Spectrum Analyzers

Selection Guide

Function and features / Basic product features	Frequency range	Input impedance	Maximum resolution	Maximum input sensitivity	Digital radio standards measurement	Digital modulation analysis	EMI measurement for EMC	Tracking generator	External interface	Battery operation	Page
R3681 • Frequency range: 20 Hz to 32 GHz • World's highest dynamic range measurement Average display noise level: -158 dBm 1dB compression point: +10 dBmTertiary intermodulation distortion (TOI): +26 dBm • Equipped with broadband 25 MHz modulation analysis function • OFDM modulation analysis option for wireless LAN available	20 Hz to 32 GHz	50Ω	1 Hz	-162 dBm (Preamplifier ON)	○	○	—	○	GPIB LAN printer	—	74
R3273 • Wide dynamic range of -137 dB and higher • Excellent signal purity: -118 dBc/Hz • High-speed zero-span sweeping: 1µs • Supports modulation analysis and standards measurement for various digital communication (optional): W/N-CDMA, PDC, GSM, DECT, Bluetooth, etc. • 3.6 GHz tracking generator (optional) • FDD	100 Hz to 26.5 GHz (60 GHz at external mixer)	50Ω	1 Hz	-130 dBm +1.55f (GHz) dB	○	○	—	○	GPIB RS232 printer FD	—	82
R3267	100 Hz to 8 GHz										
R3182 • Frequency measurement up to 110 GHz • Highest performance of its class with low price • Low-noise design realizes excellent signal purity • High-speed measurement of 20 traces/s • Total level accuracy: ±1.5 dB • Built-in pre-amplifier • TFT color LCD display • FDD	9 kHz to 40 GHz (110 GHz at external mixer)	50Ω	1 kHz (Option: 30 Hz)	-113 dBm +3f (GHz) dB	—	—	●	○	GPIB RS232 printer FD	—	100
R3172	9 kHz to 26.5 GHz (110 GHz at external mixer)							—			
R3162	9 kHz to 8 GHz							○			106
R3132	9 kHz to 3 GHz										
R3132N		75Ω									
R3131A • Low-price general purpose type • Employs synthesizer local oscillator • One-touch auto tuning function • Easy-to-see measured value display magnification function	9 kHz to 3 GHz	50Ω	300 Hz	-113 dBm +2f (GHz) dB	—	—	●	○	GPIB RS232 printer FD	—	112
U3661 • Small-size, light-weight: 6.9 kg (U3661: 8 kg) • Three power sources can be used including battery operation • Synthesizer local oscillator • High-speed sweeping: 50 µs • Capable of AVG POWER and TOTAL POWER measurements • Equipped with 2 IC card slots	9 kHz to 26.5 GHz	50Ω	1 kHz (Option: 100 Hz)	-132 dBm +3f (GHz) dB	—	—	—	○	GPIB RS232 IC card FD	●	92
U3641	9 kHz to 3 GHz			-135 dBm +4.3f (GHz) dB							94
U3641N		75Ω		-26 dBµm +4.3f (GHz) dB							

● : Standard ○ : Applies when used with accessories or other equipment.
GPIB interface provided standard on all models.
*: Direct printing by ESC/P or PCL command.

High Performance Spectrum and Broadband Modulation Analysis in One Versatile Instrument

R3681

- **Frequency Range: 20 Hz to 32 GHz**
- **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**

NEW

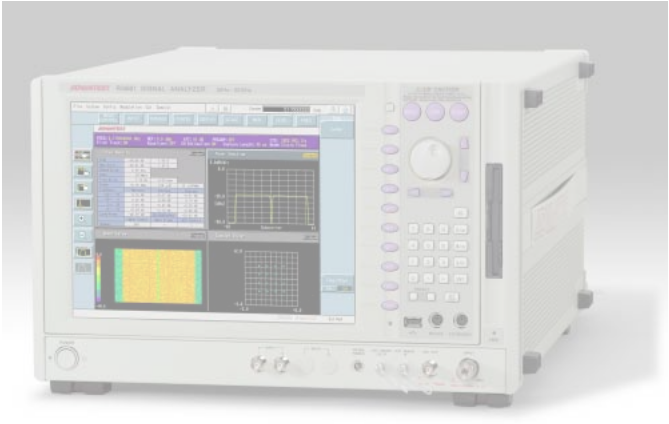
R3681
Signal Analyzer

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 a high performance analyzer to meet all the requirements. Employing our unique RF technology, the R3681 achieves an Average Display Noise Level of-158 dBm *1), a Third-Order Intercept Point (TOI) specification of +2dBm *2), and a signal purity of -122 dBc/Hz *3) to enable extremely wide dynamic range measurements. Especially, the R3681 has a unique noise correction function that enables wide dynamic range measurements of -84 dBc (typical). The R3681 supports digital modulation analysis for W-LAN signals (IEEE802.11s/b/g, HiperLAN/2, 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.



High Performance Spectrum and Broadband Modulation Analysis in One Versatile Instrument

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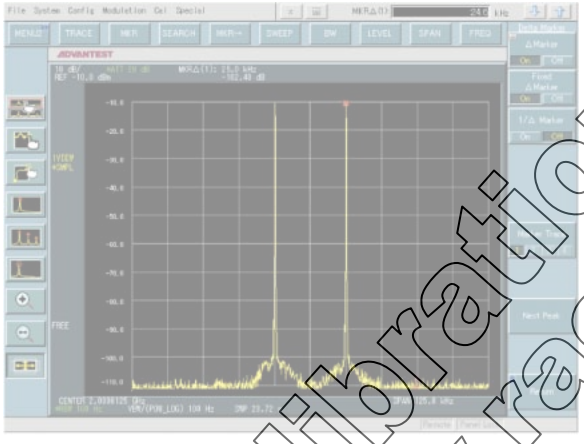
■ Dynamic Range Measurement that is the Best in the World

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

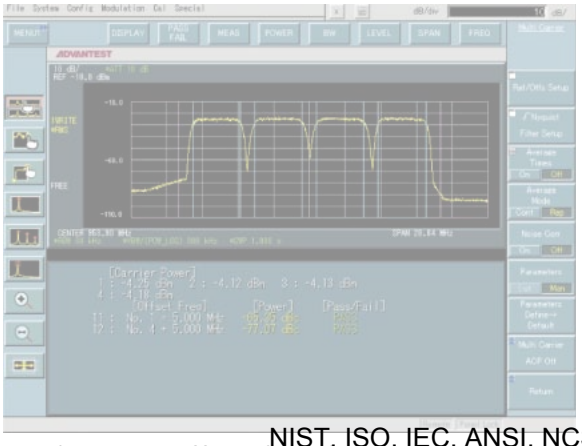
- Average Display Noise Level: -158 dBm (typ. 1 GHz)
- Built-in Preamplifier On: -168 dBm (RBW = 1 Hz, 1 GHz)
- 1 dB Compression Point: +10 dBm (typ. 200 MHz to 3.5 GHz)
- Third-Order Intercept Point (TOI): +26 dBm (typ. 2 to 3.5 GHz)
- Signal Purity (at 800 MHz)
  10 kHz Offset: -120 dBc/Hz or more
  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) >

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)

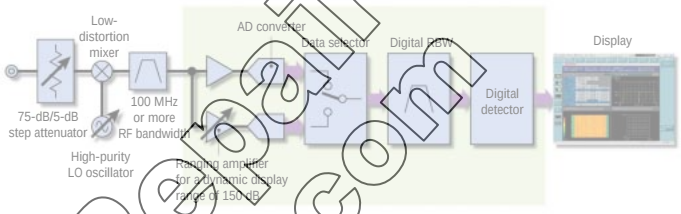


< Sample measurement of four-carrier signal W-CDMA ACLR measurement >

■ 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



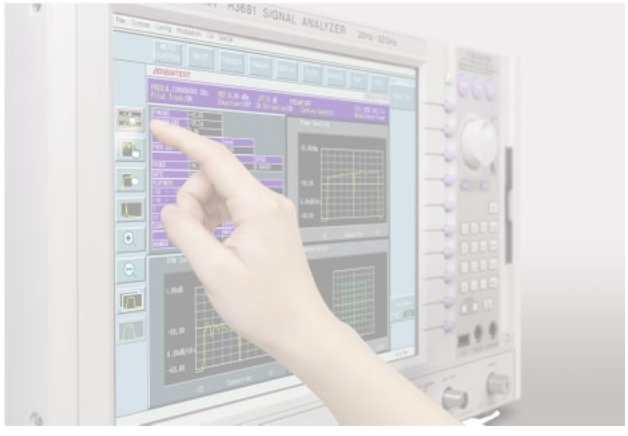
■ Easy Operation with Measurement Tools

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 wave-form 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



New Signal Analyzer for the Ubiquitous Networking Era

R3681

■ 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

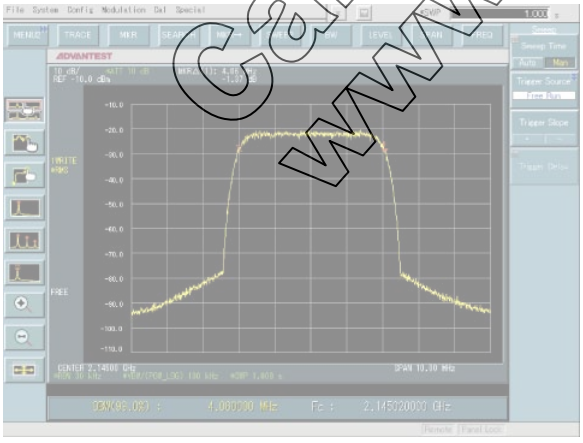
Power Measurement Mode

Power measurement (Channel Power/Avg. Power/Total Power), broadband CCDF measure-ment, 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, fre-quency counter (0.01 Hz resolution), and more

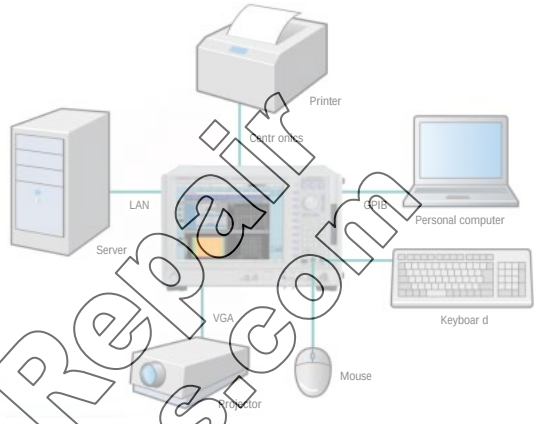
< Spectrum emission mask function >



< Sample measurement of occupied bandwidth >

■ 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 with-out extra processing.

High Performance Spectrum and Broadband Modulation Analysis in One Versatile Instrument

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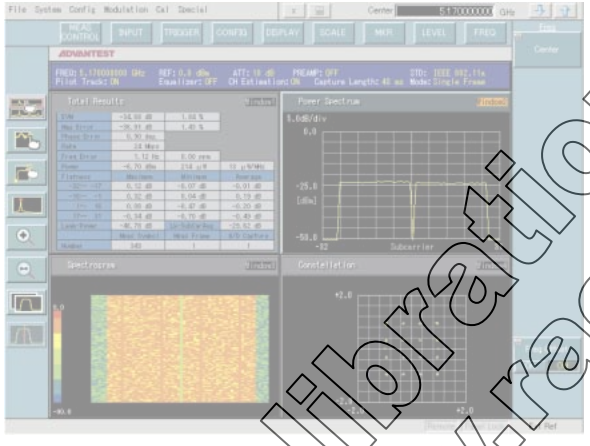
■ W-LAN Modulation Analysis
OFDM Modulation Analysis Function (OPT.68)

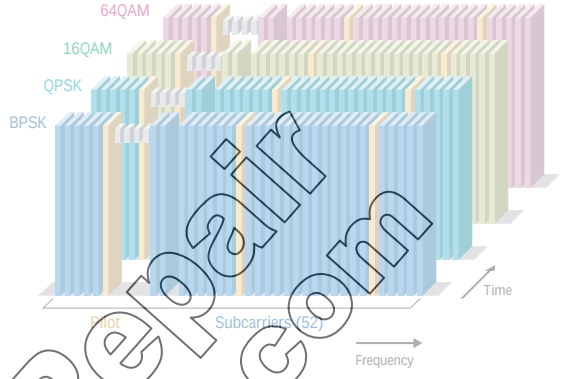
Adding Option 68, the broadband OFDM modulation analysis function, the R3681 enables IEEE802.11a, HiperLAN/2, and HiSWANa modulation signal analytical measurements. The R3681 will analyze RF Input, I/Q baseband input, and wide Wireless-LAN signals.

Main features

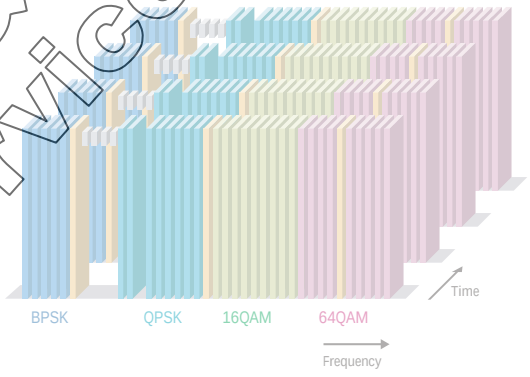
- Automatic detection for BPSK, QPSK, 16QAM, or 64QAM
- W-LAN signal analysis with a different modulation for each subcarrier
- W-LAN signal analysis without a preamble
- Signal analysis by the specified number of effective symbols
- I/Q baseband analysis
- Detailed modulation signal analysis using different 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



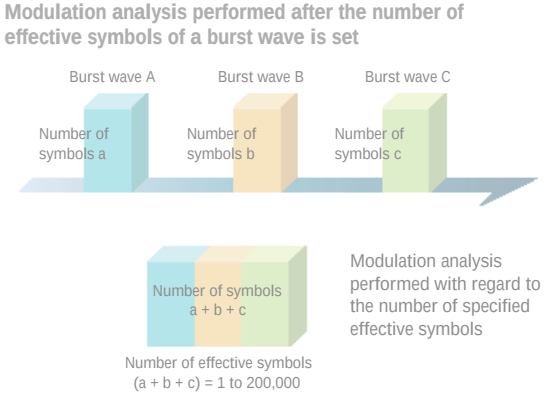
- **Automatic evaluation function for effective standard signal measurements**



- **W-LAN signal analysis function with a different modulation for each subcarrier**



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



New Signal Analyzer for the Ubiquitous Networking Era

R3681

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: $\pm 5 \times 10^{-8}$/day, $\pm 5 \times 10^{-7}$/year

Temperature stability: $\pm 1 \times 10^{-7}$
(at 5 to 40°C, with frequency at 25°C as reference)

Warm-up (nominal): $\pm 5 \times 10^{-7}$/minute

Reference frequency error:
±(Time elapsed from the latest factory calibration × Aging rate + Temperature stability)

Marker frequency counter (S/N >50 dB)

Accuracy: ±(Marker frequency × Reference frequency error + Residual FM)

Resolution: 0.01 Hz

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

Frequency stability (with internal reference frequency source)

Residual FM: ≤(3 Hz × Np-p)/100 ms

Frequency span

Range: 20 Hz to 32 GHz, 0 Hz (zero span)

Accuracy: ±1% (200 Hz ≤Span)
±1 × 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

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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: on, 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 × 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

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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 k(nominal), DC coupling
- Trigger level: TTL level

External trigger input 2
- Connector: BNC (female), rear panel
- Impedance: 10 k(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) × 266 (H) × 530 (D) mm

Mass : 32 kg or less (excluding options)

Options

OPT.22 High-stability frequency reference source

Reference frequency stability

Aging rate : ±3 × 10^{-10}/day, ±2 × 10^{-8}/year

Temperature stability : ±5 × 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 × 10^{-8}/30 minutes
±5 × 10^{-9}/60 minutes

Reference frequency error : ±(Time elapsed from the latest factory calibration × 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 × 0.25

Measurement accuracy: ±(100 Hz + Center frequency × 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)

OPT.59 IEEE802.11b/g Modulation Analysis Software

IEEE802.11g (ERP-OFDM, DSSS-OFDM)

Temperature Range	Ambient Temperature: +20 degree to +30 degree
EVM	RMS value when measuring 100 symbols of IEEE802.11g ERP-OFDM and IEEE802.11g DSSS-OFDM signals of S/N>40dB with equalizer on
Residual EVM	-40dB or less
Center Frequency Error	(S/N>40dB, mean value of 1000 symbols)
Measurement Range	
IEEE802.11g (ERP-OFDM)	±312.5kHz
IEEE802.11g (DSSS-OFDM)	±124kHz
Measurement Accuracy	±(100Hz + Center Frequency x Frequency Reference Error)
Amplitude Measurement	(After auto calibration, S/N>40dB, Preamplifier OFF, Input attenuator 10dB, mean value of 100 symbols)
Frequency Response	
50MHz to 2.5GHz	<±0.4dB
20Hz to 3.5GHz	<±1.0dB
Power Measurement Accuracy	<±(0.2dB + Frequency Response)
Residual Center Frequency Leakage Power	-40dB (for Subcarrier Mean Power)

IEEE802.11b (DBPSK, DQPSK, CCK5.5Mbps, CCK11Mbps)
IEEE802.11g (ERP-DSSS,ERP-CCK)

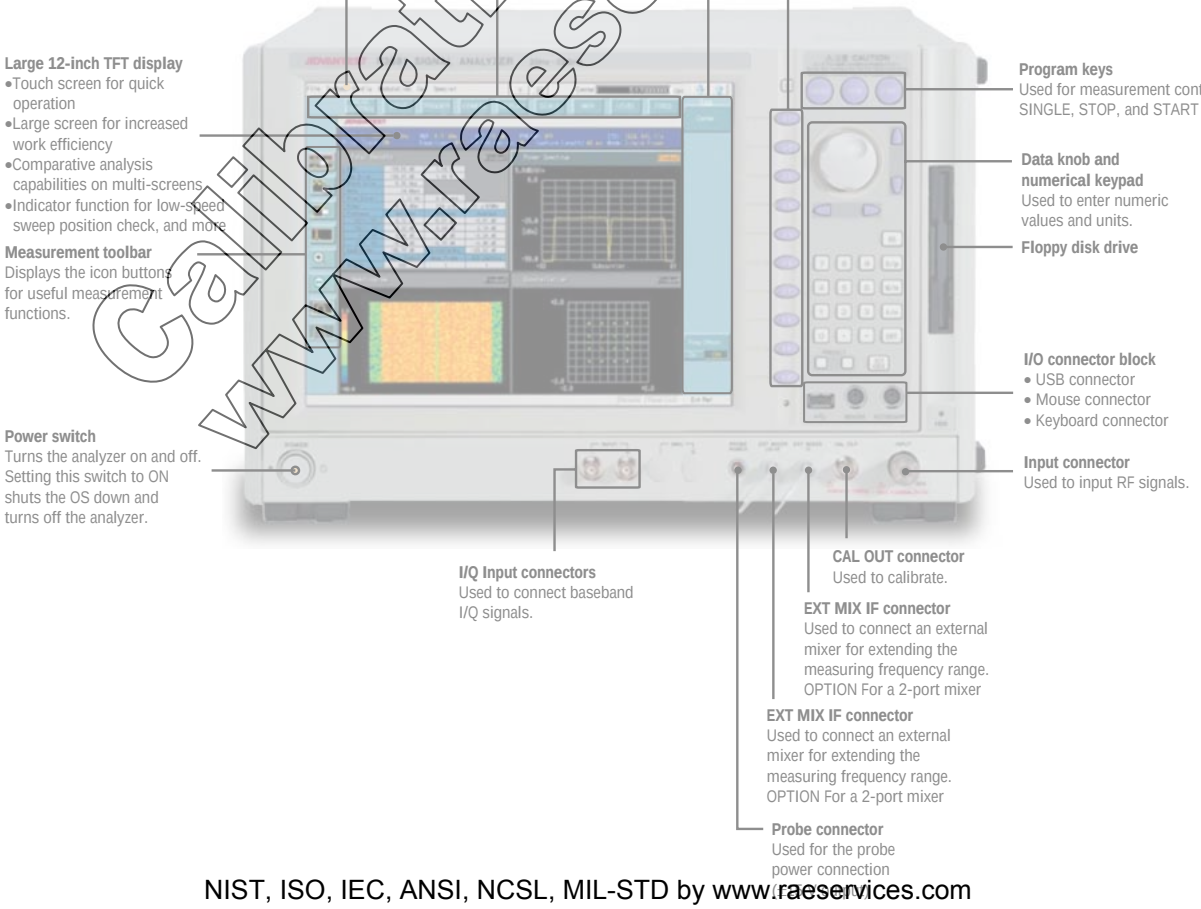
Temperature Range	Ambient Temperature: +20 degree to +30 degree
EVM	RMS value when measuring IEEE802.11g DOQPSK signals of S/N>40dB for 1000 chips
Residual EVM	2% or less
Center Frequency Error	(S/N>40dB, mean value of 1000 chips)
Measurement Range	±124kHz
Measurement Accuracy	±(20Hz + Center Frequency x Frequency Reference Error)
Amplitude Measurement	(S/N>40dB, mean value of 1000 chips)
Measurement Range	±45ppm
Measurement Accuracy	±2ppm
Analysis Range	
Number of Chips	Up to 30000 chips (including PLCP)

Accessories (optional)

Rack-mount set B: A02724 EIA standard
A02725 JIS standard

Panel extension cable (3 m): A112003

FRONT PANEL

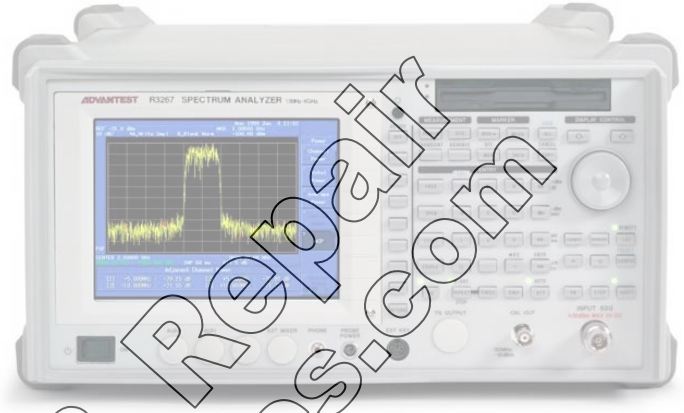


Spectrum Analyzers

8GHz/26.5GHz For Testing and Evaluation of Next Generation Mobile Communication Systems such as W-CDMA.

R3267/3273

- **Wide frequency range:**
  R3267 ; 100Hz to 8GHz
  R3273 ; 100Hz to 26.5GHz
  26.5GHz to 60GHz (External mixer option)
  Synchronization available up to 325 GHz
- **Resolution bandwidth (RBW):**
  10 Hz to 10 MHz, 5MHz (analog)
  1 Hz to 100 Hz (digital)
- **Wide dynamic range:**
  -145dBc/Hz (2GHz band, typ.)
  70dB or better for W-CDMA ACP measurement (5MHz offset, typ.)
- **1μs fast zero-span sweep**
- **Simplified, Automated measurements for mobile communications**
- **Digital modulation analysis options for 1G, 2G, and 3rd Generation : PHS, PDC, IS-136, GSM, DECT, EDGE, GPRS IS-95, W-CDMA/3GPP, cdma2000, Bluetooth**



R3267/3273
Spectrum Analyzer

The R3267/3273 are high-performance multifunction spectrum analyzers with the basic functions necessary to meet the demand for wider frequency range and a higher C/N ratio for next-generation digital mobile communications.

■ 10MHz resolution bandwidth for wide signal range

Offers an RBW of 10MHz enabling accurate analysis of the rise and fall characteristics of high-speed amplitude modulated signals. The analog RBW extends down to 10Hz providing wide dynamic measurement. Since the R3267/3273 also support the digital resolution bandwidth (RBW) from 1 Hz to 100 Hz, they are suitable for high-resolution measurement.

■ Enables measurement with wide dynamic range

To maximize the dynamic range of input signal amplitude, the R3267/3273 have inputs with low distortion characteristics and reduced average noise levels. A wide dynamic range of measurement of -145dBc/Hz (at 2GHz, typ.) with a 0dBm signal input.

■ Low distortion design ideal for inter-modulation measurement

Two-signal 3rd order inter-modulation distortion is essential for evaluating RF modules and wireless transmission devices. To provide this function the spectrum analyzer itself must have a low modulation design. The R3267 offers a high performance of -90dBc or less in the 1.6GHz to 8GHz range.

■ Advance digital modulation analysis (option)

The R3267/3273 support both spectrum analysis and modulation analysis in a single unit. In addition to major existing mobile communication standards, the R3267/3273 can also support advanced standards such as W-CDMA/3GPP and cdma2000.

OPT.01	Digital Modulation Analysis Hardware
OPT.61	cdmaOne Analysis Software
OPT.62	W-CDMA/3GPP Analysis Software
OPT.63	GSM//DECT/EDGE Analysis Software
OPT.64	PDC/PHS/IS-136 Analysis Software
OPT.65	cdma2000 Analysis Software
OPT.66	Bluetooth Analysis Software
OPT.67	1xED-DO(HDR) Analysis Software
OPT.73	AMPS/JTACS/NTACS Analysis Software

Note1 : The digital modulation analysis option OPT.01 is required for installing the analysis software options (OPT.61 to OPT.66, OPT.73).
Note2 : For installing any of options OPT.61 to OPT.66, OPT.73 up to five options can be installed simultaneously

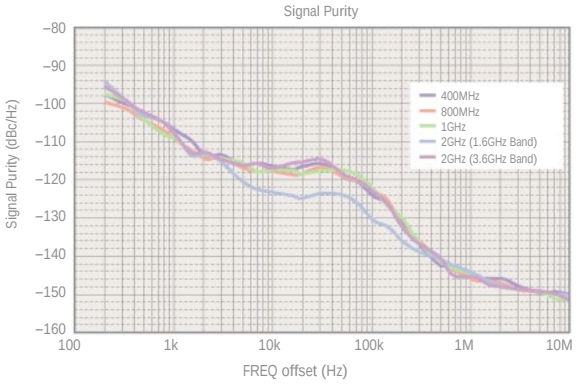
OPT.02	Memory Card Drive (swapped with floppy disk drive)
OPT.08	Rx Control (for R3560/3561/3562)
OPT.10	High-Accuracy Power Measurement (for PDC-BS)
OPT.11	High-Accuracy Power Measurement (for 3GPP-BS)
OPT.12	High-Accuracy Power Measurement (for cdma2000-BS)
OPT.16	External mixer (26.5GHz to 40GHz)
OPT.17	External mixer (40GHz to 60GHz)
OPT.21	High-stability Frequency Reference Source ($\pm 5 \times 10^{-9}$/day)
OPT.22	High-stability Frequency Reference Source ($\pm 3 \times 10^{-10}$/day)
OPT.23	Rubidium Frequency Reference Source ($\pm 1 \times 10^{-10}$/month)
OPT.25	Reference Converter
OPT.74	Tracking generator (with attenuator)

Note: Options OPT.16 and OPT.17 are for the R3273 only.

■ Key Functions

• High-level signal purity

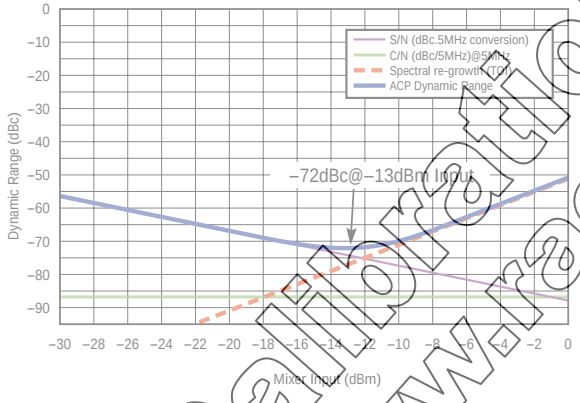
The advanced RF technology of ADVANTEST enables signal purity of -145 dBc/Hz (at 2GHz band, 5MHz offset, typical value). -145dBc/Hz (typ.) dynamic range can be measured within a 2GHz band.



< Phase Noise Characteristics (typ.) >

• Wide Dynamic Range ACP

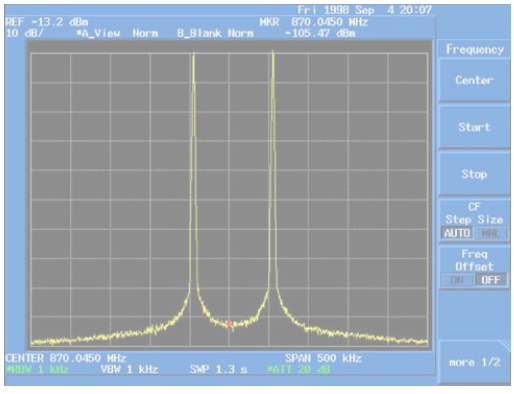
Offering the highest basic functionality in their class, the R3267/3273 ensure an ACP dynamic range of 70dBc or more (typ.) in W-CDMA ACP measurement.



< Dynamic Range of W-CDMA Measurement (5MHz offset) >

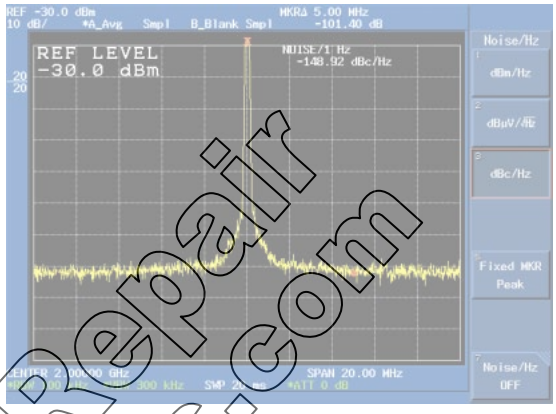
• Low Distortion

These spectrum analyzers offer high performance for 2-signal 3rd order inter-modulation distortion, the R3267 delivering 90dBc or more in the 1.6 to 8GHz band. This makes them ideal for evaluating inter-modulation in transmission amplifiers and so on.



< Example of 2-signal 3rd Order Inter-modulation Distortion>

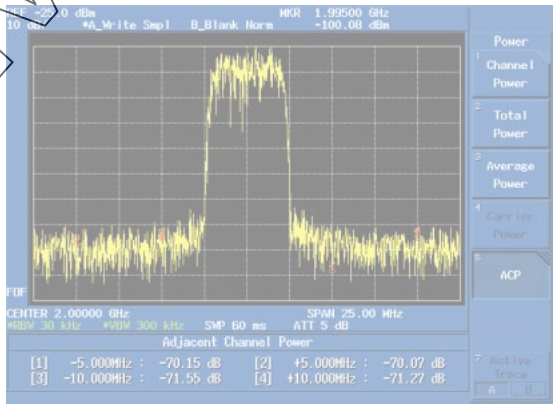
Realizes -148dBc/Hz (typ.) phase noise in the W-CDMA transmission signal band at 5MHz detuning.



< Example of Signal Purity >

Variety of ACP Measurement Methods

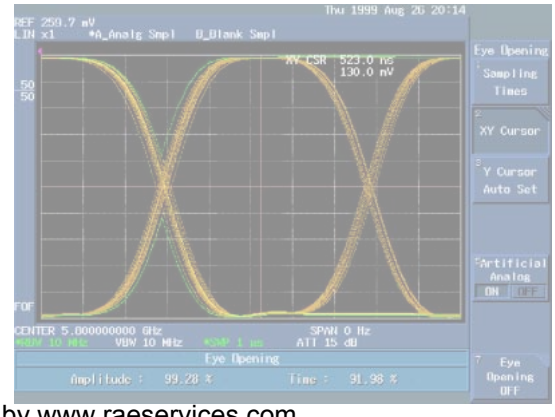
- Full mode calculated from 1 screen of trace data
- SEPA mode can separately sweep and calculate a specified channel and the adjacent channels above and below it.
- CARRIER mode in which a carrier power and an adjacent channel power are separately specified using a window.



< Example of W-CDMA ACP Measurement >

• High-Speed Zero-Span Sweep

The R3267/3273 feature high-speed transient signal analysis in the time domain sweep with a high speed of 1μs/and a 10MHz IF bandwidth filter.

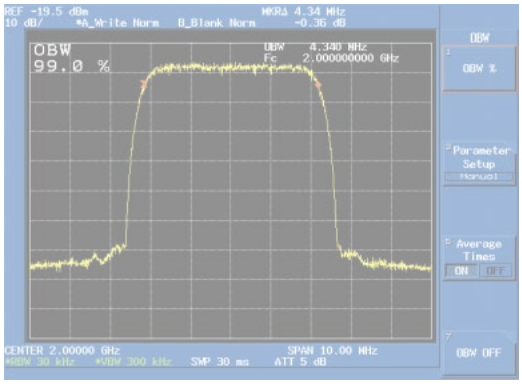


< Example of Fast Time-Domain Measurement >

8GHz/26.5GHz For Testing and Evaluation of Next Generation Mobile Communication Systems such as W-CDMA.

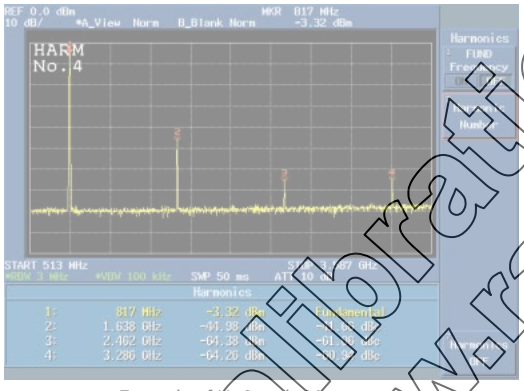
R3267/3273 (Continued From Previous Page)

• Occupied Bandwidth Measurement
The spectrum analyzer can calculate the bandwidth of a specified power ratio from measured spectrum data and display the OBW. A frequency span accuracy of 1% or better enables highly accurate OBW measurement.



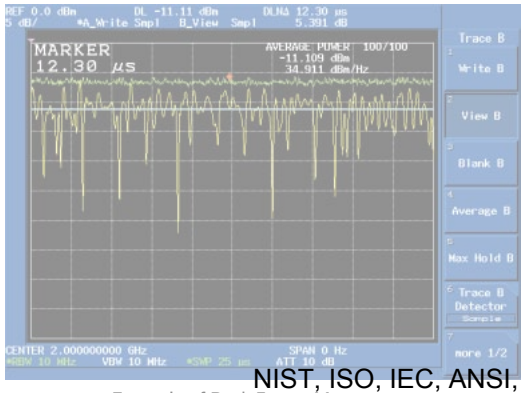
< Example of OBW Measurement >

• One Touch Harmonic Measurement
Automatic measurement of harmonics is possible simply by inputting the frequency of the fundamental waveform and the order of the harmonic you want to measure.



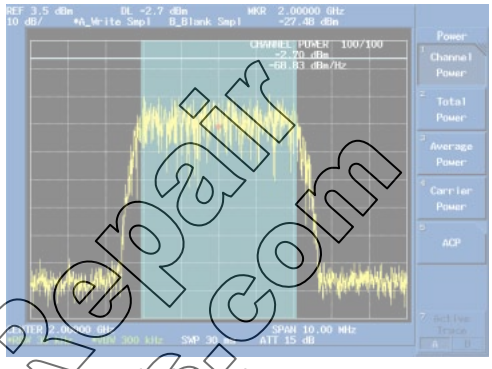
< Example of Harmonic Measurement >

• Simultaneous 2-Trace Measurement
The R3267/3273 have a two-trace display function, and POSI, NEGA or SAMPLE detector modes can be specified separately for each trace. In addition, both traces are sampled simultaneously, allowing true simultaneous measurement of two traces. For example, it is possible to measure the peak factor by simultaneously sampling the POSI peak and AVE power.



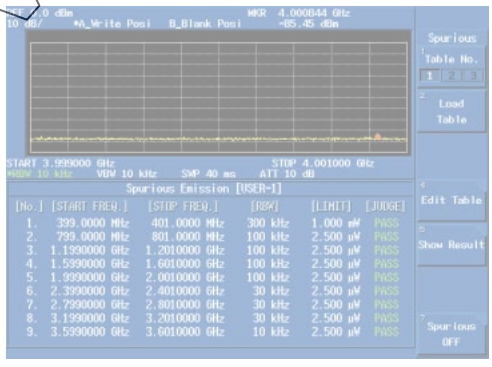
< Example of Peak Factor Measurement >

• Power Calculation Function
The R3267/3273 have a built-in power calculation function for burst signals with large amplitude variations typical of PDC and PHS, and for wide frequency range signals such as CDMA and OFDM. Measurement accuracy can be increased by executing PBW Cal. to calibrate the pass band characteristics of the IF band filter.



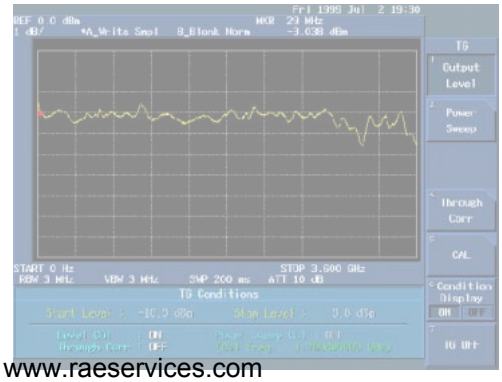
< Example of Channel Power Measurement >

• Spurious Measurement
A wide band spurious search can require a long time for measurement, but this time can be dramatically reduced by running the spurious search using a sweep table corresponding to known spurious map. The R3267/3273 allow you to create up to 10 tables of sweep start and stop frequencies.



< Example of Spurious Measurement >

• Tracking Generator (OPT.74)
An optional 100kHz to 3.6GHz signal generator that is synchronized to the R3267/3273 frequency sweep can be built into the signal analyzer. This lets you directly view the frequency characteristics of filters and amplifiers. The power sweep function provides a continuously variable output level from 0dBm to -50dBm enabling you to view the saturation characteristics of amplifiers and other devices.



< Tracking Generator Function (Option) >

8GHz/26.5GHz For Testing and Evaluation of Next Generation Mobile Communication Systems such as W-CDMA.

R3267/3273

■ Optional Modulation Analysis for Next Generation Mobile Communications

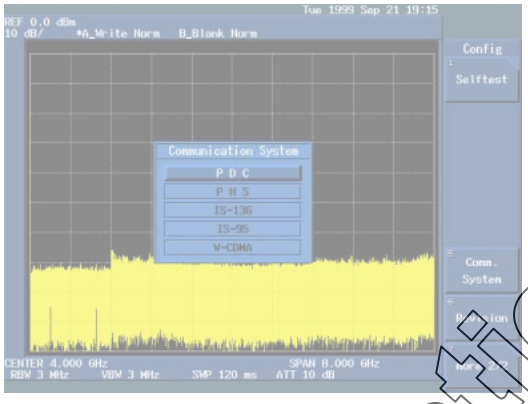
Modulation analysis options for analyzing transmission characteristics in 3rd generation mobile communication systems such as W-CDMA, 3GPP and cdma2000, as well as existing digital mobile communication systems, are available for the R3267/3273. By combining the digital modulation analysis hardware option (OPT.01) and the appropriate analysis software option, it is possible to measure compliance with standards and analyze signal modulation for transmission systems including W-CDMA, 3GPP, PDC, PHS, IS-136, GSM, EDGE, GPRS, DECT, cdmaOne (IS-95), cdma2000, Bluetooth.

A single signal analyzer can support a number of communication systems (up to five options can be installed) for greater efficiency on the production line or in the field.

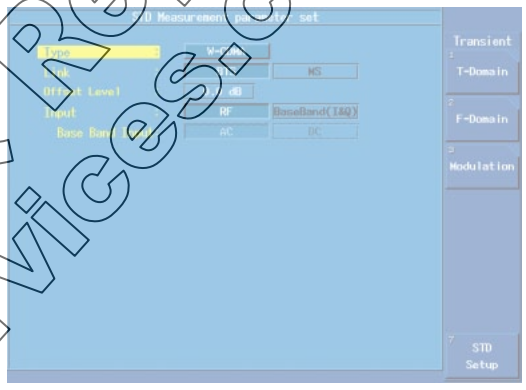
OPT.01 Digital Modulation Analysis Option (hardware)
OPT.61 cdmaOne (IS-95) Analysis Software
OPT.62 W-CDMA/3GPP Analysis Software
OPT.63 GSM/DECT/EDGE (incl. DCS1800/1900)Analysis Software
OPT.64 PDC/PHS/IS-136 Analysis Software
OPT.65 cdma2000 Analysis Software
OPT.66 Bluetooth Analysis Software
OPT.67 1xED-DO (HDR) Analysis Software
OPT.73 AMPS/JTACS/NTACS Analysis Software

Note 1: For installing any of options OPT.61 to OPT.67 and OPT.73 up to five options can be installed simultaneously.
Note 2: OPT.01 is required for integrating any of options OPT.61 to OPT.67 and OPT.73.

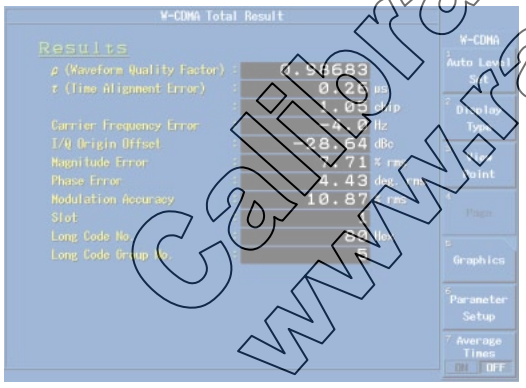
• **Communications System Selection Screen**



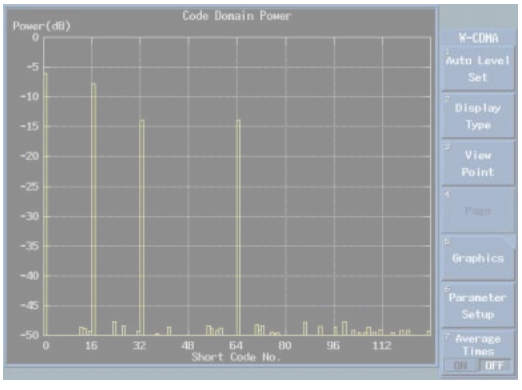
• **Example of STD Setting Screen**



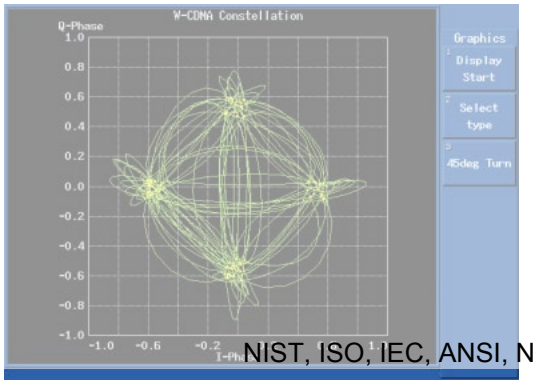
• **Example of Modulation Analysis**



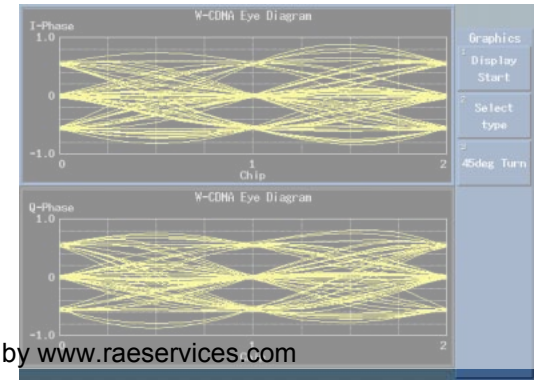
• **Example of Code Domain Power Measurement**



• **Example of Constellation**



• **Example of Eye Diagram**



8GHz/26.5GHz For Testing and Evaluation of Next Generation Mobile Communication Systems such as W-CDMA.

R3267/3273 (Continued From Previous Page)

Specifications

R3267 Specifications

Frequency

Frequency range: 100 Hz to 8 GHz

Frequency	Frequency band	Harmonic order N
100 Hz to 3.5 GHz	0	1
1.6 to 3.5 GHz	1	1
3.5 to 7 GHz	2	1
6.9 to 8 GHz	3	1

Built-in YIG tuning pre-selector at 1.6 to 8 GHz

Frequency span

Range ; 20 Hz to 8 GHz, Zero span
Accuracy ; ±1%

Signal purity (dBc/Hz)

	Offset			
Frequency	1 kHz	10 kHz	100 kHz	1 MHz
100 Hz to 1 GHz	-100	-113	-118	-135
1 to 2.6 GHz	-100	-110	-118	-135
2.6 to 8 GHz	-98	-108	-112	-135

Input attenuator range: 0 to 75 dB (5 dB step)

Dynamic range

Average noise level

(Resolution bandwidth 100 Hz, input ATT 0 dB, video bandwidth 1 Hz)

Frequency	Frequency band	Average noise level
1 kHz	0	-90 dBm
10 kHz	0	-100 dBm
100 kHz	0	-101 dBm
1 MHz	0	-125 dBm
1 MHz to 3.5 GHz	0	- (130 - f (GHz)) dBm
1.6 to 3.5 GHz	1	-125 dBm
3.5 to 7 GHz	2	-125 dBm
6.9 to 8 GHz	3	-125 dBm

Average noise level

(Resolution bandwidth 1 Hz (digital), input ATT 0 dB)

Frequency	Frequency band	Average noise level
10 kHz	0	-120 dBm
100 kHz	0	-121 dBm
1 MHz	0	-141 dBm
10 MHz to 3.5 GHz	0	- (150 - f (GHz)) dBm
1.6 to 3.5 GHz	1	-145 dBm
3.5 to 7 GHz	2	-145 dBm
6.9 to 8 GHz	3	-145 dBm

1dB gain compression

10 to 100 MHz ; -3 dBm
100 MHz to 8 GHz ; 0 dBm

Spurious response

2nd-order harmonic distortion

	Frequency	Frequency band	Mixer level
<-70 dBc	10 MHz to 3.5 GHz	0	-30 dBm
<-90 dBc	> 1.6 GHz	1, 2, 3	-10 dBm

2-tone 3rd-order intermodulation distortion
(When using the digital filter, distortion measurement should be performed on condition that Δf >5 kHz)

	Frequency	Frequency band	Mixer level
<-70 dBc	10 to 100 MHz	0	-30 dBm
<-80 dBc	100 MHz to 1 GHz	0	-30 dBm
<-85 dBc	1 to 3.5 GHz	0	-30 dBm
<-90 dBc	1.6 to 8 GHz	1, 2, 3	-30 dBm

Image/multiple/out-band response

<-70 dBc (10 MHz to 8 GHz)

Residual response(No input, input ATT 0 dB, 50Ω termination)

<-100 dBm ; 1 MHz to 3.5 GHz
<-90 dBm ; 300 kHz to 8 GHz

Amplitude accuracy

Frequency response

(Input ATT 10 dB, after tuning pre-selector for bands 1 to 3)

Frequency	Frequency band	In-band flatness (correlation value)
100 Hz to 3.5 GHz	0	±1.5 dB
50 MHz to 2.6 GHz	0	±1.0 dB
3.5 to 7.5 GHz	1	±1.5 dB
7.4 to 15.4 GHz	2	±3.5 dB
15.4 to 26.5 GHz	3	±4.0 dB

Additional error by band switching: ± 0.5 dB
Flatness with 30 MHz calibration signal as reference: ± 3.0 dB (100Hz to 8.0 GHz)
Input ATT switching error (Reference 10 dB at 15 to 75 dB) **:**

Frequency	Error
100 Hz to 8 GHz	±1.1 dB/5 dB steps, max. 2.0 dB

R3273 Specifications

Frequency

Frequency range: 100 Hz to 26.5 GHz
26.5 to 60 GHz (with external mixer; tuning possible up to 325 GHz)

Marker frequency counter (SPAN < 1 GHz) :

Frequency	Frequency band	Harmonic order N
100 Hz to 3.5 GHz	0	1
3.5 to 7.5 GHz	1	1
7.4 to 15.4 GHz	2	2
15.2 to 26.5 GHz	3	4

Built-in YIG tuning pre-selector at 3.5 to 26.5 GHz

Frequency span :

Range ; 20 Hz to 26.5 GHz, Zero span
Accuracy ; ±1%

Signal purity (dBc/Hz)

	Offset			
Frequency	1 kHz	10 kHz	100 kHz	1 MHz
100 Hz to 1 GHz	-100	-113	-118	-135
1 to 2.6 GHz	-100	-110	-118	-135
2.6 to 7.5 GHz	-98	-108	-112	-135
7.4 to 15.4 GHz	-89	-102	-106	-129
15.2 to 26.5 GHz	-83	-96	-100	-123

Input ATT range : 0 to 70 dB (10 dB steps)

8GHz/26.5GHz For Testing and Evaluation of Next Generation Mobile Communication Systems such as W-CDMA.

R3267/3273

Dynamic range

Average noise level :

(Resolution bandwidth 100 Hz, input ATT 0 dB, video bandwidth 1 Hz)

Frequency	Frequency band	Average noise level
1 kHz	0	-90 dBm
10 kHz	0	-100 dBm
100 kHz	0	-101 dBm
1 MHz	0	-125 dBm
10 MHz to 3.5 GHz	0	- (130 - f (GHz)) dBm
3.5 to 7.5 GHz	1	-125 dBm
7.4 to 15.4 GHz	2	-122 dBm
15.2 to 22.0 GHz	3	-120 dBm
22.0 to 26.5 GHz	3	-117 dBm

Average noise level :

(Resolution bandwidth 1 Hz (digital), input ATT 0 dB)

Frequency	Frequency band	Average noise level
10 kHz	0	-120 dBm
100 kHz	0	-121 dBm
1 MHz	0	-141 dBm
10 MHz to 3.5 GHz	0	- (150 - f (GHz)) dBm
3.5 to 7.5 GHz	1	-145 dBm
7.4 to 15.4 GHz	2	-142 dBm
15.2 to 22.0 GHz	3	-140 dBm
22.0 to 26.5 GHz	3	-137 dBm

1 dB gain compression:

10 to 100 MHz ; -3 dBm
100 MHz to 3.5 GHz ; 0 dBm
3.5 to 7.5 GHz ; -10 dBm
7.5 to 26.5 GHz ; -3 dBm

Spurious response

2nd-order harmonics distortion

	Frequency	Frequency band	Mixer level
<-70 dBc	10 MHz to 3.5 GHz	0	+30 dBm
<-100 dBc	>3.5 GHz	1, 2, 3	+10 dBm

2-tone 3rd-order intermodulation distortion

(When using the digital filter, distortion measurement should be performed on condition that Df >5 kHz)

	Frequency	Frequency band	Mixer level
<-70 dBc	10 to 100 MHz	0	-30 dBm
<-80 dBc	100 MHz to 1 GHz	0	-30 dBm
<-85 dBc	1 to 3.5 GHz	0	-30 dBm
<-70 dBc	3.5 to 7.5 GHz	1	-30 dBm
<-75 dBc	7.5 to 26.5 GHz	2, 3	-30 dBm

Image/multiple/out-band response :

<-70 dBc (10 MHz to 18 GHz)
<-60 dBc (10 MHz to 23 GHz)
<-50 dBc (10 MHz to 26.5 GHz)

Residual response(No input, input ATT 0 dB, 50Ω termination) **:**

<-100 dBm ; 1 MHz to 3.5 GHz
<-90 dBm ; 300 kHz to 26.5 GHz

Amplitude accuracy

Frequency response(Input ATT 10 dB, after tuning pre-selector, for bands 1 to 3)**:**

Frequency	Frequency band	In-band flatness (correlation value)
100 Hz to 3.5 GHz	0	±1.5 dB
50 MHz to 2.6 GHz	0	±1.0 dB
1.6 to 3.5 GHz	1	±1.5 dB
7.4 to 15.4 GHz	2	±3.5 dB
15.4 to 26.5 GHz	3	±4.0 dB

Additional error by band switching: ± 0.5 dB
Flatness with 30 MHz calibration signal as reference: ± 5.0 dB (100Hz to 26.5 GHz)

Input ATT switching error (Reference 10 dB, at 20 to 70 dB range) **:**

Frequency range	Error
100 Hz to 12.4 GHz	±1.1/10 dB steps, max. 2.0 dB
12.4 to 18 GHz	±1.3/10 dB steps, max. 2.5 dB
18 to 26.5 GHz	±1.8/10 dB steps, max. 3.5 dB

R3267/3273 Common Specifications

Frequency read accuracy :

± (Reading of Frequency × Frequency reference accuracy + Span × Span accuracy + 0.15 × Resolution bandwidth + 10 Hz)

Marker frequency counter (SPAN <1 GHz) **:**

Resolution; 1 Hz to 1 kHz
Accuracy (S/N >25 dB); ± (Marker frequency × Frequency reference accuracy + 5 Hz × N + 1LSD)
Delta counter; ± (Δ Frequency × Frequency reference accuracy + 10 Hz × N + 2LSD)

Frequency reference source :

Stability	Aging/day: $\pm 3 \times 10^{-8}$, Aging/year: $\pm 1 \times 10^{-7}$ Warm up (nominal) 3 minutes, $\pm 5 \times 10^{-8}$ (Reference: after 60 minutes)
Temperature stability	$\pm 1 \times 10^{-7}$ (0 to 40ºC)(with reference to the frequency when temperature is 25°C ±2°C)
OPT.21	
Stability	Aging/day: $\pm 5 \times 10^{-9}$, Aging/year: $\pm 8 \times 10^{-8}$ Warm up (nominal) 3 minutes, $\pm 5 \times 10^{-8}$ (Reference: after 60 minutes)
Temperature stability	$\pm 5 \times 10^{-9}$ (0 to 40ºC) (with reference to the frequency when temperature is 25°C ±2°C)
OPT.22*1	
Stability	Aging/day: $\pm 3 \times 10^{-10}$, Aging/year: $\pm 2 \times 10^{-8}$ $\pm 2 \times 10^{-8}$/30 minutes, $\pm 5 \times 10^{-9}$/60 minutes warm up (nominal) (Reference: after 24 hours)
Temperature stability	$\pm 5 \times 10^{-9}$ (0 to 50ºC) (with reference to the frequency when temperature is +25°C)
OPT.23*1	(Rubidium frequency reference source)
Stability	Frequency accuracy: $\pm 5 \times 10^{-9}$, Aging/month: $\pm 1 \times 10^{-10}$
Temperature stability	$\pm 1 \times 10^{-9}$ (0 to 40ºC, with reference to the frequency when temperature is +25°C)
Warm-up	$\pm 1 \times 10^{-9}$/15 minutes

*1 Probe power cannot be used when installing OPT.22 and OPT.23.

Frequency stability:

Residual FM (zero span) ; <3 Hz x Np-p/0.1 sec. N: Harmonics order
Drift; Same as reference value
(After 60 minute warm-up)

Resolution bandwidth (3 dB)**:**

Range; 1 Hz to 10 MHz (1, 3, 10 sequences), 5 MHz
Accuracy; ±25%: RBW = 3 MHz, 5 MHz
±15%: RBW = 100 Hz to 1 MHz
±25%(25 ºC ±10 ºC): RBW = 30 Hz
±10%: RBW = 1 to 100 Hz (digital filter)
Selectivity; <15:1 (RBW = 100 Hz to 5 MHz)
<20:1 (RBW = 30 Hz)
<5:1 (RBW = 1 to 100 Hz, digital filter)

Video bandwidth:

Range; 1 Hz to 10 MHz (1, 3, 10 sequences), 5 MHz

Frequency sweep:

Sweep time; Zero span: 1 µs to 1000 s
Span >0 Hz: 20 ms to 1000 s
Accuracy; ±3% (When using the digital filter, dynamic range measurement is not available)
Trigger; Free run, line, video, external, IF

Gated sweep:

Gate position/resolution; 100 ns to 1 s/100 ns
Gate value/resolution; 1 µs to 1 s/100 ns
Trigger; IF (Mixer input -40 dBm or more), external trigger, external gate

Delayed sweep

Delay time/resolution; 100 ns to 1 s/100 ns

8GHz/26.5GHz For Testing and Evaluation of Next Generation Mobile Communication Systems such as W-CDMA.

R3267/3273 (Continued From Previous Page)

Amplitude range

Measurement range:
+30 dBm, to average noise level
Maximum safety input:
Average continuous power (input ATT >10 dB) ;+30 dBm (1 W)
DC input; 0 V
Display range: 10 × 10 div.
Log mode; 10, 5, 2, 1, 0.5 dB/div
Linear mode; 10% of the reference level/div.
Reference level range:
Log; -140 to +60 dBm (0.1 dB steps)
Linear; 22.4 nV to 223 V (steps of about 1% of the full scale)
Calibration signal accuracy (30 MHz)**:** -10 dBm ±0.3 dB
IF gain error (After auto calibration)
0 to -50 dBm; ±0.5 dB
0 to -80 dBm; ±0.7 dB
Scale display accuracy (After automatic calibration)
Log ; 0 to -90 dB
Max. ±0.85 dB
±0.2 /1 dB
Linear ; ±5% of reference level
Resolution bandwidth switching error:
(Reference: RBW 300 kHz, after automatic calibration)
<±0.3 dB (RBW = 100 Hz to 5 MHz)
<±1.0 dB (RBW = 30 Hz)
<±0.5 dB (RBW = 1 to 100 Hz, digital filter)
Total level accuracy
Accuracy (typ.) ; ±1.0 dB
Frequency range: 50 MHz to 2.6 GHz
(frequency band 0)
Resolution bandwidth: 3 kHz to 1 MHz
Frequency span: <Resolution bandwidth × 20
Input ATT: 10 dB
Log scale display: 0 to -50 dB
Reference level: 0 to -50 dBm
Detection mode: Sample
Ambient temperature: 20 to 30 ºC
S/N: 20 dB or more

Input/Output

RF input
Connector ; N-type female (R3273 only: SMA convertible)
Impedance ; 50 Ω (nominal)
VSWR (Input ATT >10 dB, with set frequency) ;
<1.5:1 (<3.5 GHz) (nominal)
<2.1:1 (>3.5 GHz) (nominal)
Calibration signal output:
Connector ; BNC female, front panel
Frequency ; 30 MHz × (1 ± Frequency reference determined)
Impedance ; 50 Ω (nominal)
Amplitude ; -10 dBm ±0.3 dB
10 MHz frequency reference output
Connector ; BNC female, rear panel
Output impedance ; 50 Ω (nominal)
Output frequency accuracy ; 10 MHz ± Frequency reference accuracy
Output amplitude range ; 0 dBm ±5 dB
10 MHz frequency reference input
Connector ; BNC female, rear panel
Input impedance ; 50 Ω (nominal)
Input amplitude range ; -5 to +5 dBm
Probe power supply : ±12.6 V (100 mA) (nominal)
21.4 MHz IF output :
Connector ; BNC female, rear panel
Impedance ; 50 Ω (nominal)
421.4 MHz IF output :
Connector ; BNC female, rear panel
Impedance ; 50 Ω (nominal)
1st LO output (R3273 only) :
Connector ; SMA female, front panel
Video output
Connector ; VGA (15-pin, female), rear panel,
Equivalent to 640 × 480 dot VGA
X-axis output
Connector ; BNC female, rear panel
Impedance ; 1kΩ (nominal), DC-coupled
Amplitude ; Approx. -5 to +5 V
Y-axis output
Connector ; BNC female, rear panel
Impedance ; 220 Ω (nominal)
Amplitude ; Approx. 2 V for full scale (with 10 dB/div.)
External trigger input
Connector ; BNC female, rear panel
Impedance ; 10 kΩ (nominal), DC-coupled
Trigger level ; TTL level

External gate input
Connector ; BNC female, rear panel
Impedance ; 10 kΩ (nominal), DC-coupled
Sweep stop ; During LOW on TTL level
Sweep ; During HIGH on TTL level

Trigger output
Connector ; BNC female, rear panel
Amplitude ; TTL level

I/O
GPIB ; IEEE-488 bus connector, rear panel
RS232 ; D-SUB 9-pin, rear panel
Printer ; D-SUB 25-pin, rear panel
Extended I/O port ; D-SUB 25-pin, rear panel
FDD ; 3.5-inch floppy disk drive

Direct print
Output by ESC/P, PCL, or ESC/P raster commands

General Specifications

Temperature
Operating temperature ; 0 to 50°C
Storage temperature ; -20 to +60°C
Humidity ; 85% RH or less (no condensation)

Power supply: Automatically selects between 100 VAC and 220 VAC

	100 VAC	220 VAC
Voltage	100 V - 120 V	220 V - 240 V
Power consumption	300 VA or less	300 VA or less
Frequency	50/60 Hz	50/60 Hz

Mass: 18 kg or less (excluding options, front cover, and accessories)
Dimensions : Approx. 177 (H) x 350 (W) x 420 (D) mm
(without handle, feet, and front cover)

Accessories

Product name	Model name
Power cable	A01412
Input cable	A01036-0150
Converter adapter	JUG-201A/U
Power fuse	T6.3A/250V
Front cover	

Options

OPT.02 Memory card drive :
Memory card drive: (Exchangeable with floppy disk drive)
2-slot, front panel
Connector; JEIDA-Ver. 4.2/PCMCIA2.1

OPT.08 Rx control
When connected to the R3560
Signal source parameter settings: Output frequency, output level, output On-Off, modulation parameters
BER measurement & parameter settings
BER measurement : Average frequency, bit length, clock polarity, data polarity, measurement interval, TCH frame timing signal
Receiver sensitivity measurement & parameter settings
Receiver sensitivity measurement : Search upper and lower limits, search step, search point

When connected to the R3561
Signal source parameter settings : Output frequency, output level, output On-Off, modulation On-Off, modulation parameters, I/O clock
CAL/ADJ function: AWGN CAL execution, modulator CAL execution, 10 MHz Ref Adjust value setting
Self Test: Self Test execution

OPT.09 CDMA test source control (for R3267)
R3561L parameter setting
Output frequency setting : Range; 10 to 2300 MHz, Resolution; 1 Hz
Output level setting : Output; ON/OFF, Range; -125 to +6 dBm, Resolution; 0.1 dB, unit; dBm, dBμ
Modulation : ON/OFF
Reverse/Forward Link switching,
Data rate switching; 9600/4800/2400/1200/14400/7200/3600/1800 bps
Data source switching; ZEROS/RANDOM/RANDERR/USER (*Written by user via GPIB)
PN offset; 0 to 511 (x 64 chips)
Burst; ON/OFF
Even Second In; ENABLE/DISABLE
Equalizing Filter; ON/OFF
Reference standard : Synthe reference input switching; 19.6608/15/10/9.8304/5/4.9152/2.4576/2/1.2288/1 MHz
CDMA Time Base input switching; 19.6608/15/10/9.8304/5/4.9152/2.4576/2/1.2288/1 MHz/INTERNAL
Save/recall function: Max. 10 setting
External interface : GPIB
1st local output : 4241.4 to 6531.4 MHz, 0 dBm or more SMA connector

* 21.4 MHz IF output terminal is erased

R3267/3273 (Continued From Previous Page)

OPT.10 High-Accuracy Power Measurement (for PDC-BS)
Calibration frequency range: 810 to 959.45 MHz
1420 to 1518 MHz
Level measurement range: +15 to -30 dBm
Level measurement accuracy
Calibration error : ±0.2 dB or less
Measurement error : ±0.3 dB or less
(at 1 dB, 2 dB/DIV, 25°C,
Input ATT 30 dB, RBW 30 kHz, 100 kHz,
ZERO SPAN mode, TOTAL GAIN after
automatic calibration)
During average power
measurement mode : ±0.5 dB or less (5 dB, 10 dB/DIV, 25°C)
Temperature-induced
TOTAL GAIN calibration error: 0.015 dB/°C
Calibration cycle : 6 months

OPT.11 High-Accuracy Power Measurement (for 3GPP-BS)
Calibration frequency range: 1848.3 to 2171.7 MHz
Level measurement range: +25 to -60 dBm
Level measurement accuracy
Measurement error: ±0.4 dB or less (+25 to -50 dBm)
±0.6 dB or less (-50 to -60 dBm)
(at 25°C, after GAIN CAL, ATT = AUTO,
Min ATT = ON)
Measurement linearity: ±0.2 dB or less (0 to -30 dB)
Temperature-induced
GAIN CAL error : 0.015 dB/°C
Calibration cycle : 1 year

OPT.12 High-Accuracy Power Measurement (for cdma2000-BS)
Calibration frequency range: 802 to 963.7 MHz
1848.3 to 2171.7 MHz
Level measurement range: +25 to -60 dBm
Level measurement accuracy
Measurement error: ±0.4 dB or less (+25 to -50 dBm)
±0.6 dB or less (-50 to -60 dBm)
(at 25°C, after GAIN CAL, ATT = AUTO,
Min ATT = ON)
Measurement linearity: ±0.2 dB or less (0 to -30 dB)
Temperature-induced
GAIN CAL error : 0.015 dB/°C
Calibration cycle : 1 year

OPT.16/17 External mixer
OPT3273+16
1 dB gain compression : 26.5 to 40 GHz; 0 dBm (typ.)
Max. input level : 26.5 to 40 GHz; +15 dBm (typ.)
Frequency response : 26.5 to 40 GHz; ±3 dB (typ.)
(after reading frequency response compensated data)
Average display noise level: 26.5 to 40 GHz; -90 dBm (typ.)
(RBW 1 kHz, VIDEO BW 10 Hz)
OPT3273+17
1 dB gain compression : 40 to 60 GHz; 0 dBm (typ.)
Max. input level : 40 to 60 GHz; +15 dBm (typ.)
Frequency response : 40 to 60 GHz; ±5 dB (typ.)
(after reading frequency
responsecompensated data)
Average display noise level: 40 to 60 GHz; -90 dBm (typ.)
(RBW 1 kHz, VIDEO BW 10 Hz)

OPT.25 Reference Converter
10MHz frequency reference input
Frequency : 10 MHz, 15 MHz, 19.6608 MHz
Input amplitude range : -5 to +5 dBm

OPT.74 Tracking generator
Output frequency : 100 kHz to 3.6 GHz
(START FREQ <3.5 GHz)
Output level
Setting range : 0 to -50 dBm
Setting resolution : 0.1 dB
Output level flatness : <±3 dB
(100 kHz to 3.6 GHz, relative value)
Output level accuracy : <±1 dB
(30 MHz, -10 dBm, 25 ±10°C)
Vernier accuracy : <0.5 dB/1 dB
Level sweep width
setting range : (0 to -10 dBm) - ATT
(ATT = 0 to 40 dB/10 dB Step)

Spurious output
Harmonic : <-15 dBc (at 0 dBm output)
Non-harmonic : <-25 dBc (at 0 dBm output)
TG Leakage
100 kHz to 3.0 GHz : <-110 dBm
3.0 to 3.6 GHz : <-108 dBm
TG Output
Impedance : 50 Ω(nominal)
VSWR
(at -10 dBm output, nominal): <1.5 (100 kHz to 3.6 GHz)

8GHz/26.5GHz For Testing and Evaluation of Next Generation Mobile Communication Systems such as W-CDMA.

R3267/3273

Main units

R3267	Spectrum Analyzer
R3273	Spectrum Analyzer

Options

OPT.01	Digital Modulation Analysis Option
OPT.61	cdmaOne (IS-95) Analysis Software
OPT.62	W-CDMA (3GPP) Analysis Software
OPT.63	GSM/DECT Analysis Software
OPT.64	PDC/PHS/IS-136 Analysis Software
OPT.65	cdma2000 Analysis Software
OPT.66	Bluetooth Analysis Software
OPT.67	1xEV-DO (HDR) Analysis Software
OPT.73	AMPS/JTACS/NTACS Analysis Software
OPT.02	Memory Card Drive
OPT.08	Rx Control (for R3562)
OPT.09	CDMA Test Source Control (for R3561L, R3267 only)
OPT.10	High-Accuracy Power Measurement (for PDC-BS)
OPT.11	High-Accuracy Power Measurement (for 3GPP-PS)
OPT.12	High-Accuracy Power Measurement (for cdma 200-BS)
OPT.16	External Mixer (26.5 to 40GHz, R3273 only)
OPT.17	External Mixer (40 to 60GHz, R3273 only)
OPT.21	High Stability Frequency Reference Source ($\pm 5 \times 10^{-9}$/day)
OPT.22	High Stability Frequency Reference Source ($\pm 3 \times 10^{-10}$/day)
OPT.23	Rubidium Frequency Reference Source ($\pm 1 \times 10^{-10}$/month)
OPT.25	Reference Converter
OPT.74	Tracking Generator

Accessories

R16081	Transit Case

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Compact, Lightweight, 3-Way Power Source, 26.5GHz

U3661

- **Ultra-compact, lightweight 9kg or less without battery**
- **Battery operation available**
- **Frequency range: 9kHz to 26.5GHz**
- **Synthesized local oscillator**
- **Many measuring functions provided as standard**
  - **Internal preamplifier with 20 dB gain**
  - **dB down measurement**
  - **ACP**
  - **OBW**
  - **AVE and TOTAL POWER**
- **Built-in 1Hz resolution frequency counter**

U3661
Spectrum Analyzer

The U3661 is a microwave spectrum analyzer with the measurement frequency range expanded to 26.5GHz as well as the inherited features of the U3641 including the compact body, and battery operation.
It has the weight and performance ideal for field as an indispensable instrument for maintenance/inspection of microwave communication facilities.
This portable analyzer provides enhanced basic performance with high-precision, high-stability measurements, a minimum sweep width of 1kHz by means of a synthesized local oscillator, and time domain measurements utilizing 50µs high-speed sweep.

■ The Lightest Spectrum Analyzer in Its Class at 8kg (Max.)

The U3661 has a main unit mass of 9kg or less (without battery), easily portable for a microwave spectrum analyzer with a measurement frequency range from 9kHz to 26.5GHz.

■ Various options

OPT20 High-stability reference source
OPT26 RBW 100 Hz, 300 Hz
OPT60 CDMA measurement
OPT72 TV image/sound demodulation
OPT74 Tracking generator
OPT78 Channel input setting
* TV image demodulation (OPT72) includes channel input setting (OPT78).
* CDMA measurement (OPT60) cannot be installed together with OPT72 or OPT78.

■ Battery Provides 1.5 Hours of Operation. Three Power Sources to Choose From

The U3661 operates not only on 100/200 VAC power but also on +10 to +16 VDC external power or on the battery pack; three-way power supply. It is designed to operate in any power source environment. The battery pack can be easily attached/removed by a one-touch operation and rapidly recharged in one hour. It allows approximately 1.5 hour continuous operation on a full recharge, enabling logistically wide-ranging operation such as maintenance/installation work.

■ High-stability Measurement by Means of Synthesized Local Oscillator

Synthesizing of a local oscillator enables measuring the transmission characteristics (ACP, OBW) of narrow-band radio communication facilities.
The sideband noise, -105 dBc/Hz or less, achieves the best performance in its class, enabling high-accuracy measurements even in field use.

■ 50µs High-speed Sweep Function

In Zero Span mode (fixed tuning mode without frequency sweep), the sweep time can be set up to 50µs. This makes it possible to observe TDMA waveforms for GSM, PDC and PHS, and to perform detailed analysis through magnified display of rising and falling burst waveforms.

■ Variety of Measurement Functions

1Hz resolution counter, occupied frequency bandwidth, adjacent-channel leakage power, AM/FM audio monitoring, AM modulation measurement, dB down measurement, gated sweep.

Compact, Lightweight, 3-Way Power Source, 26.5GHz

U3661

Specifications

Frequency

Frequency range	9 kHz to 26.5 GHz		
	Frequency range	Frequency band	Order of harmonic
	9 to 3.2kHz	0	1
	3.0 to 7.1GHz	1	1
	6.7 to 14.5GHz	2	2
	13.7 to 26.5GHz	4	4
	Preamplifier : 9 kHz to 3.2 GHz (Band0)		
Frequency read accuracy (start, stop, center frequency, marker frequency)	± (Reading of frequency × Frequency reference accuracy + 5% × Span + 15% × RBW + 8 GHz × N)		
Marker frequency counter			
Resolution	1 Hz to 1 kHz		
Accuracy	± (Marker frequency × Frequency reference accuracy + 1 LSD 5 Hz × N) (S/N ≥ 25 dB, 1 kHz ≤ Span ≤ 200 MHz, RBW ≥ 3 kHz)		
Frequency reference accuracy			
Aging rate	$\pm 2 \times 10^{-6}$/year		
Temperature stability	$\pm 1 \times 10^{-5}$ (0 to 50°C)		
Frequency span			
Range	1 kHz to 26.7 GHz, 0Hz (zero span)		
Accuracy	5% of span		
Residual FM (zero span)	≤ 60 Hzp-p × N/100 ms		
Frequency drift (span ≤10 kHz)	< 150 kHz × N × Sweep time/min (30 minutes after power-on at constant temperature)		
Sideband noise			
Offset 20 kHz	Frequency ≤ 7.1 GHz (band 0, band 1) ≤ -105 dBc Frequency > 6.7 GHz ≤ (-105 + 20logN) dBc		
Offset 10 kHz	Frequency ≤ 7.1 GHz (band 0, band 1) ≤ -100 dBc Frequency > 6.7 GHz ≤ (-100 + 20logN) dBc		
Resolution bandwidth (3 dB)			
Range	1 kHz to 3 MHz (1, 3 sequence) 100 Hz, 300 Hz (with OPT.26)		
Accuracy	≤ ± 20% (1 kHz to 1 MHz) (100 kHz, 300 Hz OPT.26) ≤ ± 25% (3 MHz)		
Selectivity	<15:1 (60 dB: 3 dB)		
Video bandwidth	10 Hz to 3 MHz (1, 3 sequence)		

Amplitude range

Measuring range	+30 dBm to the average noise level
Maximum input level	(Input attenuator ≥ 10dB)
Preamplifier OFF	+30 dBm, 0VDCmax
Preamplifier ON	+13 dBm, 0VDCmax
Indication range	
Log	10 × 10div 10, 5, 2, 1dB/div
Linear	10% of the reference level/div (RBW ≥ 3kHz)
Maximum input level	
Preamplifier OFF	(Input attenuator 0 to 50 dB)
Log	-64 dBm to +40 dBm (0.1 dB step)
Linear	141.1 µV to 22.36 V
Preamplifier ON	(Input attenuator 0 to 30 dB)
Log	-89 dBm to -25 dBm (0.1 dB step)
Linear	+7.934 µV to +12.57 mV
Input ATT range	0 dB to 50 dB (10 dB step)

Dynamic range

Average indicated noise level	RBW 1 kHz, VBW 10 Hz, input ATT 0 dB,		
Preamplifier OFF	frequency bandwidth ≥ 1 MHz		
	Frequency band	Noise level	
	0	-(117-2f [GHz]) dBm	
	1	-105dBm	
	2	-110dBm	
	4	-105dBm	
Preamplifier ON	-132 dBm + 3 (GHz) NBW (1 MHz to 3.2 GHz (band 0))		
1 dB gain compression	Input ATT 0 dBm, frequency 10 MHz or more		
Preamplifier OFF	> -10 dBm (mixer input level)		
Preamplifier ON	> -30 dBm (preamplifier input level)		
Spurious response	when preamplifier is OFF		
2nd-order harmonic distortion	Frequency range	Mixer level	Distortion level
	10MHz to 1.7GHz	-30dBm	≤-70dBc
	1.7GHz to 3.2GHz	-10dBm	≤-80dBc
	>3.2GHz	-10dBm	≤-100dBc
3rd-order intermodulation distortion	≤-70 dBc (mixer input level -30 dBm, 2nd-order distortion > 10 kHz)		
Image/multiple/band external response	<-50dBc		
Residual response	50 input terminator, input ATT 0 dB		
Preamplifier OFF	≤-100 dBm (1 MHz Frequency ≤ 3.2 GHz) ≤-90 dBm (Frequency > 3.2 GHz)		
Preamplifier ON	≤-105 dBm (1 MHz ≤ Frequency ≤ 3.2 GHz)		

Sweep

Sweep time	50 ms to 1000 s 50 µs to 1000 s (zero span) Manual sweep
Accuracy	≤ ± 5%
Trigger mode	FREE RUN, SINGLE, VIDEO, EXT, TV

Amplitude accuracy

Frequency response	After automatic calibration, pre-selector, peak
Preamplifier OFF	100kHz to 2.7GHz ≤ ± 1 dB 9kHz to 3.2GHz ≤ ± 2 dB 3GHz to 7GHz ≤ ± 1.5 dB 7GHz to 14.4GHz ≤ ± 3.5 dB 14.4GHz to 26.5GHz ≤ ± 4.0 dB at 30MHz reference, 15 to 35°C, ATT.10dB calibration signal reference 100kHz to 2.7GHz ≤ ± 1 dB 9kHz to 3.2GHz ≤ ± 2 dB 9kHz to 26.5GHz ≤ ± 5 dB at ATT 10dB, 0 to 50°C
Preamplifier ON (Band 0)	100kHz to 2.7GHz ≤ ± 1 dB 9kHz to 3.2GHz ≤ ± 2 dB at 30MHz reference, ATT 0dB
Calibration signal accuracy (30 MHz)	-20 dBm ± 0.3 dB
IF gain error	< ± 0.5 dB (after automatic calibration)
Scale indication accuracy	(after automatic calibration)
Log	≤ 1.5 dB/90 dB ≤ 1 dB/10 dB ≤ 0.2 dB/1 dB
Linear	≤ 5% of reference level (RBW 3 kHz)
Input ATT switching error	Reference: 10 dB, in 0-50 dB range ≤ ± 1.1 dB (9 kHz to 12 GHz) ≤ ± 1.3 dB (12 GHz to 20 GHz) ≤ ± 1.8 dB (20 GHz to 26.5 GHz)
Resolution bandwidth switching error	after auto calibration < ±0.1 dB (RBW 3 MHz common)

Demodulation function

Sound demodulation	
Modulation mode	AM, FM (FM enabled when RBW ≥ 3 MHz)
Audio output	Speaker, earphone jack (volume adjustable)

I/O

RF input	
Connector	N type female (or SMA type)
Impedance	50 (nominal) For input ATT 10 dB to 50 dB
VSWR Preamplifier OFF	< 1.5:1 (100 kHz to 3 GHz) < 2:1 (3 GHz to 26.5 GHz)
VSWR Preamplifier ON (Band 0)	< 2.5:1 (9 kHz to 3.2 GHz)

General specifications

Temperature	
Operating temperature	0 to 50 °C
Relative humidity	85% or less
Storage temperature	-20 to 60 °C
Power supply	
External DC input	Connector XLR 4-pin Input range ; +10 to +16 V
With AC adapter	100/200 VAC automatic change-over When 100 VAC is supplied : Voltage 100 to 120 V Frequency ; 50/60 Hz When 220 VAC is supplied : Voltage 220 to 240 V Frequency ; 50/60 Hz
Power consumption	External DC input mode : max. 70 W When AC adapter is used : max. 120 VA
Mass	Main body : 8.5 kg or less (without options, accessories, carrying belt and battery) AC/DC adapter (ACB364) ; 1.1 kg Propac battery ; 2.3 kg
Dimensions	approx. 148 mm (H) × 291 mm (W) × 330 mm (D) (without protrusions and connectors)

* For the performance of the I/O interface and options, see U3641.

Standard accessories

AC/DC adapter	A08364
Power cable	A01402
Power fuse	326010
N-BNC conversion adapter	JUG-201A/U
N-SMA conversion adapter	FLA-H-SA7
Carrying belt	
Instruction manual	

Options

OPT3661+20	High-stability reference source option
OPT3661+26	narrow band resolution bandwidth option
OPT3661+60	CDMA Measurement option
OPT3661+72	TV demodulation option
OPT3661+74	Tracking generator option
OPT3661+76	Modulation input option

Light Weight, Compact, Battery Operated Spectrum Analyzer

U3641/3641N

- **Ultra-compact and lightweight**
  Main unit: 7 kg or less
  With battery: 9 kg or less
- **Frequency range: 9 kHz to 3GHz**
- **Synthesized local oscillator**
- **Display dynamic range: 100 dB**
- **Many measuring functions provided as standard**
  - **Internal pre-amp with 20dB gain**
  - **dB down measurement**
  - **ACP**
  - **OBW**
  - **Power calculation function (AVE, TOTAL POWER)**
- **Input Impedance**
  50 Ω : U3641
  75 Ω : U3641N

(Photo is U3641)

U3641/3641N
Spectrum Analyzer

The U3641/3641N is a 3-GHz synthesized spectrum analyzer ideal for field use. With a lightweight, compact size and three-way power supply including battery operation, the U3641/3641N has been designed specifically for field installation and maintenance applications. In addition, with the inclusion of a synthesized local oscillator, the U3641/3641N allows high-precision and high-stability measurements with a minimum resolution bandwidth of 100 Hz. A fast zero span sweep speed of 50 μs allows characterization of burst signal rising and falling edges and the measurement of power during on and off periods. The U3641/3641N are portable analyzers which can be used for maintenance on various aspects of CATV and PHS/PDC.

■ At 7 kg (Max.),the Lightest Field Analyzers in Their Class

The U3641/3641N are light and compact (6.8kg or less without the battery pack or 9 kg or less with the pack). The easy-to-attach strap allows the analyzer to be worn on the shoulder and easily carried.

■ Battery Provides 1.5 Hours of Operation. Three Power Sources to Choose From

The U3641/3641N operate not only on 100/200 V AC power but also on +10 to +16 V DC power or the battery pack. The battery pack can be easily attached or removed. It allows 1.5 hour continuous operation at a full charge, making it easier to perform logistically wide-ranging measurements such as maintenance and installation work. Rapid 1 hour battery charging time.

■ Diverse Option Configuration

	OPT.15 Controller	OPT.20 High-stability Reference Source	OPT.26 RBW100Hz, 300Hz	OPT.60 CDMA measurement	OPT.72 TV Image/Audio Demodulation	OPT.74 TG	OPT.78 Channel Input Setting
U3641	Yes	Yes	Yes	Yes	Yes	Yes	Yes
U3641N	Yes	Yes	Yes	No	Yes	Yes	Yes

* TV demodulation (OPT.72) includes channel setting function (OPT.78).

* CDMA measurement function (OPT.60) cannot be installed together with OPT.72 or OPT.78.

■ High-stability Measurement by Means of Synthesized Operation

The U3641/3641N calculates the bandwidth for the specified power ratio from measured spectrum data and then displays it with the marker. In addition, it displays the occupied frequency bandwidth (OBW) and carrier frequency (FC) at the upper left portion of the screen. The ratio of the obtained power to the total power can be specified in the range from 10.0 to 99.8%.

■ 50-μs High-speed Sweep Function

In ZERO SPAN mode (fixed tuning mode without frequency sweep), the sweep time can be set up to 50 μs. This makes it possible to observe TDMA waveforms for GSM, IS-136, PDC and PHS and perform detailed analysis through magnified display of burst rising and falling waveforms.

■ Variety of Measurement Functions

20-dB gain preamplifier, 1-Hz resolution counter, occupied frequency bandwidth, adjacent-channel leakage power and audio monitoring.

Frequency Range: 9 kHz to 3 GHz

U3641/3641N

Specifications

Frequency	
Frequency Range	9 kHz to 3 GHz
Frequency Readout Accuracy	(Start, Stop, CF, Marker)
	± (freq readout × freq ref error + 5% × span + 15% × RBW + 10 Hz)
Count Frequency Marker	
Resolution	1 Hz to 1 kHz
Count Accuracy	± (marker freq × freq reference accuracy + 1 LSD ±5 Hz)
Accuracy	(S/N ≥ 25 dB, RBW ≥ 3 kHz, 1 kHz ≤ SPAN ≤ 200 MHz)
Frequency Reference	$\pm 2 \times 10^{-6}$/year
Accuracy	$\pm 1 \times 10^{-5}$(at 0 to 50°C)
Frequency Span	
Range	1 kHz to 3.2 GHz, 0 Hz (ZERO span)
Accuracy	≤ ± 5% (SPAN)
Frequency Stability	
Residual FM	≤60 Hz_{p-p}/100 ms (ZERO span)
Frequency Drift	<150 Hz/min (SPAN ≤10kHz)
Noise Sidebands	≤-105 dBc, at 20 kHz offset
	≤-100 dBc, at 10 kHz offset
Resolution Bandwidth	(3 dB)
Range	1 kHz to 3 MHz 1-3 sequence
	100 Hz, 300 Hz (OPT.25)
Bandwidth Accuracy	≤ ± 20% (1 kHz to 1 MHz)
	≤ ± 25% (3 MHz)
Selectivity	< 15:1 (60 dB : 3 dB, RBW ; 1kHz to 3MHz)
Video Bandwidth	10 Hz to 3 MHz (1-3 step)

Amplitude Range	U3641	U3641N
Amplitude Range	+20 dBm to displayed Average Noise Level	+130 dBµV to displayed Average Noise Level
Maximum Input Level	± 50 V DC max	
Preamplifier OFF (Input atten ≥10 dB)	+27 dBm	+134 dBµV
Preamplifier ON (Input atten ≥10 dB)	+13 dBm	+120 dBµV
Display Range		
Log	10 × 10 div, 10, 5, 2, 1 dB/div	
Linear	10% of reference level/div, RBW ≥3kHz	
Reference Level Range		
Preamplifier OFF	(Input Atten 0 dB to 50 dB)	
Log	-64 to +40 dBm (0.1 dB step)	+46 dBµV to +150 dBµV
Linear	+141.1µV to +22.36 V	+198.4 µV to +31.44V
Preamplifier ON	(Input Atten 0 dB to 10 dB)	
Log	-89 to -25 dBm (0.1 dB step)	+21 dBµV to +85 dBµV
Linear	+7.934µV to +12.57 mV	+11.16 µV to +17.68mV
Input Attenuator Range	0 to 50 dB (10 dB step)	

Sweep	
Sweep Time	50 ms to 1000s
	50 µs to 1000s (ZERO span)
Accuracy	≤ ± 5%
Trigger mode	FREE RUN, SINGLE, VIDEO, EXT, TV

Demodulation	
Spectrum Demodulation	
Modulation Type	AM and FM (FM is at RBW ≥3kHz)
Audio Output	Speaker and phone jack with volume control

Dynamic Range	U3641/3641PHS	U3641N
Displayed Average Noise Level	(RBW 1 kHz, VBW 10 Hz, Input atten 0 dB, f ≥1 MHz)	
Preamplifier OFF	-117 dBm+ 2.7f (GHz) dB	-8 dBµV+ 2.7f (GHz) dB
Preamplifier ON	-135 dBm + 4.3f (GHz) dB	-26 dBµV + 4.3f (GHz) dB
Gain Compression	(2 dB)	
Preamplifier OFF (mixer input level, f ≥ 10 MHz)	> -10 dBm	> +100 dBµV
Preamplifier ON (RF input level, f ≥ 10 MHz)	> -40 dBm (ATT = 0)	> +70 dBµV
Spurious Response	(Input atten 0 dB, f ≥10MHz)	
Preamplifier OFF		
2nd Harmonic Distortion	≤-70 dB(-30 dBm input)	≤-70 dB(+78 dBµV input)
2 Signal, 3rd-order intermodulation distortion	≤-70 dB(-30 dBm input)	≤-70 dB(+78 dBµV input)
Residual Responses	(Input atten 0 dB, f ≥10MHz)	
Preamplifier OFF	≤-100 dBm, 50Ω	≤+10 dBµV, 75Ω
Preamplifier ON	≤-105 dBm, 50Ω	≤+5 dBµV, 75Ω

Amplitude Accuracy	U3641	U3641N
Frequency Response	At Input attenuator 10 dB, 20°C to 30°C, referenced to 30 MHz and after calibration	
Preamplifier OFF	≤ ± 1 dB (100 kHz to 2.7 GHz)	≤ ± 1 dB (100 kHz to 2.2 GHz)
	≤ ± 2 dB (9 kHz to 3.0 GHz)	
Preamplifier ON	≤ ± 1 dB (100 kHz to 2.7 GHz)	≤ ± 1 dB (100 kHz to 2.2 GHz)
	≤ ± 2 dB (9 kHz to 3.0 GHz)	
Calibration Signal Accuracy	-20 dBm ± 0.3 dB	+90.5dBµV ± 0.3 dB
IF Gain Uncertainty	≤ ± 0.5 dB (after automatic calibration)	
Scale Fidelity	(after automatic calibration)	
Log	≤ ± 1.5 dB/90 dB	
	≤ ± 1 dB/10 dB	
	≤ ± 0.2 dB/1 dB	
Linear	≤ ± 5% of reference level, RBW ≥3kHz	
Input Attenuator Switching Accuracy	(10dB reference, 20 to 50dB setting)	
	≤ ± 1.0 dB (100 kHz to 2.7 GHz)	≤ ± 1.0 dB (100 kHz to 2.2 GHz)
	≤ ± 1.5 dB (9 kHz to 3.0 GHz)	
Resolution Bandwidth Switching Uncertainty	(after automatic calibration) ≤ ± 1.0 dB at RBW 3 MHz as reference	

Light Weight, Compact, Battery Operated Spectrum Analyzer

U3641/3641N (Continued From Previous Page)

Inputs & Outputs	
RF Input	
Connector	N type jack
Impedance	U3641 : 50Ω(nominal)
	U3641N : 75Ω (nominal)
Preamplifier OFF	VSWR ≤1.5 : 1 (100 kHz to 2 GHz)
	VSWR ≤ 2 : 1
	(9 kHz to 3.0 GHz (U3641)/ 2.2 GHz(U3641N)
	(Input atten ≥10 to 50 dB)
Preamplifier ON	VSWR ≤ 2.5 : 1 (10 MHz to 3.0 GHz(U3641) / 2.2 GHz (U3641N)
10 MHz Reference Input	
Connector	BNC jack, rear panel
Impedance	500Ω (nominal)
Input Range	0 to +16 dBm
Video Output	
Connector	BNC jack, rear panel
Impedance	75Ω (nominal) AC coupled
Amplitude	approx. 1 V_{p-p} 75Ω (Composite video signal)
External Trigger Input	
Connector	BNC jack, rear panel
Impedance	10 kΩ (nominal) DC coupled
Trigger Level	TTL level
Gate Input	
Connector	BNC jack, rear panel
Impedance	10 kΩ (nominal)
Sweep Stop	during TTL low level
Sweep Continue	during TTL high level
Phone Output	
Connector	Subminiature Monophonic jack, front panel
Power Output	0.2 W, 8Ω(nominal)
GPIB interface	IEEE-488, bus Connector
Plotter	HP-GL commands (682-XA)
Printer	PCL commands
RS232	D-SUB 9 pin, rear panel
Power Input	
Battery mounter	AC/DC adapter (A08364) or battery (option)

High-Stability Reference Source (OPT20 only)	
Frequency	10MHz
Frequency Accuracy	$\pm 2 \times 10^{-9}$/ day
	$\pm 1 \times 10^{-7}$/ year

OPT. 20 and OPT. 70 cannot be installed at the same time.

Narrow Band Resolution Bandwidth (OPT26 only)	
Resolution Bandwidth (3dB)	100 Hz, 300 Hz
Bandwidth accuracy	≤20%
Selectivity	≤15:1 (60dB : 3dB)

TV Demodulation Function (OPT72 only)	
TV demodulation	
Demodulation type	NTSC, PAL, SECAM
TV standard	M, B/G, D/K/K', I, L/L'
Demodulation output	Video, Sound
TV Image Demodulation Output	
Connector	BNC jack, rear panel
Impedance	75Ω (nominal) DC coupled
Amplitude	approx. 1 V_{p-p} 75Ω
TV Sound Demodulation Output	
Connector	pin jack, rear panel
Impedance	1kΩ (nominal) AC coupled
TV Image Signal Input	
Connector	BNC jack, rear panel
Impedance	75Ω (nominal) AC coupled
Imput level	about 1 V_{p-p}
TV Sound Signal Input	
Connector	pin jack, rear panel
Impedance	1kΩ (nominal) AC coupled

OPT. 72 and OPT. 70 cannot be installed at the same time.

Tracking Generator Function (OPT74 only)	
Frequency range	100 kHz to 2.2 GHz
Output level range	U3641 ; 0 dBm to -31 dBm, 1 dB step
	U3641N ; 105 to 74 dBμV, 1 dB step
Output level accuracy	≤± 0.5 dB (at 30 MHz, -10 dBm(U3641)
	/95dBμV(U3641N), 20 to 30°C)
Output level flatness	≤± 0.7 dB (100 kHz to 1 GHz)
	≤± 1.5 dB (100 kHz to 2.2 GHz)
	(U3641 ; at -10 dBm, 30 MHz reference)
	(U3641N ; at 95 dBμV, 30 MHz reference)
Output level switching accuracy	≤± 1.0 dB (100 kHz to 1 GHz)
	≤± 2.0 dB (100 kHz to 2.2 GHz)
	(U3641 ; at -10 dBm reference)
	(U3641 ; at 95 dBμV reference)
Output spurious	Harmonic < -20 dBc
	Non-harmonic < -30 dBc
TG leakage	U3641 ; ≤-95 dBm
	U3641N ; ≤16 dBμV
TG output	
Connector	N type jack
Impedance	U3641 ; 50Ω (nominal)
(≤10 dBm output)	U3641N ; 75Ω (normal)
	VSWR ≤1.5 (100 kHz to 2 GHz)
	VSWR ≤2.0 (100 kHz to 2.2 GHz)
	(U3641 ; ≤-10 dBm output)
	(U3641N ; ≤95 dBμV output)

Channel Input Setting (OPT78 only)	
Channel setting	Channel setting for VHF, UHF, CATV, BS and CS.
	Two user channels are available and 99 channels can be
	registered for each channel

OPT78 is included in OPT72.

Frequency Range: 9kHz to 3GHz

U3641/3641N

Specifications

General Specifications	
Environment Temperature	
Operating Temperature	0 to 50°C, humidity 85% or less
Storage Temperature	-20 to +60°C
Power Supply	
External DC Input	Connector XLR 4 pin Input range ; +10 to +16V
With AC adapter	Automatically selections between 100 VAC and 200 VAC Operation at 100 VAC Voltage 100 to 120 V Frequency 50 / 60 Hz Operation at 220 VAC: Voltage 220 to 240 V Frequency 50 / 60 Hz
Power consumption	Operation at DC : Max. 60 W AC adaptor use : Max. 100VA
Mass	(Without options, accessories, carrying belts, batteries) 6.9 kg or less
Dimensions	approx. 148(H) × 291(W) × 330(D) mm (without protrusions and connectors)
IC Memory Card connector	2 slots JEIDA-Ver.4.1 PCMCIA Rel.2.0 Type 1

Standard accessories:
- Power cable : A01402
- N-BNC connector adaptor : JUG-201A/U (U3641; One)
- NC-BNC connector adaptor : BA-A165 (U3641N; One)
- N-C15 connector adaptor : NCP-NFJK (U3641N; One)
- AC-DC adaptor : A08364
- Carrying belt
- Operation manual

Options (sold separately)

OPT3641 + 15	Controller option
OPT3641N + 15	Controller option
OPT3641 + 20	High-stability reference option
OPT3641 + 26	RBW 100Hz, 300Hz option
OPT3641N + 26	RBW 100Hz, 300Hz option
OPT3641 + 72	TV demodulation option
OPT3641N + 72	TV demodulation option
OPT3641 + 74	Tracking generator option
OPT3641N + 74	Tracking generator option
OPT3641 + 78	Channel input setting option
OPT3641N + 78	Channel input setting option

Accessories (sold separately)

R16072	Transit case
R16216A	Carrying case
R16601	Display hood
A02806	Front cover
PROPAC14BAZT	Batteries
DUAL2402 CHARGER	Chargers
A01434	External DC power cable
TCF-358HAA1500	1.5 m SMA cable
TCF-358HAA2000	2.0 m SMA cable
4XAM1001	Antenna connector

U3641

CDMA Option (OPT60)

When the CDMA option (OPT60) is added to the Spectrum Analyzers U3641, the CDMA transmission characteristics specified by IS-95/J-STD-008 can be measured by one key operation. This option allows a single spectrum analyzer to cover cellular and PCS base stations and mobile stations.
With a compact, lightweight main unit of 7kg, a three-way power supply including battery, and a standard built-in pre-amp indispensable for field measurement, the U3641 + OPT60 enables high-sensitivity measurements ideal for field use.

■ Features

- Automatic internal setting of CDMA parameters
- High-stability CDMA channel power measurement function
- Channels for CDMA systems
- High-sensitivity power measurement by built-in pre-amp

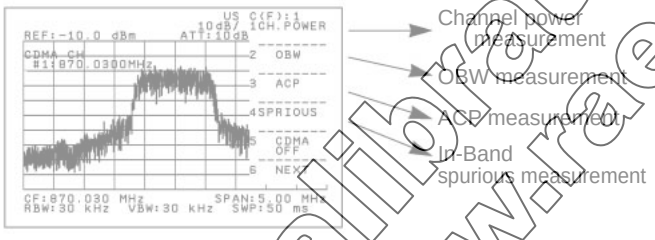
■ Applicable Communication Systems

- CDMA cellular (IS-95) - BS/MS
- CDMA-PCS (J-STD-008) - BS/MS

■ Measurement Items

- Channel power
- OBW
- ACP (spectrum mask)
- Spurious emission (In-band)

■ Easy Measurement Operation by Only Selecting an Item



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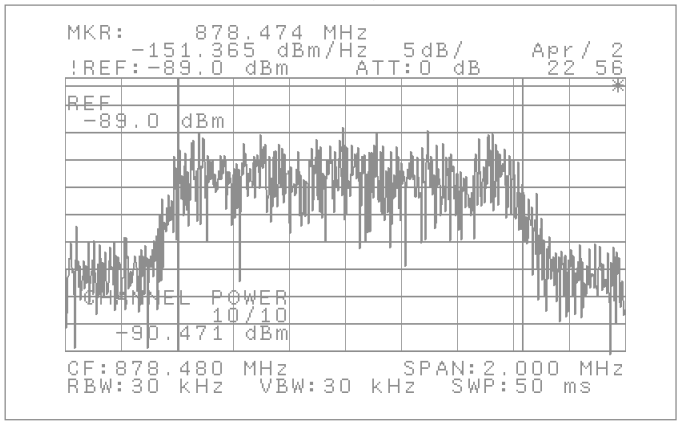
■ High-stability CDMA Channel Power Measurement

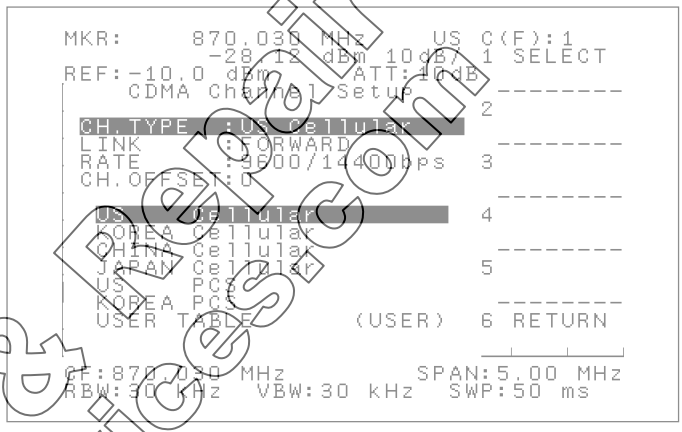
- Absolute accuracy: ≤ ± 2.0dB (15 to 35 deg.C)
  ≤ ± 2.5dB (0 to 50 deg.C)
- Relative accuracy: ≤ ± 0.5dB (15 to 35 deg.C)
  ≤ ± 0.8dB (0 to 50 deg.C)



< Channel power measurement >

■ Built-in Channel Table for Each CDMA System

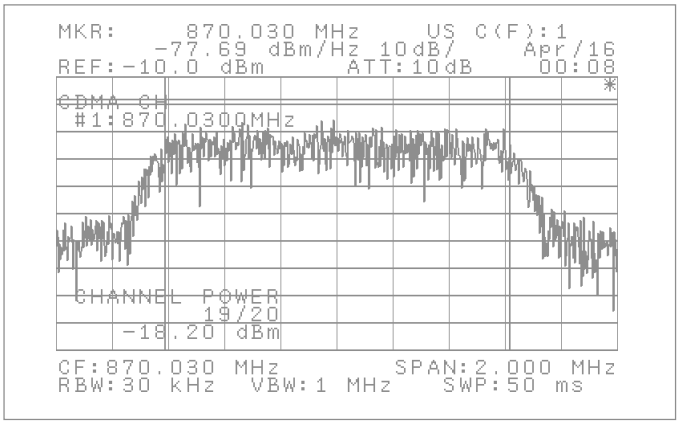
- Center frequency setting by channel No.
- Forward/Reverse channels supported
- Channel No. offset
- User table to input up to 99 channels



< Channel table >

■ High-sensitivity Power Measurement by Built-in Pre-Amp

- CDMA channel power of -90dBm/1.23MHz or less (Typ.) can be measured with the built-in pre-amp.
- Built-in pre-amp factors are automatically corrected.



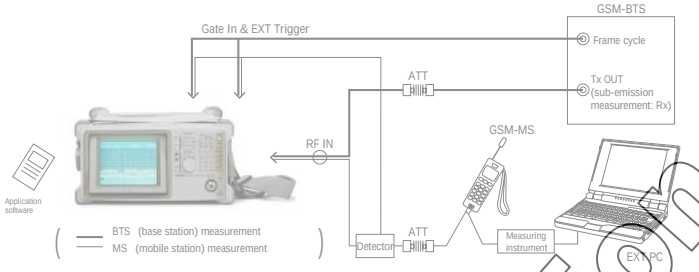
< High-sensitivity power measurement >

U3641
Application Software

■ GSM/DCS1800/DCS1900 Measurement Software

By combining the Spectrum Analyzer U3641 and the GSM/DCS1800/DCS1900 Measurement Software, transmission characteristic tests can be easily conducted in conformance to GSM-05-05/J-STD-007.

- Conformance to GSM-05-05/J-STD-007 test methods
- GSM/DCS standard measurements and judgment by single-key operation
- Selectable individual item measurement and sequential measurement
- Storage of setting conditions and measurement results on memory card



Measurement Items

Measurement items (GSM/DCS)	Measurement item name (Supported)
Output Power	• Carrier Power • Tx Band Peak Power • Tx Band Total Power
Output RF Spectrum due to the Modulation	• Modulation Swept up to 1.8 MHz • Modulation Multiple up to 1.8 MHz • Modulation Single up to 1.8 MHz • Modulation Swept from 1.8 MHz • Modulation Multiple from 1.8 MHz • Modulation Single from 1.8 MHz
Output RF Spectrum due to Transients	• Transients Swept • Transients Multiple • Transients Single
Spurious Emissions (to 3 GHz)	• Trm/Rcv TX Band Excluded • Trm/Rcv TX Band • RX Band
Output Level Dynamic Operation	Power vs Time • Frame • Time Slot

4 types of application software are available for different standards.

Model	Product Name
PU36410300-IC	GSM/DCS1800-MS Software
PU36410310-IC	GSM/DCS1800-BS Software
PU36410500-IC	DCS1900-MS Measurement Software
PU36410510-IC	DCS1900-BS Measurement Software

Note: These applications are available only in the manual operation (master) mode and require the controller option (OPT.10 or OPT.11).

Millimeter Wave General Spectrum Analyzer with Frequency Range from 9 kHz to 26.5/40 GHz

R3172/3182

- **Wide frequency range suited for applications**
  R3172 : 9 kHz to 26.5 GHz
  R3182 : 9 kHz to 40 GHz
- **Frequency range can be expanded up to 110 GHz (with an external option)**
- **High signal purity: -85 dBc/Hz @ 40 GHz (for R3182)**
- **Low-noise design: -106 dBm/RBW 1 kHz @ 40 GHz (for R3182)**
- **High-speed measurement of 20 traces per second**
- **Variety of measurement functions provided the standard**
- **6.5" TFT color LCD**
- **Data management using floppy disk**

(Photo is R3182)

R3172/3182

Spectrum Analyzer

The operating frequency band of radio communication is moving higher, and radio frequencies are expected to be used in an increasing variety of applications. Advantest's R3172/3182 spectrum analyzers can be used in a variety of applications from development to production of increasingly popular millimeter/micro wave communication equipment.

■ Highest-Class Noise Level

Along with the increasing variety of communication methods, the high frequency devices and modules that affect the fundamental performance of such communications are required to deliver higher performance.
The R3182 is a high performance analyzer with an average display noise level of -106 dBm/RBW 1 kHz at 40-GHz.
This enables a wider relative measurement range when measuring high frequencies or weak signals against a reference waveform.
The R3172/3182 also provide high performance with SSB phase noise of -91 dBc/Hz (for R3172 @26.5 GHz/20 kHz offset) or -85 dBc/Hz (for R3182 @40 GHz/20 kHz offset) by providing an internal local transmitter with a high level of purity.

■ Expansion of Measurement Frequency Band

A variety of optional external mixers are available for the R3172/3182 spectrum analyzer for measuring various high-frequency signals. By selecting the optimum option, the measurement frequency can be set from 26.5 GHz to 110 GHz.
Since the frequency characteristics specific to each mixer are corrected and the data is saved in the internal memory of R3172/3182, the level can be read directly.

■ Variety of Measurement Functions

The R3172/3182 are equipped with a 6-dB bandwidth filter of 9 kHz/120 kHz/1 MHz and a QP detector. In addition, an optical 200-Hz narrow band-pass filter is available, enabling noise measurement of high frequency bands that will be increasingly in demand in the future.
The R3172/3182 support the computing functions AVE POWER and TOTAL POWER for power measurement, and are also equipped with a frequency counter and a preamplifier up to 3 GHz as standard, supporting a variety of applications.

■ Options

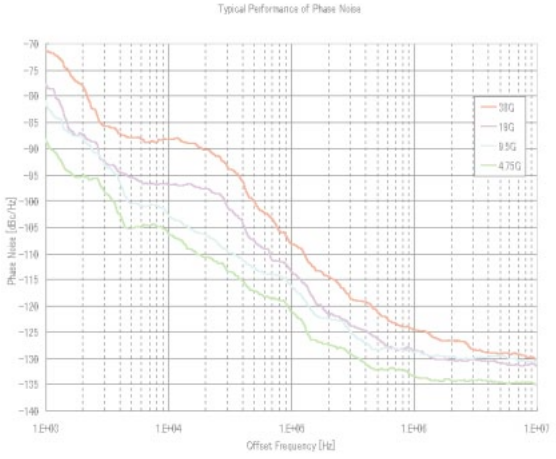
OPT.03	Local output for external mixers (dedicated to R3172)
OPT.20	Highly stable frequency reference
OPT.27	Narrow band resolution bandwidth of 30/100/300 Hz and 200 Hz (EMI bandwidth)
OPT.29	50µs high-speed time domain sweep
OPT.73	Wide-range FM demodulation
OPT.74	3-GHz tracking generator (supported by R3172 only)
OPT.16	External mixer 26.5 to 40 GHz
OPT.17	External mixer 40 to 60 GHz
OPT.18	External mixer 50 to 75 GHz
OPT.19	External mixer 75 to 110 GHz

Millimeter Wave General Spectrum Analyzer with Frequency Range from 9 kHz to 26.5/40 GHz

R3172/3182

■ High signal purity

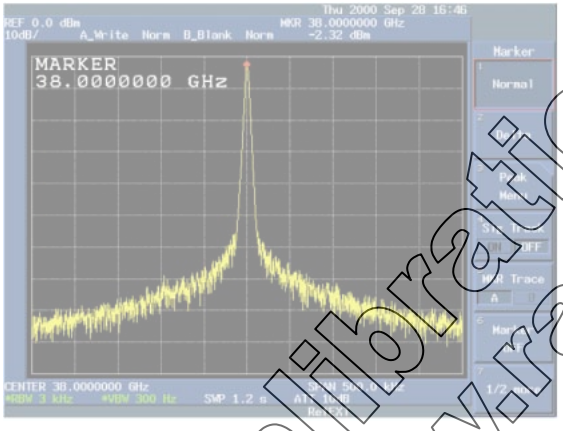
The synthesizer and an RF circuit of the R3172/3182 have been designed to take advantage of the latest advanced technologies, enabling excellent SSB phase noise characteristics.



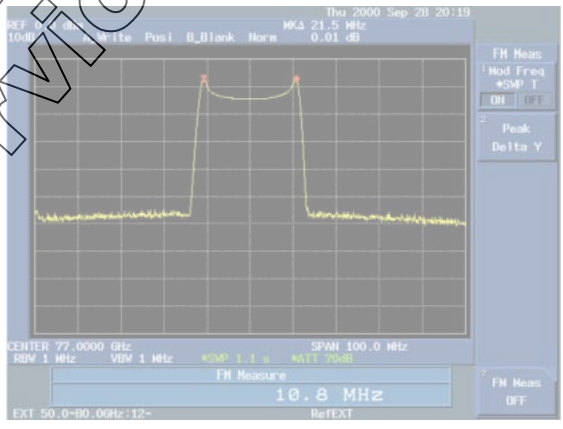
■ Highest-Class Noise Level

Generally speaking, the higher the measurement frequency becomes, the worse the noise level gets, limiting the measurement dynamic range. The R3172/3182, however, provide the best noise level in this class to overcome this problem.

■ Example of 38 GHz Measurement (by R3182)



■ Example of External Mixer Measurement (76-GHz FM Modulated Wave)

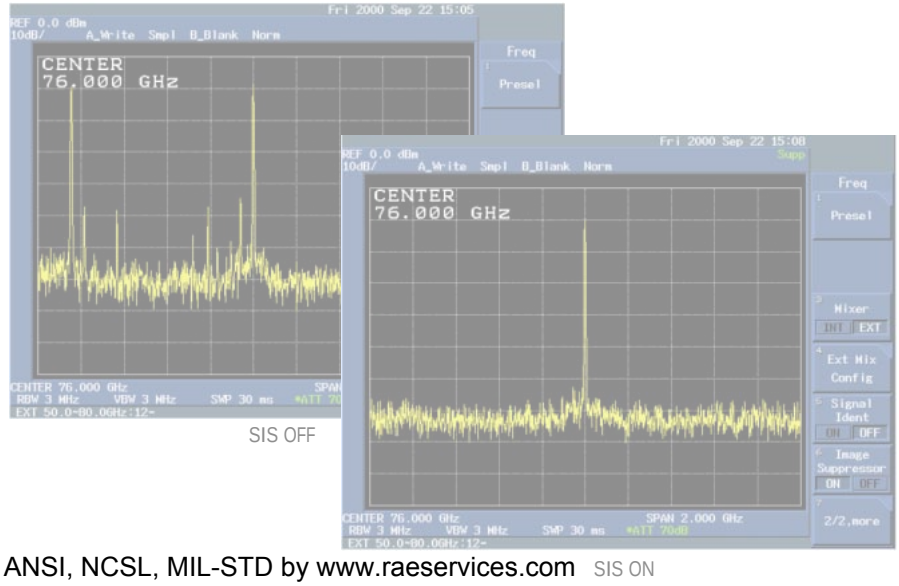


■ Software Image Supplier (SIS) Function for Image Deletion

When measuring signals using an external mixer, some image signals other than "true" measured signals are also displayed.

Th R3172/3182 can delete such unnecessary image signals by software.

With this function, complicated image signal separation can be performed easily, enabling an improvement in work efficiency.



Millimeter Wave General Spectrum Analyzer with Frequency Range from 9 kHz to 26.5/40 GHz

R3172/3182

■ Wide Choice of Options

OPT.03 Local Signal Output for External Mixer (only for the R3172)

The local signal output is supplied to the optional external mixer (OPT.16, 17, 18, or 19) of the R3172.

* The R3182 includes mixers as standard equipment.

OPT.20 High-stability frequency reference

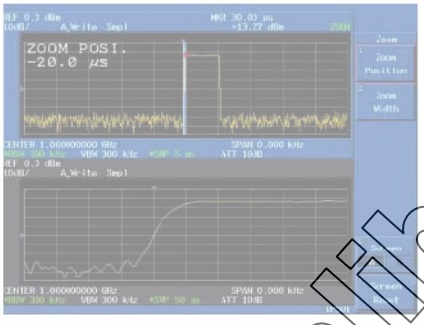
Crystal oscillator options with frequency stabilities of $\pm 2 \times 10^{-8}$/day and $\pm 1 \times 10^{-7}$/year are available for enhanced frequency reading accuracy and frequency counter accuracy.

OPT.27 Narrow-band resolution bandwidth

Since the analyzers provide signals of 30 Hz, 100 Hz, 300 Hz (3 dB bandwidth), and 200 Hz (6 dB bandwidth), as well as RBW 1 kHz (and 3 MHz as an option), the carrier wave separation and proximity noise measurements of a narrow band RF system can be measured.

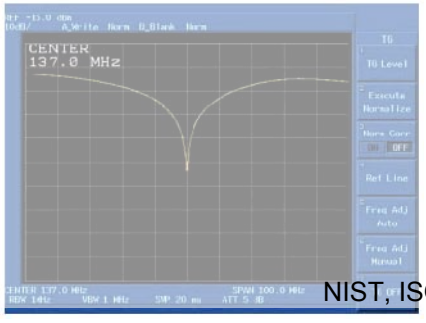
OPT.29 Time-domain high-speed sweep

In time-domain high-speed sweeps, the sweep time can be set up to 50 µs, allowing TDMA waveform observation during digital mobile communications measurement and offering zoomed views of the leading and trailing regions of burst signals.



OPT.74 Tracking generator

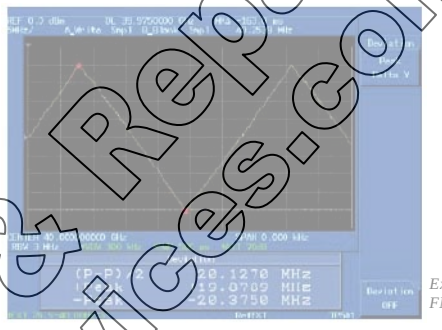
The tracking generator generates signals synchronized with frequency sweeps by a spectrum analyzer in a frequency range of 100 kHz to 3 GHz, allowing the direct measurement of the frequency response characteristics of filters and amplifiers. A normalization feature is available with the tracking generator for cancelling frequency response characteristics in a single touch operation to ease the evaluation of the characteristics of only the signals of interest. If return losses are measured using the SWR bridge, the impedance matching frequency characteristic of the signals of interest can be easily evaluated.



Return loss measurement

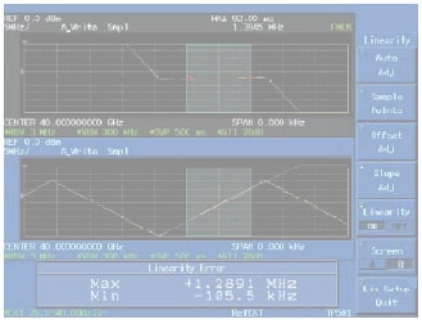
OPT.73 Wide-range FM demodulation

Devices such as a collision avoidance radar for preventing a collision between a car and another in front, which are installed in Intelligent Transport Systems (ITS), utilize an FM modulation in which the frequency deviation is very wide. The R3172/3182 can measure FM deviation widths up to 500 MHz (with an external mixer), whereas conventional measur-ing instruments can not measure these widths. At the same time, the R3172/3182 can measure modulation linearity and sensitivity. Further, since the R3172/3182 can perform a limit test during a PASS/FAIL evaluation at any given range. The function can improve the throughput of the tuning process of the production.



Example of measuring FM deviation

Example of measuring linearity

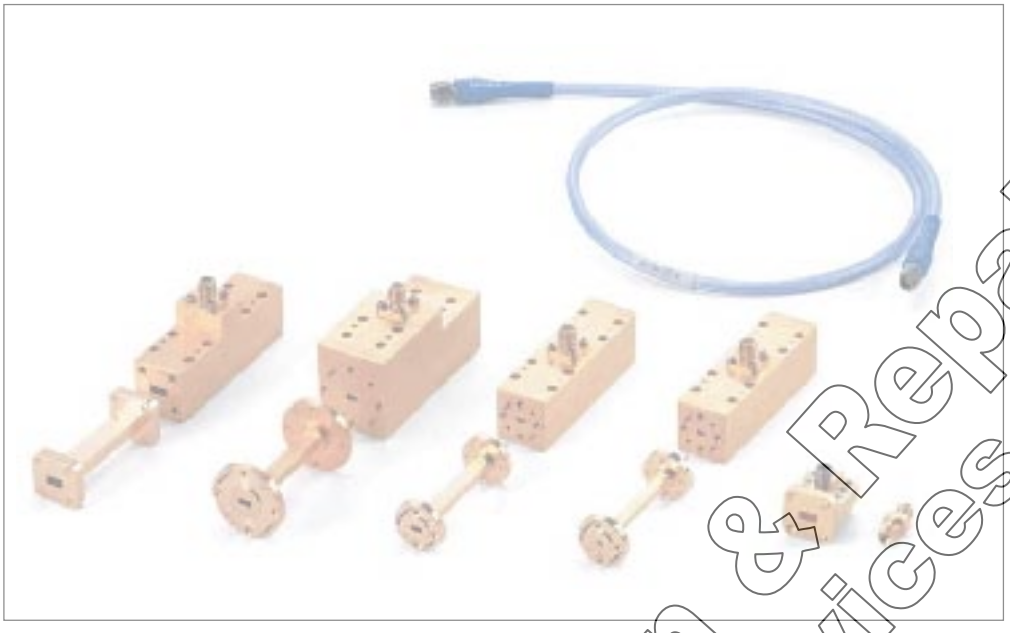


Example of measuring sensitivity

Millimeter Wave General Spectrum Analyzer with Frequency Range from 9 kHz to 26.5/40 GHz

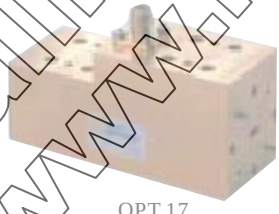
R3172/3182

■Enhanced Functions in Support of Applications



Waveforms of 26.5 to 110 GHz band can be measured with an external mixer. The following table lists the external mixers OPT.16 through OPT.19 with each appropriate measuring band. A compensation value is provided for the frequency responce of each external mixer. Further, various flanged wave-guides, and a coaxial wave-guide converter are available as listed.

Measuring cables and conver-sion connectors, which are especially required for high-frequency measuring, are available as accessories as listed following the table.

Frequency band/ Wave-guide standard	External mixer	Wave-guide with flange	Coaxial wave-guide converter
26.5 to 40 GHz WR-28	 OPT.16	 ST28S-2.0	 410A599KF
40 to 60 GHz WR-19	 OPT.17	 ST19R-2.0	 **Cables with K connector for measuring** F102-11SK-0750 (0.75m) F102-11SK-1000 (1.0m) F102-11SK-1500 (1.5m) F102-11SK-2000 (2.0m)
50 to 75 GHz WR-15	 OPT.18	 ST15R-2.0	
75 to 110 GHz WR-10	 OPT.19	 ST10R-2.0	 **K through adapter** 5A-SFF40A **SMA through adapter** HRM-501

Millimeter Wave General Spectrum Analyzer with Frequency Range from 9 kHz to 26.5/40 GHz

R3172/3182

Specifications

Frequency

Frequency range	R3172 9kHz to 26.5GHz

Preamplifier OFF

		Harmonic mode (N)
band 0	9 kHz to 3.3 GHz	1
band 1	3.2 to 7.1 GHz	1
band 2	7 to 14.7 GHz	2
band 3	14.5 to 26.5 GHz	4

R3182
9KHz to 40GHz

		Harmonic mode (N)
band 0	9 kHz to 3.3 GHz	1
band 1	3.2 to 7.1 GHz	1
band 2	7 to 14.7 GHz	2
band 3	14.5 to 27 GHz	4
band 4	26.5 to 30 GHz	4
band 5	29.5 to 40 GHz	8

Preamplifier ON

		Harmonic mode (N)
band 0	9 kHz to 3.3 GHz	1

Frequency readout accuracy (Start, Stop, CF, Marker)	±(Frequency readout × frequency reference error + span × span accuracy + RBW × 0.15 + 60Hz)
Count frequency marker Resolution Count accuracy	1Hz to 1kHz ±(Marker frequency × frequency reference accuracy + Residual FM +1LSD) (S/N≥25dB, SPAN≤200MHz)
Frequency reference Aging Temperature stability	 $\pm 2 \times 10^{-6}$/year $\pm 1 \times 10^{-5}$ (0 to +50°C)
Frequency span Range Accuracy Range Accuracy	R3172 1 kHz to 26.5 GHz, 0 Hz (zero span) ≤ ± 1% R3182 1 kHz to 40 GHz, ± 1% of span
Residual FM Zero Span	 ≤ (60Hzp-p × N)/100ms
Noise sideband	Frequency ≤ 2.6 GHz ≤ -100 dBc/Hz at 10 kHz offset (RBW 300 Hz, opt27) ≤ -105 dBc/Hz at 20 kHz offset Frequency > 2.6 GHz ≤(-98 + 20logN)dBc/Hz at 10 kHz offset (RBW 300 Hz opt27) ≤ (-103 + 20logN)dBc/Hz at 20 kHz offset
Resolution bandwidth At 3 dB Range RBW Accuracy Selectivity (60dB:3dB)	 1 kHz to 3 MHz 1-3-10 sequence ± 20% from 1 kHz to 1 MHz ± 25% for 3 MHz ≤ 15 : 1
QP (at 6 dB) Range	R3172 1 MHz, 120 kHz, 9 kHz/200Hz(OPT.27) R3182 1 MHz, 120 kHz, 9 kHz
Video bandwidth	10 Hz to 3 MHz (1-3-10 sequence)

Amplitude Range

Characteristics Description	+30 dBm to displayed average noise level
Measurement range	(Input attenuator ≥ 10 dB)
Preamplifier OFF	+30dBm 0 VDC max.
Preamplifier ON	+13dBm 0 VDC max.

Display range	10 × 10 div
Log	10, 5, 2, 1 dB/div
Linear	10% of reference level/div
Reference level range	
Preamplifier OFF	(Input attenuator 0 to 70dB)
Log	-64 dBm to +60 dBm (0.1 dB step)
Linear	+ 141.1μV to + 223.6V
Preamplifier ON	(Input attenuator 0 to 30dB)
Log	-82 dBm to +10 dBm (0.1 dB step)
Linear	+17.76μV to +707.1mV
Input attenuator range	0 to 70 dB (10 dB step)

Sweep

Sweep time	20ms to 1000s R3172 (Sweep time under 20ms can be set up at span 100MHz or less.)
Sweep time accuracy	±2%
Trigger mode	FREE RUN, LINE, VIDEO, EXT, TV
Sweep Mode	REPEAT, SINGLE

Dynamic Range

Displayed average noise level	(with RBW 1 kHz, VBW 10 Hz and input attenuator 0 dB, f ≥ 10 MHz)

Preamplifier OFF

R3172

10 MHz to 3.3 GHz	(band0)	-117 dBm + 2f(GHz)dB*1
3.2 to 7.1 GHz	(band1)	-112 dBm*1
7 to 14.7 GHz	(band2)	-111 dBm*1
14.5 to 22 GHz	(band3)	-107 dBm*1
22 to 26.5GHz	(band3)	-104 dBm*1

R3182

10 MHz to 3.3 GHz	(band0)	-117 dBm + 2f(GHz)dB*1
3.2 to 7.1 GHz	(band1)	-115 dBm*1
7 to 14.7 GHz	(band2)	-113 dBm*1
14.5 to 27 GHz	(band3)	-110 dBm*1
26.5 to 30 GHz	(band4)	-107 dBm*1
29.5 to 40 GHz	(band5)	-106 dBm*1

*1) For a temperature range of 20 to 30°C.
Add 2 dB for a temperature range of 0 to 50°C.)

Preamplifier ON: 1 MHz to 3.3 GHz : -132 dBm + 3f(GHz)dB

Gain compression (1 dB) Preamplifier OFF Preamplifier ON (Input attenuator 0 to 30dB)	 200 MHz to 3.3 GHz(Band 0) : >0 dBm(mixer input level) 3.2 to 26.5 GHz(Band 1 to 3) : > -5 dBm(mixer input level) 200 MHz to 3.3 GHz(Band 0): > -25 dBm(RF input level)

Spurious response

Preamplifier OFF

Second harmonic distortion

Frequency range	Mixer level	Distortion level
100 to 800 MHz	-30 dBm	≤-70 dBc
≥ 800 MHz(band 0)	-30 dBm	≤-80 dBc
≥ 3.3GHz	-10 dBm	≤-100 dBc

Third order intermodulation: ≤-80 dBc(200MHz to 3.3GHz, band 0)

R3172
≤-70 dBc(3.2 to 26.5GHz, band 1 to 3)
R3182
≤ -75 dBc(3.2 to 30GHz, band 1 to 4)
≤ -70 dBc(29.5 to 40GHz, band 5)
(Mixer input level -30dBm, two signal difference > 50 kHz)

Image/Multiple /Out of band response

R3172
<-70 dBc(10 MHz ≤ f ≤ 18 GHz)
<-60 dBc(18 GHz < f ≤ 23 GHz)
<-50 dBc(23 GHz < f ≤26.5 GHz)
R3182
<-70 dBc(10 MHz ≤ f ≤ 18 GHz)
<-65 dBc(18 GHz < f ≤ 26.5 GHz)
<-55 dBc(26.5 GHz < f ≤35 GHz)
<-50 dBc(35 GHz < f ≤40 GHz)

Millimeter Wave General Spectrum Analyzer with Frequency Range from 9 kHz to 26.5/40 GHz

R3172/3182

Residual response	(input terminated 50Ω, input attenuator 0 dB, f ≥1 MHz)
Preamplifier OFF	≤ -100 dBm (band 0)
	R3172
	≤ -90 dBm (band 1 to 3)
	R3182
Preamplifier ON	≤ -90 dBm (band 1 to 5)
	≤ -105 dBm (band 0)

Amplitude accuracy

Frequency response	(after Calibration and Preselector peak, Attenuator 10 dB)
Preamplifier OFF	R3172

Frequency range	Relative		Absolute*2	
	20 to 30°C	0 to 50°C	20 to	0 to 50°C
100 kHz to 3GHz	± 0.5 dB	± 1.0 dB	± 0.5 dB	± 1.0 dB
9 kHz to 3.3 GHz	± 1.5 dB	± 2.0 dB	± 1.5 dB	± 2.0 dB
3.3 to 7.1 GHz	± 1.6 dB	± 1.8 dB	± 1.8 dB	± 2.5 dB
7.1 to 14.7 GHz	± 1.8 dB	± 2.0 dB	± 2.0 dB	± 3.0 dB
14.7 to 26.5 GHz	± 2.5 dB	± 3.0 dB	± 3.0 dB	± 4.0 dB

R3182

Frequency range	Relative		Absolute*2	
	20 to 30°C	0 to 50°C	20 to	0 to 50°C
100 kHz to 3GHz	± 0.5 dB	± 1.0 dB	± 0.5 dB	± 1.0 dB
9 kHz to 3.3 GHz	± 1.5 dB	± 2.0 dB	± 1.5 dB	± 2.0 dB
3.3 to 7.1 GHz	± 1.6 dB	± 1.8 dB	± 1.8 dB	± 2.5 dB
7.1 to 14.7 GHz	± 1.8 dB	± 2.0 dB	± 2.0 dB	± 3.0 dB
14.7 to 26.5 GHz	± 2.5 dB	± 3.0 dB	± 3.0 dB	± 4.0 dB
27 to 30 GHz	± 3.0 dB	± 3.5 dB	± 3.0 dB	± 4.5 dB
30 to 40 GHz	± 3.5 dB	± 4.0 dB	± 4.0 dB	± 5.0 dB

Frequency range	Relative		Absolute*2	
	20 to 30°C	0 to 50°C	20 to 30°C	0 to 50°C
100 kHz to 2.7 GHz	± 1.0 dB	± 1.0 dB	± 1.0 dB	± 1.0 dB
9 kHz to 3.3 GHz	± 2.0 dB	± 2.0 dB	± 2.0 dB	± 2.0 dB

Preamplifier ON	R3172
	(*2 in reference to 30MHz calibration signal)
Calibration signal accuracy	-20 dBm ± 0.3 dB
IF Gain Error	(after automatic calibration) ± 0.5 dB
Scale fidelity	(after automatic calibration)
Log	± 1.5 dB / 90 dB
	± 1.0 dB / 10 dB
	± 0.2 dB / 1 dB
Liner	± 5% of reference level
Input attenuator switching accuracy	≤ ± 1.1 dB / 10 dB, 2 dB max. (9 kHz to12 GHz)
	≤ ± 1.3 dB / 10 dB, 2.5 dB max.(12 to18 GHz)
	≤ ± 1.8 dB / 10 dB, 3.5dB max.(18 to 26.5 GHz)
	R3172
	-
	R3182
	≤ ±2.2 dB/10 dB, 4dB max.(26.5 to 40GHz)
Resolution bandwidth switching uncertainty	(after automatic calibration) ± 0.5 dB
	R3172
	Preamplifier OFF
	± 1.5 dB
	(REF=-50 to 0 dBm, ATT=10 dB, 2 dB/div, RBW=300 kHz, f=100 kHz to 3 GHz, after automatic calibration)

Amplitude accuracy

RF input	R3172 R3182
	N female, SMA female K male
Connector	R3172 : 50W (nominal)
Impedance	
VSWR	R3182 : (at tuned frequency)
Preamplifier OFF	<1.5 : 1(9 kHz to 3.3 GHz, band 0)(characteristic value)
	R3172
	<2 : 1(3.2 to 26.5 GHz, band 1-3)(characteristic value)
	R3182
	<2 : 1(3.2 to 27GHz, band 1-3)(characteristic value)
	<2.5 : 1(26.5 to 40GHz, band 4-5)(characteristic value)
	with input attenuator 10 dB to 70 dB
Preamplifier ON	<2.5 : 1(9 kHz to 3.3GHz, band 0)(characteristic value)
Probe power	± 12 V (nominal), 4-pin connector
Calibration output signal	BNC female, 50 Ω
	30MHz, -20 dBm

10MHz reference input	BNC female, 500 Ω
	-10 to +10 dBm
External trigger input	BNC female
Y axis output	R3172 R3182
	BNC female -
	Approximately 2 V in full scale (10 dB / div)
Phone output	Small size monophonic female
Probe power output	R3172 R3182
	- ±12V, 4-pin connector
Calibration signal output	R3172 R3182
	- BNC female, 50 Ω
	30 MHz, -20 dBm
GPIB interface	IEEE-488 bus connector
Serial interface	D-Sub 9pin
Printer interface	D-Sub 25pin, ESC/P, ESC/P-R, PCL
Video output	VGA(15 pin, female)
Floppy drive	3.5 inch, MS-DOS format

General specifications

Operating environment range	0 to + 50°C
	Relative humidity 85% or less (without condensation)
Storage environment range	-20 to + 60°C, Relative humidity 85% or less
AC input power source	Automatic switching to 100 VAC or 200 VAC
	100VAC : 100 to 120VAC, 50 to 60 Hz
	200VAC : 220 to 240VAC, 50 to 60 Hz
Power consumption	≤ 200VA
Mass (without option)	R3172 R3182
	<16kg <18kg
Dimension	Approximately 424(W) × 177(H) × 300(D) mm
	(not including projections such as rubber feet and connectors)

Options

Option 20 High stability frequency reference crystal oscillator

Reference frequency source accuracy	Aging : $\pm 2 \times 10^{-8}$/day
	$\pm 1 \times 10^{-7}$/year
	Warm-up drift : $\pm 5 \times 10^{-8}$ (nominal)
	(25°C, 10 minutes after tuning the power on)
	temperature drift : $\pm 5 \times 10^{-8}$
	(0 to +40°C, with reference to +25°C)

Option 27 Narrow-band resolution bandwidth

3-dB resolution band width	300 Hz,100 Hz, 30Hz
Band width accuracy	± 20 %
6-dB resolution band width	200Hz

Option 29 High-speed time-domain sweep

Sweep time	50 µs to 10ms
Sweep time accuracy	± 1%
Trace detector	Sample
Trace point	501

Option 74 Tracking Generator (dedicated to R3172)

Frequency range	R3172	R3182
	100 kHz to 3GHz	-
Output level range	0 to -59.9 dBm	-
Output level accuracy	±0.5 dB (30 MHz,-10 dBm, +20 to +30 °C)	-
Output level flatness	±1.0 dB (100 kHz to 1 GHz)	
	±1.5 dB (100 kHz to 3 GHz)	-
	(30MHz, with reference to -10dBm)	
Output level switching error	±1.0 dB (100 kHz to1 GHz, output level ≥ -30 dBm)	
	±2.0 dB (100 kHz to 2.6 GHz)	
	±3.0 dB (100 kHz to 3 GHz)	-
	(with output reference to -10 dBm)	
Spurious		
Harmonics	≤-20 dBc (output level : -10 dBm)	-
Non-harmonics	≤-30 dBc (output level : -10 dBm)	
TG leakage	≤-100 dBm (attenuator : 0dB)	-
Output impedance	50Ω (nominal)	-
VSWR	≤2 (output level ≤ -10 dBm) characteristic value	
Tolerance applied level	+15 dBm	
	±10VDC	-
Weight	≤1kg	-

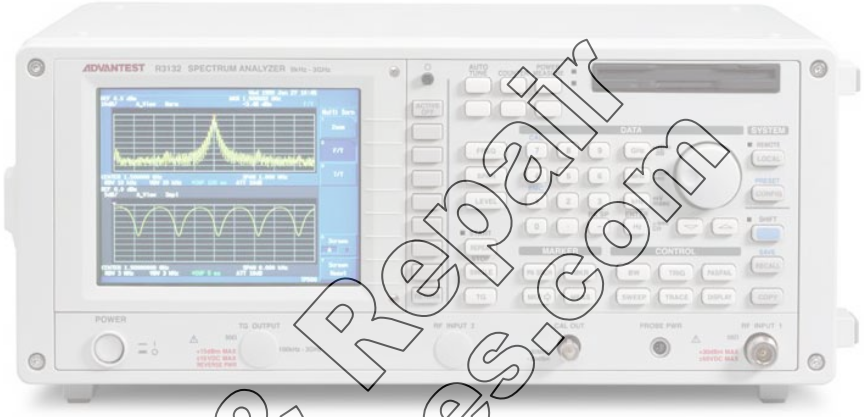
Option 03 Local output for external mixers (dedicated to 3172)

Frequency range	R3172	R3182
	4.0 to 7.6 GHz	-
Output level	>+8dBm	-
Output impedance	50Ω (nominal)	-
connector	SMA female	-

General-Purpose Spectrum Analyzer Adaptable to Various Applications

R3132/3132N/3162

- **Frequency band**
  R3132 9 kHz to 3 GHz
  R3132N: 9 kHz to 3 GHz
  R3162: 9 kHz to 8 GHz
- **High signal purity: -105 dBc (20 kHz offset)**
- **Total level accuracy: ±1.5 dB**
- **High speed GPIB useful for high speed productions system applications.**
- **High speed measurement: 20 traces per second and 20ms sweep time**
- **Abundant measurement functions provided as standard**
- **6.5-inch TFT color LCD**
- **Data management by floppy disc**



(Photo is R3132)

R3132/3132N/3162

Low cost, high performance

R3132/3132N/3162 series is the portable spectrum analyzer which realizes basic functions adaptable to various measurement needs at low cost.
As various options are prepared for specific applications, R3132/3132N/3162 can be used as dedicated measuring instrument for diversified applications, such as cable TV, EMC measurement and digital mobile communications.

■ Reinforced basic functions

Basic functions are reinforced so that R3132/3132N/3162 can be used in various fields. For example, the internal automatic calibration function guarantees the total level accuracy of ±1.5 dB, level correction factor can be stored in the internal memory, DDS is employed to improve frequency reading accuracy, and frequency span error is lowered to less than 1%.
As a result of increasing the sweep repetition cycles by improving the synthesized local oscillator, 20 cycle/s (typ.) of trace data rewriting becomes possible, enabling far more real-time waveform measurement. High speed GPIB increase, the throughput of automatic measurement, thus saving valuable time.

■ Abundant measurement functions

For EMI precompliance measurement, 6-dB bandwidth filters for 9 kHz, 120 kHz and 1 MHz as well as QP detector are equipped as standard. Optional 200 Hz narrow band-pass filter can be added.

For high-speed time domain measurement function which is indispensable for mobile communications, optional 50 µs sweep is effective. For power measurement, AVE. POWER and TOTAL POWER processing functions are provided.

Counter function, ACP, OBW, dBc/Hz, %AM and many other functions are provided for various measurement purposes.

The internal preamplifier is equipped as standard.
Even for signals which are lower in level than the average noise level, the preamplifier ensures level calibrated, high-accuracy measurement.

For measuring the attenuation characteristic of filters or the frequency characteristic of cables, etc., built-in type tracking generator is available as option. Because the output level can be set in a wide range, it is possible to measure amplifier gain, frequency response, etc.

■ Easy-operation interface

The high-resolution, 6.5-inch TFT color LCD realizes easy-to-see display of data. Display data is output through the VGA video output on the rear panel and can be output to external monitor.

Measured waveform data and set values can be saved in or recalled from the internal memory. Using the floppy disc drive which is equipped as standard, you can manage more number of measurement data. Text data or BMP data on floppy disc are also useful for making documents on the personal computer.

As the hard-copy function is adapted to ESC/P. ESC/P-R and PCL, measured data can be printed out on general-purpose printers.

GPIB and RS232 are equipped as standard.

■ Compact, lightweight design

This product features a new frame design making it more compact (approximately 424 (W) x 177 (H) and 300 (D) mm) and lighter (about 14kg). In particular, the short depth of 300mm and allows more effective utilization of the work space. A panel cover is supplied as standard to prevent damage to the analyzer while carrying or moving it.

General-Purpose Spectrum Analyzer Adaptable to Various Applications

R3132/3132N/3162

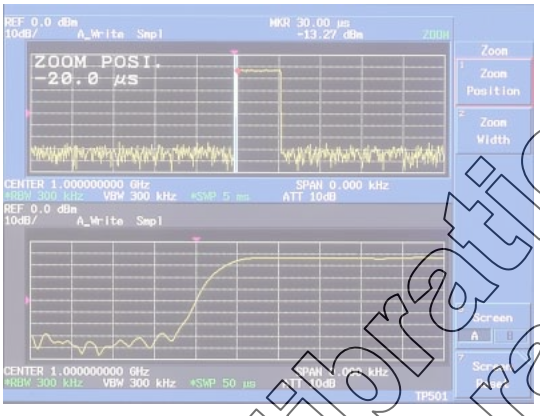
■ High-Speed Measurement

The new synthesized local oscillator developed by ADVANTEST enables more sweeps per unit time, allowing rewriting of trace data at 20 sweeps/sec (typ.) or more, making adjustment tasks more efficient, and enhancing measurement throughput when integrated into a system. When using GP-IB control, the data transfer speed is about twice that of conventional models, furthermore improving system throughput. The R3132, 3132N and 3162 models allow the number of resolution points for trace data to be switched between 501 and 1001 points, speeding up measurement where the number of points of measurement is specified as 501 points.

■ Multi-Screen Function

The zoom function displays two screens, A and B. This enables more versatile signal analysis. The F-F mode can be used to display different frequency spectra, the F-T mode can be used to display AM/FM modulation components and the T-T mode is useful for displaying partially expanded spectra in the time domain.

(Sweep time of 50µs sec is available with Option 29)



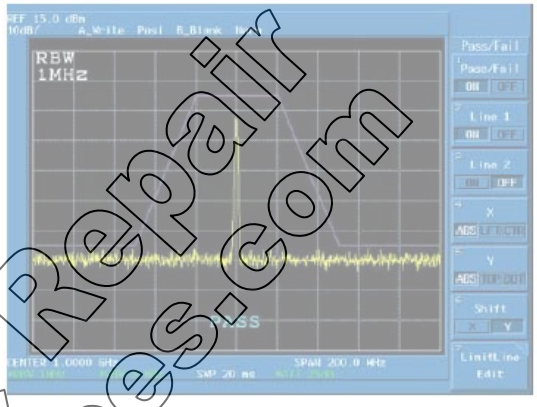
■ Multi-Markers

Up to ten markers can be specified on the screen. Each marker can be assigned to any desired frequency. Peaks can be automatically detected and displayed in a list in the order of level or frequency.

■ Pass/fail testing

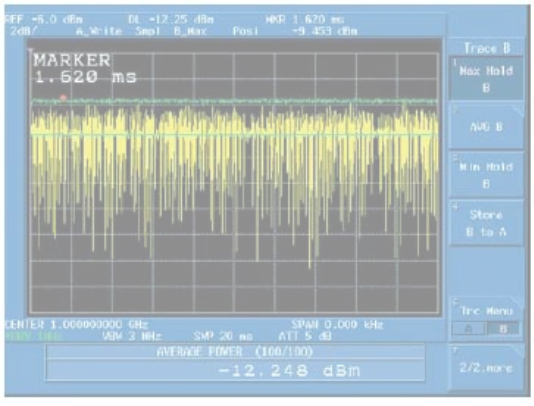
Sets two limit lines on screen, one as a high limit and the other as a low limit, for testing passes and failures. Limit lines can also be set on the timebase, allowing time template measurement.

The limit line settings can be written to internal save memory or FD, so multiple suites of pass/fail testing conditions can be recalled for testing.



■ Multitrace

The two waveforms of traces A and B can be simultaneously sampled and displayed. Since the detector mode for each trace is selectable from among POSI, NEGA, SAMPLE, and NORMAL, the maximum power and the average power might be measured at the same timing, for example.



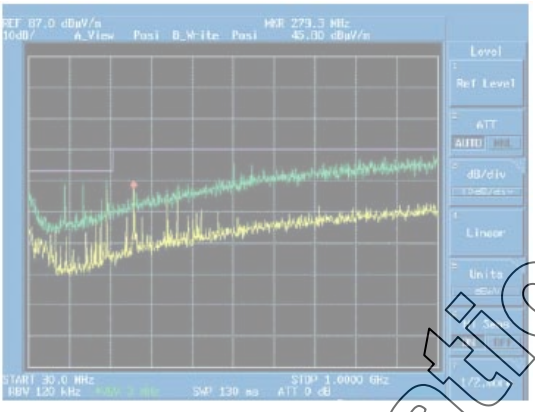
General-Purpose Spectrum Analyzer Adaptable to Various Applications

R3132/3132N/3162

■ EMC measurement

This function measures electromagnetic interferences arising from electronic equipment. The instruments come standard with 9 kHz, 120 kHz, and 1 MHz 6 dB bandwidth filters and a QP detector. A 200 Hz narrow-band filter can be added optionally.

AM/FM demodulated audio is available from the rear-panel PHONE jack to identify disturbing broadcast waves. Correction coefficients for the antennas provided by us are built in the R3132/3132N/3162 so that the level reading can be calibrated for direct reading in dBμV/m by simply selecting the name of your antenna model. If an antenna not manufactured by us is used, a correction can be registered individually. For measuring weak noise lower than noise level of the spectrum analyzer, the built-in preamplifier of R3132/3132N/3162 makes possible of sensitive measurements with calibrated level.

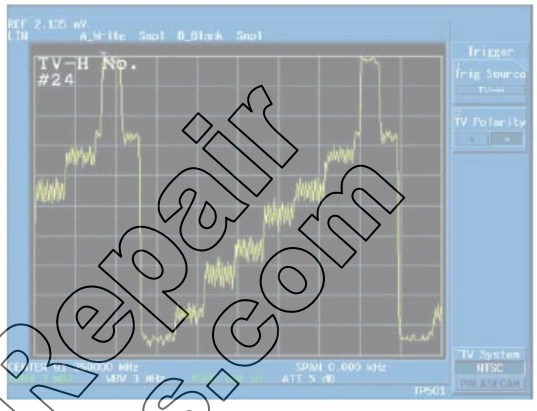


■ Gated sweep

Burst signals iterating in the ON and OFF states of communication could not be directly observed with spectrum analyzers in the past. The R3132/3132N/3162 allow spectral analysis of burst signals by accepting trigger signals synchronized with burst signals at their rear panel EXT TRIGGER IN connectors.

■ Trigger function

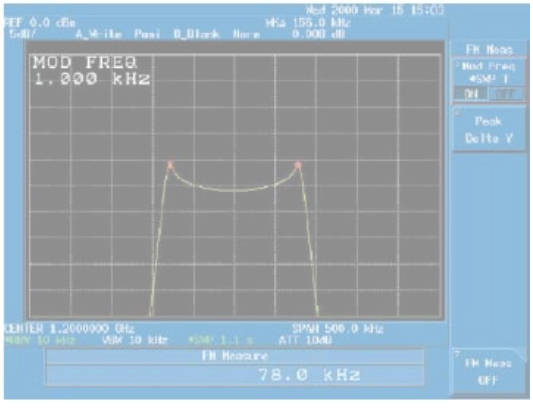
FREE RUN, LINE, VIDEO, TV, and EXT are selectable as sweep trigger sources. A positive or negative delay time can be set for a trigger point in a time-domain sweep.



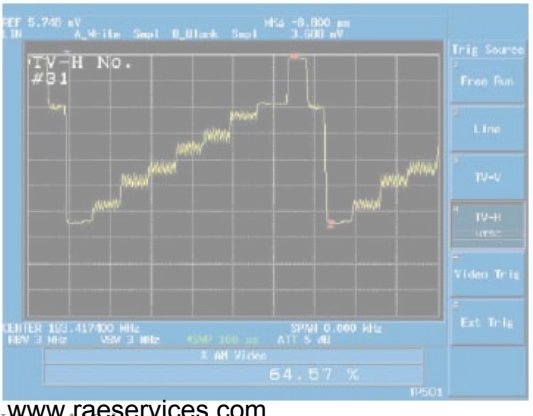
TV trigger

■ Versatile measurement functions

MEAS key supports Noise/Hz measurements, %AM/%AM Video/FM measurements, Third-order measurement and XdB Down measurement. For Noise/Hz measurement, PBW calibration function makes for measurement with higher accuracy in power measurement by providing calibration resulted form conversion of resolution bandwidth (RBW) filter used by R3132/3132N/3162 into ideal filter.



FM measurement



Video AM depth

■ Wide Choice of Options

OPT.20 High-stability frequency reference

Crystal oscillator options with frequency stabilities of $\pm 2 \times 10^{-8}$/day and $\pm 1 \times 10^{-7}$/year are available for enhanced frequency reading accuracy and frequency counter accuracy.

OPT.27 Narrow-band resolution bandwidths

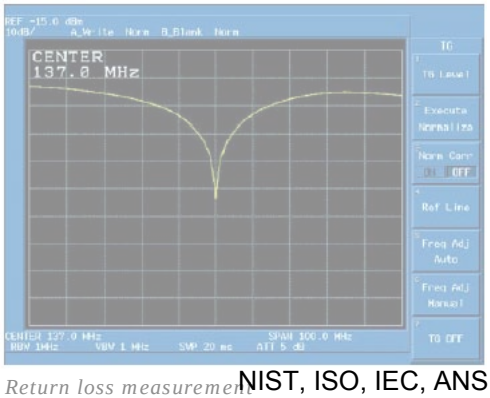
In addition to the RBW of 1 kHz to 3 MHz, 30 Hz, 100 Hz, 300 Hz (3 dB bandwidth), and 200 Hz (6 dB bandwidth) option are available for separating carrier waves and measuring neighboring noises in narrow-band radio systems. These narrowband resolution bandwidth options allow 10 kHz offset signals in TV broadcast waves to be separated positively, assuring DU ratio measurement with confidence.

OPT.29 Time-domain high-speed sweeps

In time-domain high-speed sweeps, the sweep time can be set up to 50 µs, allowing TDMA waveform observation during digital mobile communications measurement and offering zoomed views of the leading and trailing regions of burst signals.

OPT.74 Tracking generator

The tracking generator generates signals synchronized with frequency sweeps by a spectrum analyzer in a frequency range of 100 kHz to 3 GHz, allowing the direct measurement of the frequency response characteristics of filters and amplifiers. A normalization feature is available with the tracking generator for cancelling frequency response characteristics in a single-touch operation to ease the evaluation of the characteristics of only the signals of interest. If return losses are measured using the SWR bridge, the impedance matching characteristic of the signals of interest can be easily evaluated.



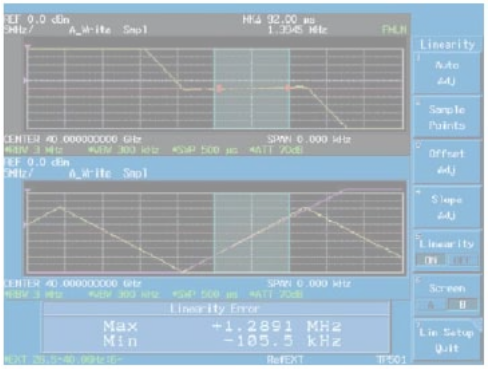
Return loss measurement

OPT.73 Wide-range FM demodulation

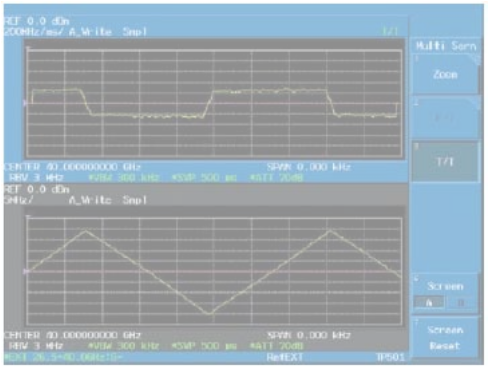
Devices such as a collision avoidance radar for preventing a collision between a car and another in front, which are installed in Intelligent Transport Systems (ITS), utilize an FM modulation in which the frequency deviation is very wide.

The R3132/3132N/3162 can measure FM deviation widths up to 500 MHz (with an external mixer), whereas conventional measuring instruments can not measure these widths. At the same time, the R3132/3132N/3162 can measure modulation linearity and sensitivity. Further, since the R3132/3132N/3162 can perform a limit test during a PASS/FAIL evaluation at any given range. The function can improve the throughput of the tuning process of the production.

Example of Measuring FM Deviation



Example of Measuring Linearity



Example of Measuring Sensitivity

General-Purpose Spectrum Analyzer Adaptable to Various Applications

R3132/3162

Specifications

	R3132	R3162
Frequency		
Frequency range	9kHz to 3GHz	9kHz to 8GHz
		Frequency range / Band: 9kHz to 3.3GHz / 0; 3.2GHz to 6.6GHz / 1-; 6.5GHz to 8GHz / 1+
Frequency reading accuracy (Start, stop, center frequency, marker frequency)	±(Reading of frequency × Frequency reference accuracy + Span × 1% + Resolution bandwidth × 15% + 60 Hz)	
Counter		
Resolution	1Hz to 1kHz	
Accuracy	±(Marker frequency × Frequency reference accuracy + 1LSD) (S/N ≥ 25 dB, span ≤ 200 MHz)	
Frequency reference accuracy	± 2 ×10^{-6}/year ± 1 ×10^{-5} (0 to 50°C)	± 1 ×10^{-7}/year (Option 20) ± 2 ×10^{-8}/day (Option 20)
Frequency span		1kHz to 8GHz, 0Hz (Zero span)
Range	1kHz to 3GHz, 0Hz (Zero span)	≤ ± 1%
Accuracy	≤ ± 1%	
Residual FM	≤ 60Hzp-p × 0.1s	
Signal purity	f ≤ 2.6 GHz	f > 2.6 GHz
20 kHz offset	105 dBc/Hz	103 dBc/Hz
10 kHz offset	100 dBc/Hz*	98 dBc/Hz*
(*RBW 300 Hz OPT 27)		
Resolution bandwidth (3 dB)		
Range	1kHz to 3MHz, 1-3-10 sequence, 30 Hz to 300 Hz (Option)	
Accuracy	< ± 20 %, 1kHz to1MHz < ± 25 %, 3MHz < ± 20 % (Option 27)	
6 dB bandwidth	1MHz, 120kHz, 9kHz, 200 Hz (Option 27)	
Video bandwidth	10Hz to 3MHz 1-3-10 sequence	
Amplitude Range		
Measuring range	+30 dBm to the average of displayed noise level	
Maximum input level (Input ATT ≥ 10 dB)		
Preamplifier OFF	+ 30dBm, ± 50VDC max.	
Preamplifier ON	+ 13dBm, ± 50VDC max.	
Indication range	10 × 10div	
Log	10, 5, 2, 1dB / div	
Linear	10% the reference level/div	
Reference level range		
Preamplifier OFF	(Input ATT: 0 to 50 dB)	(Input ATT: 0 to 75 dB)
Log	-64 to +40 dBm (0.1 dB step)	-64 to +65 dBm (0.1 dB step)
Linear	141.1µV to 22.36V	141.1µV to 397.63V
Preamplifier ON	(Input ATT: 0 to 30 dB)	(Input ATT: 0 to 30 dB)
Log	-82 to +10 dBm (0.1 dB step)	-82 to +10 dBm (0.1 dB step)
Linear	17.76 µV to + 707.1 mV	17.76 µV to + 707.1 mV
Input ATT range	0 to 50 dB (5 dB step)	0 to 75 dB (5 dB step)
Dynamic Range		
Average noise level	RBW 1 kHz, VBW 10Hz input ATT 0 dB, for 10 MHz or more	
Preamplifier OFF	-117dBm + 2f (GHz) dB*1	Band 0 : -117 dBm + 2f(GHz)dB*1 Band 1- : -115dBm + 0.5f(GHz)dB*1 Band 1+ : -115dBm + 0.5f(GHz)dB*1
Preamplifier ON	-132dBm + 3f(GHz) dB	-132 dBm + 3f(GHz)dB (1 MHz to 3.3GHz)
1 dB gain compression	At 200 MHz or more	
Preamplifier OFF	> 0 dBm (mixer input level)	
Preamplifier ON	> -25 dBm (RF input level)	
Spurious response	Preamplifier OFF	
2nd-order harmonic distortion	(Mixer input -30 dBm)	Frequency range / Mixer input / Distortion level: 100 to 800MHz / -30dBm / ≤-70dBc; ≥ 800MHz (band 0) / -30dBm / ≤-80dBc; > 3.3GHz / -10dBm / ≤-100dBc
	≤ -70 dBc 100 to 800 MHz	
	≤ -80 dBc 800 MHz or more	
2 signal, 3rd-order intermodulation distortion	≤ -80 dBc (Mixer input -30 dBm, f ≥ 200 MHz, Detuning > 50 kHz)	
Image/multiple/band external response		≤ -70dBc
Residual response	When input ATT 0 dB and 50Ω terminated and 1MHz or more	
Preamplifier OFF	≤ -100dBm	Band 0: ≤ -100 dBm; Band 1-, 1+: ≤ -90 dBm
Preamplifier ON	≤ -105dBm	≤ -95 dBm

	R3132	R3162
Amplitude Accuracy		
Frequency response	After auto calibration, ATT=10dB	
Preamplifier OFF	≤ ±0.5dB (100kHz to 3GHz)*2	≤ ±0.5dB (100kHz to 3GHz)*2
	≤ ±2dB (9kHz to 3GHz)	≤ ±2dB (9kHz to 3.3GHz)
		≤ ±2dB (3.2 to 8GHz)
Preamplifier ON	≤ ±1dB (100kHz to 2.7GHz)	≤ ±1dB (100kHz to 2.7GHz)
	≤ ±2dB (9kHz to 3GHz)	≤ ±2dB (9kHz to 3.3GHz)
Calibration signal level accuracy	-20dBm ±0.3dB	
IF gain error	After auto calibration < ±0.5dB	
Scale indication accuracy	After auto calibration	
Log	≤ ± 1.5dB/80dB	
	≤ ± 1dB/10dB	
	≤ ± 0.2dB/1dB	
Linear	± 5% of reference level	
Input ATT switching error	≤ ± 0.3dB (for 0 to 50 dB, with respect to 30 MHz/10 dB)	
Resolution bandwidth switching level error	After auto calibration ≤ ± 0.5dB	
Total level accuracy	±1.5dB (REF:-50 to 0dBm, ATT=10dB, 2dB/div, RBW=300kHz, 100kHz to 3GHz, after auto calibration)	
Sweep		
Sweep time	20ms to 1000s, 50µs to 1s (Option29, Zerospan)	
Accuracy	≤ ± 2%	
Trigger mode	FREE RUN, LINE, VIDEO, EXT, TV	
Sweep mode	REPEAT, SINGLE	
I/O		
RF input		
Connector	N type (female)	
Impedance	50Ω (Nominal)	
VSWR		
Preamplifier OFF	≤ 1.5 : 1 (100kHz to 2GHz) Input ATT: 10 to 50 dB ≤ 2 : 1 (9kHz to 3GHz) Input ATT: 5 to 50 dB	< 2 : 1 (9kHz to 3.3GHz) < 2.5 : 1 (9kHz to 8GHz) Input ATT: 10 to 75 dB
Preamplifier ON	< 2.5 : 1 (9kHz to 3GHz)	
Probe power	±12 V, 4-pin connector	
Calibration output signal	BNC female, 50Ω (Nominal) 30 MHz, -20 dBm	
10 MHz reference input	BNC female, 500Ω (Nominal) -10 to +10 dBm	
External trigger input	BNC female	
Sound output (demodulated audio)	Small monophonic jack	
GPIB interface	IEEE-488 specification BUS connector	
Serial interface	D-sub 9pin	
Printer interface	D-sub 25pin, ESC/P, ESC/P-R, PCL	
Video out	VGA (15-pin, female)	
Floppy disc	3.5-inch, MS-DOS format	
General Specifications		
Operating temperature	0 to + 50 °C Humidity RH 85% or less (no condensation)	
Storage temperature	-20 to +60 °C, RH 85% or less	
Power supply	100/200 VAC (auto switched) 100VAC : 100 to 120VAC, 50 to 60Hz 200VAC : 200 to 240VAC, 50 to 60Hz	
Dimensions	424 (W) × 177 (H) × 300 (D)mm (without feet and connectors)	
Weight	14 kg or less (Excluding options, cover, and accessories)	15 kg or less

*1: For temperature range of 20˚C to 30˚C.
(Add 2dB for a temperature range of 0˚C to 50˚C.)

*2: For temperature range of 20˚C to 30˚C.
(Add 0.5dB for a temperature range of 0˚C to 50˚C.)

General-Purpose Spectrum Analyzer Adaptable to Various Applications

R3132N

Specifications

	R3132N
Frequency	
Frequency range	9kHz to 3GHz
Frequency reading accuracy (Start, stop, center frequency, marker frequency)	±(Reading of frequency × Frequency reference accuracy + Span × 1% + Resolution bandwidth × 15% + 60 Hz)
Counter	
Resolution	1Hz to 1kHz
Accuracy	±(Marker frequency × Frequency reference accuracy + 1LSD) (S/N ≥ 25 dB, span ≤ 200 MHz)
Frequency reference accuracy	± 2 ×10^{-6}/year ± 1 ×10^{-7}/year (Option 20) ± 1 ×10^{-5} (0 to 50°C) ± 2 ×10^{-8}/day (Option 20)
Frequency span	
Range	1kHz to 3GHz, 0Hz (Zero span)
Accuracy	≤ ± 1%
Residual FM	≤ 60Hzp-p × 0.1s
Signal purity	f ≤ 2.6 GHz f > 2.6 GHz
20 kHz offset	105 dBc/Hz≤ 103 dBc/Hz≤
10 kHz offset	100 dBc/Hz* 98 dBc/Hz*
(*RBW 300 Hz OPT 27)	
Resolution bandwidth (3 dB)	
Range	1kHz to 3MHz, 1-3-10 sequence, 30 Hz to 300 Hz (Option)
Accuracy	< ± 20 %, 1kHz to1MHz < ± 25 %, 3MHz < ± 20 % (Option 27)
6 dB bandwidth	1MHz, 120kHz, 9kHz, 200 Hz (Option 27)
Video bandwidth	10Hz to 3MHz 1-3-10 sequence
Amplitude Range	
Measuring range	+134 dBm to the average of displayed noise level
Maximum input level (Input ATT ≥ 10 dB)	
Preamplifier OFF	+ 134dBm, ± 50VDC max.
Preamplifier ON	+ 120dBm, ± 50VDC max.
Indication range	10 × 10div
Log	10, 5, 2, 1dB / div
Linear	10% the reference level/div
Reference level range	
Preamplifier OFF	(Input ATT: 0 to 50 dB)
Log	+44.8 to −148.8 dBm (0.1 dB step)
Linear	172.8 µV to 27.39V
Preamplifier ON	(Input ATT: 0 to 50 dB)
Log	+26.8 to +118.8 dBm (0.1 dB step)
Linear	21.75 µV to 866 mV
Input ATT range	0 to 50 dB (5 dB step)
Dynamic Range	
Average noise level	RBW 1 kHz, VBW 10Hz input ATT 0 dB, for 10 MHz or more
Preamplifier OFF	-6 dBµV + 2f (GHz) dB*1
Preamplifier ON	-21 dBµV + 3f(GHz) dB
1 dB gain compression	At 200 MHz or more
Preamplifier OFF	> +107 dBµV (mixer input level)
Preamplifier ON	> +82 dBµV (RF input level)
Spurious response	Preamplifier OFF, Mixer input +77 dBµV
2nd-order harmonic distortion	≤ -70 dBc 100 to 800 MHz ≤ -80 dBc f ≥ 800 MHz
2 signal, 3rd-order intermodulation distortion	≤ -80 dBc (f ≥ 200 MHz, Detuning > 50 kHz)
Residual response	When input ATT 0 dB and 75Ω terminated and 1MHz or more
Preamplifier OFF	≤ +11 dBµV
Preamplifier ON	≤ +6 dBµV

	R3132N
Amplitude Accuracy	
Frequency response	After auto calibration, ATT=10dB
Preamplifier OFF	≤ ±0.5dB (100kHz to 2.2GHz)*2 ≤ ±2dB (9kHz to 2.2GHz)
Preamplifier ON	≤ ±1dB (100kHz to 2.2GHz) ≤ ±2dB (9kHz to 2.2GHz)
Calibration signal level accuracy	-20dBm ±0.3dB
IF gain error	After auto calibration < ±0.5dB
Scale indication accuracy	After auto calibration
Log	< ± 1.5dB/80dB < ± 1dB/10dB < ± 0.2dB/2dB
Linear	± 5% of reference level
Input ATT switching error	≤ ± 0.3dB (for 0 to 50 dB, with respect to 30 MHz/10 dB)
Resolution bandwidth switching level error	After auto calibration ≤ ± 0.5dB
Total level accuracy	±1.5dB (REF: +57 to +107dBµV, ATT=10dB, 2dB/div, RBW≤300kHz, 100kHz to 2.2GHz, after auto calibration)
Sweep	
Sweep time	25ms to 1000s, 50µs to 1s (Option29, Zerospan)
Accuracy	< ± 2%
Trigger mode	FREE RUN, LINE, VIDEO, EXT, TV
Sweep mode	REPEAT, SINGLE
I/O	
RF input	
Connector	N type (female)
Impedance	75Ω (Nominal)
VSWR	
Preamplifier OFF	≤ 1.5 : 1 (100kHz to 2.2GHz) Input ATT: 10 to 50 dB ≤ 2 : 1 (9kHz to 2.2GHz) Input ATT: 5 to 50 dB
Preamplifier ON	< 2.5 : 1 (9kHz to 2.2GHz)
Probe power	±12 V, 4-pin connector
Calibration output signal	BNC female, 75Ω (Nominal) 30 MHz, -20 dBm
10 MHz reference input	BNC female, 500Ω (Nominal) -10 to +10 dBm
External trigger input	BNC female
Sound output (demodulated audio)	Small monophonic jack
GPIB interface	IEEE-488 specification BUS connector
Serial interface	D-sub 9pin
Printer interface	D-sub 25pin, ESC/P, ESC/P-R, PCL
Video out	VGA (15-pin, female)
Floppy disc	3.5-inch, MS-DOS format
General Specifications	
Operating temperature	0 to + 50 °C Humidity RH 85% or less (no condensation)
Storage temperature	-20 to +60 °C, RH 85% or less
Power supply	100/200 VAC (auto switched) 100VAC : 100 to 120VAC, 50 to 60Hz 200VAC : 200 to 240VAC, 50 to 60Hz
Dimensions	424 (W) × 177 (H) × 300 (D)mm (without feet and connectors)
Weight	14 kg or less (Excluding options, cover, and accessories)

*1: For temperature range of 20˚C to 30˚C.
(Add 2dB for a temperature range of 0˚C to 50˚C.)

*2: For temperature range of 20˚C to 30˚C.
(Add 0.5dB for a temperature range of 0˚C to 50˚C.)

General-purpose Spectrum Analyzer

R3131A

- **Frequency range: 9kHz to 3GHz**
- **Built-in tracking generator of up to 3 GHz (option)**
- **Synthesized local oscillator**
- **Magnified display for counter and power measurements**
- **Enhanced measurement functions**
  - **Auto Tune function**
  - **PASS/FAIL judgment**
  - **dB down measurement**
  - **Noise/Hz conversion**
  - **AM modulation measurement**
  - **Built-in SAVE/RECALL registers**
- **Screen images can be output on commercially available printers.**
- **FDD equipped as standard**

R3131A

Spectrum Analyzer

With the performance of a standard middle-class spectrum analyzer and a low cost, the R3131A Spectrum Analyzer can be used in a wide range for many applications.
The R3131A is basically designed with a panel size assuming rack-mount use. The operation key layout is a simple, easy to use design which accommodates system use and personal use.

■ Single-key Function

Dedicated keys are arranged on the control panel to correspond with the AUTO TUNE, COUNTER, POWER MEASURE functions. In addition, the magnified display is used with priority to the COUNTER and POWER measurements, greatly improving the operator's effectiveness.

■ High-stability Measurement by Synthesized Local Oscillator

The local oscillator is configured by a high-stability synthesizer, enabling stable measurements also in system use.

■ Improvement of System Throughput

The measurement time of measuring instruments and the time required for data transmission have a large effect on the throughput of production and adjustment lines. The R3131A employs newly developed internal processing technology to reduce the time required for GPIB control or data transmission to almost half compared with conventional ADVANTEST products. In addition, by reducing the local oscillator settling time, the speed of rewriting waveform data has been almost doubled at maximum in terms of unit time. (Comparisons made under the same conditions)

■ Simplified Pass/Fail Test

Dedicated limit zones are provided in the X/Y axis directions for the most frequently used limit settings.

■ Diverse Measurement Functions

- Bandwidth conversion function necessary for phase noise and signal power measurements
- 1Hz resolution frequency counter
- 10 built-in registers for saving waveform data and measurement conditions
- Gated and Delayed Sweep functions for burst signal spectrum analysis
- AM modulation measurement
- dB down measurement
- Up to ten multi-markers can be set.
- Template setting effective for limitation tests.

■ FDD Equipped as Standard

Because MS-DOS formatted floppy discs can be used:
- Screen images can be saved in bit-map format.
- The setting of measurement conditions and waveform data can be saved as numeric data to allow making reports on a personal computer.
  In addition, antenna correction data which was created and edited on a personal computer can be read into the R3131A for processing.

■ Standard Interfaces

- GPIB
- RS232
- Printer

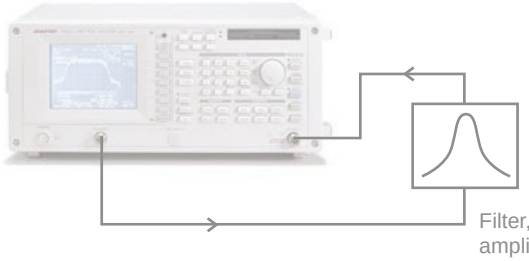
■ Tracking Generator Option

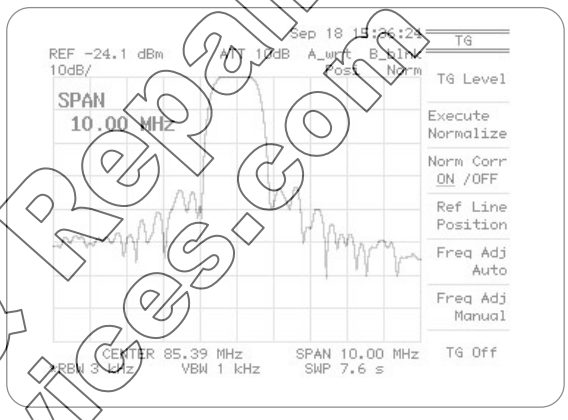
The tracking generator (OPT.74) is a monoblock option which is integrated in R3131A. It can generate constant level signal synchronized with sweep frequency in the frequency range up to 3 GHz and therefore can easily measure the frequency characteristic of devices. Besides, with the normalize function which cancels the frequency characteristic of measuring system, highly accurate measurement is possible.
Because the output level can be set in a wide range (from 0 to -59.9 dBm, in 0.1 dB steps), it can be used to measure filter pass characteristic, cable loss, amplifier gain, etc.

■ Example Use of the Tracking Generator

Frequency characteristic measurement

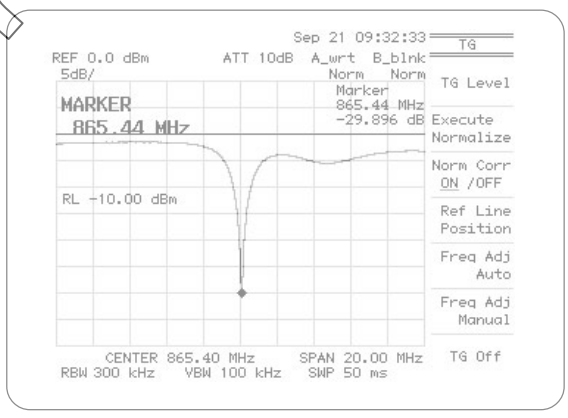
- **Filter pass characteristics**
- **Amplifier gain**





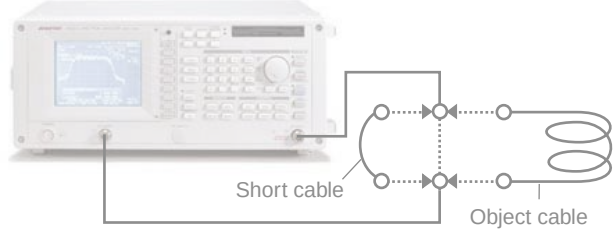
Reflection characteristics measurement

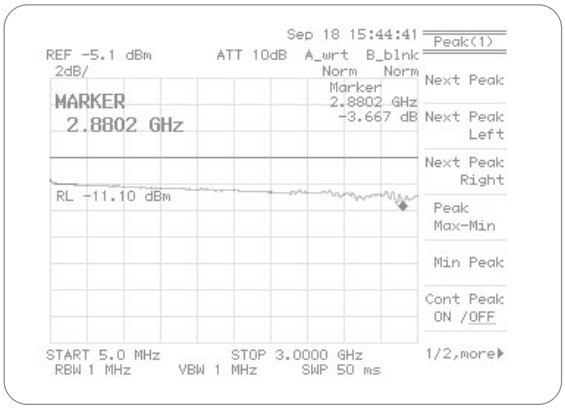
- **Antenna reflection characteristics**
- **Filter reflection characteristics**



Cable loss measurement

- **Cable high-frequency loss characteristics**





General-purpose Spectrum Analyzer

R3131A

Specifications

Frequency

Frequency range : 9 kHz to 3 GHz
Reading accuracy : ± (Frequency reading × Frequency reference accuracy + Span × Span accuracy + 0.15 × Resolution bandwidth + 1 kHz)
Marker counter accuracy : ± (Marker frequency × Frequency reference accuracy + 1 LSD) (S/N ≥ 25 dB, Span ≤ 200 MHz)
Marker counter resolution : 1 Hz to 1 kHz
Frequency reference source accuracy : ±2 ppm/year, ±5 ppm at operating temperature range
Frequency span : Zero, 10 kHz to 3 GHz
Frequency span accuracy : ≤ ±3 % (Frequency span : 50 kHz to 3 GHz)
Frequency stability :
Residual FM ; ≤ 100 Hzp-p/100 ms @ span 1 MHz or lower
Sideband noise : ≤ 100 dBc/Hz (20 kHz offset)
Resolution 3dB bandwidth : 300 Hz to 1 MHz 1-3step
Bandwidth accuracy ; ≤ ±20% (RBW 1 kHz to 1 MHz)
≤ ±50% (RBW 300 Hz, Typ.±20%)
Selectivity (60 dB:3 dB) ; ≤ 15:1
≤ ±20:1 (RBW 300 Hz, 50 dB:3 dB)
6dB bandwidth : 9 kHz, 120 kHz
Video bandwidth : 10 Hz, 1 MHz 1-10step

Amplitude range

Amplitude measurement range : +30 dBm to Average displayed noise level
Maximum input level : +30 dBm , 50 V DC
Display range :
Log : 10 dB/div 8 div
1, 2, 5 dB/div 10 div
Linear : 10 div of reference level
Reference level display range
Log : -64 dBm to + 40 dBm
Linear : +141.1 µV to +22.36 V
Input attenuator range : 0 to 50 dB 10 dB step

Sweep

Sweep time : 50 ms to 500 s
Sweep time accuracy : ≤ ±3%
Trigger mode : FREE RUN, VIDEO, EXT, LINE
Sweep mode : REPEAT, SINGLE

Dynamic range

Average noise level : -113 dBm + 2f(GHz) dB
(at RBW 1 kHz, VBW 10 Hz, INPUT ATT 0 dB, frequency 1 MHz or higher)
1 dB gain compression: > -5 dBm (mixer input level, f > 100 MHz)
Secondary harmonic distortion : ≤ -70 dB,
input frequency ≥ 10 MHz, mixer input level -30 dBm
2-signal, 3rd-order intermodulation distortion : ≤ -70 dB,
input frequency ≥ 10 MHz, mixer input level -30 dBm
Residual response : ≤ -100 dBm (Frequency ≥ 1 MHz)
(INPUT ATT 0 dB, input 50 Ω terminated)

Amplitude accuracy

Calibration signal : 30 MHz, -20 dBm ± 0.3 dB
Frequency response :
≤ ± 0.5 dB (100 kHz to 3 GHz, ATT=10 dB)
≤ ± 1 dB (100 kHz to 2 GHz)
≤ ± 2 dB (9 kHz to 3 GHz)
(after calibration at 30 MHz reference)
Scale display accuracy:
LOG ; ≤ ± 0.5 dB (0 to -20 dB) (after auto calibration)
≤ ± 1.5 dB/70 dB (0 to -20 dB) (after auto calibration)
≤ ± 1.0 dB/10 dB (0 to -20 dB) (after auto calibration)
≤ ± 0.2 dB/1 dB (0 to -20 dB) (after auto calibration)
LIN ; ± 5% of reference level
Input attenuator switching accuracy: ≤ ± 0.3 dB (0 to 50 dB)
(10 dB reference, @30 MHz)
Resolution bandwidth switching accuracy:
≤ ± 0.3 dB (after auto calibration)
IF gain error: ≤ ± 0.5 dB (after auto calibration)
Reference level accuracy: ≤ ± 0.5 dB (-50 to 0 dBm)
Total level accuracy : ± 1.5dB (REF = -50 to 0 dBm, Att = 10 dB, 2 dB/div, RBW = 300 kHz, f>100 kHz)

Input/output

RF input :
Connector/impedance ; N type jack/50 Ω (nominal)
VSWR: ≤ 1.5 (100 kHz to 2 GHz, INPUT ATT≥10 dB)
≤ 2.0 (9 kHz to 3 GHz, INPUT ATT≥10 dB)
10MHz REF input : BNC jack, 50 Ω
Input range : -10 dBm to +10 dBm
Ext. trigger input : BNC jack, 10 kΩ (nominal), DC coupling
PHONE output : Mini monophonic jack 8 Ω
Probe power: ±12 V, 4 pin connector
GPIB interface : IEEE-488 bus connector
Serial interface : D-SUB 9-pin
Printer interface : D-SUB 25-pin, ESC/P, PCL
Floppy disk drive : 3.5-inch, MS-DOS format

Tracking generator (option)

Frequency range : 100 kHz to 3.0 GHz
Output level range : 0 to -59.9 dBm (0.1 dB step)
Output level accuracy : ≤ 0.5 dB (30 MHz, -0 dBm, -20°C to 30°C)
Output level flatness : ≤ 0.7 dB (100 kHz to 1 GHz)
≤ 1.5 dB (100 kHz to 3 GHz)
(for -10 dBm ; Reference: 30 MHz)
Output level switching accuracy : ≤ ± 1.0 dB (100 kHz to 1 GHz)
≤ ± 2.0 dB (100 kHz to 2.6 GHz)
≤ ± 3.0 dB (100 kHz to 3 GHz)
(Reference: -10 dBc)
Output spurious : Harmonics ; ≤ -20 dBc
Non-harmonics ;≤ -30 dBc
(For TG level 0 dBm)
Output impedance : 50 Ω

R3131A

Specifications

General specifications

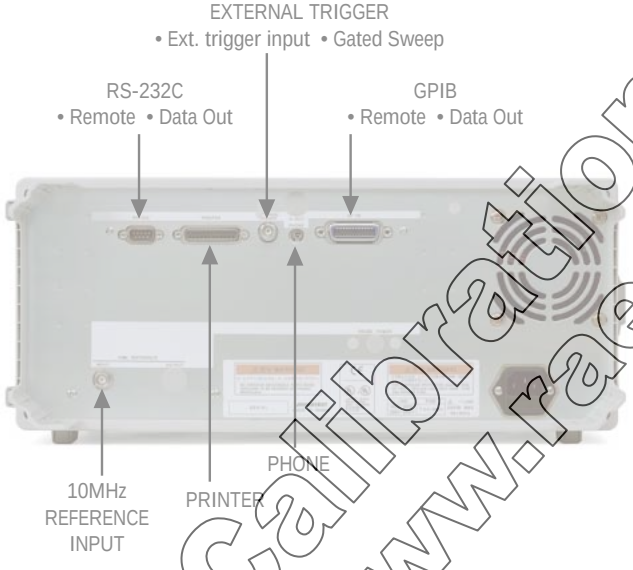
Operating temperature: 0 to +50°C, 85%RH max.
(no condensation)
Storage temperature : -20 to +60°C
Power supply : 100/200V AC, auto switching
At 100V AC; 100 to 120 V, 50 Hz/60 Hz
At 220V AC; 220 to 240 V, 50 Hz/60 Hz
Power consumption : 200 VA max. (at 100 V AC)
Mass : 12 kg
Dimensions : 424 mm (W) × 177 mm (H) × 300 mm (D)

Accessories

A02268	Rack mount set (JIS)
A02468	Rack mount set (EIA)
R16080	Transit case

Option

OPT3131+74	Tracking generator



List of Accessories

Name	Product name	Model number	Recommended manufacturer	Remarks
Antenna	See the section on EMC measuring equipment			
Probe	Active probe	***AP003**	Sony Tektronix	DC to 1000 MHz
Converter adapter	NP-NP	***N-A-PP**	Noble Radio	50 Ω system
	NJ-NJ	***N-A-JJ**	Noble Radio	50 Ω system
	NJ-BNCP	***NJ-BNCP**	Noble Radio	50 Ω system
	NJ-BNCJ	***NJ-BNCP**	Noble Radio	50 Ω system
	NP-BNCJ	***JUG-201A-U**	Hirose Electric Co., Ltd.	50 Ω system
	SMAJ-SMAJ	***HRM-501**	Hirose Electric Co., Ltd.	50 Ω system
	SMAP-SMAP	***HRM-502**	Hirose Electric Co., Ltd.	50 Ω system
	NP-SMAJ	***HRM-554S**	Hirose Electric Co., Ltd.	50 Ω system
	NP-SMAP	***HRM-555S**	Hirose Electric Co., Ltd.	50 Ω system
	NCJ-NFP	***NCJ-NFP**	Hirose Electric Co., Ltd.	75 Ω system (C15 type), DC to 1500 MHz
	NCJ-NFJ	***NCJ-NFJ**	Hirose Electric Co., Ltd.	75 Ω system (C15 type), DC to 1500 MHz
	NCP-NFP	***NCP-NFP**	Hirose Electric Co., Ltd.	75 Ω system (C15 type), DC to 1500 MHz
	NCP-NFJ	***NCP-NFJ**	Hirose Electric Co., Ltd.	75 Ω system (C15 type), DC to 1500 MHz
	NFJ-NFJ	***NF-A-JJ**	Hirose Electric Co., Ltd.	(C15 type), DC to 1500 MHz
	BNCP-FJ	***BNCP-FJ**	Noble Radio	75 Ω system
	BNCP-NCP	***BNCP-NCP**	Noble Radio	75 Ω system
	BNCP-NCJ	***BNCP-NCJ**	Noble Radio	75 Ω system
	BNCJ-NCJ	***BNCJ-NCJ**	Noble Radio	75 Ω system
	BNCJ-NCP	***BNCJ-NCP**	Noble Radio	75 Ω system
Impedance converter	50 Ω to 75 Ω impedance converter	***ZT-102BB**	Tamagawa Electronics	BNCP-BNCJ, resistor type, 6 dB loss, DC to 300 MHz
	50 Ω to 75 Ω impedance converter	***ZT-102NC**	Tamagawa Electronics	NP-NCJ, resistor type, 6 dB loss, DC to 1000 MHz
	50 Ω to 75 Ω impedance converter	***ZT-104NY**	Tamagawa Electronics	NP-SP3CR, resistor type, 6 dB loss, DC to 1000 MHz
	50 Ω to 75 Ω impedance converter	***ZT-201BB**	Tamagawa Electronics	BNCP-BNCJ, transformer type, loss within 1 dB, 10 to 300 MHz
	50 Ω to 75 Ω impedance converter	***ZT-204NC**	Tamagawa Electronics	NP-NCJ, transformer type, loss within 1 dB, 10 to 1000 MHz
	50 Ω to 75 Ω impedance converter	***ZT-205NY**	Tamagawa Electronics	NP-SP3CR, transformer type, loss within 1 dB, 10 to 1000 MHz
	50 Ω to 75 Ω impedance converter	***ZT-130NC**	Tamagawa Electronics	NP-NCJ, 6 dB loss, VSWR 1.3 or less, DC to 2000 MHz
Termination	Coaxial non reflective terminator	***BNC-TMP-2**	Hirose Electric Co., Ltd.	DC to 2 GHz, 1 W, 50 Ω system, BNCP
	Coaxial non reflective terminator	***BNC-TMP-05(75)**	Hirose Electric Co., Ltd.	DC to 2 GHz, 0.5 W, 75 Ω system, BNCP
	Coaxial non reflective terminator	***MODEL M1418**	Weinschel Associates Inc.	DC to 18 GHz, 10 W, 50 Ω system, NP
	Coaxial non reflective terminator	***MODEL M1419**	Weinschel Associates Inc.	DC to 18 GHz, 10 W, 50 Ω system, SAMP
	Coaxial non reflective terminator	***MODEL M1426**	Weinschel Associates Inc.	DC to 8 GHz, 50 W, 50 Ω system, NP

*Recommended model. Can be purchased directly from the manufacturer or through ADVANTEST (a handling fee will be added). In all cases, see the manufacturer regarding maintenance or other points.