

HP 87415A Microwave System Amplifier HP 87400A Microwave Component Amplifier

Product Overview

2 to 8 GHz



Features and Description

- 25 dB gain
- 23 dBm output power
- GaAs MMIC reliability >1 x 10⁶ hours MTBF
- Compact size, integral bias regulation

The HP 87415A and 87400A microwave system amplifiers bring compact, reliable gain block performance to systems integrators and microwave designers. With 25 dB minimum gain and over 23 dBm output power from 2-8 GHz, these amplifiers offer output power where it is needed: at the test port. Both amplifiers offer internal bias regulation and GaAs MMIC reliability, and the HP 87415A adds integral heat sinking, bias port cabling, and stand-alone packaging for use in test system applications. The HP 87400A offers similar performance in a compact microcircuit-only package for OEM amplifier applications.

Packaging

These two gain blocks differ primarily in level of integration. Both amplifiers share similar internal GaAs MMIC devices, but the HP 87415A features a complete, stand-alone solution for test system designers and integrators. An integral heat sink keeps the package at a temperature comfortable to the touch, enhancing its use as a benchtop amplifier, and a DC bias port allows easy connection to an external power supply such as the HP 87421A.

Without the heat sink and base, the smaller HP 87400A easily fits tight OEM applications. To ensure optimum performance and product life, an external heat sink or forced air cooling is recommended for the HP 87400A to keep the case temperature below +55°C.

HP 87415A Microwave System Amplifier HP 87400A¹ Microwave Component Amplifier Specifications

Specifications describe the instrument's warranted performance over the temperature range + 20° C to +30° C (unless otherwise noted). All specifications apply after the instrument's temperature has been stabilized after one hour continuous operation.

Supplemental characteristics are intended to provide information useful in applying the instrument by giving typical but nonwarranted performance parameters. These are denoted as "typical", "nominal", or "approximate". Supplemental characteristics apply over the temperature range +20° C to +30° C.

Frequency Range	2 to 8 GHz
Small Signal Gain	25 dB minimum
Small Signal Gain Flatness	± 3 dB max
Output Power at 1 dB Compression Point	23 dBm min
Input SWR	2.0 : 1
Output SWR	3.6, 2.0-2.5 GHz 3.0, 2.5-8.0 GHz
Harmonics	–20 dBc at Pout = +23 dBm

General Specifications

Power Requirements Bias Voltage and Current:	+12 V dc nominal (+11 to +13 V dc); 900mA
Weight	Net 0.64 kg (1.41 lb) Shipping 1.32 kg (2.9 lb)
RF Connectors	SMA (f) on RF input and output

 $^{1}\mathrm{HP}$ 87400A microcircuit specifications and supplemental characteristics apply between +45 to +55°C case temp

Applications

Test system amplifier.

The HP 87415A's compact size makes it an ideal remote amplifier for use by microwave test system integrators. It is a complete, off-the-shelf gain block that enables the system designer to place system power where it is needed, without consuming valuable rack space. Typical applications include microwave test sets and interface matrixes.

Loss compensation

Compensate for systematic power losses from switching and signal routing ATE systems, frequency conversion, and long microwave cable paths. Use the HP 87415A microwave system amplifier to recover lost signal strength at test cable ends.

Level source output power at a remote test port

By combining the HP 87415A or HP 87400A amplifiers with an HP 87300B directional coupler and an HP 8471E coaxial microwave detector, as shown in figure 1, levelled source power can be available at the test port.

Preamp

As a preamp, the HP 87415A can increase spectrum analyzer and frequency counter sensitivity.

Benchtop amplifier for the RF and microwave designer

The HP 87415A microwave system amplifier gives the microwave engineer 30 dB gain and 23 dBm output power without consuming valuable bench or rack space. Other applications include antenna subsystems and production test systems. The HP 87400A OEM component amplifier offers the HP 87415's electrical perform

 Image: Window Structure

 Image: Window Structure

ance in a small microcircuit package. Ideal for instrument applications needing small, internally biased gain blocks, this amplifier offers designers a very small, easy to integrate package, configuration flexibility, and GaAs MMIC reliability.

Separate Power Supply

The HP 87421A power supply provides the dc power needed to bias the HP 87415A. The power supply is housed in a small separate package, allowing it to be placed up to two meters away from the amplifier.

Electrostatic Discharge Caution

Electrostatic discharge (ESD) can damage or destroy electronic components. It is recommended that these amplifiers, like other electronic components be installed and operated at a staticfree workstation or in an environment where precautions against ESD have been implemented.



Figure 1. External Leveling Loop



Typical Performance Data

Saturated Power Level:	+26 dBm
Input Power Survival Level:	+23 dBm
Noise Figure:	13 dB
Non-Harmonically Related	
Spurious:	–50 dBc
Third Order Intercept (TOI):	+34 dBm
Impedance:	50 ohms
Reverse Isolation: (S12)	60 dB
Power Dissipation:	10 W





Environmental Specifications

Operating Temperature: Storage Temperature: 0 to +55 Degrees C -40 to +70 Degrees C



Other Environmental Information

Temperature Coefficient of Gain: Temperature Coefficient of 1 dBc: Random Vibration:

Shock:

Altitude (non-operating):

EMC:

0.1 dB/Degree C 0.045 dB/Degree C 5.2 G(rms) 50 to 2000 Hz per Mil-Std-883C method 2026 test condition IIA

1500 G (peak), 0.5 ms per Mil-Std-883C method 2002.3 test condition B

15,000 m per Mil-Std-883C method 1001 test condition C

Radiated Interference is within the requirements of VDE 0871 and CISPR Publication 11

Figure 5. Gain vs Frequency



Figure 6. Harmonics vs Frequency



Figure 7. Noise Figure vs Frequency



Ordering Information

HP 87415A Microwave System Amplifier

Includes amplifier and HP Part Number 83006-60004, which is a two meter cable with a 3-pin connector on one end and three wire leads on the other end.

HP 87400A Microwave Amplifier

Microcircuit-only version of HP 87415A for OEM applications

Other Instruments and Accessories

HP 87421A Power Supply

Includes power supply and HP part number 83006-60005, which is a two meter cable with a 3-pin connector on one end and a D-subminiature connector on the other end.

HP 87300B Coaxial Directional Coupler

HP 8471E 0.01-12 GHz Coaxial Detector

HP 83006-60004 dc Bias Cable

For use with user supplied power; consists of a two meter long shielded cable with a three pin connector on one end and three wire leads on the other end. Included with the HP 87415A microwave system amplifier.

HP 83006-60005 dc Bias Cable

For use with HP 87421A power supply; consists of a two meter long shielded cable with a 3-pin connector on one end and a D-subminiature connector on the other end. Included with the HP 87421A power supply.



Figure 8. HP 83006-60004 DC Bias Cable. Dimensions in meters and inches For more information, call your local HP sales office listed in your telephone directory or an HP regional office listed below for the location of your nearest sales office.

United States:

Hewlett-Packard Company 4 Choke Cherry Road Rockville, MD 20850 (301) 670 4300

Hewlett-Packard Company 5201 Tollview Drive Rolling Meadows, IL 60008 (708) 255 9800

Hewlett-Packard Company 5161 Lankershim Blvd. No. Hollywood, CA 91601 (818) 505 5600

Hewlett-Packard Company 2015 South Park Place Atlanta, GA 30339 (404) 955 1500

Canada:

Hewlett-Packard Ltd. 6877 Goreway Drive Mississauga, Ontario L4V 1M8 (416) 678 9430

Europe:

Hewlett-Packard European Marketing Centre P.O. Box 999 1180 AZ Amstelveen The Netherlands (31) 20 547 9999

Japan:

Yokogawa-Hewlett-Packard Ltd. 15-7, Nishi Shinjuku 4 Chome Shinjuku-ku, Tokyo 160, Japan (03) 5371 1351

Latin America:

Hewlett-Packard Latin American Region Headquarters Monte Pelvoux No. 111 Lomas de Chapultepec 11000 Mexico, D.F. (525) 202 0155

Australia/New Zealand:

Hewlett-Packard Australia Ltd. 31-41 Joseph Street Blackburn, Victoria 3130 Australia (A.C.N. 004 394 763) (03) 895 2895

Far East:

Hewlett-Packard Asia Ltd. 22/F Bond Centre, West Tower 89 Queensway, Central, Hong Kong (852) 848 7777

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