Product Introduction

MX882001C
GSM Measurement Software

MT8820B
Radio Communication Analyzer
MX882001C
GSM Measurement Software
Product Introduction

Including MT8820B-002/-011,
MX882001C-001/-002/-011/-041

Version 2.0
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ANRITSU CORPORATION
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6. MX882001C-041 GSM High-Speed Adjustment and EGPRS Predistortion Adjustment*

*MX882001C supports EGPRS Predistortion Adjustment is a standard feature.
Key Features of
MX882001C GSM Measurement Software and
MX882001C-011 EGPRS Measurement Software
Key Features of MX882001C GSM Measurement Software and MX882001C-011 EGPRS Measurement Software

All-in-One Call Processing and RF Tx/Rx Testing of GSM/GPRS/EGPRS Mobiles

The MT8820B can easily test the basic RF Tx/Rx characteristics of GSM/GPRS/EGPRS mobiles. And it supports testing of call processing, such as origination and termination.

Mobile Tx/Rx Measurement
On-screen Mobile Measurement Report

Frequency Bands
GSM450, GSM480, T-GSM810, GSM850, P-GSM, E-GSM, R-GSM, DCS1800, PCS1900
Key Features of MX882001C GSM Measurement Software and MX882001C-011 EGPRS Measurement Software

Wide Range of Measurement Functions
In addition to supporting basic Tx/Rx measurements of GSM/GPRS/EGPRS mobile terminals, the spectrum can be checked and calibration can be performed at the Spectrum Monitor screen. And the GPRS/EGPRS multislot can be measured.

Fundamental Measurement Screen
(Spectrum Monitor Screen)
Key Features of MX882001C GSM Measurement Software and MX882001C-011 EGPRS Measurement Software

High-speed Tx Measurement

The Tx measurement times except signalling time are shown below. The MT8820B times are 40% to 75% shorter than the MT8820A.

Avg. = 1 for GSM/GPRS (GMSK Modulation)

Avg. = 20 for GSM/GPRS (GMSK Modulation)

Avg. = 1 for EGPRS (8PSK Modulation)

Avg. = 20 for EGPRS (8PSK Modulation)
RF Characteristics Tests without Call Processing

By setting Call Processing to OFF, RF characteristics are tested without call processing.

Multislot Class (GPRS/EGPRS)

The "1DL,1UL", "2DL,1UL", "2DL,2UL", "3DL,1UL", "3DL,2UL", "4DL,1UL", "1DL,3UL", “1DL,4UL”, “3DL,3UL”, “4DL,2UL”, “5DL,1UL”, and “2DL,4UL” multislot configurations are supported, along with multislot classes 1 to 12 and 30 to 33.

DL: Downlink, UL: Uplink
MX882001C GSM Measurement Software
**MX882001C GSM Measurement Software**

**Key Specifications**

- **Frequency range**: 300 to 2700 MHz
- **Maximum input level**: +40 dBm
- **Amplitude measurement accuracy**:
  - ±0.5 dB (−20 to +40 dBm)
  - ±0.7 dB (−30 to −20 dBm) after calibration
- **Modulation accuracy**
  - (residual phase error) ≤0.5 deg. rms, 2 deg. peak
- **Output RF spectrum**
  - (due to modulation) ≤−55 dB (≤250 kHz offset)
  - ≤−65 dB (≥400 kHz offset)
- **RF Output level range**:
  - −140 to −10 dBm (MAIN),
  - −130 to 0 dBm (AUX)
- **RF Output level accuracy**:
  - ±1.0 dB (−120 to −10 dBm, MAIN),
  - ±1.0 dB (−110 to 0 dBm, AUX) after calibration
MX882001C GSM Measurement Software

The MX882001C GSM Measurement Software supports tests of Tx/Rx characteristics for both GSM and GPRS terminals.

Batch Measurements at Fundamental Measurement Screen

All Tx and Rx measurement items can be measured simultaneously (batch measurement), making measurement much faster.

<table>
<thead>
<tr>
<th>Measurement Item</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmitter Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Frequency and Phase Error</td>
<td>RMS and peak for phase error (GSM/GPRS)</td>
</tr>
<tr>
<td>Transmitter Output Power and Burst Timing</td>
<td>(GSM/GPRS)</td>
</tr>
<tr>
<td>Output RF Spectrum</td>
<td>Modulation and switching (GSM/GPRS)</td>
</tr>
<tr>
<td><strong>Receiver Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Reference Sensitivity</td>
<td>Loopback Type A, Loopback Type B and Loopback Type C (FAST BER) as Loopback Type (GSM)</td>
</tr>
<tr>
<td>Minimum Input Level for Reference Performance</td>
<td>BLER (GPRS)</td>
</tr>
</tbody>
</table>
The batch measurement results screens for both Tx and Rx characteristics are shown below. The results can be read simultaneously via GPIB.

The FAST BER (Loopback Type C) supports faster BER measurement.
Burst Waveform Evaluation

The burst characteristics at ramp-up and ramp-down can be evaluated graphically as well as numerically. Moreover, any measurement point in time can be specified.
GPRS BLER Measurement

Multislot BLER measurement is supported for GPRS, reducing BLER measurement time.

Multislot BLER Measurement

<table>
<thead>
<tr>
<th>Block Error Rate</th>
<th>Ratio</th>
<th>Event</th>
<th>Received</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.00%</td>
<td>0</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>- 1st Slot</td>
<td>0.00%</td>
<td>0</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>- 2nd Slot</td>
<td>0.00%</td>
<td>0</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>- 3rd Slot</td>
<td>0.00%</td>
<td>0</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>- 4th Slot</td>
<td>0.00%</td>
<td>0</td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>
The graphical interface supports faster maintenance because the Tx characteristics of GSM/GPRS mobiles can be understood at a glance by viewing the spectrum.

At-a-glance understanding because spectrum and template mask displayed simultaneously

Efficient design, repair and maintenance

The phase error and magnitude error waveforms can be viewed and read via GPIB.
Modulation Analysis View window can show IQ Imbalance.

8PSK IQ Imbalance
GSM frequency hopping function

The frequency hopping is a function that changes the channel (ARFCN) used for communication between the base station (BS) and mobile station (MS) by each 4.62ms frame.

The value of Measure Channel & Frequency used for frequency hopping.
The frequency hopping changes the Measure Frequency based on this table.*

*Please refer MX882001C Operation manual for setting condition of the channel list.
**Spectrum Monitor**

The spectrum in the 25 MHz band can be viewed using the spectrum monitor, and in-band spurious can be checked easily. Moreover, the IQ and carrier leakage from the orthogonal modulator can be adjusted easily. SPAN and RBW can be changed, and marker (zone and spot) and peak search functions are supported.

**Effective adjustment and inspection**

**Spot Marker Function**

**Peak Searching Function with Zone Marker**
The power class of GSM terminals, and the power level (RXLEV) and quality (RXQUAL) at GSM receivers can be checked at the MS Report screen.
MX882001C-001 GSM Voice CODEC
Overview

The MX882001C-001 GSM Voice Codec software option adds real-time voice encoding/decoding to the GSM measurement software. Live end-to-end communication tests between a handset and GSM terminal are supported by installing the MT8820B-011 Audio Board. Moreover, the MT8820B can measure audio Tx/Rx without an external audio analyzer and generator.
**MX882001C-001 GSM Voice Codec**

**Live End-to-End Communication Test**

When a handset is connected to the MT8820B RJ11 connector, live end-to-end communication between the handset and a GSM terminal can be tested.

MT8820B, MT8820B-002, MT8820B-011, MX882001C, **MX882001C-001**
Audio Tx/Rx Measurement

The GSM terminal audio characteristics can be measured with one MT8820B unit using the internal audio generator and audio meter.
## MX882001C-001 GSM Voice Codec

### Specifications

<table>
<thead>
<tr>
<th>Voice Codec</th>
<th>GSM_EFR, GSM_AMR</th>
</tr>
</thead>
</table>
| **Codec Level Adjustment** | Encoder input gain: –3.00 to 3.00 dB, in 0.01 dB increments  
Handset microphone volume: 0, 1, 2, 3, 4, 5  
Handset speaker volume: 0, 1, 2, 3, 4, 5 |
| **AF Output** | Frequency range: 30 Hz to 10 kHz  
Setting range: 0 V peak to 5 V peak (AF Output connector)  
Setting resolution: 1 mV (≤5 V peak), 100 µV (≤500 mV peak), 10 µV (≤50 mV peak)  
Accuracy: ±0.2 dB (≥10 mV peak, ≥50 Hz), ±0.3 dB (≥10 mV peak, <50 Hz)  
Waveform distortion: band ≤30 kHz  
≤–60 dB (≥500 mV peak, ≤5 kHz), ≤–54 dB (≥70 mV peak)  
Output impedance: ≤1 Ω  
Max. output current: 100 mA |
| **AF Input** | Frequency range: 50 Hz to 10 kHz  
Input voltage range: 1 mV peak to 5 V peak (AF Input connector)  
Max. allowable input voltage: 30 V rms  
Input impedance: 100 kΩ |
| **Frequency Measurement** | Accuracy: Reference oscillator accuracy + 0.5 Hz |
| **Level Measurement** | Accuracy: ±0.2 dB (≥10 mV peak), ±0.4 dB (≥1 mV peak, ≥1 kHz) |
| **SINAD Measurement** | At frequency = 1 kHz, band ≤30 kHz  
≥60 dB (≥1000 mV peak), ≥54 dB (>50 mV peak), ≥46 dB (≥10 mV peak) |
| **Distortion Rate Measurement** | At frequency = 1 kHz, band ≤30 kHz  
≤–60 dB (≥1000 mV peak), ≤–54 dB (>50 mV peak), ≤–46 dB (≥10 mV peak) |
MX882001C-002 GSM External Packet Data
**Overview**

The MX882001C-002 can test end-to-end data transfer both in the local environment, such as the connection between an application server connected to the MT8820B and a GPRS terminal, as well as in an almost-real environment, such as the connection between equipment connected to a LAN and a GPRS terminal.

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td>10Base-T</td>
</tr>
<tr>
<td>Data Rate</td>
<td>Downlink: 85.6 kbps max. Uplink: 64.2 kbps max.</td>
</tr>
<tr>
<td>Server IP Address</td>
<td>0.0.0.0 to 255.255.255.255</td>
</tr>
<tr>
<td>Client IP Address</td>
<td>0.0.0.0 to 255.255.255.255</td>
</tr>
<tr>
<td>Coding Scheme</td>
<td>CS-1, CS-2, CS-3, CS-4</td>
</tr>
<tr>
<td>PDTCH Data Pattern</td>
<td>External IP Packet</td>
</tr>
</tbody>
</table>
MX882001C-011 EGPRS Measurement Software
Key Specifications

- Frequency range: 300 to 2700 MHz
- Maximum input level: +40 dBm
- Amplitude measurement accuracy:
  - ±0.5 dB (−20 to +40 dBm),
  - ±0.7 dB (−30 to −20 dBm) after calibration

Modulation accuracy

- Residual phase error (GMSK): ≤0.5 deg. rms, 2 deg. peak
- Residual EVM (8PSK): ≤1.5% rms

- Output RF spectrum:
  - ≤−55 dB (≤250 kHz offset)
  - ≤−65 dB (≥400 kHz offset)
  *Average of 10 measurements

- RF Output level range:
  - −140 to −10 dBm (MAIN)
  - −130 to 0 dBm (AUX)

- RF Output level accuracy:
  - ±1.0 dB (−120 to −10 dBm, MAIN)
  - ±1.0 dB (−110 to 0 dBm, AUX) after calibration

(Note) The MX882001C requires the MX882001C-011.
Batch Measurements at Fundamental Measurement Screen

All Tx and Rx measurement items can be measured simultaneously (batch measurement), making measurement much faster.

<table>
<thead>
<tr>
<th>Measurement Item</th>
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<tbody>
<tr>
<td><strong>Transmitter Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Frequency and Modulation Accuracy</td>
<td>RMS and peak of phase error for GMSK modulation</td>
</tr>
<tr>
<td></td>
<td>RMS and peak of EVM, and origin offset for 8PSK modulation</td>
</tr>
<tr>
<td>Transmitter Output Power and Burst Timing</td>
<td>Estimated power measurement functionality supported</td>
</tr>
<tr>
<td>Output RF Spectrum</td>
<td>Modulation and switching</td>
</tr>
<tr>
<td><strong>Receiver Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>SRB Loopback</td>
<td>BER</td>
</tr>
<tr>
<td>Minimum Input Level for Reference Performance</td>
<td>BLER</td>
</tr>
</tbody>
</table>

Estimated Power Measurement

Since the 8PSK modulated signal has a level variation, multiple bursts are used to reduce the variance of measurement results, reducing the number of averagings (and measurement time).
Batch Measurements at Fundamental Measurement Screen

The batch measurement results screens for both Tx and Rx characteristics are shown below. The results can be read simultaneously via GPIB.

Batch Measurement Result Screens (EGPRS)
EGPRS BLER Measurement

Multislot BLER measurement is supported for EGPRS BLER, reducing measurement time.

EGPRS BER Measurement

EGPRS BER can be measured by selecting the SRB loopback mode as the connection type.

Multislot BER Measurement (SRB Loopback Mode)
MS Report

The power and multislot classes of EGPRS terminals, and the EGPRS receiver power level (C Value) and quality (Signal Variance) can be checked at the MS Report screen.
MX882001C-041 GSM High-Speed Adjustment and EGPRS Predistortion Adjustment*

*MX882001C supports EGPRS Predistortion Adjustment as a standard feature.
GSM High-Speed Adjustment is a function of GSM terminals, running in synchronization with the chipset adjustment function. And it runs IQ Capturing Measurement.

*The measurement runs Fundamental Measurement screen. The measurement can't run Fundamental Measurement, and IQ Capturing Measurement, or High-Speed Adjustment Measurement when the measurement is effective. The measurement runs with Remote Control only.

Sequence of Rx Sweep

- **Burst Type**
  - FCCH
  - SCH
  - PRBS

- **TDMA Frame**
  - 4.6msec

- **Power**

- **Time**
  - 0 to -30dB

- **Frequency**
  - 925.2MHz
  - 925.2MHz
  - 925.2MHz
  - 930.2MHz
  - 935.2MHz

Sequence of Tx Sweep

- **Burst Type**
  - FCCH
  - SCH
  - PRBS

- **TDMA Frame**
  - 4.6msec

- **Power**

- **Time**

- **Frequency**
  - 925.2MHz
  - 925.2MHz
  - 930.2MHz
  - 935.2MHz

IQ Capturing Measurement

- **Trigger**
  - Trigger threshold
  - Trigger delay

- **Input level of MT8820/15B**

- **Signal to be measured**

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MX882001C-E-L-1

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EGPRS Predistortion Adjustment*

EGPRS Predistortion Adjustment is a function to adjust the predistortion part of EGPRS terminals. Predistortion adjustment is performed in conjunction with the mobile adjustment function.

*The measurement runs Fundamental Measurement screen. The measurement runs with Call Processing Off only. The measurement runs with Remote Control only. MX882001C supports EGPRS Predistortion Adjustment is a standard feature.

Measure power and phase at each sample time in CW duration.