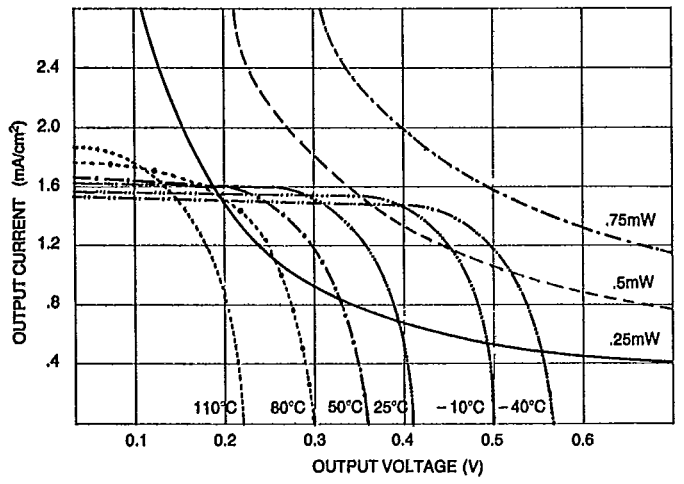


Fig. 5: EFFECTS OF TEMPERATURE OF 700 SERIES I - V Characteristic: 200 Ftc (10 mW/cm²)

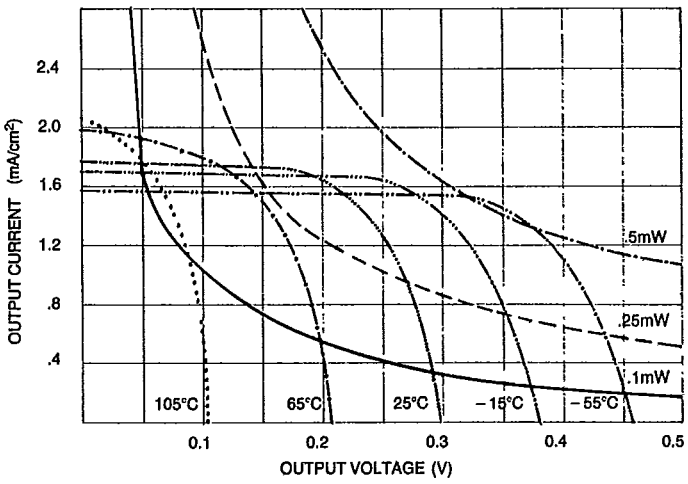


Fig. 6: EFFECTS OF TEMPERATURE OF 800 SERIES I - V Characteristic: 200 Ftc (10 mW/cm²)

Optimum power transfer is obtained with a load impedance which results in a voltage and current combination that yields maximum power output. Output current for maximum power and short circuit current normally remain constant over the operating temperature range of the cell.

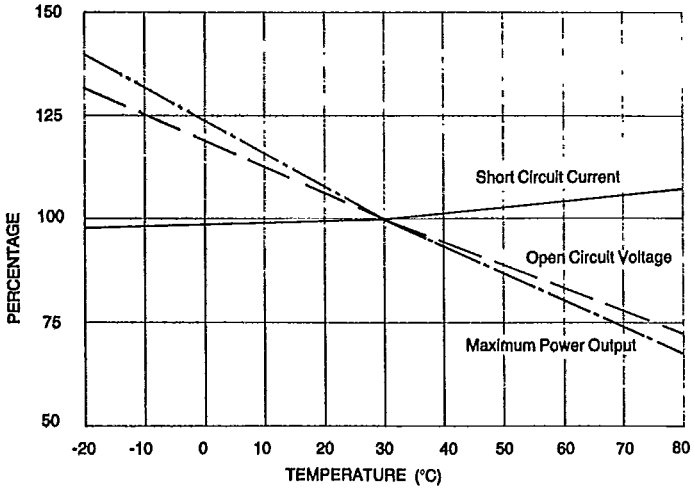


Fig. 7: TYPICAL OUTPUT VARIATIONS OF 700 SERIES @ 200 Ftc (10 mW/cm²)

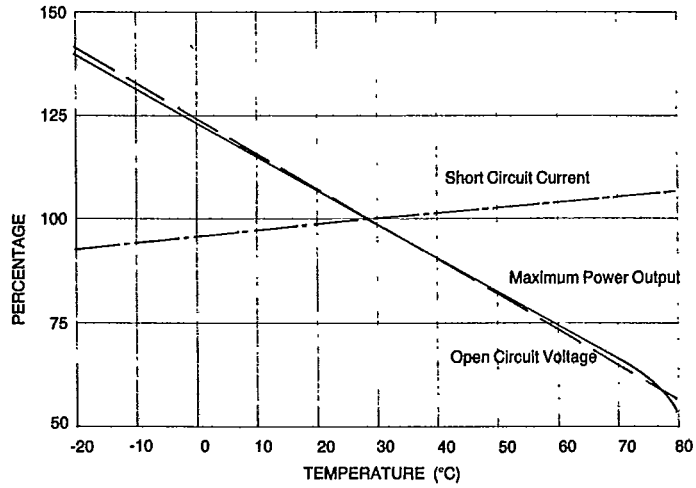


Fig. 8: TYPICAL OUTPUT VARIATIONS OF 800 SERIES @ 200 Ftc (10 mW/cm²)

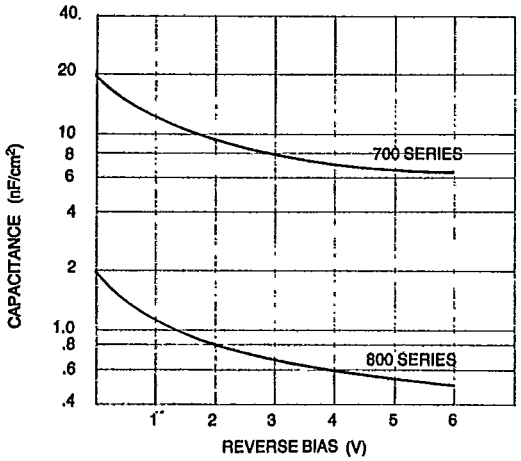


Fig. 9: CAPACITANCE AS FUNCTION OF REVERSE BIAS

Junction capacitance, which is constant per unit area of the cell at a given reverse voltage, has a major effect on the cell response time. Response time depends on load resistance, illumination level as well as junction capacitance. Best control over response time can be achieved by selecting smaller active areas for faster response.

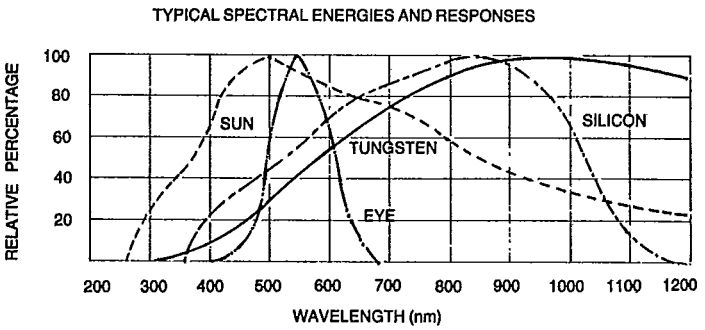
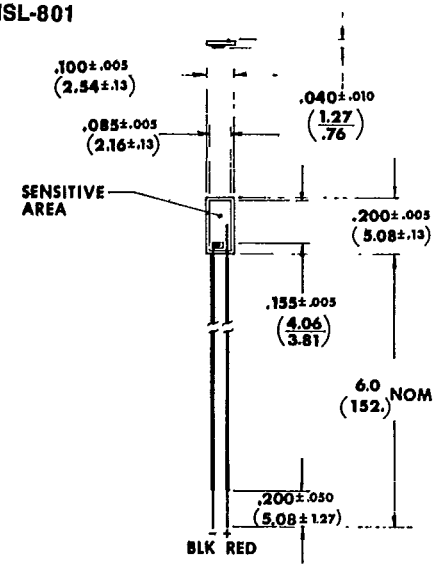


Fig. 10: TYPICAL SPECTRAL ENERGIES & RESPONSES

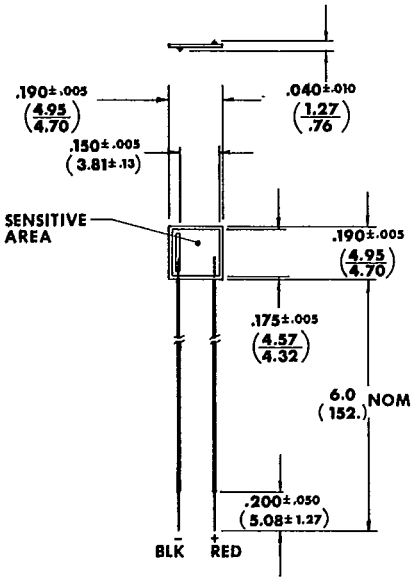
HUMAN EYE — SUNLIGHT

TUNGSTEN — SILICON

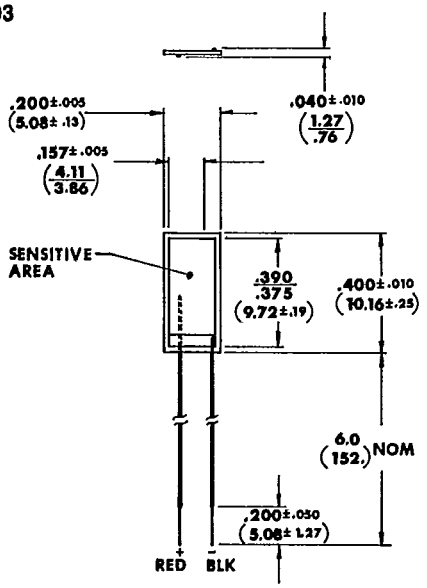
NSL-701/NSL-801



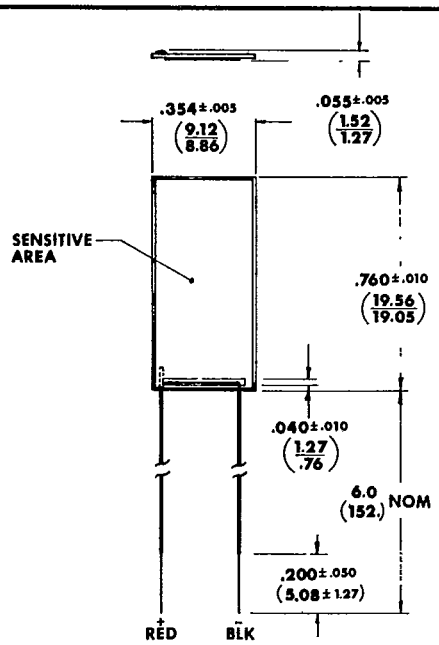
NSL-702/802



NSL-703/803



NSL-705/805



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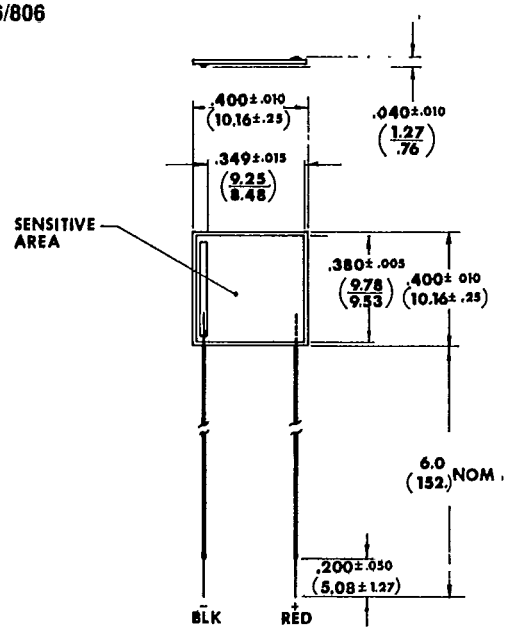
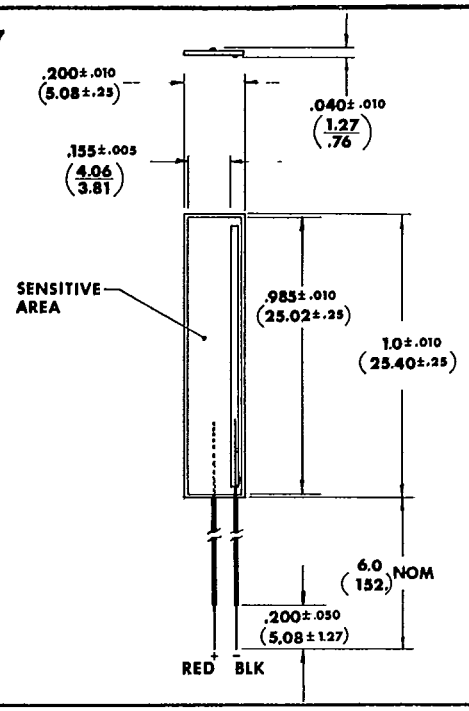
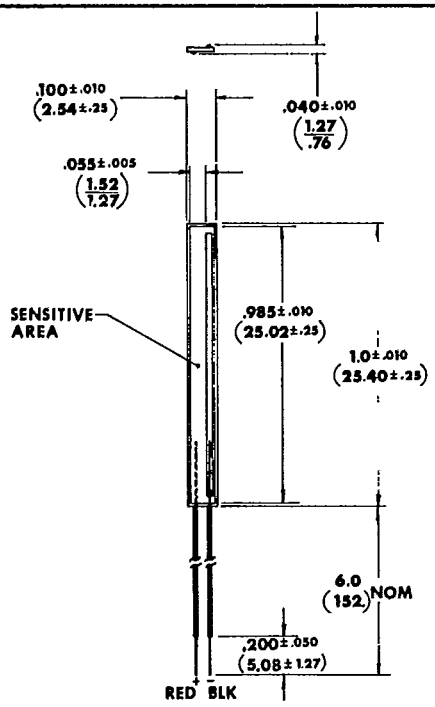
NSL-706/806



NSL-707/807



NSL-708/808



NOTES:

All characteristics measured at 25°C free air unless otherwise noted.

Output Current Scale Factor. This parameter can be used to calculate the short circuit current of the various devices under illumination levels other than 500 Ftc and 25°C. For example, the short circuit current for the NSL-701 at 250 Ftc illumination and room temperature can be calculated by obtaining the short circuit current per unit area of 2.05 mA/cm² for the 700 series at 250 Ftc (Fig. 1) and dividing by the 701 scale factor of 10.5, giving typical output of 0.195 mA.

This scale factor could also be used for calculating typical capacitances at various reverse voltages by using the data from Fig. 9 in a similar manner. Please note that capacitance calculated in this manner would only be first order approximation as contact areas must also be considered.

The cells' front and back electrodes are solder-coated. Electrodes may be soldered using 60/40 tin-lead solder with an active flux capable of making a solder joint quickly to minimize heat, as excessive soldering temperature can cause contact damage. Whenever possible, it is recommended that all soldering be done by Silonex since it is possible to degrade the cells' characteristics with improper handling.

Units in inches (millimeters)
Leads 32 AWG stranded PVC insulation

SILONEX inc

331 Cornelia St., Plattsburgh, N.Y. 12901 Tel. (518) 561-3160 TWX 610-421-3362
2150 Ward Street, Montreal, Que., H4M 1T7 Tel. (514) 744-5507 FAX (514) 747-3906
Altrincham, Cheshire, WA14 4NX. Tel. (061) 928-3417 Telex 51 669 663