ADVANTEST

R3264/3267/3273
Spectrum Analyzers

For Next-Generation Communication Systems

Digital Communication standards

(W-CDMA, PDC, PHS, IS-136, GSM, GPRS, EDGE,

DECT, cdmaOne, cdma2000, Bluetooth™…)

R3264/3267/3273

New communication technologies such as 3rd Generation Mobile (IMT-2000), microwave digital broadcast, high-speed multimedia mobile access (MMAC), and satellite-based services require the latest in spectrum and modulation measurement capabilities. These new services must be introduced in less time and for more users than ever before.

The R3264/3267/3273 are high-performance spectrum analyzers designed to meet these needs.

The R3264/3267/3273 features a frequency span accuracy ±0.2% (typ.) and a dynamic range of -145 dBc/Hz (typ.) in the 2 GHz band to allow accurate, repeatable measurements for high-quality digital signals. Its 1 Hz to 10 MHz resolution band with filter and ability to perform a 70 dB (typ., at 5 MHz offset) ACP measurement on W-CDMA makes it ideal for testing of wide band signals. With a frequency range from 9 kHz to 3.5 GHz (R3264), 100 Hz to 8 GHz (R3267), and 26.5 GHz (R3273), the R3264/3267/3273 allow comprehensive measurements of even high frequency systems.

The digital modulation analysis option offers one-button testing of modulation parameters for communication systems including PHS, PDC, IS-136, DECT, GSM, GPRS, EDGE, IS-95, cdma2000, Bluetooth as well as W-CDMA (3GPP).

The R3264/3267/3273 provides excellent value with its combination of spectrum and optional modulation analyzer, so that it can be used with applications ranging from research and development of communication devices and modules, to production line and deployment testing of communication infrastructure equipment. The R3264/3267/3273: a new family of analyzers to test today's, and tomorrow's communication systems.

High Frequency and Wide Bandwidth Measurements

- Frequency range: R3264: 9 kHz to 3.5 GHz
  R3267: 100 Hz to 8 GHz
  R3273: 100 Hz to 26.5 GHz
- Resolution bandwidth: 1 Hz to 10 MHz
- Span accuracy: ±1% or better (typ. ±0.2% for all spans)

High Dynamic Range Measurements

- Dynamic range: -145 dBc/Hz (2 GHz band, typ.)
  70 dB or better (5 MHz offset, typ.)
  for W-CDMA ACP measurement
- Average noise level: -154 dBm/Hz (2 GHz band)
- Input attenuator: 75 dB in 5 dB steps (R3264/3267)
- 1 dB gain compression: 0 dBm (typ. +3 dBm)
- 3rd order intermodulation distortion: -90 dBc or less (2 GHz band, R3267)

High Speed Measurements

- Trace update rate: up to 20 times/sec.
- 1 µs fast zero-span sweep

Simplified, Automated Measurements for Mobile Communications

- ACP (adjacent channel leakage power) measurement
- OBW (occupied bandwidth) measurement
- Channel and total power measurement
- Harmonics measurement
- Spurious emission measurement
- 2-trace simultaneous measurement
- Delayed sweep/Gated sweep functions
- Peak list function
- Noise/Hz measurement
- XdB down measurement
- 3rd-order measurement
- %AM measurement
- 1 Hz resolution frequency counter
- SSB phase noise automatic measurement
- Phase Jitter measurement
- IM (Inter Modulation) automatic measurement

Simple Connectivity

- 6.5-inch TFT color LCD
- 3.5-inch MS-DOS compatible floppy disk drive
- Standard I/O interfaces for integration:
  GPIB, RS232, Parallel, and VGA

Options

OPT.01 Digital Modulation Analysis Option

OPT.61 cdmaOne (IS-95) Analysis Software

OPT.62 W-CDMA (3GPP) Analysis Software

OPT.63 GSM/GPRS/EDGE/DECT Analysis Software

OPT.64 PDC/PHS/IS-136 Analysis Software

OPT.65 cdma2000 Analysis Software

OPT.66 Bluetooth Analysis Software

OPT.73 AMPS/JTACS/NTACS Analysis Software

Note 1: OPT.01 is strictly required for the installation of OPT.61 to OPT.73.
Note 2: A maximum 5 options OPT.61 to OPT.73 can be among these options installed at a time.

OPT.02 Memory Card Drive
(Exchangeable with Floppy Disk Drive)

OPT.08 Rx Control (for R3560/3561/3562)

OPT.09 CDMA Test Source Control
(for R3561L and R3264/3267 only)

OPT.10 Level Tuning (for PDC-BS)

OPT.11 3GPP High-Accuracy Power Measurement
(Power Meter Function)

OPT.16 External Mixer
(26.5 to 40 GHz for R3273 only)

OPT.17 External Mixer
(40 to 60 GHz for R3273 only)

OPT.21 High Stability Frequency Reference Source
(±5 x 10^{-9}/day)

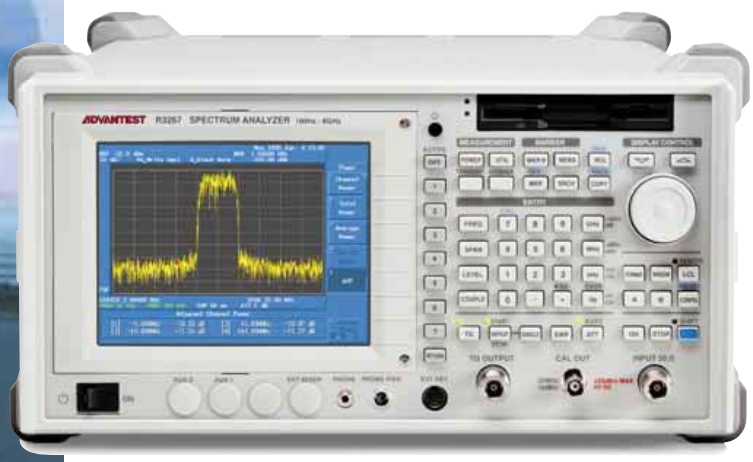
OPT.22 High Stability Frequency Reference Source
(±3 x 10^{-10}/day)

OPT.23 Rubidium Frequency Reference Source
(±1 x 10^{-10}/month)

OPT.25 Reference Converter

OPT.74 Tracking Generator

Note 3: Probe power cannot be used when installing OPT.22 and OPT.23.
Note 4: OPT.25 and OPT.74 can not be installed at a same time.

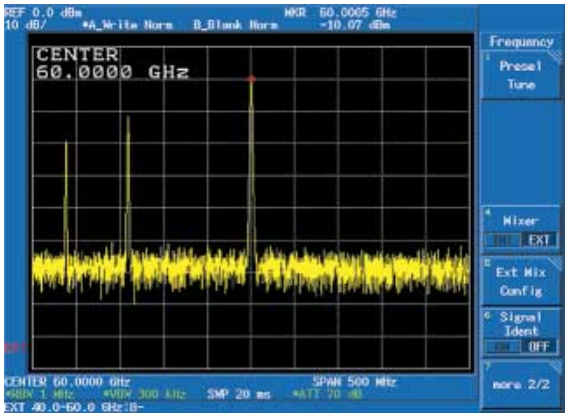


R3267 with tracking generator option.

Strong Spectrum Performance

High Accuracy Measurement through Microwave and Sub-millimeter Bands

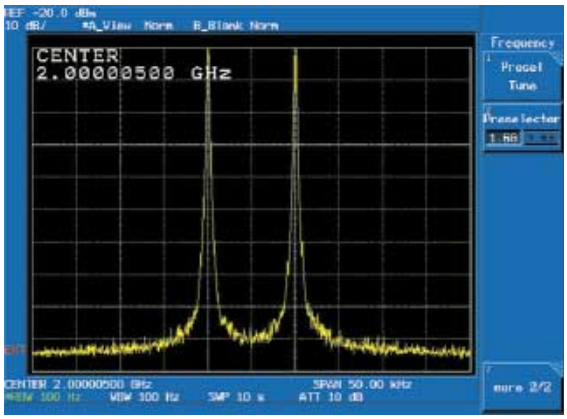
The R3264/3267/3273 spectrum analyzers use a newly developed fast direct digital synthesizer to provide a span accuracy of ±1% or better (typ. ±0.2%) for all span settings. In addition, these units feature residual FM of 3 Hz p-p or less per 0.1 second over a frequency range of 9 kHz to 3.5 GHz (R3264), 100 Hz to 8 GHz (R3267), and 26.5 GHz (R3273). Use of optional external mixers for the R3273 enable measurement up to 60 GHz.



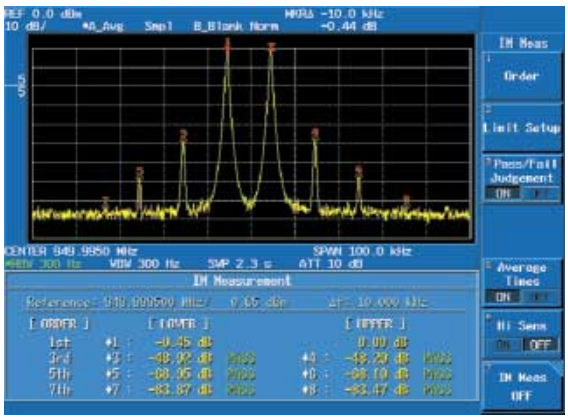
60 GHz measurement

Wide Dynamic Range Measurement

By using installed pre-selector tuned to frequency sweep, the harmonic frequency level including the input signal can be precisely measured 70 dBc or more for the R3264, 90 dBc or more for the R3267, and 100 dBc or more for the R3273. The two tone 3rd order harmonic distortion, essential characteristic for device evaluation, makes high performance of 90 dBc or more possible over a frequency range of 1.6 to 8 GHz. Moreover, the inter-modulation automatic measurement function is optimized for evaluating the distortion of Tx/Rx amplifiers and others, and auto-search of up to 9th order distortion and measurement result display are available.



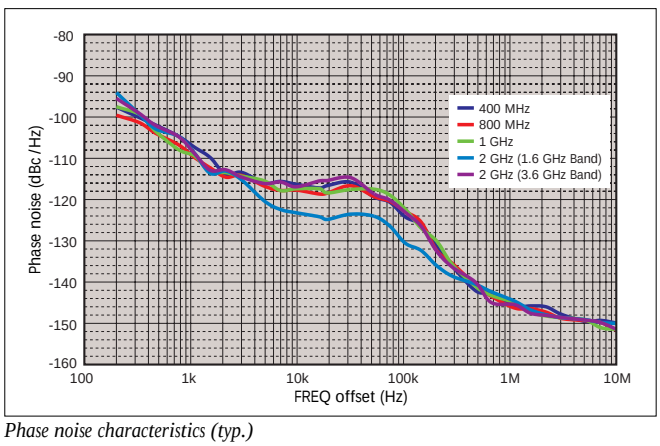
2 tone 3rd order intermodulation



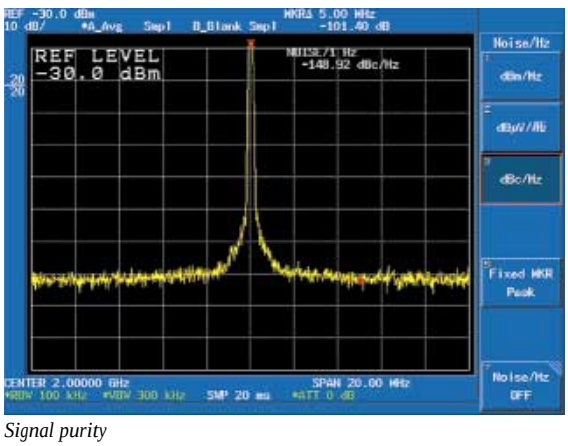
IM automatic measurement

High Dynamic Range Measurement

The latest generation of communication standards require both high dynamic range and excellent signal purity from test equipment. The R3264/3267/3273 delivers, with phase noise performance of -145 dBc/Hz , a 1 dB compression point of 0 dBm (typ. +3 dBm), and 3rd order intermodulation distortion of -90 dBc. The phase noise within the region of the W-CDMA frequency band, can be measured at a dynamic range of -148 dBc/Hz (typ.), by detuning 5 MHz.



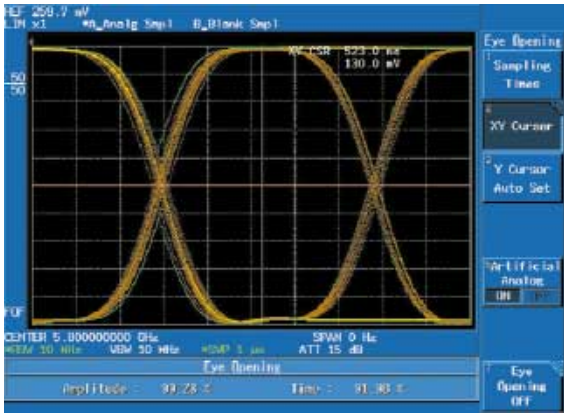
Phase noise characteristics (typ.)



Signal purity

High Throughput Measurement with Fast Sweeps

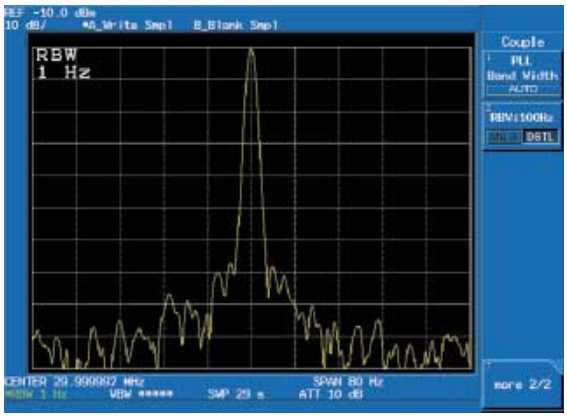
Communication systems require increasingly accurate analysis of power vs. time templates. Additionally, manufacturing lines must continue to increase throughput. The R3264/3267/3273 spectrum analyzers are equipped with fast A/D converters offering 40 M samples/sec. and fast zero span sweeps of 1 µs (40 points)/25 µs (1,000 points). Thus high-resolution, high-speed measurements in the time domain are easier than ever before. The measurement throughput is greatly improved due to a measurement data update speed (refresh rate) of 20 traces/sec.



Fast time-domain sweep

Built-in RBW 1Hz Digital Filter

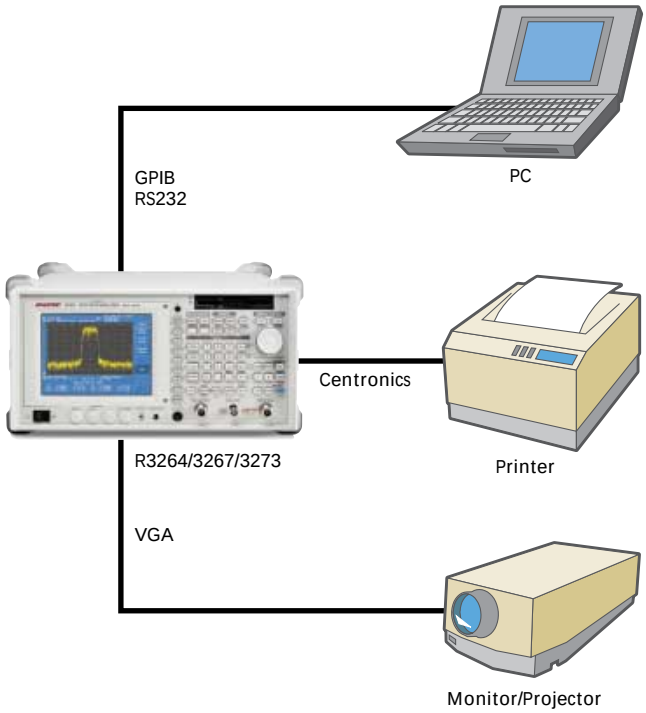
In addition to an analog RBW 10 Hz to 10 MHz (1-3 step, 5 MHz) filter, a digital RBW 1 Hz to 100 Hz (1-3 step) filter developed by a new calculating method is also provided. Compared with the analog method, it expands the evaluation range for carrier proximity characteristic as filter selectivity can be made more precipitous. Measurement of throughput using short-time sweep setting is also improved.



Measurement at RBW 1Hz

Wide Selection of Interfaces for Automated Systems

The R3264/3267/3273 are equipped as standard with controller interfaces (both GPIB and RS232) essential for establishing an automatic measurement system. Also equipped as standard is a Centronics I/O interface for printer output and a VGA interface for connecting a video printer, external monitor or projector.



Simplified Data Storage

Data can be stored in three types of formats using the standard floppy disk drive.

SAVE/Binary format

All measurement conditions and data are stored on the disk. The stored data can later be recalled on an R3264/3267/3273. If multiple measurement conditions are stored, the necessary conditions can be quickly recalled with a simple operation.

SAVE/Text format (numeric)

Data stored in text format can be directly loaded to a personal computer (PC). The loaded measurement data can be edited or evaluated with common spreadsheet software on most PC's.

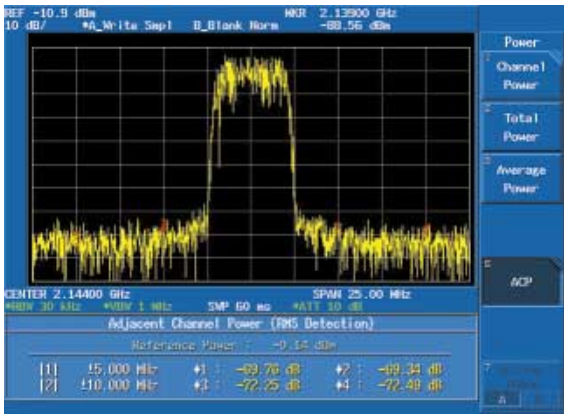
COPY/Bitmap format

If the disk drive is specified for the copy destination, the spectrum analyzer screen image is stored in bitmap format on disk. The stored image can then be imported to applications on a PC.

Specialized Measurement Functions for 3rd Generation Digital Mobile Communication

ACP (Adjacent Channel Power) Measurement

The R3264/3267/3273 first calculates either the total power in the selected span, or carrier power in the specified bandwidth. It then integrates the power in the adjacent channels (in user defined or standard bandwidths and offsets) and calculates the power ratio and displays the result. To aid in development efforts, the R3264/3267/3273 can carry out these measurements with or without Root Nyquist filter functions applied.



ACP measurement in FULL mode

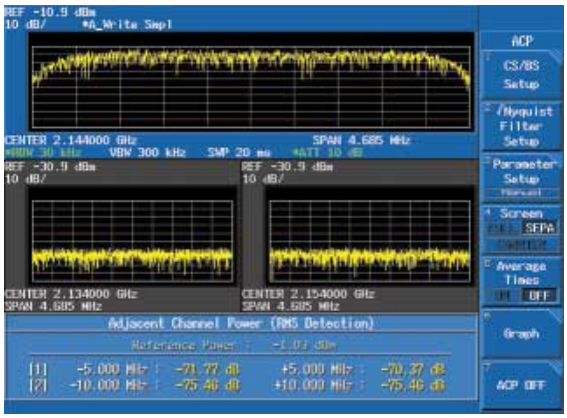
There are 3 kinds of measurement modes.

FULL — **Obtains the total power from the full trace data on one screen and calculates the ratio to leakage power of adjacent channel bandwidth.**

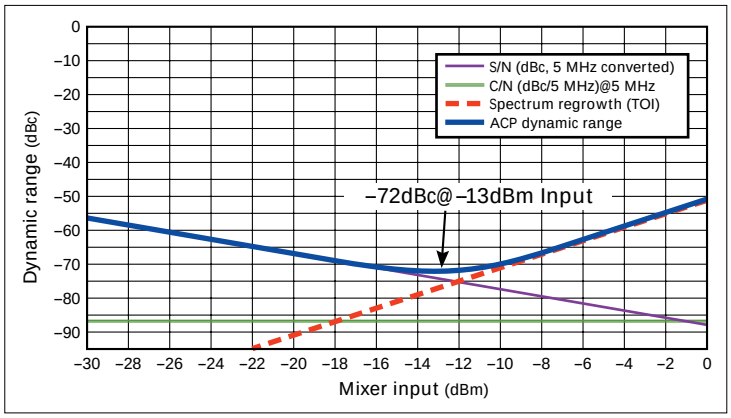
SEPA — **Sweeps the assigned channel and up-down adjacent channels separately, and calculates the power ratio from each trace data.**

CARRIER — **By setting the carrier window and adjacent channel window, calculates the power ratio for each window.**

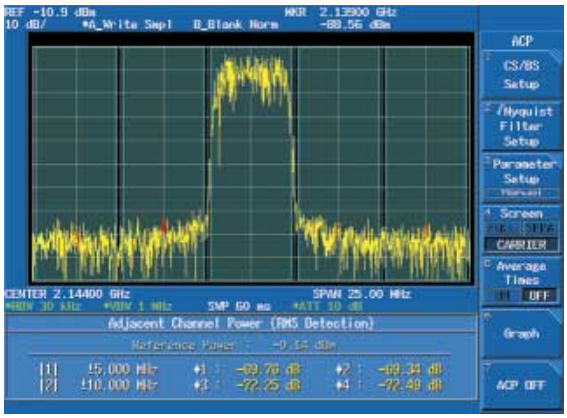
The R3264/3267/3273 spectrum analyzers offer the highest performance for their class, with a dynamic range of 70 dBc or more (typical) for ACP measurements on a W-CDMA signal at 5 MHz offsets.



ACP measurement in SEPA mode



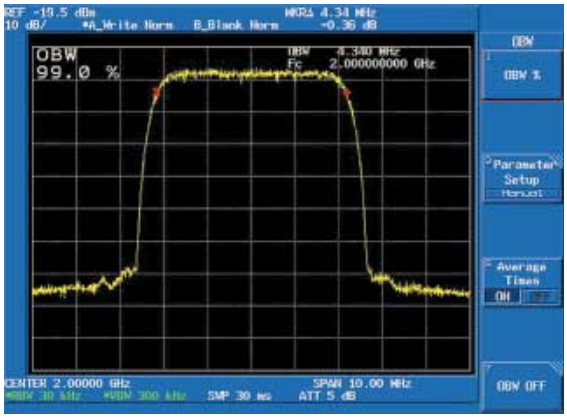
Typical dynamic range for W-CDMA measurement



ACP measurement in CARRIER mode

OBW (Occupied Bandwidth) Measurements

This function automatically calculates the bandwidth containing the selected power ratio relative to the span. Both the resulting occupied bandwidth and the carrier frequency are displayed. Occupied bandwidth ratios can be specified from 10 to 99.8%. The ±1% (typ. ±0.2%) span accuracy and improved sweep speed of the R3264/3267/3273 allows fast, repeatable measurements.



OBW measurement

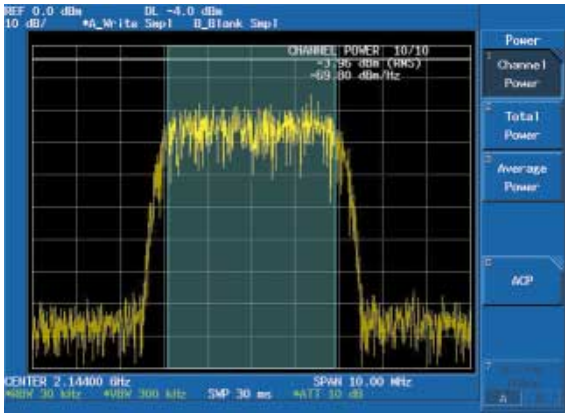
Automated RMS Power Measurements

These functions are essential for evaluation of systems like CDMA or wireless LAN to show a spectrum over a wide band or a burst signal with great amplitude variation.

Channel Power — **Measures the RMS of power within the band specified on the measuring window.**

Total Power — **Measures the RMS of power in the entire measurement span.**

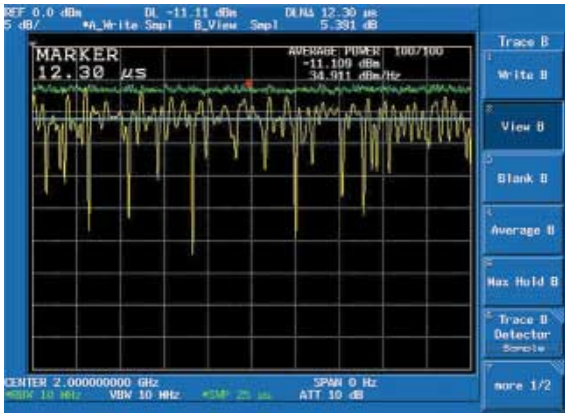
Average Power — **Measures the average power of the measurement data on the screen.**



Channel power measurement

True Simultaneous 2-trace Measurement Function

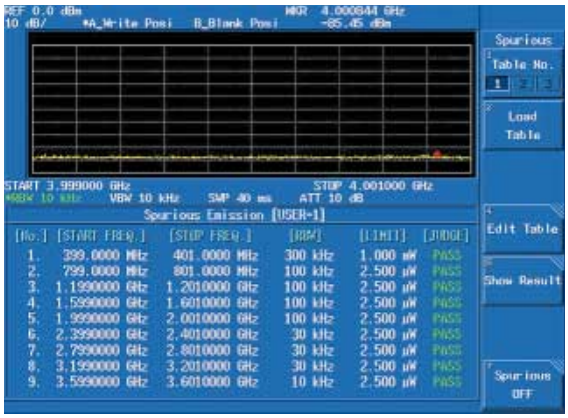
Equipped with individual A/D converters for each trace detector (POSI, NEGA, and SAMPLE), the R3264/3267/3273 allows true 2-trace simultaneous measurement with independent measurement of Trace A and Trace B. For example, by displaying POSI peak data on Trace A and the AVG power data in SAMPLE mode on Trace B, a peak factor (crest factor) measurement can quickly be carried out.



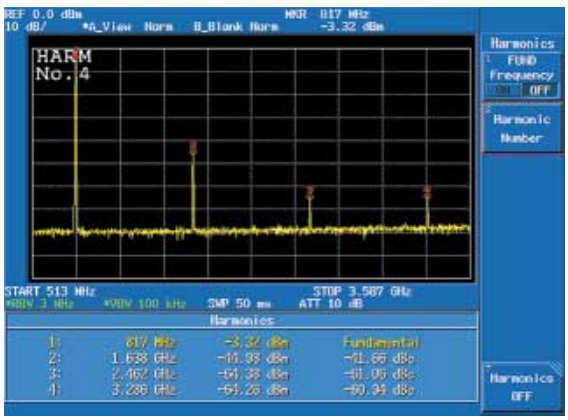
Peak factor measurement

Harmonics Measurement/Spurious Measurement Function

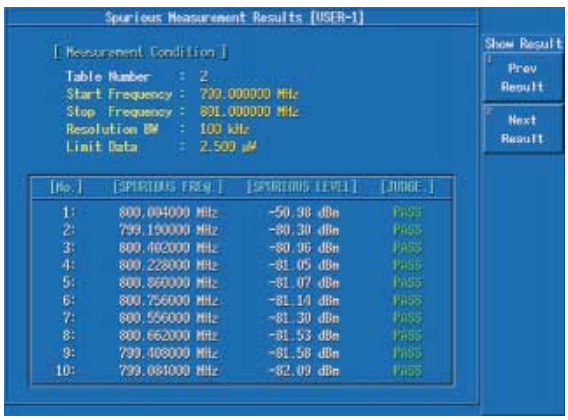
With only the fundamental frequency and number of harmonics entered by the user, the R3264/3267/3273 harmonics measurement function (HARM) automatically sets the start/stop frequencies and executes the measurement, finding the highest signals suspected to be harmonic products. More general spurious measurement algorithms are also provided, allowings arbitrary creation of a sweep table for a maximum of 10 areas. The routine then automatically measures spurious emissions by referencing only the maximum limit value in each area.



Spurious measurement



Harmonics (HARM) measurement



Spurious measurement (detailed measurement result display)

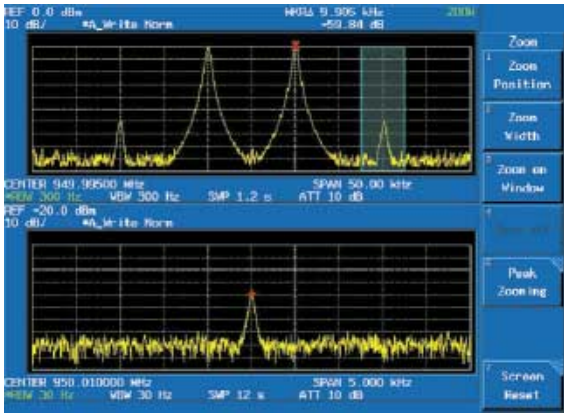
Powerful Functions For Versatile Applications

Split screen and zoom function

The zoom function creates an upper and lower split screen with three different settings; F-F (Frequency) mode, F-T (Frequency/Time) mode and T-T (Time) mode. The parameter settings in each screen can be set separately for easy and convenient comparative analysis.

F-F (Frequency) Zoom

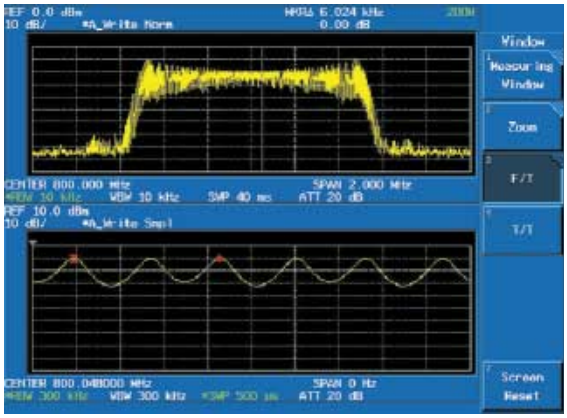
The waveform specified in the upper split screen can be further expanded on the lower screen. For example on the lower screen the RBW setting can be changed to measure and view the spurious noise of the signal. It is also possible to expand and view only the harmonic range by direct input of the center frequency on the lower screen.



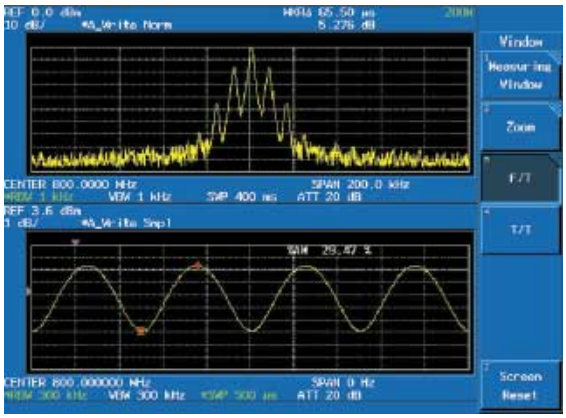
F-F (Frequency) zoom measurement

F-T (Frequency/Time) Zoom

By locating the cursor point in the frequency domain in the upper screen, the lower screen can display level variance in the time axis. A simple measurement of FM deviation width/modulation rate or AM depth/modulation rate is possible using the marker functions.



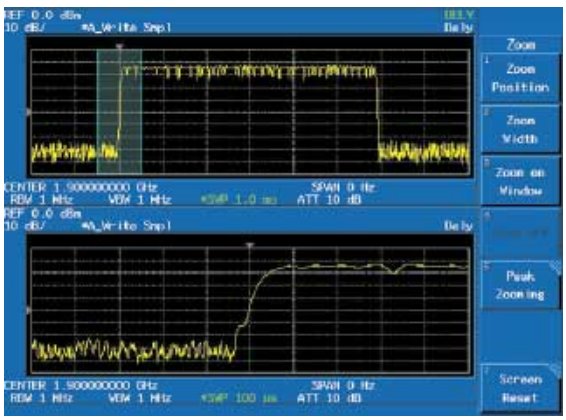
FM signal measurement by F-T (Frequency/Time) zoom



AM signal measurement by F-T (Frequency/Time) zoom

T-T (Time) Zoom

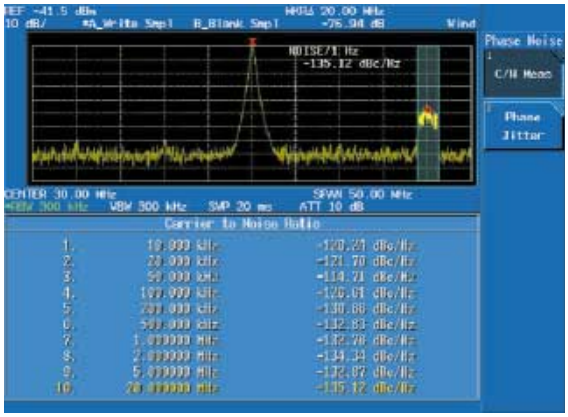
The evaluation of the Rise/Fall waveform is essential for quality test of transmission signal characteristics in TDMA communications. The power control is carried out on the rise/fall time of TDMA transmission signals. The pre-trigger/delay trigger can be set for sweep trigger so the waveform can be centered on the display. The T-T zoom function is a flexible tool to select the specific point to observe the waveform. The R3264/3267/3273 have a wide RBW (Max.10 MHz) and fast sweep (1µs/div) for high-speed waveform analysis under rapidly changing amplitude variances.



T-T (Time) zoom measurement

Single Side Band (SSB) and Carrier to Noise (C/N) Phase Noise Measurement

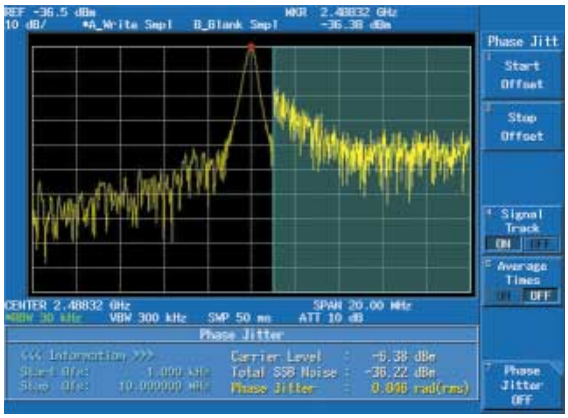
The signal characteristic of radio equipment is dominated by the phase noise characteristic of the oscillator inside the radio equipment. Historically phase noise measurements required manual tuning at multiple offset frequencies. The C/N measurement function automatically pre-selects different offset frequencies to obtain accurate results in a single measurement.



Automatic phase noise measurement

Phase Jitter Measurement of Recovery Clock

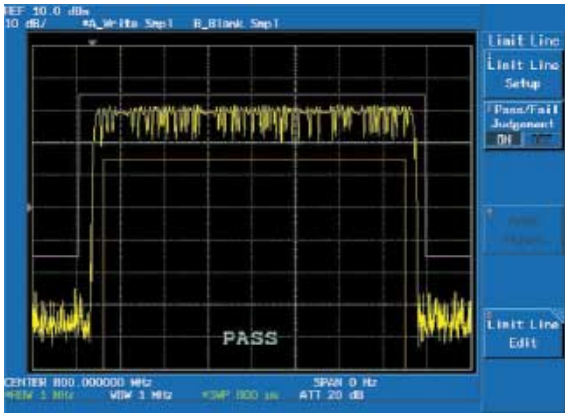
The jitter components in a lightwave repeater can become broadband as data rates increase. Jitter measurements are becoming increasingly common in the field of optical communication. The phase jitter measurement function on the R3264/3267/3273 can obtain the RMS jitter from the power spectrum just by selecting the jitter frequency range.



Jitter measurement

Limit Line Function

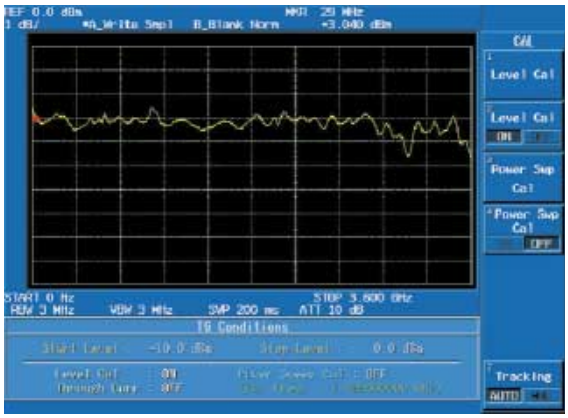
The R3264/3267/3273 can display two independent limit lines. For increased flexibility each limit line can be selected separately and have different edit tables. Each limit line can be selected as either an upper or lower limit “pass/fail” verdict for trace data in either time or frequency domain.



Time domain testing

Tracking Generator Option (OPT.74)

Option 74 is a built in tracking generator covering the frequency range from 100 kHz to 3.6 GHz. With an internal tracking generator, the frequency noise created by the spectrum analyzer can be normalized so the frequency characteristic for device under test can be measured at high speed with high accuracy. For example with a normalized level sweep, amplifiers compression can be accurately characterized without the interference of internally generated harmonic or spurious noise.



Tracking generator output

●R3264 Specifications

Frequency

Frequency range	9 kHz to 3.5 GHz
Harmonic order N	1

Frequency span

Range	20 Hz to 3.5 GHz, Zero span
Accuracy	±1%

Signal purity (dBc/Hz)

	Offset			
Frequency	1 kHz	10 kHz	100 kHz	1 MHz
9 kHz to 1 GHz	-100	-113	-118	-135
1 to 2.6 GHz	-100	-110	-118	-135
2.6 to 3.5 GHz	-98	-108	-112	-135

Input attenuator range

0 to 75 dB (5 dB steps)

Dynamic range

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

Frequency	Average noise level
10 kHz	-100 dBm
100 kHz	-101 dBm
1 MHz	-125 dBm
10 MHz to 3.5 GHz	- (130 - 2f (GHz)) dBm

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

Frequency	Average noise level
10 kHz	-120 dBm
100 kHz	-121 dBm
1 MHz	-141 dBm
10 MHz to 3.5 GHz	- (150 - 2f (GHz)) dBm

1 dB gain compression

10 to 100 MHz	-3 dBm
100 MHz to 3.5 GHz	0 dBm

Spurious response
2nd-order harmonics distortion

	Frequency	Mixer level
<-70 dBc	10 MHz to 3.5 GHz	-30 dBm

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

	Frequency	Mixer level
<-70 dBc	10 to 100 MHz	-30 dBm
<-80 dBc	100 MHz to 1 GHz	-30 dBm
<-85 dBc	1 to 3.5 GHz	-30 dBm

Residual response

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

Amplitude accuracy

Frequency response (Input ATT 10 dB)

In-band flatness (relative value)	±1.5 dB (9 kHz to 3.5 GHz)
Flatness with 30 MHz calibration signal as reference	±3.0 dB (9 kHz to 3.5 GHz)

Input ATT switching error (Reference 10 dB at 15 to 75 dB)

Frequency range	Error
9 kHz to 3.5 GHz	±1.1 dB/5 dB steps, max. ±2.0 dB

●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 steps)

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

1 dB gain compression

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

Spurious response
2nd-order harmonics 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 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
<-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, 50 Ω 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 (relative value)
100 MHz 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
3.5 to 7.0 GHz	2	±1.5 dB
6.9 to 8.0 GHz	3	±1.5 dB

Additional error by band switching	±0.5 dB
Flatness with 30 MHz calibration signal as reference	±3.0 dB (100 Hz to 8.0 GHz)

Input ATT switching error
(Reference 10 dB at 15 to 75 dB)

Frequency range	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)

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)

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 range	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 range	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, 50 Ω 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
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	±5.0 dB (100 Hz 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

●R3264/3267/3273 Common Specifications

Frequency read accuracy

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

Marker frequency counter (SPAN <1 GHz)

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

Frequency reference source

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

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 x 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 x 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 °C 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 x (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 x 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 x 480 dot VGA

X-axis output

Connector	BNC female, rear panel
Impedance	1 kΩ (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

When connected to the R3562

Signal source parameter settings:	Output frequency, output level, output On-Off, modulation On-Off, modulation parameters, I/O clock
BER measurement & parameter settings:	BER settings, data, bit length, clock polarity, data polarity
CAL/ADJ function:	Modulator CAL execution, 10 MHz Ref Adjust value setting
Self Test:	Self Test execution

OPT.09 CDMA test source control (for R3264/3267)

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*

OPT.10 Level tuning (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 3GPP level calibration (Power meter function)

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:	6 months

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 response compensated 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:	<-100 dBm
TG Output	
Impedance:	50 Ω (nominal)
VSWR (at -10 dBm output, nominal):	<1.5 (100 kHz to 3.6 GHz)

Main units	
R3264	Spectrum Analyzer
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.73	AMPS/JTACS/NTACS Analysis Software
OPT.02	Memory Card Drive
OPT.08	Rx Control (for R3560/3561/3562)
OPT.09	CDMA Test Source Control (for R3561L and R3264/3267 only)
OPT.10	Level Tuning (for PDC-BS)
OPT.11	3GPP Level Calibration (Power Meter Function)
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

* Bluetooth™ is a trademark owned by Telefonaktiebolaget LM Ericsson, Sweden.

Specifications may change without notification.

Rear view for R3264/3267/3273.

For Receiver Characteristics Tests of W-CDMA (3GPP)/cdma2000 (3GPP2) Base and Mobile Stations (User Equipment)

R3562 Receiver Test Source

Features

- Covers wide frequency band (Cellular, PCS, and IMT-2000) with a single unit
- Generates radio frame by real-time coder
- Bit error rate (BER) counter is provided as standard
- GPIB interface is provided as standard
- An option (OPT.08) is available to control all functions of the R3562 from the R3264/3267/3273 main unit

3GPP

- Compatible with the reference measurement channel (12.2/64/144/384 kbps) with real-time coder
- Transmission power control signal (TPC) output available

cdma2000 (OPT.65)

- All data rate output for forward link (RC1 to RC5) and reverse link (RC1 to RC4) possible
- Several receiver characteristics tests are possible using the built-in AWGN source

For Pre-production Lines/Maintenance of Mobile Phones (MS/UE)

R3132/3162 series Spectrum Analyzers

- **Wide frequency bandwidth**
  R3132: 9 kHz to 3 GHz
  R3162: 9 kHz to 8 GHz
- **High stability/wide dynamic range power measurement**
- **High sensitivity measurement (Pre-amp. as standard)**
  -144 dBm/30 Hz RBW (option) (Typ.,f = 1 GHz, Pre-amp. ON)
- **Wide dynamic range**
  3GPP ACLR measurement dynamic range:
  -67 dBc (Typ., Mix input = -14 dBm)
  3rd distortion: -80 dBc (f ≥200 MHz, Mix input = -30 dBm)
- **Channel input/single button (quick) measurement**
- **High throughput/high speed measurement with GPIB**
  Trace speed: 20 traces/sec (typical)

ADVANTEST®

ADVANTEST CORPORATION
Shinjuku-NS building, 4-1
Nishi-Shinjuku 2-chome
Shinjuku-ku, Tokyo 163-0880,
Japan
Tel: +81-3-3342-7500
Fax: +81-3-5322-7270
http://www.advantest.co.jp

Advantest (Singapore) Pte. Ltd.
438A Alexandra Road,
#8-03/06 Alexandra Technopark
Singapore 119967
Tel: +65-274-3100
Fax: +65-274-4055

Tektronix Inc. (North America)
P. O. Box 500 Howard Vollum
Industrial Park Beaverton,
Oregon 97077-0001 U. S. A.
Tel: +1-800-426-2200
Fax: +1-503-627-4090

Rohde & Schwarz
Engineering and Sales GmbH
(Europe)
Mühldorfstraße 15
D-81671 München, Germany
P.O.B. 80 14 29
D-81614 München, Germany
Tel: +49-89-4129-13711
Fax: +49-89-4129-13723

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