SIGNAL RECOVERY

Model 5188

Optical Input Preamplifier

FEATURES

- **InGaAs or Si input device**
- **Separate DC and AC outputs**
- **Four switched conversion settings**
- **Battery or external DC power**

APPLICATIONS

- **Fiber optic measurements**
- **EMC immune systems**
- **Replacement for separate photodiode and current preamplifier**

DESCRIPTION

The model 5188 preamplifier has an optical input and is designed to be used as a light to voltage converter in situations where the signal to be amplified is derived from an optical source. There are two versions of the product, differing only by the type of optical detector. The model 5188A has an InGaAs device which responds to near infrared radiation while that in the model 5188B is silicon based and operates in the visible region of the spectrum. Sensitivity is switch-selectable with a choice of five settings. This enables the amplifier to detect fractions of a picowatt, without noise degradation, on its most sensitive range, while being able to accept optical power of up to 18 mW on its least sensitive range without overload.

The instrument has bandwidths from 25 kHz on its most sensitive range to 1 MHz on its least sensitive range. Input noise ranges from 70 fW/√Hz to 15 pW/√Hz for the model 5188A, and 180 fW/√Hz to 25 pW/√Hz for the model 5188B, dependent on the sensitivity setting selected. An additional low-noise range, denoted 10^{-8} W/V LOW NOISE, is also provided, this setting having a reduced bandwidth of 10 kHz.

Input signal connection is made via an FC/PC optical connector on the front panel of the preamplifier. AC and DC components of the input signal are processed such that independent outputs for each are made available via BNC connectors, also on the front panel. This allows users to measure modulated and CW components of an input signal separately to perform, for example, ratio calculations between them.

The model 5188 can be powered from its own internally housed (alkaline) batteries, an external low voltage supply (±15 V or ±18 V) or from the model PS0108 remote line power supply (optional extra). This preamplifier can also be powered from most of our range of lock-in amplifiers and from the model 7310 noise rejecting voltmeter.

Specifications

General

DC coupled optical power to voltage amplifier with adjustable conversion ratio and a maximum frequency response extending from DC to 1 MHz. FC/PC optical connector input and single-ended DC and AC coupled outputs via BNC connectors.

Battery powered from internal alkaline batteries or external DC power supplies.

Inputs

Connector	FC/PC
Device	
5188A	InGaAs
5188B	Si

Operating Wavelength	
5188A	1000 nm to 1650 nm
5188B	400 nm to 1000 nm
Sensitivity	
Switch selectable (5 settings)	
AC Output	10^{-5}, 10^{-6}, 10^{-7}, 10^{-8}, 10^{-8} low noise W/V
DC Output	10^{-3}, 10^{-4}, 10^{-6}, 10^{-7}, 10^{-8} W/V
Calibration Factor	
5188A	Sensitivity setting x 1.3 at 1300/1550 nm
5188B	Sensitivity setting x 2.2 at 830 nm
Detector Response	See Figures 1 & 2 (overleaf)

Model 5188 Specifications - continued

Accuracy	±2%
Stability	±300 ppm/°C
Frequency Response	
10^{-5} W/V setting	0.5 Hz to 1 MHz
10^{-6} W/V setting	0.5 Hz to 800 kHz
10^{-7} W/V setting	0.5 Hz to 200 kHz
10^{-8} W/V setting	0.5 Hz to 25 kHz
10^{-8} W/V low noise setting	0.5 Hz to 10 kHz
Max Optical Power at input	
10^{-5} W/V setting	5188A: 10 mW; 5188B: 18 mW
10^{-6} W/V setting	5188A: 1 mW; 5188B: 1.8 mW
10^{-7} W/V setting	5188A: 10 µW; 5188B: 18 µW
10^{-8} W/V setting	5188A: 1 µW; 5188B: 1.8 µW
10^{-8} W/V low noise setting	5188A: 100 nW; 5188B: 180 nW

Output	
AC Output	
Impedance	450 Ω
Max voltage swing	> 10 V pk-pk
Slew rate	> 22 V/µs
Noise, rms. referred to input	
10^{-5} W/V setting	5188A: 15 pW/√Hz; 5188B: 25 pW/√Hz
10^{-6} W/V setting	5188A: 8 pW/√Hz; 5188B: 15 pW/√Hz
10^{-7} W/V setting	5188A: 200 fW/√Hz; 5188B: 350 fW/√Hz
10^{-8} W/V setting	5188A: 70 fW/√Hz; 5188B: 180 fW/√Hz
10^{-8} W/V low noise setting	5188A: 40 fW/√Hz; 5188B: 150 fW/√Hz
DC Output	
Impedance	10 kΩ
Max voltage swing	> ±9 V
Output due to photodiode dark current, max	
10^{-5} W/V setting	5188A: 1 µV; 5188B: 10 µV
10^{-6} W/V setting	5188A: 10 µV; 5188B: 100 µV
10^{-7} W/V setting	5188A: 1 mV; 5188B: 10 mV
10^{-8} W/V setting	5188A: 10 mV; 5188B: 100 mV
10^{-8} W/V low noise setting	5188A: 100 mV; 5188B: 1 V

Power	
Internal	Four 9 V alkaline batteries provide approximately 15 hours of use
External	
a)	±15 V or ±18 V DC @ 25 mA
b)	110 V AC or 240 V AC via optional external model PS0108 power supply
Dimensions	
(excluding connectors)	8.25" wide x 11" deep x 3.5" high (210 mm wide x 279 mm deep x 89 mm high)
Weight	5.3 lbs. (2.4 kg) excluding power supply

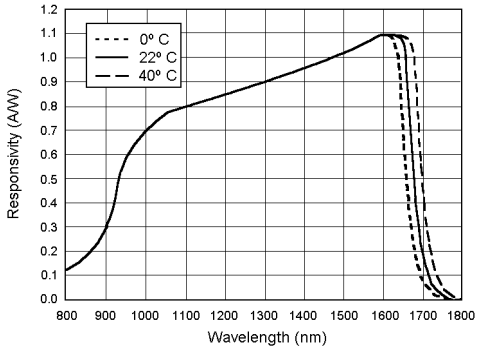

Figure 1, Model 5188A Detector Spectral Response (Typical)

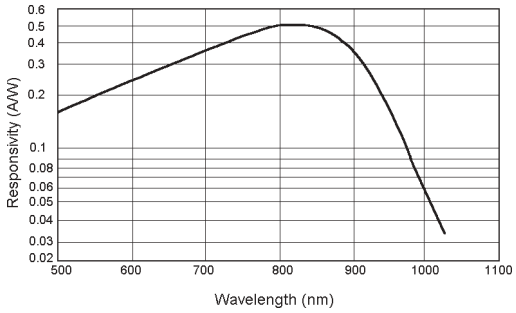

Figure 2, Model 5188B Detector Spectral Response (Typical)

Accessories for 51XX series Preamplifiers

Remote Line Power Supply
Model PS0108
for Models
5113, 5182, 5183, 5184, 5185, 5186, 5187, 5188A or 5188B
(110 V or 240 V)

Alkaline Batteries (Pack of 20)
Model PS0109
for Models
5182, 5183, 5184
5186, 5187, 5188A
and 5188B

Power Cable
Model C0218
To power one model
5182, 5183, 5184, 5186, 5187, 5188A or 5188B
from models
5102, 5104, 5109, 5110(A), 5205, 5206, 5207, 5208, 5209, 5210, 5302, 7220(BFP), 7225(BFP), 7260, 7265, 7280(BFP) or 7310

Rack Mount Kit
Model K0304
to accommodate 1 or 2 models
5113, 5182, 5183, 5184, 5185, 5186, 5187, 5188A or 5188B