

**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  
May 2007

Anritsu Corporation

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10. CDMA2000 1X, 1xEV-DO Synchronous Mode(Hybrid)

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## Key Features of MX882002C CDMA2000 Measurement Software

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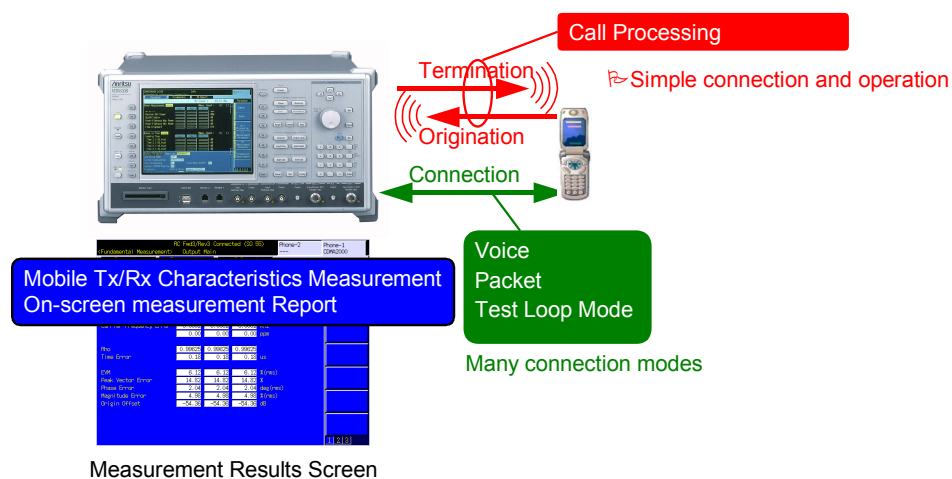
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### Key Features of MX882002C CDMA2000 Measurement Software

#### 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.



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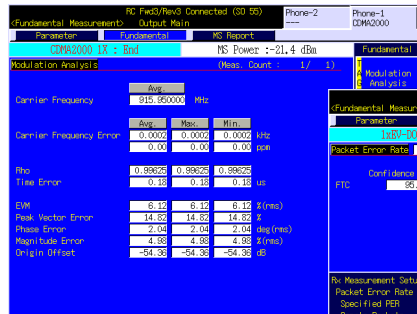
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## Key Features of MX882002C CDMA2000 Measurement Software

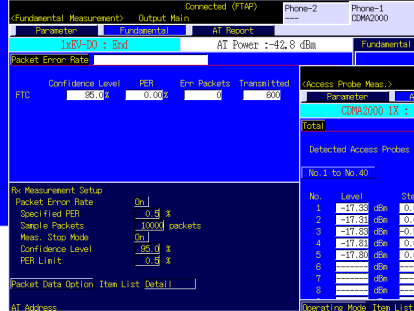
### Wide Range of Measurement Functions

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 CDMA2000 1x mobile external servers and packet communications functions.

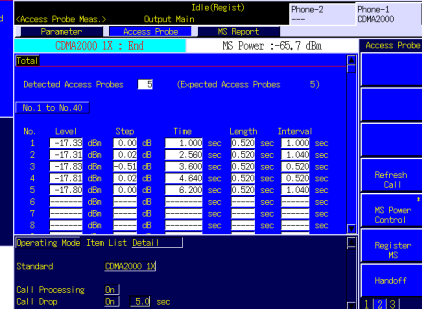
#### Fundamental Measurement Screen (Tx Measurement)



#### Fundamental Measurement Screen (Rx Measurement)



#### Access Probe Measurement Screen



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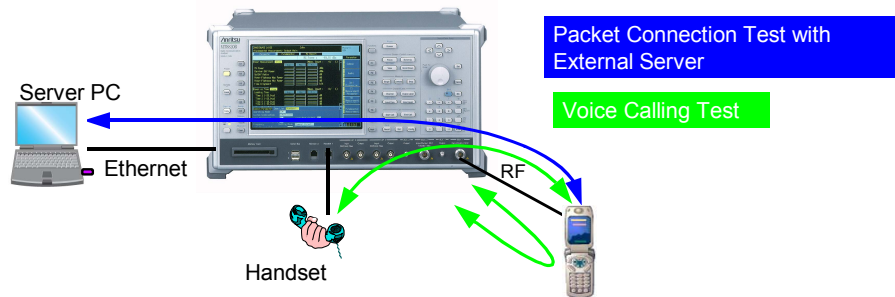
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## Key Features of MX882002C CDMA2000 Measurement Software

### Functional Test of CDMA2000 Mobiles

Both voice calling and PPP/IP connections tests with an external server (Packet Connection Test) are both supported.



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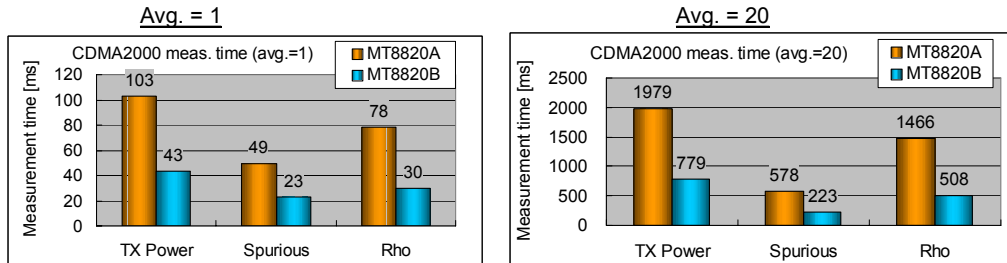
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## Key Features of MX882002C CDMA2000 Measurement Software

### High-speed Tx Measurement

The Tx measurement times\*<sup>1</sup> (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.

## MX882002C CDMA2000 Measurement Software

## MX882002C CDMA2000 Measurement Software

### Key Specifications

- Frequency range : 300 to 2700 MHz
- Maximum input level : +35 dBm
- Amplitude measurement accuracy :  $\pm 0.5$  dB (–25 to +35 dBm),  
 $\pm 0.7$  dB (–55 to –25 dBm)  
 $\pm 0.9$  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)

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## MX882002C CDMA2000 Measurement Software

### Supported Tx Measurements

3GPP2 C.S0011	Item	
4. 1	Frequency Accuracy	Yes
4. 3. 1	Time Reference	Yes
4. 3. 4	Waveform Quality and Frequency Accuracy	Yes
4. 3. 5	Code Domain Power	Yes
4. 4. 1	Range of Open Loop Output Power (Access Channel)	Yes
4. 4. 2	Time Response of Open Loop Power Control	Yes
4. 4. 3	Access Probe Output Power	Yes
4. 4. 5	Maximum RF Output Power	Yes
4. 4. 6	Minimum Controlled Output Power	Yes
4. 4. 7	Standby Output Power and Gated Output Power	Yes
4. 4. 9	Code Channel to Reverse Pilot Channel Output Power Accuracy (2.2)	Yes
4. 5. 1	Conducted Spurious Emissions	Yes
4. 5. 3	Occupied Bandwidth	Yes

### Supported Rx Measurements

3GPP2 C.S0011	Item	
3. 4. 1	Demodulation of Forward Traffic Channel in Additive White Gaussian Noise	Yes
3. 5. 1	Receiver Sensitivity and Dynamic Range	Yes

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

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## MX882002C CDMA2000 Measurement Software

### Batch Measurements at Fundamental Measurement Screen

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

Measurement item
<b>Transmitter Characteristics</b>
Time Reference
Waveform Quality and Frequency Accuracy
Code Domain Power
Maximum RF Output Power
Conducted Spurious Emissions
Occupied Bandwidth

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

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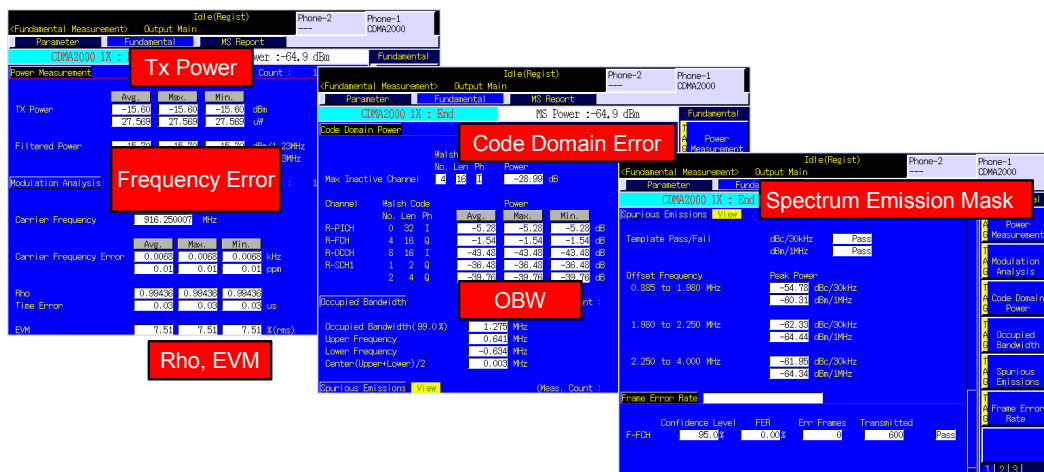
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## MX882002C CDMA2000 Measurement Software

### Batch Measurements at Fundamental Measurement Screen

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

#### Batch Measurement Result Screens



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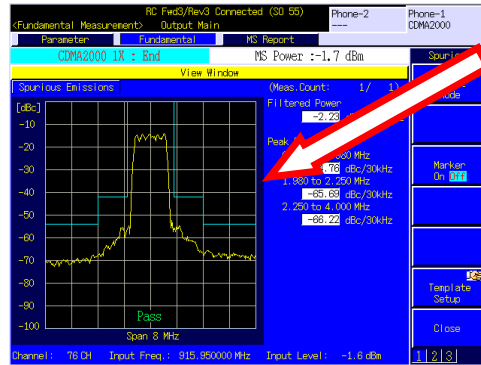
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## MX882002C CDMA2000 Measurement Software

### 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



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

Spectrum Display Function (Spectrum Emission Mask)

\*The spectrum can also be read via GPIB.

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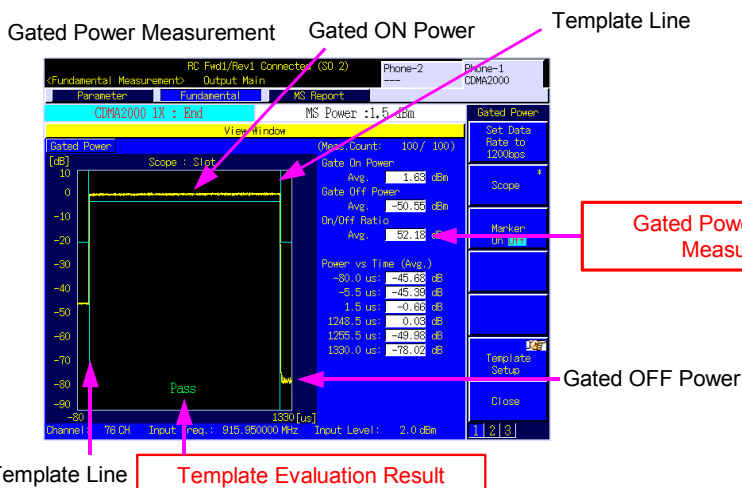
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## MX882002C CDMA2000 Measurement Software

### Graphical Gated Power Measurement

At gated Tx power measurement\*1, 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.



Gated Power On/Off Ratio Measured Value

Gated OFF Power

Template Evaluation Result

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## MX882002C CDMA2000 Measurement Software

### MS Report Function

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

#### MS Report Screen



#### Call Processing Test Items

- Location Registration
- Origination
- Termination
- Disconnect from UE
- Disconnect from Network
- Hard Handover

### Call Processing Test Function

Call processing can be tested.

## MX882002C-001 CDMA2000 Voice CODEC

## MX882002C-001 CDMA2000 Voice Codec

### Overview

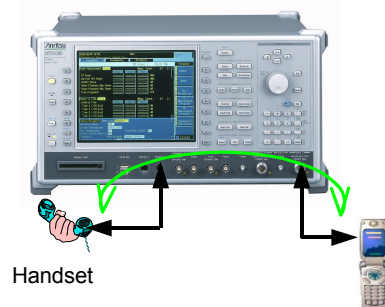
The MX882002C-001 CDMA2000 Voice Codec software option adds real-time voice encoding/decoding to the CDMA2000 measurement software. Live end-to-end communication tests between a handset and CDMA2000 mobile are supported by installing the MT8820B-011 Audio Board.

## MX882002C-001 CDMA2000 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 CDMA2000<sup>1</sup> mobile can be tested.

MT8820B, MT8820B-003, [MT8820B-011](#),  
MX882002C, [MX882002C-001](#)



## **MX882002C-002 CDMA2000**

### **External Packet Data**

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## **MX882002C-002 CDMA2000 External Packet Data**

### **Overview**

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.

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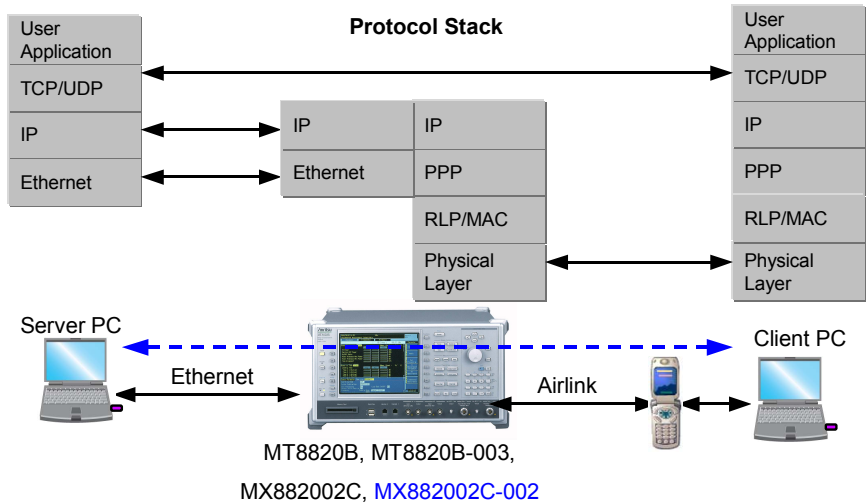
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## MX882002C-002 CDMA2000 External Packet Data

### 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.



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## MX882002C-002 CDMA2000 External Packet Data

### Specifications

Service Option	SO33
Radio Configuration	F-RC3+R-RC3, F-RC4+R-RC3
Signalling Ch	Encoding: Convolutional, Turbo Data Rates: 9.6, 19.2, 38.4, 76.8, 153.6 Kbps
RLP (Radio Link Protocol)	Interactive or background/UL: 64 DL: 384 Kbps/PS RAB
Packet Data Mode	RLP Loopback, PPP/IP RLP Loop: Mode for looping back RLP data unit received at Reverse Link to Forward Link PPP/IP: Mode for transferring IP packet data between mobile and server

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## CDMA2000 High-speed Adjustment (MT8820B/15B-003, MX882002C)

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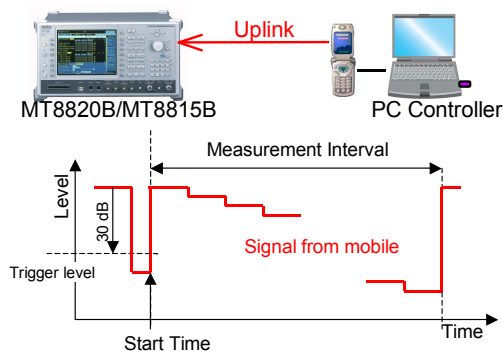
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### CDMA2000 High-speed Adjustment (MT8820B/15B-003, MX882002C)

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



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## Key Features of MX882003C 1xEV-DO Measurement Software

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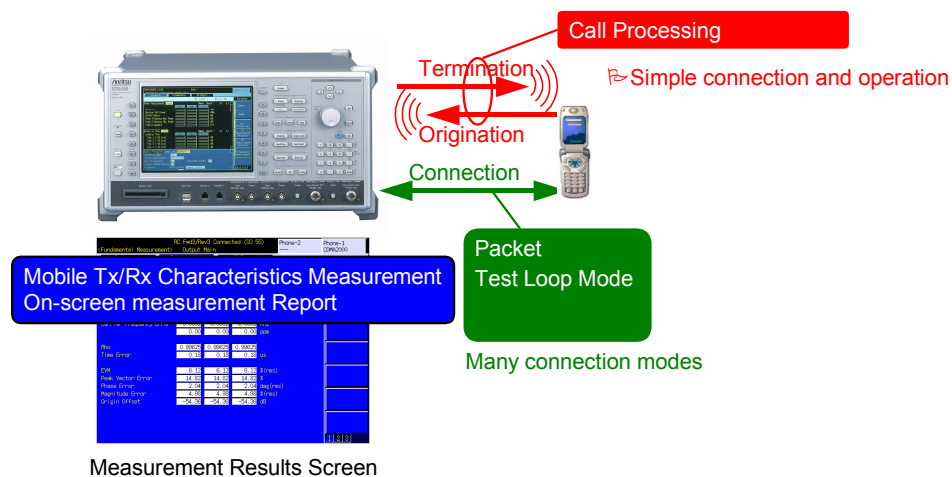
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## Key Features of MX882003C 1xEV-DO Measurement Software

### 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.



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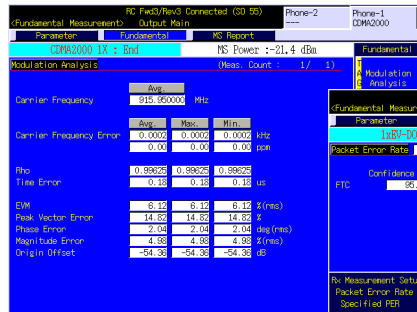
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## Key Features of MX882003C 1xEV-DO Measurement Software

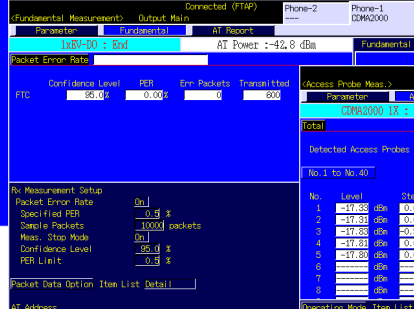
### Wide Range of Measurement Functions

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.

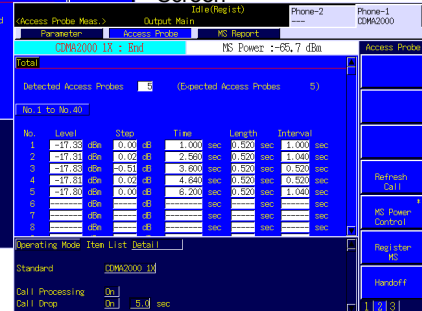
Fundamental Measurement Screen (Tx Measurement)



Fundamental Measurement Screen (Rx Measurement)



Open Loop Measurement Screen



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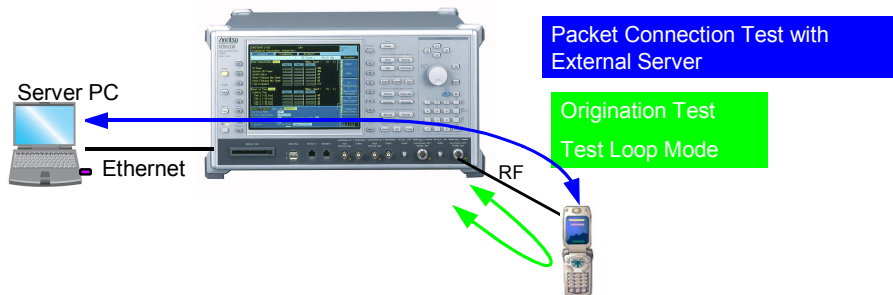
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## Key Features of MX882003C 1xEV-DO Measurement Software

### Functional Test of 1xEV-DO Mobiles

Voice calling and PPP/IP connections tests with an external server (Packet Connection Test) are both supported.



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# MX882003C 1xEV-DO Measurement Software

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## 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

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## MX882003C 1xEV-DO Measurement Software

### Supported Tx Measurements

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

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

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## 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.

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

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

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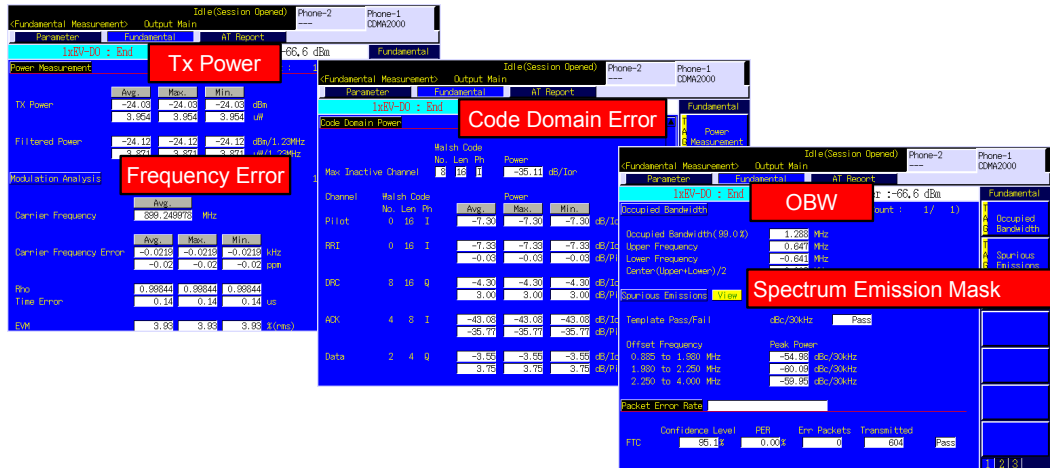
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## MX882003C 1xEV-DO Measurement Software

### 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



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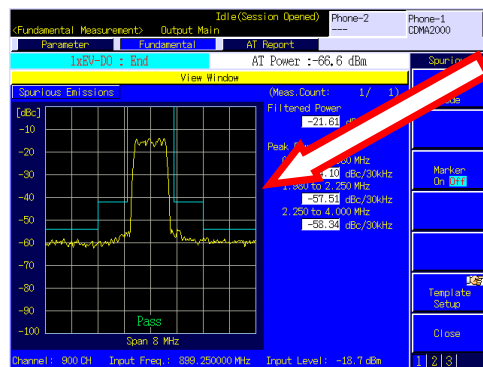
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## MX882003C 1xEV-DO Measurement Software

### 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**



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

Spectrum Display Function (Spectrum Emission Mask)

\*The spectrum can also be read via GPIB.

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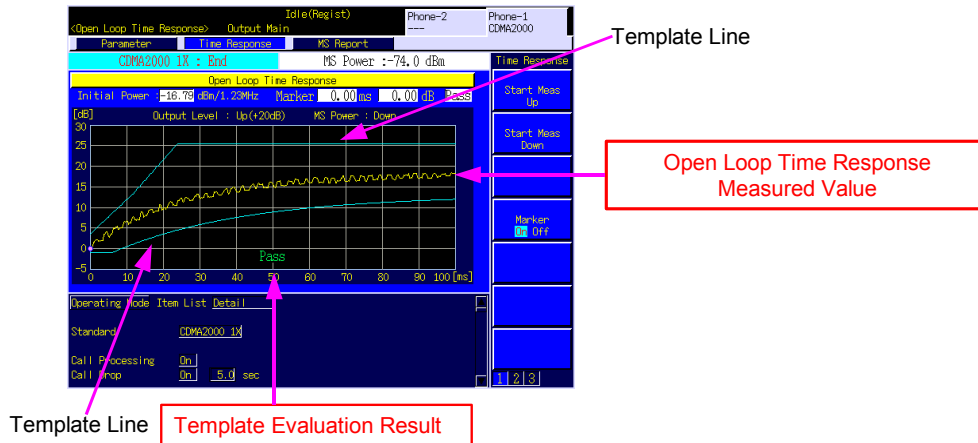
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## MX882003C 1xEV-DO Measurement Software

### 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



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## 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.

#### Call Processing Test Items

Open Session  
Close Session  
AT Origination  
NW Origination  
AT Release  
NW Release  
Hard Handoff  
Softer Handoff

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## MX882003C-002 1xEV-DO

### External Packet Data

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## MX882003C-002 1xEV-DO External Packet Data

### 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.

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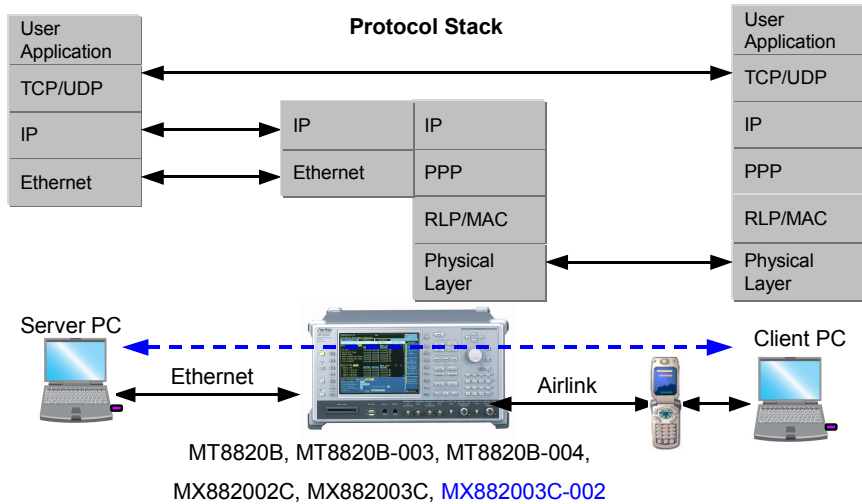
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## MX882003C-002 1xEV-DO External Packet Data

### IP Data Communications Mode

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.



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## MX882003C-002 1xEV-DO External Packet Data

### Specifications

Application protocol	Default Packet
Packet Data Mode	PPP/IP: Mode for transferring IP packet data between mobile and server

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# **AMPS Measurement MT8820B-011 Audio Board MX882002C CDMA2000 Measurement Software**

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## **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

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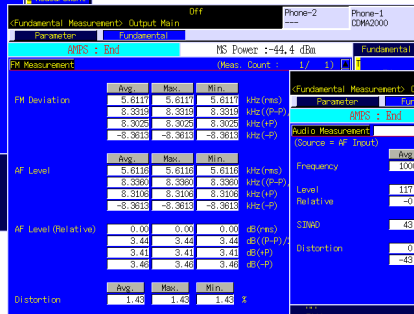
## Key Features of AMPS Measurement Tx and Audio Measurements

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

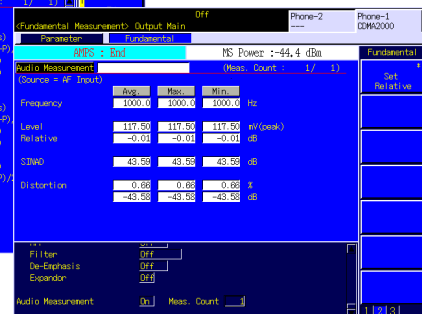
Fundamental Measurement Screen (Tx Measurement)



Fundamental Measurement Screen (FM Measurement)



Audio Measurement Screen



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

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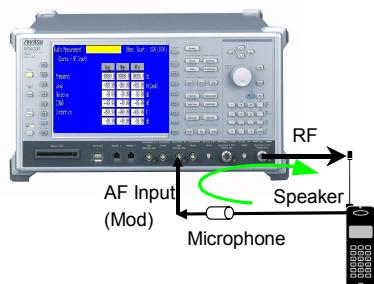
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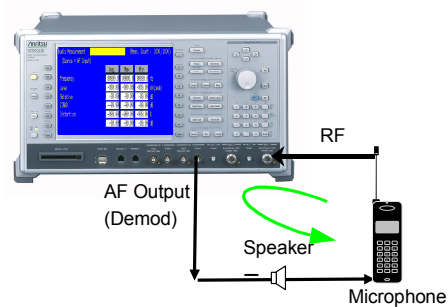
## Key Features of AMPS Measurement

### Audio Measurement

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



<Audio Rx measurement including mobile speaker>



<Tx Measurement including mobile microphone>

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## Key Features of AMPS Measurement

### Specifications

#### ■AMPS Measurement

- Frequency : 800 ~ 960 MHz
- Input Level max. : +35 dBm
- Amplitude Measurement Accuracy :  $\pm 0.5$  dB (–25 to +35 dBm),  
 $\pm 0.7$  dB (–55 to –25 dBm),  
 $\pm 0.9$  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)

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## Key Features of AMPS Measurement

### Specifications

#### ■AF Measurement

- Input frequency range : 50Hz ~ 10kHz
- Input level range : 1 mVpeak ~ 5 Vpeak(AF Input)
- Amplitude measurement accuracy :  $\pm 0.2$  dB ( $\geq -10$ mVpeak,  $\geq 50$  Hz),  
 $\pm 0.4$  dB ( $\geq -1$ mVpeak,  $\geq 1$  kHz)
- Input impedance : 100 k $\Omega$
- Output frequency range : 30 Hz ~ 10 kHz
- Output level range : 0 ~ 5Vpeak (AF Output)
- Amplitude measurement accuracy :  $\pm 0.2$  dB ( $\geq -10$  mVpeak,  $\geq 50$  Hz),  
 $\pm 0.3$  dB ( $\geq 10$  mVpeak,  $< 50$  Hz)
- Output impedance :  $< 1\Omega$
- Output current max. : 100 mA

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## CDMA2000 1X, 1xEV-DO Synchronous Mode (Hybrid)

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### 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.

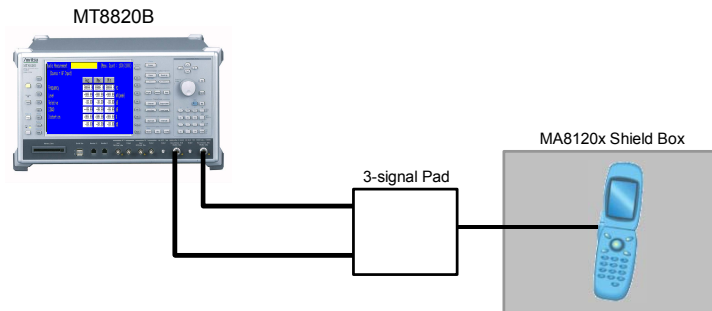
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## Overview of Synchronous Mode (Hybrid)

### Function Overview



Supports CDMA2000 1X/1xEV-DO Hybrid mobiles

Finally, the 1X side becomes Idle (Regist), and the 1xEV-DO side becomes Idle (Session Opened).

Phone2 side

<Fundamental Measurement> Output Main	
Parameter	Fundamental
1xEV-DO : Stop	AT Power : -66.

Phone1 side

<Fundamental Measurement> Output Main	
Parameter	Fundamental
CDMA2000 1X	MS Power : -64.

Discover What's Possible™  
MX882002C/03C-E-L-1

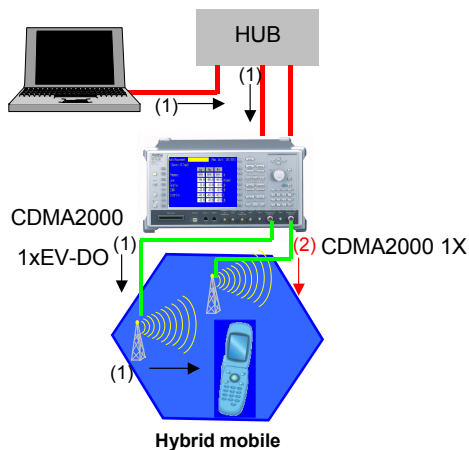
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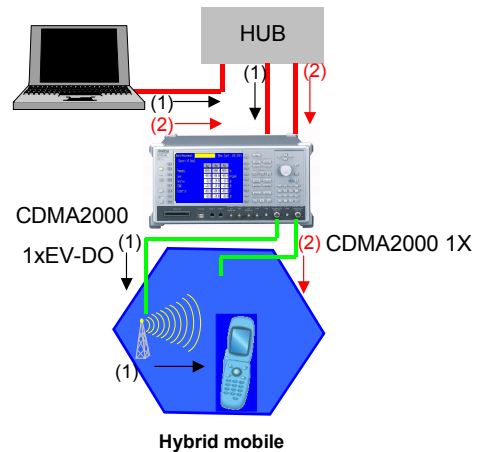
## Overview of Synchronous Mode (Hybrid)

### ■Voice Call Test Function during 1xEV-DO Data Communications

### ■Hand-down Function Test



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.



1. Use the hybrid mobile to start downloading data from the Server PC.  
After starting downloading, send the disconnect signal (off).
2. When a SO33 connection is made at the CDMA2000 1x side, data can continue to be downloaded from the Server PC.

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