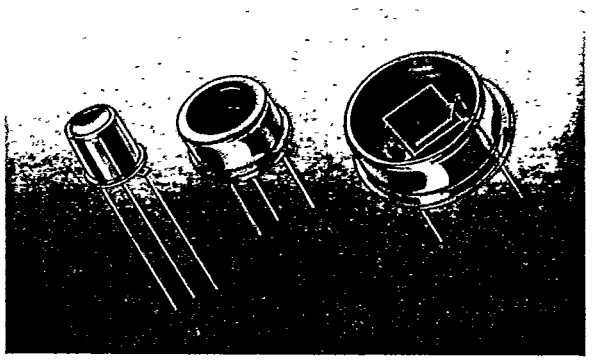
SILONEX inc

T-41-51

PACKAGED SILICON PHOTOVOLTAIC CELLS

FEATURES

- High reliability, long life
- 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 packaged silicon photovoltaic cells are generally used for light sensing and power generation because of their stability and high efficiency. The cells' inherent stability, linearity, and compatibility with simple transistor amplifiers also well suit them for low light level applications. Silonex cells are generally of N on P construction but P on N cells can also be provided.

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-710	0.15	0.18	0.35	0.4	1.0	2.0	1.00	5	0.036	22.7
NSL-720	0.13	0.15	0.35	0.4	1.0	2.0	1.50	5	0.047	27.3
NSL-751	1.80	2.20	0.35	0.4	20.0	40.0	13.50	5	0.439	2.28
NSL-781	0.28	0.36	0.35	0.4	5.0	10.0	3.00	5	0.095	11.40
NSL-782	0.42	0.55	0.35	0.4	5.0	10.0	4.50	5	0.148	7.45
NSL-791	0.60	0.76	0.35	0.4	5.0	10.0	6.00	5	0.187	5.40
NSL-792	1.40	1.80	0.35	0.4	15.0	30.0	11.00	5	0.438	2.83
NSL-810	0.16	0.20	0.28	0.3	0.5	1.0	0.13	10	0.036	19.40
NSL-820	0.13	0.17	0.28	0.3	0.5	1.0	0.18	10	0.047	26.40
NSL-851	1.90	2.30	0.28	0.3	10.0	20.0	1.70	10	0.439	2.30
NSL-881	0.30	0.40	0.28	0.3	2.5	5.0	0.38	10	0.095	10.90
NSL-882	0.44	0.58	0.28	0.3	2.5	5.0	0.55	10	0.148	7.50
NSL-891	0.65	0.80	0.28	0.3	2.5	5.0	0.75	10	0.187	5.45
NSL-892	1.20	1.50	0.28	0.3	7.5	15.0	1.35	10	0.438	2.90

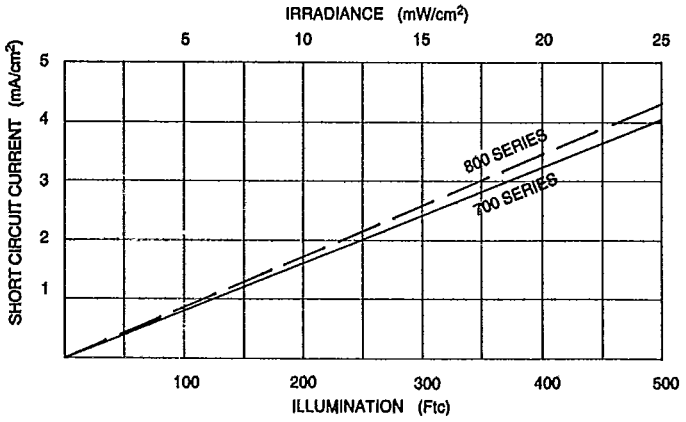


Fig. 1: SHORT CIRCUIT CURRENT CHARACTERISTICS
The short circuit current is extremely linear over wide ranges of illumination.

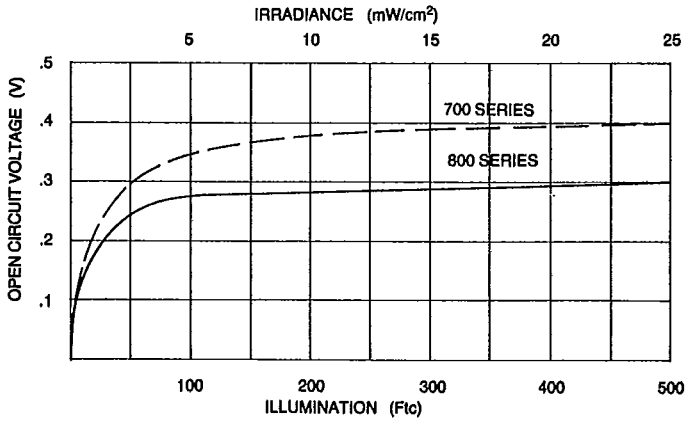


Fig. 2: OPEN CIRCUIT VOLTAGE CHARACTERISTICS
Open circuit voltage is generally independent of active area and varies logarithmically with linear variations of illumination.

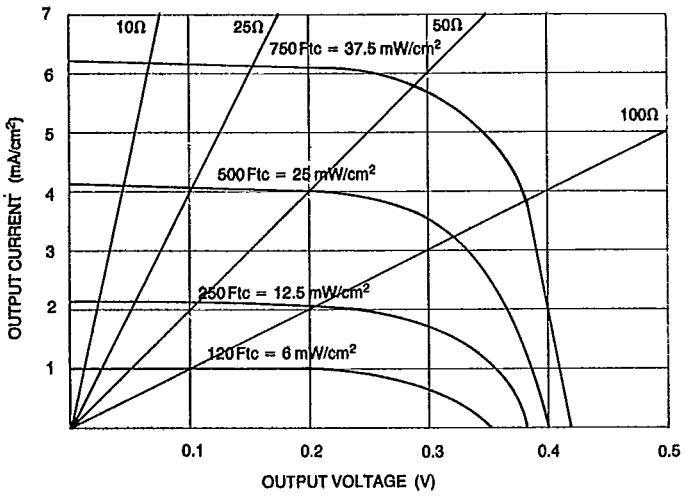


Fig. 3: 700 SERIES TYPICAL VOLTAGE/CURRENT CHARACTERISTICS

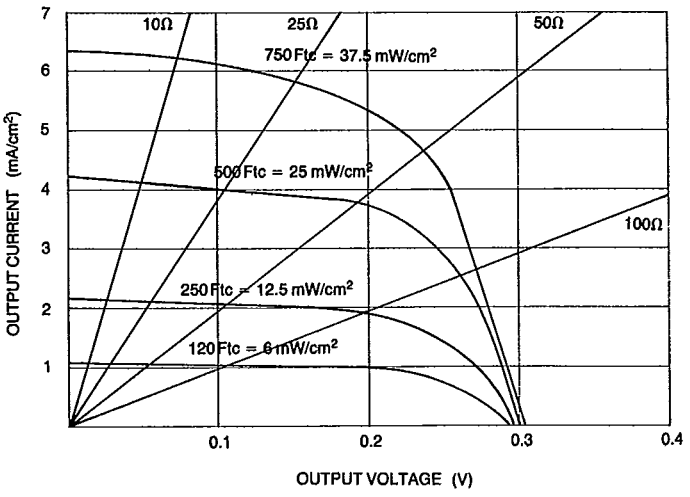


FIG. 4: 800 SERIES TYPICAL VOLTAGE/CURRENT CHARACTERISTICS

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

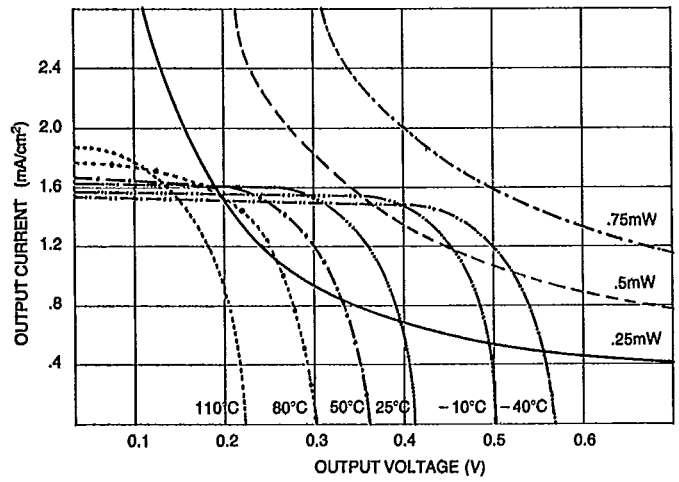


Fig. 5: EFFECTS OF TEMPERATURE OF 700 SERIES I - V Characteristic: 200 Ftc (10 mW/cm²)

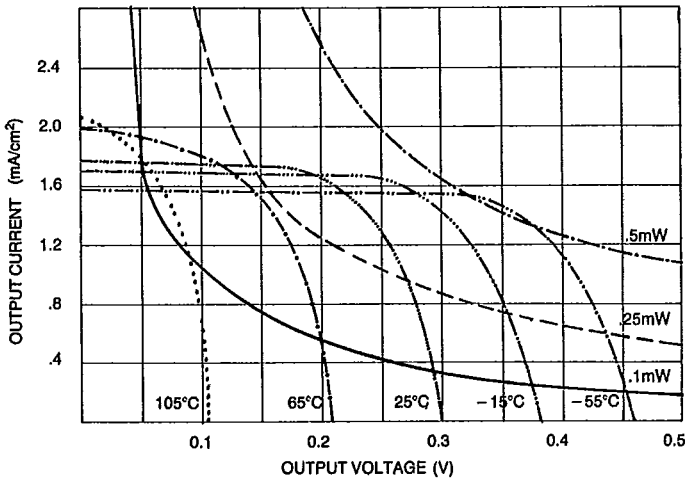


Fig. 6: EFFECTS OF TEMPERATURE OF 800 SERIES I - V Characteristic: 200 Ftc (10 mW/cm²)

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.

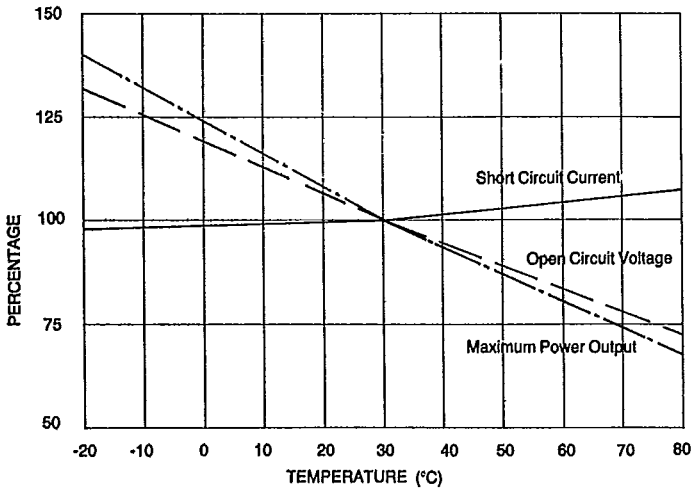


Fig. 7: TYPICAL OUTPUT VARIATIONS OF 700 SERIES @ 200 Ftc (10 mW/cm²)

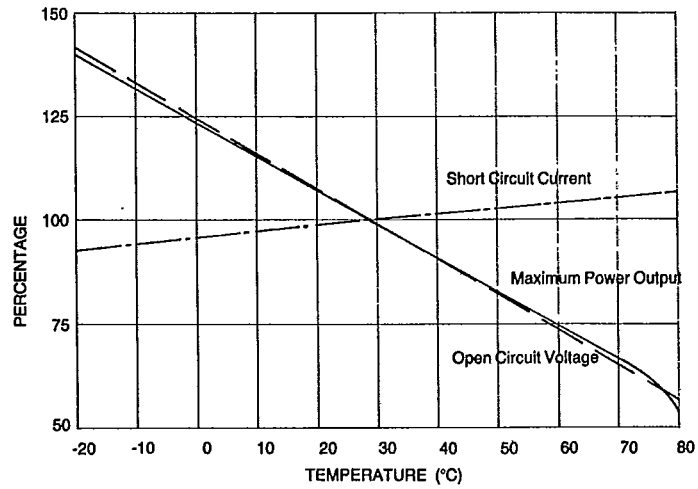


Fig. 8: TYPICAL OUTPUT VARIATIONS OF 800 SERIES @ 200 Ftc (10 mW/cm²)

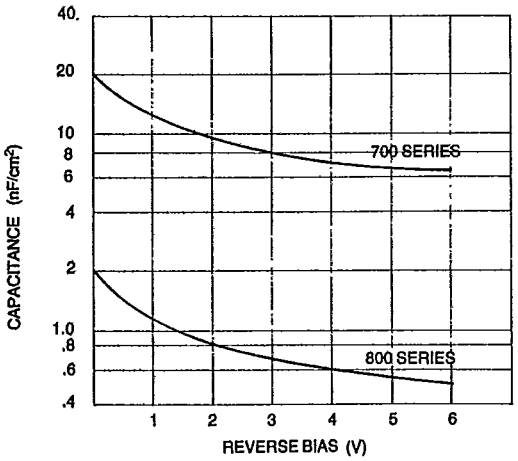


Fig. 9: CAPACITANCE AS FUNCTION OF REVERSE BIAS

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.

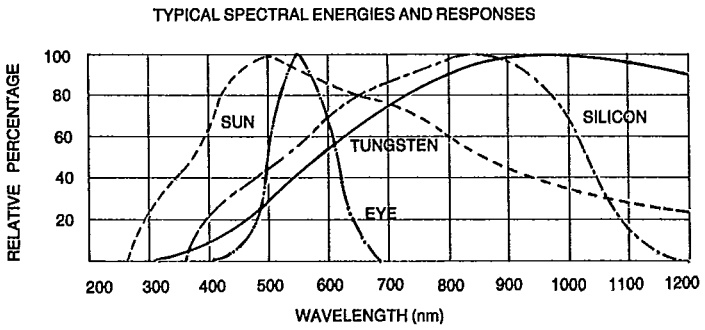
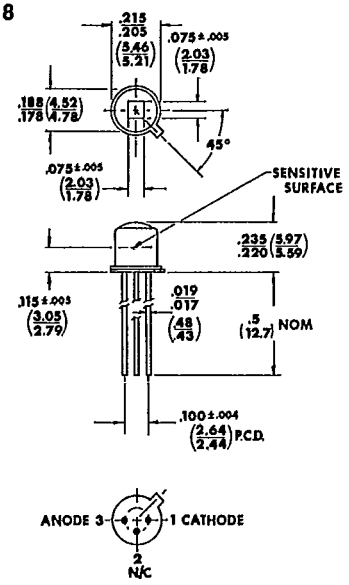


Fig. 10: TYPICAL SPECTRAL ENERGIES & RESPONSES

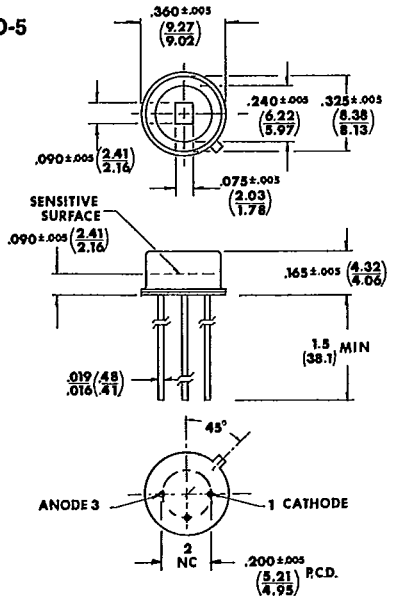
HUMAN EYE — SUNLIGHT

TUNGSTEN — SILICON

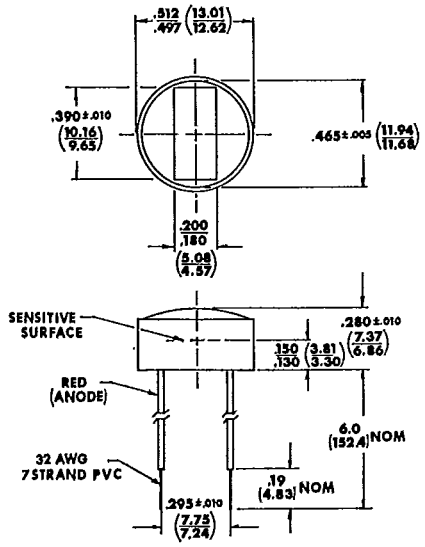
NSL-710/810 TO-18



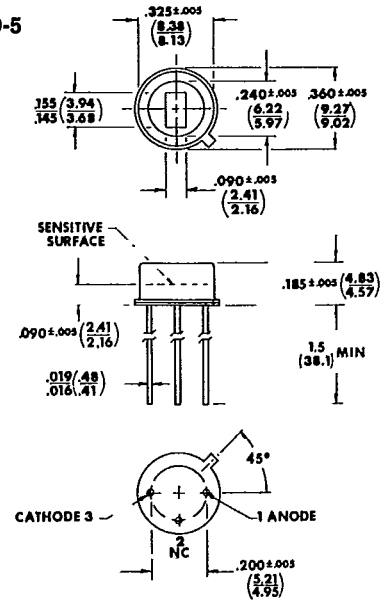
NSL-720/820 TO-5



NSL-751/851 ½" EPOXY



NSL-781/881 TO-5



Units in inches (millimeters)

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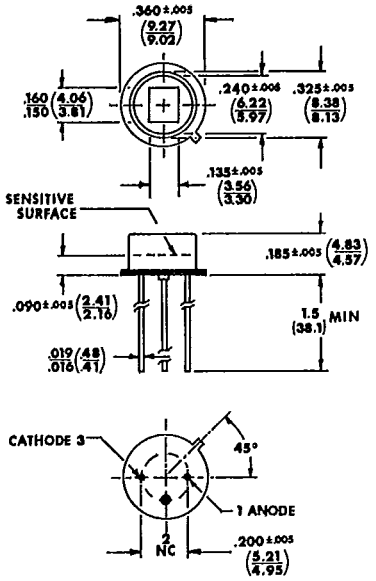
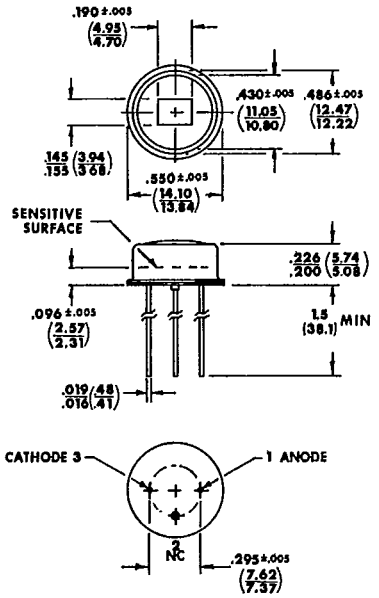
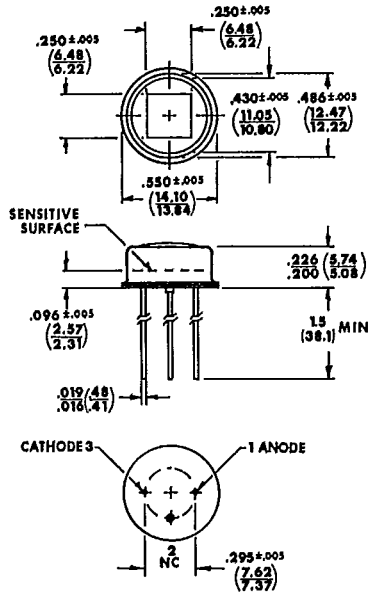
NSL-782/882 TO-5



NSL-791/891 TO-8



NSL-792-892 TO-8



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-781 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 781 scale factor of 11.4, giving typical output of 0.18 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.

Units in inches (millimeters)

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