

MX882000B

W-CDMA Measurement Software



Supports Third Generation W-CDMA Mobile Communications Systems

MX882000B

W-CDMA Measurement Software

Advanced High-Speed Measurement Method and Batch Measurement Supporting the Manufacture of W-CDMA Terminals

The MX882000B W-CDMA Measurement Software (requires MX88205xA W-CDMA Call Processing Software) is designed for mobile terminal transmission and reception measurements of the W-CDMA system that supports the third generation digital mobile communications. With the MX882000B W-CDMA and MX882001A GSM Measurement Softwares installed in the MT8820A main frame, the user can fully evaluate the major transmission and reception characteristics of representative digital mobile terminals used in Europe. Moreover, the addition of the MX882071A W-CDMA Ciphering Software (requires MX882051A W-CDMA Call Processing Software) can perform the connection test of cipher communication between the MT8820A and a W-CDMA mobile terminal. Advanced DSP and parallel measurement technologies dramatically reduce wireless manufacturing and inspection test time. Furthermore, several measurement items can be selected freely for batch measurement.

A one-touch operation also allows for each selected batch measurement item to be executed repeatedly for the designated number of times. Pass/fail evaluation of the main measurement items including transmission frequency, modulation accuracy, output power, spectrum emission mask, adjacent

channel leakage power, occupied frequency bandwidth and BER, can be performed easily and quickly.

The built-in GPIB interface enables MT8820A to be integrated into automated production lines as well as to configure an automated test system for after-sales maintenance.

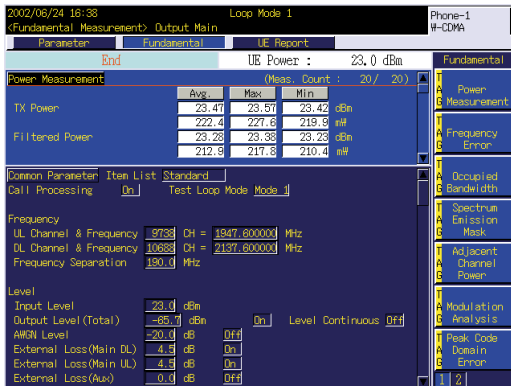
Tests	3GPP TS34.121	Test items
Transmitter tests	5.2	Max. output power
	5.3	Frequency error
	5.4.1	Open loop power control
	5.4.2	Close loop power control
	5.4.3	Min. transmission power
	5.5.1	Transmission off power
	5.8	Occupied bandwidth (OBW)
	5.9	Spectrum emission mask
	5.10	Adjacent channel leakage power ratio (ACLR)
	5.13.1	Error vector magnitude (EVM)
Receiver tests	5.13.2	Peak code domain error
	6.2	Reference sensitivity level
	6.3	Max. input level
Performance test	7.2.1	DCH demodulation



Transmitter Tests

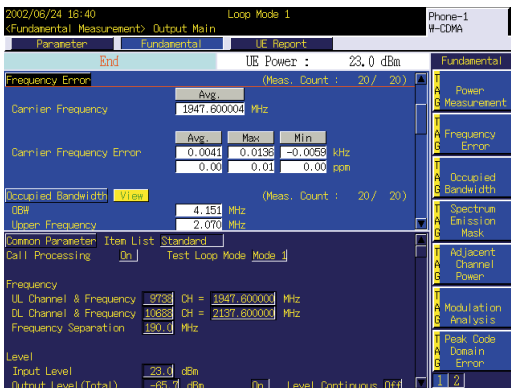
Output Power

This test measures the output power of the W-CDMA terminal with the power controlled to maximum, minimum and any other level. When the number of measurements is set to two or more, the max., average, and min. values of the result are displayed, providing evaluation of the terminal randomness. This repeat measurement function is also supported for other measurements.



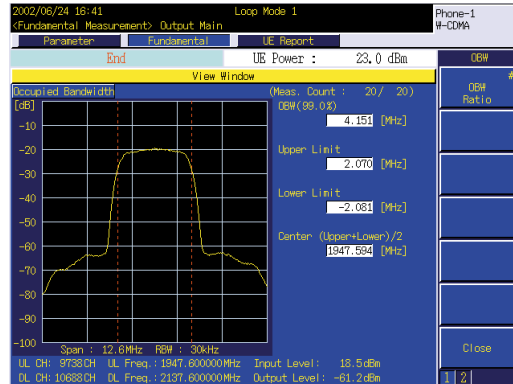
Frequency Error

This test measures the frequency error of the W-CDMA terminal. The absolute error (kHz) and relative error (ppm) can be measured and displayed simultaneously.



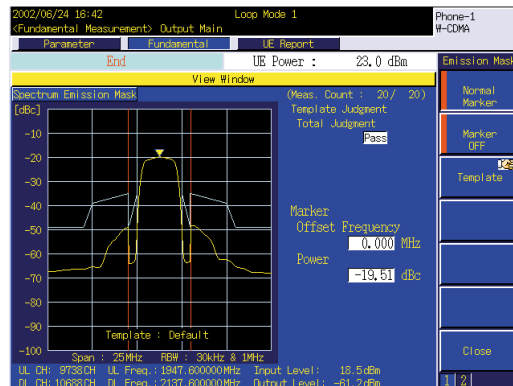
Occupied Bandwidth

This test measures the occupied frequency bandwidth of the W-CDMA terminal. The ratio of the frequency bandwidth to the total power can be changed in a range of 80.0% to 99.9%.



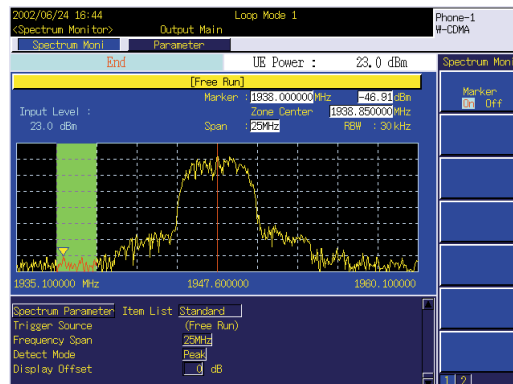
Spectrum Emission Mask

This function performs pass/fail evaluation of the W-CDMA terminal spectrum emission mask. Frequency components are checked within ± 12.5 MHz of the center frequency comparing with the specified limits of the template.



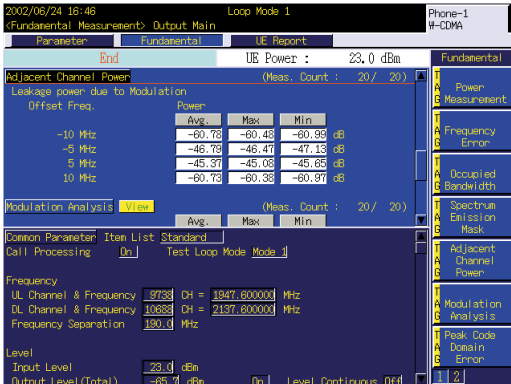
Spectrum Monitor

It is possible to monitor an uplink RF signal spectrum with a center frequency in a range of ± 2.5 MHz or ± 12.5 MHz. The zone marker function facilitates the detection of maximum spectrum level in the zone.



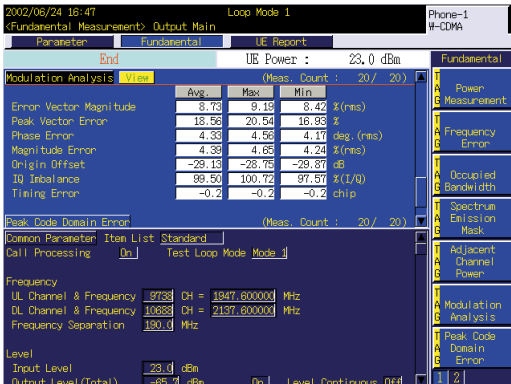
Adjacent Channel Leakage Power

This test measures the adjacent channel leakage power of the W-CDMA terminal. The leakage power at points ± 5 and ± 10 MHz from the center frequency can be measured at high speed using the advanced measurement architecture.

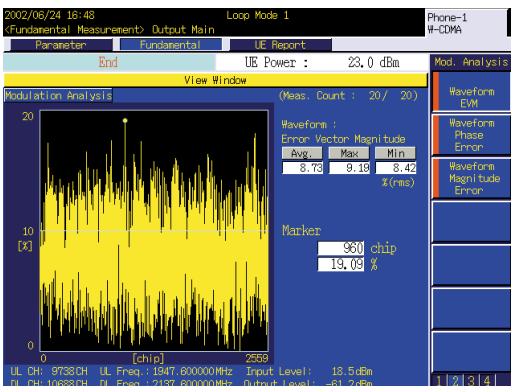


Modulation Analysis

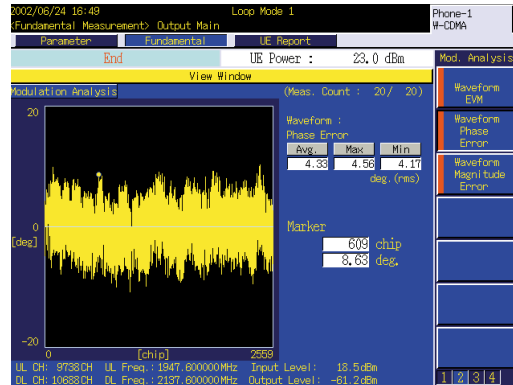
This test performs modulation analysis of the W-CDMA terminal. In addition to the error vector magnitude (EVM) specified in the 3GPP measurement items, the phase error, amplitude error, origin offset and I/Q level ratio can also be measured.



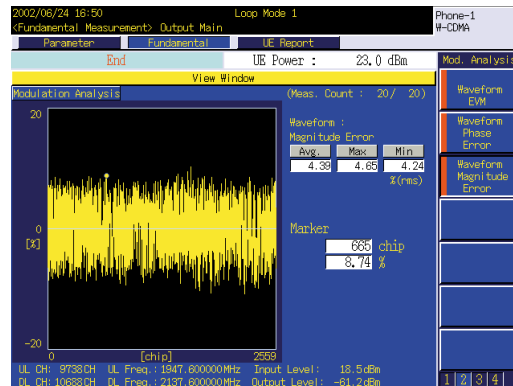
Vector error, phase error and amplitude error can be displayed in waveform. This function is useful for R&D, repair and maintenance purposes.



Vector error waveform



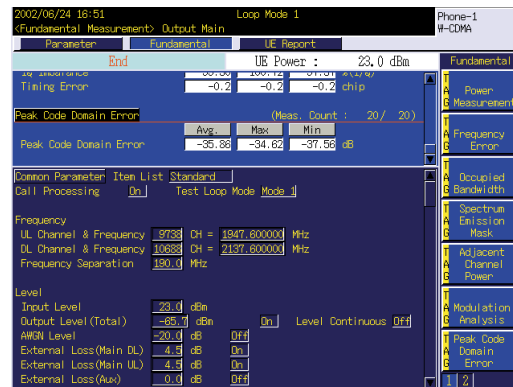
Phase error waveform



Amplitude error waveform

Peak Code Domain Error

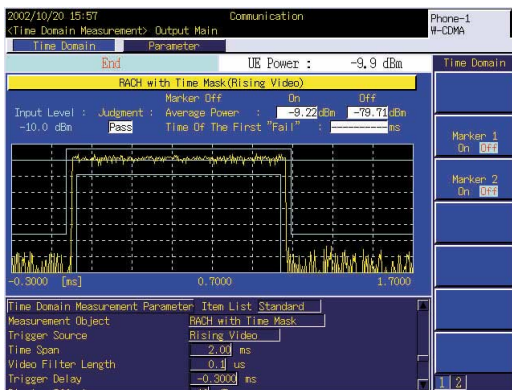
The test measures the peak code domain error of the W-CDMA terminal.



Open Loop Power Control

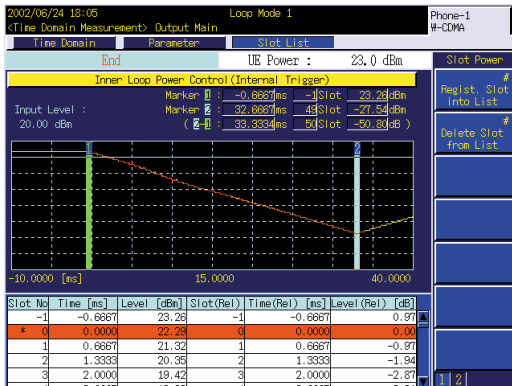
Transmission level for RACH*1 preamble of a W-CDMA terminal is determined by the down link RF signal level and RACH-related parameter of call processing. Time domain measurement can perform transmission level measurement of RACH preamble and template mask evaluation simultaneously.

*1: Random Access Channel



Close Loop Power Control

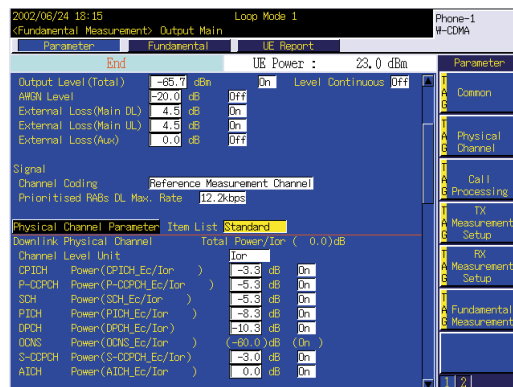
It is possible to transmit any particular TPC (Transmission Power Control) bit row to a W-CDMA terminal. Terminal's transmission power response to power control can be monitored on the Time Domain Measurement screen, and transmission power for max. 164 slots can be measured at high speed in a batch.



Down Link RF Signal Generation Function

The relative level for each of the CPICH*1, P-CCPCH*2, SCH*3, PICH*4, DPCH*5, S-CCPCH*6, and AICH*7 code channels can be set in a range of -30.0 to 0.0 dB. In addition, OCNS*8 and AWGN*9 are also provided, enabling to generate any down link modulation signal required for transmitter and receiver tests. The RF output level can be set in 0.1 dB steps across a range of -140 to -10 dBm (MAIN I/O connectors).

- *1: Common Pilot Channel
- *2: Primary Common Control Physical Channel,
- *3: Synchronization Channel
- *4: Paging Indicator Channel
- *5: Dedicated Physical Channel
- *6: Secondary Common Control Physical Channel
- *7: Acquisition Indication Channel
- *8: Orthogonal Channel Noise Simulator,
- *9: Additive White Gaussian Noise



Receiver Tests

Bit Error Rate Measurement

Bit error rate can be measured by the loopback test mode specified in the 3GPP standards. In addition, bit error rate can also be measured by directly inputting the demodulated data and clock signals from a W-CDMA terminal when the W-CDMA terminal test is executed. Either PN9 or PN15 can be selected for data pattern inserted in the down link RF signal.

Parameter	Fundamental	UE Report	Fundamental
2002/06/24 18:22 Loop Mode 1 Phone-1 W-CDMA			
UB Power : 23.1 dBm			
Bit Error Rate			
Bit Error Rate	0.0000 (= 0.00 %)		Bit Error Rate
Error Count	0		
Transmitted/Sample	10717 / 10000 Bit		
Judgment	Pass		
Common Parameter Item List Standard			
Call Processing	On	Test Loop Mode	Mode 1
Frequency			
UL Channel & Frequency	9738 CH = 1847.600000 Mhz		
DL Channel & Frequency	10688 CH = 2137.600000 Mhz		
Frequency Separation	190.0 Mhz		
Level			
Input Level	20.0 dBm		
Output Level (Total)	-108.0 dBm On Level Continuous Off		
AWGN Level	-20.0 dB Off		
External Loss (Main DL)	4.5 dB On		
External Loss (Main UL)	4.5 dB On		
Output Level	= -108.0 dBm		

Performance Tests

Block Error Rate Measurement

Block error rate is measured based on the test loop mode 2, enabling to perform the DCH*1 demodulation tests in accordance with the 7.2.1 of the 3GPP standards TS34.121.

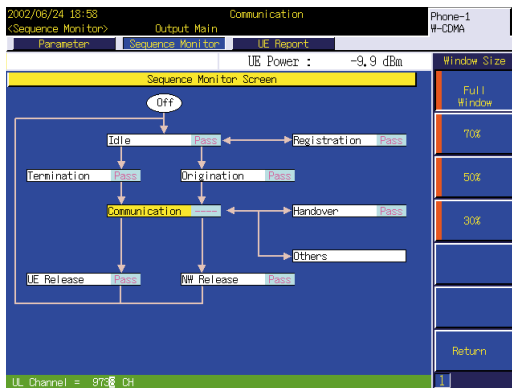
*1: Dedicated Channel

Parameter	Fundamental	UE Report	Fundamental
2002/06/24 18:53 Loop Mode 2 Phone-1 W-CDMA			
UB Power : 23.0 dBm			
Block Error Rate			
Block Error Rate	0.0000 (= 0.00 %)		Block Error Rate
Error Count	0		
Transmitted/Sample	1000 / 1000 Block		
Judgment	Pass		
Output Level (Total) = -81.0 dBm On Level Continuous Off			
AWGN Level	-1.0 dB On		
External Loss (Main DL)	4.5 dB On		
External Loss (Main UL)	4.5 dB On		
External Loss (Aux)	0.0 dB Off		
Signal			
Channel Coding	Reference Measurement Channel		
Prioritised PABs DL Max. Rate	12.2 kbps		
Physical Channel Parameter Item List Standard			
Downlink Physical Channel Total Power/Tot (0.0)dB			
Channel Level Unit			
CPICH Power (P-CPICH_Ec/Ior)	-3.3 dB On		
P-CPICH Power (P-CPICH_Ec/Ior)	-5.3 dB On		

Call Processing Function

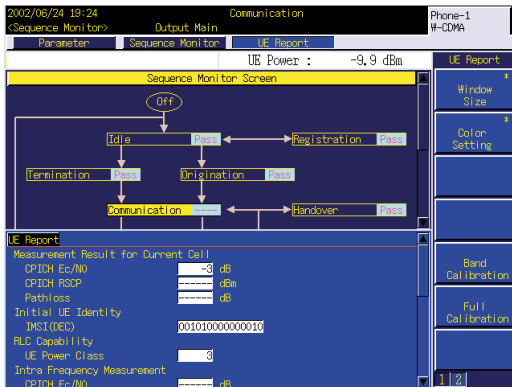
Connection Tests

The call processing function performs various connection tests such as registration, origination, termination, hand-over, disconnection from terminal and disconnection from network. In addition, the voice signal from the terminal can be echoed-back during conversation to perform a simple voice communications test.



Terminal Monitor

This function enables to periodically monitor the W-CDMA terminal transmission power level and power class.



High-speed and Easy-to-use GPIB Control

Minimized Screen Changes

Measurement parameters can be easily viewed and changed regardless of the screen settings. Screen changes are kept therefore to a minimum to speed up the measurement time.

Measurement Results Batch Read Command

All the results of a batch measurement can be read using the single "ALLMEAS?" command. Specific measurement results can be selected and reported by specifying the measurement items, for example "ALLMEAS? MOD" (for modulation analysis). The load on the GPIB bus of both the MT8820A and the control PC has been lightened and measurement throughput is increased by reducing the number of GPIB commands. Moreover, the number of steps in the control program has been reduced, facilitating to write comprehensible and maintainable remote control programs.

Specifications

• **MT8820A-01 W-CDMA Measurement Hardware, MX882000B W-CDMA Measurement Software, MX88205xA W-CDMA Call Processing Software**

Modulation analysis	<p>Frequency: 300 to 2200 MHz Input level: -30 to +35 dBm (MAIN) Carrier frequency accuracy: Reference oscillator accuracy + 10 Hz Modulation accuracy (residual vector error): $\leq 2.5\%$ (at input of 1-DPCCH and 1-DPDCH)</p>
RF power	<p>Frequency: 300 to 2200 MHz Input level: -65 to +35 dBm (MAIN) 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 Linearity: ± 0.2 dB (-40 to 0 dB, ≥ -55 dBm), ± 0.4 dB (-40 to 0 dB, ≥ -65 dBm) Measurement object: DPCH, PRACH</p>
Occupied bandwidth	<p>Frequency: 300 to 2200 MHz Input level: -10 to +35 dBm (MAIN)</p>
Adjacent channel leakage power	<p>Frequency: 300 to 2200 MHz Input level: -10 to +35 dBm (MAIN) Measurement points: ± 5 MHz, ± 10 MHz Measurement range: ≥ 50 dB (at ± 5 MHz), ≥ 55 dB (at ± 10 MHz)</p>
RF signal generator	<p>Output frequency: 300 to 2200 MHz (1 Hz step) Channel level (CPICH, P-CCPCH, SCH, PICH, DPCH, S-CCPCH, AICH): Off, -30.0 to 0.0 dB [0.1dB step, relative level for Ior (total level)] Channel level (OCNS): Auto-setting Channel level accuracy: ± 0.2 dB (relative level accuracy for Ior) AWGN level: Off, -20 to +5 dB (0.1 dB step) AWGN level accuracy: ± 0.2 dB (relative level accuracy for Ior)</p>
Bit error rate measurement	<p>Functions: Insert PN9 or PN15 pattern in DTCH Measurement items: BER, BLER Measurement objective: Loop-back data imposed on uplink DTCH (BER, BLER), serial data inputted from rear-panel call processing I/O port (BER)</p>
Call processing	<p>Origination control: Registration, origination, termination, handover, disconnection from network, disconnection from mobile station (executes each processing conforming to 3GPP standards and performs pass/fail evaluation) Mobile station control: Output level, loop-back (executes each mobile function control conforming to 3GPP standards)</p>

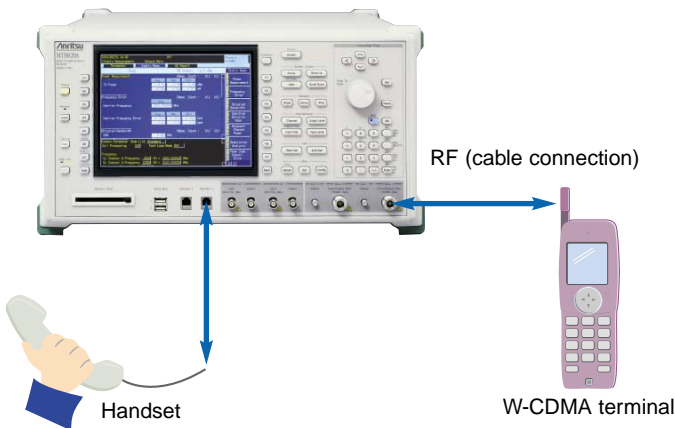
MX882000B-01 W-CDMA Voice Codec

Real-time Voice Encoding and Decoding Audio Measurement Function

The MX882000B-01 W-CDMA Voice Codec is optional software that brings real-time voice encoding and decoding to the W-CDMA Measurement Software. The installation of this option and MT8820A Option11 Audio Board enables end-to-end communication testing with a handset. Also, transmission/reception audio measurement is performable in call processing state.

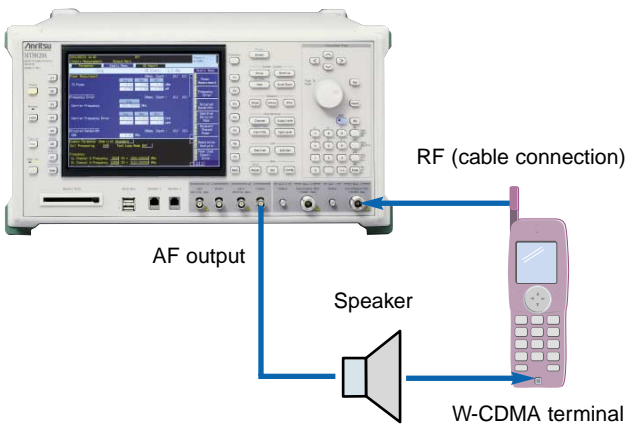
End-to-end Communications Testing

Connection of a handset to the MT8820A RJ11 connector enables end-to-end communications testing between the MT8820A and a mobile terminal.



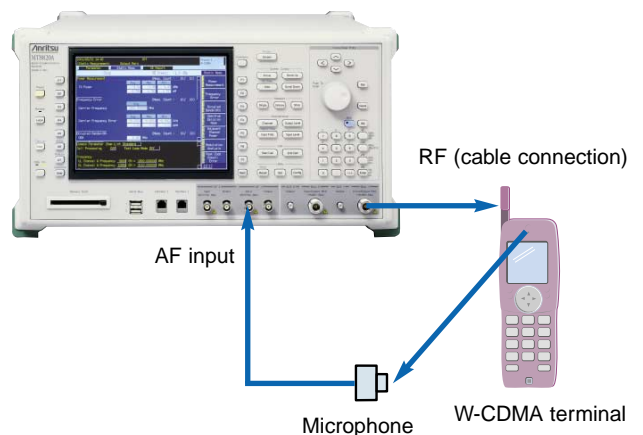
Transmission Audio Measurement

The tone signal outputted from AF Output connector is inputted to the W-CDMA terminal microphone. Then the MT8820A demodulates up-link RF signal and measures the level, frequency and distortion rate of demodulated tone signal. This function achieves the evaluation of audio characteristic on transmitter side of mobile terminals.



Reception Audio Measurement

The tone signal demodulated by the W-CDMA terminal is inputted to AF Input connector of the MT8820A. The audio characteristic on receiver side of mobile terminals can be evaluated by measuring the level, frequency and distortion rate of the tone signal inputted to AF Input connector.



Specifications

• MT8820A-11 Audio Board, MX882000B-01 W-CDMA Voice Codec

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 V _{peak} to 5 V _{peak} (AF Output connector) Setting resolution: 1 mV (≤ 5 V peak), 100 μ V (≤ 500 mV _{peak}), 10 μ V (≤ 50 mV _{peak}) Accuracy: ± 0.2 dB (≥ 10 mV _{peak} , ≥ 50 Hz), ± 0.3 dB (≥ 10 mV _{peak} , < 50 Hz) Waveform distortion: ≤ 30 kHz band ≤ -60 dB (≥ 500 mV peak, ≤ 5 kHz), ≤ -54 dB (≥ 70 mV _{peak}) Output impedance: $\leq 1 \Omega$ 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 k Ω
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	Frequency: 1 kHz in ≤ 30 kHz band ≥ 60 dB (≥ 1000 mV _{peak}), ≥ 54 dB (> 50 mV _{peak}), ≥ 46 dB (≥ 10 mV _{peak})
Distortion rate measurement	Frequency: 1 kHz in ≤ 30 kHz band ≤ -60 dB (≥ 1000 mV _{peak}), ≤ -54 dB (> 50 mV _{peak}), ≤ -46 dB (≥ 10 mV _{peak})

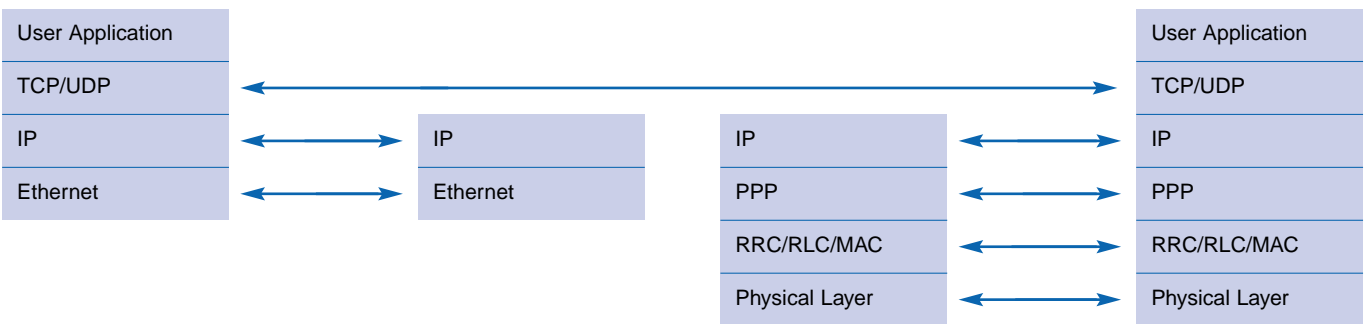
MX882051A-02 W-CDMA External Packet Data

Verification Test Function for Packet Communication Data Transfer

The MX882051A-02 W-CDMA External Packet Data option enables data transfer to/from external equipment by using the Ethernet port on the rear of MT8820A. Installing the MX882051A-02 enables End-to-End data transfer between an application server connected to the MT8820A and W-CDMA terminal or a client PC connected to a W-CDMA terminal.

External PPP Packet Test

The MT8820A equipped with a PPP server terminates PPP packets received from a W-CDMA terminal and outputs IP packets to the Ethernet port. It also converts IP packets input from the Ethernet port to PPP Packets, then transmits them to a W-CDMA terminal.



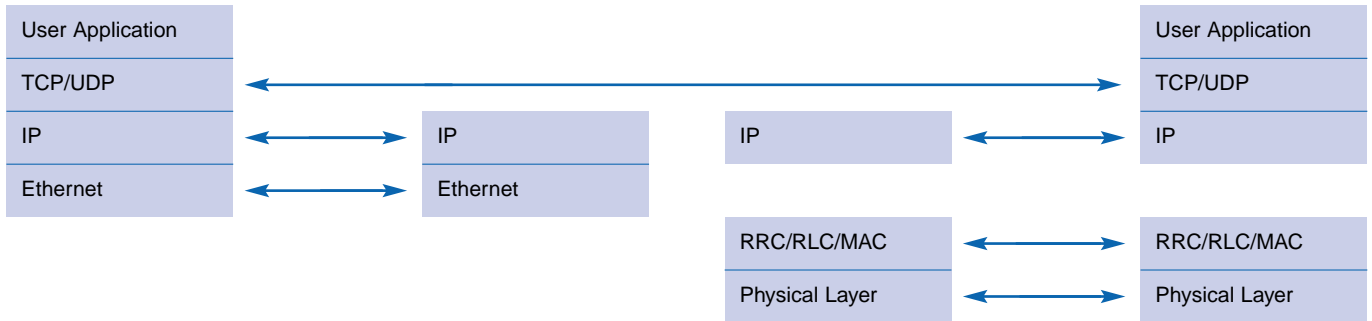
Protocol Stack for External PPP Packet Test



Sample MT8820A Connection

External IP Packet Test

The MT8820A outputs IP packets received from a W-CDMA terminal. It also transmits IP packets input from the Ethernet port to a W-CDMA terminal.



Protocol Stack for External PPP Packet Test



Sample MT8820A Connection

Specifications

• MX882051A-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

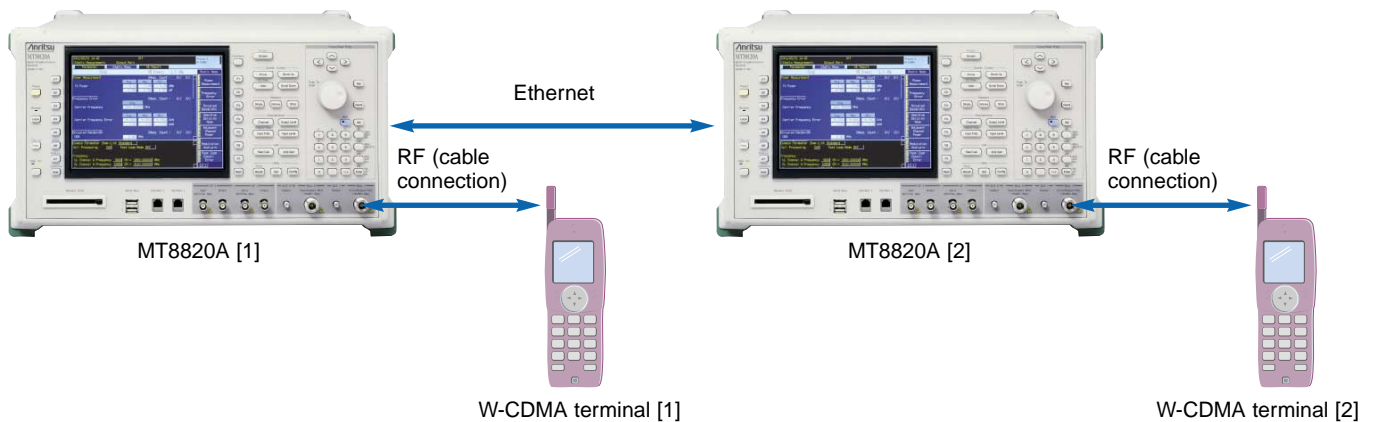
MX882051A-03 W-CDMA Video Phone Test

End-to-End Test Function for Videophones between 2 MT8820A Units

The MX882051A-03 W-CDMA Video Phone Test Option enables data transfer between two MT8820A units by using their Ethernet ports. Installing the MX882051A-03 enables End-to-End test between the videophone-compatible W-CDMA terminals connected to each of the two MT8820A units.

End-to-End Test

Set MT8820A [1] to Start Call status. Then originate a call from the W-CDMA terminal connected to MT8820A [2]. The call is terminated by the W-CDMA terminal connected to MT8820A [1] thus the End-to-End videophone test can be performed.



Specifications

• MX882051A-03 W-CDMA Video Phone Test

Ethernet	10Base-T
Data rate	Downlink: 64 kbps, Uplink: 64 kbps
Channel coding	Conversational/unknown/UL: 64 DL: 64 kbps/CS RAB

Ordering Information

Please specify the model/order number, name and quantity when ordering.

Model/Order No.	Name
MT8820A	Main frame Radio Communication Analyzer
	Standard accessories
	Power cord, 2.6 m : 1 pc
HB28B064C8H	CF card (64 MB) : 1 pc
CA68ADP	PC card adapter : 1 pc
W1940AE	MT8820A operation manual (CD-ROM) : 1 copy
	Options
MT8820A-01	W-CDMA measurement hardware
MT8820A-02	TDMA measurement hardware
MT8820A-03	CDMA2000 measurement hardware
MT8820A-04	1xEV-DO measurement hardware
MT8820A-11	Audio board
MT8820A-12	Parallel phone measurement hardware
MT8820A-21	W-CDMA measurement hardware retrofit
MT8820A-22	TDMA measurement hardware retrofit
MT8820A-23	CDMA2000 measurement hardware retrofit
MT8820A-24	1xEV-DO measurement hardware retrofit
MT8820A-31	Audio board retrofit
MT8820A-32	Parallel phone measurement hardware retrofit
	Softwares
MX882000B	W-CDMA Measurement Software (requires MT8820A-01 and MX88205xA)
MX882000B-01	W-CDMA voice codec (requires MT8820A-11 and MX882000B)
MX882001A	GSM Measurement Software (requires MT8820A-02)
MX882001A-01	GSM voice codec (requires MT8820A-11 and MX882001A)
MX882001A-02	GSM external packet data (requires MX882001A)
MX882001A-11	EGPRS Measurement Software (requires MX882001A)
MX882002A	CDMA2000 Measurement Software (requires MT8820A-03)
MX882002A-02	CDMA2000 external packet data (requires MX882002A)
MX882003A	1xEV-DO measurement Software (requires MT8820A-03, MT8820A-04 and MX882002A)
MX882003A-02	1xEV-DO external packet data (requires MX882003A)
MX882004A	PDC Measurement Software (requires MT8820A-02)
MX882005A	PHS Measurement Software (requires MT8820A-02)
MX882010A	Parallel Phone Measurement Software*1 [requires MT8820A-12, the two same measurement hardware (2 board/set) and one measurement software]
MX882022A	CDMA2000 Wireless Application Test Software (requires MT8820A-03)
MX882050A	W-CDMA Call Processing Software*2 (requires MX882000B)
MX882051A	W-CDMA Call Processing Software*2 (requires MX882000B)

Model/Order No.	Name
MX882051A-02	W-CDMA external packet data*2 (requires MX882051A)
MX882051A-03	W-CDMA video phone test*2 (requires MX882051A)
MX882071A	W-CDMA Ciphering Software*2 (requires MX882051A)
W2161AE	MX882000B operation manual*3 (attached to MX882000B)
W2026AE	MX882001A operation manual*3 (attached to MX882001A)
W2104AE	MX882002A operation manual*3 (attached to MX882002A)
W2201AE	MX882003A operation manual*3 (attached to MX882003A)
W2159AE	MX882004A operation manual*3 (attached to MX882004A)
W2228AE	MX882005A operation manual*3 (attached to MX882005A)
W2247AE	MX882022A operation manual*3 (attached to MX882022A)
W2220AE	MX88205xA operation manual*3 (attached to MX88205xA)
W2230AE	MX88207xA operation manual*3 (attached to MX88207xA)
	Warranty
MT8820A-90	Extended three year warranty service
MT8820A-91	Extended five year warranty service
	Application parts
P0019	TEST USIM001
A0012	Handset
J0576B	Coaxial cord (N-P · 5D-2W · N-P), 1 m
J0576D	Coaxial cord (N-P · 5D-2W · N-P), 2 m
J0127A	Coaxial cord (BNC-P · RG58A/U · BNC-P), 1 m
J0127C	Coaxial cord (BNC-P · RG58A/U · BNC-P), 0.5 m
J0007	GPIB cable, 1 m
J0008	GPIB cable, 2 m
MN8110B	I/O Adapter (for call processing I/O)
B0332	Joint plate (4 pcs/set)
B0333G	Rack mount kit
B0499	Carrying case (hard type, with protective cover and casters)
B0499B	Carrying case (hard type, with protective cover, without casters)
W1943AE	MT8820A operation manual (booklet)
W2162AE	MX882000B operation manual (booklet)
W2027AE	MX882001A operation manual (booklet)
W2100AE	MX882002A operation manual panel operation (booklet)
W2101AE	MX882002A operation manual remote control (booklet)
W2202AE	MX882003A operation manual panel operation (booklet)
W2203AE	MX882003A operation manual remote control (booklet)
W2160AE	MX882004A operation manual (booklet)
W2229AE	MX882005A operation manual (booklet)
W2245AE	MX882022A operation manual panel operation (booklet)
W2246AE	MX882022A operation manual remote control (booklet)
W2221AE	MX88205xA operation manual (booklet)
W2231AE	MX88207xA operation manual (booklet)

*1: Max two types of measurement hardware (MT8820A-01, MT8820A-02) are selectable for parallel phone measurement.

*2: For W-CDMA terminal connectivity, contact your Anritsu sales representative.

*3: Supplied by CD-ROM



Specifications are subject to change without notice.

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