MX882002C CDMA2000 Measurement Software
MX882003C 1xEV-DO Measurement Software

MT8820B
Radio Communication Analyzer
MX882002C
CDMA2000 Measurement Software
MX882003C
1xEV-DO Measurement Software
Product Introduction

MT8820B-003/-103, MT8820B-004/-104,
MX882002C, MX882002C-001, MX882002C-002
MX882003C, MX882003C-002

Version 3.00
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Anritsu Corporation

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Key Features of MX882002C
CDMA2000 Measurement Software

All-in-One Call Processing and RF Tx/Rx Testing of CDMA200 Mobiles

The MT8820B can easily test the basic RF Tx/Rx characteristics of CDMA2000 mobiles. And it supports testing of call processing, such as origination and termination.
Key Features of MX882002C CDMA2000 Measurement Software

Wide Range of Measurement Functions

In addition to supporting basic Tx/Rx measurements of CDMA2000 1x mobile terminals, the access probe send power and open loop power control time response can be measured. And adding software options supports tests of CDMA2001 1x mobile external servers and packet communications functions.

Fundamental Measurement Screen (Tx Measurement)

Fundamental Measurement Screen (Rx Measurement)

Access Probe Measurement Screen

Key Features of MX882002C CDMA2000 Measurement Software

Functional Test of CDMA2000 Mobiles

Both voice calling and PPP/IP connections tests with an external server (Packet Connection Test) are both supported.
Key Features of MX882002C CDMA2000 Measurement Software

High-speed Tx Measurement
The Tx measurement times*1 (excluding Rx measurement and signalling) are shown below. The MT8820B is two times faster than the MT8820A.

*1: MT8820B can test faster than the MT8820A with core TX measurement item.

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MX882002C CDMA2000 Measurement Software
### Key Specifications

- **Frequency range**: 300 to 2700 MHz
- **Maximum input level**: +35 dBm
- **Amplitude measurement accuracy**: ±0.5 dB (−25 to +35 dBm), ±0.7 dB (−55 to −25 dBm), ±0.9 dB (−65 to −55 dBm) after calibration
- **Residual waveform quality**: >0.999
- **Residual EVM**: <2.5%
- **FER Measurement**: Measurement at Service Option 2, 9, 55, and 32 (TDSO)

### Supported Tx Measurements

<table>
<thead>
<tr>
<th>3GPP2 C.S0011 Item</th>
<th>Item</th>
<th>Yes/Part of Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. 1</td>
<td>Frequency Accuracy</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 3. 1</td>
<td>Time Reference</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 3. 4</td>
<td>Waveform Quality and Frequency Accuracy</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 3. 5</td>
<td>Code Domain Power</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 4. 1</td>
<td>Range of Open Loop Output Power (Access Channel)</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 4. 2</td>
<td>Time Response of Open Loop Power Control</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 4. 3</td>
<td>Access Probe Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 4. 5</td>
<td>Maximum RF Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 4. 6</td>
<td>Minimum Controlled Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 4. 7</td>
<td>Standby Output Power and Gated Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 4. 9</td>
<td>Code Channel to Reverse Pilot Channel Output Power Accuracy (2.2)</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 5. 1</td>
<td>Conducted Spurious Emissions</td>
<td>Yes</td>
</tr>
<tr>
<td>4. 5. 3</td>
<td>Occupied Bandwidth</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Supported Rx Measurements

<table>
<thead>
<tr>
<th>3GPP2 C.S0011 Item</th>
<th>Item</th>
<th>Yes/Part of Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. 4. 1</td>
<td>Demodulation of Forward Traffic Channel in Additive White Gaussian Noise</td>
<td>Yes</td>
</tr>
<tr>
<td>3. 5. 1</td>
<td>Receiver Sensitivity and Dynamic Range</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Batch Measurements at Fundamental Measurement Screen

The Tx measurement items below can be measured simultaneously (batch measurement), making measurement much faster.

<table>
<thead>
<tr>
<th>Measurement item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter Characteristics</td>
</tr>
<tr>
<td>Time Reference</td>
</tr>
<tr>
<td>Waveform Quality and Frequency Accuracy</td>
</tr>
<tr>
<td>Code Domain Power</td>
</tr>
<tr>
<td>Maximum RF Output Power</td>
</tr>
<tr>
<td>Conducted Spurious Emissions</td>
</tr>
<tr>
<td>Occupied Bandwidth</td>
</tr>
</tbody>
</table>

*The combination of batch measurement items varies with measurement conditions.*

Batch Measurement Result Screens

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

The graphical interface supports easy maintenance because the Tx characteristics of CDMA mobiles can be understood at a glance by viewing the spectrum.

*Spectrum Display Function (Spectrum Emission Mask)*

At-a-glance Pass/Fail evaluation because spectrum and template mask displayed simultaneously

*The spectrum can also be read via GPIB.*

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**Graphical Gated Power Measurement**

At gated Tx power measurement**, the Tx power of the mobile is measured in the gated condition. Template evaluation is also supported.

**1** MS output becomes gating (burst) status when Radio Configuration is Fwd. RC 1 + Rev. RC 1 or Fwd. RC 2 + Rev. RC 2 while FCH data rate is 1/2, 1/4 or 1/8 rate.
MX882002C CDMA2000 Measurement Software

Graphical Open Loop Time Response Measurement
The mobile open loop Tx power control time response can be measured at the Open Loop Time Response screen.

Handoff Function
The parameters after handoff (Band Class Channel, Protocol Revision (P_REV), Radio Configuration, Service Option) can be set at the Handoff pop-up window. And Handoff is performed according to the set parameters.
**MX882002C CDMA2000 Measurement Software**

**MS Report Function**

This screen displays the periodically reported CDMA2000 1X terminal status.

**MS Report Screen**

**Call Processing Test Function**

Call processing can be tested.

**Call Processing Test Items**
- Location Registration
- Origination
- Termination
- Disconnect from UE
- Disconnect from Network
- Hard Handover

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**MX882002C-001 CDMA2000 Voice CODEC**
**MX882002C-001 CDMA2000 Voice Codec**

**Overview**

The MX882002C-001 CDMA2000 Voice Codec software option adds real-time voice encoding/decoding to the CDMA2000 measurement software. Live end-to-end communication tests between a handset and CDMA2000 mobile are supported by installing the MT8820B-011 Audio Board.

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**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 CDMA2000 mobile can be tested.

MT8820B, MT8820B-003, MT8820B-011, MX882002C, MX882002C-001
End-to-end data transfer between an application server connected to the MT8820B and a CDMA2000 mobile or client PC connected to the CDMA2000 mobile can be tested using the MX882002C-002 CDMA2000 External Packet Data Option. The transferred PPP and IP packet data can be measured.
As shown below, packet data transfer via the CDMA2000 mobile PPP connection can be tested by a client PC using a server PC service such as FTP, HTTP, etc. The CDMA2000 mobile operates as a modem for the client PC.

### MX882002C-002 CDMA2000 External Packet Data

#### IP Data Communication Mode

As shown below, packet data transfer via the CDMA2000 mobile PPP connection can be tested by a client PC using a server PC service such as FTP, HTTP, etc. The CDMA2000 mobile operates as a modem for the client PC.

### Specifications

<table>
<thead>
<tr>
<th>Service Option</th>
<th>SO33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Configuration</td>
<td>F-RC3+R-RC3, F-RC4+R-RC3</td>
</tr>
<tr>
<td>Signalling Ch</td>
<td>Encoding: Convolutional, Turbo</td>
</tr>
<tr>
<td></td>
<td>Data Rates: 9.6, 19.2, 38.4, 76.8, 153.6 Kbps</td>
</tr>
<tr>
<td>RLP (Radio Link Protocol)</td>
<td>Interactive or background/UL: 64 DL: 384 Kbps/PS RAB</td>
</tr>
<tr>
<td>Packet Data Mode</td>
<td>RLP Loopback, PPP/IP</td>
</tr>
<tr>
<td></td>
<td>RLP Loop: Mode for looping back RLP data unit received at Reverse Link to Forward Link</td>
</tr>
<tr>
<td></td>
<td>PPP/IP: Mode for transferring IP packet data between mobile and server</td>
</tr>
</tbody>
</table>
CDMA2000 High-speed Adjustment (MT8820B/15B-003, MX882002C)

CDMA2000 High-speed Adjustment is a function for fast adjustment of the RF Tx part of CDMA2000 1X terminals. High-speed adjustment is performed in conjunction with the mobile adjustment function.

**Multi-power Measurement**
Adjustment of transmitter output power in one sweep

![Diagram of CDMA2000 High-speed Adjustment](image)
Key Features of MX882003C
1xEV-DO Measurement Software

All-in-One Call Processing and RF Tx/Rx Testing of 1xEV-Do Mobiles

The MT8820B can easily test the basic RF Tx/Rx characteristics of 1xEV-DO mobiles. And it supports testing of call processing, such as origination and termination.
Key Features of MX882003C 1xEV-DO Measurement Software

Wide Range of Measurement Functions

In addition to supporting basic Tx/Rx measurements of CDMA2000 1xEV-DO mobile terminals, the access probe send power and open loop power control time response can be measured. And adding software options supports tests of CDMA2001 1xEV-DO mobile external servers and packet communications functions.

Fundamental Measurement Screen (Tx Measurement)

Functional Test of 1xEV-DO Mobiles

Voice calling and PPP/IP connections tests with an external server (Packet Connection Test) are both supported.
MX882003C 1xEV-DO Measurement Software

Key Specifications

- **Frequency range**: 300 to 2700 MHz
- **Maximum input level**: +35 dBm
- **Amplitude measurement accuracy**: ±0.5 dB (−25 to +35 dBm), ±0.7 dB (−55 to −25 dBm), ±0.9 dB (−65 to −55 dBm) after calibration
- **Residual waveform quality**: >0.999
- **Residual EVM**: <2.5%
- **PER Measurement**: PER Measurement at F-TAP
**MX882003C 1xEV-DO Measurement Software**

**Supported Tx Measurements**

<table>
<thead>
<tr>
<th>3GPP2 C.S0033 Item</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.1.1 Frequency Coverage Requirement</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.1.3.1 Receiver Sensitivity and Dynamic Range</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.1 Frequency Requirement</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.2.1 Time Reference</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.2.2 Time Response of Open Loop Power Control</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.3.4 Maximum RF Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.3.5 Minimum Controlled Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.3.6 Standby Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.3.7 RRI Channel Output Power</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.3.8 Code Domain Power</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.4.1 Conducted Spurious Emissions</td>
<td>Yes</td>
</tr>
<tr>
<td>3.1.2.4.3 Occupied Bandwidth</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Yes: Supported | Part of Yes: Requires external equipment (SPA or SG) | No: Not Supported

**MX882003C 1xEV-DO Measurement Software**

**Batch Measurements at Fundamental Measurement Screen**

The Tx measurement items below can be measured simultaneously (batch measurement), making measurement much faster.

<table>
<thead>
<tr>
<th>Measurement item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter Characteristics</td>
</tr>
<tr>
<td>Time Reference</td>
</tr>
<tr>
<td>Waveform Quality and Frequency Accuracy</td>
</tr>
<tr>
<td>Maximum RF Output Power</td>
</tr>
<tr>
<td>Code Domain Power</td>
</tr>
<tr>
<td>RRI Channel Output Power</td>
</tr>
<tr>
<td>Maximum RF Output Power</td>
</tr>
<tr>
<td>DRC Channel Output Power</td>
</tr>
<tr>
<td>ACK Channel Output Power</td>
</tr>
<tr>
<td>Conducted Spurious Emissions</td>
</tr>
<tr>
<td>Occupied Bandwidth</td>
</tr>
</tbody>
</table>

*The combination of batch measurement items varies with measurement conditions.*
MX882003C 1xEV-DO Measurement Software

Batch Measurements at Fundamental Measurement Screen

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

**Batch Measurement Result Screens**

![Batch Measurement Result Screens](image1.png)

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**Graphical Spectrum Interface**

The graphical interface supports easy maintenance because the Tx characteristics of CDMA mobiles can be understood at a glance by viewing the spectrum. **Efficient repair and maintenance**

![Graphical Spectrum Interface](image2.png)

*The spectrum can also be read via GPIB.
MX882003C 1xEV-DO Measurement Software

Graphical Open Loop Time Response Measurement
The mobile open loop Tx power control time response can be measured at the Open Loop Time Response screen.

Open Loop Time Response Measurement

MX882003C 1xEV-DO Measurement Software

AT Report Function
This screen displays the periodically reported 1xEV-DO terminal status.

AT Report Screen

Call Processing Test Function
Call processing can be tested.
Overview

End-to-end data transfer between an application server connected to the MT8820B and a 1xEV-DO mobile or client PC connected to the 1xEV-DO mobile can be tested using the MX882003C-002 CDMA2000 External Packet Data Option. The transferred PPP and IP packet data can be measured.
As shown below, packet data transfer via the 1xEV-DO mobile PPP connection can be tested by a client PC using a server PC service such as FTP, HTTP, etc. The 1xEV-DO mobile operates as a modem for the client PC.

**Protocol Stack**

<table>
<thead>
<tr>
<th>User Application</th>
<th>TCP/UDP</th>
<th>IP</th>
<th>IP</th>
<th>Ethernet</th>
<th>PPP</th>
<th>RLP/MAC</th>
<th>Physical Layer</th>
<th>Ethernet</th>
<th>Physical Layer</th>
</tr>
</thead>
</table>

**Applications**

- MT8820B, MT8820B-003, MT8820B-004, MX882002C, MX882003C, MX882003C-002

**Specifications**

<table>
<thead>
<tr>
<th>Application protocol</th>
<th>Default Packet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packet Data Mode</td>
<td>PPP/IP: Mode for transferring IP packet data between mobile and server</td>
</tr>
</tbody>
</table>
Overview of AMPS Measurement

Overview

When the MT8820B-002, MX882002C, and MT8820B-011 audio boards are installed in the MT8820B, the RF of AMPS (American Mobile Phone System) mobiles can be measured and the AF signal can be output and measured.

*Call Processing not currently supported
Key Features of AMPS Measurement

Tx and Audio Measurements

In addition to measuring the fundamental RF Tx and Rx characteristics of AMPS mobiles, the Audio can be tested.

Fundamental Measurement Screen (Tx Measurement)

Fundamental Measurement Screen (FM Measurement)

Audio Measurement Screen

Frequency, Level, SINAD (Signal to Noise And Distortion), Distortion can be measured and displayed simultaneously.

Key Features of AMPS Measurement

Audio Measurement

CDMA2000 1X: CDMA2000 Measurement hardware + audio board + CDMA2000 Measurement Software Option

<Audio Rx measurement including mobile speaker>

<Tx Measurement including mobile microphone>
Key Features of AMPS Measurement

Specifications

- **AMPS Measurement**
  - Frequency: 800 ~ 960 MHz
  - Input Level max.: +35 dBm
  - Amplitude Measurement Accuracy:
    - ±0.5 dB (−25 to +35 dBm),
    - ±0.7 dB (−55 to −25 dBm),
    - ±0.9 dB (−65 to −55 dBm) after calibration
  - Demodulation frequency range: 30 Hz ~ 20 kHz
  - Residual FM: 10 Hz rms (at 300 Hz ~ 3 kHz demodulation frequency)

- **AF Measurement**
  - Input frequency range: 50Hz ~ 10kHz
  - Input level range: 1 mVpeak ~ 5 Vpeak(AF Input)
  - Amplitude measurement accuracy:
    - ±0.2 dB (≥−10mVpeak, ≥50 Hz),
    - ±0.4 dB (≥−1mVpeak, ≥1 kHz)
  - Input impedance: 100 kΩ
  - Output frequency range: 30 Hz ~ 10 kHz
  - Output level range: 0 ~ 5Vpeak (AF Output)
  - Amplitude measurement accuracy:
    - ±0.2 dB (≥−10 mVpeak, ≥50 Hz),
    - ±0.3 dB (≥10 mVpeak, <50 Hz)
  - Output impedance: <1Ω
  - Output current max.: 100 mA
Overview of Synchronous Mode (Hybrid)

Overview

A Forward Link signal for CDMA2000 1X and 1xEV-DO mobiles synchronized with the system time can be output by using the MX882002A and MX882003A either with two MT8820A units or one MT8820A unit in which the Parallelphone™ measurement option is installed. This supports function testing of both cdma20001x and 1xEV-DO systems.

*Parallelphone is a registered trademark of Anritsu Corporation.
Finally, the 1X side becomes Idle (Regist), and the 1xEV-DO side becomes Idle (Session Opened).

1. Use the hybrid mobile to start downloading data from the Server PC.
2. Originate a voice call at the CDMA2000 1x side during the data download.
   The hybrid mobile answers the call after steps 1 and 2.