

PXI Modules

WiMAX measurement suite

AEROFLEX
A passion for performance.



Cost effective WiMAX signal analysis

- Transmit power
- Spectral mask
- Occupied bandwidth
- EVM (all, data only, pilots only)
- Frequency error
- Symbol/chip clock frequency error
- Carrier leakage
- Spectral flatness
- Use with 3030 series PXI RF digitizer

Introduction

The WiMAX measurement suite expands the capability of the Aeroflex 3030 series PXI RF digitizers to perform WiMAX PHY (physical layer) OFDMA power, spectrum and modulation measurements in accordance with IEEE 802.16e (2005) and WiBro.

The WiMAX measurement suite is a library of specialised functions with .dll and VB APIs (applications programming interfaces) for use in a broad range application development environments such as LabVIEW, LabWindows/CVI, Visual Basic and Visual C/C++

Applications

The WiMAX measurement suite is designed for PXI based RF test systems used in manufacturing. For complete RF component / sub system characterization the WiMAX measurement suite is complemented by IQCreator, a waveform creation software application for generating complex modulation including IEEE 802.16 OFDM & OFDMA signals compatible for use with 3020 series digital RF signal generator modules.

Highlights

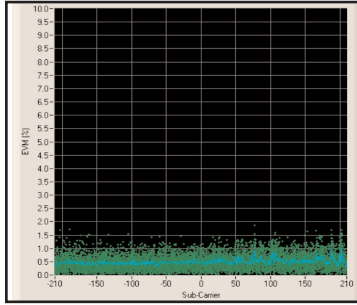
The WiMAX measurement suite provides analysis of OFDMA RF transmit signal characteristics as defined in IEEE 802.16e-2005 and 802.16-2004 / cor1-2005 for both uplink and downlink transmissions.

All major system parameters are user settable to enable testing of a wide variety of OFDMA system profiles including those defined in WiMAX Forum Mobile System Profile release 1.0.

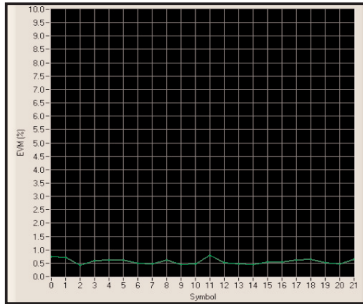
Nominal bandwidths up to 28 MHz are supported when used with 3030A/3035 RF Digitizers and 20 MHz when used with 3030.

Power, modulation quality and spectral measurement parameters can be processed from a single set of acquired IQ data. In the case of spectral mask measurements, data from multiple acquisitions can be stitched and processed to determine pass/fail over an 80 MHz wide span. Measurement parameters may be processed independently in which case measurement time can be accelerated for a single measurement type.

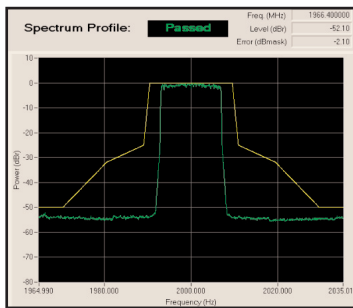
A variety of trace data is available to enable easy generation of graphs. These are especially useful in debugging. Traces, as illustrated in the figures below, include, spectrum, power vs time, EVM vs symbol time, EVM vs sub carrier, spectral flatness and constellation.



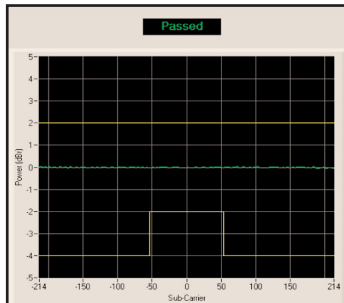
EVM vs sub carrier



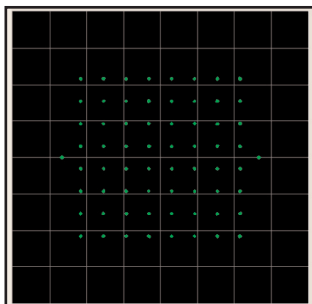
EVM vs symbol



Spectral mask



Spectral flatness



Constellation

Example Code

The measurement suite is supplied with comprehensive help including useful example source code to aid the user in the development of measurement applications. Examples are supplied for a variety of ADEs (applications development environments) including Visual Basic (VB6) and C/C++.

SPECIFICATION

All specifications for accuracy and range relate to performance when used in conjunction with a 3030 series PXI RF digitizer

ACQUISITION SETUP

Standards Supported

IEEE 802.16e (2005) OFDMA

FRAME SETUP

Nominal Bandwidth

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

FFT size

128, 512, 1024, 2048

Guard Period

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

Modulation

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

Subframes (link direction)

Uplink, Downlink

Downlink preamble Index

0 to 113

Uplink cell ID

0 to 31

ZONE SETUP

Type

PUSC

Length

1 to maximum symbol time set by frame and BW ratio

Offset

1 to maximum symbol time set by frame and BW ratio

PermBase

Downlink: 0 to 31

Uplink: 0 to 69

DATA BURST ANALYSIS

Burst type

Downlink, Uplink

Uplink PUSC: Normal data

Downlink PUSC: Normal data

Burst edit operations

Add, delete

Burst definition

Modulation: QPSK, 16QAM, 64QAM

Burst Type: Normal data

BURST POWER MEASUREMENTS

TRANSMIT POWER

The Peak and RMS power is measured for a single UL or DL subframe

Indication

dBm
power vs time trace data

Accuracy

S/N >40 dB in the temperature range 23°C ±5°C
3030 <0.6 dB, Typ 0.3 dB
3030A/3035 <0.45 dB, Typ 0.3 dB

OBW

Bandwidth containing 99% of total of the transmitted spectrum

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

10 MHz, 20 MHz, user defined

Measurement BW

100 kHz

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)
EVM (rms) for a single sub-carrier
EVM (rms) all data carriers
EVM (rms) all pilot carriers (CPE-common pilot error)

Indication

%

Traces

EVM (rms) vs. sub-carrier for all symbols
EVM (rms) vs. symbol for all sub-carriers
Constellation

Accuracy

<-40 dB residual EVM

FREQUENCY TOLERANCE

Lock Range (% of sub carrier spacing)

±20%

Indication

Hz

Accuracy

As per reference frequency

TX CENTRE FREQUENCY LEAKAGE / RF CARRIER SUPPRESSION

Indication

dB

SYMBOL / CHIP CLOCK TOLERANCE

Range

±50 ppm

Indication

ppm
clock error vs time

Accuracy

As per reference frequency

SPECTRAL FLATNESS

Indication

Pass/Fail
Upper Pass/Fail
Lower Pass/Fail

Trace

dBr values for each sub-carrier

ORDERING

This application is designed for use in conjunction with the 3030 series PXI RF Digitizer.

It may be purchased either with the RF digitizer at time of order or purchased as an upgrade.

When purchased with the 3030, order as: 3030 option 104

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

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.