Vector signal analyzer with powerful spectrum analyzer capabilities; ideal test companion to the Model 2910

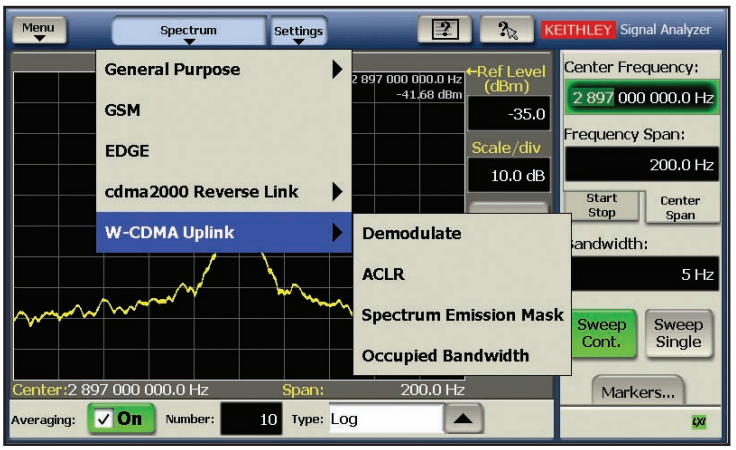
RF/MICROWAVE

2810

RF Vector Signal Analyzer with Spectrum Analyzer Capabilities

- Built-in spectrum analyzer mode
- Continuous frequency range of 400MHz–2.5GHz spans key mobile wireless frequency bands
- Intuitive, easy-to-use graphical user interface
- >30MHz modulation measurement bandwidth for capturing signals based on the latest high bandwidth wireless standards
- Signal analysis options for all worldwide mobile phone standards: GSM/GPRS/EDGE, cdma2000 1xRTT, and WCDMA
- High speed DSP delivers low noise floor for measuring signals thousands of times faster than competitive solutions
- Fast sweep times: A fifteen-second sweep can display 200MHz of a signal's spectrum with a 100Hz resolution bandwidth
- Built-in, fixed-output variable frequency generator
- Remotely controllable via Ethernet, USB, and GPIB interfaces
- LXI Class C compliant
- Readily updatable software-defined radio architecture
- 3-year standard warranty

The Model 2810 RF Vector Signal Analyzer combines complex signal analysis and spectrum analysis capabilities with high performance and unprecedented ease of use. It's designed to address a wide range of measurement needs for wireless devices, wireless transceiver modules, and RF components. In production testing applications, the Model 2810's fast frequency tuning, rapid attenuator switching, and high speed digital signal processing reduce test time significantly, which helps to minimize overall testing costs. High speed digital architecture and the use of Fast Fourier Transform (FFT) technology allow the Model 2810 to measure signals near the noise floor thousands of times faster than competitive solutions, such as swept spectrum analyzers. That means manufacturers can test prototype circuits more thoroughly than previously possible, speeding time to market and identifying costly design flaws sooner. Research and development engineers will appreciate how the Model 2810's fast sweep times with narrow resolution bandwidths over wide frequency spans allow them to obtain



Easily navigable menus provide quick access to all measurements and set-up parameters. The Model 2810's menus can be controlled from the front panel using either the touch screen or the USB mouse.

APPLICATIONS

- Mobile handset production test
- Handset R&D and design verification
- Testing mobile communications infrastructure
- RFIC testing
- Wireless connectivity testing (802.11b/g WLAN, Bluetooth)
- Research and education in mobile communications

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RF Vector Signal Analyzer with Spectrum Analyzer Capabilities

Ordering Information

2810-FRK RF Connector on Front, Configured for Rack Installation*

2810-RRK RF Connector on Rear, Configured for Rack Installation*

2810-F RF Connector on Front, Configured for Bench-top Use**

2810-R RF Connector on Rear, Configured for Bench-top Use**

*** Versions configured for rack installation include rack mount kit and exclude bumpers and handle.**

**** Versions configured for bench-top use include bumpers and handle and exclude rack mount kit.**

Options

2810-GSM
GSM/GPRS/EDGE Signal Analysis Personality

2810-cdma2000
cdma2000 Signal Reverse Link Analysis Personality

2810-WCDMA
WCDMA Uplink Signal Analysis Personality

Accessories Supplied

AC power cable

Printed Quick Start Guide

CD-ROM containing 2810 system help, utility programs, and PDF files (also available on-line at www.keithley.com).

On-board help system

ACCESSORIES AVAILABLE

2910-RMK	Rack Mount Kit
2910-BENCH-KIT	Bench-Top Kit: Bumpers and Handle
2910-ADAPTER-KIT	Cable and Adapter Accessory Kit

CABLES/ADAPTERS

7007-1	Shielded IEEE-488 Cable, 1m (3.3 ft)
7007-2	Shielded IEEE-488 Cable, 2m (6.6 ft)

OTHER

KPCI-488LP	IEEE-488 Interface/Controller for the PCI Bus
KPXI-488	IEEE-488 Interface Board for the PXI Bus
KUSB-488A	IEEE-488 USB-to-GPIB Interface Adapter

the maximum information from a spectrum for characterization and analysis. A highly intuitive graphical user interface and simple operation allow even occasional users to make measurements with the Model 2810 with confidence.

The Model 2810's 400MHz—2.5GHz frequency range covers the mobile wireless frequency bands where extensive product innovation is continually occurring. Optional signal analysis formats support power calibration and modulation quality analysis for the major worldwide mobile phone standards. The Model 2810 can test and analyze signals from GSM, GPRS, EDGE, cdma2000, and WCDMA mobile phones.

With greater than 30MHz of signal acquisition bandwidth, the Model 2810 can acquire any of the current wireless signals in one sweep, as well as signals from the wireless standards now being developed. Its large built-in memory is capable of storing up to 50 mega-samples of down-converted I and Q pairs for either internal or customized external modulation analysis.

The instrument's flexible, software-defined radio architecture and ongoing firmware updates make it easy and economical to incorporate new modulation analysis schemes and new measurement algorithms into the Model 2810 as needed.

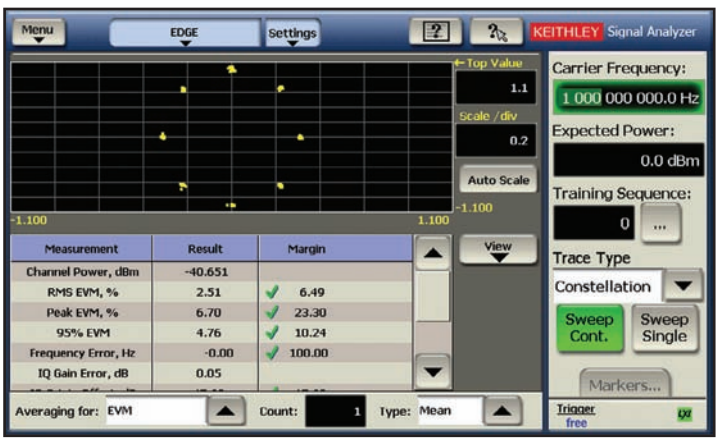
Multiple Personalities

Three user-installable analysis options are available for testing mobile phone handsets based on a variety of technologies. These analysis "personalities" are provided as firmware modules that can quickly and cost-effectively tailor and/or update the Model 2810's operation.

The *Model 2810-GSM* GSM/GPRS/EDGE Signal Analysis Personality measures all the key modulation quality parameters needed to assess the performance of a GSM/GPRS/EDGE transmitter: channel power, frequency error, phase error, time mask conformance, the Output RF Spectrum due to Modulation, and the Output RF Spectrum due to Switching. For testing EDGE transmitters, the Model 2810-GSM option also measures Error Vector Magnitude (EVM) and related parameters.

The *Model 2810-cdma2000* cdma2000 Reverse Link Signal Analysis Personality analyzes 1.23MHz spread spectrum CDMA reverse link signals with measurements of channel power, frequency error, rho (ρ), adjacent channel power, code domain power, occupied bandwidth, and spurious emissions conformance.

The *Model 2810-WCDMA* WCDMA Uplink Signal Analysis Personality tests WCDMA transmitters with measurements similar to the cdma2000 modulation quality measurements. Rather than ρ and code domain power, the Model 2810-WCDMA option measures EVM and peak code domain error on a 3.84MHz WCDMA transmitter signal.



The *Model 2810-GSM* GSM/GPRS/EDGE Signal Analysis Option demodulates GSM and EDGE transmitter signals and provides both displays and computations of a number of modulation quality parameters. This constellation diagram of an 8PSK EDGE transmission also includes measurements of EVM, frequency error, and I-Q gain error.

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RF Vector Signal Analyzer with Spectrum Analyzer Capabilities

To minimize test time and maximize throughput in production testing, the analysis options compute multiple measurements with only a single acquisition of data. Furthermore, these signal analysis options are portable, so the license for any option can be transferred from one Model 2810 to another. This licensing flexibility helps reduce capital costs because it's no longer necessary for manufacturers to order all their instruments "fully loaded" with options in order to be prepared for every testing possibility. Options can be transferred from Model 2810s on one production line to instruments on another production line, so manufacturers can quickly respond to changes in capacity requirements and device type. Options can be transferred between instruments over a LAN network in minutes, so it's easy to modify the test capabilities of production lines quickly.

Optimized for High Speed Testing

For making high speed measurements, the Model 2810 has a powerful digital processing engine, which substantially reduces test times and the cost of test. Conventional spectrum analyzers aren't able to match its ability to acquire wide segments of a signal's spectrum with high resolution. For example, while a Model 2810 can sweep a frequency band that's 200MHz wide using a 100Hz resolution bandwidth in just fifteen seconds, conventional sweeping spectrum analyzers can take a thousand times longer to perform the same task. Solid-state variable attenuators allow the Model 2810 to change reference levels quickly. It can also tune to any frequency in less than 3ms. These speeds make it possible to perform a set of GSM or EDGE measurements in approximately 27 milliseconds.

High Speed RF Component Testing

When used in combination with the Model 2910 RF Vector Signal Generator, the Model 2810 can reduce both test times and capital equipment costs for testing active and passive RF components. Unlike time-consuming instruments that require issuing a separate command for each instruction, both the Models 2810 and 2910 are supported by powerful bus commands that allow generating multiple signals at different frequencies and taking multiple measurements at different frequencies. The Model 2810 can decompose a modulated signal into the I and Q samples that created the signal, while the Model 2910 can generate modulated waveforms. This economical, two-instrument configuration can analyze the magnitude of modulation distortion created by a component, making it possible to estimate or model the performance of the component in a modulating circuit.

A TTL signal output provided by the Model 2910 indicates when the generator's output has settled, eliminating the need to program time-consuming delay states into the Model 2810 to ensure the source signal has settled sufficiently before analysis begins. Both instruments have TTL trigger inputs and synchronization outputs to communicate with each other directly and control the test protocol. This direct communication bypasses the much slower control process of using individual PC commands to control every aspect of the test.

Compact System for Transceiver Testing

Combine the Model 2810 and the Model 2910 Vector Signal Generator with an RF-coupled, single-connection interface to a transceiver to perform high speed transmitter and receiver calibration and testing. With fast frequency tuning and fast amplitude switching times, the transmitter and receiver circuits can be quickly calibrated over multiple operating bands—the response of the device under test becomes the limiting factor in test time reduction. For testing mobile phone handsets with multiple operating modes, such as GSM and WCDMA, the Models 2810 and 2910 switch quickly between the different mobile phone operating standards to eliminate delays due to instrument state changes. A test system configured with the Models 2810, 2910, and a 1U-high RF single-connection interface minimizes both equipment costs and rack space, requiring just 4U of rack height.

Easy to Configure, Easy to Use

A variety of features simplify configuring and operating Model 2810-based RF test systems:

- **Intuitive GUI.** The Model 2810's simple, touch-screen graphical user interface (GUI) makes it ideal for use by both experienced RF test engineers and novices, including students.
- **Compact size.** At just 3U (5.25 inches) high and half the width of a 19-inch rack, the Model 2810 fits equally well in a test rack or on a benchtop. Its compact enclosure makes it easy to pair with other half-rack RF instruments, such as the Model 2910, for maximum testing capability in minimal space.
- **Choice of remote programming interfaces.** The Model 2810's built-in 100Base-T Ethernet and USB interfaces allow direct, high speed programming and command transfer to the system controller. A GPIB interface makes it adaptable for use in legacy environments.
- **Built-in generator.** A variable frequency, RF source output is built into the Model 2810 for use as a system self-test signal, as a test stimulus signal, or as a local oscillator drive for an external mixer.
- **Flexible software tools.** The collection of software tools included was selected to help speed and simplify development of remote control software applications. Programmers have the flexibility to develop applications directly in SCPI, employ IVI-COM drivers, or use a LabVIEW™ driver.
- **LXI Class C Compliance.** The Model 2810 supports the physical, programmatic, LAN, and Web portions of the emerging LAN eXtensions for Instrumentation (LXI) standard. The instrument can be monitored and controlled from any location on the LAN network via its LXI web page.
- **Graphical Help system.** The Model 2810's Help system provides comprehensive and easy-to-use documentation that's accessible via the GUI and also remotely, so users can refer to it while working directly with the instrument or while working at their desks on their PCs.

Keithley's Growing RF Line

The Model 2810 is the latest addition to our expanding RF/wireless test offering, which provides a complete line of RF sourcing, measurement, and signal routing capabilities. In addition, Keithley serves many phases within the wireless industry, starting with our automated DC/RF parametric test systems for wafer-level testing. Component manufacturers often choose Series 2400 and 2600 SourceMeter® instruments for high speed DC testing of packaged parts like RFICs. Keithley's high speed power supplies and battery/charger simulators are widely used in board-level, wireless handset testing, and our THD Multimeters and Audio Analyzing DMMs are popular choices for audio test systems. We also offer an array of RF/microwave signal routing solutions, ranging from stand-alone switches and simple plug-in modules for multimeters to large, high density solutions designed for production test applications.

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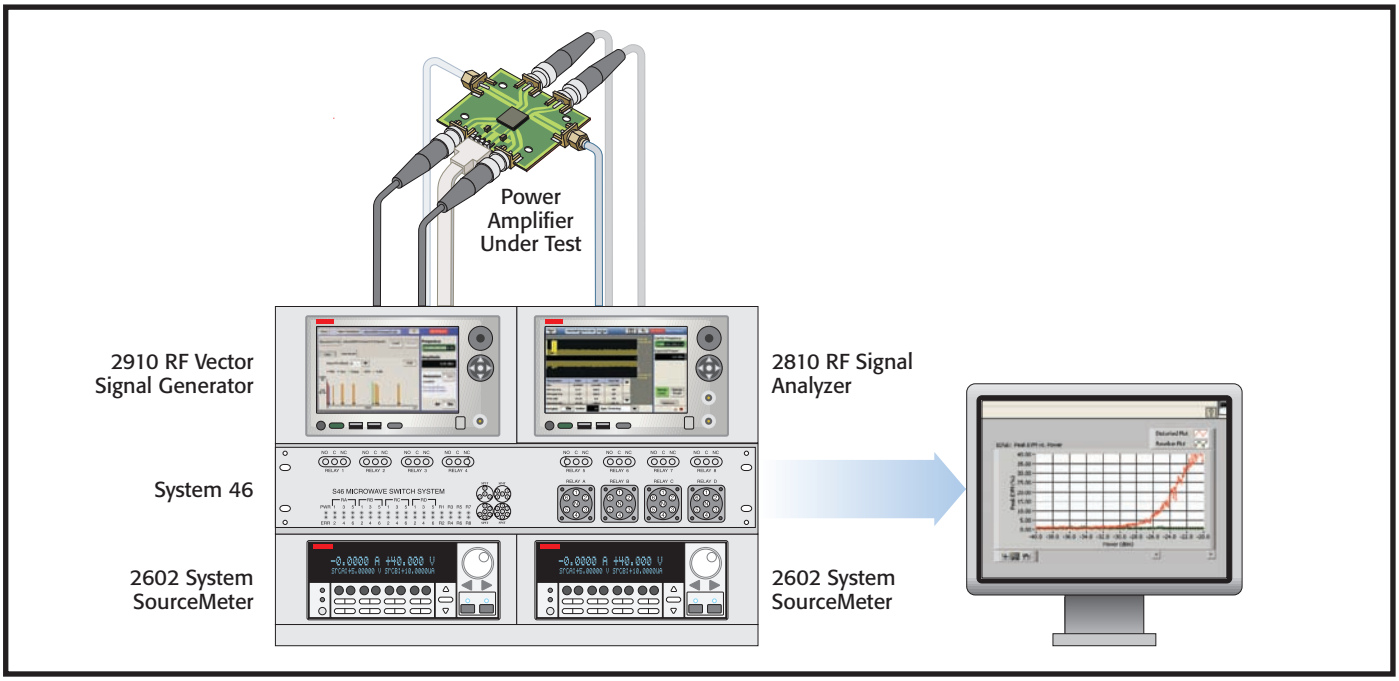
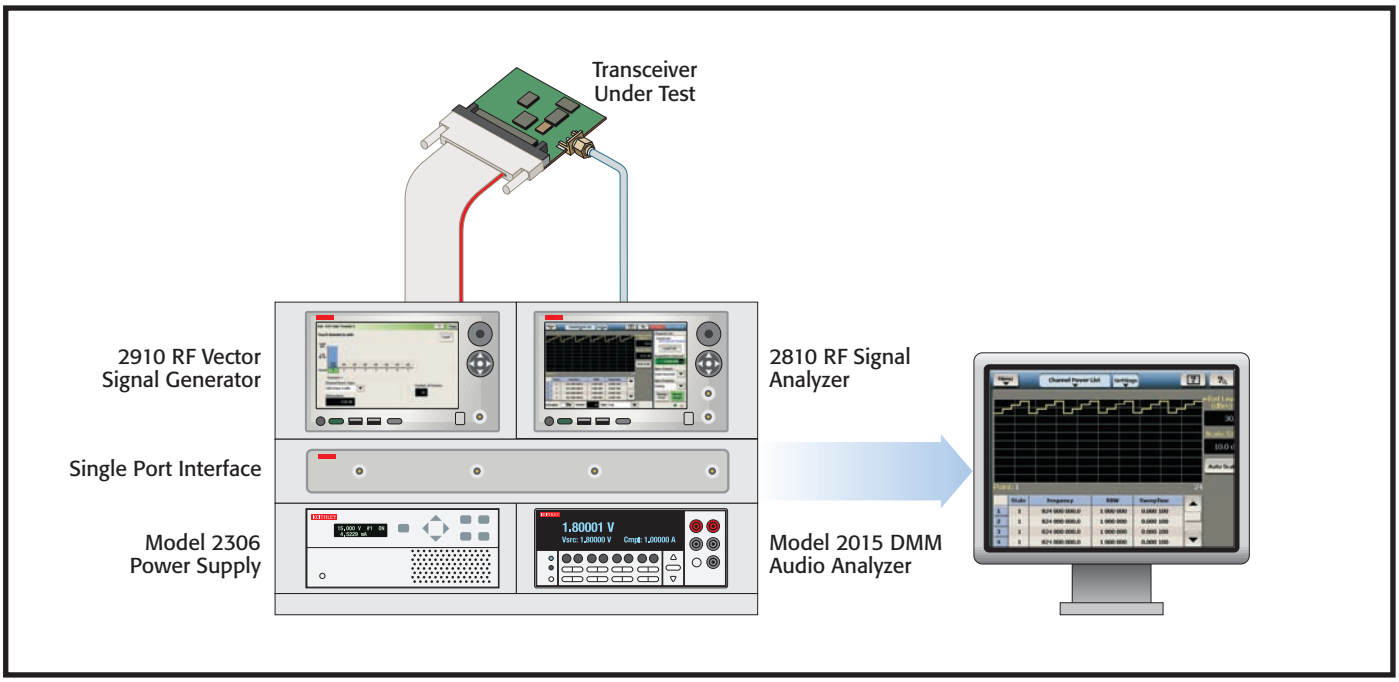
RF Vector Signal Analyzer with Spectrum Analyzer Capabilities



The combination of the Model 2810 and the Model 2910 Vector Signal Generator with the triggering and test script control of the Model 2602 System SourceMeter® instruments allows for simultaneous measurements of RF power and DC load currents. In addition, the Model 2810 and the Model 2910 can perform high speed measurements of modulation performance on the device under test.



In just 4U of rack space, this configuration supports calibrating and testing the modulation and demodulation performance of transceivers, all with far faster test times and lower costs than dedicated communication testers allow.

2810

RF Vector Signal Analyzer with Spectrum Analyzer Capabilities

BASIC MODES OF OPERATION

SPECTRUM ANALYZER MODE: Power envelope amplitude vs. frequency spectrum, power envelope amplitude vs. time (zero span), adjacent channel power bar chart.

VECTOR SIGNAL ANALYSIS MODE: Modulation quality measurements on GSM, GPRS, EDGE, cdma2000, and WCDMA mobile phone transmitter signals.

FREQUENCY

FREQUENCY RANGE[1]: 400MHz to 2.5GHz.

FREQUENCY SETTLING RESOLUTION: 0.1Hz.

FREQUENCY ACCURACY: Same as frequency reference + synthesizer resolution term[2].

INTERNAL FREQUENCY REFERENCE

AGING RATE: ≤1ppm/year.

TEMPERATURE STABILITY: ≤0.2ppm/year[3].

FREQUENCY REFERENCE OUTPUT

IMPEDANCE: 50Ω (characteristic), AC coupled.

REF. OUTPUT SIGNAL: 10MHz, +7dBm ±3dB (characteristic).

EXTERNAL FREQUENCY REFERENCE INPUT

FREQUENCY: 1 to 20MHz[4].

AMPLITUDE: Lock Range: 0 to +15dBm[5].

IMPEDANCE: 50Ω (characteristic).

SPECTRUM ANALYSIS CONTROLS AND PARAMETERS

FREQUENCY SPAN: 200Hz to 2.1GHz[6]. Zero Span mode available.

SWEEP TIME SETTINGS IN ZERO SPAN MODE: 1μs to 0.5s.

SWEEP MODES: Continuous, Single.

IF BANDWIDTH:
- **Relative Flatness over 20MHz:** ±1.0dB (typical).
- **Relative Flatness over 4MHz:** ± 0.3dB (typical).
- **3dB BW:** >30MHz.

RESOLUTION BANDWIDTHS: 2Hz to 3MHz (ENBW) with 1Hz resolution for spans >0Hz[7].

RESOLUTION BANDWIDTH FILTERS (1Hz resolution)[8]:
- **Brickwall:** 10Hz to 35MHz, flat BW[9].
- **Root Raised Cosine:** α = 0.22: 10Hz to 28MHz, 3dB BW.
- **Gaussian:** 10Hz to 7MHz, 3dB BW.
- **5 pole Synchronously Tuned:** 10Hz to 2.3MHz, 3dB BW.
- **4 pole Synchronously Tuned:** 10Hz to 1.75MHz, 3dB BW.

AMPLITUDE:
- **Reference Level Range Setting:** +40dBm to –170dBm.
- **Scale Settings:** Manual: 0.1dB/division to 40dB/division.

PRE-AMPLIFIER (15dB gain characteristic): On, off.

DISPLAY:
- **Detection modes:** Normal, Maximum, Minimum, Sample, Power Average, Power Average + Noise Correction.
- **Trace Hold Displays:** Normal, Max Hold, Min Hold, Min/Max Hold.

AVERAGING: 1–1,000 traces. **Modes:** Log, Power, Log Group, Power Group, Max Group, Min Group, Min/Max Group.

MARKERS: Four independent markers, each with a delta marker, Normal and Peak modes.
- **Marker Amplitude Resolution:** 0.01dB from front panel; 0.001dB via remote interface.

CHANNEL POWER LIST: Single command to execute up to 501 power measurements.

AMPLITUDE[10]

MAXIMUM SAFE INPUT POWER: +35dBm.

MAXIMUM SAFE DC VOLTAGE: ±50VDC.

ABSOLUTE ACCURACY[11]:

	Specified	Typical
400MHz ≤ Freq ≤ 2,000MHz	±0.6dB	±0.3dB
2,000MHz < Freq ≤ 2,500MHz	±0.7dB	±0.4dB

REF LEVEL ACCURACY (referenced to 0dBm):

Reference Level Setting	Accuracy
+10 to –70dBm	±0.2dB
–70 to –90dBm	±0.4dB
–90 to –100dBm	±1.0dB

DISPLAY SCALE FIDELITY[12]: ±0.16dB.

RESOLUTION BANDWIDTH SWITCHING ERROR[13]: ±0.01dB.

ATTENUATOR ACCURACY[14]:
±0.10dB for 0 through 15dB attenuator settings.
±0.15dB for 20 and 25dB attenuator settings.
±0.25dB for 30dB attenuator setting.

AMPLITUDE REPEATABILITY[15]: ±0.20dB, ±0.14dB typical.

AMPLITUDE CHANGE DUE TO PREAMP ON: ±0.3dB, ±0.18dB (typical).

DISPLAYED AVERAGE NOISE LEVEL:
–141dBm/Hz, pre-amp off. –148dBm/Hz, pre-amp on.

VSWR: 1.4:1

SPURIOUS AND RESIDUAL RESPONSES:
- **TOI (referred to the 2810 input, two 0dBm input signals and reference level = 0dBm):** +30dBm (typical).
- **SOI (referred to the 2810 input, 0dBm input signals and reference level = 0dBm):** +50dBm (typical).
- **Residuals (reference level setting ≤ –40dBm):** ≤ –90dBm.
- **LO Spurs:** ≤ –55dBc.
- **Phase Noise (1GHz carrier frequency and 20kHz offset frequency):** ≤ –115dBc/Hz.

GENERATOR OUTPUT

FREQUENCY RANGE: 400MHz to 2.5GHz[16].

SWEEP SPAN: 0Hz to 2.1GHz[17].

SWEEP POINTS: 1 to 501.

DWELL SETTING: 1ms to 1s in 1ms increments.

AMPLITUDE: Fixed: –10dBm ±3.5dB (typical: ±3dB).

DATA TRANSFER RATES

REMOTE TRACE DATA TRANSFER:[18]
- **LAN:** 7.5ms.
- **USB:** 12.7ms.
- **GPIB:** 20ms.

Model 2810 rear panel.

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RF Vector Signal Analyzer with Spectrum Analyzer Capabilities

2810-GSM GSM/GPRS/EDGE SIGNAL ANALYSIS PERSONALITY

GSM/GPRS POWER AND MODULATION QUALITY

CHANNEL POWER:
- **Measurement Range:** +33dBm to –30dBm (typical).
- **Accuracy:** ±0.6dB (typical).

PHASE AND FREQUENCY ERROR:
- **Frequency Error Measurement Range:** ±50kHz (typical).
- **Frequency Error Accuracy:** ±10Hz (typical).
- **RMS Phase Error Measurement Range:** 0°–10° (typical).
- **RMS Phase Error Accuracy:** <±1°.
- **Peak Phase Error Measurement Range[19]:** 0°–25° (typical).
- **Peak Phase Error Accuracy[19]:** ±2°.
- **Phase Error Floor:** RMS: 0.35°, Peak: 1.0°.

TIME MASK CONFORMANCE:
- **Sampling Resolution:** 0.615µs (1/6 bit).
- **Accuracy Along Burst Peak:** ±0.25dB.
- **Outputs:** Pass/Fail, complete burst with upper and lower mask limit lines.

OUTPUT RF SPECTRUM[20]:

ORFS Due to Modulation:

DYNAMIC RANGE (dBc)

Offset Frequency (kHz)	Carrier Frequency (F_C) (typical in parentheses) 400MHz ≤ F_C ≤ 1GHz	1GHz < F_C < 2GHz
200	34 (35)	34 (35)
250	39 (40)	39 (40)
400	66 (67)	62 (64)
600	71 (74)	67 (70)
1200	74 (79)	74 (76)
1800[21]	70 (76)	70 (74)

- **Relative Accuracy:** ±0.5dB.

ORFS Due to Switching:

DYNAMIC RANGE (dBc)

Offset Frequency (kHz)	Carrier Frequency (F_C) (typical in parentheses) 400MHz ≤ F_C ≤ 1GHz	1GHz < F_C < 2GHz
400	(65)	(62)
600	(71)	(67)
1200	(76)	(74)
1800	(78)	(77)

- **Relative Accuracy:** ±0.5dB.

Displays: Power vs. Time with Time Mask, ORFS due to Modulation, ORFS due to Switching, Phase Error vs. Time, Symbols vs. Time.

EDGE POWER AND MODULATION QUALITY

CHANNEL POWER:
- **Measurement Range:** +33dBm to –30dBm (typical).
- **Accuracy:** ±0.6dB (typical).

FREQUENCY ERROR:
- **Frequency Error Measurement Range:** ±50kHz (typical).
- **Frequency Error Accuracy:** ±10Hz (typical).

EVM:
- **RMS Measurement Range:** 0°–15° (typical).
- **RMS Floor:** ≤0.5%.
- **Origin Offset Range:** –20dBc maximum (typical).
- **RMS Accuracy:** ±0.5%.

TIME MASK CONFORMANCE:
- **Sampling Resolution:** 0.615µs (1/6 bit) (typical).
- **Accuracy Along Burst Peak:** ±0.25dB (typical).
- **Outputs:** Pass/Fail, complete burst with upper and lower mask limit lines.

OUTPUT RF SPECTRUM[20]:

ORFS Due to Modulation:

DYNAMIC RANGE (dBc)

Offset Frequency (kHz)	Carrier Frequency (F_C) (typical in parentheses) 400MHz ≤ F_C ≤ 1GHz	1GHz < F_C < 2GHz
200	36 (37)	36 (37)
250	39 (41)	39 (41)
400	65 (67)	60 (63)
600	70 (71)	64 (68)
1200	73 (75)	71 (73)
1800[21]	68 (72)	67 (70)

- **Relative Accuracy:** ±0.5dB.

ORFS Due to Switching:

DYNAMIC RANGE (dBc)

Offset Frequency (kHz)	Carrier Frequency (F_C) (typical in parentheses) 400MHz ≤ F_C ≤ 1GHz	1GHz < F_C < 2GHz
400	(62)	(60)
600	(68)	(65)
1200	(72)	(70)
1800	(74)	(73)

- **Relative Accuracy:** ±0.5dB (typical).

Displays: Power vs. Time with Time Mask, ORFS due to Modulation, ORFS due to Switching, EVM vs. Time, Symbols vs. Time, Constellation.

2810-CDMA2000 CDMA2000 REVERSE LINK SIGNAL ANALYSIS PERSONALITY

CHANNEL POWER:
- **Measurement Range:** +33dBm to –70dBm (typical).
- **Accuracy (1.2288MHz BW):** ±0.6 dB (typical).

FREQUENCY ERROR:
- **Frequency Error Measurement Range:** ±3kHz (typical).
- **Frequency Error Accuracy:** ±10Hz (typical).

RHO (ρ):
- **Range:** 0.7–1.0 (typical).
- **Ceiling:** 0.999.
- **Accuracy:** ±0.005 (for ρ values >0.9).

CODE DOMAIN POWER:
- **Relative accuracy, for code channels ≥ –20dB of total power:** ±0.3dB (typical).

ADJACENT CHANNEL POWER[22]:
- **Dynamic Range:** 65dBc @ 885kHz offset (typical). 80dBc @1980kHz offset (typical).
- **Relative Accuracy:** ±0.5dB.

OCCUPIED BANDWIDTH:
- **Frequency Accuracy:** ±5kHz (typical).

SPECTRUM EMISSIONS MASK[22]:
- **Accuracy relative to carrier power:** <0.5dB.

DISPLAYS: Code Domain Power, Adjacent Channel Power with limits, Occupied Bandwidth with limit lines, Conducted Spurious Emissions with limits.

2810-WCDMA WCDMA UPLINK SIGNAL ANALYSIS PERSONALITY

CHANNEL POWER:
- **Measurement Range:** +33dBm to –60dBm (typical).
- **Accuracy (3.8MHz BW):** ±0.6dB (typical).

FREQUENCY ERROR:
- **Frequency Error Measurement Range:** ±3kHz (typical).
- **Frequency Error Accuracy:** ±10Hz (typical).

RMS EVM:
- **Range:** 0%–25% (typical).
- **Floor:** 1.75% (typical).
- **Accuracy:** ±2%.

CODE DOMAIN POWER:
- **Relative accuracy, for code channels ≥ –20dB of total power:** ±0.3dB.

ADJACENT CHANNEL POWER[22]:
- **Dynamic Range:** 60dBc @ 5MHz offset (typical). 68dBc @10MHz offset (typical).
- **Relative Accuracy:** ±0.5dB.

OCCUPIED BANDWIDTH:
- **Frequency Accuracy:** ±20kHz (characteristic).

SPECTRUM EMISSIONS MASK[22]:
- **Accuracy relative to carrier power:** <1.5dB (characteristic).

DISPLAYS: Code Domain Power, Adjacent Channel Power with limits, Occupied Bandwidth with limit lines, Spectrum Emissions with limits.

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RF Vector Signal Analyzer with Spectrum Analyzer Capabilities

TRIGGER AND SYNCHRONIZATION INPUTS AND OUTPUTS

TRIGGER SOURCES[23]:
Free run
External
Video
Bus
External arm using video trigger
Bus arm using external or video trigger

TRIGGER DELAY: –0.5 to +0.5s.

TRIGGER MODES: On measurement
On acquire

EXTERNAL TRIGGER:
Rising edge of external input
Falling edge of external input
Input level TTL
Minimum input pulse width required 50ns (characteristic)

VIDEO TRIGGER MODES:
Rising signal edge
Falling signal edge
Video level
Pre-qualification mode level and time settings

SYNC OUTPUT MODES:
Generate a sync pulse:
Off
Begin measurement
Start tune
Ready acquire
Start acquire
End acquire
End measurement

SYNC OUTPUT POLARITY SELECT:
Sync out is on the rising edge
Sync out is on the falling edge

SYNC OUTPUT: TTL level. Minimum pulse width 200ns (characteristic).

EVEN SECOND CLOCK INPUT: External even second clock (TTL).

EVEN SECOND CLOCK OUTPUT: External even second clock (TTL).

GENERAL SPECIFICATIONS:

POWER: 100VAC to 240VAC; 50/60Hz (automatically detected); 120VA max.

CE EMC COMPLIANCE: EU Directive 89/336/EEC; EN 61326-1.

CE SAFETY COMPLIANCE: CE; EU Directive 73/23/EEC, EN 61010-1.

CALIBRATION: Annual calibration cycle in system.

ENVIRONMENT (FOR INDOOR USE ONLY): 18°–23°C specified operating, unless otherwise noted.

0°–50°C operating survival, non-specified operation.

–25° to 65°C non-operating (AC power off) storage.

Altitude: Maximum 2000 meters above sea level.

Cooling: Forced air top, bottom, and side intakes and rear exhaust. For proper cooling in a rack, use Keithley Instruments 2910-RMK Rack Mount Kit.

DIGITAL INPUTS/OUTPUTS: 4 bits, TTL-compatible.

INTERFACES: IEEE-488.1 compliant. Supports IEEE-488.2 common commands and status model topology.

LAN: 10/100Base-T Ethernet, RJ45, LXI Class C, no auto MDIX.

IVI-COM.

USB: USB full speed.

RF In/TG Out: Type N connector.

MECHANICAL VIBRATION AND SHOCK:

MIL-PRF-2880 CL3 random vibration, 3 axes.

Sine-Sweep test for resonances, 3 axes.

MIL-STD-810F 516.5 paragraph, 4.5.7 procedure VI bench drop MIL-PRF-2880 CL3 random vibration, 3 axes.

GENERAL MECHANICAL CHARACTERISTICS:
Height: 3U (133mm) (5.25 in.).
Width: Half-rack (213mm) (8.4 in.).
Depth: 464mm (18.25 in.).
Weight: 7.5kg (16.5 lb.).

WARRANTY: 3 years standard.

NOTES

1. Over range operation provided: 325MHz to 2.975GHz. Performance below 400MHz and above 2.5GHz is not specified.
2. Synthesizer resolution term: ≤5μHz.
3. Total variation relative to 23ºC to 50ºC ambient temperature range.
4. On 10Hz boundaries Freq = 1MHz + n · 10Hz. Reference accuracy ≤ ±1ppm. Sine or square wave inputs acceptable.
5. For optimum phase noise, 0 to +10dBm.
6. Over range operation provided: 325MHz to 2.975GHz. Maximum span is 2.425GHz. Performance below 400MHz and above 2.5GHz is not specified.
7. RBW accuracy <1% characteristic.
8. Filter types are settable in Zero Span, Channel Power List, and ACPR modes.
9. 6dB BW is 1.09 · RBW setting.
10. Specifications apply when in Autocoupled mode unless otherwise stated.
11. Input power at 0dBm, span = 1MHz and RBW = 100Hz.
12. Signal level within 50dB of top of screen, reference level 0dBm, no change in instrument state.
13. RBW switching error specified for 10000 ≤ Span/RBW setting ratio ≤15000 and frequency spans ≤25MHz.
14. Applies only if input attenuator is changed from auto-coupled setting.
15. For repetitive CW power readings with Read signal removed then reapplied for signals: >40dB above noise floor within 5 minutes.
16. Over range operation provided: 325MHz to 2.7GHz. Performance below 400MHz and above 2.5GHz is not specified.
17. Over range operation provided: Maximum span: 2.375GHz. Performance below 400MHz and above 2.5GHz is not specified.
18. Zero span, sweep time 100μs, binary data transfer, 501 data points, display off.
19. Average of peak from each burst.
20. Nominal carrier power at RF input ≥ –10dBm. Does not include level uncertainty due to inherent noise.
21. 1800kHz offset measured using 100kHz RBW All other offsets measured using 30kHz RBW
22. Carrier power at RF input ≥ –10dBm. Does not include level uncertainty due to inherent noise.
23. Bus Trigger and Bus Arm available only in Channel Power List mode.

SPECIFICATION NOTES:

Specifications describe the instrument's warranted performance. Typical and characteristic values are not warranted, but provide additional information regarding performance that you should expect from the Model 2810 and are provided to assist in application of the Model 2810.

SPECIFICATIONS: (warranted performance):

Specifications indicate performance that is warranted. All units are warranted to meet these performance specifications under the following conditions:

- Ambient operating temperature of 18° to 28°C, unless otherwise noted.
- After specified warm-up time of 30 minutes and self calibration at ambient temperature.

TYPICAL (mean + 3 standard deviations):

Typical indicates performance that units will meet under the following conditions:

- Ambient operating temperature of 23°C, unless otherwise noted.
- After specified warm-up time of 30 minutes and self calibration at ambient temperature.

This performance is not warranted.

CHARACTERISTIC (mean or expected value):

Characteristic indicates performance that a unit would be expected to exhibit under the following conditions:

- Ambient operating temperature of 23°C, unless otherwise noted.
- After specified warm-up time of 30 minutes and self calibration at ambient temperature.

This performance is not warranted.