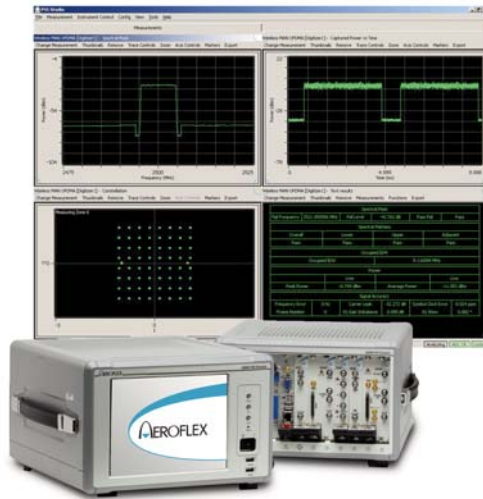


PXI

WiMAX Measurement Suite



AEROFLEX
A passion for performance.

A complete suite of measurement functions to characterize WiMAX signals in accordance with the requirements of IEEE 802.16e (2005) and the WiMAX Forum.

- Transmit power
- Spectral mask
- Occupied bandwidth
- EVM (all, data only, pilots only)
- Frequency error
- Gain imbalance, Skew
- Symbol/chip clock frequency error
- Carrier leakage
- Spectral flatness
- CCDF

The WiMAX measurement suite enables measurement of all major signal characteristics of WiMAX CPE devices including power, modulation accuracy and spectral parameters.

Configuration for each zone and burst within the sub-frame is made easily configurable using point and click/drag and drop. Color is used to differentiate between modulation types.

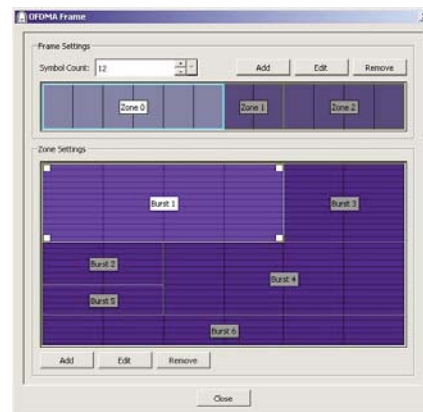


Figure 1. Zone Definition

Complex EVM results can be viewed as a function of sub-carrier or symbol for each burst in a multi-burst frame. Markers can be used to link between EVM vs. sub-carrier and sub-carrier EVM vs. symbol views.

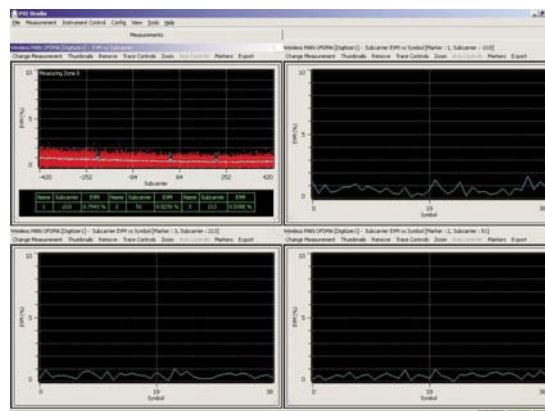


Figure 2. EVM Vs. Subcarrier with marker inspection

For the very latest specifications visit www.aeroflex.com

Spectral measurements are displayed and checked against standard compliant or user defined spectral mask.



Figure 3. Spectral mask

Spectral flatness results provide a pass/fail indication independently for each portion of the mask and check the relative level between successive sub-carriers as well as providing trace data with markers.

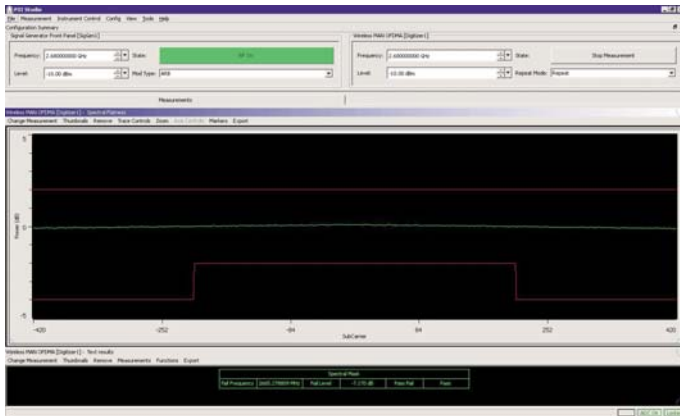


Figure 4. Spectral flatness

WIMAX

All specifications for accuracy and range relate to performance when used in conjunction with a 3030 Series PXI RF digitizer with option 104.

Specifications are defined with the input signal at the RF digitizer tuned frequency and at the reference level unless otherwise specified.

CONFIGURATION

Standards Supported

IEEE 802.16e (2005) OFDMA

FRAME SETUP

Frame Length

2.5, 4.0, 5.0, 8.0, 10.0, 12.5, 20 (ms)

Nominal Bandwidth

1.25, 3.5, 4.375, 5, 7, 8.75, 10, 14, 15, 17.5, 20, 28⁽¹⁾ MHz

1 Supported in 3030A, 3030C, 3035, 3035C

FFT Size

128, 512, 1024, 2048

Guard Period

1/4, 1/8, 1/16, 1/32

Sub-frames (link direction)

Uplink, Downlink

Downlink Preamble Index

0 to 113

Uplink Cell ID

0 to 31

ZONE SETUP

Type

PUSC

Number of Zones

Downlink: 8

Uplink: 3

Length

1 to max. symbol count set by frame length and guard period

Offset

0 to max. symbol count - 1 set by frame length and guard period

Permutation Base

Downlink: 0 to 31

Uplink: 0 to 69

BURST SET UP

Burst type

Downlink / Uplink

Uplink PUSC: Normal data

Downlink PUSC: Normal data

Burst Edit Operations

Add, delete

Burst definition

Single/multiple

Modulation: QPSK, 16QAM, 64QAM

Burst Type: Normal data

Modulation⁽²⁾

BPSK (pilots), QPSK, 16QAM, 64QAM

Number of Symbols⁽²⁾

1 to n where n is the number of symbols in the zone

Number of Sub-channels⁽²⁾

1 to n where n is the number of sub-channels in the zone set by the zone type and FFT size

Symbol Offset^(1,2)

0 to n - 1 where n is the number of symbols in the zone

Sub-channel offset^(1,2)

0 to n - 1 where n is the number of sub-channels in the zone set by the zone type and FFT size

MEASUREMENT SET-UP

Channel Equalisation Methods:

Channel estimation sequence only; channel estimation sequence and pilots

Channel Estimation Sequence Only

Downlink - using preamble

Uplink - no equalization

Channel Estimation Sequence and Pilots

Downlink - using preamble and pilot sub-carriers of the data symbols in the sub-frame

Uplink - Pilot sub-carriers of the data symbols of the sub-frame.

PILOT TRACKING

Phase Tracking

On / Off

Amplitude Tracking

On / Off

Symbol Time Tracking

On / Off

TRANSMIT POWER

The Peak and RMS power is measured for a single UL or DL sub-frame.

Indication

dBm

Trace

Power vs. time trace

Accuracy

See 3030 Series module level accuracy spec

OCCUPIED BANDWIDTH (OBW)

Bandwidth containing 99% of total of the transmitted power

Indication

Hz

Accuracy

Typically <100 kHz

SPECTRAL MASK

The spectral density of the transmitted signal should lie within the spectral mask.

The mask is frequency aligned to the maximum spectrum density.

Mask Type

IEEE802.16e (2005) 10 MHz, 20 MHz,

WiMAX Forum 5 MHz, 10 MHz masks,

User defined

Measurement BW

User defined or as determined by mask type selected

Measurement Range

80 MHz

Indication

Global Pass/Fail

The worst case dBc level value and its corresponding frequency relative to the mask are reported

Traces

FFT power spectrum and mask values

MODULATION ACCURACY

The error vector magnitude (EVM) is the magnitude of the IQ vector at the decision point measured relative to the ideal constellation point.

RCE (residual constellation error) / EVM (error vector magnitude)

Composite RCE / EVM (rms), (all sub-carriers and symbols within a zone)

EVM (rms) for a single burst within a zone

EVM (rms) for a single sub-carrier

EVM (rms) all data sub-carriers (within a burst or zone)

EVM (rms) for a specific symbol on a specific sub-carrier within a burst

EVM (rms) all pilot sub-carriers (CPE-common pilot error)

EVM (rms) for unmodulated subcarriers

Indication

% / dB

IQ Gain Imbalance

dB

IQ Skew

Degrees

Traces

EVM (rms) vs. sub-carrier for a specific burst or for all symbols

EVM (rms) vs. symbol for a specific burst or for all sub-carriers

Constellation for a specific burst or for all sub-carriers

Accuracy

Typically <-40 dB residual EVM

FREQUENCY TOLERANCE

Lock Range (% of sub carrier spacing)

±20%

Indication

Hz

Accuracy

<±10 Hz + (Freq Standard Error x Transmitter Freq (MHz))

TX CENTRE FREQUENCY LEAKAGE / RF CARRIER SUPPRESSION

Indication

dB

SYMBOL/CHIP CLOCK TOLERANCE

Range

±50 ppm

Indication

ppm

Trace

clock error vs. time

Accuracy

As per reference frequency

SPECTRAL FLATNESS

Mask Type

WiMAX Standard

IEEE 802.16e 2005

User defined

Indication

Mask Pass / Fail

Mask Upper Pass / Fail

Mask Lower Pass / Fail

Adjacent sub-carrier Pass / Fail

Trace

dBr values for each sub-carrier

CCDF (COMPLIMENTARY CUMULATIVE DISTRIBUTION FUNCTION)

Trace: Peak to average power (dB) vs. probability (%)

(1) For each burst in a multi-burst zone

(2) non overlapping

GENERAL

Operating System

Windows® XP (service pack 2) and 32-bit Vista.

Required Memory

512 Mbytes minimum, 1024 Mbytes recommended

Display Resolution

Minimum 1024 x 768

Other

Aeroflex 3000 Series modules require NI VISA version 3.1 or later (NI Visa 4.2 or later under Windows® Vista).

Aeroflex 3000 Series module drivers version 5.4.0 or later

ORDERING

PXI Studio is supplied as standard with plug-ins for RF Digitizer, Signal Generator, RF Combiner and Spectrum Analyzer.

Optional measurement plug-ins may be purchased with the 303x at time of order or purchased as an upgrade to the 303x.

Note: To be able to use measurement plug-ins within PXI Studio, associated options must be enabled in the 303x digitizer.

WiMAX

When purchased with a 303x, order as: 3030 option 104

When purchased as an upgrade, then order as: RTROPT104/3030

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