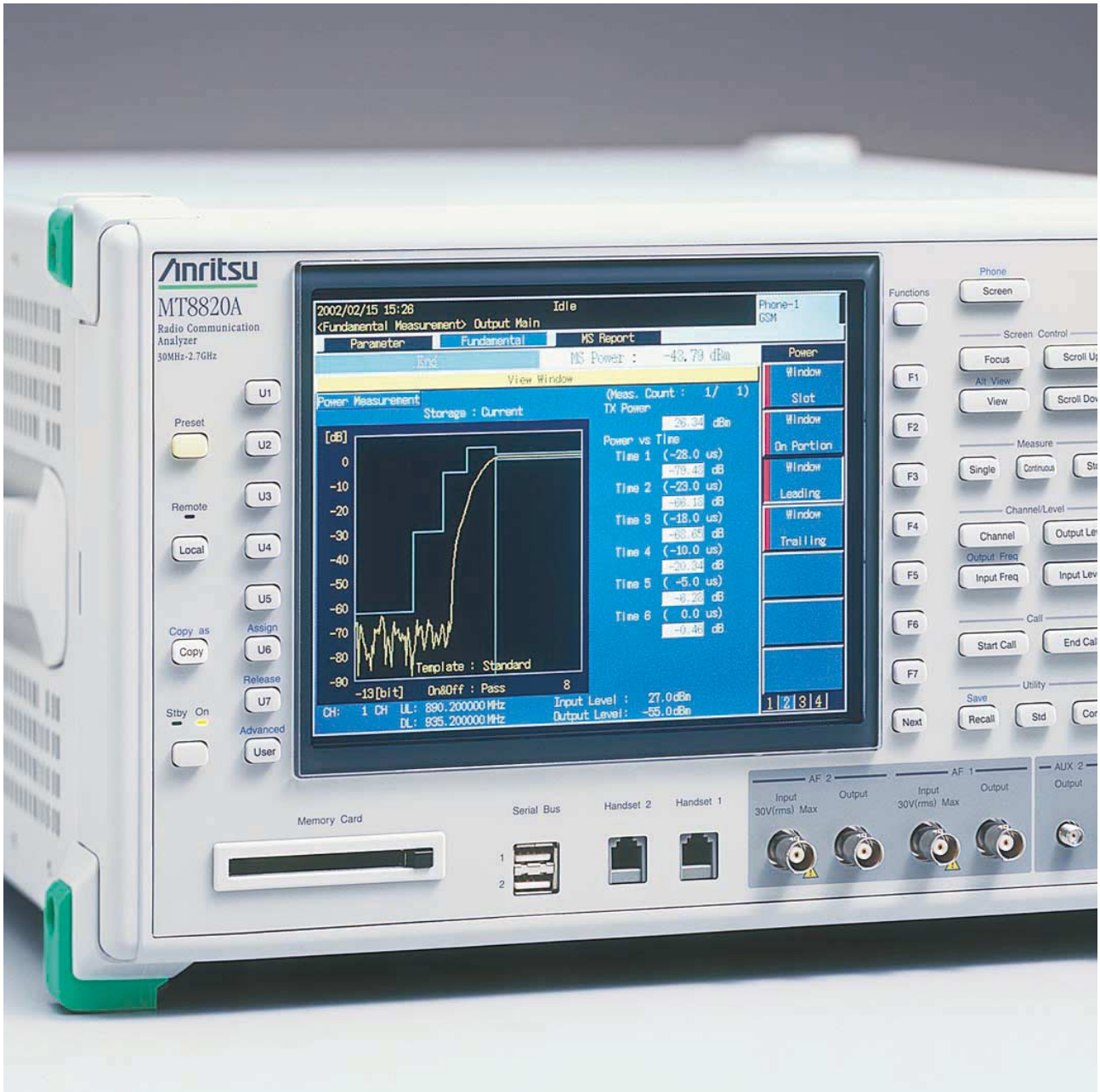


MX882001A

GSM Measurement Software



Designed for GSM/GPRS/EGPRS systems

MX882001A

GSM Measurement Software

Utilizing an advanced high-speed measuring method and offering batch measurements to support GSM/GPRS/EGPRS terminal production

The MX882001A GSM Measurement Software supports transmission and reception measurements of digital mobile terminals that conform to GSM/GPRS/EGPRS(MX882001A-11 is required for EGPRS measurement), the most widely used digital mobile standard in the world. With the MX882001A GSM and MX882000B W-CDMA Measurement Softwares installed in the MT8820A mainframe, the user can fully evaluate all the major transmission and reception characteristics of digital mobile terminals for all major GSM standards throughout the world. Anritsu's advanced DSP (Digital Signal Processing) and parallel-measurement technologies greatly reduce the time required for the production and testing of mobile terminals. Combinations of parameters for batch measurements are freely selectable, and the number of repetitions for each measurement can be set independently. In GSM measurement, selected items for measurement can be batch-processed through one-touch operation, enabling easy, high-speed Pass/Fail evaluation on major test items including transmission frequency, modulation accuracy, transmission power, adjacent channel leakage power and BER.

In GPRS measurement, transmission frequency, modulation accuracy and transmission power are measured when Test Mode A is selected, and Test Mode B or BLER measurement that matches each Multislot class and coding scheme is performed when BLER Measurement is selected, both at high speed.

The standard GPIB interface enables the MT8820A to be easily incorporated into existing automated production lines or to configure automatic test systems in maintenance sites.

• GSM measurement item

Transmission measurement	Transmission power
	Power vs time (template mask evaluation)
	Frequency error
	Phase error (rms and peak)
	Output spectrum
Reception measurement	FER, BER and CRC error rates
Call processing	Location registration, terminal call origination, network call origination, communication, handover, terminal disconnect, network disconnect
	Mobile terminal report monitor (reception level, reception quality, etc)

• EGPRS measurement item

Transmission measurement	Transmission power
	Power vs time (template mask evaluation)*1
	Frequency error
	Phase error (GMSK)
	Modulation accuracy (8PSK)
Reception measurement	Output spectrum*1
	BER

*1 Can be measured only when the up-link slot number is "1".

• GPRS measurement item

Transmission measurement	Transmission power
	Power vs time (template mask evaluation)*1
	Frequency error
	Phase error (rms and peak)
	Output spectrum*1
Reception measurement	BLER
Call processing	connect, communication, disconnection

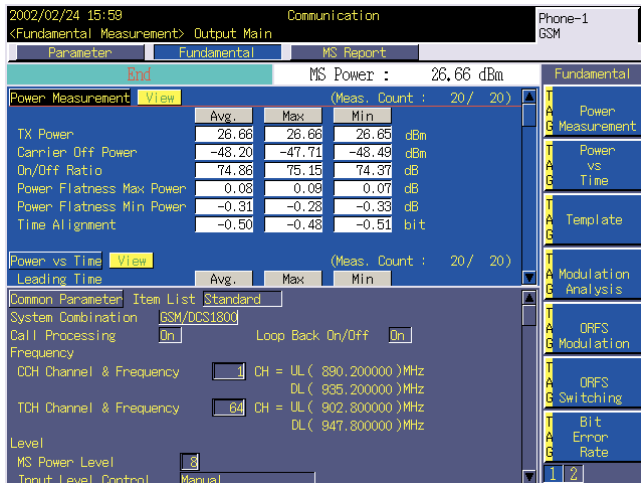
*1 Can be measured only when the up-link slot number is "1".

GSM

Transmission Measurement

Transmission power

When the number of measurement repetitions is set to two or more, the GSM terminal transmission power; maximum, average and minimum values of measured results are displayed, enabling the distribution of the terminal characteristics to be evaluated. This repeat measurement function is also available for other measurements.



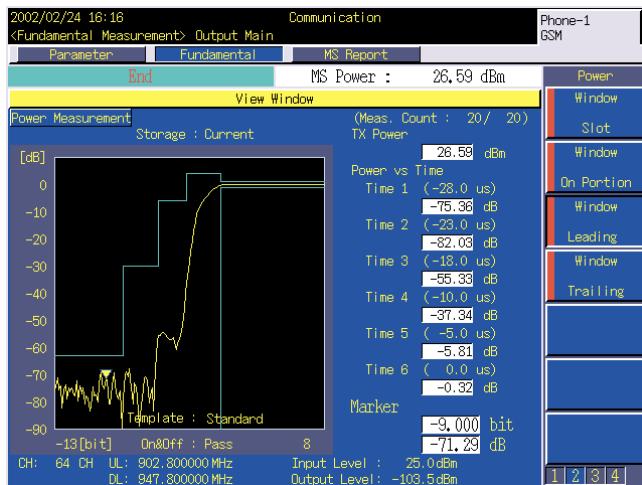
Power vs Time

Power at six measuring points for each burst rise/fall edge can be measured, with measuring time set in increments of 0.1 μ s resolution.

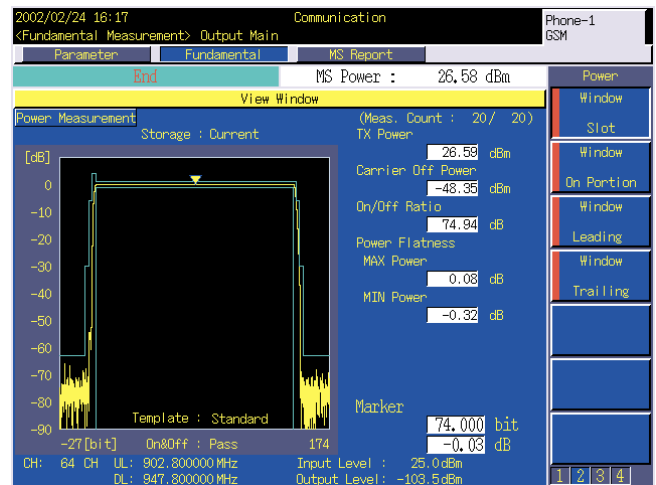


Burst waveform display

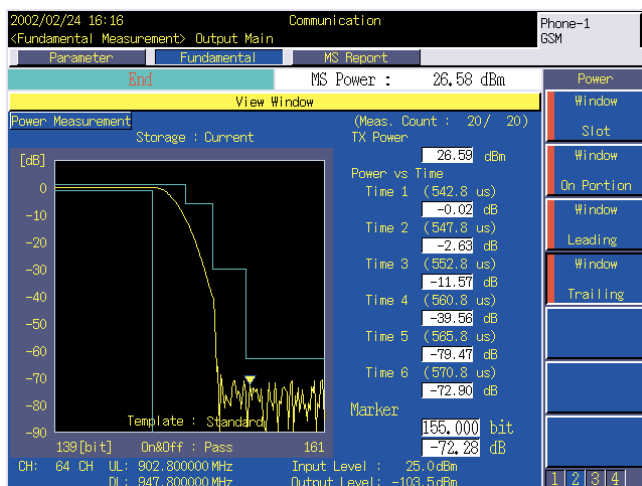
Graphical display of the burst waveform is also available. Magnified display of the entire time slot and the burst-on area as well as the rising/falling edges enables users to confirm at a glance whether or not the burst waveform meets the GSM standard template.



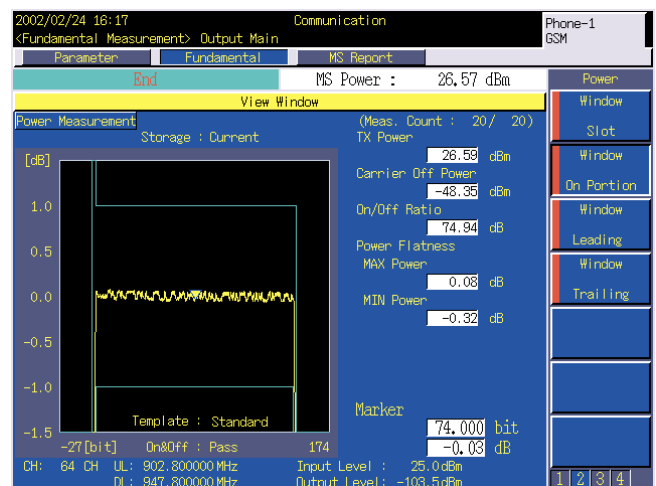
Rising edge



Entire time slot



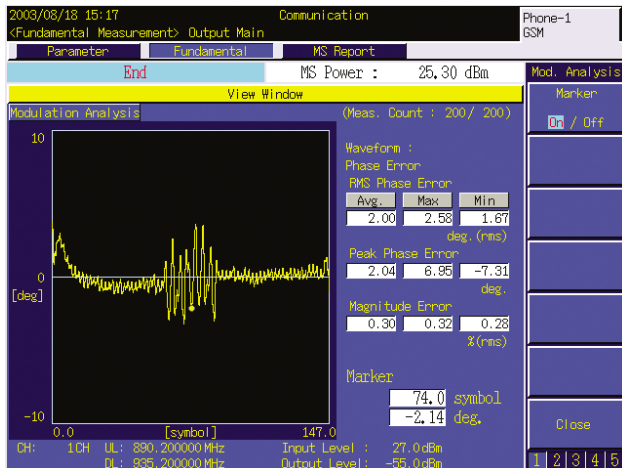
Falling edge



Burst on area

Modulation analysis

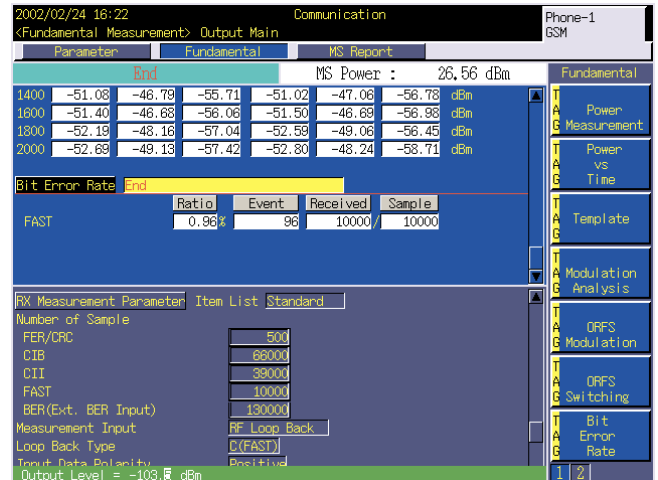
Simultaneous measurement and display of frequency, frequency error (in kHz and ppm), phase error and peak phase error are performable. Amplitude error at the burst-on area can also be measured.



Reception Measurement

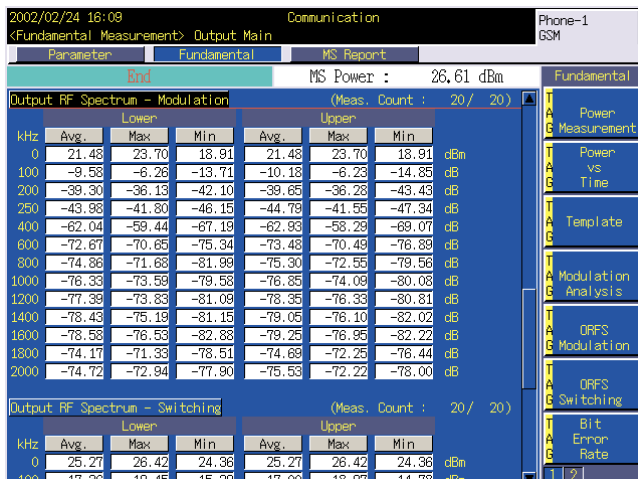
Error rate test

By controlling GSM terminals to the loop-back conditions, the up-link RF signal, which is looped back from the terminal, is demodulated to measure frame error rate, bit error rate and CRC error rate. These measurements can be processed in parallel with the transmission measurements.



Output spectrum

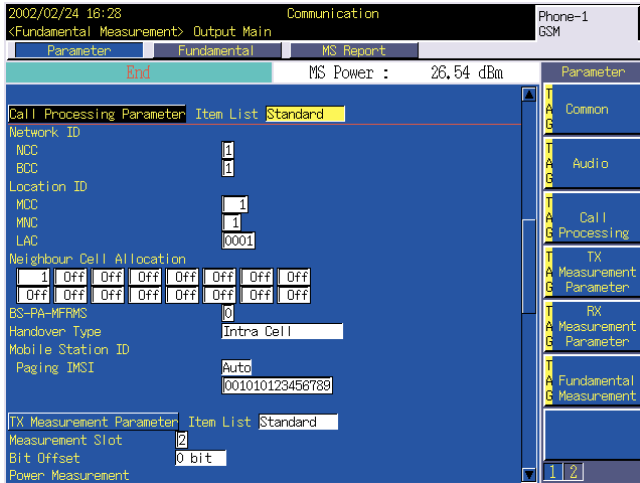
Power spectrum is measured at a total of 25 frequency points within the range of ± 2 MHz from the carrier frequency. "Modulation" is the spectrum resulting from the modulation signal around the center of burst signal, while "Switching" is the spectrum resulting from the rise and fall of the burst signal. In addition to the latest DSP technology, high-speed measurement is achieved as the output spectrum can be processed in parallel with other measurements.



Call Processing Function

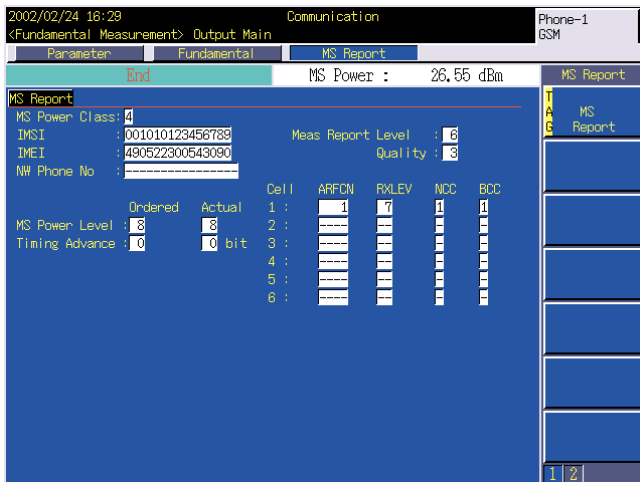
Connection test

The call processing function enables to perform various connection tests including location registration, terminal call origination, network call origination, terminal disconnect and network disconnect. During a call, the user's speech can be echoed back from the terminal to provide a simple voice communication test.



Mobile terminal report monitor

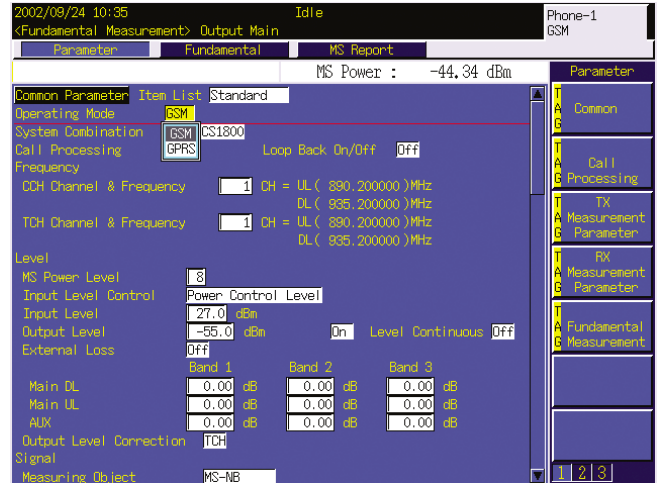
GSM terminal status can be displayed as the periodical report that the terminal sends back to the tester. "RX Level" monitoring shows the down-link RF signal level received by the terminal.



GPRS

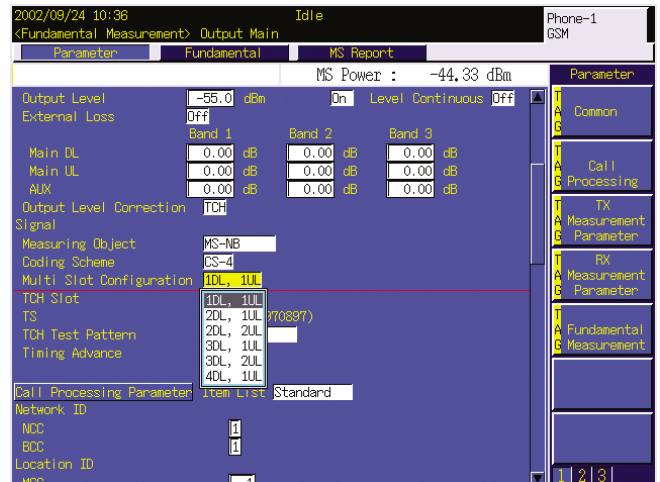
GPRS Measurement Function

The MX882001A GSM Measurement Software is equipped with GPRS test function. Test functions can be switched between GSM and GPRS through one-touch operation without reinstalling measurement software in the MT8820A. Thus, both GSM and GPRS terminals can be tested at high speed.

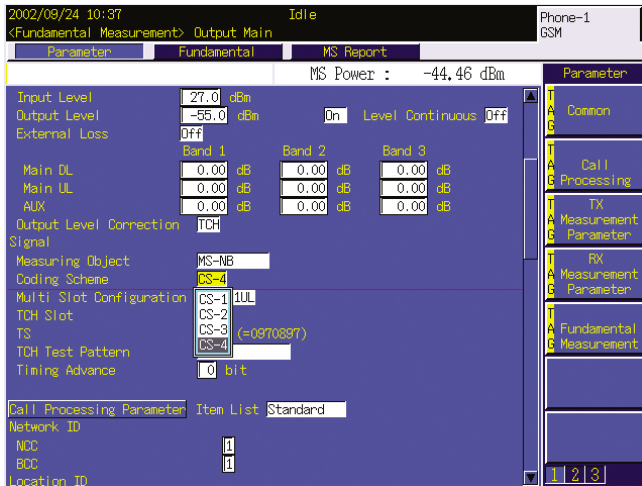


Multislot class and Channel Coding Scheme

The combinations of up-link/down-link slots can be selected in GPRS terminals of class 1 to 10 (except class 7).



All coding schemes, CS-1 to CS-4, are supported.

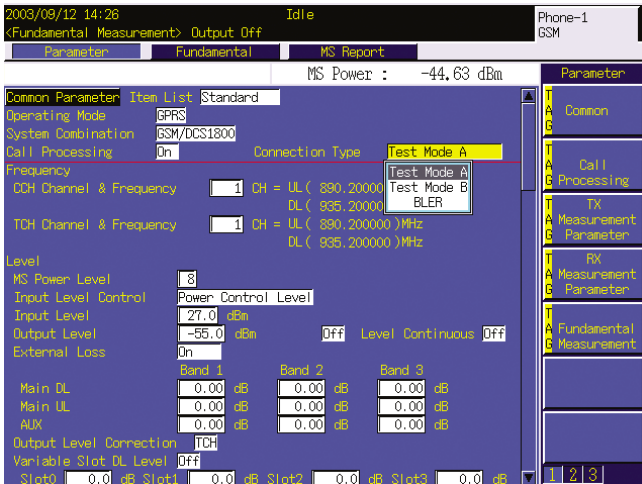


Connection type

Test Mode A/B or BLER is selectable for connection type. In Test Mode A, selected for transmission measurement, the terminal generates the up-link slot inserting pseudo random pattern in PDTCH.

In BLER, selected for BLER measurement, the terminal counts the number of blocks in received down-link data and reports the number of received blocks with up-link slot.

The MT8820A performs the BLER measurement on the basis of this report.



Transmission Measurement

Similarly to GSM measurement, the transmission measurement for the following Items is carried out for 1 slot specified when Test Mode A is selected.

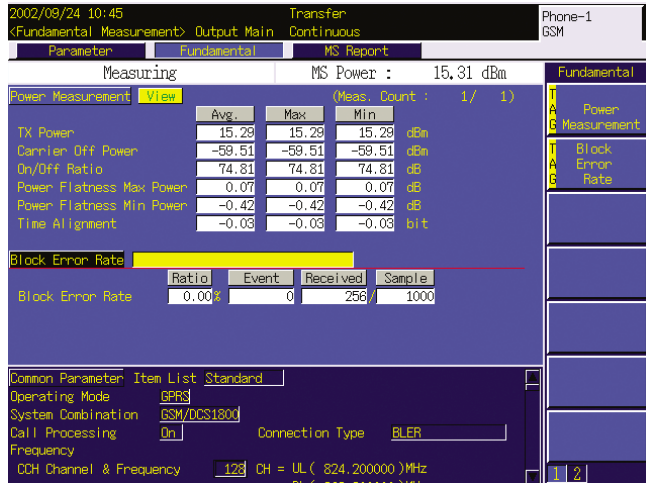
- Power vs Time (template mask evaluation)*1
- Frequency error
- Phase error (rms and peak)
- Output spectrum*1

*1 Can be measured only when the up-link slot number is "1".

Reception Measurement

Block Error Rate

When BLER is selected, the number of blocks received from the terminal is counted for block error rate measurement.



Call Processing Function

The following functions are tested when call processing is set to ON.

- Location registration
- Connection
- Communication
- Disconnection

After connection, MS generates up-link slot, enabling Transmission measurement and BLER measurement.

High-speed, easy-to-use GPIB control

Controllable without displaying the measurement window

Items not currently displayed on the measurement window can be read out or changed freely without requiring display. This dramatically saves time that would otherwise be lost by displaying the relevant measurement window.

Batch readout command for measured results

All results obtained by batch measurement can be read out with the single command: "ALLMEAS?". If required, only desired measurement results can be read out using commands such as "ALL MEAS? MOD" (modulation analysis). A decrease in the number of GPIB commands reduces the GPIB traffic on both the MT8820A and control PC, contributing to the increase in measurement throughput. Besides, the step size of the control program is reduced, which provides a real benefit to the user for the creation of a control program that is easy to read and maintain.

Specifications

• MT8820A-02 TDMA Measurement Hardware, MX882001A GSM Measurement Software

Frequency/modulation measurement	<p>Frequency: 300 to 2200 MHz Input level: -30 to +40 dBm (average power of burst signal, MAIN connector) Measurement items: Normal burst, RACH Carrier frequency accuracy: reference oscillator accuracy + 10 Hz at normal burst measurement reference oscillator accuracy + 20 Hz at RACH measurement Residual phase error: $\leq 0.5^\circ$ rms, 2° peak</p>
Amplitude measurement	<p>Frequency: 300 to 2200 MHz Input level: -30 to +40 dBm (average power of burst signal, MAIN connector) Measurement items: Normal burst, RACH Measurement accuracy: ± 0.5 dB (-20 to +40 dBm), ± 0.7 dB (-30 to -20 dBm) *After calibration Linearity: ± 0.2 dB (0 to -40 dB, ≥ -30 dBm) Carrier-off power: ≥ 65 dB (input level ≥ -10 dBm), ≥ 45 dB (input level ≥ -30 dBm) Burst waveform display: Rise, fall, time slot, burst-on</p>
Output RF spectrum measurement	<p>Frequency: 300 to 2200 MHz Input level: -10 to +40 dBm (average power of burst signal, MAIN connector) Measurement item: Normal burst Measurement points: ± 100 kHz, ± 200 kHz, ± 250 kHz, ± 400 kHz, ± 600 kHz, ± 800 kHz, ± 1000 kHz, ± 1200 kHz, ± 1400 kHz, ± 1600 kHz, ± 1800 kHz, ± 2000 kHz Measurement range in modulation area: ≤ -55 dB (≤ 250 kHz offset), ≤ -66 dB (≥ 400 kHz offset) *Average of 10-time measurement Measurement range in transient area: ≤ -57 dB (≥ 400 kHz offset)</p>
RF signal generator	<p>Output frequency: 300 to 2200 MHz (in increments of 1 Hz) Phase error: $\leq 1^\circ$ rms, $\leq 4^\circ$ peak Output patterns: CCH, TCH, CCH + TCH TCH data: PN9, PN15, ALL 0, ALL 1, Fixed Pattern (PAT0-PAT9)</p>
Error rate measurement	<p>Function: Error rate measurement of frame, bit and CRC Measurement items: GSM Loop-back data inserted in up-link TCH Serial data inputted through the call processing I/O port on the rear panel GPRS The number of blocks received from the terminal and inserted in up-link TCH The number of USF reception blocks of a terminal</p>
Call processing	<p>Call controlling: GSM Location registration, terminal call origination, network call origination, network disconnect, terminal disconnect GPRS Connection, disconnection, data transfer Terminal controlling: GSM Output level, time slot, timing advance, loop-back on/off GPRS Test Mode A, Test Mode B, BLER</p>
Channel coding	FS, EFS, HS0, HS1, AFS, AHS0, AHS1, CS-1, CS-2, CS-3, CS-4
Frequency bands	GSM450, GSM480, GSM850, P-GSM, E-GSM, R-GSM, DCS1800, PCS1900

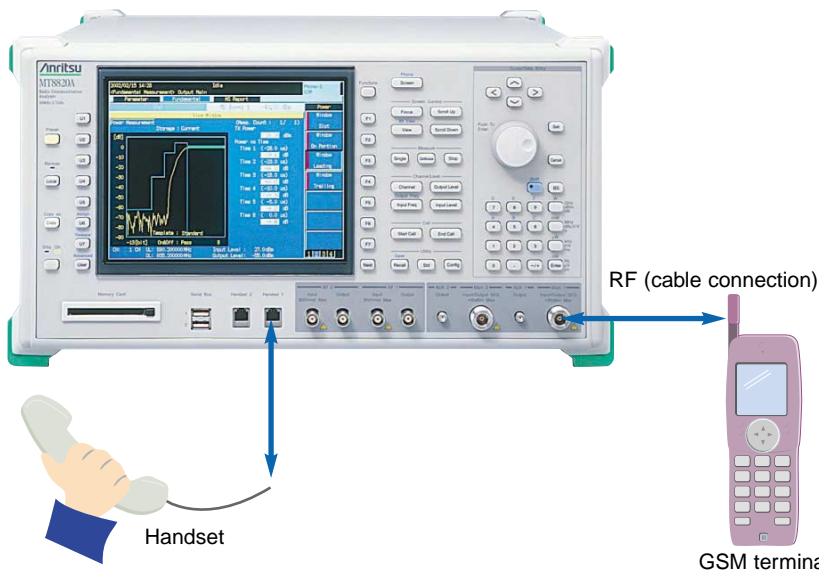
MX882001A-01 GSM Voice Codec

Real-time Voice Encoding and Decoding, Audio Measurement Function

The MX882001A-01 GSM Voice Codec is optional software that brings real-time voice encoding and decoding to the GSM 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.

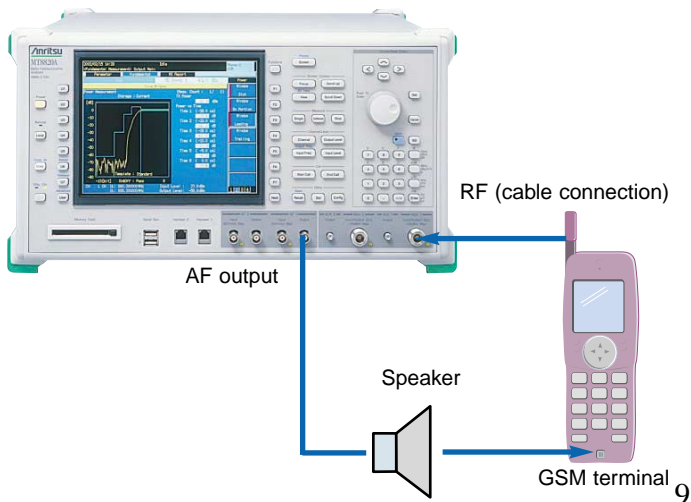
End-to-End communications testing

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



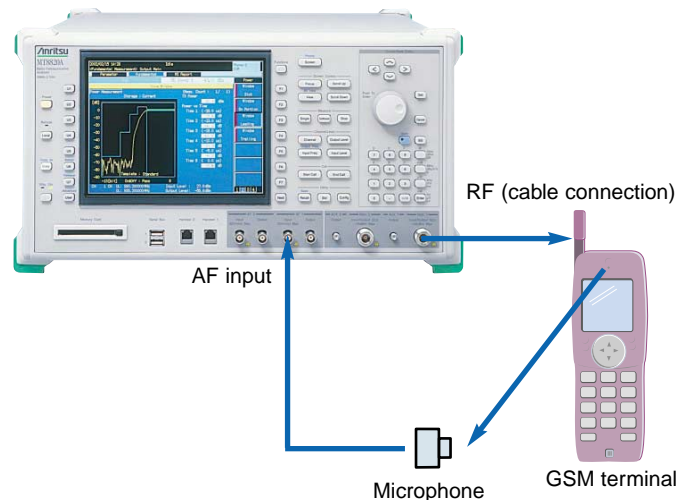
Transmission audio measurement

The tone signal outputted from AF Output connector is inputted to the 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 mobile 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, MX882001A-01 GSM Voice Codec

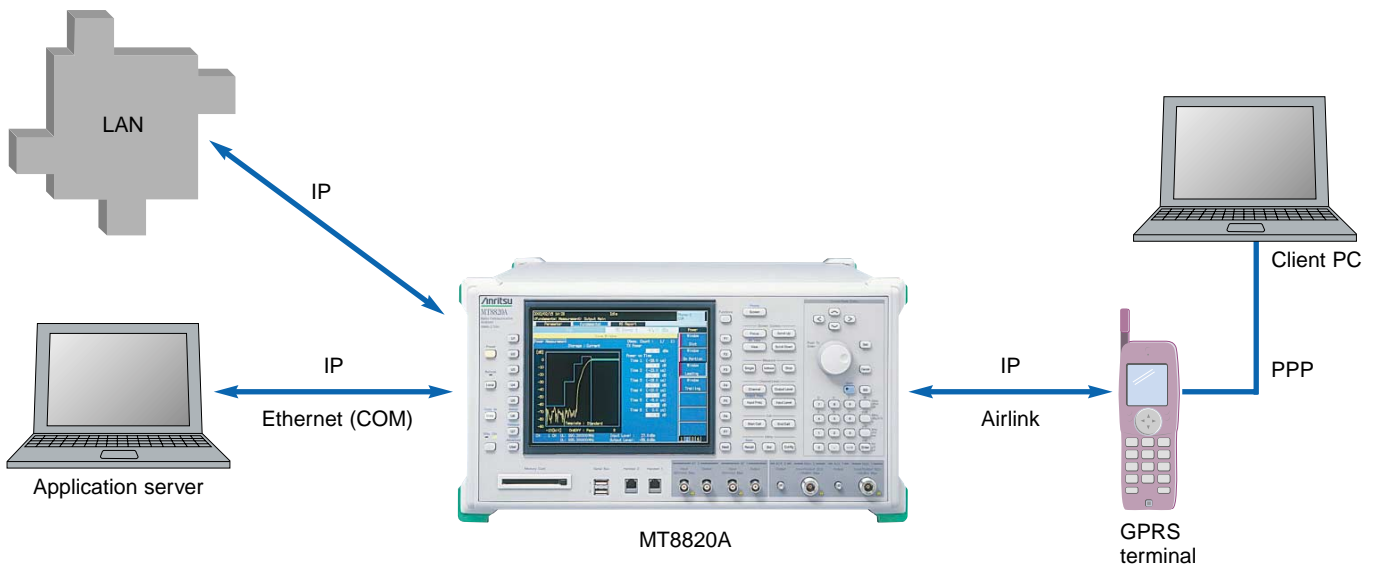
Voice codec	GSM_EFR, GSM_AMR
Codec level adjustment	Encoder input gain: -3.00 to 3.00 dB, in increments of 0.01 dB Handset microphone volume: 0, 1, 2, 3, 4, 5 Handset speaker volume: 0, 1, 2, 3, 4, 5
AF output	Frequency range: 30 Hz to 10 kHz, 1 Hz resolution Setting range: 0 to 5 V _{peak} (AF Output 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: In ≤ 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 adjustment	Accuracy: ± 0.2 dB (≥ 10 mV _{peak}), ± 0.4 dB (≥ 1 mV _{peak} , ≥ 1 kHz)
SINAD measurement	At 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	At frequency 1 kHz in ≤ 30 kHz band, ≤ -60 dB (≥ 1000 mV _{peak}), ≤ -54 dB (> 50 mV _{peak}), ≤ -46 dB (≥ 10 mV _{peak})

MX882001A-02 GSM External Packet Data

Verification Test Function for GPRS Packet Communication Data Transfer

The MX882001A-02 GSM External Packet Data option enables data transfer to/from external equipment by using the Ethernet port. Installing the MX882001A-02 enables End-to-End data transfer between an application server connected to the MT8820A and GSM/GPRS terminal or equipment connected to LAN network and GSM/GPRS terminal under near-actual operating environment.

External packet test



Sample MT8820A connection

MX882001A-11

EGPRS Measurement Software

Utilizing an advanced high-speed measuring method and offering batch measurements to support EGPRS terminal production

The MX882001A-11 EGPRS Measurement Software supports transmission and reception measurements of mobile terminals conforming to EGPRS which is the advanced system of GPRS. MX882001A-11 EGPRS Measurement Software supports coding scheme of MCS1-MCS4 which uses the modulation type of GMSK and coding scheme of MCS5-MCS9 which uses the modulation type of 8PSK.

EGPRS

Transmission Measurement

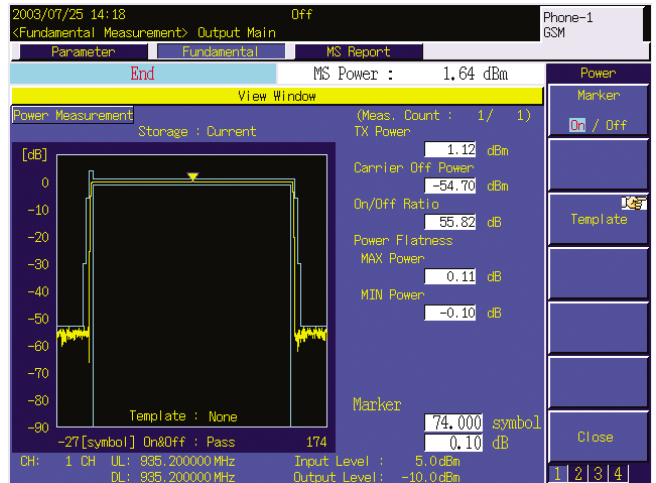
Transmission power

When the number of measurement repetitions is set to two or more, the EGPRS terminal transmission power; maximum, average and minimum values of measured results are displayed, enabling the distribution of the terminal characteristics to be evaluated. This repeat measurement function is also available for other measurements.

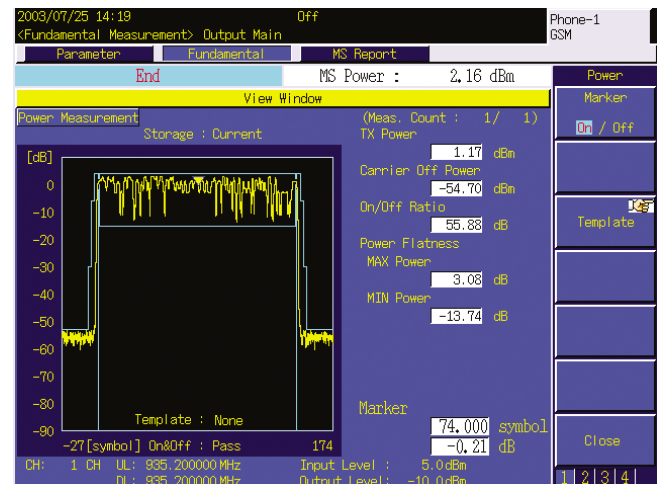
Power vs. Time

Power at five measuring points for each burst rise/ fall edge can be measured, with measuring time set in increments of 0.1 μ s resolution.

Graphical display of the burst waveform is also available. Magnified display of the entire time slot and the burst-on area as well as the rising/falling edges enables users to confirm at a glance whether or not the burst waveform meets the GSM standard template.



Entire time slot of GMSK

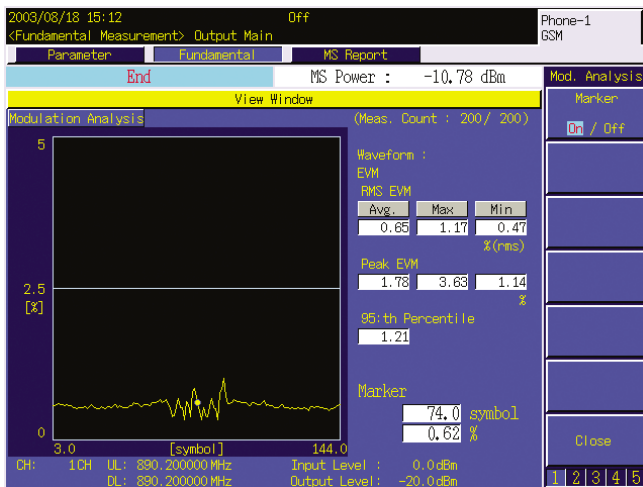


Entire time slot of 8PSK

Modulation analysis

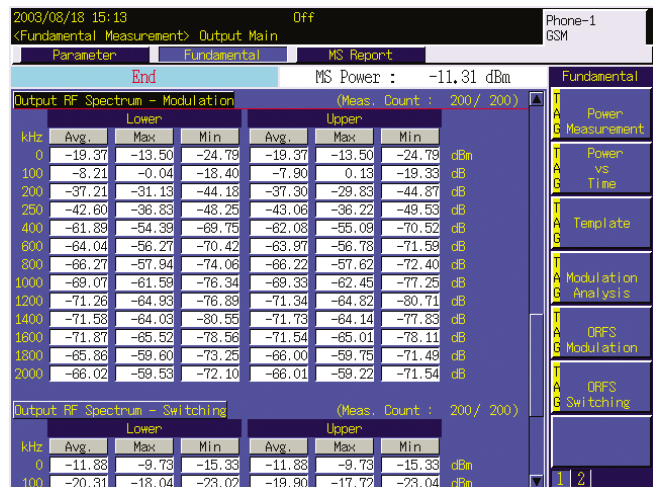
Simultaneous measurement and display of frequency, frequency error (in kHz and ppm), phase error and peak phase error are performable for GMSK modulation signal.

Amplitude error at the burst-on area can also be measured. Measurement of EVM, PEAK EVM, 95th percentile EVM, origin off-set, etc. are performable for 8PSK modulation signal.



Output spectrum

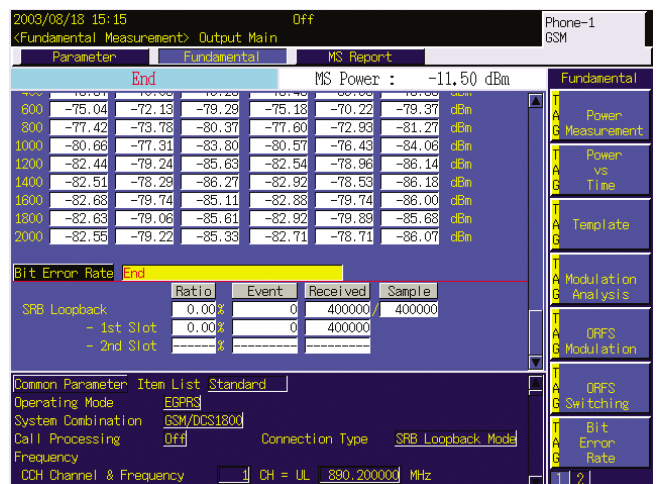
Power spectrum is measured at a total of 25 frequency points within the range of ± 2 MHz from the carrier frequency. "Modulation" is the spectrum resulting from the modulation signal around the center of burst signal, while "Switching" is the spectrum resulting from the rise and fall of the burst signal. In addition to the latest DSP technology, high-speed measurement is achieved as the output spectrum can be processed in parallel with other measurements.



Reception Measurement

Error rate test

By controlling EGPRS terminals to the loop-back conditions (Equivalent to EGPRS switched Radio Block Loopback Mode), the up-link RF signal, which is looped back from the terminal, is demodulated to measure bit error rate. These measurements can be processed in parallel with the transmission measurements.



Specifications

• MT8820A-02 TDMA Measurement Hardware, MX882001A-11 EGPRS Measurement Software

Frequency/modulation measurement	<p>Frequency: 300 to 2200 MHz Input level: -30 to +40 dBm (average power of burst signal, MAIN connector) Measurement items: Normal burst (GMSK, 8PSK), RACH Carrier frequency accuracy: reference oscillator accuracy + 10 Hz at normal burst measurement reference oscillator accuracy + 20 Hz at RACH measurement Residual phase error (GMSK) : $\leq 0.5^\circ$ rms, 2° peak Residual EVM (8PSK) : $\leq 1.5\%$ rms Waveform display: phase error VS. bit number, Amplitude error VS. bit number, EVM VS. bit number</p>
Amplitude measurement	<p>Frequency: 300 to 2200 MHz Input level: -30 to +40 dBm (average power of burst signal, MAIN connector) Measurement items: Normal burst (GMSK, 8PSK), RACH Measurement accuracy: ± 0.5 dB (-20 to +40 dBm), ± 0.7 dB (-30 to -20 dBm) *After calibration Linearity: ± 0.2 dB (0 to -40 dB, ≥ -30 dBm) Carrier-off power: ≥ 65 dB (input level ≥ -10 dBm), ≥ 45 dB (input level ≥ -30 dBm) Burst waveform display: Rise, fall, time slot, burst-on</p>
Output RF spectrum measurement	<p>Frequency: 300 to 2200 MHz Input level: -10 to +40 dBm (average power of burst signal, MAIN connector) Measurement item: Normal burst (GMSK, 8PSK) Measurement points: ± 100 kHz, ± 200 kHz, ± 250 kHz, ± 400 kHz, ± 600 kHz, ± 800 kHz, ± 1000 kHz, ± 1200 kHz, ± 1400 kHz, ± 1600 kHz, ± 1800 kHz, ± 2000 kHz Measurement range in modulation area: ≤ -55 dB (≤ 250 kHz offset), ≤ -66 dB (≥ 400 kHz offset) *Average of 10-time measurement Measurement range in transient area: ≤ -57 dB (≥ 400 kHz offset)</p>
RF signal generator	<p>Output frequency: 300 to 2200 MHz (in increments of 1 Hz) Phase error: $\leq 1^\circ$ rms, $\leq 4^\circ$ peak Modulation accuracy (8PSK): $\leq 3\%$ rms Output patterns: OCH, TCH, OCH + TCH TCH data: PN9, PN15, ALL 0, ALL 1, Fixed Pattern (PAT0-PAT9)</p>
Error rate measurement	<p>Function: Error rate measurement of bit Measurement items: Loop-back data inserted in up-link TCH</p>
Coding scheme	MCS1-MCS4 (GMSK), MCS5-MCS9 (8PSK)
Puncturing scheme	P1, P2, P3

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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