PRODUCT INTRODUCTION

MX882000B
W-CDMA/HSDPA Measurement Software

ANRITSU CORPORATION
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MX882000B
W-CDMA/HSDPA Measurement Software
Product Introduction
(with MT8820A, MT8820A-01/-11,
MX882000B-01, MX882000B-11,
MX88205xA, MX88205xA-02/-03, MX882050A-11)

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ANRITSU CORPORATION

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Key Features of the MX882000B W-CDMA Measurement Software

1. Effective Fusion of Signaling and RF Measuring technology

The MT8820A is a measuring equipment that effectively combines signaling and high-performance RF measuring technologies. Therefore, it can provide wide coverage of R&D, production, and maintenance applications.
Key Features of the MX882000B W-CDMA Measurement Software

2. 3G UE connection test and TRX measurement with ONE BOX

- Connected with signaling
- Easy operation to connect
- Termination
- Origination
- Connected

TRX measurement of UE Measurement report from UE on the screen

Measurement result screen

Key Features of the MX882000B W-CDMA Measurement Software

3. Wide variety of measurement functions

- Power measurements in the time domain screen and a spectrum monitor function in addition to fundamental measurements.
- Measuring a steady signal in the fundamental screen and a signal with temporal response in the time domain screen.

Fundamental measurement screen

Time domain measurement screen

Spectrum monitor screen
Key Features of the MX882000B W-CDMA Measurement Software

4. Voice communication test, video phone test, PPP/IP connection test with external server, and HSDPA measurement (Note) via added options.

(Note) MX882050A is necessary to integrate MX882000B-11.
In order to integrate MX882000B-1, the MX882000B and MX882050A should be upgraded into V4.20 or later.

2. Key Specifications of the MX882000B W-CDMA Measurement Software
Key Specifications of the MX882000B W-CDMA Measurement Software

Hardware and measurement specifications

- Frequency range : 300 to 2200 MHz
- Maximum input level : +35 dBm
- Power measurement accuracy : ±0.5 dB (-25 to +35 dBm)
- EVM (residual vector error) : ≤2.5 %
- ACLR : >50 dB at ±5 MHz
  >55 dB at ±10 MHz
- 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) after calibrated

Key Specifications of the MX882000B W-CDMA Measurement Software

Supported TX measurements

<table>
<thead>
<tr>
<th>Item comment</th>
<th>5</th>
<th>Item</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td>Transmitter Characteristics</td>
<td></td>
</tr>
<tr>
<td>5.2</td>
<td></td>
<td>Maximum Output Power</td>
<td></td>
</tr>
<tr>
<td>5.3</td>
<td></td>
<td>Frequency Error</td>
<td></td>
</tr>
<tr>
<td>5.4</td>
<td></td>
<td>Output Power Dynamics in the Uplink</td>
<td></td>
</tr>
<tr>
<td>5.4.1</td>
<td></td>
<td>Open Loop Power Control in the Uplink</td>
<td></td>
</tr>
<tr>
<td>5.4.2</td>
<td></td>
<td>Inner Loop Power Control in the Uplink</td>
<td></td>
</tr>
<tr>
<td>5.4.3</td>
<td></td>
<td>Minimum Output Power</td>
<td></td>
</tr>
<tr>
<td>5.4.4</td>
<td></td>
<td>Out-of-synchronisation handling of output power</td>
<td></td>
</tr>
<tr>
<td>5.5</td>
<td></td>
<td>Transmit ON/OFF Power</td>
<td></td>
</tr>
<tr>
<td>5.6</td>
<td></td>
<td>Change of TFC</td>
<td></td>
</tr>
<tr>
<td>5.7</td>
<td></td>
<td>Power setting in uplink compressed mode</td>
<td></td>
</tr>
<tr>
<td>5.8</td>
<td></td>
<td>Occupied Bandwidth (OBW)</td>
<td></td>
</tr>
<tr>
<td>5.9</td>
<td></td>
<td>Spectrum emission mask</td>
<td></td>
</tr>
<tr>
<td>5.10</td>
<td></td>
<td>Adjacent Channel Leakage Power</td>
<td></td>
</tr>
<tr>
<td>5.11</td>
<td></td>
<td>Spurious Emissions</td>
<td>Requires SPA</td>
</tr>
<tr>
<td>5.12</td>
<td></td>
<td>Transmit Intermodulation</td>
<td>Requires SG and SPA</td>
</tr>
<tr>
<td>5.13</td>
<td></td>
<td>Transmit Modulation</td>
<td></td>
</tr>
<tr>
<td>5.13.1</td>
<td></td>
<td>Error Vector Magnitude (EVM)</td>
<td></td>
</tr>
<tr>
<td>5.13.2</td>
<td></td>
<td>Peak code domain error</td>
<td>Single Code Only</td>
</tr>
<tr>
<td>5.13.3</td>
<td></td>
<td>UE phase discontinuity</td>
<td></td>
</tr>
<tr>
<td>5.13.4</td>
<td></td>
<td>PRACH preamble quality</td>
<td></td>
</tr>
</tbody>
</table>

√√: Supported  √: Requires external equipment (SPA or SG)
Key Specifications of the MX882000B W-CDMA Measurement Software

**Supported RX measurements**

<table>
<thead>
<tr>
<th>Item</th>
<th>Receiver Characteristics</th>
<th>comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2</td>
<td>Reference Sensitivity Level</td>
<td>✓✓</td>
</tr>
<tr>
<td>6.3</td>
<td>Maximum Input Level</td>
<td>✓</td>
</tr>
<tr>
<td>6.4</td>
<td>Adjacent Channel Selectivity (ACS)</td>
<td>Requires SG</td>
</tr>
<tr>
<td>6.5</td>
<td>Blocking Characteristics</td>
<td>Requires SG</td>
</tr>
<tr>
<td>6.6</td>
<td>Spurious Response</td>
<td>Requires SG</td>
</tr>
<tr>
<td>6.7</td>
<td>Intermodulation Characteristics</td>
<td>Requires SG</td>
</tr>
<tr>
<td>6.8</td>
<td>Spurious Emissions</td>
<td>Requires SPA</td>
</tr>
</tbody>
</table>

✓✓: Supported  ✓: Requires equipment (SPA or SG)
Measurement Functions of the MX882000B W-CDMA Measurement Software

Multiple simultaneous measurements in the fundamental measurement screen

The following TRX measurements are performed rapidly at the same time:

<table>
<thead>
<tr>
<th>Measurement item</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmitter Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>RRC Filtered Power and Mean Power</td>
<td>Power within RRC filter and 5MHz bandwidth</td>
</tr>
<tr>
<td>Frequency Error</td>
<td></td>
</tr>
<tr>
<td>Occupied Bandwidth (OBW)</td>
<td></td>
</tr>
<tr>
<td>Spectrum Emission Mask</td>
<td></td>
</tr>
<tr>
<td>Adjacent Channel Leakage Power</td>
<td></td>
</tr>
<tr>
<td>Error Vector Magnitude (EVM)</td>
<td></td>
</tr>
<tr>
<td>Peak Code Domain Error</td>
<td></td>
</tr>
<tr>
<td><strong>Receiver Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>BER</td>
<td>For sensitivity level and maximum input level</td>
</tr>
<tr>
<td></td>
<td>Test Loop Mode 1 used</td>
</tr>
<tr>
<td>BLER</td>
<td>For performance test</td>
</tr>
<tr>
<td></td>
<td>Test Loop Mode 2 used</td>
</tr>
</tbody>
</table>

Measurement result screen (1)

![Measurement result screen](image)
**Measurement Functions of the MX882000B W-CDMA Measurement Software**

*Multiple simultaneous measurements in the fundamental measurement screen*

- Measurement result screen (2)

**Graphical spectrum interface**

- Enables faster repairs because you can figure out the UE TX characteristics easily by checking its spectrum.
- **Effective for repair and maintenance groups**
- **Obvious at a glance because spectrum and template mask are displayed at the same time.**

- Spectrum for OBW
- Spectrum for Spectrum Emission Mask
  - Vector error versus chip, phase error versus chip and magnitude error versus chip available for display.
- Spectrum available via GPIB
Measurement Functions of the MX882000B W-CDMA Measurement Software

Graphical interface of power change in time domain

By using the time domain screen, it is possible to measure the UE TX dynamic power change.

RACH measurement (template mask and EVM)

- RACH ON Power
- RACH EVM
- Time at the first fail
- Template mask result
- RACH power, EVM, pass/fail to template mask available.

Measurement Functions of the MX882000B W-CDMA Measurement Software

Graphical interface of power change in time domain

Using slot marker and slot list functionality helps you figure out the result.

Inner loop power control result
Measurement Functions of the MX882000B W-CDMA Measurement Software

Modulation accuracy of consecutive slots

EVM, frequency error and phase discontinuity of the consecutive slots are measured.

Phase Discontinuity Measurement

Using slot list helps you figure out the result.

Spectrum monitor

You can figure out the spectrum in 25 MHz bandwidth, which helps you check the in-band spurious and adjust the carrier leakage from the orthogonal modulator. Also, the CW characteristics of UL without AFC can be measured by the frequency measurement function.

Effective in adjustment and inspection
Measurement Functions of the MX882000B W-CDMA Measurement Software

**UE report**

You can see the UE TX power and power class in the UE report screen, as well as the report from the UE.

**Sequence Monitor Screen**

This function is helpful to check the test results of the call processing sequence.
Measurement Functions of the MX882000B W-CDMA Measurement Software

**Other Functionality**

- Fast handover between W-CDMA and GSM in less than 2s
- CW signal output
- DRX Cycle Length
- Separate external loss setting between TX and RX

![Diagram showing measurement functions]

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**4. MX882000B-01 W-CDMA Voice CODEC**
The MX882000B-01 W-CDMA voice codec is a software option to add a real-time voice encoding/decoding function to the W-CDMA measurement software. Live end-to-end communication test with a UE is available by installing the MT8820A-11 audio board. Also, a standalone MT8820A is capable of performing a UE audio transmit/receive test without an external audio analyzer and generator.

Live end-to-end communication test

Live end-to-end communication test between a UE and the MT8820A is done by connecting a handset to the MT8820A RJ11 connector.
The UE audio characteristics can be measured with a single MT8820A, which has an internal audio generator and audio meter.

Configuration required

- Hardware: W-CDMA hardware and Audio board
- Software: W-CDMA software, W-CDMA voice CODEC option

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**MX882000B-01 W-CDMA Voice Codec**

**Audio TRX measurement**

The UE audio characteristics can be measured with a single MT8820A, which has an internal audio generator and audio meter.

![Audio TRX measurement diagram](image)

**Specifications**

<table>
<thead>
<tr>
<th>Voice codec</th>
<th>AMR 12.2 kbps</th>
</tr>
</thead>
</table>
| Codec level adjustment | Encoder input gain: –3.00 to 3.00 dB, in increments of 0.01 dB  
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, 1 Hz resolution  
Setting range: 0 Vpeak to 5 Vpeak (AF Output connector)  
Setting resolution: 1 mV (≤5 V peak), 100 μV (≤500 mVpeak), 10 μV (≤50 mVpeak)  
Accuracy: ±0.2 dB (≤10 mVpeak), ±0.3 dB (≤100 mVpeak), ±0.5 dB (≤500 mVpeak)  
Waveform distortion: ≤80 dB (≤500 mV peak, ≤5 kHz), ≤54 dB (≤70 mVpeak)  
Output impedance: ≤1Ω  
Max. output current: 100 mA |
| AF input | Frequency range: 30 Hz to 10 kHz  
Input voltage range: 1 mVpeak to 5 Vpeak (AF Input connector)  
Max. allowable input voltage: 30 Vrms  
Input impedance: 100 kΩ  
Frequency measurement | Accuracy: Reference oscillator accuracy ± 0.5 Hz |
| Level measurement | Accuracy: ±0.2 dB (≤100 mVpeak), ±0.4 dB (≤1 mVpeak, ≥1 kHz) |
| SINAD measurement | Frequency: 1 kHz in ≤30 kHz band  
≥60 dB (≤1000 mVpeak), ≥54 dB (≥50 mVpeak), ≥46 dB (≥10 mVpeak) |
| Distortion rate measurement | Frequency: 1 kHz in ≤30 kHz band  
≤–60 dB (≤1000 mVpeak), ≤–54 dB (≥50 mVpeak), ≤–46 dB (≥10 mVpeak) |
5. MX88205xA-02 W-CDMA External Packet Data

The MX88205xA-02 W-CDMA external packet data option is used for transferring data via the MT8820A Ethernet port to an external device. By installing this software, packet data communication can be tested with the MT8820A, which has the MX882000B W-CDMA measurement software and MX88205xA W-CDMA call processing software installed.
As shown in the following diagram, the MT8820A is capable of using a client PC to test UE PPP packet data transfer functionality by making use of server PC functions such as FTP, HTTP, POP, and SMTP. The UE operates as a modem for the client PC.

**PPP packet data**

As shown in the following diagram, the MT8820A is capable of testing UE applications such as i-mode that are based on IP packet data transfer.

**IP packet data**
### MX882000B-01 W-CDMA External Packet Data

**Specifications**

<table>
<thead>
<tr>
<th>MX88205xA-02 W-CDMA external packet data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethernet</strong></td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
</tr>
<tr>
<td><strong>Server IP Address</strong></td>
</tr>
<tr>
<td><strong>Client IP Address</strong></td>
</tr>
<tr>
<td><strong>Channel Coding</strong></td>
</tr>
<tr>
<td><strong>DTCH Data pattern</strong></td>
</tr>
</tbody>
</table>

---

**6. MX88205xA-03 W-CDMA Video Phone Test**
The MX88205xA-03 W-CDMA video phone test is capable of testing end-to-end communication between two UEs using two MT8820As as shown in the left side below. Alternatively, by using the MT8820A with its parallel phone capability, the test can be done with one MT8820A as shown in the right side below.

**Specifications**

<table>
<thead>
<tr>
<th>MX88205xA-03 W-CDMA Video Phone Test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethernet</strong></td>
<td>10BASE-T</td>
</tr>
<tr>
<td><strong>Data Rate</strong></td>
<td>Downlink: 64 kbps, Uplink: 64 kbps</td>
</tr>
<tr>
<td><strong>Channel Coding</strong></td>
<td>Conversation / Unknown / UL: 64 DL: 64 kbps / CS RAB</td>
</tr>
</tbody>
</table>
7. MX882000B-11 HSDPA Measurement Software

**Overview**
- Easy to connect with UE with call processing function
- HSDPA-specific TRX measurement up to 3.6 Mbps class UE
MX882000B-11 HSDPA Measurement Software

**Features**

- Upgrade via software only (Note 1)
- Transmit and receive HSDPA physical channels
  
  Support Fixed Reference Channel specified in 3GPP
  
  (FRC is used for HSDPA TRX measurement)
- HSDPA TRX measurement (Note 2)
  
  Throughput, CQI, TX measurements with HS-DPCCH
- Easy to connect with HSDPA-UE and easy to measure TRX
- Supports TRX measurements of categories 1 to 6, 11, and 12
  
  Support H-Set 1 to 5 and modulation of QPSK and 16QAM

(Note 1) The MX882050A is required to integrate MX882000B-11.

The MX882000B and MX882050A of V4.20 or later is required to integrate MX882000B-11.

(Note 2) Planned to support the some measurement items after finalized in 3GPP TS34.121 (Sep 2005).

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MX882000B-11 HSDPA Measurement Software

**Connection requirements for HSDPA measurements**

For HSDPA TRX measurements, 3GPP specifies a connection with RMC12.2k + FRC. So, the HSDPA measurement is done after the connection with RMC12.2k is established between the UE and the MT8820A. Then the FRC signal is generated in DL.
**Supported TRX measurements**

The MT8820A supports the TRX measurement items shown below.

<table>
<thead>
<tr>
<th>Measurement items (TS 34.121)</th>
<th>MX88200B-11 v4.30</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2A Maximum Output Power with HS-DPCCH</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>5.7AHS-DPCCH</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>5.9A Spectrum Emission Mask with HS-DPCCH</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>5.10A Adjacent Channel Leakage Power Ratio with HS-DPCCH</td>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>5.13.1A Error Vector Magnitude with HS-DPCCH</td>
<td>Supported</td>
<td>Temporary supported. Not finalized yet in TS 34.121 2005-10</td>
</tr>
<tr>
<td>6.3A Maximum Input Level for HS-PDSCH Reception (16QAM)</td>
<td>Supported</td>
<td></td>
</tr>
</tbody>
</table>

**Throughput measurement**

Throughput measurements are done by the MT8820A calculating ACK/NACK/DTX from the UE. By selecting H-Set 1 to 5 and the modulation QPSK or 16QAM as the test signal, the UE throughput of categories 1 to 6, 11, and 12 is measured.
The MT8820A decodes the UE CQI value and calculates the statistical results (average, median, maximum, minimum), displaying them in the histogram below. This functionality helps to verify if the UE reports the CQI values correctly.

CQI statistical results
- Average
- Median
- Maximum
- Minimum
- Number of CQI samples within the specified range centered in median value
- Number of received samples

You can check the number of CQI samples using a marker.

The MT8820A measures the changes in power due to the bursted HS-DPCCH (ACK/NACK and CQI) transmission. This test verifies the accuracy of the power steps due to the HS-DPCCH transmitted.

Transmit power template during HS-DPCCH transmission
**MX882000B-11 HSDPA Measurement Software**

**TX measurement with HS-DPCCH**

The MT8820A measures UE output power, SEM, ACLR and EVM when the HS-DPCCH transmitted. In order to simplify these measurements, the ACK/NACK repetition factor, CQI repetition factor and CQI feedback cycle are used to have the HS-DPCCH be transmitted continuously.

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**8. MX882050A-11 HSDPA External Packet Data**
MX882050A-11 HSDPA External Packet Data

Outline
The MX882050A-11 HSDPA external packet data option is used to check the end-to-end IP packet data communication between an external server and a HSDPA terminal. The option supports QPSK and 16QAM modulation of the downlink signal. The maximum data rate in DL is 267 kbps for QPSK and 388 kbps for 16QAM.

Specifications
The MX882000B, MX882050A and MX882000B-11 are necessary to integrate the MX882050A-11. And the software version 4.30 or later is also required.