

PRODUCT INTRODUCTION

MX882000A

W-CDMA Measurement Software

ANRITSU CORPORATION

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MX882000A

W-CDMA Measurement Software

(with MT8820A, MT8820A-11, MX882000A-01)

Product Introduction



Ver. 2.00
December 2002

Marketing Div.
Wireless Measurement Solutions
Anritsu Corporation

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1. Outline of MX882000A

MT8820A with MX882000A is...

the measuring instrument platform which can perform connection testing and transmission/reception testing of 3G UE with standalone equipment.

The MT8820A hardware platform covers a frequency range of 30 MHz to 2.7 GHz. When MX882000A W-CDMA Measurement Software is installed, this single platform supports evaluation of all the main transmission/reception characteristics for W-CDMA terminal. 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. Real-time voice encoding/decoding function can be added by installing **MX882000A-01 W-CDMA Voice Codec** (MT8820A-11 Audio Board is required).

1.1 Main Specifications (MT8820A with MX882000A)

- Frequency range : 300 MHz to 2200 MHz
- Max. input level : +35 dBm
- Power measurement accuracy : ± 0.5 dB (-25 to +35 dBm)
- Modulation accuracy (residual vector error) : $\leq 2.5\%$
- Adjacent channel leakage power : >50 dB@ ± 5 MHz
>55 dB@ ± 10 MHz
- RF output level range : -140 dBm to -10 dBm (MAIN1)
- RF output level accuracy : ± 1.0 dB
(-120 to -10 dBm, after calibration)

1.2 Measurement Items for W-CDMA

TS 34.121	Terminal Conformance Specification	Function	MT8820A	Reference
5	Transmitter Test			
5.2	Maximum Output Power	Power Level	√	
5.3	Frequency Stability	Frequency	√	
5.4	Output Power Dynamics in the Uplink			
5.4.1	Open Loop Power Control in the Uplink	Power Level	√	
5.4.2	Inner Loop Power Control in the Uplink	Power Level	√	
5.4.3	Minimum Output Power	Power Level	√	
5.5	Transmit ON/OFF Power			
5.5.1	Transmit OFF Power	Power Level	√	
5.8	Occupied Bandwidth	Spectrum	√	
5.9	Spectrum Emission Mask	Spectrum	√	
5.10	Adjacent Channel Leakage Power Ratio	Spectrum	√	
5.13	Transmit Modulation			
5.13.1	Modulation Accuracy	EVM	√	
5.13.2	Peak Code Domain Error	PCDE	√	
6	Receiver Test			
6.2	Reference Sensitivity Level	BER	√	
6.3	Maximum Input Level	BER	√	
7	Performance requirements			
7.2.1	Demodulation of Dedicated Channel(DC	BLER	√	

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1.3 Features

Major transmission characteristics
measured within 200 ms.

Power Measurement (Meas. Count : 10 / 10)	
	Avg. Max Min
TX Power	-10.26 -10.24 -10.30 dBm
	94.12 94.73 93.22 uW

Modulation Analysis (Meas. Count : 10 / 10)	
	Avg. Max Min
Error Vector Magnitude	2.60 2.36 2.38 %(rms)
Peak Vector Error	6.53 3.37 5.53 %
Phase Error	1.04 1.54 0.36 deg.(rms)
Magnitude Error	1.85 1.39 1.82 %(rms)
Origin Offset	-42.03 -42.00 -42.06 dB

Adjacent Channel Power (Meas. Count : 10 / 10)	
Leakage power due to Modulation Offset Freq.	Power
	Avg. Max Min
-10 MHz	-60.36 -60.06 -60.58 dB
-5 MHz	-53.09 -52.73 -53.46 dB
5 MHz	-51.32 -51.22 -51.45 dB
10 MHz	-60.06 -59.93 -60.16 dB

* Measurement examples of transmission power,
modulation analysis and adjacent channel leakage power (above)

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Major transmission characteristics
can be measured in a batch for
more than 5 times per second.
Furthermore, Avg./Max./Min. values
can be simultaneously measured.

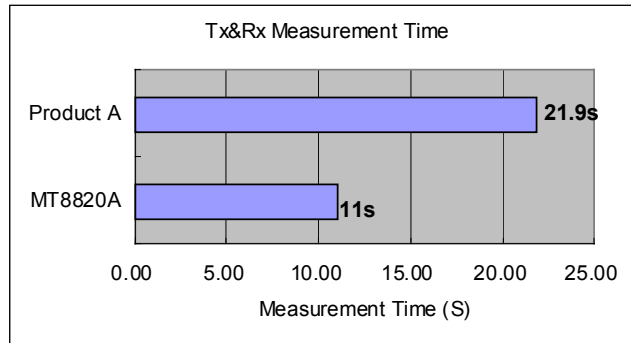


UE performances are
statistically administrated
in a short time.

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The Fastest Measurement Speed

Measurement speed has been doubled to competitors.

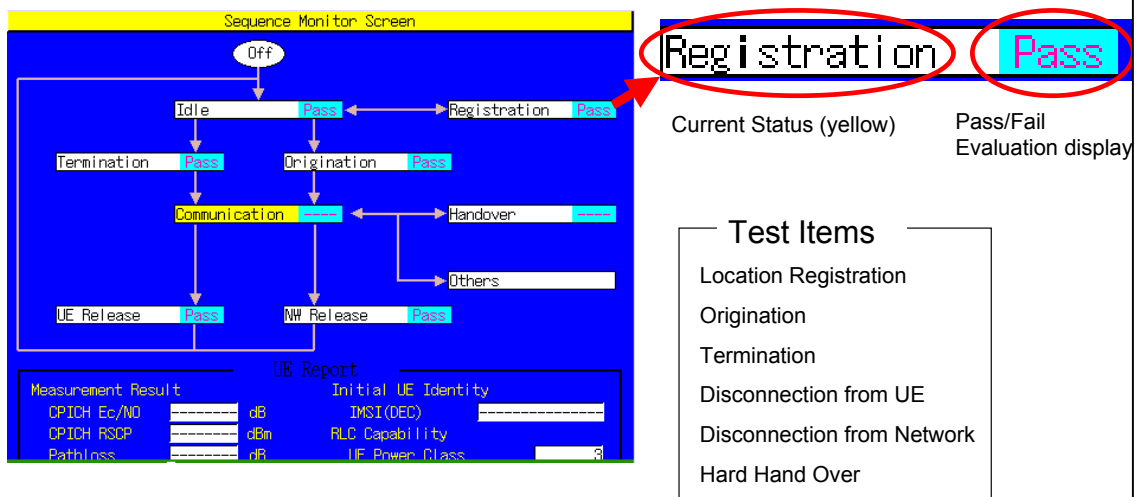


- TX measurement & reception sensitivity measurement at max. output power (10000bit)
- TX measurement at output power+15dBm(e.g.)
- TX measurement at output power+0dBm(e.g.) & BER measurement at max. input (10000bit)
- EVM and PCDE measurements at output power -20dBm
- Min. output power measurement

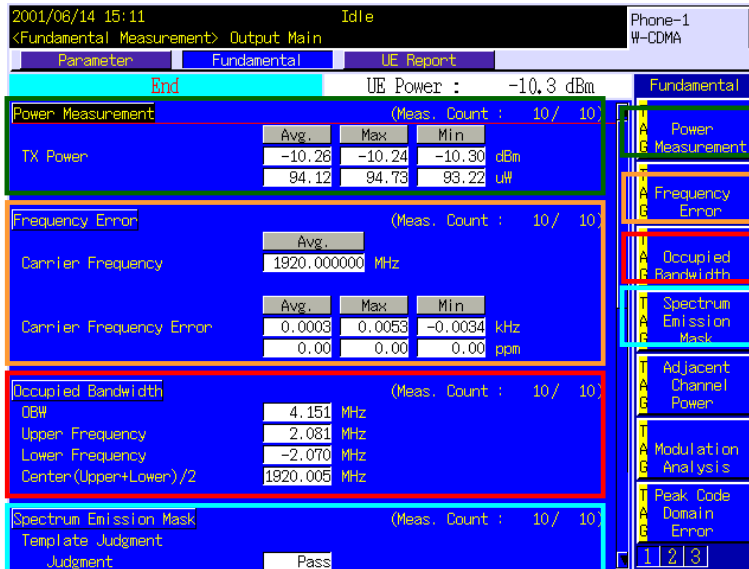
TX measurement: output power, frequency error, OBW, spectrum emission mask, adjacent channel leakage power, EVM, PCDE.

*Measurement count is specified to 20 times for 1 carrier measurement.

Call Processing Test simplified by Call Processing function



1.4 Measurement Function and Screen Examples



5.2

Transmission Power

5.3 Frequency Error

5.8

Occupied Bandwidth

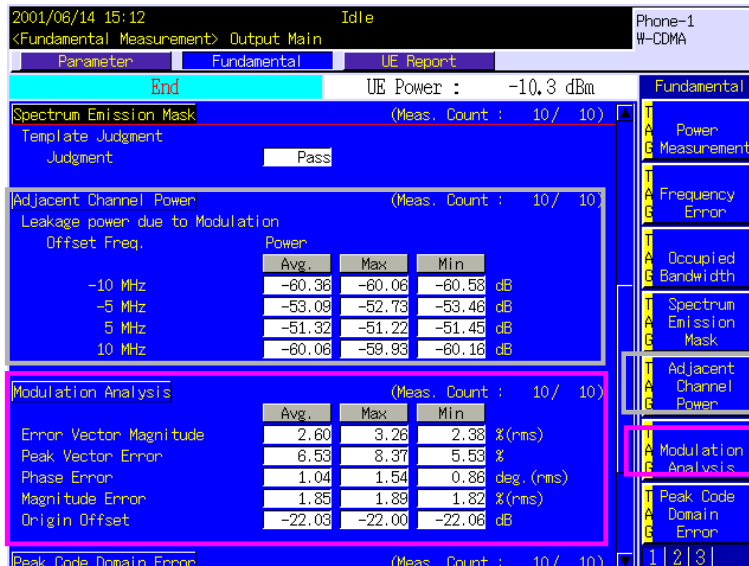
5.2

Spectrum Emission Mask

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5.10 Adjacent Channel Leakage Power Ratio

5.13.1 Vector Error

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2001/07/15 16:52 Off
 <Fundamental Measurement> Output Main Phone-1 W-CDMA

Parameter	Fundamental	UE Report
End UE Power : -7.4 dBm Fundamental		
Peak Code Domain Error	Avg. -54.26 Max -54.26 Min -54.26 dB	5.13.2 Peak Code Domain Error
Bit Error Rate	Bit Error Rate 0.0000 (= 0.00 %) Error Count 0 Transmitted/Sample 10717 / 10000 Bit Judgment Pass	6.2 Reception Sensitivity
Block Error Rate	Block Error Rate 0.0000 (= 0.00 %) Error Count 0 Transmitted/Sample 1000 / 1000 Block Judgment Pass	6.3 Max. Input Level
Common Parameter Item List Standard		
Call Processing Off Test Loop Mode Off		
Frequency		
UL Channel & Frequency 9600 CH = 1920.000000 MHz		
DL Channel & Frequency 10550 CH = 2110.000000 MHz		

7.2.1 Block Error Rate

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Waveform Display Function (OBW)

2001/06/26 19:44 Idle
 <Fundamental Measurement> Output Main Phone-1 W-CDMA

Parameter	Fundamental	UE Report
End UE Power : -20.1 dBm OBW		
View Window (Meas. Count : 1 / 1)		
Occupied Bandwidth [dB]	OBW (99.0%) 4.151 [MHz]	OBW Ratio
	Upper Limit 2.070 [MHz]	
	Lower Limit -2.081 [MHz]	
	Center (Upper+Lower)/2 1919.994 [MHz]	
Span : 12.6MHz RBW : 30kHz		
UL CH: 9600CH UL Freq: 1920.000000MHz Input Level: -10.0dBm		
DL CH: 10550CH DL Freq: 2110.000000MHz Output Level: -93.0dBm		

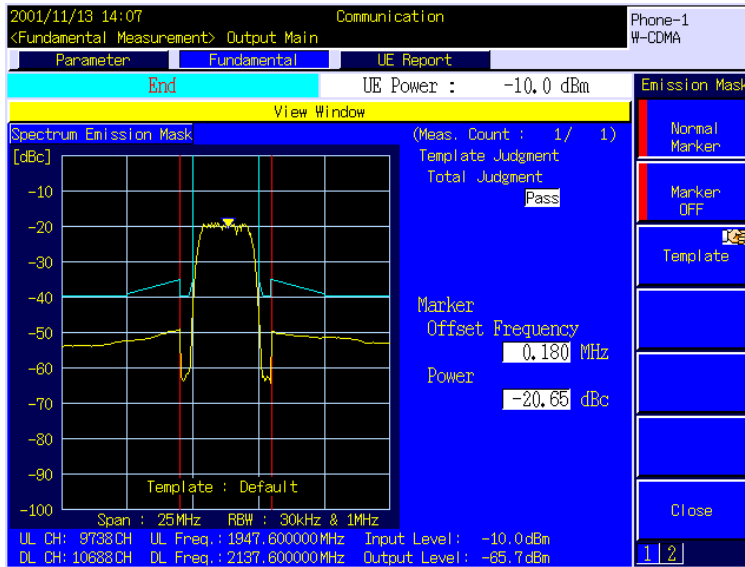
Characteristics can be visually confirmed with waveform display.

Effective in repair line and maintenance section

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Waveform Display Function (Spectrum Emission Mask)



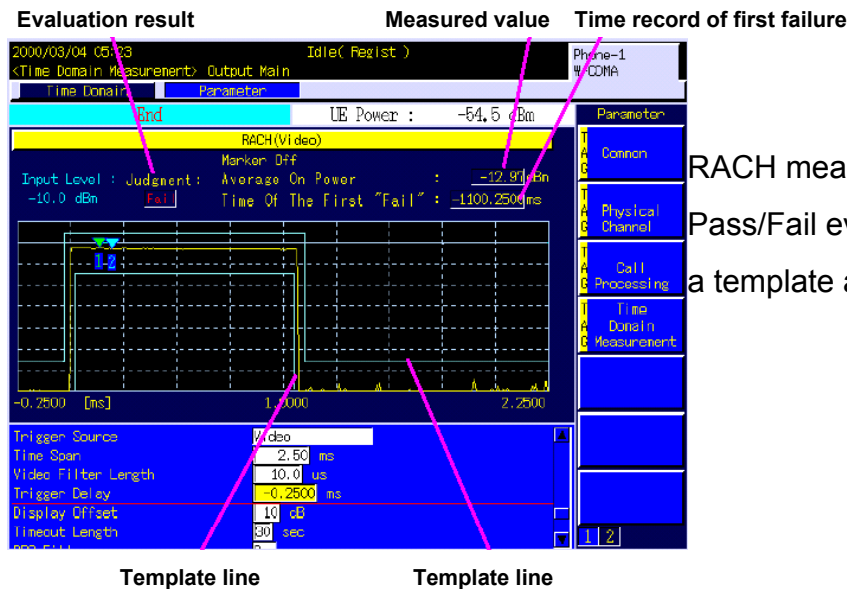
Template and waveform are simultaneously displayed, enabling the pass/fail evaluation confirmed at a glance.

Furthermore, waveforms can be displayed for EVM, phase error and magnitude error.

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Time Domain Measurement

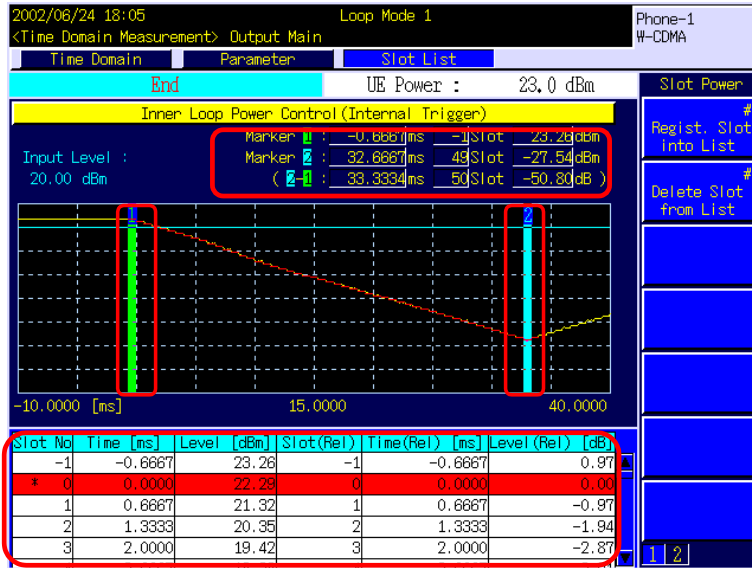


RACH measurement and Pass/Fail evaluation with a template are performable.

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Time Domain Measurement Screen



Power control is measured.

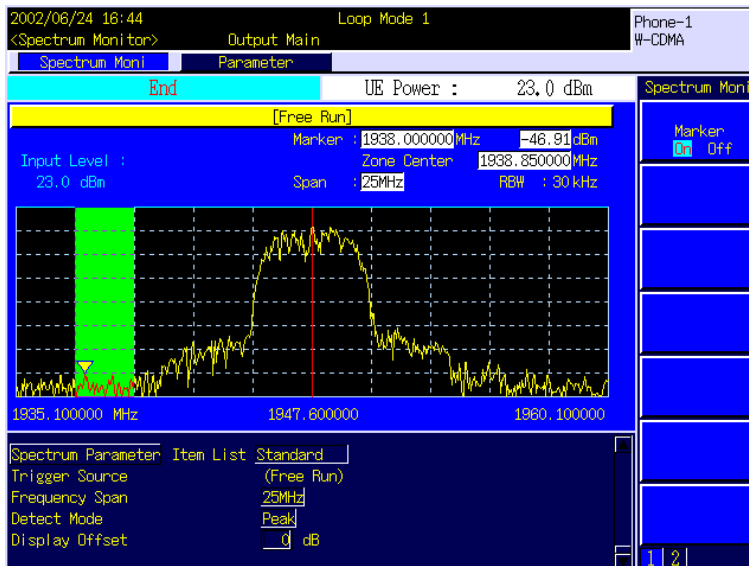
Measured values are easily confirmed with equipped slot marker and slot list functions.

*Inner loop power control at 1dB steps (above)

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Spectrum Monitoring



Available for in-band spurious check within 25MHz and carrier leak adjustment of orthogonal modulator.

Also, frequency counter function enables to measure CW characteristic of UL without AFC (only GPIB is supported)

Effective for adjustment and inspection

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UE Monitoring Function

The screenshot displays the 'UE Report' window in a software application. At the top, it shows the date and time '2002/04/11 11:37', the mode 'Communication', and the device 'Phone-1 W-CDMA'. Below this, there are tabs for 'Parameter', 'Fundamental', and 'UE Report', with 'UE Report' being the active tab. A status bar at the top right indicates 'UE Power : -10.0 dBm'. The main area is titled 'UE Report' and contains the following data:

Measurement Result for Current Cell	Value	Unit
CPICH Ec/No	-3	dB
CPICH RSCP	-----	dBm
Pathloss	-----	dB
Initial UE Identity	-----	
IMSI(DEC)	-----	
RLC Capability		
UE Power Class	3	
Intra-Frequency Measurement		
CPICH Ec/No	-----	dB
CPICH RSCP	-----	dBm
Pathloss	-----	dB
Inter-Frequency Measurement		
UTRA Carrier RSSI	-----	
CPICH Ec/No	-----	dB
CPICH RSCP	-----	dBm
Pathloss	-----	dB
Quality Measurement		
DL Transport Channel BLER	-----	

Transmission power and power class of W-CDMA UE can be monitored.

2. Outline of MX882000A -01 W-CDMA Voice Codec

MX882000A-01 W-CDMA Voice Codec is a software option to add real-time voice encoding/decoding function to W-CDMA measurement software. Live end-to-end communications test with a Handset is enabled by installing MT8820A-11 Audio Board. Also, standalone MT8820A is able to perform Audio transmission/reception test of mobile terminals without external audio analyzer/generator.

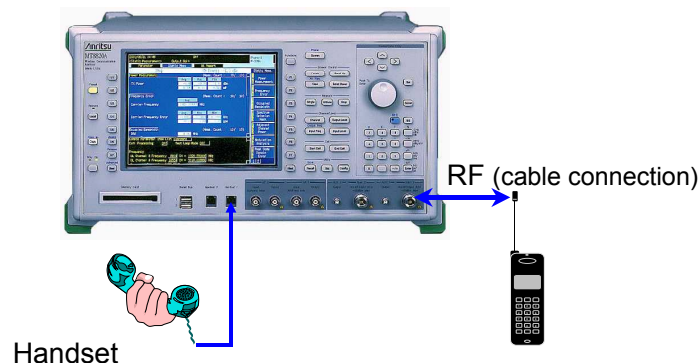
2.1 Main Specifications (MT8820A-11 with MX882000A-01)

Voice codec	AMR 12.2kbps
Codec level adjustment	Encoder input gain: -3.00 to 3.00dB, in increments of 0.01dB Handset microphone volume: 0, 1, 2, 3, 4, 5 Handset speaker volume: 0, 1, 2, 3, 4, 5
AF output	Frequency range: 30Hz to 10kHz Setting range: 0V peak to 5V peak (AF Output connector) Setting resolution: 1mV ($\leq 5V$ peak), 100uV ($\leq 500mV$ peak), 10uV ($\leq 50mV$ peak) Accuracy: $\pm 0.2dB$ ($\geq 10mV$ peak, $\geq 50Hz$), $\pm 0.3dB$ ($\geq 10mV$ peak, $< 50Hz$) Waveform distortion: band $\leq 30kHz$ $\leq -60dB$ ($\geq 500mV$ peak, $\leq 5kHz$), $\leq -54dB$ ($\geq 70mV$ peak) Output impedance: $\leq 1\Omega$ Max. output current: 100mA
AF input	Frequency range: 50Hz to 10kHz Input voltage range: 1mV peak to 5V peak (AF Input connector) Max. allowable input voltage: 30V rms Input impedance: 100k Ω
Frequency measurement	Accuracy: Reference oscillator accuracy +0.5Hz
Level measurement	Accuracy: $\pm 0.2dB$ ($\geq 10mV$ peak), $\pm 0.4dB$ ($\geq 1mV$ peak, $\geq 1kHz$)
SINAD measurement	At frequency=1kHz, band $\leq 30kHz$ $\geq 60dB$ ($\geq 1000mV$ peak), $\geq 54dB$ ($> 50mV$ peak), $\geq 46dB$ ($\geq 10mV$ peak)
Distortion rate measurement	At frequency=1kHz, band $\leq 30kHz$ $\leq -60dB$ ($\geq 1000mV$ peak), $\leq -54dB$ ($> 50mV$ peak), $\leq -46dB$ ($\geq 10mV$ peak)

2.2 Main functions

Live end-to-end Communications Test

Connection of a handset to the RJ11 connector of MT8820A enables live end-to-end communications test between the MT8820A and W-CDMA terminal.

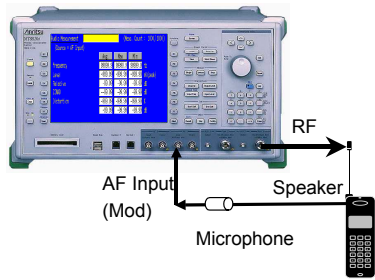


Transmission/Reception Audio Measurement Function

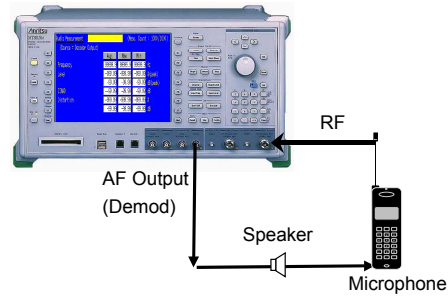
•The Audio Generator and Audio Meter incorporated in MT8820A perform Audio measurement of UE. (W-CDMA/GSM)

W-CDMA: W-CDMA Hardware + Audio Board + W-CDMA Software + W-CDMA Voice Codec software option

GSM: TDMA Hardware + Audio Board + GSM Software + GSM Voice Codec software option



<Audio reception measurement including terminal speaker>



<Audio transmission measurement including terminal microphone>

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3. MT8820A Application Support Table

APPLICATION	W-CDMA Terminal testing	GSM Terminal testing	W-CDMA /GSM Dual-mode Terminal testing	W-CDMA Terminal testing (with audio)	GSM Terminal testing (with audio)	W-CDMA /GSM Dual-mode Terminal testing (with audio)
MT8820A Main Frame	√	√	√	√	√	√
MT8820A-01 W-CDMA Measurement Hardware	√		√	√		√
MT8820A-02 TDMA Measurement Hardware		√	√		√	√
MT8820A-11 Audio Board				√	√	√
MX882000A W-CDMA Measurement Software (requires MT8820A-01)	√		√	√		√
MX882000A-01 W-CDMA voice codec (requires MT8820A-11 and MX882000A)				√		√
MX882001A GSM Measurement Software (requires MT8820A-02)		√	√		√	√
MX882001A-01 GSM voice codec (requires MT8820A-11 and MX882001A)					√	√

√ Option required

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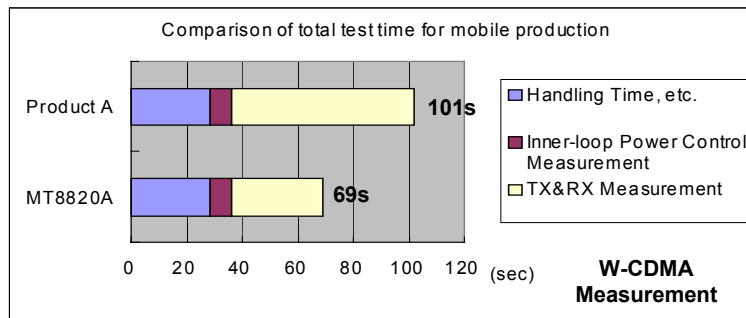
4. Merits of Introducing MT8820A

- Monthly production amount of UE can be increased to 1.4 times and more by replacing the OBT in current line equipment with MT8820A.

Product A is not supporting call processing, therefore the measurement time for all items except TX&RX measurement is equal to that of MT8820A.

- Above throughput is achieved with higher inspection quality than current solution.

MT8820A enables the parallel processing of all TX/RX measurements without restricting measurement items. Thus, inspection quality can be improved without thinning out the measurement points.



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W-CDMA Phone Manufacturing Cost Comparison

		Product A	MT8820A
1	RCA W-CDMA set price	\$62,000	\$60,200
2	Fixture-related cost	\$15,000	\$15,000
3	3-year maintenance option	\$5,000	\$5,000
4	3-year operation cost	\$7,500	\$7,500
5	Measurement time per UE (sec.)	101	69
6	Yearly quantity of UE manufactured by single RCA (260 days/year)	74342	108820
7	The quantity of RCA required (for manufacturing 1.5M sets/year)	21	14
8	Manufacturing cost for 3 years $= (1+2+3+4) \times 7$	\$1,879,500	\$1,227,800

W-CDMA Phone

The use of MT8820A as production equipment is able to reduce the cost by **\$654,500** for 3 years.

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W-CDMA/GSM Dual Phone Manufacturing Cost Comparison

		Product A	MT8820A
1	RCA W-CDMA+GSM set price	\$74,500	\$78,100
2	Fixture-related cost	\$15,000	\$15,000
3	3-year maintenance option	\$5,000	\$5,000
4	3-year operation cost	\$7,500	\$7,500
5	Measurement time per UE (sec.)	147	93
6	Yearly quantity of UE manufactured by single RCA (260 days/year)	51079	80737
7	The quantity of RCA required (for manufacturing 1.5M sets/year)	30	19
8	Manufacturing cost for 3 years = (1+2+3+4)×7	\$3,060,000	\$2,006,400

W-CDMA /GSM
Dual Phone

The use of MT8820A as production equipment is able to reduce the cost by **\$ 1,053,600** for 3 years.

*1: Estimated cost

- The latest platform supporting the manufacture of W-CDMA/GSM DUAL mode phone
 - MT8820A is the first to support W-CDMA measurement in the world.
 - Well-developed functions support various phases ranging from R&D to manufacturing and maintenance.
 - More efficient production cost is achieved than aging equipment supporting 3G.
- Satisfactory support by 3-year/5-year warranty (optional)
 - Quick and accurate calibration and repair services are provided.

5. Conclusion

With our Signalling & RF technologies, Anritsu provides complete support for customers' 3G business ranging from R&D through manufacturing and maintenance.

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Specifications are subject to change without notice.

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