ADVANTEST

R3681
Signal Analyzer

High Performance Spectrum and Broadband modulation analysis in one versatile instrument

- Wide Dynamic Range
  Average Display Noise Level: –158 dBm (typical @ 1 GHz)
  1 dB Compression Point: +10 dBm (typical, 200 MHz to 3.5 GHz)
  Third-Order Intercept Point (TOI): +26 dBm (typical, 2 to 3.5 GHz)
- Standard broadband 25 MHz modulation analysis function
- OFDM Modulation Analysis Option (OPT.68) for W-LAN
  IEEE802.11a, HiperLAN/2, and HiSWANa

R3681

New Signal Analyzer for the Ubiquitous Networking Era

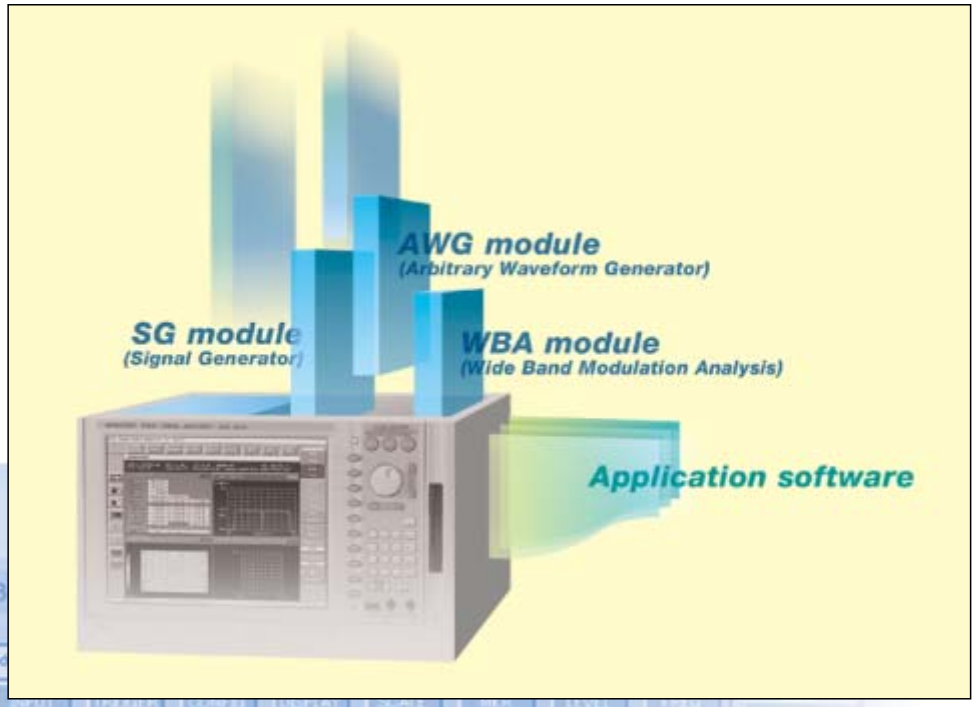
With growing data communications traffic, broadband radio communication systems such as radio-LANs, are being developed that employ various modulation formats. For example, IMT-2000 and other mobile communication systems already use multicarrier methods.
Broadband radio signals are already being used in the RF band. To push this envelope for higher quality data transmissions, researchers and developers are studying higher frequency/broader band carriers. In this kind of radio communications environment, new measuring instruments are needed that are not only more efficient than ever, but also more flexible to support new test requirements and communication standards.
The R3681 is one of these new measuring instruments for this new era of test and measurement requirements. The R3681 is a high performance signal analyzer. Employing its unique RF technology, the R3681 achieves an Average Display Noise Level of –158 dBm*1), a Third-Order Intercept Point (TOI) specification of +26 dBm*2), and a signal purity of –122 dBc/Hz*3) to enable measurements over a wide dynamic range. The R3681 also has a unique noise correction function that enhances its dynamic range (–84 dBc [typical]) for W-CDMA adjacent leakage power (ACLP) measurements.
The R3681 supports a standard broadband modulation analysis function (bandwidth 25 MHz). This functionality enables testing of next-generation digital radio communication standards. In short, the R3681 with its W-LAN Signal Analysis Options provides a flexible platform to support next-generation broadband digital radio communications including IEEE802.11a, HiperLAN/2, and HiSWANa.

**1 Typical value at RBW of 1 Hz and 1 GHz with built-in preamplifier off*
**2 Typical value at 2 to 3.5 GHz*
**3 Typical value at 800 MHz and 10 kHz offset*

ADVANTEST's Wizard Module Test (WMT) system platform

Adapting to new radio communication standards generally requires new investments in test-and-measurement instruments. To lower these new capital investments for next-generation radio communication systems, ADVANTEST introduces the Wizard Module Test (WMT) system platform.

The R3681 allows you to add and replace extension modules to meet your exact test-and-measurement requirements. This added flexibility allows you to develop testing system platforms that meet your specific measurement needs. This also enables you to expand and reuse your testing platforms as your measurement needs evolve over time.

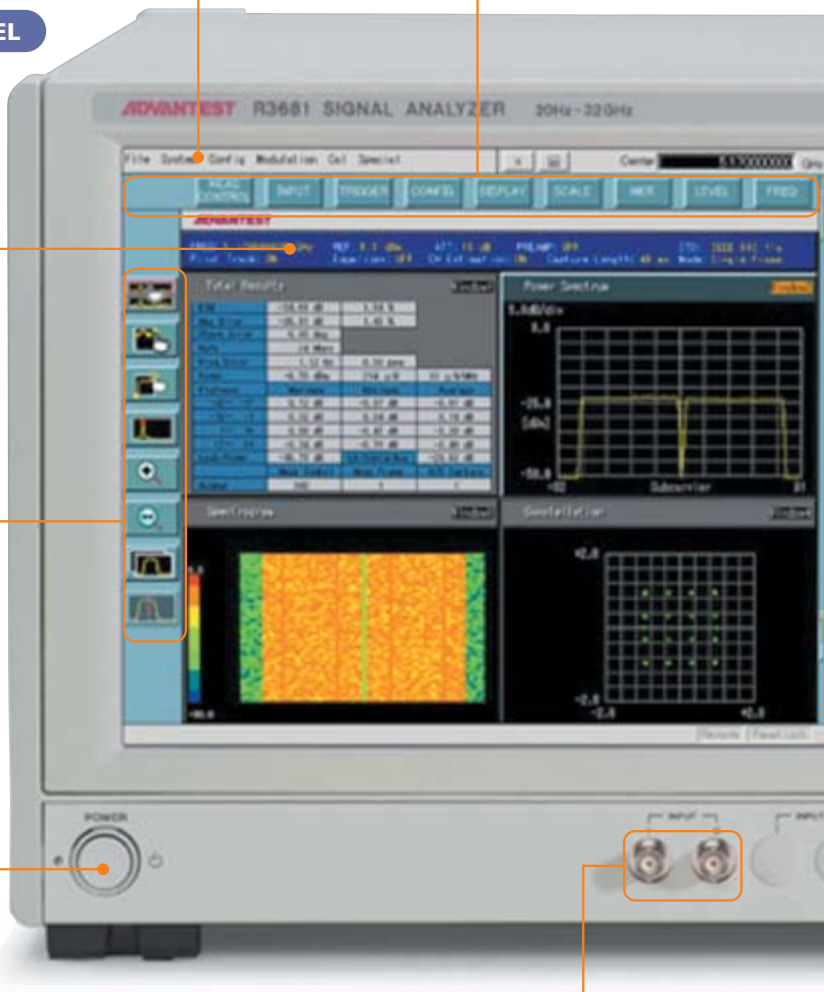


Adopting a Large TFT Display for Higher Work Efficiency

Menu bar
Displays the analyzer's system operation menu.

Function bar
Displays the buttons for basic functions.

FRONT PANEL



Large 12-inch TFT display
- Touch screen for quick operation
- Large screen for increased work efficiency
- Comparative analysis capabilities on multi-screens
- Indicator function for low-speed sweep position check, and more

Measurement toolbar
Displays the icon buttons for useful measurement functions.

Power switch
Turns the analyzer on and off.
Setting this switch to ON shuts the OS down and turns off the analyzer.

I/Q Input connectors
Used to connect baseband I/Q signals.

Software menu bar
Displays a software menu for various functions.

Application keys
Used to select from a side menu on the display.

Program keys
Used for measurement control.
SINGLE, STOP, and START

Data knob and numerical keypad
Used to enter numeric values and units.

Floppy disk drive

I/O connector block
- USB connector
- Mouse connector
- Keyboard connector

Input connector
Used to input RF signals.

CAL OUT connector
Used to calibrate.

EXT MIX IF connector
Used to connect an external mixer for extending the measuring frequency range.
OPTION | For a 2-port mixer

EXT MIX LO/IF connector
Used to connect an external mixer for extending the measuring frequency range.
OPTION | For a 2-port mixer

Probe connector
Used for the probe power connection (±15 V output)

REAR PANEL

GPIB (conforming to IEEE488.2)

LAN (10Base-T, TCP/IP)

VIDEO (VGA specifications)

PRINTER (conforming to IEEE1284-1994)

TRIG OUT (TTL)

EXT TRIG IN 1 (TTL)
EXT TRIG IN 2
(0 to 5 V, DC coupled)

EXT REF IN

10 MHz REF OUT

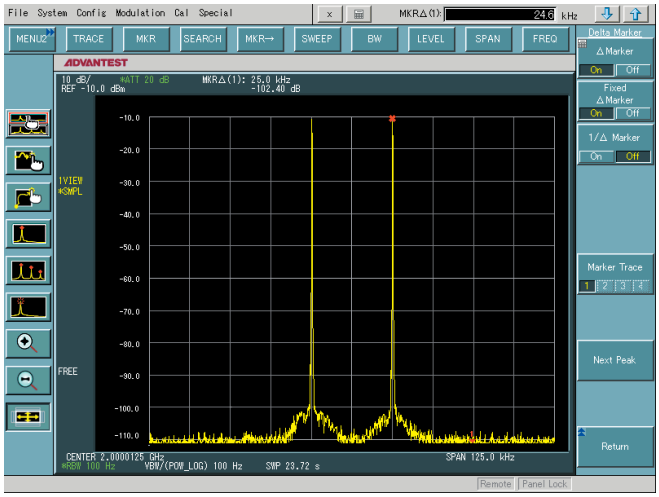
21.4 MHz IF OUT

High-Performance Spectrum Analysis

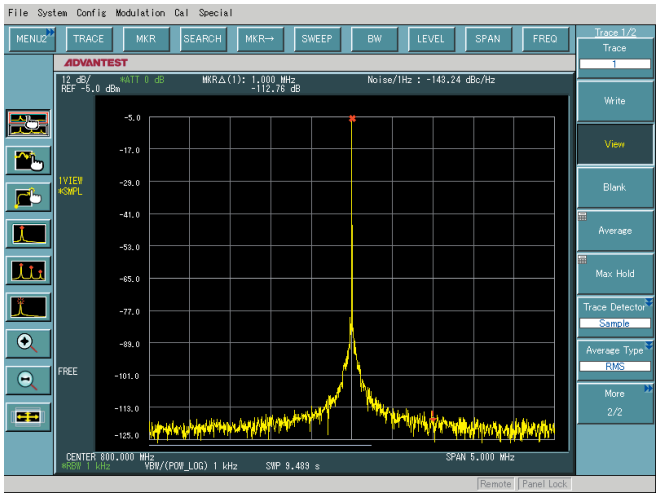
Dynamic range measurement that is the best in the world

By making full use of the latest RF techniques, the R3681 enables measurements over a wide dynamic range:

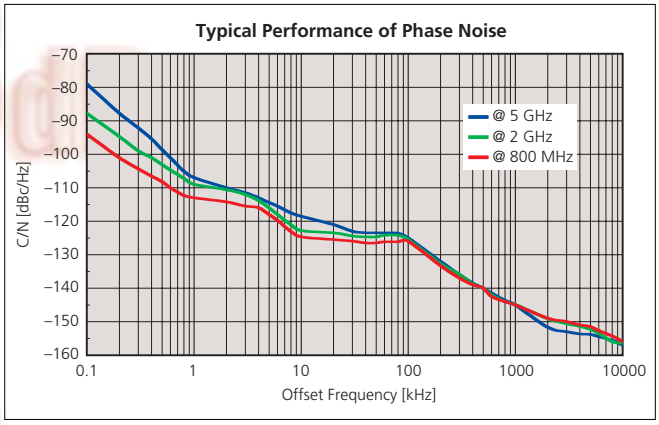
- **Average Display Noise Level: –158 dBm (typ. 1 GHz)**
- **Built-in Preamplifier On: –168 dBm (RBW = 1 Hz, 1 GHz)**
- **1 dB Compression Point: +10 dBm (typ. 200 MHz to 3.5 GHz)**
- **Third-Order Intercept Point (TOI): +26 dBm (typ. 2 to 3.5 GHz)**
- **Signal Purity (at 800 MHz)**
  10 kHz Offset: –120 dBc/Hz or more
  1 MHz Offset: –140 dBc/Hz or more
  10 MHz Offset: –155 dBc/Hz or more
- **Built-in attenuator with 5 dB steps (standard)**
  Attenuator with 1 dB steps (OPT.14)
- **Resolution Bandwidth (RBW): 1 Hz to 10 MHz (Sequences 1, 2, 3, and 5)**
- **Dynamic Range of display: 10 div. fixed**
  0.1 to 1 dB/div. (0.1 dB steps)
  1 to 20 dB/div. (1 dB steps)
- **Steep shape factor**
  Approximately 3 times the conventional value. This narrows the carrier near-field measurement resolution.



Sample measurement of Third-Order Intercept Point (TOI)



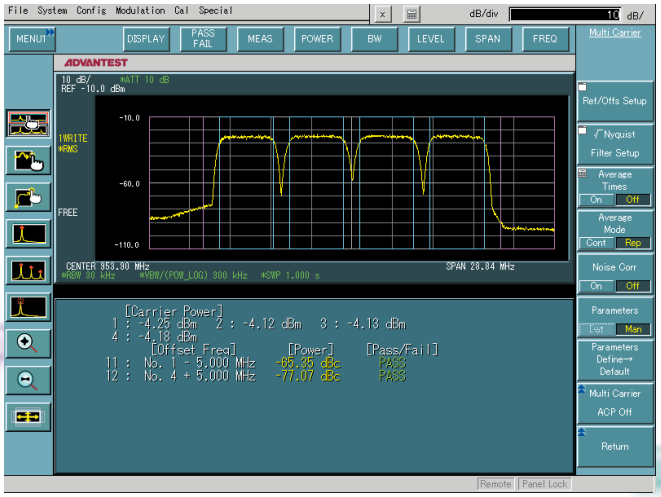
Excellent signal purity



Characteristic phase noise (typical)

When the noise correction function is on for W-CDMA adjacent channel leakage power ratio (ACLR) measurements, the R3681 achieves:

- **–84 dBc (typical for one-carrier signal measurements with a 5 MHz offset)**
- **–77 dBc (typical for four-carrier signal measurements with a 5 MHz offset)**



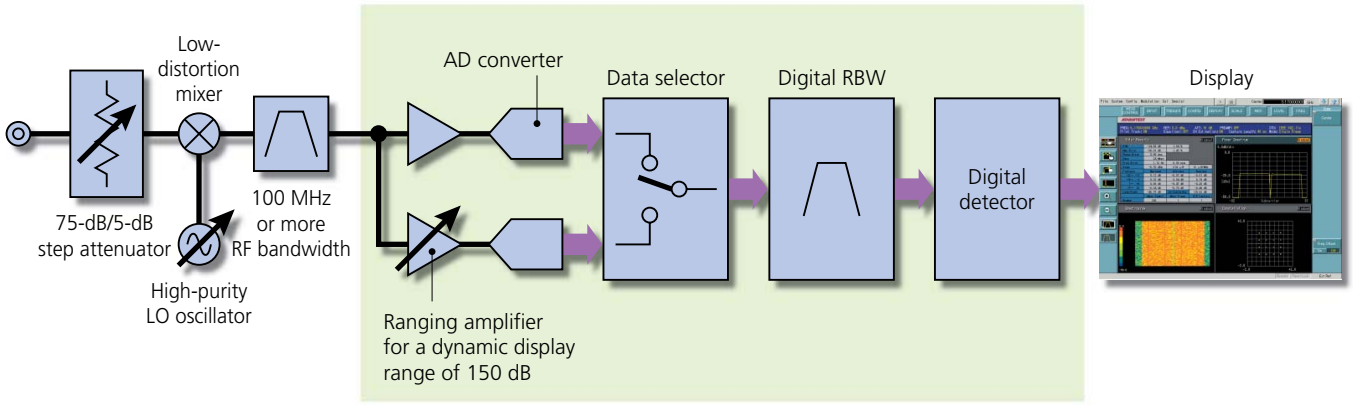
Sample measurement of four-carrier signal W-CDMA ACLR measurement.
Insert L.P.F. into the signal resource, and measure the ACLR of the upper channel.

Highly accurate level measurement

The R3681 provides highly accurate measurement by adopting high-performance digital IF technology.

- **General Level Accuracy: >±0.73 dB (50 MHz to 2.5 GHz, 10 dB ATT, 100 kHz RBW)**
- **Level Display Linearity: Inaccuracy reduced**
- **Level Display Stability: Instability significantly improved**
- **Self-calibration: Calibration time shortened**

Digital IF selection



Easy Operation with Measurement Tools

Large touch screen to enhance user interface

With its large touch screen, the R3681 is easy to operate and achieves high measurement efficiency.

Main functions — Adopting a measurement toolbar results in improved operability

- Waveform Enlargement Function (Area enlargement by specifying a range)
- Waveform Scroll Function
- Peak Markers over specified range, and a peak marker list
- One-Touch Selection Function*1) for specifying the point of analysis within the acquired waveform data
- Switching Function for waveform data display and analytical result display*1)
- Active window switching function to simultaneously display four-screens*1)

Note: The above functions are available in the Freq. and Time domains.

**1: Used in modulation analysis mode*

Measurement toolbar

Active screen selection

Window width setting

Window diagonal area setting

Peak search ON

Multi-marker and peak search ON

Marker/marker list OFF

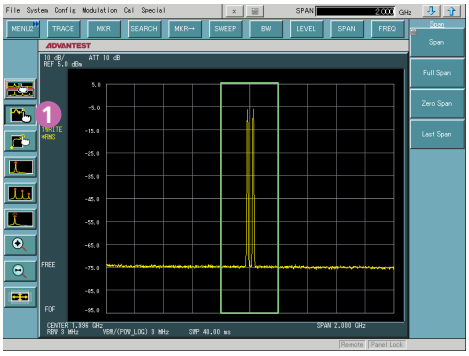
Zoom-in function

Zoom-out function

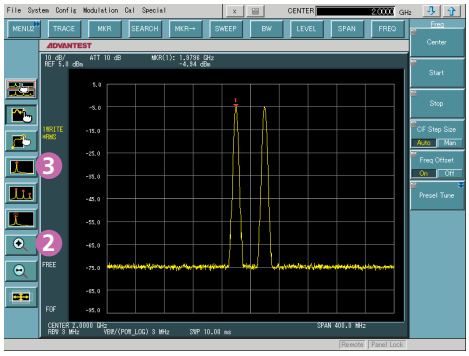
Reference level and center frequency step-variation

Operation example 1 *The width of the window is set and the Zoom-in function is used, before a peak search.*

1 Window width setting



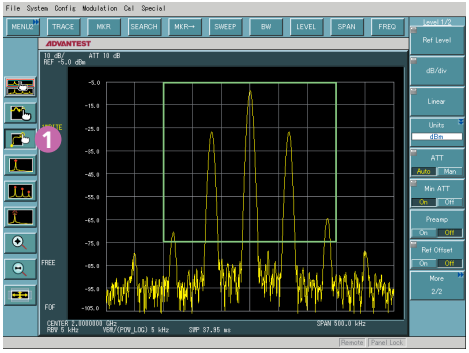
2 Zoom-in



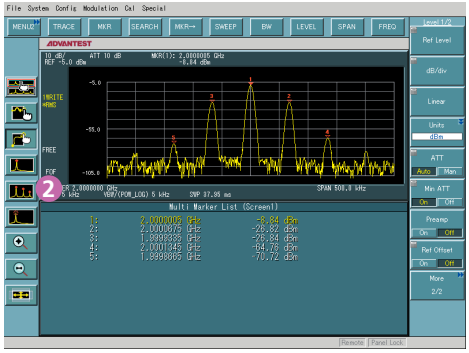
3 Peak search ON

Operation example 2 *The dimensions of the window are set using the Window diagonal area setting, before a multi-marker peak search.*

1 Window diagonal area setting



2 Multi-marker and peak search ON

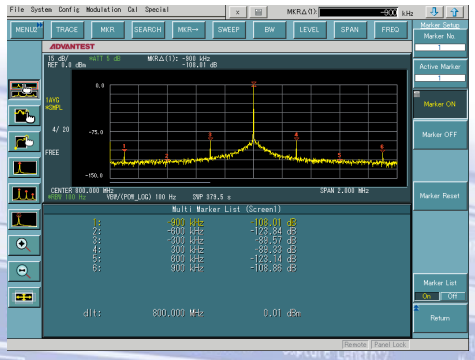


Abundance of Analysis Functions

Equipped with a wealth of standard analysis functions

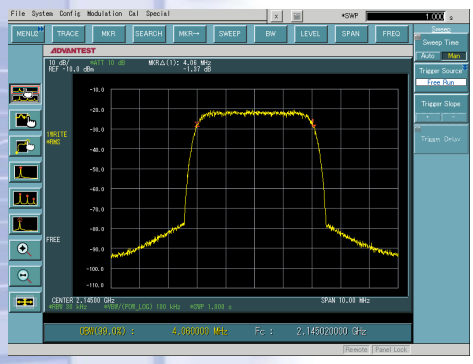
The R3681 comes standard with the refined measurement functions of ADVANTEST's conventional spectrum analyzers:

- **Marker Function (multi-marker, delta marker, peak search, and more)**
- **Variety of Detection Functions necessary for communications standards measurements**
  Normal, positive peak, negative peak, sample, RMS, video average, and mean voltage
- **One-Touch Measurement Functions frequently used for other RF measurements**
  Power Measurement Mode
  Power measurement (Channel Power/Avg. Power/Total Power), broadband CCDF measurement, occupied bandwidth (OBW) measurement, adjacent channel leakage power (ACP) measurement, multi-carrier measurement, and more
  General Measurement Mode
  Spectrum emission mask, spurious measurement, noise/Hz conversion, IM measurement, frequency counter (0.01 Hz resolution), and more

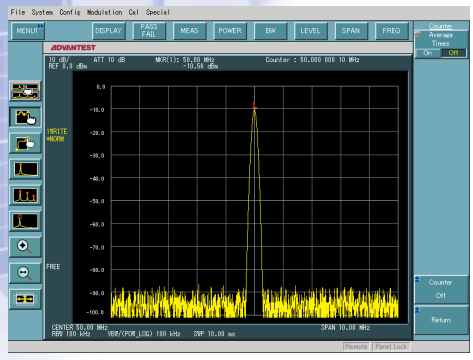


Multi-marker function

Spectrum emission mask function



Sample measurement of occupied bandwidth



Sample measurement of frequency counter

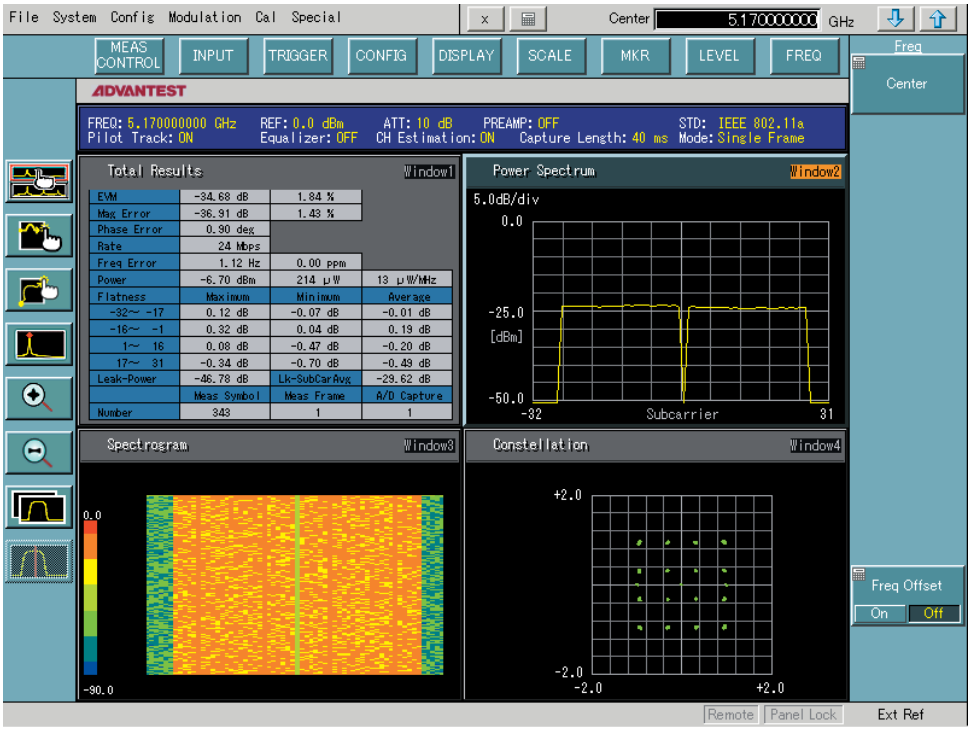
W-LAN Modulation Analysis

Broadband measurements with the OFDM modulation analysis function (OPT.68)

Adding Option 68, the broadband OFDM modulation analysis function, the R3681 enables IEEE802.11a, HiperLAN/2, and HiSWANa modulation signal analytical measurements. The R3681 will analyze RF Input, I/Q baseband input, and wide Wireless-LAN signals.

Main features

- Automatic detection for BPSK, QPSK, 16QAM, or 64QAM
- W-LAN signal analysis with a different modulation for each subcarrier
- W-LAN signal analysis without a preamble
- Signal analysis by the specified number of effective symbols
- I/Q baseband analysis
- Detailed modulation signal analysis using different graphic displays
- Comparative analysis in different display formats using a simultaneous four-screen display
- High operability with a large 12-inch screen and a touch panel



Measurement items

- E.V.M.
- Magnitude Error
- Phase Error
- Frequency Error
- Power
- Flatness
- Leak Power (to Total Power)
- Leak Power (to Avg. Subcarrier)

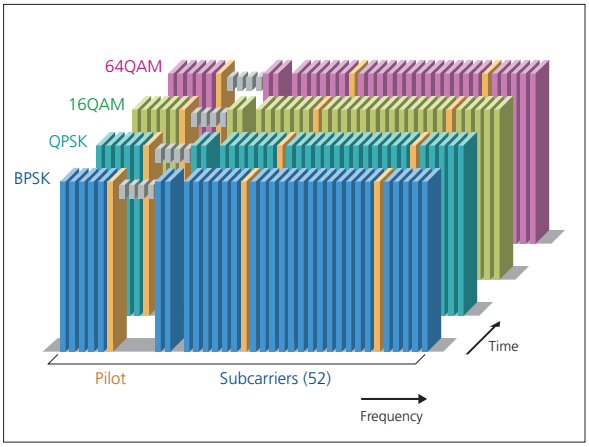
Graph display functions

- E.V.M. vs. Time
- Mag. Error vs. Time
- Phase Error vs. Time
- Mag. Flatness vs. Time
- Power vs. Time
- Constellation
- Center Freq. Error vs. Time
- E.V.M. Spectrum
- Mag. Error Spectrum
- Phase Error Spectrum
- Mag. Flatness Spectrum
- Power Spectrum
- Demodulating Data
- Spectrogram

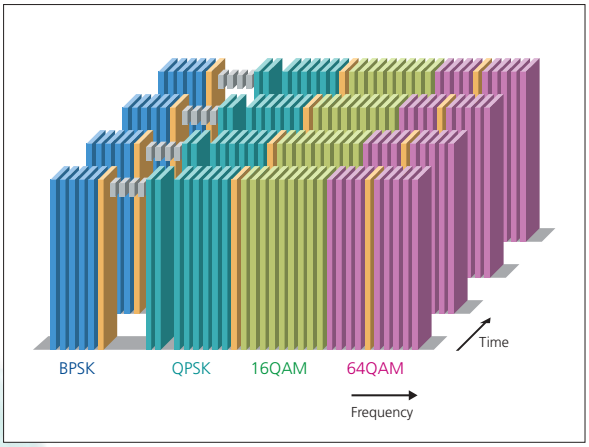
Note: Software is available for automatic measurement based on the W-LAN standard. Please contact us if you are interested

HiperLAN/2 HiSWANa IEEE802.11a

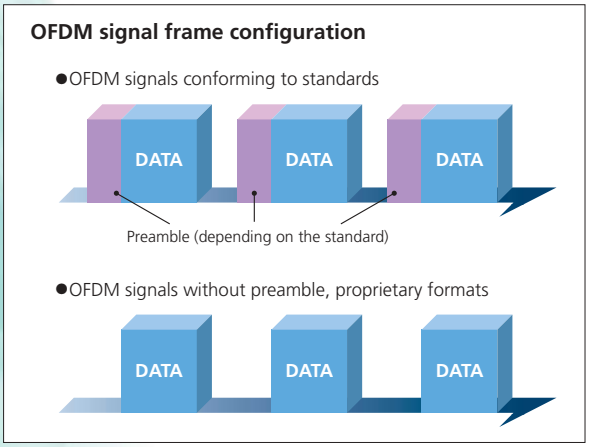
Automatic Evaluation Function for effective standard signal measurements



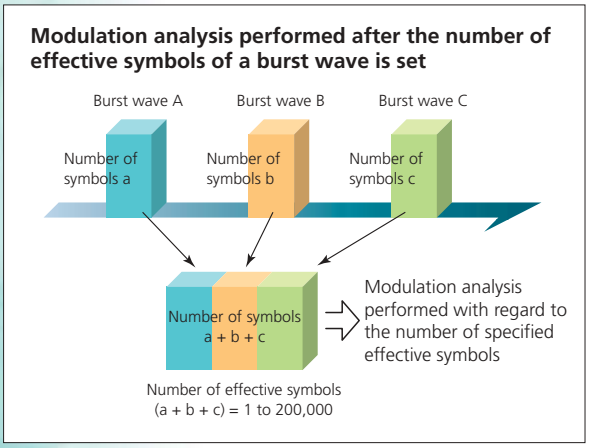
W-LAN Signal Analysis Function with a different modulation for each subcarrier



Analysis Function for W-LAN signals without preamble, effective for proprietary OFDM signals analysis



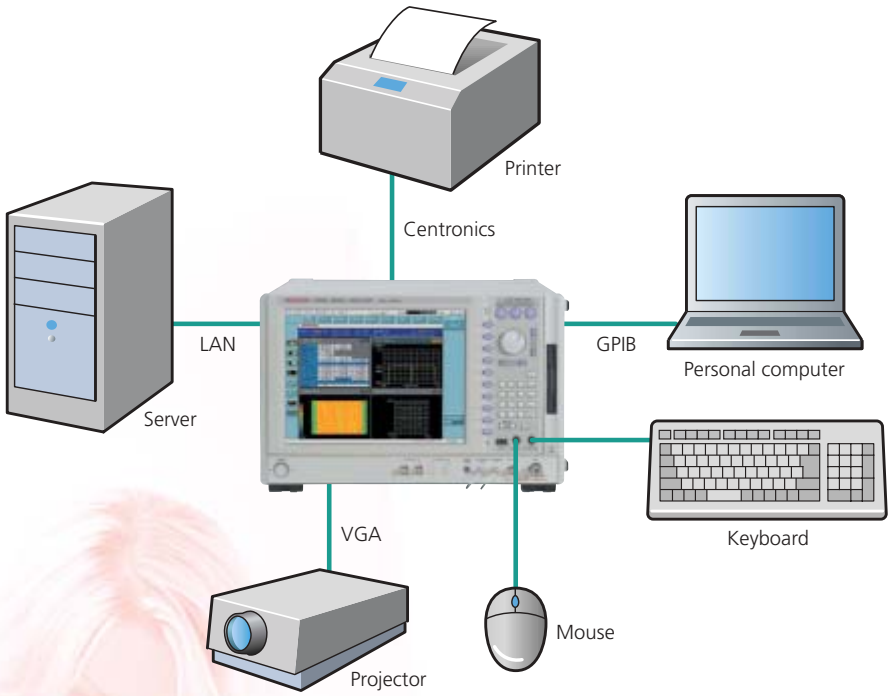
Signal analysis function using the specified number of effective symbols (200,000 signals maximum), effective for analyzing burst signals with long intervals and with the specified number of symbols



Variety of Interfaces

Equipped with a variety of standard I/O interfaces

The R3681 comes with standard USB, LAN, and GPIB control interfaces. The unit also comes with a built-in Centronics interface (for printers) and VGA interface (for projectors).



Saving and using a variety of data

Save function anddata in CSV format (Numeric format)

You can access data in CSV format on the R3681 or a personal computer. When multiple measurement conditions have been saved, you can easily recall these conditions at any time without performing complicated operations.

Copy function and data in bitmap format

If you specify a copy destination, image data can be saved as in bitmap format on a floppy disk. Image editing software allows you to manage display data on a personal computer without extra processing.

Specifications

Frequency

Frequency Range

Spectrum analysis mode: 20 Hz to 32 GHz

Frequency range	Frequency Band	Harmonic mixing mode (N)
20 Hz to 3.5 GHz	0	1 –
3.4 to 7.5 GHz	1	1 –
7.4 to 15.4 GHz	2	2 –
15.2 to 32 GHz	3	4 –

Bands 1 to 3 use a built-in YIG tuning preselector

Modulation analysis mode: (Enabled when the modulation analysis option is specified)
20 MHz to 6 GHz

Frequency range	Frequency Band	Harmonic mixing mode (N)
20 MHz to 3.5 GHz	0	1 –
3.5 to 6 GHz	1M	1 –

Band 1M bypasses the built-in YIG tuning preselector

Built-in preamplifier (Band 0 only): 100 kHz to 3.5 GHz, 20 dB gain (typical)

Input coupling: DC

Internal frequency reference stability
- Aging rate: ±5 x 10^{-8}/day, ±5 x 10^{-7}/year
- Temperature stability: ±1 x 10^{-7} (at 5 to 40°C, with frequency at 25°C as reference)
- Warm-up (nominal): ±5 x 10^{-7}/minute
- Reference frequency error: ±(Time elapsed from the latest factory calibration x Aging rate + Temperature stability)

Marker frequency counter (S/N >50 dB)
- Accuracy: ±(Marker frequency x Reference frequency error + Residual FM)
- Resolution: 0.01 Hz

Frequency reading accuracy: (Resolution bandwidth 1 Hz to 3 MHz)
±(Frequency reading x Reference frequency error + Span x Span accuracy + Resolution bandwidth x 0.1 + Residual FM)

Frequency stability (with internal reference frequency source)
- Residual FM: ≤(3 Hz x Np-p)/100 ms

Frequency span
- Range: 20 Hz to 32 GHz, 0 Hz (zero span)
- Accuracy: ±1% (200 Hz ≤Span)
  ±1 x N% (20 Hz ≤Span <200 Hz)

Signal purity: (with internal reference frequency source, Frequency 800 MHz, and temperature range: 20 to 30°C)
- 100 Hz offset: <–87 dBc/Hz
- 1 kHz offset: <–110 dBc/Hz
- 10 kHz offset: <–120 dBc/Hz
- 100 kHz offset: <–120 dBc/Hz
- 1 MHz offset: <–140 dBc/Hz
- 10 MHz offset: <–155 dBc/Hz (nominal)

Resolution bandwidth (RBW)
- Range: 1 Hz to 10 MHz (sequences 1, 2, 3, and 5)
- Accuracy: ±3%: Resolution bandwidth 1 Hz to 500 kHz
  ±7%: Resolution bandwidth 1 to 3 MHz
  ±12%: Resolution bandwidth 5 MHz
  ±20%: Resolution bandwidth 10 MHz
- Selectivity (60 dB/3 dB): <6: 1 (5: 1, typ.)

Video bandwidth (VBW)
- Range: 1 Hz to 10 MHz (sequences 1, 2, 3, and 5)

Sweep

Sweep time setting range
- Zero span: 1 µs to 6000 s
- Span > 0 Hz: 10 ms to 2000 s

Sweep time accuracy: ±2%

Sweep mode: Continuous and single

Trigger function
- Trigger source: Free-run, Video, IF, Line, Ext 1 (TTL level), and Ext 2 (0 to 5 V, Resolution: 20 mV)
- Trigger delay setting range: 10 ns to 1 s
- Resolution: 10 ns

Amplitude

Amplitude measurement range
- Preamplifier off: +30 dBm to Average display noise level
- Preamplifier on (Band 0 only): +20 dBm to Average display noise level

Maximum safety input level
- Average continuous power
  - Preamplifier off: +30 dBm (at input ATT. ≥10 dB)
  - Preamplifier on: +13 dBm (at input ATT. ≥10 dB)
- DC voltage: 0 V (No DC applied to signals)

Input ATT. range: 0 to 75 dB by 5 dB steps

Scale display range: 10 div., fixed
- Log scale: 0.1 to 1 dB/div. by 0.1 dB steps
  1 to 20 dB/div. by 1 dB steps
- Linear scale: 10%/div. of reference level

Scale unit : dBm, dBmV, dBµV, dBµVemf, dBpW, W, V

Reference level setting range
- Preamplifier off
  - Log scale: –170 to +60 dBm by 0.01 dB steps
  - Linear scale: 707.1 pV to 223.6 V by Approx. 1% steps
- Preamplifier on
  - Log scale: –170 to +30 dBm, 0.01 dB steps
  - Linear scale: 707.1 pV to 7.071 V by Approx. 1% steps

Trace: 4 maximum

Detector modes: Normal, positive peak, negative peak, sample, RMS, video average, and voltage average

Amplitude accuracy

Calibration signal (50 MHz)
- Amplitude: –10 dBm
- Accuracy: ±0.2 dB (temperature range: 20 to 30°C)

Frequency response (After automatic calibration, where reference frequency: 50 MHz; input ATT.: 10 dB; pre-selector: peak-adjusted; and temperature range: 20 to 30°C)

Spectrum analysis mode

Preamplifier off:	50 MHz to 2.5 GHz: <±0.4 dB
	20 Hz to 3.5 GHz: <±1.0 dB
	3.5 to 7.5 GHz: <±1.5 dB
	7.5 to 15.4 GHz: <±2.0 dB
	15.4 to 32 GHz: <±2.5 dB
Preamplifier on:	50 MHz to 2.5 GHz: <±1.0 dB
	100 kHz to 3.5 GHz: <±2.0 dB

Input ATT. switching error: (At input ATT. 5 to 50 dB, with ATT. 10 dB as reference)
- 20 Hz to 8 GHz: <±1.0 dB
- 8 to 12 GHz: <±1.3 dB
- 12 to 20 GHz: <±1.4 dB
- 20 to 26.5 GHz: <±1.8 dB
- 26.5 to 32 GHz: <±2.1 dB

Scale display error: (Mixer level: –20 dBm as reference, mixer level range: –10 to –50 dBm, and temperature range: 20 to 30°C) <±0.13 dB

Resolution bandwidth switching uncertainty: (RBW 100 kHz as reference, after automatic calibration with and 10 dB/div. or less)
- <±0.05 dB: Resolution bandwidth 1 Hz to 3 MHz
- <±0.3 dB: Resolution bandwidth 5 MHz, 10 MHz

Total level accuracy: (After automatic calibration, mixer level: –10 to –50 dBm, preamplifier: off; input ATT.: 10 dB; RBW: 100 kHz; and temperature range: 20 to 30°C) <±(0.2 dB + Frequency response + Scale display error)

Dynamic range

Average display noise level

Spectrum analysis mode (Input terminated, input ATT.: 0 dB; RBW: 1 Hz; VBW: 1Hz, detector: sample; average: 20 times or more; AVG mode: Video; and temperature range: 20 to 30°C. For a temperature range of 5 to 40°C, 2 dB is added.)

Preamplifier off:	100 Hz: <–96 dBm
	1 kHz: <–119 dBm
	10 kHz: <–129 dBm
	100 kHz: <–130 dBm
	1 MHz: <–140 dBm
	10 MHz to 1 GHz: <–156 dBm (typical: –158 dBm)
	1 to 2 GHz: <–154 dBm (typical: –156 dBm)
	2 to 2.5 GHz: <–152 dBm (typical: –154 dBm)
	2.5 to 3 GHz: <–150 dBm (typical: –152 dBm)
	3 to 3.5 GHz: <–148 dBm (typical: –150 dBm)
	3.5 to 7.5 GHz: <–146 dBm (typical: –149 dBm)
	7.5 to 15.4 GHz: <–146 dBm (typical: –149 dBm)
	15.4 to 26.5 GHz: <–141 dBm (typical: –144 dBm)
	26.5 to 32 GHz: <–140 dBm (typical: –143 dBm)
Preamplifier on:	100 kHz: <–136 dBm
	1 MHz: <–146 dBm
	10 MHz to 1 GHz: <–162 dBm (typical: –168 dBm)
	1 to 2.5 GHz: <–160 dBm (typical: –166 dBm)
	2.5 to 3 GHz: <–158 dBm (typical: –164 dBm)
	3 to 3.5 GHz: <–156 dBm (typical: –162 dBm)

1 dB gain compression: (Separation: Resolution bandwidth x 15, 50 kHz min.)
- 10 to 200 MHz: >+2 dBm (typical: +5 dBm)
- 200 MHz to 3.5 GHz: >+7 dBm (typical: +10 dBm)
- 3.5 to 7.5 GHz: >–5 dBm (typical: –2 dBm)
- 7.5 to 32 GHz: >–3 dBm (typical: 0 dBm)

2nd order harmonic distortion:
- 10 MHz to 1.75 GHz: <–60 dBc (mixer level: –20 dBm)
- >1.75 GHz: <–90 dBc (mixer level: –10 dBm)

3rd order intercept point (TOI): (Mixer level: –20 dBm, separation: 25 kHz)
- 10 to 200 MHz: >+12 dBm (typical: +16 dBm)
- 200 to 500 MHz: >+16 dBm (typical: +20 dBm)
- 500 MHz to 1 GHz: >+20 dBm (typical: +24 dBm)
- 1 to 2 GHz: >+21 dBm (typical: +25 dBm)
- 2 to 3.5 GHz: >+22 dBm (typical: +26 dBm)
- 3.5 to 7.5 GHz: >+5 dBm (typical: +10 dBm)
- 7.5 to 32 GHz: >+8 dBm (typical: +12 dBm)

Image/multiple/out-band spurious

Spectrum analysis mode:
- 10 MHz to 15.4 GHz: <–70 dBc
- 15.4 to 26.5 GHz: <–65 dBc
- 26.5 to 32.0 GHz: <–60 dBc

Residual spurious (Spectrum analysis mode, no input, input terminated, input ATT.: 0 dB)
- Preamplifier on: 1 MHz to 3.5 GHz: <–95 dBm
- Preamplifier off: 1 MHz to 32 GHz: <–90 dBm

Input/Output

RF input	
Connector:	K type (male), front panel
Impedance:	50 Ω (nominal)
VSWR:	(Input ATT.: ≥10 dB, at the specified frequency) <1.5: 1 (<3.5 GHz) (nominal) <2.0: 1 (>3.5 GHz) (nominal)
Calibration signal output	
Connector:	BNC (female), front panel
Impedance:	50 Ω (nominal)
Frequency:	50 MHz
Probe power source	
Connector:	4-pin connector, front panel
Output voltage and current:	±15 V, 150 mA (nominal)
I/Q input	
Connector:	BNC (female), front panel
Impedance:	50 Ω (nominal), AC/DC coupling
Maximum input amplitude:	1.0 Vp-p (DC ±0.5 V or less)
External trigger input 1	
Connector:	BNC (female), rear panel
Impedance:	10 kΩ (nominal), DC coupling
Trigger level:	TTL level
External trigger input 2	
Connector:	BNC (female), rear panel
Impedance:	10 kΩ (nominal), DC coupling
Trigger level:	0 to 5 V
Trigger output	
Connector:	BNC (female), rear panel
Amplitude:	TTL level
Frequency reference input	
Connector:	BNC (female), rear panel
Impedance:	50 Ω (nominal)
Frequency:	5 to 20 MHz
Amplitude:	0 dBm ±5 dB
10 MHz frequency reference output	
Connector:	BNC (female), rear panel
Impedance:	50 Ω (nominal)
Frequency:	10 MHz
Amplitude:	0 dBm ±5 dB
21.4 MHz IF output	
Connector:	BNC (female), rear panel
Impedance:	50 Ω (nominal)
Frequency:	21.4 MHz
Amplitude:	Mixer level: +2 dB (typical at 50 MHz)
I/O	
Keyboard:	PS/2 101/106 keyboard, front panel
Mouse:	PS/2 mouse, front panel
USB:	Front panel
GPIB:	Conforming to IEEE-488.2, rear panel
LAN port:	10 Base-T, supporting TCP/IP, rear panel
Printer port:	Conforming to IEEE-1284-1994, rear panel
Signal for external indicator:	15-pin D-subconnector (VGA), rear panel

Notice: RS232 and EXT IN 1 to 4 connectors are not available.

General specifications

Operating environment range:	Ambient temperature: +5 to +40°C Relative humidity: 80% or less (No condensation)
Storage environment range:	Ambient temperature: –20 to +60°C Relative humidity: 80% or less (No condensation)
AC power input:	100 to 120 VAC, 50 Hz/60 Hz 220 to 240 VAC, 50 Hz/60 Hz (automatic switching between 100 VAC and 220 VAC)
Power consumption:	500 VA or less Approx. 220 VA (excluding options)
Dimensions:	Approx. 424 (W) x 266 (H) x 530 (D) mm
Mass:	32 kg or less (excluding options)

Options

OPT.22 High-stability frequency reference source

Reference frequency stability	
Aging rate:	±3 x 10^{-10}/ day, ±2 x 10^{-8}/ year
Temperature stability:	±5 x 10^{-9} (5 to 40°C, with frequency at 25°C as reference)
Warm-up (nominal):	(At 25°C, the frequency at 24 hours after power is turned on is used as a reference) ±1 x 10^{-8}/30 minutes ±5 x 10^{-9}/60 minutes
Reference frequency error:	±(Time elapsed from the latest factory calibration x Aging rate + Temperature stability)

OPT.68 OFDM modulation analysis function

Temperature range:	Ambient temperature: +20 to +30°C
EVM	(100-symbol RMS value when S/N >40 dB IEEE802.11a, HiperLAN/2, HiSWANa signals are measured with the equalizer on)
Residual EVM:	–40 dB or less
Center frequency error	(S/N >40 dB, 2. 1000-symbol average)
Measuring range	
Standard signal	
IEEE802. 11a:	±312.5 kHz
HiperLAN/2, HiSWANa:	±312.5 kHz (at broadcast burst and uplink burst) ±125 kHz (at downlink burst)
User table	±Subcarrier frequency interval x 0.25
Measurement accuracy:	±(100 Hz + Center frequency x Reference frequency error)
Amplitude measurement:	(After automatic calibration, S/N >40 dB, preamplifier off, input ATT.: 10 dB, 100-symbol average)
Frequency response (Band 1M):	<±1.0 dB (3.5 to 6 GHz)
Power measurement accuracy:	<±(0.2 dB + Frequency response)
Residual center frequency leakage power:	–40 dB (at the subcarrier average power)

Ordering information

Accessories

Power cable:	A01402	1
Input cable (50 Ω):	A01261-30	1
K (f)–K (f) adapter:	5A-SFF40 (A)	1
SMA (f) – SMA (f) adapter:	HRM-501	1
SMA (m) – BNC (m) adapter:	HRM-517 (09)	1
Stylus pen:	ST-PEN	1

Options

High-stability frequency reference source:	OPT.22
OFDM modulation analysis function:	OPT.68

Accessories (optional)

Rack-mount set B:	A02724	EIA standard
	A02725	JIS standard
Panel extension cable (3 m):	A112003	

Please be sure to read the product manual thoroughly before using the products. Specifications may change without notification.

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