Models 1421 and 1422
User's Manual

Broadband Amplifiers

【ν】

Warranty

New Focus, Inc. guarantees its products to be free of defects for one year from the date of shipment. This is in lieu of all other guarantees, expressed or implied, and does not cover incidental or consequential loss.

Contents

Introduction

The Model 1421 and 1422 Broadband Amplifiers are designed specifically for use as low-noise amplifiers following a high-speed photodetector such as the Model Series 14XX and 10XX. These amplifiers are specified over a 50-MHz-to-20-GHz bandwidth and have good small-signal step response as well. This makes them suitable for both time- and frequency-domain applications.

Operation

The Model 1421 and 1422 Broadband Amplifiers are housed in a compact unit whose input and output connectors are Wiltron K-connectors. A female connector is used on the input to mate with the male connector used on the output of New Focus' High-speed Photodetectors. (See Fig.1.) In addition, there is a captive screw piercing the unit that allows the amplifier to be fastened to any Model 10XX or 14XX Series photodetector module. The connection is made by removing the left-most screw on the battery cover of a Series 10XX detector or using the hole provided on a Series 14XX detector. The RF connectors should then be mated but not fully torqued. Next, use a 1/8" Allen wrench or ball-driver to fasten the captive screw to the photodetector. Finally, tighten the RF connectors to their proper torque. To allow proper alignment of the RF connectors, the microwave amplifier housing floats freely inside the black anodized casing.The captive screw along with the RF connectors, provides a rigid assembly that can be used as a unit. The screw is also useful in cascading many Model 1421 or 1422 amplifiers.

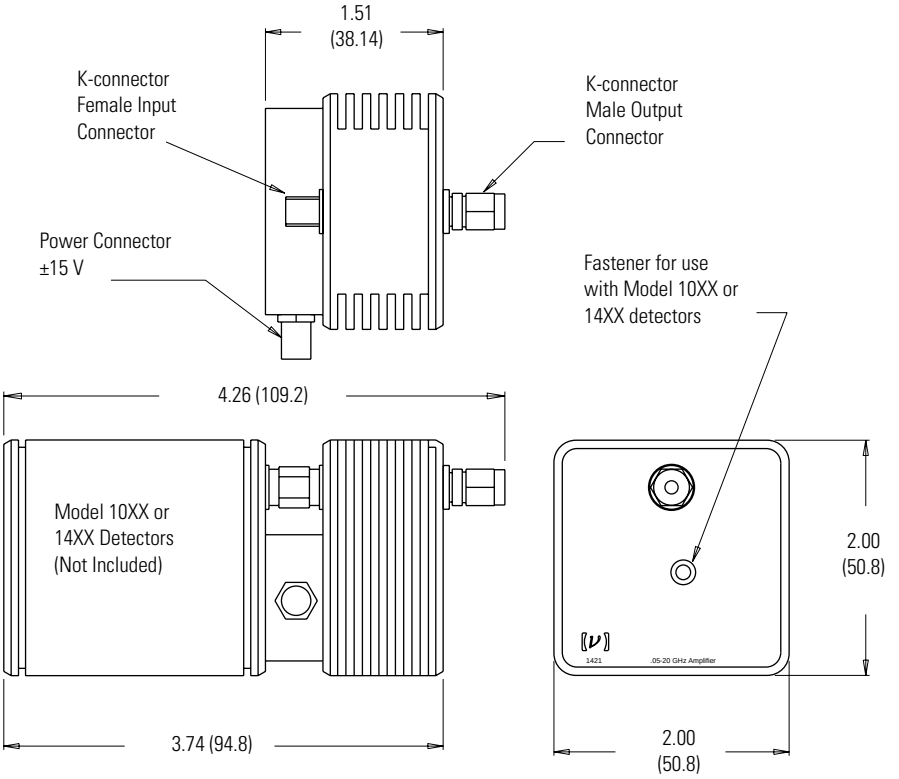
When a Model 1421 or 1422 amplifier is not being cascaded with other amplifiers, the male output connector may be inconvenient. For this situation, New Focus offers a cable assembly with a female K-connector on one end and a male K-connector on the other: Model 1227 40-GHz Cable Assembly.

DC-power is supplied to the amplifier via a 3-pin Microtech connector. This is the same connector used on the New Focus Model 0901 Power Supply. Two cables are provided for the power connection. If the Model 1421 or 1422 is to be used with the Model 0901, use the Microtech-to-Microtech connector cable only. If the Model 1421 or 1422 is to be used with a power supply other than the Model 0901, use the Microtech-to-banana cable and observe the following precautions:

- Input voltage range is 15 to 8 V at 250 mA on the positive (red) banana plug.
- Input voltage range is -15 to -8 V at 100 mA on the negative (black) banana plug.
- The negative supply must be turned on first or simultaneously with the positive supply. If the positive supply is turned on first, the unit could be destroyed.
- The two supplies should share a common ground which should be connected to the green banana plug.

Fig. 1

Front, side, and rear views of the Model 1421 and 1422 amplifier modules.



Model 1421 Specifications

Nominal Gain:	8.5 dB
Gain Flatness:[1]	±1.5 dB
Max. Power Out:[2]	10 dBm
Max. AC Input:[2]	10 dBm
Max. DC Input:	10 V
VSWR:[3]	1.8:1 input 2.1:1 output
Noise Figure:[4]	8 dB
Input Noise:	22 pA/√Hz
Impulse Response:	20 ps
Frequency Response:[5]	50 MHz–20 GHz
Input Impedance:	50 Ω
Output Impedance:	50 Ω
Power Requirements:	±15 V, <150 mA

(To protect the amplifiers from possible incorrect connections we recommend the Model 0901.)

[1] This is the variation of the gain over the entire frequency bandwidth. For instance, the 1421 has a gain that varies from 7 dB to 10 dB. In terms of voltage gain, this is the variation from 2.2 to 3.2.

[2] In a 50-Ω system, 10 dBm=1.0 V peak.

[3] The VSWR is the Voltage Standing-Wave Ratio. It is the ratio between a maximum and a minimum of a standing wave that occurs because of the impedance mismatch. A VSWR value of 1 indicates a perfectly matched system. For a reflection coefficient R,

$$VSWR = \frac{1+|R|}{1-|R|}$$

[4] Noise Figure is the amount of excess input noise above -174 dBm in a 1 Hz bandwidth and at 290 K. In a 50-Ω system, 8 dB corresponds to an input noise current of 22 pA/Hz.

[5] We offer an option which extends the low frequency cutoff to 14 MHz.

Model 1422 Specifications

Nominal Gain:	18 dB
Gain Flatness:[1]	±2 dB
Max. Power Out:[2]	10 dBm
Max. AC Input:[2]	10 dBm
Max. DC Input:	10 V
VSWR:[3]	1.8:1 input 2.1:1 output
Noise Figure:[4]	8 dB
Input Noise:	22 pA/√Hz
Impulse Response:	25 ps
Frequency Response:[5]	50 MHz–20 GHz
Input Impedance:	50 Ω
Output Impedance:	50 Ω
Power Requirements:	±15 V, <300 mA

(To protect the amplifiers from possible incorrect connections we recommend the Model 0901.)

[1] This is the variation of the gain over the entire frequency bandwidth. For instance, the 1421 has a gain that varies from 7 dB to 10 dB. In terms of voltage gain, this is the variation from 2.2 to 3.2.

[2] In a 50-Ω system, 10 dBm=1.0 V peak.

[3] The VSWR is the Voltage Standing-Wave Ratio. It is the ratio between a maximum and a minimum of a standing wave that occurs because of the impedance mismatch. A VSWR value of 1 indicates a perfectly matched system. For a reflection coefficient R,

$$VSWR = \frac{1+|R|}{1-|R|}$$

[4] Noise Figure is the amount of excess input noise above -174 dBm in a 1 Hz bandwidth and at 290 K. In a 50-Ω system, 8 dB corresponds to an input noise current of 22 pA/Hz.

[5] We offer an option which extends the low frequency cutoff to 14 MHz.

Fig. 2

Typical response of the Models 1421 and 1422 amplifiers to a 120-mV, 50-ps, positive step-function input.

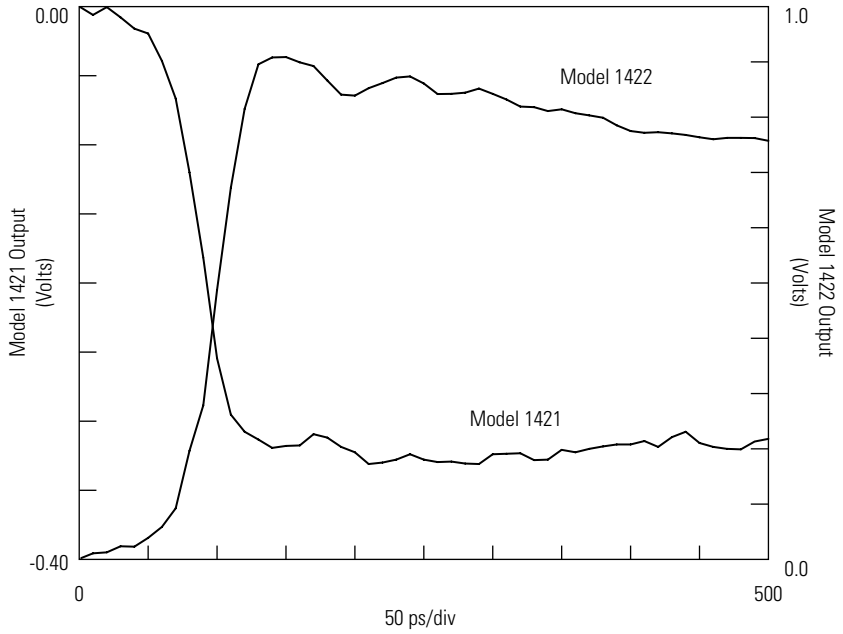
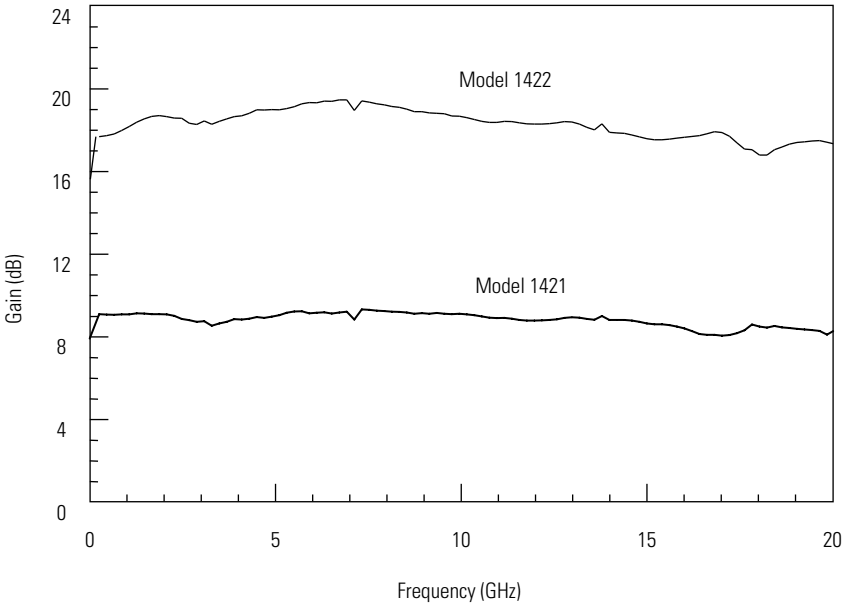


Fig. 3

Typical frequency response of the Models 1421 and 1422 Amplifiers.



Notes