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 Hz p-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 Transmission Characteristics
- Measurement Function Provided Standard
- GSM Tx Plus (Option 55) 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 p-p (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

<table>
<thead>
<tr>
<th>Standard measurement item</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Output Power</td>
<td>Power step not implemented</td>
</tr>
<tr>
<td>4.2 Spectrum due to the modulation</td>
<td>Sweep measurement</td>
</tr>
<tr>
<td>4.3 Spectrum due to switching transient</td>
<td>Sweep measurement</td>
</tr>
<tr>
<td>4.4 Spurious emission (relevant transient band)</td>
<td></td>
</tr>
<tr>
<td>4.5 Spurious emission frequency reference</td>
<td>Standard 0.1 ppm or less</td>
</tr>
<tr>
<td>4.6 Output level dynamic operation (Template)</td>
<td></td>
</tr>
<tr>
<td>4.7 Phase accuracy</td>
<td>Standard peak 5° or less, rms 5° or less</td>
</tr>
</tbody>
</table>

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

GSM/DCS1800/DCS1900 Tx Analysis
- GSM Tx Plus (option 52, 58)
- GSM Graphics (option 77)
- DECT Tx Analysis (option 52, 58)

Application Software
- PR32630300-4C GSM/DCS1800-MS Software
- PR32630310-4C GSM/DCS1800-BS Software
- PR32630500-4C DCS1900-MS Software
- PR32630510-4C DCS1900-BS Software

Requires GSM Tx Plus option (OPT55, 58) and program loader option (OPT. 15)
Spectrum Analyzers

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

R3263

■ Selection of Digital Radio System
The R3263 can switch easily between the GSM, DCS1800 and DCS1900 communications systems.

■ Burst Envelope Measurement Function
The TDMA format used in many digital mobile communication systems, enables multiple users to talk on the same frequency and has a stringently specified envelope characteristic. The R3263 can measure TDMA parameters at the touch of a button.

■ One Touch Zoom Function
T-Zoom enlarges the rise or fall at the touch of a button.

■ Menu Operation for Selection of Measurement Items
Measurement can be carried out simply by selecting the desired measurement item.

■ 1 Frame Measurement Function
1 frame mode enables slot condition measurement to be done easily, simply by specifying the slot number.

■ 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.
Spectrum Analyzers

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

R3263

- **Burst Spectrum Measurement Function**
  Using a gated sweep function, the R3263 can perform spectrum analysis of only the burst ON area. Time domain and frequency domain are each displayed on a separate screen, simplifying measurement range settings and verification.

- **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.

- **Switching Spectrum Measurement**
  Measures spectrum including burst rise/fall. PASS/FAIL determination is also done using standard templates.

- **Spurious Measurement**
  Sweeps communication system bands to measure spurious. Three types of measurement can be performed at the touch of a button: ±1.8 to 6 MHz, >6 MHz and full span.

- **GSM Tx Plus Option (Options 55, 58)**
  With the global boom in GSM, DCS1800 and DCS1900 transmission systems, measurement of frequency error, phase error and bit synch Tx power are increasingly needed. 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>
GSM Graphics (Option 77, Requires Options 55, 58)

- **Outline**
  Frequency error/Phase error measurement are required in communication systems of GSM/DCS 1800/DCS 1900 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

- **Analysis Functions**
  - Bit-Frequency
  - Phase Error
  - FFT of Phase Error
  - Trellis
  - Demodulated Data

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
Spectrum Analyzers

9 kHz to 3 GHz

R3263

**Measurement Functions**
- CW mode: Spectrum measurement
- Transient mode: Burst envelope measurement
- GSM Tx Plus (option 55, 58)
- DECT Option (option 52, 58)

**Frequency**
- Frequency range: 9 kHz to 3.0 GHz
- Frequency resolution: 1 Hz
- Frequency reading accuracy: ±(reading × reference accuracy + span × span accuracy + 0.15 × RBW + 10 Hz)

**Marker frequency counter:**
- Resolution: 1 Hz to 1 kHz
- Accuracy: ±(marker f × reference accuracy + 1 LSD) *
- Delta counter: ±(Δf × reference accuracy + 2 LSD) *
  - LSD: Least Significant Digit
- Frequency reference accuracy: ±2 × 10⁻⁷/day
  - ±1 × 10⁻⁸/year

**Frequency stability:**
- Residual FM: ≤±13 Hz ±0.1 sec (ZERO span)
- Drift: < 0.1 Hz (after 1 hour warm up at span ≤5 MHz)
  - < 20 Hz × (sweep time [minutes])

**Signal purity:**
- Pulse width: ≤1.5 µs
- Non-linearity: ≤±1 µs

**Input attenuator range:**
- Maximum safe input: ±30 dBm to average display noise level
- Maximum safe output: ±30 dBm to average display noise level

**Amplitude Range**
- Measurement range: ±30 dBm to average display noise level
- Maximum safe input: ±1.25 mV to 223 V (approx. 1% of full scale steps)
- Input attenuator range: 0 to 70 dB (10 dB steps)

**Dynamic Range**
- Average display noise level: (RBW 1 kHz, input attenuator 0 dB, video bandwidth 1 Hz)

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Average Display Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 10 kHz</td>
<td>-60 dBm</td>
</tr>
<tr>
<td>10 kHz to 18 kHz</td>
<td>-50 dBm</td>
</tr>
<tr>
<td>1 MHz to 3.0 GHz</td>
<td>-40 dBm</td>
</tr>
</tbody>
</table>

**Spurious response:**
- Second order harmonic distortion:
  - < -70 dBc 10 MHz to 3.0 GHz -30 dBm (Mix level)
- Third order distortion:
  - 12.5 kHz separation, RBW 300 Hz
  - < -75 dBc 10 MHz to 3.0 GHz -30 dBm (Mix level)
- Image/multiple/inter-band response:
  - < -70 dBc 10 MHz to 3 GHz
- Residual response (with wide span)
  - (no input signal, input ATT 0 dB, 50Ω termination)
  - < -100 dBm 1 MHz to 3.0 GHz
  - < -90 dBm 300 kHz to 3 GHz

**Amplitude Accuracy**
- Frequency response (input ATT 10 dB):
  - ±1.5 dB 9 kHz to 3.0 GHz
  - ±1.0 dB 50 MHz to 3.0 GHz
- Calibration signal accuracy:
  - ±0.5 dB (15 to 35°C) 0 to -50 dBm
  - ±0.6 dB (0 to 50°C) 0 to -50 dBm
- Scale display accuracy (after auto calibration):
  - Linear ± 0.05% of reference level (after 8 div)

**Input attenuator switching error**
- (with 10 dB reference, at 20 to 70 dB):
  - ± 1.1 dB/10 dB steps, 2.0 dB max. 9 kHz to 3.0 GHz

**RBW switching error**
- (RBW 300 kHz reference, after auto calibration):
  - ≤ ±0.5 dB (0 to 50°C)
  - ≤ ±0.3 dB (15 to 35°C)

**Pulse quantization error**
- (pulse measurement mode, with PRF > 500/sweep time):
  - Log 1.2 dBp-p (RBW ≤ 1 MHz)
  - 3 dBp-p (RBW = 3 MHz)
  - Linear 4% of reference level (RBW ≤ 1 MHz)
  - 12% of reference level (RBW = 3 MHz)

**Spectrum demodulation**
- Modulation type: AM and FM
- Audio output: Built-in speaker, earphone jack, adjustable volume
  - Demodulation.continuation time 100 ms to 1000 s
Spectrum Analyzers

Spectrum Analyzer Enabling Burst-Envelope/Burst-Spectrum Analysis

R3263

Temp

Temperature:
- Operating temperature: 0 to 50°C
- Storage temperature: -20 to 60°C
- Humidity: 85 % RH max.

Power supply (100VAC / 220 VAC automatic switching):
- With 100 VAC operation
  - Voltage: 100 to 120 V
  - Frequency: 50 / 60 Hz
- With 220 VAC operation
  - Voltage: 220 to 240 V
  - Frequency: 50 / 60 Hz

Mass: 17 kg max. (excluding options, front cover, and accessories)
Dimensions: Approx. 177 (H) × 350 (W) × 420 (D) mm (excluding handle, feet, and front cover)

Memory Cards
- 2 slots, front panel
- Connector: JEIDA Ver. 4.2/PCMCIA 2.1

Accessories
- Power cable: A01412
- Input cable: MC-61
- Converter adapter: JUG-201A/U
- Power fuse: 21806.3 (6.3 A)

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

Transient RF Analysis
- Burst envelope measurement:
  - Amplitude resolution: 10 bits
  - Sweep time: 50 μs 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 μs to 65 ms/1 μs
  - Gate width/resolution: 2 μs to 65 ms/1 μs
  - 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
- Average power measurement
  - (after calibration, during automatic setting in GSM, DCS1800, DCS1900 bands)
  - Measurement accuracy: 10.0 dB

Frequency/phase error measurement

<table>
<thead>
<tr>
<th>Frequency error</th>
<th>Accuracy</th>
<th>Reference accuracy x fc ± 5 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase error</td>
<td>Range</td>
<td>0 to ±30° (peak)</td>
</tr>
<tr>
<td></td>
<td>Accuracy</td>
<td>&lt; ±1.0° (max)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; ±5.0° (peak)</td>
</tr>
</tbody>
</table>

fc: carrier frequency

Input/output
- RF input:
  - Connector: N type female
  - Impedance: 50 Ω (nominal)
  - VSWR (input ATT ≥ 10 dB, at the set frequency): < 1.5:1 (≤ 53 GHz) (nominal)

Calibration signal output:
- Connector: BNC female, front panel
- Frequency: 30 MHz × (1 ± frequency reference accuracy)
- Impedance: 50 Ω (nominal)
- Amplitude: -10 dBm ± 0.3 dBm

10 MHz frequency reference input/output:
- Connector: BNC female, rear panel
- Output impedance: 50 Ω (nominal)
- Output frequency accuracy: 10 MHz × frequency reference accuracy
- Input/output amplitude range: -5 to +5 dBm

Gate input:
- Connector: BNC female, rear panel
- Impedance: 10 kΩ (nominal), DC coupled
- Sweep stop: While LOW of TTL level
- Sweep: While HIGH of TTL level

I/O:
- GPIB: IEEE-488 bus connector rear panel
- P-FO: S-SUB 25 pin rear panel
- EXT-KEY: DIN Front panel
- RS232: D-SUB 9 pin rear panel
- Direct Print: Conformed to ESC/P, HP-PCL
- Direct File: Conformed to Windows bit-map file
- Direct Prot: Conformed to HP-GL (waveform data only)

REAR PANEL