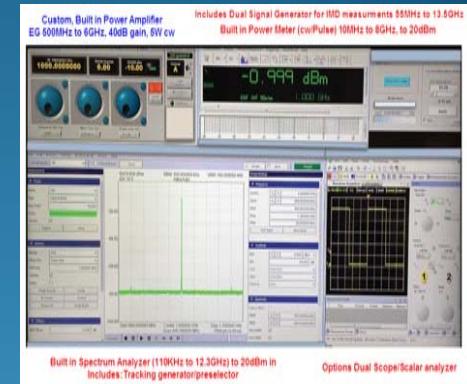
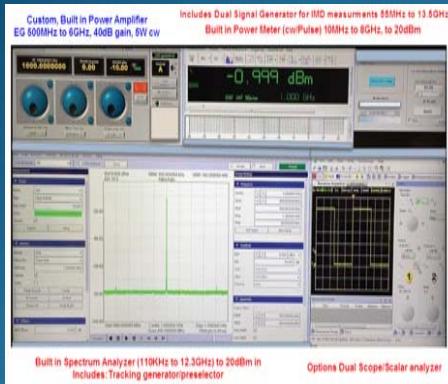


A new kind of Test equipment



RADITEK inc



RADITEK-RFTS-M1-L21

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The RADITEK new generation of test equipment...

- A fully integrated, custom test set includes combinations of:
- 2 Oscillators
- Spectrum analyzer with Preselector
- Two scopes
- Power amplifier
- Power meter (Pulsed and cw)
- The idea is to combine any and all of the above modules to realize the best possible test set for testing Cell phones, for example....

First generation product options includes:

- **RADITEK's new line of RF Test Systems, includes (other options can be quoted / provided on request):**
- **SPECTRUM ANALYZER: 100 KHz-12.3 GHz**
- **TRACKING GENERATOR / PRESELECTOR: 100 KHz-12.3 GHz for spur free spectrum display**
- **POWER METER: 10MHz to 8 GHz, measures Average and peak/pulse power**
- **DUAL SIGNAL GENERATOR: 55 MHz-13.5 GHz (suitable for IMD linearity testing etc.)**
- **USB based test set modules, can be integrated with other custom setups**
- **Use with any display with HDMI interface!**
- **Optional POWER AMPLIFIER: such as: 500 MHz-6 GHz / 5 watts**

Testing examples:

- Frequency response/selectivity with Spectrum analyzer/preselector
- Phase noise (SSB) with Spectrum analyzer
- Linearity (2 tone test)
- EMC (electro-magnetic compatibility)-integral, custom power amplifier test with spectrum analyzer.
- Spur test with spectrum analyzer/preselector
- Modulation/demodulation test (with built in modulator/demodulator)
- Input return loss (via optional Scalar network analyzer with reflection bridge)
- Output power measurement test (Peak and cw)
- System gain, attenuation measurement (with power detector)
- Other to be defined test

Linearity: IMD (Intermodulation distortion) with 2 tones

The DUT generates many tones due to intermodulation (one tone mixing with the other tone) as shown in **Figure 1**. The intermodulation tones of most concern are the third-order tones at $2\omega_1 - \omega_2$ and $2\omega_2 - \omega_1$ as shown in **Figure 2**.

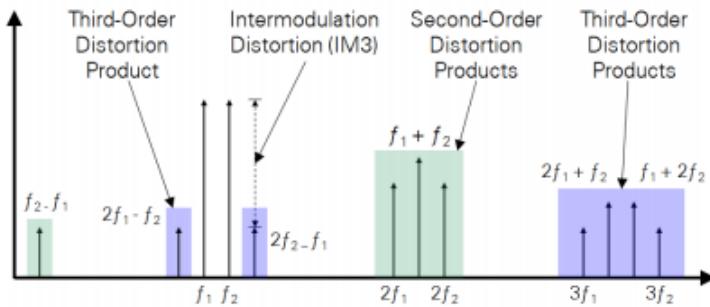


Figure 1: Intermodulation Tones Caused by Non-linear DUT

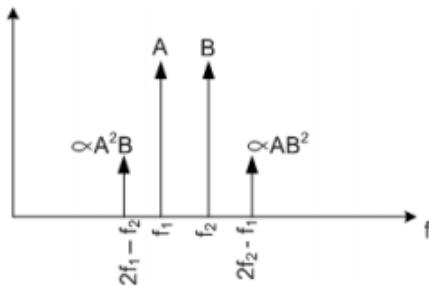
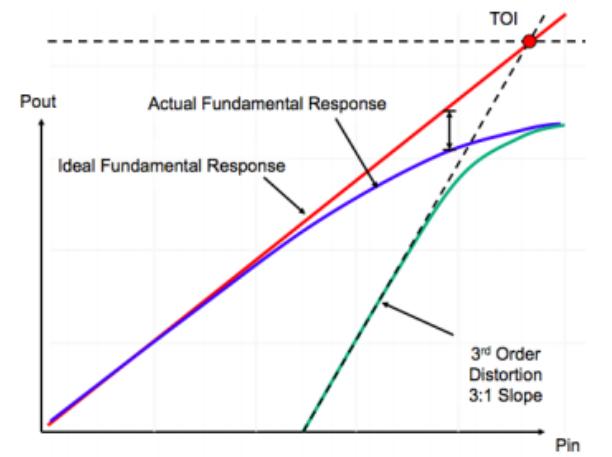


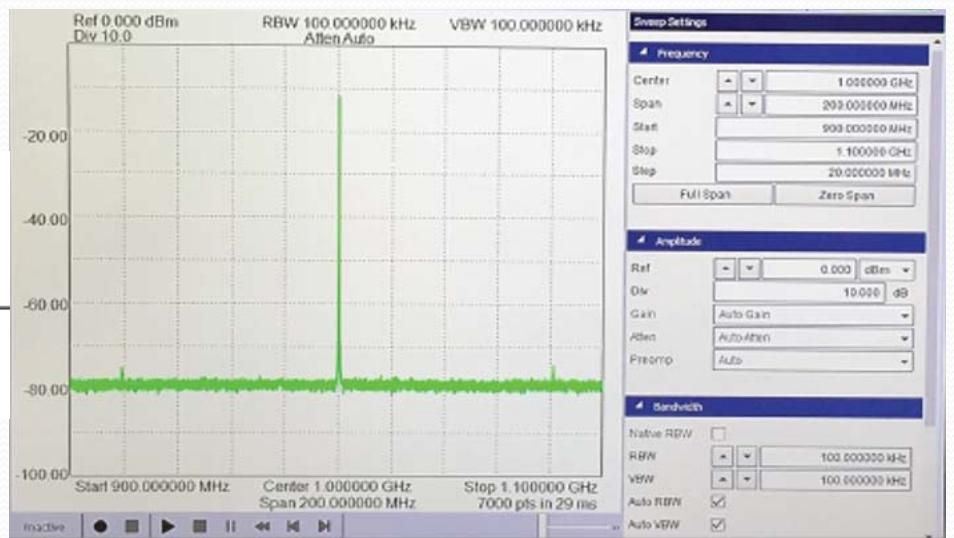
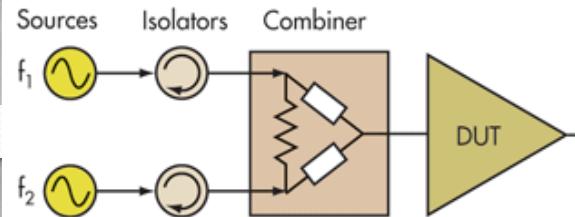
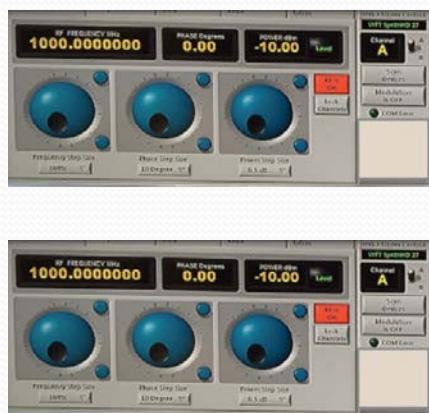
Figure 2: Two-Tone Third-Order Intermodulation Distortion

Intermodulation distortion relates to the linearity of a device, when presented with two (or more) tones.
For example: a power amplifier, (PA) should have low noise figure and remain linear
- so it does not distort the incoming signals. TOI=Third Order Intercept



- IMD ratio greatly depends on the power level of the fundamental input tones. As a result, a related measurement known as third-order intercept (TOI) is used to specify device characteristics.
- The fundamental principle of TOI is that for every 1-dB increase in the power of the input tones, the third-order products will increase by 3 dB.
- As you increase the power level of a two-tone input signals, the IMD ratio will decrease as a function of input power.
- At some high input power level, the third-order distortion products would theoretically be equal in power to the fundamental tones. This theoretical power level at which first-order and third-order products are equal in power is called the Third-Order Intercept point..
- TOI, called IP_3 (intercept point of the third order), is a useful specification that relates the IMD to the power level at which it was measured.
- TOI is always calculated as a function of IMD:
- $TOI = (IMD/2) + \text{power}$

The RRFTS has 2 oscillators and Spectrum analyzer built in.



The signals from the Device under test (DUT) needs to be attenuated, as necessary, before going to the Spectrum Analyzer. The combiner can be a Quadrature Hybrid used as a combiner, for example.

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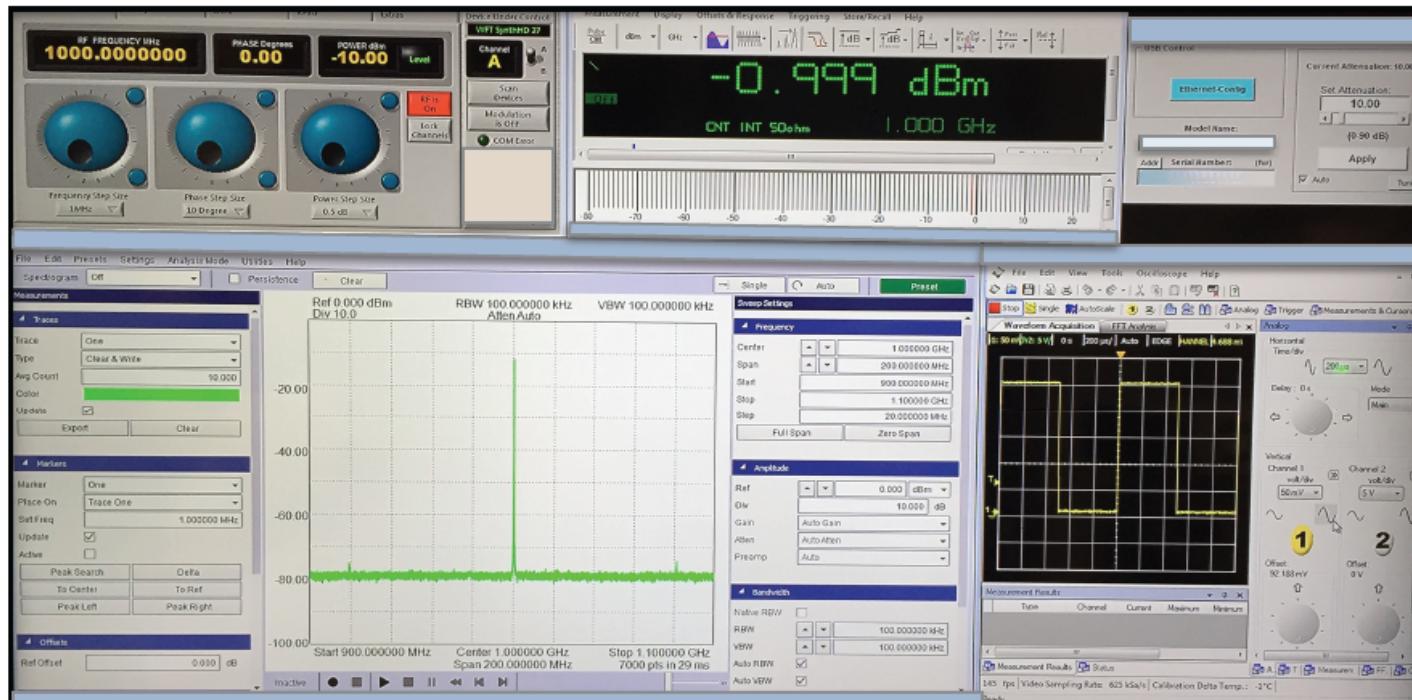
Customized GUI displayed on any display with HDMI port.

Front panel 4RU x 15" deep:

Custom, Built in Power Amplifier
EG 500MHz to 6GHz, 40dB gain, 5W cw

Includes Dual Signal Generator for IMD measurements 55MHz to 13.5GHz

Built in Power Meter (cw/Pulse) 10MHz to 8GHz, to 20dBm



Built in Spectrum Analyzer (110KHz to 12.3GHz) to 20dBm in
Includes: Tracking generator/preselector

Options Dual Scope/Scalar analyzer

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In detail:

- The RADITEK RFTS-family of customizable test equipment allows a user to specify their exact test equipment selection incorporated in one compact unit.
- In addition, a custom amplifier can be included, to cover the exact bandwidth and power level they actually need.
- For example, we can provide a cell phone test set, that can include custom modulators and demodulators, if needed. The Spurious, EMC, phase noise, power level and linearity and frequency selection can all be tested with the SAME test system.
- The RFTS-M1 test set's operation can be automated and is fully compatible with Windows XP and 7 etc.
- It uses USB 2, running at 480Mbps, and includes a 72MHz ARM processor.

And:

- The RFTS-M1 can run Open source LabView GUI software, via USB.
- It can run hardware functions with or without an external PC.
- Operates with a universal 110-250V AC, 50-60Hz power source
- It shows absolute power on the display GUI.
- Any HDMI display can be used to display the GUI, and function selection via wireless mouse and/or wireless keyboard
- Application Programming to Customer's Specifications

Spectrum Analyzer / Scalar Network Analyzer options

This RFTS test system includes an advanced, high dynamic range, Spectrum Analyzer with preselector, operating to 12.3GHz. It is suitable for performing intermodulation (2 tone) testing, in addition to other spurious and spectral analysis. Additionally, it includes adjustable audio filters and demodulators for accurate AM,FM, SSB and CW measurements. Alternatively the Spectrum Analyzer function can be replaced by a Scalar Network Analyzer function. If the customer needs both Spectrum and Scalar analyzer in one unit, we can optionally supply that too!

Performance:

RF Frequency Range	100 kHz to 12.3 GHz
Resolution bandwidths (RBW)	0.1 Hz to 250 KHz and 6 MHz
Relative accuracy	0.25 dB
High Dynamic Range	-151 dBm to +10 dBm 0 dBm to -125 dBm, 100 kHz to 1 GHz 0 dBm to -115 dBm, 1 GHz to 4 GHz

6 MHz RBW available as an analog IF output centered at 63 MHz

Corresponds to U.S. analog / digital TV Channel 3

Demodulates AM/FM/SSB/CW audio in real-time

Adjustable digital audio filters	Accurate AM and FM measurements
I/Q Data	To 240 KHz bandwidth
Frequency Sweeps	To 140 MHz per second

12.3GHz Tracking Generator / Preselector performance:

Works with the Spectrum Amplifier to measure filters, attenuators, amplifiers and other 2 port devices.

RF Frequency Range	100 kHz to 12.3 GHz
Amplitude range	-30 dBm to -12 dBm
Up to 19 selectable frequency step sizes in a 1-2-5 sequence	
Below 4 GHz	10 Hz to 10 MHz steps
Above 4 GHz	100 Hz to 10 MHz steps
Sweep rate	up to 700 frequency points per second

Power Meter Detector/Sensor

The sensor has exceptionally fast measurement speed, broad dynamic range and a feature rich Power Meter Applications capability.

In addition to average power, the sensor can show: statistical peak & pulse power, duty cycle and crest factor. The fast statistical measurements are valuable for manufacturing operations where numerical verification is desired.

The sensor can be used for radar, R&D and manufacturing as well as servicing.

Recommended for average, peak and pulse power measurements within the sensor's 10 MHz video bandwidth.

Highlights:

- 10 MHz to 8 GHz with service to 10 GHz
- Ideal for fast CW and pulse RF measurements
- Statistical pulse measurements
- Patented No Zero No Cal before use
- A variety of options such as triggering & analog outputs
- Excellent dynamic range
- ATE Support
- Connector type can be customized too.
- Logger application is included
- Optional external triggering capability

RF Dual Channel Signal Generator: 54MHz-13.6GHz

The dual channel, signal generator can be used for Quadrature (or other phase) local oscillator functions.

Signal generator features include:

- Two channel: Full frequency, phase and amplitude control
- Up to +22dBm output power
- 0.1Hz or less frequency resolution
- 2.5ppm generator frequency accuracy
- External Sweep and Step Trigger
- Over 50dB of power control
- 100 point Frequency and Amplitude Hop Table
- Dual Channel Frequency and Amplitude Lock
- 24 bit phase control on each channel
- 4ms RF lock time standard
- 50us RF lock time (option subject to export restrictions)
- 16 bit, 0.01dB amplitude resolution
- 10MHz – 100MHz external reference input
- Selectable 10 or 27 MHz internal reference output
- FM, AM, Pulse and Phase Modulations
- Pulsed FMCW Chirp
- High Speed External Analog FM Hack
- Calibration option