



Agilent Waveguide Harmonic Mixers

M1970V 50 GHz to 75/80 GHz

M1970W 75 GHz to 110 GHz

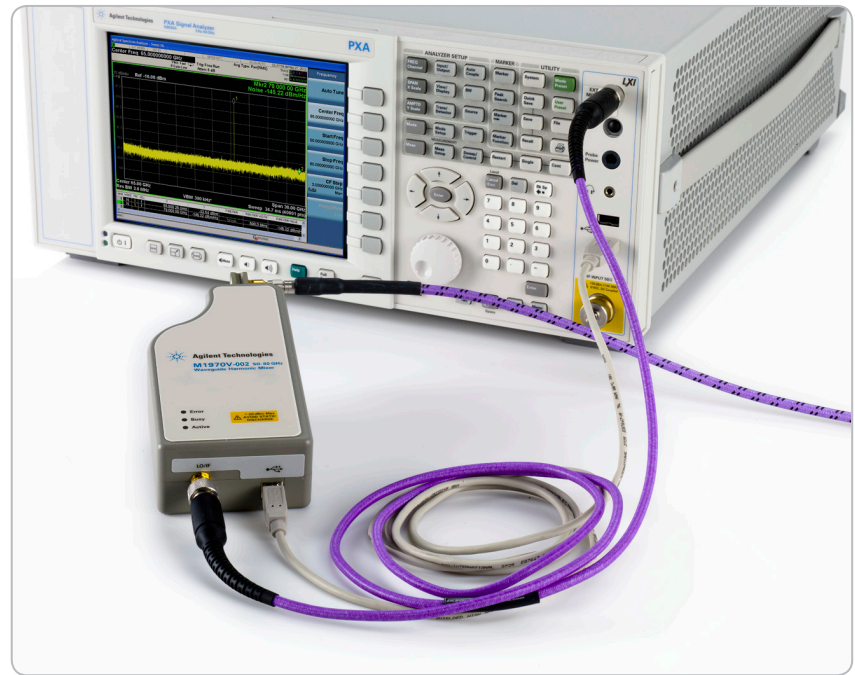
Technical Overview

Go *smart* with harmonic mixing

Most efficient test setup
with excellent performance
when combined with Agilent's
N9030A PXA signal analyzer

Smart Features:

- Automatic amplitude correction and transfer of conversion loss data through USB plug and play features
- Automatic LO amplitude adjustment to compensate for cable loss (up to 3 m or 10 dB loss)
- Auto-detect mixer model/serial number when used with N9030A PXA signal analyzer:
 - Automatic setting of default frequency range and LO harmonic numbers
 - Automatic LO alignment at start up
- Excellent conversion loss of 25 dB maximum and excellent amplitude calibration accuracy



Description:

The Agilent M1970V/W waveguide harmonic mixers are un-preselected mixers designed to extend the frequency range of the high-performance Agilent N9030A PXA signal analyzer for millimeter-wave applications up to 110 GHz.

Embedded with smart features, the smart mixers provide the most efficient test setup and measurement accuracy that's needed in demanding mixer application test environment. These smart mixers use a simple USB plug-and-play connection that can automatically configure the PXA detected mixer connected with specific mixer connected, including downloading conversion loss data and automatically compensate for local oscillator path loss. Therefore, it greatly shortens the overall start up operation and technically improves the overall DANL and TOI of your test systems with excellent conversion loss and amplitude accuracy.

Break free from conventional harmonic mixing test methods and discover the smarter solution using the M1970V/W waveguide harmonic mixers and N9030A PXA signal analyzer solution.



Agilent Technologies

Specifications

Specifications refer to the performance standards or limits against which the M1970V/W waveguide harmonic mixers are tested.

Typical characteristics are included for additional information only and they are not specifications. These are denoted as “typical”, “nominal” or “approximate” and are printed in italic.

Specification subject to change

Specifications	Agilent M1970V (Option 001)	Agilent M1970V (Option 002)	Agilent M1970W
Frequency range	50 to 75 GHz	50 to 80 GHz	75 to 110 GHz
LO harmonic number ¹		-6	-8
LO input frequency range ²	8.39 to 12.56 GHz	8.39 to 13.39 GHz	9.42 to 13.80 GHz
Maximum conversion loss ³		23	25
Calibration accuracy (<i>nominal</i>) ⁴		2.2	
Maximum LO power		20 dBm	
Maximum CW RF input level		20 dBm (100 mW)	
Maximum RF peak pulse power		24 dBm with < 1µsec pulse (Average power: + 20 dBm)	
Odd order mixing product suppression (<i>nominal</i>)		15 dBm	
Input SWR (<i>nominal</i>)		2.6	
Noise figure (<i>nominal</i>) ⁵		36 dB	38 dB
System Displayed Average Noise Level (DANL) at 1 Hz resolution bandwidth (<i>nominal</i>) ⁶		-140 dBm	-138 dBm
Supplemental characteristic			
CE data storage method		EEPROM	
Automatic amplitude correction and transfer of conversion loss data		YES	
Automatic LO amplitude adjustment		YES	
Automatic run calibration when time and temperature changes		YES	
LO amplitude		LO requirement provided by compatible signal analyzers. Maximum cable loss 10 dB nominal	
USB requirements		5 V nominal, 500 mA maximum	
IF bandwidth ⁷		200 MHz to 500 MHz	
IF/LO connector		SMA (f)	

¹ “-” signifies that the LO frequency times the LO harmonic number is higher than the RF input frequency. $LO \times N = RF + IF$

² Exact LO frequency is dependent on the IF path setting of the signal analyzer

³ Conversion loss value shown include the effect of an internal IF amplifier

⁴ Calibration accuracy is the difference between the conversion loss factors measured and programmed into the M1970V/W at the factory and the actual conversion loss the mixer experiences when used with an X-Series signal analyzer with Option EXM. The values shown include test system uncertainty, interpolation error, and the effects of the difference between the X-Series environment and the factory calibration environment. The system amplitude accuracy is worse than the M1970V/W calibration accuracy due to SWR effects between the M1970V/W and the X-Series IF input, and to the gain accuracy at the IF input in Option EXM of the X-Series analyzer.

⁵ The values shown are the noise figures of the M1970V/W alone. They include effects of the internal IF amplifier. The system noise figure when connected to an X-Series analyzer will be higher, by nominally 0.8 dB

⁶ System DANL includes the effect of an X-Series analyzer and cable as well as the M1970V/W. DANL is defined with log-scale averaging according to the industry conventions. The noise density is about 2.25 dB higher than DANL

⁷ The M1970V/W are designed to work with the PXA IF frequencies. With PXA Option CR3, other IF frequencies can be supported for special applications.

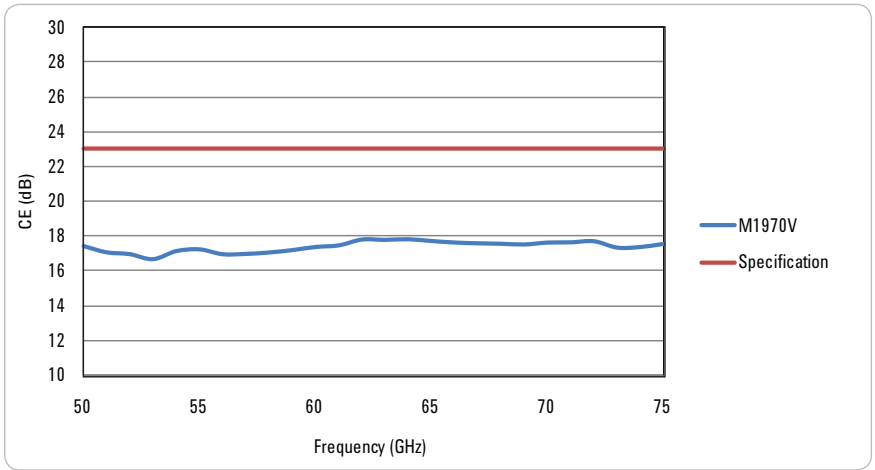


Figure 1. Agilent M1970V conversion efficiency versus frequency (typical)

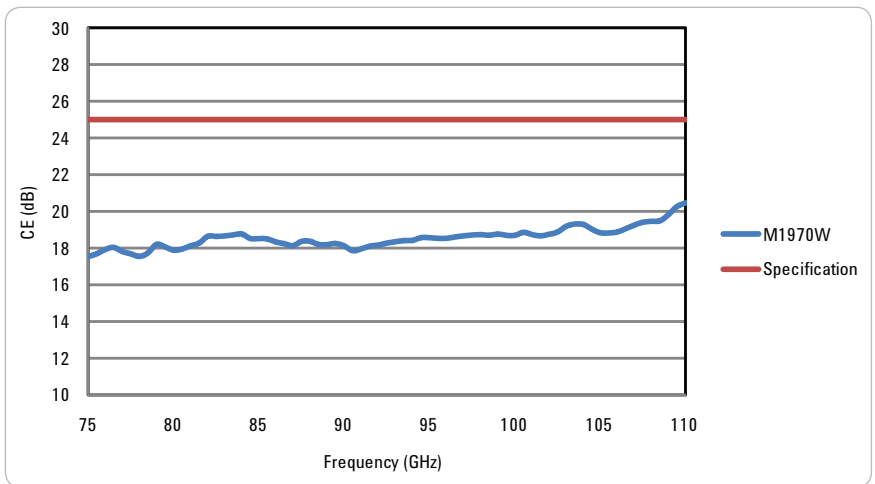


Figure 2. Agilent M1970W conversion efficiency versus frequency (typical)

Environmental Specifications

Agilent M1970V/W waveguide harmonic mixers are designed to fully comply with Agilent Technologies' product operating environmental specifications. The following are the summarized environmental specifications for these products.

Temperature range

Operating	0 to 55 °C
Storage	- 40 to 70 °C

Relative humidity

Operating	95 % RH at 40 °C (non-condensing)
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Shock

End use handling shock	Half sine wave form
Transportation shock	30 g

Vibration

Operating	0.21 g rms
Survival	2.09 g rms

Altitude

Operating	< 4,572 meters (15,000 feet)
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ESD immunity

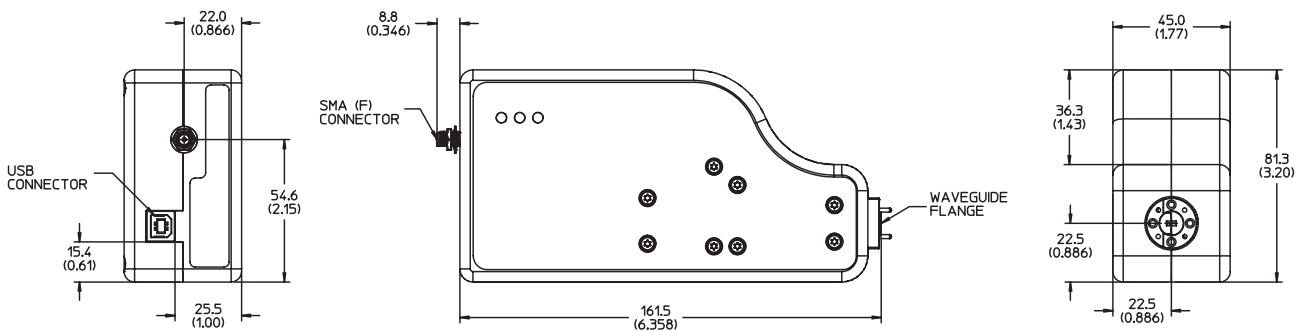
Direct discharge	6.0 kV per IEC 61000-4-2
Air discharge	15 kV per IEC 61000-4-2

Mechanical dimension*

Does not include SMA connector

Model	Flange	Weight	Height	Width	Length
M1970V (Option 001)	UG-385/U WR-15	0.70 kg (1.54 lbs)	45.00 mm (1.77 in)	81.28 mm (3.20 in)	161.50 mm (6.36 in)
M1970V (Option 002)					
M1970W	UG-385/U-M WR-10				

*Dimensions are in mm (inches) nominal, unless otherwise specified.



Mechanical dimension for M1970V/W

Ordering Information

M1970V

Option 001 50 to 75 GHz waveguide harmonic mixer
Option 002 50 to 80 GHz waveguide harmonic mixer

M1970W 75 to 110 GHz waveguide harmonic mixer

LO cable options (optional)¹

Option 101 1 meter LO cable
Option 102 3 meter LO cable

USB cable options (optional)¹

Option 201 1.8 meter USB cable
Option 201 3 meter USB cable

Jackstand

Option 301² Standard jackstand for mixer

Recommended signal analyzers

N9030A PXA series signal analyzer, 3 Hz to 50 GHz
www.agilent.com/find/pxa

Note:

¹ The cable options is defaulted to LO (1 meter) and USB (1.8 meter) if no selection is made.

² Option 301 is also orderable as standalone products.

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