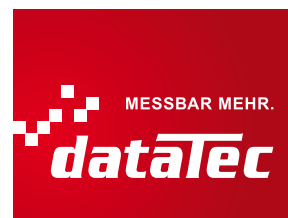


Ihr Spezialist für
Mess- und Prüfgeräte



Keysight Technologies E-Band Signal Analysis Solution

Solution Brochure



The Keysight Technologies, Inc. E-band signal analysis solution is a reference solution that provides flexible, multichannel measurement for wideband mmW signal types.

Next-Generation Wideband Test Challenges

With the rapid development of next-generation communication signals, test and measurement instrumentation is challenged to keep pace. With signal bandwidth increasing from the cellular maximum of up to 100 MHz to more than 500 MHz, there is a need for a flexible, low cost solution to measure these new signal types. In addition to the challenges of bandwidth analysis, some of these signals need to be investigated at mmW frequencies, which adds complexity to most measurement setups. Demanding applications such as 5G, 802.11ad, and automotive radar are a few examples of these types of complex signals.

E-Band Signal Analysis Reference Solution

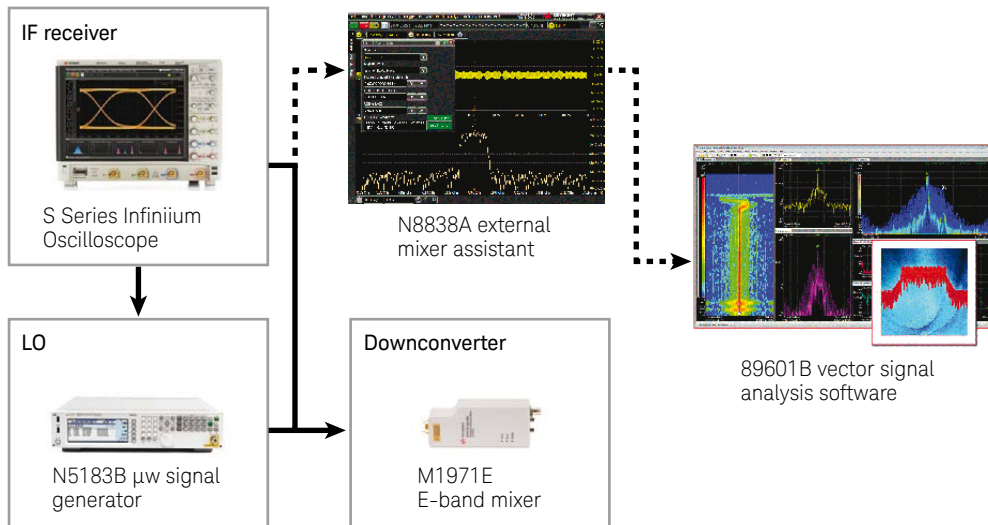
With test and measurement challenges evolving, a flexible, low cost, multipurpose solution is needed to stay current with signal advancement. The E-band signal analysis reference solution combines the power of Keysight software and hardware to deliver an integrated solution.

Using a high-performance oscilloscope with an external mixer and signal generator provides an integrated block down-conversion system that delivers 2.5 GHz of analysis bandwidth over the E-band frequency range of 55 to 90 GHz.

Keep Your Test Systems Up and Running

In addition to an industry standard three year warranty on all instruments, Keysight offers three and five year Express Warranties with new instrument purchases. The Express Warranty program provides the fastest repair service in the industry with up to a 10 day improvement in service turnaround time. Reduce downtime with priority service and gain confidence that your instruments are operating accurately and reliably.

Reference Solution Architecture



Reference Solution Description

With the N5183B μW signal generator providing a LO to the M1971E E-band mixer, the E-band signal analysis solution provides multichannel E-band signal analysis for R&D engineers. The N8838A external mixer assistant runs as part of the S-Series Infiniium software, automating frequency and amplitude settings of the LO to optimize signal down-conversion, as well managing the settings and corrections of the external mixers. This provides a simplified connect and calibration process, allowing you to focus on your measurements. Because the 89601B VSA software supports the N8838A software and its features, you can make demodulation measurements in the VSA software without needing any macros or extra routines to setup the equipment.

Reference Solution Key Performance Characteristics

Solution features and benefits

Feature	Benefit
55 to 90 GHz frequency range	Covers all of E band for flexible analysis
Multichannel analysis	Allows for multiple DUT or multichannel DUT testing
DC to 8 GHz oscilloscope bandwidth	Supports use of the oscilloscope's direct inputs to cover your cellular and μW requirements when you have frequencies lower than 55 GHz
Supports many topologies for transmitter testing (IQ/IF, RF/mmW)	Provides flexible multi-use solution for changing test needs using oscilloscope inputs or mixer inputs
Simple connection, loss correction, and LO power optimization menu	Reduces measurement errors and decreases time to obtain an accurate measurement with fast and repeatable measurement setup and calibration
Integration with 89601B VSA software	Simplifies measurement setup and user interface

Solution specifications and characteristics

DSOS04A	
Bandwidth	DC to 4 GHz
Maximum sample rate	Up to 20 GSa/s (2 ch) or 10 GSa/s (4 ch) ± 0.4 dB
N5183B μW analog signal generator	
Frequency range	9 kHz to 13/20/31.8/40 GHz (option dependent)
Absolute amplitude accuracy	± 0.7 dB
Phase noise (100 kHz offset at 10 GHz)	-126 dB (typical)
M1971E waveguide harmonic mixer	
Frequency range	55 or 60 to 90 GHz
Conversion loss	20 dB (typical)
Gain compression level (P1 dB)	0 dBm (nominal)

Recommended Reference Solution

Configuration A – Single-channel configuration

Hardware

Model	Description
DSOS404A	4 GHz S-Series oscilloscope
- DSOS000-400	400 Mpts/ch memory
N5183B	MXG-B μ W analog signal generator
- N5183B-513	9 kHz to 13 GHz frequency range
- N5183B-UNY	Low phase noise
M1971E	Waveguide harmonic mixer (Serial number must be greater than MY56130101)
- M1971E-001	60 to 90 GHz frequency range

Software

Model	Description
89601B	
- 89601B-200	Basic vector signal analysis and hardware connectivity
- 89601B-AYA	Vector modulation analysis
N8838A	External mixer assistant software

Recommended accessories

Model	Qty	Description
RF cables	2	M9392A-80003
USB cables	2	M1971E-202
3.5 mm (f) to 3.5 mm (f) adapters	1	83095B
3.5 mm (f) to BNC (m)	1	54855-67604

Configuration B – Two-channel configuration

Hardware

Model	Description
DSOS404A	4 GHz S-Series Oscilloscope
– DSOS000-400	400 Mpts/ch memory
N5183B	MXG-B μ W analog signal generator
– N5183B-513	9 kHz to 13 GHz frequency range
– N5183B-UNY	Low phase noise
M1971E	Waveguide harmonic mixer
– M1971E-001	60 to 90 GHz frequency range

Software

Model	Description
89601B	
– 89601B-200	Basic vector signal analysis and hardware connectivity
– 89601B-AYA	Vector modulation analysis
N8838A	External mixer assistant software

Recommended accessories

Model	Qty	Description
RF cables	5	M9392A-80003
USB cables	3	M1971E-202
3.5 mm (f) to 3.5 mm (f) adapters	1	83095B
3.5 mm (f) to BNC (m)	2	54855-67604
Power divider	1	87304C

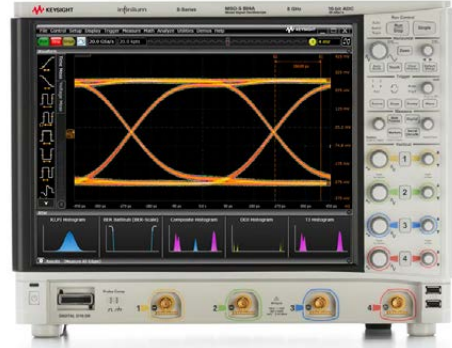
1. For a more complete set of configuration options, please refer to the E-Band Signal Analysis, Reference Solution - Configuration Guide, literature number 5992-1421EN.

Hardware Elements

With the E-band signal analysis solution, you can leverage your existing/standard lab equipment or have the reassurance that the hardware that you need can be reused for many other RF and digital applications.

S-Series oscilloscope

An Infiniium S-Series high-definition oscilloscope is used to perform signal analysis. A 10-bit ADC, low noise front end, correction filters, and vertical scaling support down to 2 mV/division, and a precise time base produce high-fidelity measurements. In addition, its advanced frame and broad range of capabilities enable the S-Series oscilloscopes to tackle a wide range of test needs.



M1971E E-band mixer

The Keysight M1971E 55/60 to 90 GHz waveguide harmonic mixer is an un-pre-selected mixer and provides a complete solution for wideband millimeter-wave signal analysis of more than 2 GHz. Smart features are embedded to help you to greatly simplify your overall test setup and improve the DANL and TOI of your test system. Go smart with harmonic mixing for your millimeter-wave applications.



N5183B μ W analog signal generator

The N5183B MXG microwave analog signal generator is the pure and precise alternative to the PSG analog, with advantages in size and speed. It delivers the performance you need—spectral purity, output power, and more—to perform module- and system-level testing.

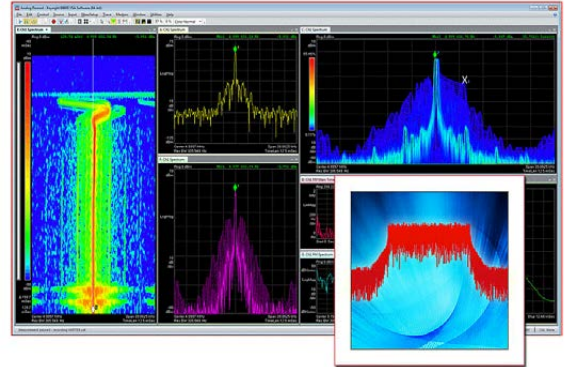


Software Elements

The E-band signal analysis solution leverages the flexibility of the 89601B VSA software to provide familiar measurements. With the VSA software flexibility, which supports over +30 Keysight platforms, you have a powerful, flexible, and consistent measurement experience.

89600B vector signal analysis software

The 89600 VSA software is a comprehensive set of tools for demodulation and vector signal analysis. These tools enable you to explore virtually every facet of a signal and optimize your most advanced designs. As you assess the tradeoffs, the 89600 VSA helps you see through the complexity.

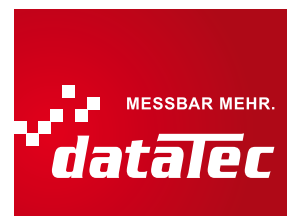


N8838A external mixer assistant

The N8838A external mixer assistant software enables the M1971E waveguide harmonic mixer to be used with the S- and V-Series Infiniium oscilloscopes. The software option provides seamless control, easy connection, and calibration of the mixer as well as the LO of your choosing (N5183B or E8257D).



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Suggested Accessories

The E-band signal analysis solution only support 55 to 90 GHz.

Waveguide horns

Model	Frequency range
N9029AH05	140 to 220 GHz
N9029AH08	90 to 140 GHz
N9029AH10	75 to 110 GHz
N9029AH12	60 to 90 GHz
N9029AH15	50 to 75 GHz
N9029AH19	40 to 60 GHz

Waveguide filters and amplifiers

Please contact our solution partner VDI (Virginian Diodes Inc.) for more information.

Related Literature

Publication title	Publication number
<i>89600 VSA Software - Configuration Guide</i>	5990-6386EN
<i>89601B/BN-200 Basic VSA, 89601B/BN-300 Hardware Connectivity - Technical Overview</i>	5990-6405EN
<i>MXG X-Series Signal Generator N5183B Microwave Analog - Data Sheet</i>	5991-3131EN
<i>MXG X-Series Signal Generator N5183B Microwave Analog - Configuration Guide</i>	5991-3596EN
<i>Infiniium S-Series High-Definition Oscilloscopes - Data Sheet</i>	5991-3904EN
<i>M1971E Waveguide Harmonic Mixer - Technical Overview</i>	5992-0836EN
<i>E-Band Signal Analysis Reference Solution - Configuration Guide</i>	5992-1421EN