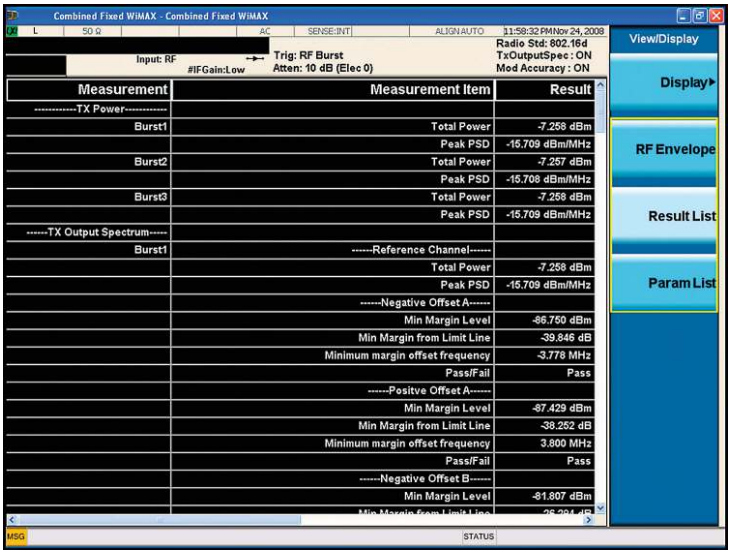
Keysight Technologies

X-Series Signal Analyzers (MXA/EXA)

Single Acquisition Combined Fixed WiMAX™ Measurement Application (N9074A-XFP)

Technical Overview



KEYSIGHT TECHNOLOGIES

Introduction

The Keysight Technologies, Inc. N9074A-XFP single acquisition combined Fixed WiMAX measurement application is a breakthrough, high-speed manufacturing test solution available as an option on Keysight's highest speed mid-range, general-purpose X-Series signal analyzers—the MXA (N9020A) and EXA (N9010A).

Features and Benefits

- Supports IEEE standard 802.16d (802.16-2004)
- Supports demodulation of uplink and downlink signals using IEEE 802.16-2004 modulation formats including BPSK, QPSK, 16QAM and 64QAM
- SCPI[1]-based measurement application allows production familiar remote programming commands for ease-of-test software development
- Flexible selections of predefined parameters allow easy and customizable set-up of the measurements to suit various production test requirements
- Varied measurement methods to meet different needs for best speed or best accuracy
- Supports frequency hopping for broadband and multi-frequency points measurements
- Tabular user interface showing the parameter, measurement, and result lists for easy viewing
- Parameter list view displays SCPI commands, related parameter name and value in one table and is easier to understand than only showing a list of SCPI commands
- Additional RF envelope view provides troubleshooting tool for the time alignment between target signal and the instrument

1. SCPI is the abbreviation for Standard Commands for Programmable Instruments.

Introduction

The increasing complexity of today's mobile devices, driven by the need for multi-frequency/band coverage, support of multiple formats (2G/3G and emerging communication technologies) and multiple applications (phone, multimedia and PDA) combined with ever-increasing pressure to achieve lower cost factors are driving manufacturers to look for ways to reduce test times and test costs for these complex devices. By using general-purpose RF test equipment without any call-processing for production testing, it is possible to apply new measurement processing techniques to drastically reduce the test time required and keep test costs well under control.

The single acquisition combined Fixed WiMAX measurement application allows manufacturers to make measurements much faster than traditional measurements. In the combined measurement applications a single acquisition of data is used for multiple measurements, saving valuable time in comparison to traditional measurements that recapture data for each individual measurement. The N9074A-XFP option is a SCPI-based measurement application with varied parameter setups and a simple user interface. It supports multiple measurements for different signals including frequency hopping signal. The N9074A-XFP option is designed for time-critical tests on the production line, and the high dynamic range of the Keysight signal analyzers ensures that the measurements remain as accurate as possible.

Single acquisition: contains one continuous block of captured data using predefined capture settings. The capture period can be defined by test engineers to suit the requirements for specific device tests, for example, how many bursts are required to provide enough data to ensure a good measurement on the DUT.

Combined measurements: imply that the measurement sequences performed by the analyzer can accommodate transmitter power measurements and any mix of transmitter output spectrum modulation accuracy measurements performed on the data collected within the capture period.

Advantages of the combined Fixed WiMAX application measurements

Acceleration of test speed without required measurement switching and using fewer acquisitions

Compared with traditional one-button measurements, which limit the "speed" of tests due to measurement switching time (such as from SEM to EVM), the combined Fixed WiMAX measurement application uses SCPI-based programming to configure the X-Series signal analyzer to conduct the specified measurements ahead of time, without measurement switching, and with fewer acquisitions that normally would require processing of the data after each capture is completed.

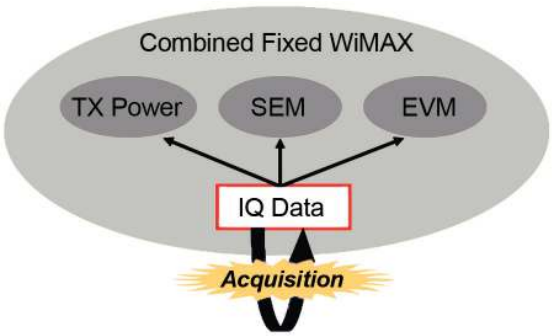


Figure 1. Combined Fixed WiMAX measurement

In order to perform the single acquisition combined measurements, the N9074A-XFP measurement application option requires option B25 to be installed on either the N9020A MXA or N9010A EXA signal analyzer.

Available measurements:

– Transmit Power

– Transmit Output Spectrum

– Modulation Accuracy

Measurement overview

The N9074A–XFP combined Fixed WiMAX measurement application is ideal for characterizing the overall PHY layer performance of a Fixed WiMAX signal. Take advantage of standardized tests to evaluate a transmitter against the IEEE standard for manufacturing test.

The N9074A–XFP combined Fixed WiMAX measurement application provides all of the IEEE 802.16d Fixed WiMAX transmitter tests. Through SCPI commands, turn Transmit Output Spectrum measurement and Modulation Accuracy measurement On or Off to assure complete assessment or perform only a few tests to reduce overall test time and speed device evaluation.

The Transmit Power measurement specifies the total power of the transmitted signal, and the power spectral density is also provided.

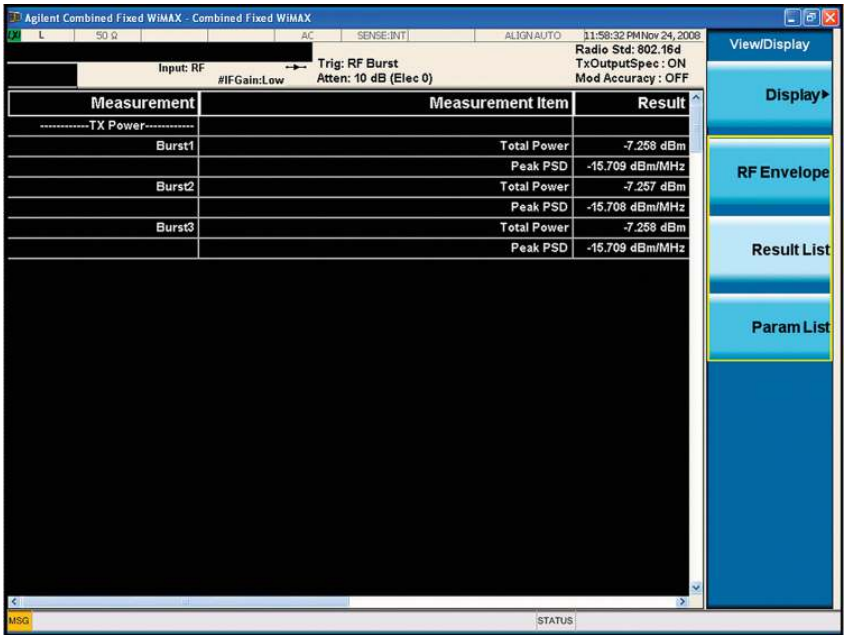


Figure 2. Transmit Power measurement

Transmit Output Spectrum measures spurious signal levels for up to four (A/B/C/D) pairs of offsets. The specification called out in the standard is used as the default, however, the profile of the test masks can be changed as required by using related SCPI commands. The Pass/Fail sign indicates the result status for each offset.

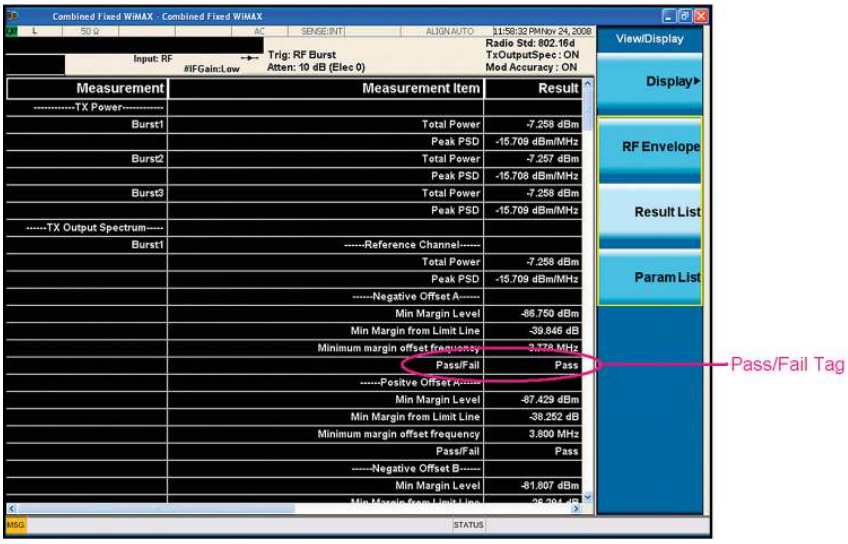


Figure 3. Transmit Output Spectrum measurement

Modulation Accuracy measurement provides the results of Frequency Error, Symbol Error, RMS EVM in dB, RMS EVM in percent, I/Q Offset, Absolute Spectrum Flatness Minimum Margin, Absolute Spectrum Flatness Minimum Margin Pass/Fail flag, Difference Spectrum Flatness Minimum Margin, and Difference Spectrum Flatness Minimum Margin Pass/Fail flag. Figure 4 shows an example of Modulation Accuracy measurement.

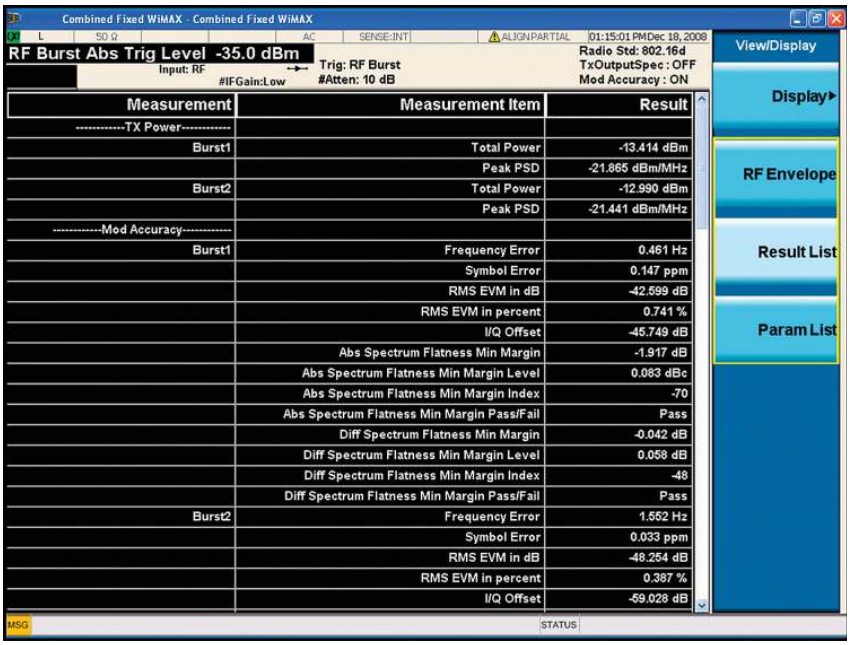


Figure 4. Modulation Accuracy measurement

The N9074A–XFP combined Fixed WiMAX measurement application performs capture according to the capture setup, and after the capture is completed, the acquired data is calculated. The burst setup can be modified for different captures, parameters, and measurements by using SCPI commands. If it is a frequency hopping signal, multiple frequencies in the Center Freq of Burst Setup can be specified and the "Suffix", which is the time interval for frequency or attenuation change needed by the RF front end, should be designated in the capture setup. There are three types of measurement methods—Best Speed, Balanced, and Best Accuracy to meet specific priorities.

Greater flexibility of measurement setup

The N9074A-XFP measurement application option provides high flexibility for the setup of combined measurement parameters. Figure 5 shows an example of a parameter list view. Parameter name, with its SCPI command and value, is listed in this view. The list is ordered in SCPI commands and identifying what parameter corresponds to a specific command can be easily found. The value can be verified or modified in three ways—sending SCPI commands, using the menu and front panel keys, or using a mouse and keyboard. This is more convenient than having to access the SCPI programming interface for minor changes.

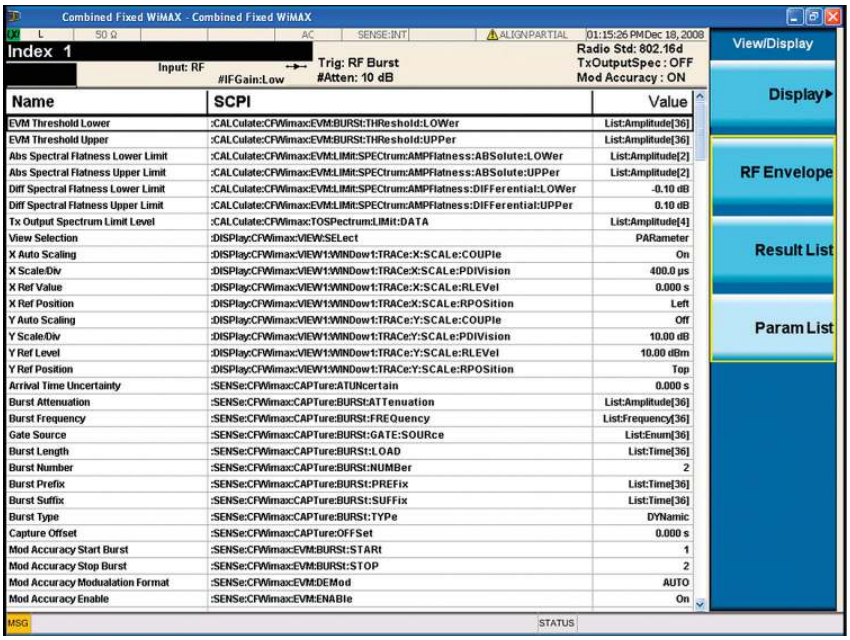


Figure 5. Parameter List view

Simplified user interface for reduced processing overhead allows for highest speed

The user interface of the N9074A-XFP measurement application option is designed for maximum efficiency. All of the results listed in the Result List view can be queried by SCPI commands (see Figures 2, 3, and 4).

Comprehensive user interface for troubleshooting

For troubleshooting or diagnostic purposes, the N9074A-XFP measurement application option provides a graphical user interface that displays measurement traces. The RF Envelope view is useful for setting time alignment between target signal and the instrument. Figure 6 shows a view of an RF envelope. In this view, the instrument acquires a trace with two bursts for demodulation. The RF Envelope view can be turned off during the measurement for higher speed.

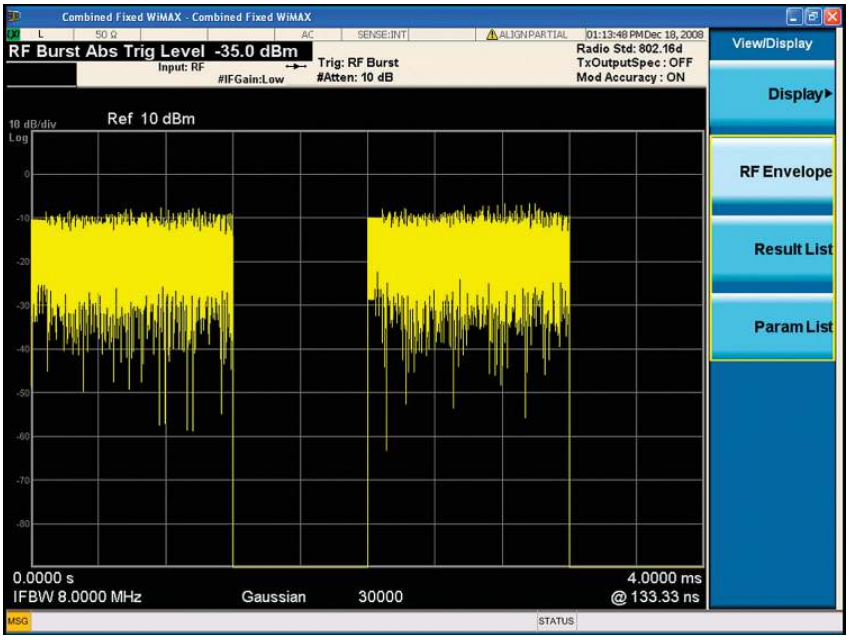


Figure 6. RF Envelope view

Key Specifications

N9074A-XFP single acquisition combined Fixed WiMAX measurement application

Description	N9020A MXA	N9010A EXA
Transmit power		
Absolute power accuracy 20 to 30 °C	±1.29 dB	±1.46 dB
Spectrum emission mask		
10 MHz Integration BW RBW = 100 kHz 5.05 MHz offset Accuracy		
Relative	±0.63 dB	±0.63 dB
Absolute 20 to 30 °C	±1.37 dB	±1.55 dB

Description	Specifications	Supplemental information
64QAM EVM		
EVM		
Operating range	0.1 to 8%	0.1 to 8%
Floor	–48 dB (0.37%)	–45 dB (0.57%)
Accuracy		
from 0.5% to 2%	±0.20%	±0.30%
from 2% to 8%	±0.10%	±0.10%

Ordering Information

Below you will find information on how to order your X-Series signal analyzer with the single acquisition combined Fixed WiMAX measurement application.

For further information, refer to the *MXA Configuration Guide,* literature number 5989-4943EN or the *EXA Configuration Guide,* literature number 5989-6531EN.

Instruments	Model number	Options
		Required options
MXA signal analyzer	N9020A	503 or 508 or 513 or 526 – frequency range up to 26.5 GHz
EXA signal analyzer	N9010A	503 or 507 or 513 or 526 – frequency range up to 26.5 GHz
MXA or EXA signal analyzer	N9020A or N9010A	B25 25 MHz analysis bandwidth
Single acquisition combined Fixed WiMAX measurement application	N9074A	XFP
		Recommended options
MXA signal analyzer	N9020A	P03 or P08 or P13 or P26 for MXA – Preamplifier up to 26.5 GHz
EXA signal analyzer	N9010A	P03 for EXA—Preamplifier up to 3.6 GHz
MXA or EXA signal analyzer	N9020A or N9010A	EA3—Electronic attenuator (3.6 GHz)
EXA signal analyzer	N9010A	PC2 dual core processor (standard on MXA)

Literature Resources

Literature title	Number
Keysight MXA Signal Analyzers	
Brochure	5989-5047EN
Data Sheet	5989-4942EN
Configuration Guide	5989-4943EN
Option BBA: Analog Baseband IQ Inputs Technical Overview	5989-6538EN
Keysight EXA Signal Analyzers	
Brochure	5989-6527EN
Data Sheet	5989-6529EN
Configuration Guide	5989-6531EN
Keysight X-Series Signal Analyzers (MXA/EXA)	
Demonstration Guide	5989-6126EN
X-Series Signal Analyzer Measurement Application Overview	5989-8019EN
EMI Precompliance Measurements Using MXA/EXA	5990-3690EN
Analog Demodulation Measurement Application Technical Overview	5989-6535EN
Noise Figure Measurement Application Technical Overview	5989-6536EN
Phase Noise Measurement Application Technical Overview	5989-5354EN
Pulse Measurement Software Technical Overview	5990-3801EN
W-CDMA, HSDPA/HSUPA Measurement Application Technical Overview	5989-5352EN
802.16 OFDMA Measurement Application Technical Overview	5989-5353EN
GSM/EDGE Measurement Application Technical Overview	5989-6532EN
EDGE Evolution Measurement Application Flyer	5989-9837EN
cdma2000®, 1xEV-DO Measurement Application Technical Overview	5989-6533EN
TD-SCDMA Measurement Application Technical Overview	5989-6534EN
LTE Measurement Application Technical Overview	5989-6537EN
Single Acquisition Combined WLAN Measurement Application Technical Overview	5990-3519EN
Single Acquisition Combined Fixed WiMAX® Measurement Application Technical Overview	5990-3520EN
DVB-T/H Measurement Application Technical Overview	5990-3569EN
DTMB Measurement Application Technical Overview	5990-3570EN
Remote Language Compatibility Technical Overview	5989-6539EN
Speed Enhancement and Removable Hard Drive	5989-6541EN
Using Keysight X-Series Analyzers (MXA/EXA) for Measuring and Troubleshooting Digitally Modulated Signals	5989-4944EN
Using Keysight X-Series Analyzers (MXA/EXA) Preselector Tuning for Amplitude Accuracy in Microwave Spectrum Analysis	5989-4946EN
Maximizing Measurement Speed with Keysight X-Series Signal Analyzers (MXA/EXA)	5989-4947EN
Making Precompliance Measurements with Option EMC on X-Series Analyzers (MXA/EXA)	5990-3133EN
Keysight VXA Vector Signal Analyzer Measurement Applications	
VXA Vector Signal Analyzer Measurement Application, Technical Overview	5989-7463EN
Option AYA Vector Modulation Analysis, Technical Overview	5989-7464EN
Option B7R WLAN Modulation Analysis, Technical Overview	5989-7465EN

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