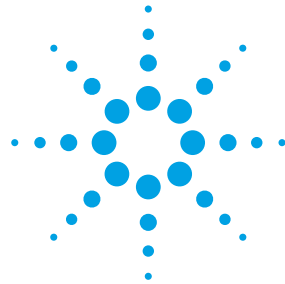


Agilent
 11970 Series
 Harmonic Mixers



Data Sheet

18 to 110 GHz

11970K*, 11970A, 11970Q,
 11970U, 11970V, 11970W

For use with the Agilent E4407B, 8560E/EC Series, 8566B,
 71000 Series, and PSA Series spectrum analyzers,
 plus the N9030A PXA signal analyzer



Exceptional performance

The Agilent Technologies 11970 Series harmonic mixers are general purpose mixers employing a dual-diode design to achieve very flat frequency response and low conversion loss. Each mixer is calibrated across its full band:

11970K* 18 to 26.5 GHz	11970Q 33 to 50 GHz	11970V 50 to 75 GHz
11970A 26.5 to 40 GHz	11970U 40 to 60 GHz	11970W 75 to 110 GHz

This series of mixers has been designed for a local oscillator frequency of 3 to 6.1 GHz. Accurate absolute amplitude measurements can be made by using the mixer's conversion loss calibration chart. The SWR of the waveguide input is typically 2.2:1 to further minimize measurement uncertainty. The combination of high gain-compression level and low conversion loss provides the maximum dynamic range for measuring input signals.

* 11970K is excluded from PXA support



Easy to use

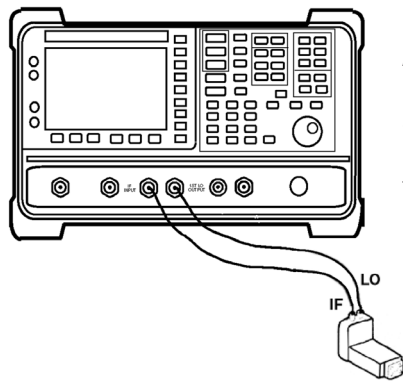
The excellent frequency response and low conversion loss are achieved without external dc bias or tuning stubs. Since bias and tuning stubs are not required, manual operation is simplified, and the complexity of hardware and software for automatic systems is greatly reduced. The repeatability of amplitude measurements is also enhanced. The dual-diode design of the mixers further simplifies measurements by suppressing the odd-order harmonics by more than 20 dB, which makes identification of the mixing products easier.



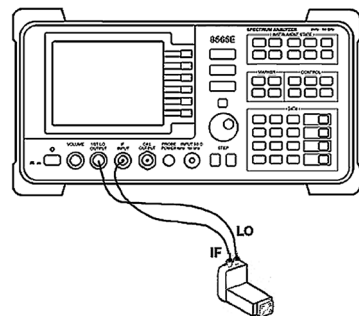
Figure 1. The 11970 Series mixers have separate LO input and IF output ports

Rugged

The rugged Agilent 11970 Series mixers will survive input levels up to 100 milliwatts (+20 dBm) with no damage to the mixer diodes. They will withstand shocks up to 30 G's and the vibration required by MIL-STD 28800C, Type III, Class 3 tests.



Agilent 8560E/EC Series spectrum analyzer
Extended frequency 8560E/EC Series



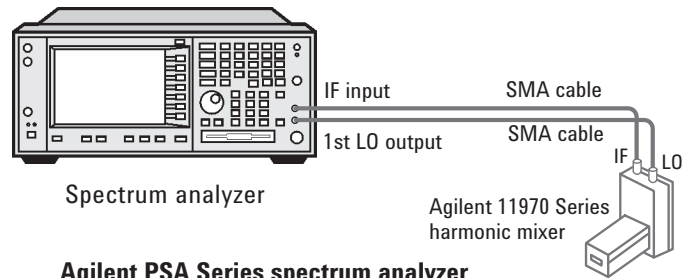
Agilent E4407B spectrum analyzer
Extended frequency E4407B ESA-E Series

Frequency extension for the Agilent E4407B, 8560E/EC Series, 8566B, and 71000 Series and PSA Series spectrum analyzers

The 11970 Series harmonic mixers are fully compatible with the Agilent E4407B, 8560E/EC Series, 8566B (requires a preamplifier), 71000, and PSA Series spectrum analyzers. Accurate frequency and amplitude measurements are made directly from the spectrum analyzer's display after calibration using the mixer's calibration chart.

Frequency extension for the Agilent N9030A PXA Series signal analyzer

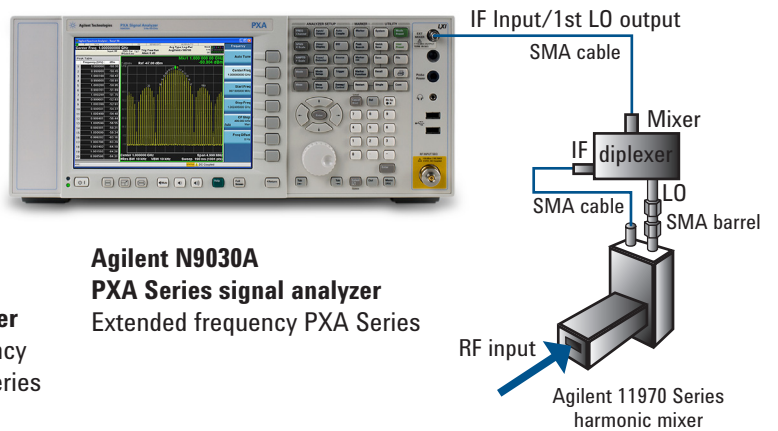
The 11970 Series harmonic mixers (11970K excluded) are also compatible with the N9030A PXA Series high-performance signal analyzer. The PXA offers optional external mixing (Option EXM), enabling it to work with the 11970 Series and other external mixers for frequency extension. An external diplexer is required because the PXA external mixing has a single SMA LO/IF port, whereas the 11970 Series mixers have separate LO and IF ports. Recommended diplexers can be purchased from Agilent as N9020A-E13, or from OML Inc. as DLP.313B.



Spectrum analyzer

Agilent 11970 Series harmonic mixer

Agilent PSA Series spectrum analyzer
Extended frequency PSA Series



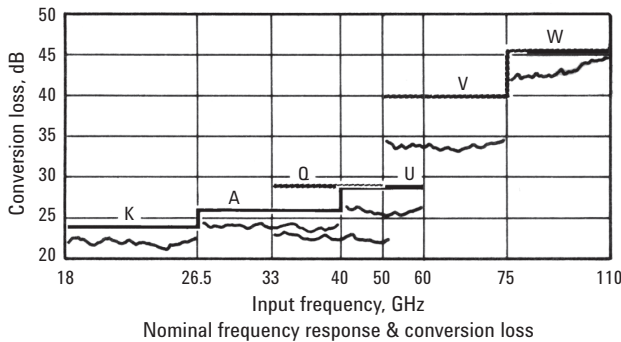
Agilent N9030A PXA Series signal analyzer
Extended frequency PXA Series

Agilent 11970 Series harmonic mixer

Specifications

Specifications describe the device's warranted performance over the temperature range 0 to 55° C (except where noted).

IF range	DC to 1300 MHz
LO amplitude range	+14 to +18 dBm ¹
Calibration accuracy (with IF of 321.4 MHz or 322.5 MHz) 11970A/Q/U 11970V/W	±2.0 dB with LO amplitude range of +14.5 to +16 dBm; ±3.0 dB with LO amplitude range of +16 to +18 dBm ±2.6 dB with LO amplitude range of +14.5 to +16 dBm; ±3.2 dB with LO amplitude range of +16 to +18 dBm
Nominal RF input SWR 11970A/Q/U 11970V/W	< 2.2:1 < 2.6:1
Bias requirements	None
Nominal odd-order suppression 11970A/Q/U 11970V/W	> 20 dB > 15 dB
Maximum CW RF input level	+20 dBm (100 mW)
Maximum peak pulse power	+24 dBm (250 mW) with < 1 μs pulse (average power +20 dBm)



Nominal performance, as noted in the following tables, while not warranted, provides information useful in applying the device.

11970 Series tested with Agilent PSA spectrum analyzers

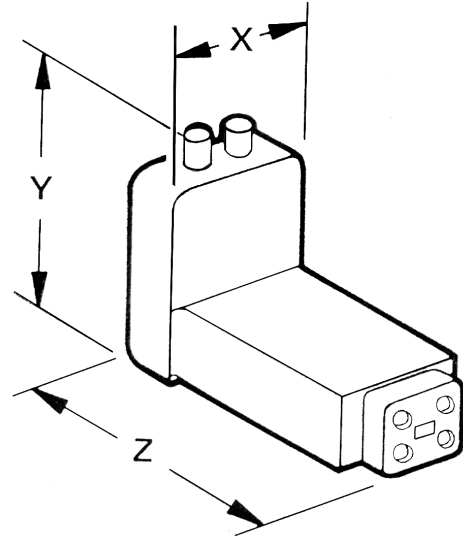
Agilent model number	Frequency range (GHz)	LO harmonic number	Maximum conversion loss (dB)	Nominal spectrum analyzer noise (dBm) 1 kHz BW	Frequency response (dB)	Nominal gain compression (dBm)
11970K	18 to 26.5	6-	24	-105	±1.9	-3
11970A	26.5 to 40	8-	26	-102	±1.9	-5
11970Q	33 to 50	10-	28	-101	±1.9	-7
11970U	40 to 60	10-	28	-101	±1.9	-7
11970V	50 to 75	14-	40	-92	±2.1	-3
11970W	75 to 110	18-	46	-85	±3.0	-1

1. An LO power of between 14.5 to 16 dBm at the mixer's LO input is necessary to achieve the given frequency response and spectrum analyzer amplitude accuracy specifications. When LO power varies between 14 to 18 dBm at the mixer's LO input, add ±1 dB to the frequency response and spectrum analyzer amplitude accuracy specification.

11970 Series tested with Agilent PXA signal analyzer

Agilent model number	Frequency range (GHz)	LO harmonic number ¹	Maximum conversion loss (dB)	Nominal signal analyzer noise (dBm) ² 1 kHz BW	Frequency response (dB)	Nominal gain compression (dBm)
11970A	26.5 to 40	6-/8-	26	-110/-108	±1.9	-5
11970Q	33 to 50	8-/10-	28	-108/-106	±1.9	-7
11970U	40 to 60	10-	28	-106	±1.9	-7
11970V	50 to 75	12-/14-	40	-96/-94	±2.1	-3
11970W	75 to 110	18-	46	-88	±3.0	-1

Agilent model number	Flange	Weight	X	Y	Z
11970K	UG-595/U WR-42	0.17 kg 0.36 lb	36 mm 1.4 in	51 mm 2.0 in	90 mm 3.5 in
11970A	UG-599/U WR-28	0.14 kg 0.32 lb	36 mm 1.4 in	51 mm 2.0 in	71 mm 2.8 in
11970Q	UG-383/U WR-22	0.14 kg 0.32 lb	36 mm 1.4 in	51 mm 2.0 in	76 mm 3.0 in
11970U	UG-383/U-M WR-19	0.14 kg 0.32 lb	36 mm 1.4 in	51 mm 2.0 in	76 mm 3.0 in
11970V	UG-385/U WR-15	0.14 kg 0.32 lb	36 mm 1.4 in	51 mm 2.0 in	76 mm 3.0 in
11970W	UG-387/U WR-10	0.14 kg 0.32 lb	36 mm 1.4 in	51 mm 2.0 in	76 mm 3.0 in



Ordering Information

11970K*	18 to 26.5 GHz mixer
11970A	26.5 to 40 GHz mixer
11970Q	33 to 50 GHz mixer
11970U	40 to 60 GHz mixer
11970V	50 to 75 GHz mixer
11970W	75 to 110 GHz mixer

Options:

11970X-009	Mixer connection kit containing three 1-meter SMA cables, wrench, and allen driver. Note: X = K, A, Q, U, V or W
11970X-C01	Improved EMC radiated susceptibility. Note: X = K, A, Q, U, V or W
N9029A-E13**	Ordering convenience for one OML INC. LO/IF diplexer with cables and adapter

* Not compatible with N9030A PXA

** Required if the 11970 mixer is used with the Agilent PXA

Warranty and Service

Standard warranty for 11970 mixers is 12 months
Standard warranty for N9029A-E13 diplexer is 3 months,
provided by OML, Inc.

1. When used with 11970 Series mixer in A-, Q-, or V-band, the PXA's LO harmonics are automatically switched between two different numbers as listed to optimize conversion loss.
2. If the LO harmonics are switched, the noise levels for the signal analyzer/mixer combination will change, corresponding to the different LO harmonic numbers.



Agilent Advantage Services is committed to your success throughout your equipment's lifetime. To keep you competitive, we continually invest in tools and processes that speed up calibration and repair and reduce your cost of ownership. You can also use Infoline Web Services to manage equipment and services more effectively. By sharing our measurement and service expertise, we help you create the products that change our world.

www.agilent.com/find/advantageservices

 **Agilent Email Updates**

www.agilent.com/find/emailupdates

Get the latest information on the products and applications you select.



www.axiestandard.org

AdvancedTCA[®] Extensions for Instrumentation and Test (AXIe) is an open standard that extends the Advanced TCA for general purpose and semiconductor test. Agilent is a founding member of the AXIe consortium.



www.lxistandard.org

LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Agilent is a founding member of the LXI consortium.



www.pxisa.org

PCI eXtensions for Instrumentation (PXI) modular instrumentation delivers a rugged, PC-based high-performance measurement and automation system.

Agilent Channel Partners

www.agilent.com/find/channelpartners

Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.



www.agilent.com/quality

www.agilent.com

www.agilent.com/find/externalmixers

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:

www.agilent.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	(11) 4197 3500
Mexico	01800 5064 800
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 375 8100

Europe & Middle East

Belgium	32 (0) 2 404 93 40
Denmark	45 70 13 15 15
Finland	358 (0) 10 855 2100
France	0825 010 700 * 0.125 €/minute
Germany	49 (0) 7031 464 6333
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
United Kingdom	44 (0) 131 452 0200

For other unlisted countries:

www.agilent.com/find/contactus

Revised: June 8, 2011

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2011
Published in USA, September 19, 2011
5968-1445E



Agilent Technologies