THORLABS

Photodetector

CAUTION
ELECTROSTATIC SENSITIVE DEVICE
DO NOT HANDLE EXCEPT
WITH AN ESD WRIST STRAP AT A
STATIC-FREE WORKSTATION

SV2-FC

Description

The SV2-FC is a ready-to-use, high-speed photodetector for use with FC/PC-connectorized single mode or multimode fiber optic cables. The detector offers a 2 GHz bandwidth and incorporates a Si detector for detection in the 320 – 1100 nm range. The SV2-FC connects directly to an oscilloscope with built-in Bias-T, and the small package size allows for easy mounting. The high-speed photodetector underwent specialized testing, thereby ensuring compliance with our specifications. A complete test report comes with every serialized detector package.

Specifications

Specification	Value
Wavelength Range	320 - 1100 nm
Active Diameter	Ø0.4 mm
Rise/Fall Time (R_L = 50 Ω)	150 ps
Bandwidth (R_L = 50 Ω, -3 dB)	2.0 GHz
NEP (Max)	2.0 x 10^{-15} W/$Hz^{½}$
Dark Current	0.1 nA
Junction Capacitance, Max (20 V)	1 pF
Battery Shelf Life	190 mAh of stored charge, lifetime depends on signal rep-rate, etc.

Specification	Value
Detector Material	Si
Fiber Input	FC
Dimensions	25 x 36 x 38 mm
Max Ratings	
Damage Threshold, CW	10 W/cm^2
Peak Power (2 V)	200 mW
Safe Output	2.5 V

Battery Lifetime Example

If the responsivity of a biased photodetector at the wavelength of light illuminating the sensor is 0.5 A/W and the average power of the light incident on the detector is 1 mW, then the photocurrent generated would be 0.5 A/W * 1 mW, which equals 0.5 mA. If the battery used to power the biased photodetector has specified capacities of 190 mAh, then the battery will last 190 mAh/0.5 mA, which equal 380 hrs (16 days) of continuous use. By reducing the average incident power of the light to 10 µW, the same battery would last for about 4 years when used continuously. As a result, when using a biased photodetector with a battery power source, it is beneficial to use as low of intensity light source as is reasonable for the application.

Graphs

The responsivity of a photodiode is a measure of its sensitivity to light, and it is defined as the ratio of the photocurrent I_P to the incident light power P at a given wavelength:

$$R_\lambda = \frac{I_P}{P}$$

In other words, it is a measure of the effectiveness of the conversion of light power into electrical current.

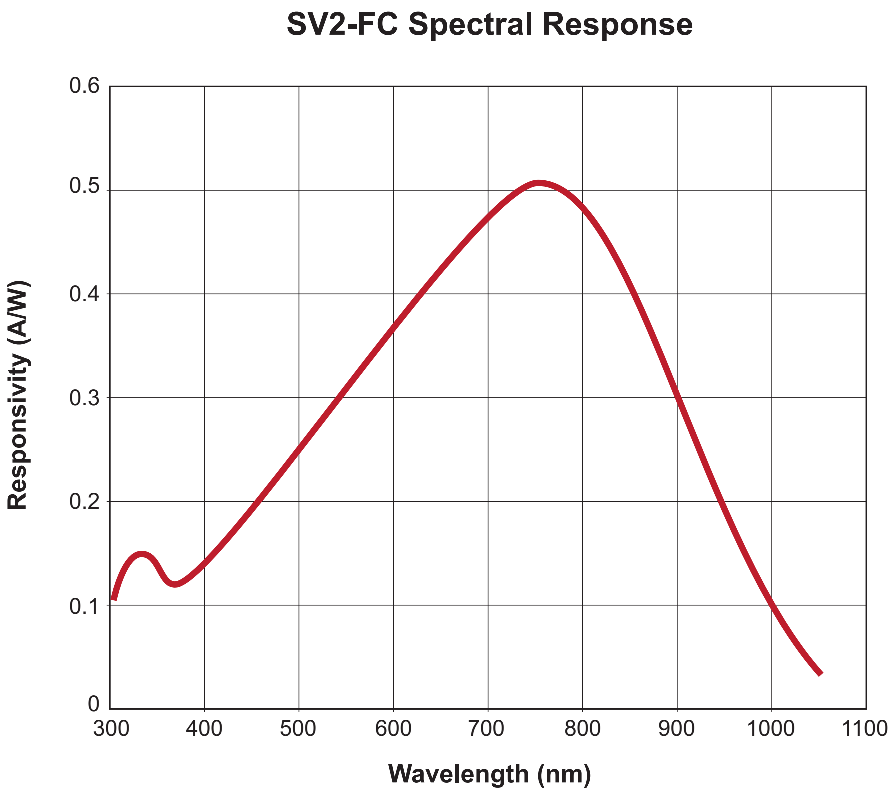
Responsivity varies from lot to lot and with the wavelength of the incident light, applied reverse bias, and temperature. The spectral responsivity [$\Re(\lambda)$] can be obtained from the graph below to estimate the amount of photocurrent to expect. Most users will wish to convert this photocurrent to a voltage (V_{OUT}) for viewing on an oscilloscope or DVM. This is accomplished by factoring in an external load resistance (R_{LOAD}). The output voltage is derived as:

$$V_{OUT} = P \times \Re(\lambda) \times R_{LOAD}$$

It should be noted that the load resistor will react with the photo detector junction capacitance (CJ) to limit the bandwidth. For best frequency response, a 50Ω terminator should be used. The bandwidth (fBW) and the rise-time response (t_R) can be approximated using the diode capacitance (CJ) and the load resistance (RLOAD) as shown below:

$$f_{BW} = 1 / (2\pi R_{LOAD} \times C_J)$$

$$t_R = 0.35 / f_{BW}$$



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