ADVANTEST®

**R3267/3273**
**Spectrum Analyzers**

For Next-Generation Communication Systems

Digital Communication standards

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

DECT, cdmaOne, cdma2000, Bluetooth™…)

# R3267/3273

**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 R3267/3273 are high-performance spectrum analyzers designed to meet these needs.**

**The R3267/3273 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 100 Hz to 8 GHz (R3267), and 26.5 GHz (R3273), the R3267/3273 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 R3267/3273 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 R3267/3273: a new family of analyzers to test today's, and tomorrow's communication systems.**

## High Frequency and Wide Bandwidth Measurements

| | |
|---|---|
| • Frequency range: | R3267: 100 Hz to 8 GHz<br>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.)<br>70 dB or better (5 MHz offset, typ.)<br>for W-CDMA ACP measurement |
| • Average noise level: | -154 dBm/Hz (2 GHz band) |
| • Input attenuator: | 75 dB in 5 dB steps (R3267) |
| • 1 dB gain compression: | 0 dBm (typ. +3 dBm) |
| • 3rd order intermodulation distortion: | -90 dBc or less (2 GHz band, R3267) |

## High Speed Measurements

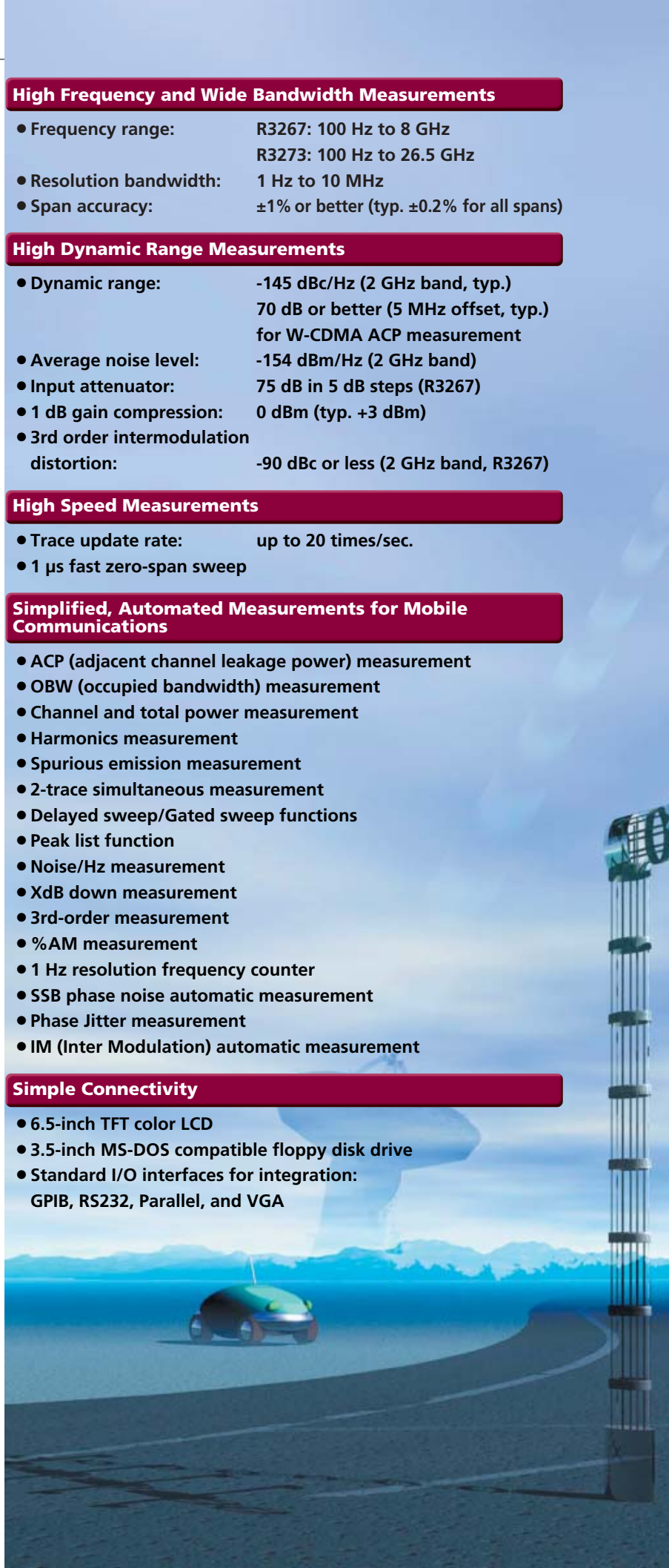
- Trace update rate: up to 20 times/sec.
- 1 µs fast zero-span sweep

## 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 R3267 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)

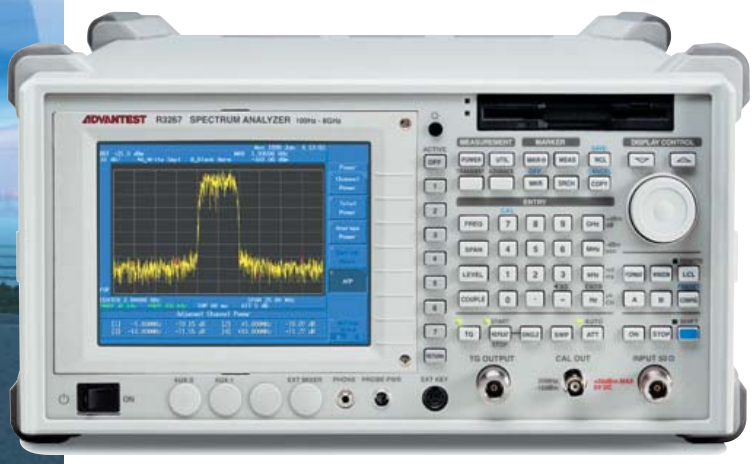
**OPT.22** High Stability Frequency Reference Source
(±3 x $10^{-10}$/day)

**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.*

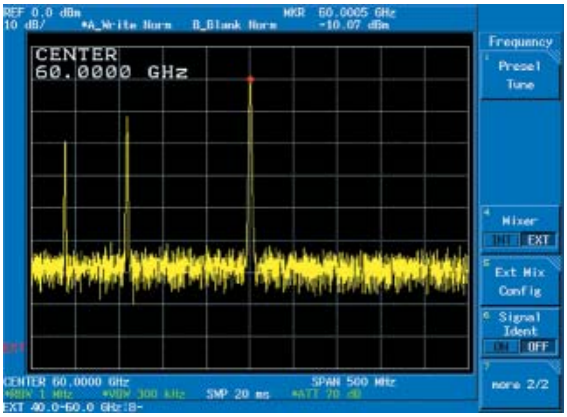



*R3267 with tracking generator option.*

## Strong Spectrum Performance

### High Accuracy Measurement through Microwave and Sub-millimeter Bands

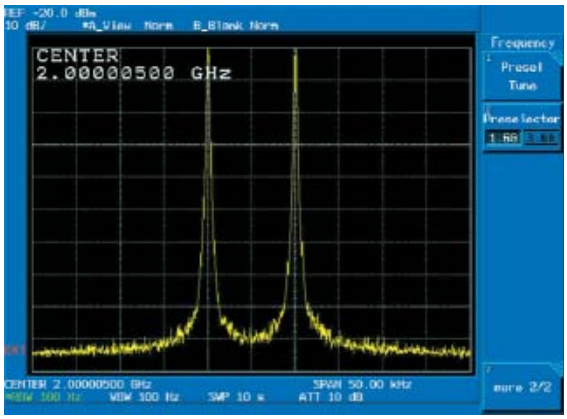
The R3267/3273 spectrum analyzers use a newly developed fast direct digital synthesizer to provide a span accuracy of ±1% or better (typ. ±0.2%) for all span settings.
In addition, these units feature residual FM of 3 Hz p-p or less per 0.1 second over a frequency range of 100 Hz to 8 GHz (R3267), and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



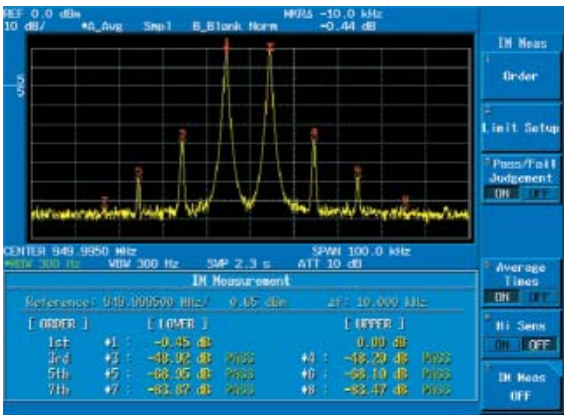
*60 GHz measurement*

### 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 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.



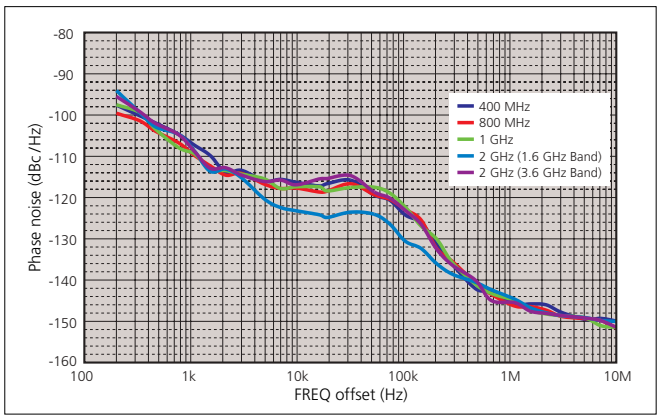
*2 tone 3rd order intermodulation*



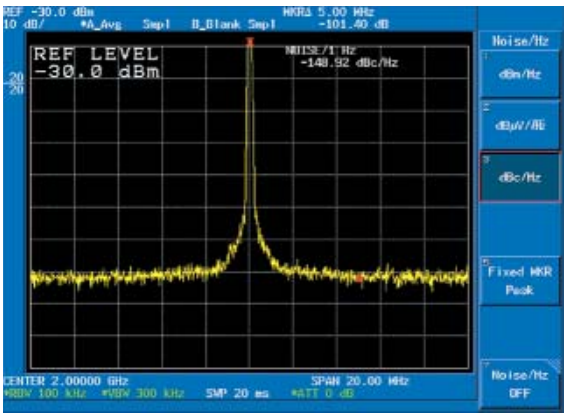
*IM automatic measurement*

### High Dynamic Range Measurement

The latest generation of communication standards require both high dynamic range and excellent signal purity from test equipment. The R3267/3273 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.



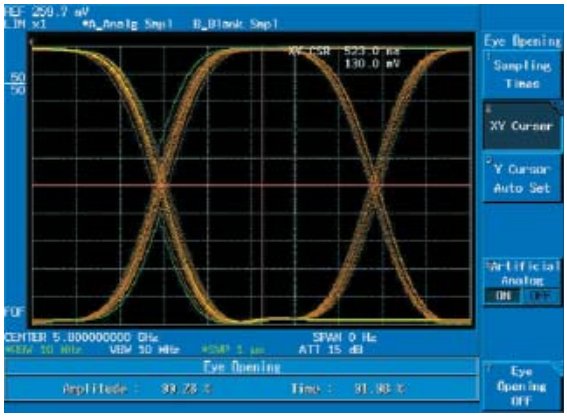
*Phase noise characteristics (typ.)*



*Signal purity*

### High Throughput Measurement with Fast Sweeps

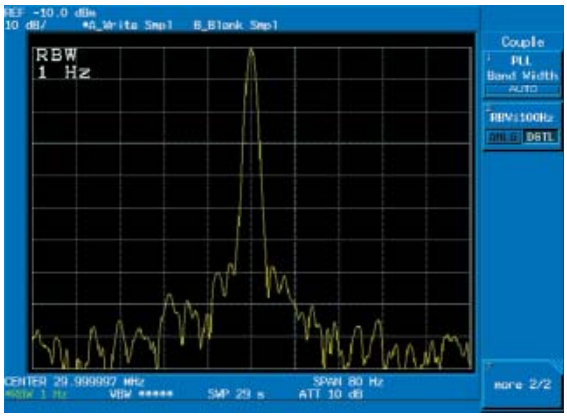
Communication systems require increasingly accurate analysis of power vs. time templates. Additionally, manufacturing lines must continue to increase throughput. The R3267/3273 spectrum analyzers are equipped with fast A/D converters offering 40 M samples/sec. and fast zero span sweeps of 1 µs (40 points)/25 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

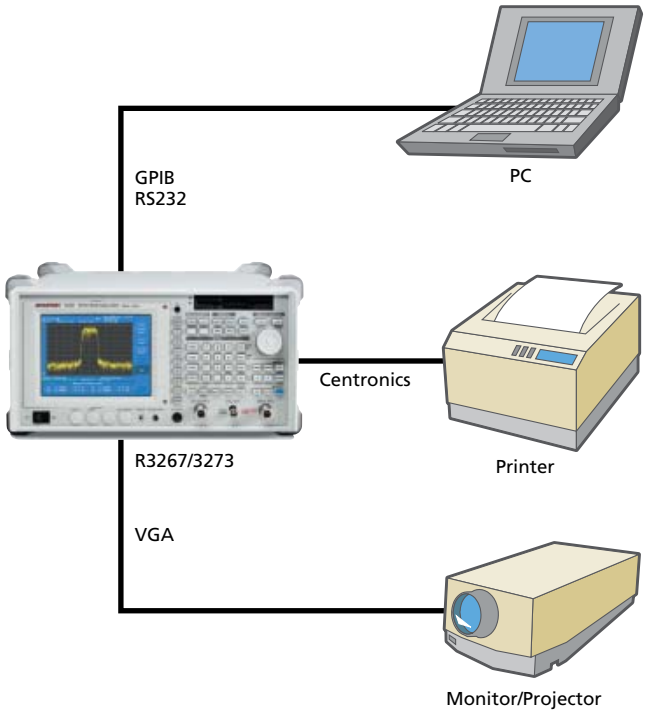
In addition to an analog RBW 10 Hz to 10 MHz (1-3 step, 5 MHz) filter, a digital RBW 1 Hz to 100 Hz (1-3 step) filter developed by a new calculating method is also provided. Compared with the analog method, it expands the evaluation range for carrier proximity characteristic as filter selectivity can 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 R3267/3273 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 R3267/3273.
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.

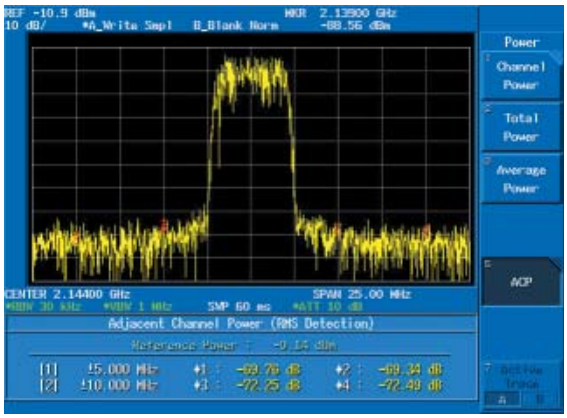
#### COPY/Bitmap format

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 R3267/3273 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 R3267/3273 can carry out these measurements with or without Root Nyquist filter functions applied.




*ACP measurement in FULL mode*

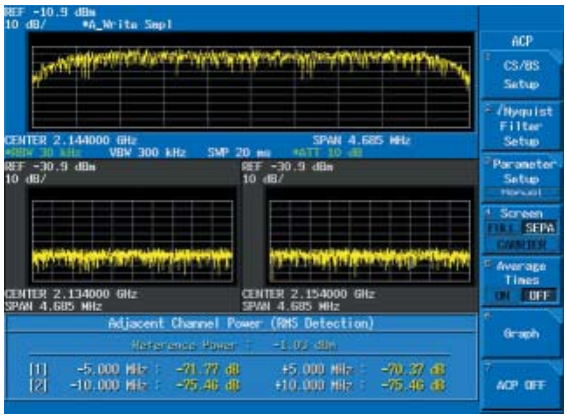
There are 3 kinds of measurement modes.

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

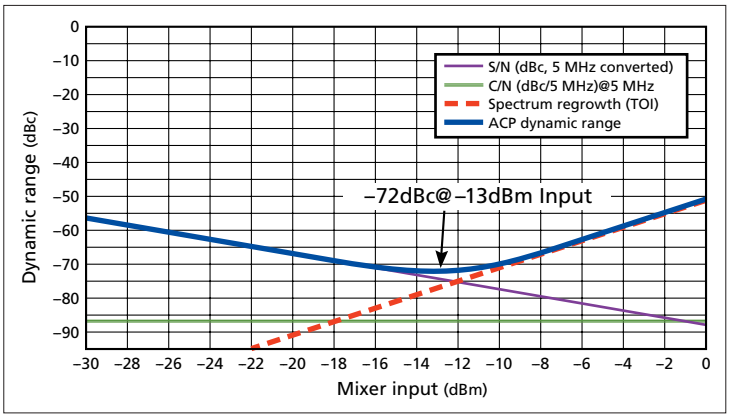
**SEPA** — **Sweeps the assigned channel and up-down adjacent channels separately, and calculates the power ratio from each trace data.**

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

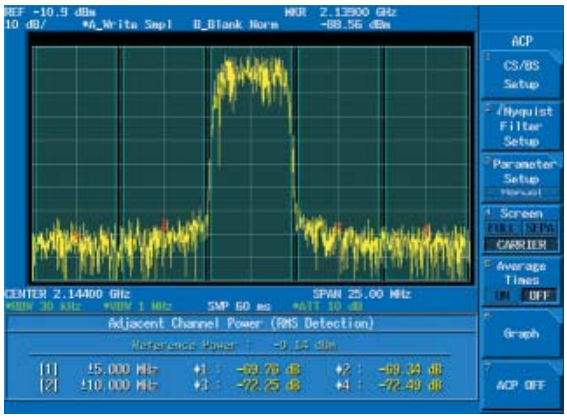
The R3267/3273 spectrum analyzers offer the highest performance for their class, with a dynamic range of 70 dBc or more (typical) for ACP measurements on a W-CDMA signal at 5 MHz offsets.




*ACP measurement in SEPA mode*



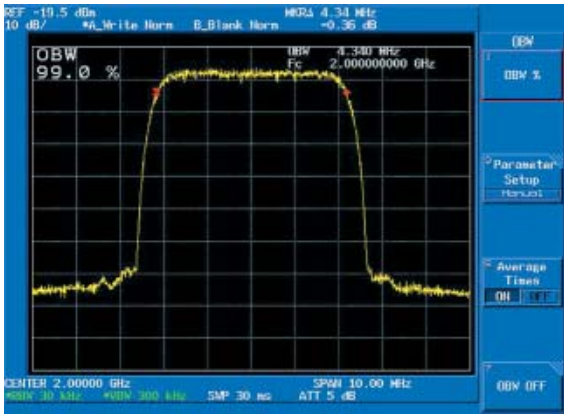

*Typical dynamic range for W-CDMA measurement*




*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 R3267/3273 allows fast, repeatable measurements.




*OBW measurement*

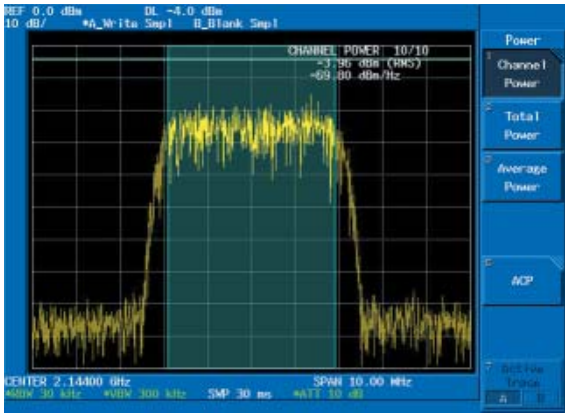
### Automated RMS Power Measurements

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.**

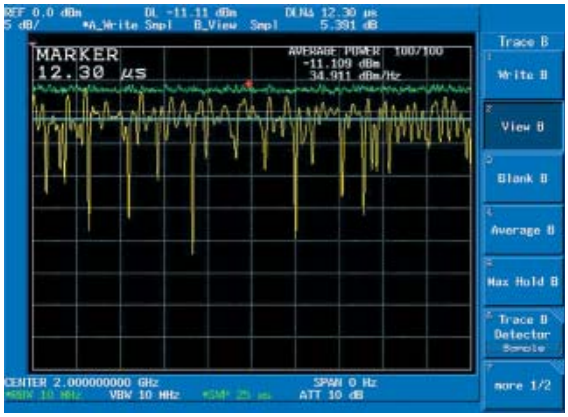
**Average Power** — **Measures the average power of the measurement data on the screen.**




*Channel power measurement*

### True Simultaneous 2-trace Measurement Function

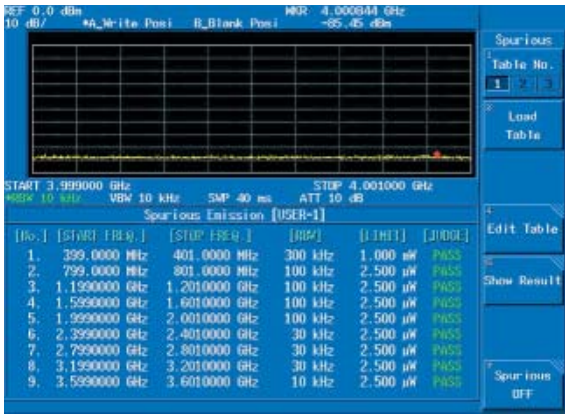
Equipped with individual A/D converters for each trace detector (POSI, NEGA, and SAMPLE), the R3267/3273 allows true 2-trace simultaneous measurement with independent measurement of Trace A and Trace B. For example, by displaying POSI peak data on Trace A and the AVG power data in SAMPLE mode on Trace B, a peak factor (crest factor) measurement can quickly be carried out.



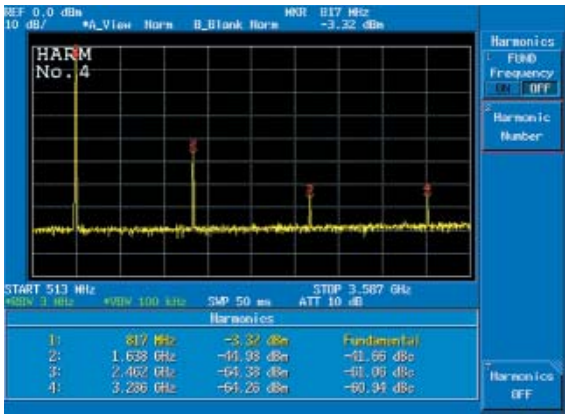

*Peak factor measurement*

### Harmonics Measurement/Spurious Measurement Function

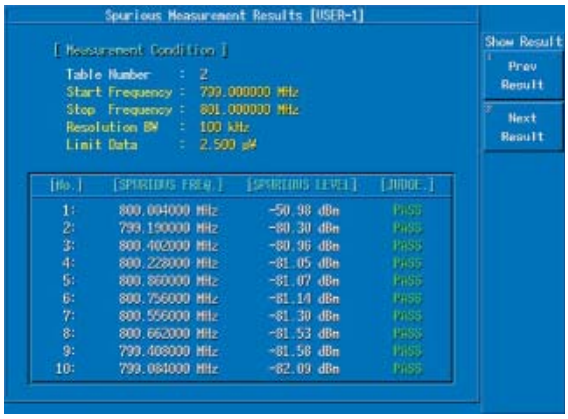
With only the fundamental frequency and number of harmonics entered by the user, the R3267/3273 harmonics measurement function (HARM) automatically sets the start/stop frequencies and executes the measurement, finding the highest signals suspected to be harmonic products. More general spurious measurement 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)*

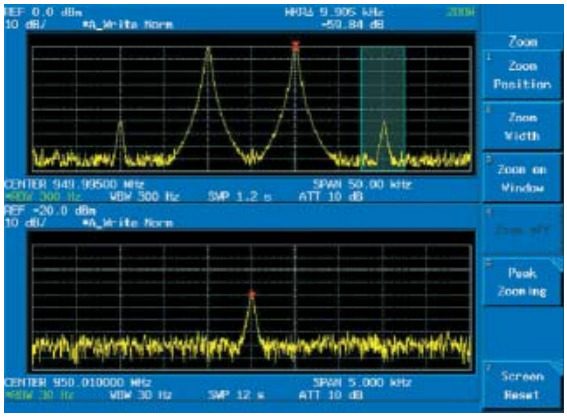
## Powerful Functions For Versatile Applications

### 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

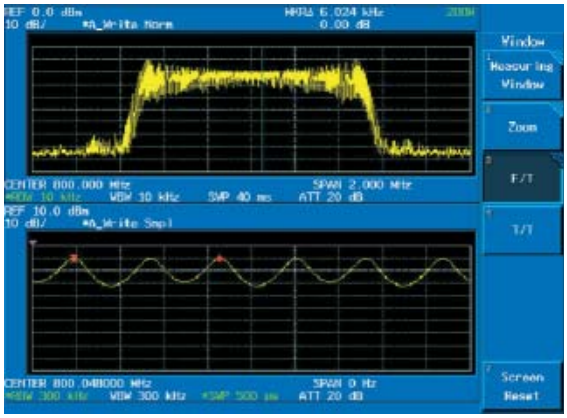
The waveform specified in the upper split screen can be further expanded on the lower screen. For example on the lower screen the RBW setting can be changed to measure and view the spurious noise of the signal. It is also possible to expand and view only the harmonic range by direct input of the center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



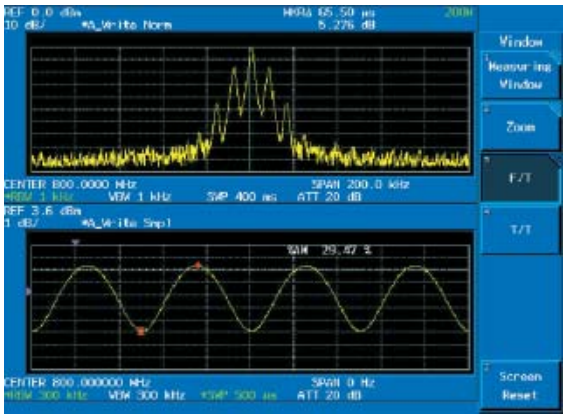

*F-F (Frequency) zoom measurement*

#### 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.



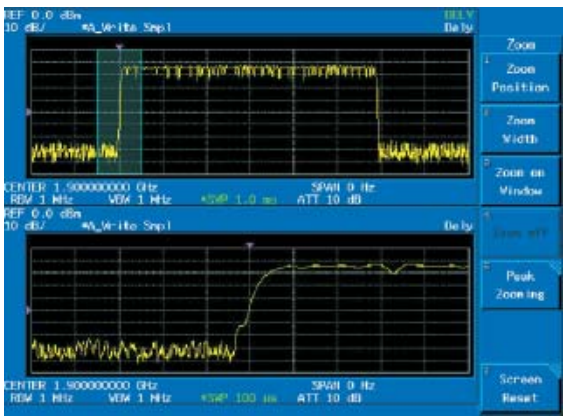

*FM signal measurement by F-T (Frequency/Time) zoom*




*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 R3267/3273 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*

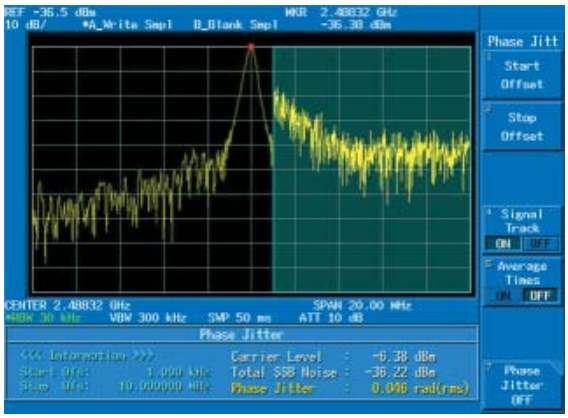
### Single Side Band (SSB) and Carrier to Noise (C/N) Phase Noise Measurement

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

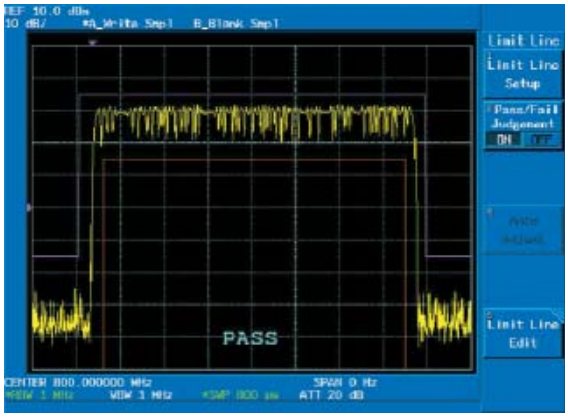
The jitter components in a lightwave repeater can become broadband as data rates increase. Jitter measurements are becoming increasingly common in the field of optical communication. The phase jitter measurement function on the R3267/3273 can obtain the RMS jitter from the power spectrum just by selecting the jitter frequency range.




*Jitter measurement*

### Limit Line Function

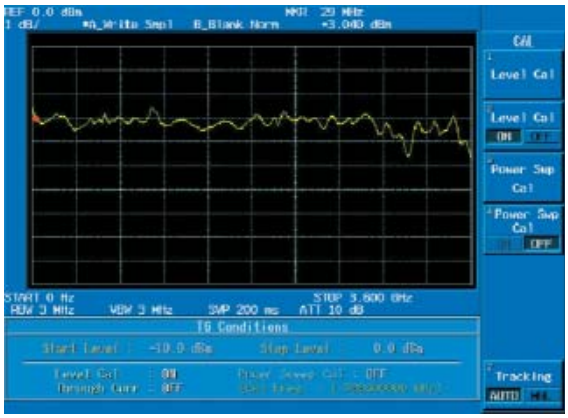
The R3267/3273 can display two independent limit lines. For increased flexibility each limit line can be selected separately and have different edit tables. Each limit line can be selected as either an upper or lower limit "pass/fail" verdict for trace data in either time or frequency domain.




*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*

## ●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 |

## ●R3267/3273 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 $10^{-7}$<br>Warm up (nominal) 3 minutes,<br>±5 x $10^{-8}$ (Reference: after 60 minutes) |
| Temperature stability | ±1 x $10^{-7}$ (0 to 40°C)<br>(with reference to the frequency when temperature is 25°C ±2°C) |
| OPT.21<br>Stability | Aging/day: ±5 x $10^{-9}$, Aging/year: ±8 x $10^{-8}$<br>Warm up (nominal) 3 minutes,<br>±5 x $10^{-8}$ (Reference: after 60 minutes) |
| Temperature stability | ±5 x $10^{-8}$ (0 to 40°C)<br>(with reference to the frequency when temperature is 25°C ±2°C) |
| OPT.22*1<br>Stability | Aging/day: ±3 x $10^{-10}$, Aging/year: ±2 x $10^{-8}$<br>±1 x $10^{-8}$/30 minutes,<br>±5 x $10^{-9}$/60 minutes warm up (nominal)<br>(Reference: after 24 hours) |
| Temperature stability | ±5 x $10^{-9}$ (0 to 50°C)<br>(with reference to the frequency when temperature is +25°C) |
| OPT.23*1<br>Stability | (Rubidium frequency reference source)<br>Frequency accuracy: ±5 x $10^{-9}$,<br>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<br>±15%: RBW = 100 Hz to 1 MHz<br>±25% (25 °C ±10 °C): RBW = 30 Hz<br>±10%: RBW = 1 to 100 Hz (digital filter) |
| Selectivity | <15:1 (RBW = 100 Hz to 5 MHz)<br><20:1 (RBW = 30 Hz)<br><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<br>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<br>(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<br>Max. ±0.85 dB<br>±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<br>Frequency range: 50 MHz to 2.6 GHz (frequency band 0)<br>Resolution bandwidth: 3 kHz to 1 MHz<br>Frequency span: <Resolution bandwidth x 20<br>Input ATT: 10 dB<br>Log scale display: 0 to -50 dB<br>Reference level: 0 to -50 dBm<br>Detection mode: Sample<br>Ambient temperature: 20 to 30 °C<br>S/N: 20 dB or more |

## Input/Output

### RF input

| | |
|---|---|
| Connector | N-type female<br>(R3273 only: SMA convertible) |
| Impedance | 50 Ω (nominal) |
| VSWR (Input ATT >10 dB, with set frequency) | <1.5:1 (<3.5 GHz) (nominal)<br><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,<br>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<br>(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)<br>2-slot, front panel<br>Connector; JEIDA-Ver. 4.2/PCMCIA2.1 |

### OPT.08 Rx control

When connected to the R3560

| | |
|---|---|
| Signal source parameter settings: | Output frequency, output level,<br>output On-Off,<br>modulation parameters |
| BER measurement & parameter settings | |
| BER measurement: | Average frequency, bit length,<br>clock polarity, data polarity,<br>measurement interval,<br>TCH frame timing signal |
| Receiver sensitivity measurement & parameter settings | |
| Receiver sensitivity measurement: | Search upper and lower limits,<br>search step, search point |

When connected to the R3561

| | |
|---|---|
| Signal source parameter settings: | Output frequency, output level,<br>output On-Off,<br>modulation On-Off,<br>modulation parameters, I/O clock |
| CAL/ADJ function: | AWGN CAL execution,<br>modulator CAL execution,<br>10 MHz Ref Adjust value setting |
| Self Test: | Self Test execution |

When connected to the R3562

| | |
|---|---|
| Signal source parameter settings: | Output frequency, output level,<br>output On-Off,<br>modulation On-Off,<br>modulation parameters, I/O clock |
| BER measurement &<br>parameter settings: | BER settings, data, bit length,<br>clock polarity, data polarity |
| CAL/ADJ function: | Modulator CAL execution,<br>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,<br>Resolution; 1 Hz |
| Output level setting: | Output; ON/OFF,<br>Range; -125 to +6 dBm<br>Resolution; 0.1 dB, unit; dBm, dBμ |
| Modulation: | ON/OFF<br>Reverse/Forward Link switching,<br>Data rate switching; 9600/4800/2400/<br>1200/14400/7200/3600/1800 bps<br>Data source switching;<br>ZEROS/RANDOM/RANDERR/USER<br>(*Written by user via GPIB)<br>PN offset; 0 to 511 (x 64 chips)<br>Burst; ON/OFF<br>Even Second In; ENABLE/DISABLE<br>Equalizing Filter; ON/OFF |
| Reference standard: | Synthe reference input switching;<br>19.6608/15/10/9.8304/5/4.9152/<br>2.4576/2/1.2288/1 MHz<br>CDMA Time Base input switching;<br>19.6608/15/10/9.8304/5/4.9152/<br>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<br>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<br>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<br>(at 1 dB, 2 dB/DIV, 25°C,<br>Input ATT 30 dB, RBW 30 kHz, 100 kHz,<br>ZERO SPAN mode, TOTAL GAIN after<br>automatic calibration) |
| During average power<br>measurement mode: | ±0.5 dB or less (5 dB, 10 dB/DIV, 25°C) |
| Temperature-induced<br>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)<br>±0.6 dB or less (-50 to -60 dBm)<br>(at 25°C, after GAIN CAL, ATT = AUTO,<br>Min ATT = ON) |
| Measurement linearity: | ±0.2 dB or less (0 to -30 dB) |
| Temperature-induced<br>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.)<br>(after reading frequency response<br>compensated data) |
| Average display noise level: | 26.5 to 40 GHz; -90 dBm (typ.)<br>(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.)<br>(after reading frequency response<br>compensated data) |
| Average display noise level: | 40 to 60 GHz; -90 dBm (typ.)<br>(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<br>(START FREQ <3.5 GHz) |
| Output level | |
| Setting range: | 0 to -50 dBm |
| Setting resolution: | 0.1 dB |
| Output level flatness: | <±3 dB<br>(100 kHz to 3.6 GHz, relative value) |
| Output level accuracy: | <±1 dB<br>(30 MHz, -10 dBm, 25 ±10°C) |
| Vernier accuracy: | <0.5 dB/1 dB |
| Level sweep width<br>setting range: | (0 to -10 dBm) - ATT<br>(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<br>(at -10 dBm output, nominal): | <1.5 (100 kHz to 3.6 GHz) |

| 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.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 R3267 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 R3267/3273*

## 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 R3267/3273 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)

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