

# Spectrum Analyzers

Low Cost, High Performance Spectrum Analyzer Enabling Burst Envelope/Burst Spectrum Analysis

## R3263

- Measurement Frequency Range: 9 kHz to 3 GHz
- Frequency Stability
  - Residual FM: 3 Hzp-p Max./0.1 s
  - Drift: 20 Hz Max. (Span ≤ 5 MHz)
- Frequency Span Accuracy: ± 1% max. (Span ≤ 5 MHz)
- Time Domain Measurement: 50 μs to 2 s/100 ns Resolution
- Resolution Bandwidth: 300 Hz to 3 MHz, 5 MHz (1, 3 Steps)
- GSM/DCS1800/DCS1900 Tx Measurement Function Provided Standard
- GSM Tx Plus (Option 55/58) Enables GSM/DCS1800/DCS1900 Frequency Error, Phase Error and Bit Synch Tx Power Measurement
- GSM Graphics (Option 77) Enables Detailed Modulated Signal Analysis
- DECT Tx Analysis Option (Options 52/58)



## R3263 Spectrum Analyzer

The R3263 is a 3 GHz spectrum analyzer developed for digital mobile communication equipment. Its basic specifications include a frequency range of 9 kHz to 3 GHz, span accuracy of ± 1% or less, residual FM of 3 Hz<sub>p-p</sub> (max.)/0.1 s and drift of 20 Hz or less. It comes with CW mode for spectrum analysis and TRANSIENT mode for powerful support of burst wave analysis. It also comes equipped with a burst envelope measurement function for measuring TDMA digital modulated signal ON/OFF characteristics and a burst spectrum measurement function enabling spectrum analysis in the burst ON interval. By adding the GSM Tx Plus Option, measurement of parameters such as GMSK signal frequency and phase errors, and bit synch power can be done at the touch of a button.

### ■ Measurement Items

- Burst envelope measurement
- Burst spectrum measurement
- Modulation spectrum measurement
- Switching spectrum measurement
- Spurious emission intensity measurement
- Power measurement

### GSM Tx Plus (option 55/58)

- Frequency error measurement
- Phase error measurement
- Tx power measurement
- Power vs time measurement

### ■ Dual Mode Analysis Function

- CW mode: Spectrum Analyzer
- TRANSIENT mode: GSM/DCS1800/DCS1900 Tx Tester (DECT Tx Tester Option)

### ■ GSM Standards and Measurement Items

|     | Standard measurement item                   |      | Remarks                                   |
|-----|---------------------------------------------|------|-------------------------------------------|
| 4.1 | Output Power                                | *1 Δ | Power step not implemented                |
| 4.2 | Spectrum due to the modulation              | Δ    | Sweep measurement                         |
| 4.2 | Spectrum due to switching transient         | Δ    | Sweep measurement                         |
| 4.3 | Spurious emission (relevant transient band) | ○    |                                           |
| 4.4 | Radio frequency tolerance                   | *2 ○ | Standard 0.1 ppm or less                  |
| 4.5 | Output level dynamic operation (Template)   | ○    |                                           |
| 4.6 | Phase accuracy                              | *2 ○ | Standard peak 20° or less, rms 5° or less |

\*1: Standard is spectrum analyzer mode. Option 55, 58 is required for bit synch power measurement.  
\*2: Requires GSM Tx Plus (option 55, 58).

### ■ R3263 Option Table

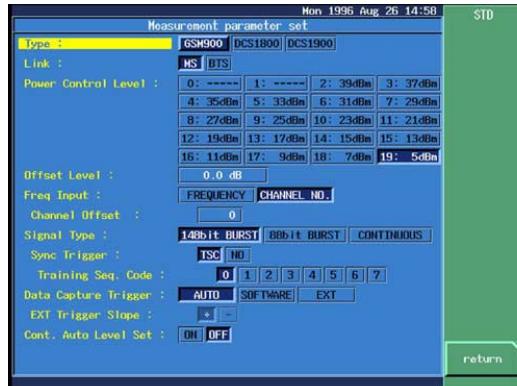
| Model                             | R3263                          | R3263+55   | R3263+52 | R3263+58   |
|-----------------------------------|--------------------------------|------------|----------|------------|
| GSM/DCS1800/DCS1900 Tx Analysis   | Yes                            | Yes        | Yes      | Yes        |
| GSM Tx Plus (option 55, 58)       | No                             | Yes        | No       | Yes        |
| GSM Graphics (option 77)          | No                             | Applicable | No       | Applicable |
| DECT Tx Analysis (options 52, 58) | No                             | No         | Yes      | Yes        |
| Program Loader (option 15)        | Applicable to all combinations |            |          |            |

Option 3263 + 55 GSM Tx Plus (Phase error, Freq. error, Tx power, Power vs time)  
Option 3263 + 52 DECT Addition  
Option 3263 + 58 GSM Tx Plus/DECT Addition

\* Refer to description of R3463 for basic analog performance.

#### ■ Selection of Digital Radio System

The R3263 can switch easily between the GSM, DCS1800 and DCS1900 communications systems.



< GSM setting screen (with TX Plus Option) >

#### ■ Menu Operation for Selection of Measurement Items

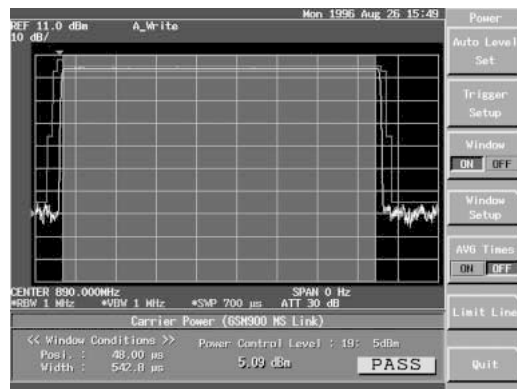
Measurement can be carried out simply by selecting the desired measurement item.



< TRANSIENT menu screen (with Tx Plus Option) >

#### ■ Power Measurement Function

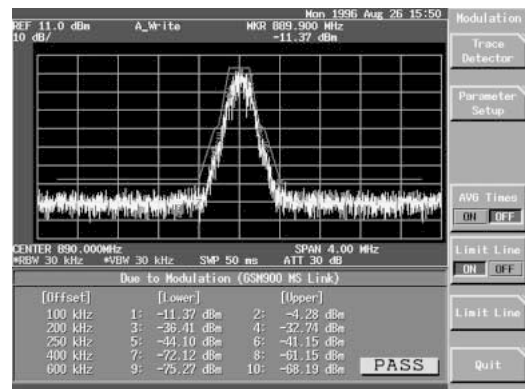
The window width and position required for the measurement are set automatically. PASS/FAIL judgments can also be done simultaneously using a limit line linked to the power value.



< Power measurement screen >

#### ■ Modulation Spectrum Measurement

Measures spectrum of modulated components using a gated sweep. With measured peak values as the reference, performs PASS/FAIL determination using templates.

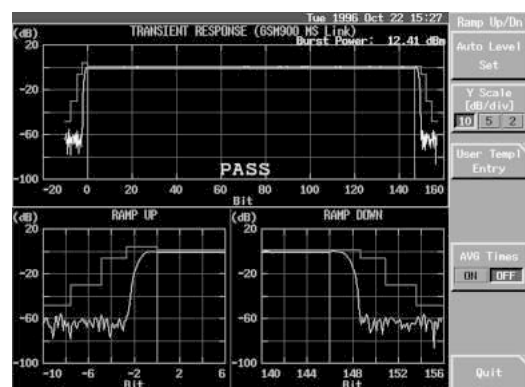


#### ■ GSM Tx Plus Option (Options 55, 58)

GSM, DCS1800 and DCS1900 transmission systems, Frequency error, phase error and bit synch Tx power can be measured. The GSM Tx Plus Option enables simple measurements of these parameters using GMSK modulated signal analysis.



<Frequency error, phase error measurement>



<Power vs time measurement>

# Spectrum Analyzers

Low Cost, High Performance Spectrum Analyzer Enabling Burst Envelope/Burst Spectrum Analysis

## R3263

### ■ GSM Graphics (Option 77, Requires Options 55, 58)

#### • Outline

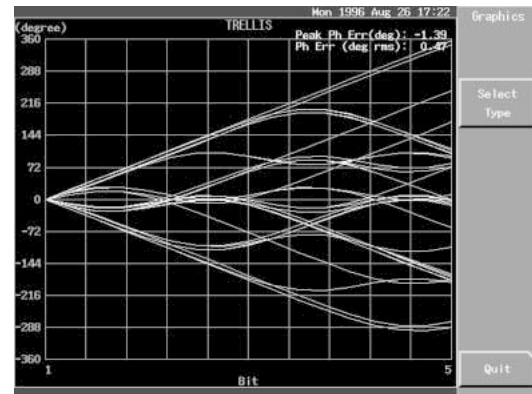
Frequency error/Phase error measurement are required in communication systems of GSM/DCS 1800/DCS1900 respectively. The GSM graphics option (OPT. 77) ensures more detailed modulation signal analysis by graphically displaying these measurement results.

#### • Applicable Communications System

GSM/ DCS1800/DCS1900 ————— MS/BTS

#### • Analysis Functions

- Bit-Frequency
- Phase Error
- FFT of Phase Error
- Trellis
- Demodulated Data



< Trellis display >

### ■ DECT Option (Options 52, 58)

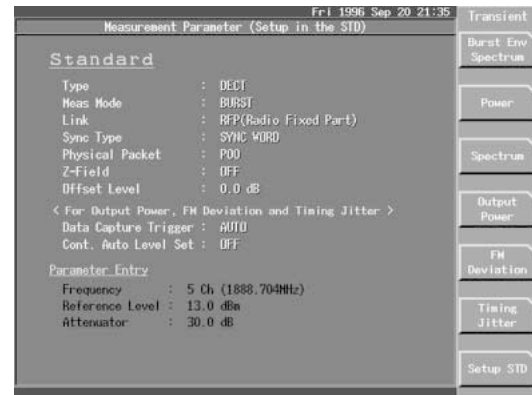
The DECT Option (options 52, 58) enables burst envelope measurement and burst spectrum measurement, conforming to various physical packets at the touch of a button. The GFSK modulation analysis function also enables measurements of Tx power, power vs time and FM deviation.

#### • Applicable Communication Systems

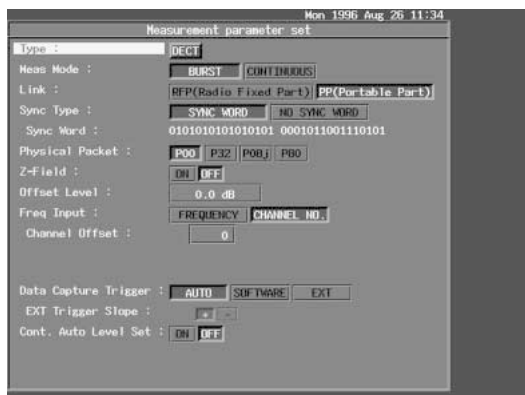
DECT: RFP (Radio Fixed Part), PP (Portable Part)

#### • Measurement Items

- Burst envelope measurement
- Power measurement
- Power vs time measurement
- FM deviation measurement
- Emission due to modulation measurement
- Emission due to transient measurement
- Spurious emission measurement
- Timing jitter measurement
- Graphics display



< DECT TRANSIENT menu >



< DECT setting screen >



< DECT FM deviation measurement >

#### Specifications

##### Measurement Functions

**CW mode:** Spectrum measurement  
**Transient mode:** Burst envelope measurement  
 Burst spectrum measurement  
**GSM Tx Plus** (option 55/58)  
**DECT Option** (option 52/58)

##### Frequency

**Frequency range:** 9 kHz to 3.0 GHz  
**Frequency reading accuracy:**  
 (start, stop, center frequency, marker frequency)  
 $\pm (f\text{-reading} \times f\text{-reference accuracy} + \text{span} \times \text{span accuracy} + 0.15 \times \text{RBW} + 10 \text{ Hz})$   
**Marker frequency counter:**  
**Resolution** 1 Hz to 1 kHz  
**Accuracy** (S/N  $\geq 25$  dB)  
 $\pm (\text{marker-f} \times f\text{-reference accuracy} + 1 \text{ LSD})$  \*  
**Delta counter**  $\pm (\Delta f \times f\text{-reference accuracy} + 2 \text{ LSD})$  \*  
 \* LSD : Least Significant Digit  
**Frequency reference accuracy:**  $\pm 2 \times 10^{-8}/\text{day}$   
 $\pm 1 \times 10^{-7}/\text{year}$

##### Frequency stability:

**Residual FM**  $< 3 \text{ Hz}_{\text{p-p}}/0.1 \text{ sec}$  (ZERO span)  
**Drift** (after 1 hour warm up at span  $\leq 5 \text{ MHz}$ )  
 $< 20 \text{ Hz} \times (\text{sweep time (minutes)})$

##### Signal purity:

$< -100 \text{ dBc/Hz}$  (10 kHz offset)  
 $< -110 \text{ dBc/Hz}$  (100 kHz offset)

##### Frequency span:

**Linear span**  
**Range** 2 kHz to 3 GHz, zero span  
**Accuracy**  $\pm 4\%$  (span  $> 5 \text{ MHz}$ )  
 $\pm 1\%$  (span  $\leq 5 \text{ MHz}$ )

##### Resolution bandwidth (3 dB):

**Range** 300 Hz to 3 MHz, 5 MHz (1, 3, 10 sequence)  
**Accuracy**  $\pm 20\%$  (RBW 1 kHz to 1 MHz)  
 $\pm 30\%$  (RBW 300 Hz, 3 MHz, 5 MHz)  
**Selectivity**  $< 15:1$  (300 Hz to 5 MHz)

##### Video bandwidth range: 1 Hz to 3 MHz, 5 MHz (1, 3, 10 sequence)

##### Frequency sweep:

**Sweep time** 50 ms to 1000 s (CW mode spectrum measurement)  
**Accuracy**  $\pm 5\%$   
**Sweep trigger** Free run, line, single, video, external

##### Amplitude Range

**Measurement range:** +30 dBm to average display noise level

##### Dynamic Range

##### Average display noise level:

(RBW 1 kHz, input attenuator 0 dB, video bandwidth 1 Hz)

| Frequency Range  | Average display noise level                      |
|------------------|--------------------------------------------------|
| 10 kHz           | -70 dBm                                          |
| 100 kHz          | -80 dBm                                          |
| 1 MHz to 3.0 GHz | $-(115 - 1.55 \times f(\text{GHz})) \text{ dBm}$ |

##### 1 dB gain compression:

-5 dBm  $> 10 \text{ MHz}$  (input mixer level)

##### Spurious response:

##### Second order harmonic distortion

$< -70 \text{ dBc}$  10 MHz to 3.0 GHz -30 dBm (Mixer level)

##### Third order distortion (12.5 kHz separation, RBW 300 Hz)

$< -75 \text{ dBc}$  10 MHz to 3.0 GHz -30 dBm (Mixer level)

##### Amplitude Accuracy

**Frequency response** (input ATT 10 dB):

##### In-band flatness

$\pm 1.5 \text{ dB}$  9 kHz to 3.0 GHz  
 $\pm 1.0 \text{ dB}$  50 MHz to 3.0 GHz

**Calibration signal accuracy** (30 MHz): -10 dBm  $\pm 0.3 \text{ dB}$

##### Transient RF Analysis

##### Burst envelope measurement:

**Amplitude resolution** 10 bits

**Sweep time** 50  $\mu\text{s}$  to 2 s/100 ns (resolution)

**Trigger** Free run, single, video, IF detection, external

**Delay trigger time** 200 ns to 650 ms

##### Burst spectrum measurement (with Gated sweep):

**Gate position/resolution** 1  $\mu\text{s}$  to 65 ms/1  $\mu\text{s}$

**Gate width/resolution** 2  $\mu\text{s}$  to 65 ms/1  $\mu\text{s}$

**Trigger** Internal IF detection, external

##### GSM Tx Plus (Option 55, 58):

**Modulation system** GMSK (GSM, DCS1800, DCS 1900)

**Analysis input range** 10 MHz to 3.0 GHz  
 -30 to +30 dBm

##### Average power measurement

(after calibration, during automatic setting in GSM, DCS1800 DCS1900 bands)

**Measurement accuracy**  $\pm 0.8 \text{ dB}$

##### Frequency/phase error measurement

| Frequency error |                                                  |
|-----------------|--------------------------------------------------|
| Range           | $\pm 10 \text{ kHz}$                             |
| Accuracy        | Reference accuracy $\times f_c \pm 5 \text{ Hz}$ |
| Phase error     |                                                  |
| Range           | 0 to 30° (peak)                                  |
| Accuracy        | $< \pm 1.0^\circ$ (rms)                          |
|                 | $< \pm 5.0^\circ$ (peak)                         |

$f_c$ : carrier frequency

##### Option

**Option 15** Program Loader  
**Option 52** DECT  
**Option 55** GSM Tx Plus  
**Option 58** DECT & GSM Tx Plus  
**Option 77** GSM Graphics  
**Option 85** JIS Rack Mounted Set  
**Option 86** EIA Rack Mounted Set