The most important thing we build is trust

3250 Series Spectrum Analyzer
• Introduction
• 3250 Overview including:
  – Key specifications
  – Key features
• Applications
• Target Markets and Customers
• Automated measurements
• EMC pre-compliance option
3250 Series

• 3 instruments in 1!
  – A high performance, portable spectrum analyzer offering a large selection of standard features
  – Built-in vector signal analysis
  – EMI pre-compliance option
• ...all in a competitively priced package
Model Range

**Hardware options:**
- opt 2: high stability reference oscillator
- opt 5: A,B band preselector (for use with opt 13)

**EMI option:**
- opt 13: EMI (pre-compliance) measurement suite

**Wireless measurement options:**
- opt 8: GSM/EDGE measurement suite (uplink)
- opt 9: UMTS measurement suite (uplink)
- opt 10: CDMA 2000 measurement suite (uplink)
- opt 11: WLAN a,b,g measurement suite
- opt 12: WiMAX measurement suite

**Tracking generator options:**

- Identified by suffix after the model number:
  - 325x/1: 9 kHz to 3 GHz
  - 325x/2: 100 kHz to 8 GHz (not 3251)
  - 325x/0: no tracking generator

- 1 Hz frequency resolution

- Variable output level
  - -30 dBm to 0 dBm (3 GHz)
  - -20 dBm to 0 dBm (8 GHz)
Key Specifications

- Phase noise: $-118 \text{ dBc/Hz (10 kHz offset at 1 GHz)}$
- DANL: $-145 \text{ dBm/Hz (at 1 GHz), typ -163 dBm/Hz with preamp enabled}$
- TOI: $+15 \text{ dBm}$
- 14 bit IQ digitizer with 30 MHz bandwidth supports PSK/QAM vector signal analysis
  - Max symbol rate 13 MHz
- Resolution bandwidth filters from 1 Hz to 5 MHz
- 2 GHz processor running Windows XP
- Power consumption: <140 W
- Compact size: 380W x 200H x 400D (mm)
- Light weight: 11 to 14 kg
Other Key Features

- Comprehensive automatic measurements e.g.
  - Total Harmonic Distortion
  - Channel Power / Multi-Channel Power
  - Occupied Bandwidth
  - TOI
  - Spectral Emissions
  - X dB Down
- Phase noise and EMC measurements capability
- LAN / GPIB remote control – LabView / IVI drivers – Webserver – LXI compatible
- Standard removable hard disk drive
- 7” touch-panel display
3250 Front Panel Layout

Front of 3250 Series
3250 Connectivity and Rear Panel

Back of 3250 Series
Phase Noise Measurement - Standard

- Allows 3250 to be configured as a phase noise analyzer (within the performance of the spectrum analyzer’s phase noise specification)
Digital Analysis - Standard

- **Digital modulation analysis**
  - BPSK, QPSK, 8PSK, 16PSK, 32PSK, 64PSK (offset and shifted)
  - 4QAM, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM

- **Spectrogram (freq vs. time)**
  - Power vs. time
  - FFT spectral analysis (non-swept mode)
• Allows 3250 to be used for pre-compliance testing
• Additional PC control software available for saving of settings and results
A pre-selector is a narrow-band filter which removes large unwanted external signals at higher frequencies which could otherwise overload the input and affect the dynamic range of the measurements being performed.

- Complements the EMI pre-compliance measurement option.
- Provides many benefits, especially when performing open-site measurements.
- Especially critical when the pre-amp is enabled.
  - Towards DC, it removes spurious generated by, for example, pulse edges, allowing EMI measurements to be performed at low frequencies.

Seven pre-selection filters in the CISPR A and B bands between 9 kHz and 30 MHz are included as follows:

- 9 kHz to 150 kHz, fixed LPF
- 150 kHz to 600 kHz, fixed BPF
- 600 kHz to 1.2 MHz, fixed BPF
- 1.2 MHz to 2.5 MHz, fixed BPF
- 2.5 MHz to 5 MHz, fixed BPF
- 5 MHz to 10 MHz, fixed BPF
- 10 MHz to 30 MHz, fixed BPF

A band
B band
Automated Measurements

- Automated measurements suites:
  - Phase noise
  - CCDF
  - Channel power
  - Multi channel power
  - Occupied bandwidth
  - Adjacent channel power
  - X-dB down
  - Frequency counter
  - Total harmonic distortion
  - Third order intercept
  - Spurious emissions
  - Spurious emissions mask
  - AM/FM demodulation
Automated Measurements

- **XdB down**
  - Allows automatic measurement of signal bandwidth from specific dB down points
  - Automatic calculation of -3dB and -6dB signal bandwidth

- **Adjacent channel power**
  - Allows user to enter channel frequency plan including allocated and adjacent channels
  - Multiple adjacent channels can be added
Automated Measurements

- **Channel power**
  - Measures the total power and power spectral density for a given user bandwidth

- **Occupied bandwidth**
  - Measures the % power in a specific bandwidth
  - User can select % power and analyzer calculates the corresponding BW
Automated Measurements

- **Third order intercept**
  - Calculates the value of the TOI products created when 2 tones are presented to the DUT

- **Total power**
  - Calculates the total power and power spectral density for a given bandwidth setting
Automated Measurements

- **Total Harmonic Distortion**
  - Calculates the values of harmonics (up to 5th harmonic) then calculates THD

- **Spectrum emission mask**
  - The spectrum analyzer has pre-loaded ETSI standard spectral masks for WLAN 802.11 and WCDMA 3GPP waveforms
Automated Measurements

- Spurious emissions
  - Allows the user to construct their own spectrum emissions mask and out of band spurious mask and save to the unit.
Wireless Options

Wireless LAN Option 11

• Measurements against 802.11a,b,g standard
  – Spectral Flatness
  – Occupied Bandwidth
  – Constellation
  – EVM, including carrier leakage, frequency error and clock error
  – CCDF
Wireless Options
GSM/EDGE Option 8

- Measurements of:
  - Power vs time
  - GSM phase error inc. freq. error
  - EDGE EVM inc. freq. error
  - Spectrum analysis
  - CCDF
Wireless Options
UMTS Option 9

- Measurements of:
  - Spectral mask
  - EVM
  - Occupied B/W
  - Code domain pwr
  - ACLR
  - Channel identity
3250 EMC Pre-compliance Applications

- EMI Receiver option to make Conducted and Radiated Emissions Measurements
- EMI diagnostic tool
EMI conducted measurements

- Conducted measurement pre-compliance system

- 325x Spectrum Analyser with:
  - EMI receiver option 13
  - Pre-selector option 05

- LISN (Line impedance stabilization network): e.g. ETS-Lindgren 3810
  - Isolate power mains from DUT
  - Provide 50 ohm RF connection

- Pulse/transients Limiter: to protect the RF input against signal levels that are too high
EMI radiated measurements

• Radiated measurement pre-compliance system

  • 325x Spectrum Analyser with:
    – EMI receiver option 13
    – Pre-selector option 05

    – Biconical Antenna: e.g.
      ETS-Lindgren 3110 or Agilent 11966C

    – Log periodic antenna: e.g.
      ETS-Lindgren 3148 or Agilent 11966D

    – Double ridge horn antenna: e.g.
      ETS-Lindgren 3115 or Agilent 11966E

    – Waveguide horn antenna: e.g.
      ETS-Lindgren 3110 or Agilent 11966I
EMI investigation and diagnostics

• During EMI pre-compliance tests, some investigation may be required to find and solve emission problems. In such an application the 325x should be used in Spectrum Mode.

  • 325x Spectrum Analyser with:
    – EMI receiver option 13
    – Pre-selector option 05

  • Near Field Probe Kit:
    – Aeroflex AC0100
    – The set consists of three loop probes, one stub and one ball probe, an extension handle, an optional battery powered preamplifier
EMI software options

ETS-2008

- ETS2008 is an EMC Total Solution for PC in order to measure electromagnetic noise of commercial products
- ETS2008 controls the 3250 Series via serial, GPIB or LAN and provides various function using data that is acquired from the Receiver as well as special functions - management data, reporting, save image, etc.
SoftplotCreator – Remote Measurement Suite

Remote measurement management, presentation and analysis

- Network Analyzer
- Spectrum Analyzer
- Modulation Analyzer
- GPS Device

Test automation scripts:
- Simplify equipment configuration
- Replay test sequences
- Interactive graphing of measurements

Export to:
- Documentation and Presentations
- Circuit and System Simulation
- Spreadsheets and Maths software

Automation links to external Software
SoftplotCreator – Remote Measurement Suite

• Remote measurement management, presentation and analysis capabilities

• A powerful scripting editor allows automation of instrument measurements and GPS logging
  – Scripts can be written by customers or by AEs in support of a sale
  – significantly enhance the value of an instrument in solving complex or unusual measurement problems
    • Automate repetitive test sequences
  – A script can contain commands to control SoftPlot Creator, mixed with SCPI commands for any instrument
  – Create measurements controlling multiple instruments
  – The script can contain branching and looping, function calls, math operations and variables

• Connect by LAN, GPIB, Serial

• Presentation quality graphics
SoftplotCreator – Remote Measurement Suite

• Markers, Masks, Notes
  – Up to 20 markers can be activated on any trace
  – Delta marker function
    • enabling identification of harmonics, adjacent channels and intermod products
  – Measurement notes, marker notes and trace notes can be applied to each marker of the trace.

• Limit Testing
  – Create limit line entry tables of up to 50 segments
  – Limit lines can be applied to previously stored traces.
  – Predefined templates with limit lines for CISPR, FCC, VCCI and VDE conducted and radiated emissions
  – Repeatedly take measurements and store only traces that fail limit tests
  – Branch in scripts according to limit line test
SoftplotCreator – Remote Measurement Suite

• GPS Capabilities
  – Logs time and location from NMEA GPS receiver with each stored trace
  – Capture location and signal strength together to:
    • Perform network coverage analysis and identify low signal level locations
    • Identify unwanted emitters with time and location

• Local and Remote Connectivity and Control
  – Coordinates and automates measurements from single or multiple instruments in remote locations
  – Free one month licence after which can be purchased
  – Find out more at:  http://www.aphena.com/
3250 Applications

• Transmitter measurements
  – Harmonics; sub-harmonics; spurious; frequency response; adjacent channel power; bandwidth; EVM; frequency error; phase error

• Parametric test of RF components and sub-assemblies; amplifiers; mixers; filters
  – frequency response; intermodulation performance; compression; scalar analysis (using TG)

• Oscillator quality
  – phase noise; stability; spurious

• Interference

• EMC pre-compliance

• Off-air spectrum monitoring
  – Network coverage analysis (with external software)
A Solution for all Markets

- Aerospace and defence, military contractors
- RF, wireless and broadcast communications
- Scientific research
- Colleges, universities
- Medical research
- Utilities: electricity, gas, fire, water
- Homeland Security, police, intelligence agencies
- EMC

- General purpose – “Performance far beyond the price tag!”
A high performance, portable spectrum analyzer offering a large selection of standard features in a competitively priced package