

A suite of measurement functions to analyze a wide range of modulation schemes including FM, PSK and QAM.

This measurement suite enables testing of wireless technologies such as those found in FM radio, ZigBee® (802.15.4), TETRA, RFID, tire pressure monitoring systems (TPMSs), satellite communications, and commercial broadcast systems among others. In addition, this measurement suite also allows audio measurements on mono or stereo audio frequency signals that are demodulated from a FM signal.

- Transmit power (Peak and Average)
- Spectrum analysis
- EVM (Peak and RMS)
- CCDF
- IQ skew/Phase imbalance and gain imbalance
- Carrier leak (IQ origin offset)
- Phase and amplitude errors (Peak and RMS)
- Frequency error
- FM Frequency deviation
- Audio measurements
- Demodulated symbols and bits output
- User defined constellation to bit pattern mapping
- Ability to detect sync patterns (user defined or preset)
- Presets measurement settings for ZigBee®, UMTS (basic modulation accuracy), TETRA, VDL and APCO-25
- Modulation schemes supported:
 - FM
 - BPSK, QPSK, OQPSK, DQPSK, $\pi/4$ DQPSK, 8-PSK, D8PSK, $\pi/8$ D8PSK, 8-PSK EDGE
 - 16-QAM, 64-QAM

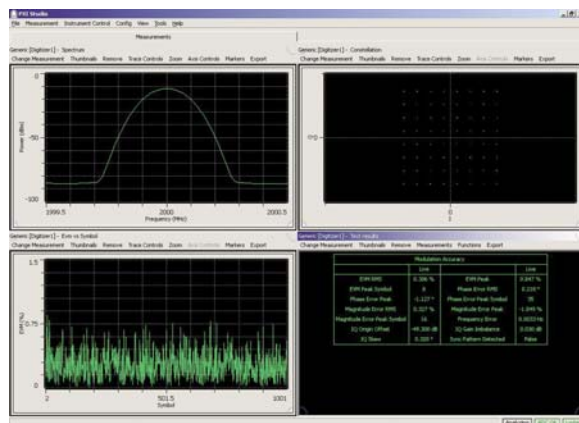


Figure 1. 64 QAM screen shot

GENERIC MEASUREMENT SUITE

Specifications apply when used in conjunction with a PXI3000 RF digitizer with option 1.11 enabled.

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

FREQUENCY MODULATION

Mode

Stereo / Mono

De-emphasis

None, 50 μ s, 75 μ s

Demodulated Audio Measurement Settings

Filter weighting: None, A or C (IEC 61672:2003)

No of harmonics: 0 to 147 (Typically 7)

Level units: Linear / logarithmic

Measurement bandwidth: 20 Hz to 20 MHz

Measurements

Frequency Deviation

Deviation (Pk-Pk), mono deviation (M), stereo deviation (S), Pilot deviation (P)

Deviation Range:

Stereo: 22.5 kHz to 75 kHz

Mono: 22.5 kHz to 200 kHz

Resolution: 0.1%

Accuracy: Typically $\pm 1\%$ of total deviation

Modulation Frequency and Level

Frequency Range: 20 Hz to 20 MHz

Accuracy: $\pm 0.1\%$ typical

Level (dB rms / V rms)

Accuracy: Typically ± 0.1 dB

Audio Distortion (SNR, SINAD, THD, THD+N)

SNR Range: Mono up to 80 dB, Stereo up to 70 dB

SINAD Range: Range: Mono up to 80 dB, Stereo up to 64 dB

Resolution 0.1 dB

Accuracy: Typically ± 0.5 dB

THD Accuracy: $< 0.1\%$ with deviation of 22.5 kHz and max harmonic $N=7$

THD+N Accuracy $< 0.2\%$ with deviation of 22.5 kHz and max harmonic $N=7$

Stereo Isolation (crosstalk)

100 Hz to 15 kHz

> 50 dB down

Accuracy: Typically ± 0.5 dB

DIGITAL MODULATION

PSK

BPSK, QPSK, OQPSK, DQPSK, $\pi/4$ DQPSK, 8-PSK, D8PSK, $\pi/8$ D8PSK, 8-PSK EDGE

QAM

16-QAM, 64-QAM

Measurements

Measurement and reference filter: None, Raised Cosine (RC), Root Raised Cosine (RRC), Half Sine, Rectangular

Symbol Rate Range: 10 ksym/s to 20 Msym/s (3030A/3035)

10 ksym/s to 50 Msym/s (3030C/3035C)

Origin offset: On/Off

Modulation Accuracy

EVM

Measured with 2000 RRC pulse shaped symbols with matching measurement/reference filters selected, symbol offset 10, AWGN channel, at reference power level, receiver tuned to transmit frequency.

Modulation Type	EVM Range	Accuracy
BPSK	Up to 50%	Max (0.5%, 10% of measured EVM)
OQPSK DQPSK $\pi/4$ DQPSK	Up to 30%	Max (0.5%, 10% of measured EVM)
8-PSK D8PSK, $\pi/8$ D8PSK, 8-PSK EDGE	Up to 10%	Max (0.5%, 10% of measured EVM)
16-QAM	Up to 10%	Max (0.5%, 10% of measured EVM)
64-QAM	Up to 5%	0.5%

Indication:

EVM RMS

EVM Peak and symbol number

Phase Error RMS/Peak (degrees)

Phase Error Peak and symbol number

Magnitude Error RMS/Peak (%)

Magnitude Error Peak and symbol number

Frequency Error

Measurement range:

Up to ± 100 kHz for symbol rates < 1 Msym/s

Up to ± 1 MHz for symbol rates > 1 Msym/s

Accuracy:

$< \pm 1$ Hz for frequency error < 100 kHz

$< \pm 10$ Hz for frequency error > 100 kHz

IQ Origin Offset

Measurement range: Up to -14 dB (25 %)

Residual Error: -40 dB (1 %)

IQ Gain Imbalance

Resolution: 0.1 dB

IQ Skew

Resolution: 0.2 degrees

Pattern Synchronization

When it is enabled, the system will search the pattern from the captured IQ data.

Pattern Type

User Defined, TETRA TSC0, TETRA TSC1

Symbol Offset

0 to 1000

Trace Displays

Constellation

Burst Power vs. Time ⁽¹⁾

EVM vs. symbol

Phase Error vs. symbol

Magnitude Error vs. symbol

CCDF

GENERAL MEASUREMENTS

Analysis Mode

All IQ, Burst IQ

Spectrum FFT Overlap

0 to 99%

Spectrum Gating

Enable/Disable

Window Type

Gaussian Noise, Gaussian 3 dB, Blackman Harris

Channel Filter Type

None, Raised Cosine (RC), Root Raised Cosine (RRC)

Channel Filter Alpha (bandwidth coefficient)

0 to 1, resolution 0.1

Display Traces

Captured Power vs. Time

Spectrum

Adjacent channel power

Occupied Bandwidth

Spectrum Mask

Measurements

Average Power (dBm)

Accuracy: Refer to 3030 Series specification

Adjacent Channel Power

Number of channels: user defined up to 99

Total measurement span: up to 200 MHz

ACP filter: None, Raised Cosine (RC), Root Raised Cosine (RRC)

ACP filter alpha: 0.0 to 1.0

Indication: Reference channel power (dBm), adjacent channel power (dBc)

Accuracy: Typically 0.1 dB / 10 dB excluding the effects of noise

Occupied Bandwidth

Range setting: 1% to 99.9%

Upper/lower frequency (Hz)

Spectrum Mask

Status (Pass/Fail)

Proximity to mask level (dB)

Proximity to mask frequency (Hz)

Reference Level (dBm)

Accuracy

Typically 0.1 dB / 10 dB excluding the effects of noise

Burst Power Location⁽¹⁾

Burst Position (ms) relative to start of capture

Burst Length (ms)

CW Frequency

CW frequency Offset (Hz)

Demodulated Bits

The result is presented in a table with the left column containing indexes for sequences of 16 bits presented in the right column.

Demodulated Symbols

The result is presented in a table with the symbol and value as column headers. The symbol column contains the symbol number and the value column contains the binary representation of the symbol value.

⁽¹⁾ when analysis mode set to Burst IQ

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.

Generic Measurement

When purchased with a 303x order as: 3030 option 111

When purchased as an upgrade, then order as: RTROPT111/3030

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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.