Product Introduction

MX269013A GSM/EDGE Measurement Software
MX269013A-001 EDGE Evolution Measurement Software

MS2690A/MS2691A/MS2692A/MS2830A
Signal Analyzer
MX269013A GSM/EDGE Measurement Software
MX269013A-001 EDGE Evolution Measurement Software

Product Introduction

MS269xA

MS2830A

Version 3.00

Anritsu Corporation
GSM/EDGE, EDGE Evolution Measurement Software

The MX269013A GSM/EDGE and MX269013A-001 EDGE Evolution Measurement Software packages support measurement of RF Tx characteristics for GSM/EDGE (EGPRS) and EDGE Evolution (EGPRS2) signals. Installing these software in the MS2690A/MS2691A/MS2692A/MS2830A Signal Analyzer supports Modulation Analysis, Output RF Spectrum and Power vs. Time measurements.

MX269013A
GSM/EDGE Measurement Software
MX269013A-001
EDGE Evolution Measurement Software

Install

MS269xA
MS2830A
The MX269013A GSM/EDGE Measurement Software analyzes GSM/EDGE (EGPRS) signals. The MX269013A-001 EDGE Evolution Measurement Software analyzes EDGE Evolution (EGPRS2) signals.

<table>
<thead>
<tr>
<th>Modulation</th>
<th>Burst Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GMSK</strong></td>
<td>Normal Burst [NB]</td>
</tr>
<tr>
<td><strong>8PSK</strong></td>
<td></td>
</tr>
</tbody>
</table>

**MX269013A GSM/EDGE Measurement Software**

**MX269013A-001 EDGE Evolution Measurement Software**

*MX269013A required*
Common Functions

- Test Signals: Downlink/Uplink

- Bands: P-GSM, E-GSM, R-GSM, GSM 450, GSM 480, GSM 750, GSM 850, DCS 1800, PCS 1900
  *Other frequency signals measured by direct input

- Modulation: GMSK, 8PSK
  QPSK, 16QAM, 32QAM \( \iff \) requires MX269013A-001

- Signal Types: Normal Burst, Continuous
  Higher Symbol Rate Burst \( \iff \) requires MX269013A-001
Setting Parameter (1/2)

- **ARFCN**
  When setting ARFCN, the value matching the Band and RF signal settings is set as the carrier frequency.

- **Carrier Frequency:**
  Measurement range: 400 MHz to 2GHz
  Settable range: 10 MHz to the upper limit of the main unit

- **Lowest ATT Setting:**
  The lower limit for the attenuator, which is automatically adjusted according to the Input Level setting, can be changed manually.

- **Auto Range:**
  This function adjusts input level according to input signal.

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Refer to the next page

Refer to "Measurement Functions"
Setting Parameter (2/2)

- **Signal Direction:**
  - DL: Select this for downlink input signal.
  - UL: Select this for uplink input signal.

- **Band:** Select the frequency band of measurement target.
  - P-GSM, E-GSM, R-GSM, GSM450, GSM480, GSM750, GSM850, GSM1800, GSM1900

- **RF Signal:** Select the burst type of the input signal.
  - Normal Burst, Continuous
  - Higher Symbol Rate Burst, .............Require MX269013A-001

- **Modulation:** Select the modulation method of the input signal.
  - GMSK, 8PSK,
  - QPSK, 16QAM, 32QAM .............Require MX269013A-001

- **Burst Sync:** Select the DUT signal sync detection method.
  - Auto, TSC0, TSC1, TSC2, TSC3, TSC4, TSC5, TSC6, TSC7

- **Active Slot Threshold:**
  - Select the slot detection level threshold value from the Input Level.

- **Measurement Offset:**
  - Select the position of the measured target burst slot, on which trigger input point is based (frame header), in slot units.

- **Symbol Rotation:** Select the symbol rotation phase.
  - π/2, π/4, 3π/8

- **BTS Type:** Select the BTS type for the measurement target.
  - Normal BTS, Micro1/2/3 BTS, Pico BTS

- **BTS Power Level:**
  - Select the BTS power level for the measurement target.

- **Pulse Shaping:**
  - Select the type of Pulse Shaping filter applied to the DUT signal.
    - Narrow, Wide

- **Power Control Level:**
  - Select the MS power control levels for the measurement target.

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Measurement Functions

Modulation analysis and Tx power measurement for GSM/EDGE/base station for EDGE Evolution/terminal/device component development performed at high speed and high accuracy

**Modulation Analysis**

**Text Display**
- Frequency Error *
- EVM (rms) *
- EVM (peak) *
- Magnitude Error (rms) *
- Phase Error (rms)
- Phase Error (peak) **
- Origin Offset *
- 95\(^{th}\) percentile *
- Droop *

**Graph Display**
- Constellation
- EVM vs Symbol *
- Magnitude Error vs Symbol *
- Phase Error vs Symbol

**Output RF Spectrum**

**Text Display**
- Reference Power
- Modulation Pass/Fail
- MKR

**Graph Display**
- Modulation
- Switching
- Numeric

**Power vs Time**

**Text Display**
- Slot Power: Avg/Max/Min
- Slot Status: Active/Inactive
- Judge: Pass/Fail

**Graph Display**
- Rise and Fail
- Slot
- Frame
Modulation Analysis (1/3)

GSM, EDGE and EDGE Evolution signals can be analyzed. The frequency and vector error (Avg/Max) are displayed as numerics, while the constellation and vector error vs. symbol are displayed as graphs.
Modulation Analysis (2/3)

Text Display

The Result window shows the numerical results.

- **Frequency Error**: Displays frequency error of analyzed signal in Hz and ppm units
- **EVM (rms)**: Displays input signal EVM as RMS value
- **EVM (peak)**: Displays peak EVM value of input signal
- **Magnitude Error (rms)**: Displays amplitude error between input signal and ideal signal as RMS value
- **Phase Error (rms)**: Displays phase error between input signal and ideal signal as RMS value
- **Phase Error (peak)**: Displays peak phase error between input signal and ideal signal
- **Origin Offset**: Displays Origin Offset of input signal
- **Droop**: Displays the Droop value of the analysis signal in dB and nepers/s.

### Modulation Analysis (2/3) Table

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Error</td>
<td>-0.11 Hz</td>
</tr>
<tr>
<td>Mean Power</td>
<td>-0.0001 ppm</td>
</tr>
<tr>
<td>EVM (rms)</td>
<td>-10.71 dBm</td>
</tr>
<tr>
<td>EVM (peak)</td>
<td>3.74 %</td>
</tr>
<tr>
<td>Mag. Error (rms)</td>
<td>0.33 %</td>
</tr>
<tr>
<td>Phase Error (rms)</td>
<td>0.32 deg.</td>
</tr>
<tr>
<td>Origin Offset</td>
<td>-55.69 dB</td>
</tr>
<tr>
<td>Time Offset</td>
<td>-0.146 chips</td>
</tr>
<tr>
<td>Peak CDE</td>
<td>-60.54 dB</td>
</tr>
<tr>
<td>Peak Active CDE</td>
<td>-54.08 dB</td>
</tr>
<tr>
<td>Peak Relative CDE</td>
<td>-42.10 dB</td>
</tr>
</tbody>
</table>

*: Excluding GMSK

**: GMSK only
Vector, amplitude and phase errors can be graphed on the vertical axis to easily find instantaneous symbol-dependent signal degradation.

Modulation Analysis

EVM vs. Symbol

Amplitude Error vs. Symbol

Phase Error vs. Symbol
**Output RF Spectrum (1/4)**

**Modulation**

This function supports measurement of the output RF spectrum modulation specified by 3GPP TS45.005. Pass/fail is evaluated from the limit line.

**Output RF Spectrum (Modulation)**

- **Noise Cancel:** Noise cancellation function ON/OFF (subtracts main-frame noise from measurement result)

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**Pass/Fail**

**Limit Line**

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**Ref Int**

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**Pre-Amp Off**

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**Anritsu**

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**MX269013A-E-L-1**
Output RF Spectrum (2/4)

Switching

This function supports measurement of the output RF spectrum switching (rise/fall part) specified by 3GPP TS45.005. Pass/fail is evaluated from the limit line.

Output RF Spectrum (Switching)

 ➢ **Pass/Fail**

 ➢ **Reference mode for switching:**
  - This sets Reference Power for the Switching measurement.
  - **rms**: Sets the power measured at Detection=RMS to the Reference Power.
  - **peak**: Sets the power measured at Detection=Peak to the Reference Power.

 ➢ **Noise Cancel:**
  - Noise cancellation function ON/OFF (subtracts main-frame noise from measurement result)
The modulation and switching output RF spectrum measurement results are listed for simultaneous pass/fail evaluation.

### Output RF Spectrum (Numeric)

<table>
<thead>
<tr>
<th>Offset Freq [kHz]</th>
<th>Modulation Pass</th>
<th>Reference Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>-7.13 dB</td>
<td>-19.49 dBm/30kHz</td>
</tr>
<tr>
<td>200</td>
<td>-37.97 dB</td>
<td>-36.85 dBm/30kHz</td>
</tr>
<tr>
<td>400</td>
<td>-72.49 dB</td>
<td>-70.29 dBm/30kHz</td>
</tr>
<tr>
<td>600</td>
<td>-81.49 dB</td>
<td>-78.70 dBm/30kHz</td>
</tr>
<tr>
<td>800</td>
<td>-80.88 dB</td>
<td>-77.52 dBm/30kHz</td>
</tr>
<tr>
<td>1000</td>
<td>-76.93 dB</td>
<td>-74.55 dBm/30kHz</td>
</tr>
<tr>
<td>1200</td>
<td>-80.21 dB</td>
<td>-76.23 dBm/30kHz</td>
</tr>
<tr>
<td>1400</td>
<td>-81.54 dB</td>
<td>-78.18 dBm/30kHz</td>
</tr>
<tr>
<td>1600</td>
<td>-80.42 dB</td>
<td>-77.95 dBm/30kHz</td>
</tr>
<tr>
<td>1800</td>
<td>-76.93 dB</td>
<td>-74.55 dBm/30kHz</td>
</tr>
<tr>
<td>2000</td>
<td>-75.80 dB</td>
<td>-72.30 dBm/30kHz</td>
</tr>
</tbody>
</table>

### Reference mode for switching:
- **rms**: Sets the power measured at Detection=RMS to the Reference Power.
- **peak**: Sets the power measured at Detection=Peak to the Reference Power.

### Noise Cancel:
- Noise cancellation function ON/OFF (subtracts main-frame noise from measurement result)
Output RF Spectrum (4/4)

Mask Template Editing

This function supports editing of the mask template for the output RF spectrum. Listed setting parameters can be changed easily.

Mask Setting (Modulation)

Mask Setting (Switching)
Power vs. Time (1/4)

The slot power results are listed and symbol power vs. time is graphed. Avg, max, and min values are displayed.

Power vs. Time Screen

Text Display

Graph Display

Max. Value

Ave. Value

Min. Value
Power vs. Time (2/4)

Text Display

The Result window shows the numerical results.

Slot Power

<table>
<thead>
<tr>
<th>Slot</th>
<th>State</th>
<th>Avg [dBm]</th>
<th>Max [dBm]</th>
<th>Min [dBm]</th>
<th>Judge</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Active</td>
<td>-10.43</td>
<td>-10.43</td>
<td>-10.43</td>
<td>Pass</td>
</tr>
<tr>
<td>1</td>
<td>Active</td>
<td>-10.43</td>
<td>-10.43</td>
<td>-10.43</td>
<td>Pass</td>
</tr>
<tr>
<td>2</td>
<td>Active</td>
<td>-10.43</td>
<td>-10.43</td>
<td>-10.43</td>
<td>Pass</td>
</tr>
<tr>
<td>3</td>
<td>Active</td>
<td>-10.43</td>
<td>-10.43</td>
<td>-10.43</td>
<td>Pass</td>
</tr>
<tr>
<td>4</td>
<td>Active</td>
<td>-10.43</td>
<td>-10.43</td>
<td>-10.43</td>
<td>Pass</td>
</tr>
<tr>
<td>5</td>
<td>Active</td>
<td>-10.43</td>
<td>-10.43</td>
<td>-10.43</td>
<td>Pass</td>
</tr>
<tr>
<td>6</td>
<td>Active</td>
<td>-10.43</td>
<td>-10.43</td>
<td>-10.43</td>
<td>Pass</td>
</tr>
<tr>
<td>7</td>
<td>Inactive</td>
<td>-91.78</td>
<td>-91.65</td>
<td>-91.88</td>
<td>****</td>
</tr>
</tbody>
</table>

- Slot Power: Avg/Max/Min:
  Displays power for 8 consecutive slots from measurement target head slot
- Slot Status: Active/Inactive:
  Displays Active/Inactive status for 8 consecutive slots from measurement target head slot
- Judge: Pass/Fail:
  Displays mask evaluation result for Symbol Power at each measurement target slot (8 slots)
Power vs. Time (3/4)

The change in DUT output power over time can be observed using three rising/falling, slot, and frame displays. Pass/fail is evaluated using the template.
Power vs. Time (4/4)

This function supports editing of the mask template for power vs. time. Listed setting parameters can be changed easily.
Spurious Emission (Mainframe Function)

The peak frequency and level in each segment and the standard margin are displayed; parts exceeding the limit line are indicated in red. The limit line and measurement method can be set for up to 20 segments.
Specifications

All 3GPP TS45.005 (Rel. 8) RF Tx tests of GSM/EDGE/EDGE Evolution systems are supported.

<table>
<thead>
<tr>
<th>3GPP TS45.005 Transmitter Characteristics</th>
<th>Software</th>
<th>SPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Output Power</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.2 Output RF spectrum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2.1 Spectrum due to modulation and wideband noise</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.2.2 Spectrum due to switching transients</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.3 Spurious emissions</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>4.4 Radio frequency tolerance</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.5 Output level dynamic operation</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.6 Modulation accuracy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.6.1 GMSK Modulation</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.6.2 QPSK, 8-PSK, 16-QAM and 32-QAM modulations</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.6.2.1 RMS EVM</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.6.2.2 Origin offset suppression</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.6.2.3 Peak EVM</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.6.2.4 95th percentile</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4.7 Intermodulation attenuation</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

*ATT, filters and amplifiers required as necessary