

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-09, MX882050A-11)

Version 4.00
March 2006



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1. Key Features of the MX882000B W-CDMA Measurement Software

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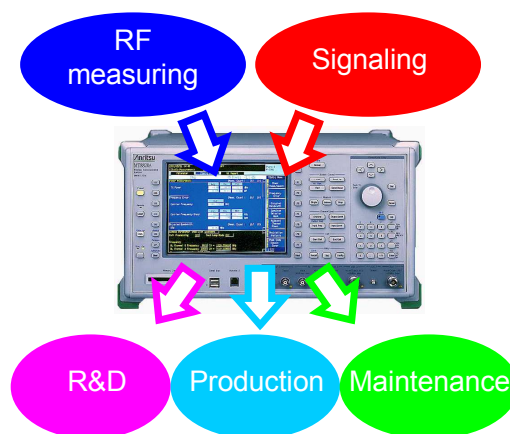
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Key Features of the MX882000B W-CDMA Measurement Software

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.



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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

Voice
Audio & visual
Packet
Test loop mode

Many connection modes

Sequence Monitor Screen

Measurement result screen

TRX measurement of UE
Measurement report from UE on the screen

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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

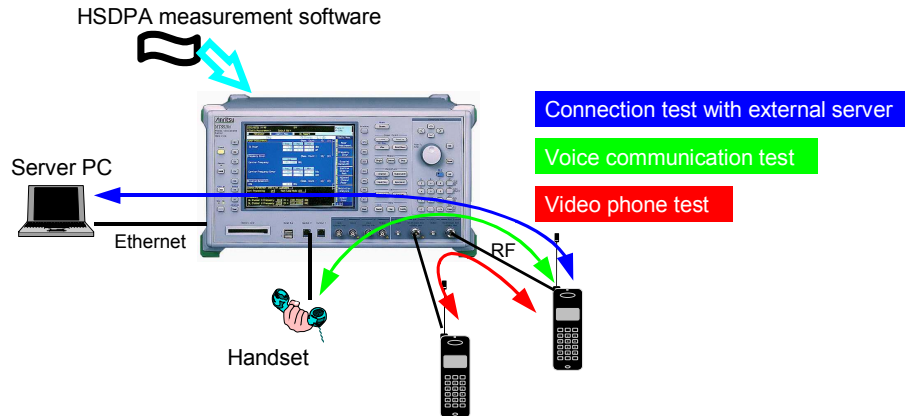
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Key Features of the MX882000B W-CDMA Measurement Software

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

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

√√: Supported √: Requires external equipment (SPA or SG)

Key Specifications of the MX882000B W-CDMA Measurement Software

Supported RX measurements

	Item	comment	
6	Receiver Characteristics		
6.2	Reference Sensitivity Level		√√
6.3	Maximum Input Level		√√
6.4	Adjacent Channel Selectivity (ACS)	Requires SG	√
6.5	Blocking Characteristics	Requires SG	√
6.6	Spurious Response	Requires SG	√
6.7	Intermodulation Characteristics	Requires SG	√
6.8	Spurious Emissions	Requires SPA	√

√√: Supported √: Requires external equipment (SPA or SG)

3. Measurement Functions of the MX882000B W-CDMA Measurement Software

Measurement Functions of the MX882000B W-CDMA Measurement Software

Multiple simultaneous measurements in the fundamental measurement screen

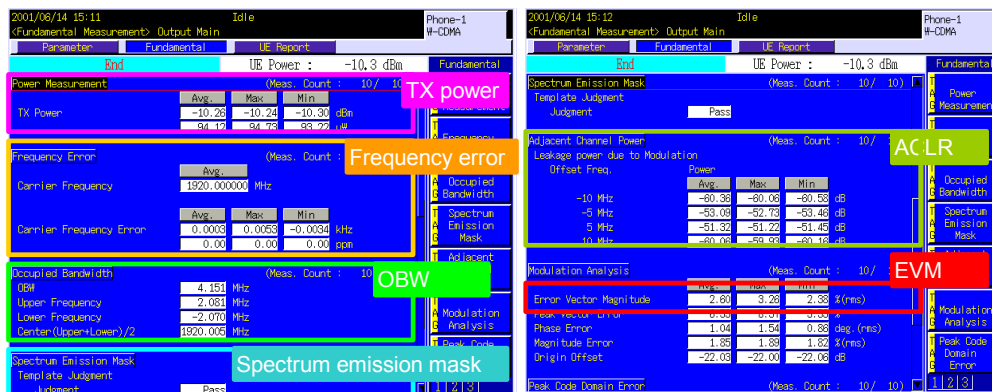
The following TRX measurements are performed rapidly at the same time:

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

Measurement Functions of the MX882000B W-CDMA Measurement Software

Multiple simultaneous measurements in the fundamental measurement screen

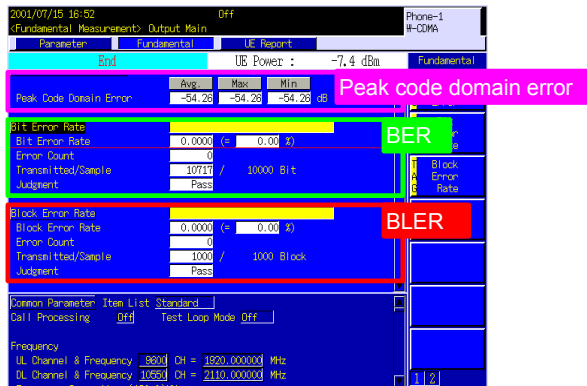
Measurement result screen (1)



Measurement Functions of the MX882000B W-CDMA Measurement Software

Multiple simultaneous measurements in the fundamental measurement screen

Measurement result screen (2)



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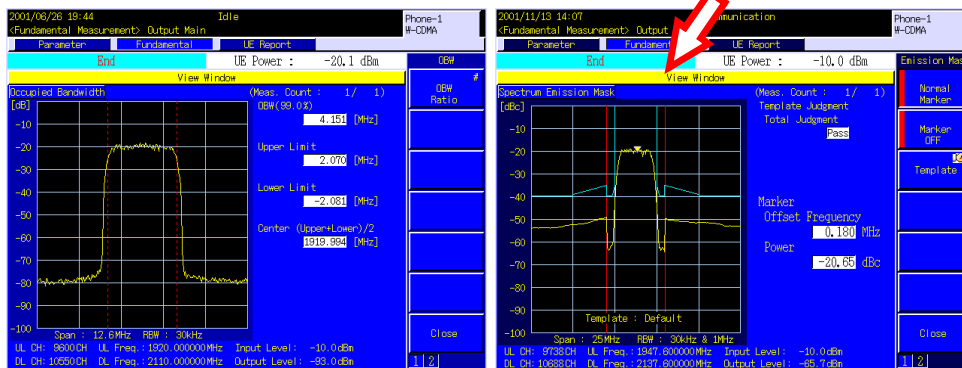
Measurement Functions of the MX882000B W-CDMA Measurement Software

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

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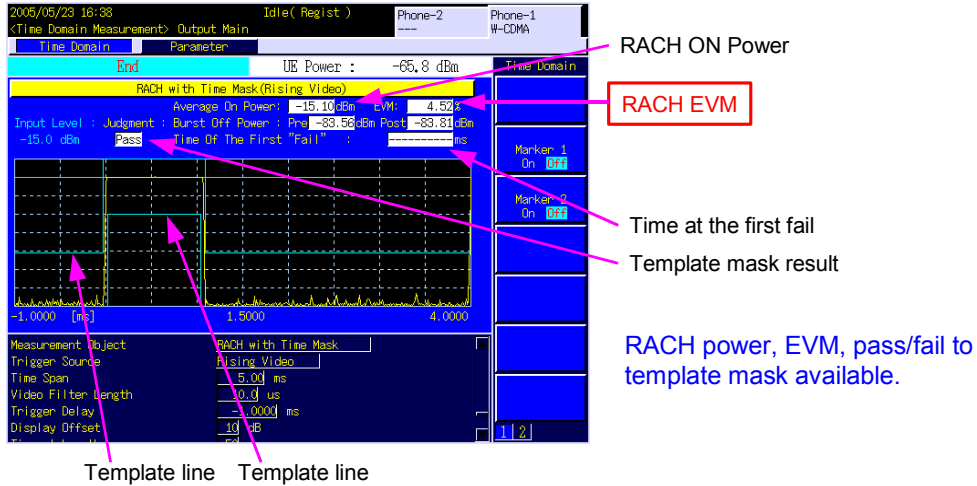
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Measurement Functions of the MX882000B W-CDMA Measurement Software

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)



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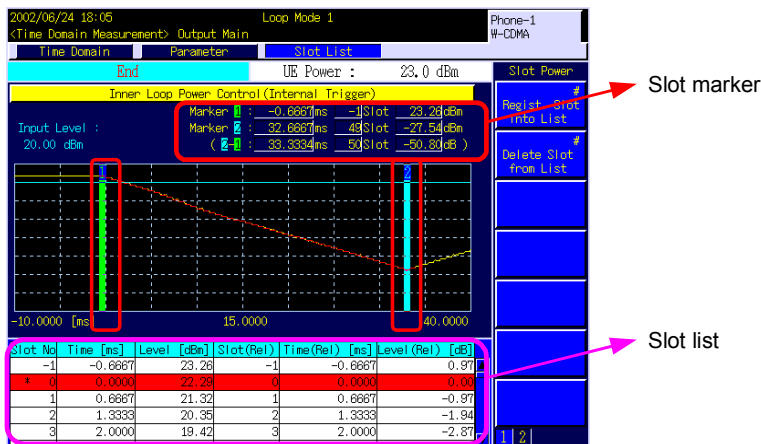
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Measurement Functions of the MX882000B W-CDMA Measurement Software

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



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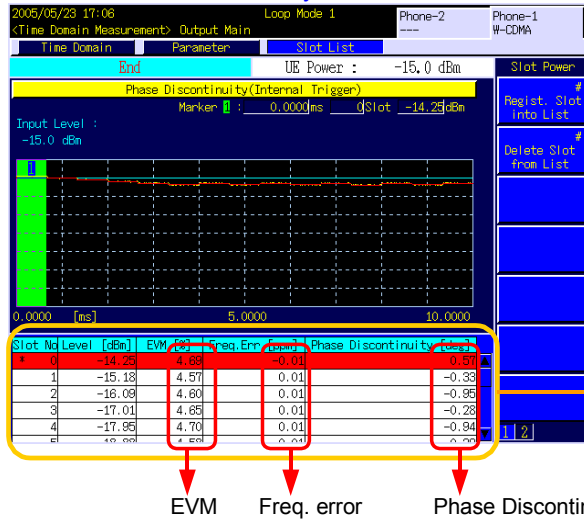
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Measurement Functions of the MX882000B W-CDMA Measurement Software

Modulation accuracy of consecutive slots

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

Phase Discontinuity Measurement



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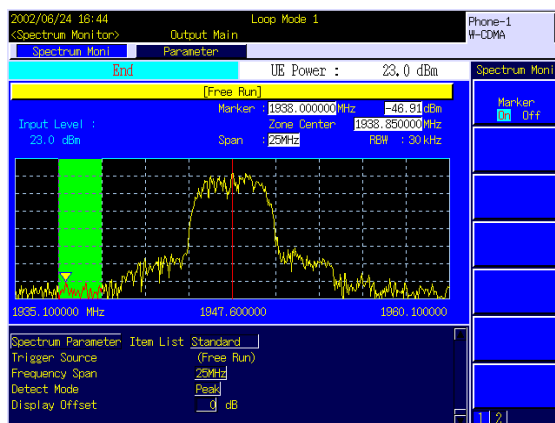
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Measurement Functions of the MX882000B W-CDMA Measurement Software

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



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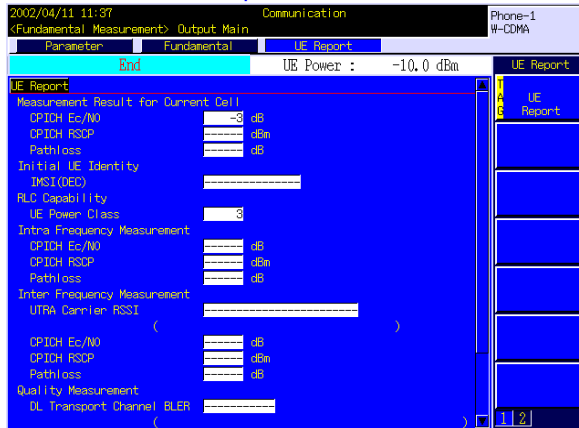
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Measurement Functions of the MX882000B W-CDMA Measurement Software

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.

UE Report Screen



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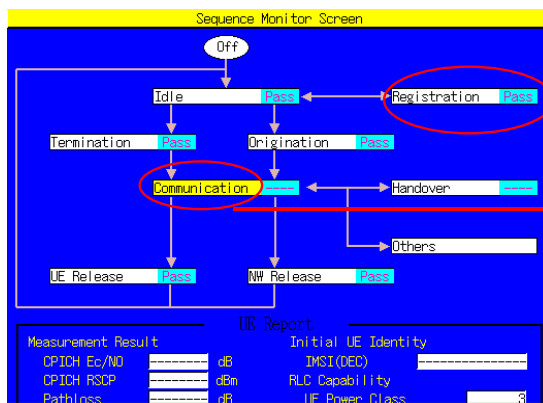
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Measurement Functions of the MX882000B W-CDMA Measurement Software

Call processing testing

This function is helpful to check the test results of the call processing sequence.

Sequence Monitor Screen



- Test items
- Location registration
 - Origination
 - Termination
 - Disconnection from UE
 - Disconnection from network
 - Hard hand over

Registration Pass

Pass/Fail judge

Current status (yellow)

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Measurement Functions of the MX882000B W-CDMA Measurement Software

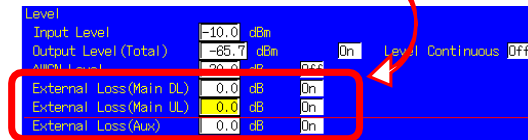
Other Functionality

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



4. MX882000B-01 W-CDMA Voice CODEC

MX882000B-01 W-CDMA Voice Codec

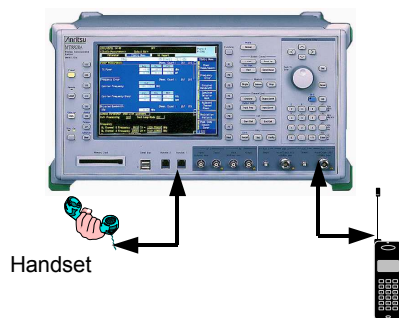
Overview

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.

MX882000B-01 W-CDMA Voice Codec

Live end-to-end communication test

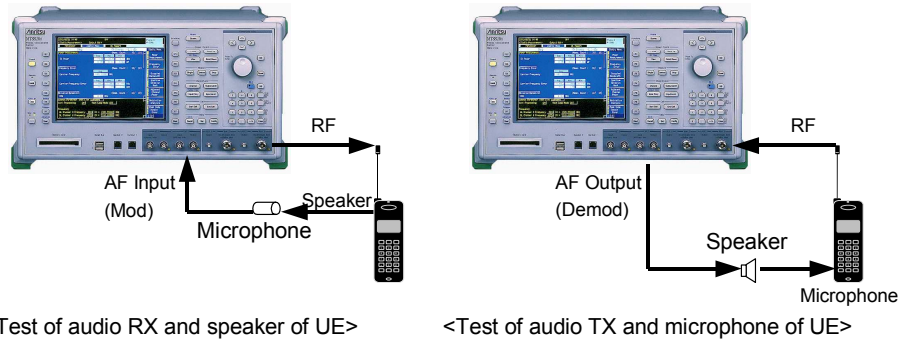
Live end-to-end communication test between a UE and the MT8820A is done by connecting a handset to the MT8820A RJ11 connector.



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.



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

Specifications

Voice codec	AMR 12.2 kbps
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 μ V (≤ 500 mVpeak), 10 μ V (≤ 50 mVpeak) Accuracy: ± 0.2 dB (≥ 10 mVpeak, ≥ 50 Hz), ± 0.3 dB (≥ 10 mVpeak, < 50 Hz) Waveform distortion: ≤ 30 kHz band ≥ -60 dB (≥ 500 mV peak, ≤ 5 kHz), ≤ -54 dB (≥ 70 mVpeak) Output impedance: $\leq 1\Omega$ Max. output current: 100 mA
AF input	Frequency range: 50 Hz to 10 kHz Input voltage range: 1 mVpeak to 5 Vpeak (AF Input connector) Max. allowable input voltage: 30 Vrms Input impedance: 100 k Ω
Frequency measurement	Accuracy: Reference oscillator accuracy + 0.5 Hz
Level measurement	Accuracy: ± 0.2 dB (≥ 10 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)

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5. MX88205xA-02 W-CDMA External Packet Data

MX882000B-01 W-CDMA External Packet Data

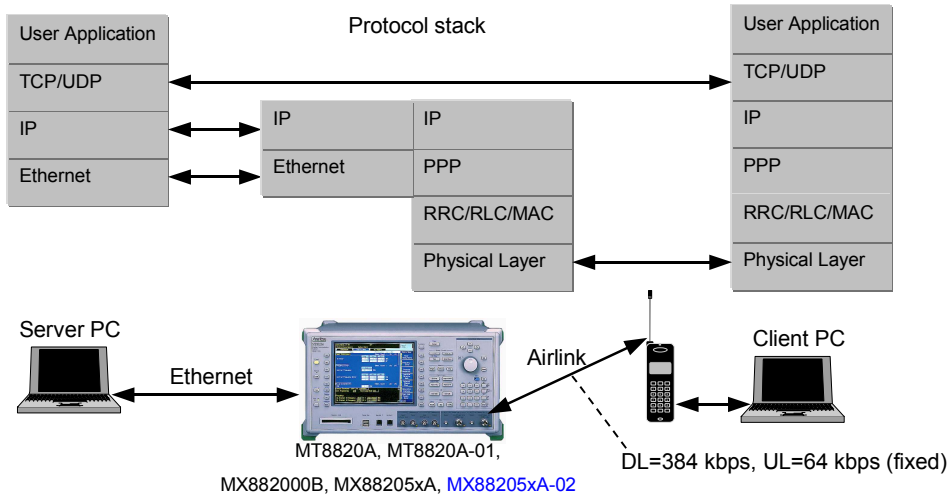
Overview

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.

MX882000B-01 W-CDMA External Packet Data

PPP packet data

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.



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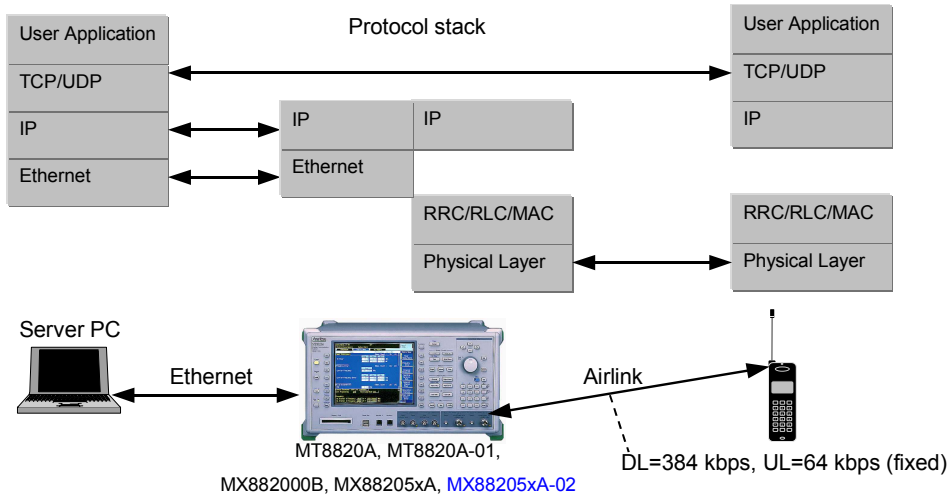
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MX882000B-01 W-CDMA External Packet Data

IP 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.



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MX882000B-01 W-CDMA External Packet Data

Specifications

MX88205xA-02 W-CDMA external packet data

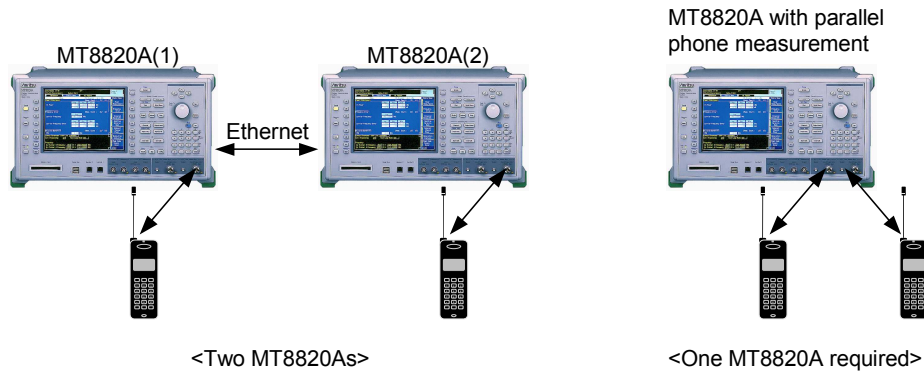
Ethernet	10BASE-T
Data Rate	Downlink: 384 kbps, Uplink: 64 kbps
Server IP Address	0.0.0.0 to 255.255.255.255
Client IP Address	0.0.0.0 to 255.255.255.255
Channel Coding	Interactive or background / UL: 64 DL: 384 kbps / PS RAB
DTCH Data pattern	External PPP Packet, External IP Packet

6. MX88205xA-03 W-CDMA Video Phone Test

MX88205xA-03 W-CDMA Video Phone Test

Outline

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.



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MX88205xA-03 W-CDMA Video Phone Test

Specifications

MX88205xA-03 W-CDMA Video Phone Test

Ethernet	10BASE-T
Data Rate	Downlink: 64 kbps, Uplink: 64 kbps
Channel Coding	Conversation / Unknown / UL: 64 DL: 64 kbps / CS RAB

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7. MX882000B-11 HSDPA Measurement Software

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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

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MX882000B-11 HSDPA Measurement Software

Features

- Upgrade via software only^(Note1)
- Transmit and receive HSDPA physical channels
Support Fixed Reference Channel specified in 3GPP
(FRC is used for HSDPA TRX measurement)
- HSDPA TRX measurement^(Note2)
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

(Note1) The MX882050A is required to integrate MX882000B-11.

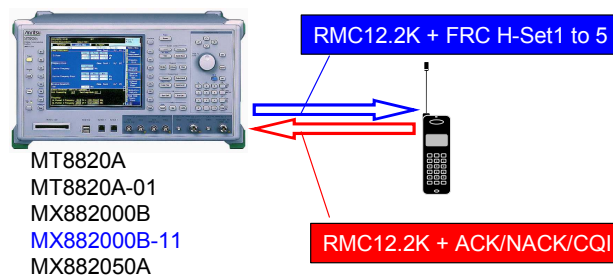
The MX882000B and MX882050A of V4.20 or later is required to integrate MX882000B-11.

(Note2) Planned to support the some measurement items after finalized in 3GPP TS34.121 (Sep 2005).

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.



MX882000B-11 HSDPA Measurement Software

Supported TRX measurements

The MT8820A supports the TRX measurement items shown below.

Measurement items (TS 34.121)	MX882000B-11 v4.30	Note
5.2A Maximum Output Power with HS-DPCCH	Supported	
5.7A HS-DPCCH	Supported	
5.9A Spectrum Emission Mask with HS-DPCCH	Supported	
5.10A Adjacent Channel Leakage Power Ratio with HS-DPCCH	Supported	
5.13.1A Error Vector Magnitude with HS-DPCCH	Supported	Temporary supported. Not finalized yet in TS 34.121 2005-10
6.3A Maximum Input Level for HS-PDSCH Reception (16QAM)	Supported	

MX882000B-11 HSDPA Measurement Software

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.

Parameter	Fundamental	UE Report
Bit Error Rate	0.0000 (= 0.00 %)	
Error Count	0.00E+00	
Transmitted/Sample	10717 / 10000 Bit	
Judgment	Pass	
Block Error Rate	0.0000 (= 0.00 %)	
Error Count	0.00E+00	
Transmitted/Sample	200 / 200 Block	
Judgment	Pass	
HSDPA Throughput	2332 kbps	
Throughput	0.0000 (= 0.00 %)	
Block Error Rate	0.00E+00	
Error Count	(NACK: 0 DTX: 0)	
Transmitted/Sample	1000 / 2000 Block	
Judgment	Pass	

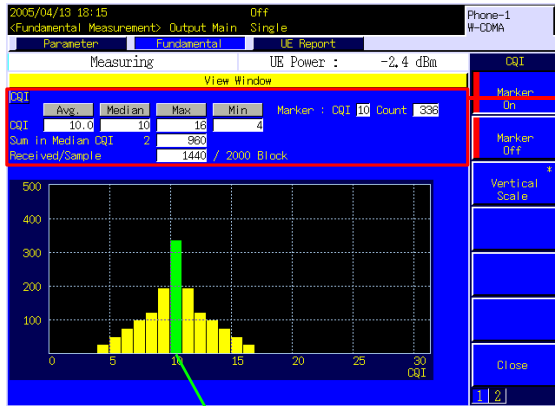
Throughput (kbps) and block error measurement

Type of error, NACK or DTX

MX882000B-11 HSDPA Measurement Software

CQI measurement

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

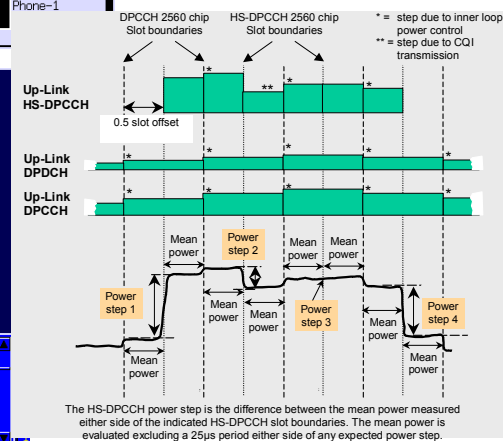
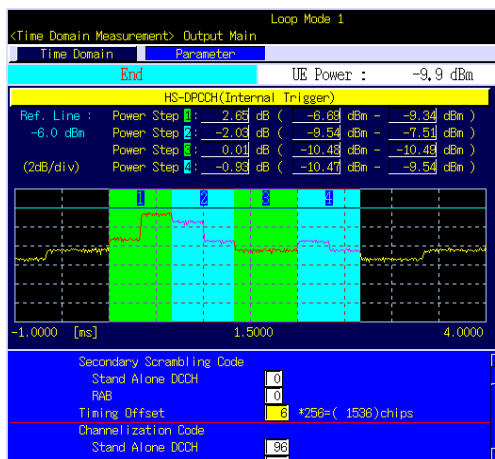
- Average
- Median
- Maximum
- Minimum
- Number of CQI samples within the specified range centered in median value
- Number of received samples

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

MX882000B-11 HSDPA Measurement Software

HS-DPCCH (Power versus Time)

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.

The screenshot displays the software interface with two main panels. The left panel shows measurement results for 'Fundamental' and 'Adjacent Channel Power'. The right panel shows 'HSDPA' call processing parameters.

Measurement Results (Left Panel):

- UE Power: 17.9 dBm
- Occupied Bandwidth: 4.140 MHz
- Upper Frequency: 2.070 MHz
- Lower Frequency: -2.070 MHz
- Center (Upper+Lower)/2: 1950.000 MHz
- Spectrum Emission Mask: Pass
- Adjacent Channel Power (Leakage power due to Modulation):

Offset Freq.	Avg.	Max.	Min.
-10 MHz	-55.36	-55.36	-55.36
-5 MHz	-48.75	-48.75	-48.75
5 MHz	-48.83	-48.83	-48.83
10 MHz	-56.32	-56.32	-56.32

- Modulation Analysis: Error Vector Magnitude: 3.53

HSDPA Call Processing Parameters (Right Panel):

- CQI Feedback Cycle: 4 ms
- UE Identity: 00000000
- Max. Number of HARQ Transmission: 1
- Redundancy and Constellation Version: 8 2 1 5
- Delta ACK: 8
- Delta NACK: 8
- Delta CQI: 8
- Ack-Nack Repetition Factor: 8
- CQI Repetition Factor: 8
- Measurement Power Offset: 0 X 0.5dB

Annotations with red arrows point to:

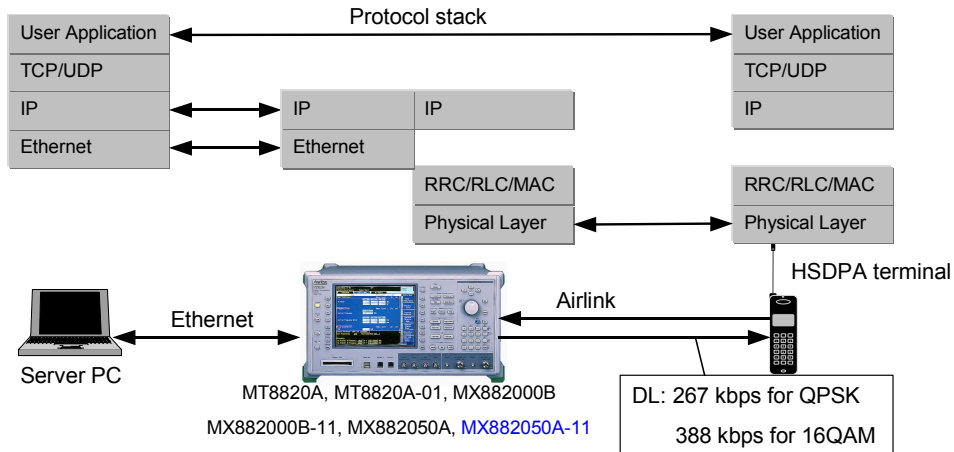
- Spectrum Emission Mask (SEM) with HS-DPCCH
- Adjacent Channel Power (ACLR) with HS-DPCCH
- HSDPA call processing parameters

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.



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MX882050A-11 HSDPA External Packet Data

Specifications

MX882050A-11 HSDPA External Packet Data

Ethernet	10BASE-T
Data rate	Downlink: 267 kbps maximum for QPSK, 388 kbps maximum for 16QAM Uplink: 64 kbps
Server IP address	0.0.0.0 to 255.255.255.255
Client IP address	0.0.0.0 to 255.255.255.255
Channel coding	Interactive or background/UL: 64 DL: 267 kbps/PS RAB for QPSK, 388 kbps/PS RAB for 16QAM
DTCH data pattern	External IP packet

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

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9. MX882050A-09 W-CDMA Band IX

MX882050A-09 W-CDMA Band IX

Outline

The MX882050A-09 W-CDMA Band IX option is capable of sending the broadcast message specified in 3GPP Band IX. A registration and call connection in Band IX can be established with this option.

MX882050A-09 W-CDMA Band IX

Parameters

Parameter settings

Frequency			
UL Channel & Frequency	8762	CH =	1752.400000 MHz
DL Channel & Frequency	9237	CH =	1847.400000 MHz
Frequency Separation			(95.0) MHz
Band Indicator	Band IX		
SIB5 Type	SIB5bis		

"Band IX" is available.

"Auto", "SIB5" and "SIB5bis" are available. When the MX882050A-09 is not installed, only "Auto" is available.

By setting "Band IX", a registration and call connection in Band IX can be established. In case of disconnecting a call after handover from another band to Band IX, the UE does not go out of service.

When "Auto" is selected, the MT8820A determines the SIB5 type according to the band indicator. For example, when the SIB5 type is set to "Auto" and the band indicator to "Band IX", a broadcast message with SIB 5bis is sent. When the MX882050A-09 is installed, SIB 5 or SIB 5bis can be specified.



Specifications are subject to change without notice.

ANRITSU CORPORATION

5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan
 Phone: +81-46-223-1111
 Fax: +81-46-296-1264

● **U.S.A.****ANRITSU COMPANY****TX OFFICE SALES AND SERVICE**

1155 East Collins Blvd., Richardson, TX 75081, U.S.A.
 Toll Free: 1-800-ANRITSU (267-4878)
 Phone: +1-972-644-1777
 Fax: +1-972-644-3416

● **Canada****ANRITSU ELECTRONICS LTD.**

700 Silver Seven Road, Suite 120, Kanata,
 ON K2V 1C3, Canada
 Phone: +1-613-591-2003
 Fax: +1-613-591-1006

● **Brasil****ANRITSU ELETRÔNICA LTDA.**

Praca Amadeu Amaral, 27 - 1 andar
 01327-010 - Paraiso, Sao Paulo, Brazil
 Phone: +55-11-3283-2511
 Fax: +55-11-3886940

● **U.K.****ANRITSU LTD.**

200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.
 Phone: +44-1582-433280
 Fax: +44-1582-731303

● **Germany****ANRITSU GmbH**

Nemetschek Haus Konrad-Zuse-Platz 1 81829
 München, Germany
 Phone: +49 (0) 89 442308-0
 Fax: +49 (0) 89 442308-55

● **France****ANRITSU S.A.**

9, Avenue du Québec Z.A. de Courtabœuf 91951 Les
 Ulis Cedex, France
 Phone: +33-1-60-92-15-50
 Fax: +33-1-64-46-10-65

● **Italy****ANRITSU S.p.A.**

Via Elio Vittorini, 129, 00144 Roma EUR, Italy
 Phone: +39-06-509-9711
 Fax: +39-06-502-2425

● **Sweden****ANRITSU AB**

Borgafjordsgatan 13 164 40 Kista, Sweden
 Phone: +46-853470700
 Fax: +46-853470730

● **Finland****ANRITSU AB**

Teknobulevardi 3-5, FI-01530 Vantaa, Finland
 Phone: +358-9-4355-220
 Fax: +358-9-4355-2250

● **Denmark****Anritsu AB Danmark**

Korskildelund 6 DK - 2670 Greve, Denmark
 Phone: +45-36915035
 Fax: +45-43909371

● **Singapore****ANRITSU PTE LTD.**

10, Hoe Chiang Road #07-01/02, Keppel Towers,
 Singapore 089315
 Phone: +65-6282-2400
 Fax: +65-6282-2533

● **Hong Kong****ANRITSU COMPANY LTD.**

Suite 923, 9/F., Chinachem Golden Plaza, 77 Mody
 Road, Tsimshatsui East, Kowloon, Hong Kong, China
 Phone: +852-2301-4980
 Fax: +852-2301-3545

● **P. R. China****ANRITSU COMPANY LTD.****Beijing Representative Office**

Room 1515, Beijing Fortune Building, No. 5 North
 Road, the East 3rd Ring Road, Chao-Yang District
 Beijing 100004, P.R. China
 Phone: +86-10-6590-9230

● **Korea****ANRITSU CORPORATION**

8F Hyun Juk Bldg. 832-41, Yeoksam-dong,
 Kangnam-ku, Seoul, 135-080, Korea
 Phone: +82-2-553-6603
 Fax: +82-2-553-6604

● **Australia****ANRITSU PTY LTD.**

Unit 3/170 Forster Road Mt. Waverley, Victoria, 3149,
 Australia
 Phone: +61-3-9558-8177
 Fax: +61-3-9558-8255

● **Taiwan****ANRITSU COMPANY INC.**

7F, No. 316, Sec. 1, NeiHu Rd., Taipei, Taiwan
 Phone: +886-2-8751-1816
 Fax: +886-2-8751-1817

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