Product Brochure

MT8820A
Radio Communication Analyzer
30 MHz to 2.7 GHz
The MT8820A hardware platform covers a frequency range of 30 MHz to 2.7 GHz. When dedicated measurement software and hardware (options) are installed, this single platform supports evaluation of all the main transmission/reception test items for W-CDMA/HSDPA, GSM/GPRS/EGPRS, cdma2000 1x (IS-2000), cdma2000 1xEV-DO, PDC and PHS/ADVANCED PHS terminals. Advanced DSP (Digital Signal Processing) and parallel-measurement technology 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 repeat measurements for each measurement can be set independently. The 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 power, occupied bandwidth and BER. The standard GPIB interface enables for the MT8820A to be configured in existing automated production lines or to configure automatic test systems in maintenance site. cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA).

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*1: For W-CDMA terminal connectivity, contact your Anritsu sales representative.
Main Measurement Function

Output Power
The MT8820A enables measuring output power of mobile terminals. When the number of measurements is set to two or more, the max., mean, and min. values of the result are displayed, providing evaluation of the mobile terminal randomness. This repeat measurement function is also available for other measurements.

Example of output power measurement (W-CDMA)

Modulation Analysis
The MT8820A enables modulation analysis of mobile terminal. For example in GSM, simultaneous measurement of frequency, frequency error (in KHz and ppm), phase error and peak phase error is performable. Amplitude error at the burst section can be also measured.

Example of modulation analysis (GSM)

Receiver Measurement
Measurement of the error rate conforming to the standard of each communication system is performable. For example, in W-CDMA, the bit error rate can be measured by the loopback test mode specified in the 3GPP standards.
W-CDMA/HSDPA Measurement Function

- With W-CDMA Measurement Software, Hardware and HSDPA Measurement Software

The MT8820A-01 W-CDMA Measurement Hardware can measure the main test items of transmission and reception characteristics for 3G W-CDMA conforming to 3GPP in combination with MX882000B W-CDMA Measurement Software and MX88205xA W-CDMA Call Process Software. The combined use of MX882000B-11 HSDPA Measurement Software enables the measurement of main Tx and Rx characteristics on HSDPA.

Transmitter Measurements
This test can measure output power, frequency error, occupied bandwidth, spectrum emission mask, spectrum monitor, adjacent channel leakage power ratio, modulation accuracy and peak code domain error.

Close Loop Power Control
It is possible to transmit any particular TPC (Transmission Power Control) bit row to a W-CDMA terminal. W-CDMA 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.

Downlink RF Signal Generation Function
The relative level for each of the CPICH*, P-CCPCH*, SCH*, PICH*, DPCH*, S-CCPCH*, AICH*, HS-SCCH* and HS-PDSCH* code channels can be set in a range of –30 to 0 dB. In addition, OCNS* and AWGN* are also provided, enabling to generate arbitrary downlink 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).

* Please refer to an individual catalogue of MX882000B W-CDMA Measurement Software for details.

Receiver Measurements
Bit error rate can be measured by the loopback test mode specified in the 3GPP standards or by directly inputting the demodulated data and clock signals from a W-CDMA terminal. Either PN9 or PN15 is selectable for data pattern inserted in the downlink RF signal.
GSM/GPRS/EGPRS Measurement Function
- With GSM, EGPRS Measurement Software and TDMA Measurement Hardware

Transmitter Measurements
This test can measure transmission frequency, modulation accuracy, transmission power, adjacent channel power and output spectrum. When Test Mode A/B is selected in GPRS measurement, power versus time (template mask evaluation)\(^\ast\), frequency error, phase error (rms and peak) and output spectrum\(^\ast\) of the designated 1 slot can be measured similarly to GSM.

EGPRS measurement brings the measurement of Output Power, Power versus Time, Modulation Analysis and Output Spectrum of EGPRS mobile terminals.

\(^\ast\): Can be measured up to 2 uplink slots.

Receiver Measurements
By controlling GSM terminals under the loopback conditions, the uplink RF signal, which is looped back from the GSM terminal, is demodulated to measure frame error rate, bit error rate and CRC error rate. The FAST BER mode enables high-speed BLER measurement corresponding to each GSM terminal class and coding scheme when Test Mode B or BLER measurement is selected, by controlling GPRS terminals to loopback condition. These measurements are performable in parallel with the transmission measurements.

With an EGPRS terminal controlled to loopback state from an external PC, uplink RF signal that is looped back from the EGPRS terminal is demodulated to measure bit error. Similarly to GPRS, such measurement is performable simultaneously with Tx measurement.

\* Please refer to an individual catalogue of MX882001A GSM Measurement Software for details.
cdma2000 1x Measurement Function

- With CDMA2000 Measurement Software and Hardware

The MT8820A-03 CDMA2000 Measurement Hardware can measure the major transmission/reception characteristics on the third-generation cdma2000 1x terminals conforming to 3GPP2, in combination with the MX882002A CDMA2000 Measurement Software.

**Transmitter Measurements**
Transmitter measurement includes measurements of transmission power, modulation analysis, occupied bandwidth, code domain power, spurious emission mask and access probe power of cdma2000 1x terminals.

**Receiver Measurements**
FER (Frame Error Rate) measurement and Pass/Fail evaluation at SO2, SO9, SO55 and SO32 (TDSO) can be performed. FER, error frame count, transmission frame count, confidence level and Pass/Fail evaluation results are displayed.

**Handoff Function**
On the Handoff window, parameters after Handoff [Band Class Channel, Protocol Revision (P_REV), Radio Configuration, Service Option] can be set. Also, Handoff can be performed according to the preset parameters.

* Please refer to an individual catalogue of MX882002A CDMA2000 Measurement Software for details.
cdma2000 1xEV-DO Measurement Function

- With 1xEV-DO Measurement Software and Hardware

The MT8820A-04 1xEV-DO Measurement Hardware, in combination with MX882003A 1xEV-DO Measurement Software1, is able to measure main Tx characteristics on 3rd-generation cdma2000 1xEV-DO conforming to 3GPP2.

1: Requires MT8820A-03, MT8820A-04 and MX882002A

Transmitter Measurements

Access Probe Power Measurement
The level trigger acquires the first Access Probe from a 1xEV-DO terminal to measure the average power. Even in continuous measurement mode, the measured value is kept once the measurement of probe is terminated. It is effective for the measurement of 3.1.2.3.1 Range of Open Loop Output Power in the 3GPP2 standard C.S0033.

Open Loop Time Response Measurement
(Open Loop Time Response Screen)
On the Open Loop Time Response screen, it is a screen for measuring the time response of open loop power control of a 1xEV-DO terminal. Change of the transmitted power of a 1xEV-DO terminal is measured between 100 ms from the point where the power of a forward link signal changed.

* Similarly the MX882002A can perform the Open Loop Time Response measurement.

Receiver Measurements
PER (Packet Error Rate) measurement and Pass/Fail evaluation can be performed in FTAP. The PER, error packet count, transmission packet count, confidence level, and Pass/Fail results are displayed.

* Please refer to an individual catalogue of MX882003A 1xEV-DO Measurement Software for details.
PDC Measurement Function

- With PDC Measurement Software and TDMA Measurement Hardware

The MT8820A-02 TDMA Measurement Hardware, in combination with MX882004A PDC Measurement Software, is able to measure main Tx and Rx measurements of second-generation PDC system which are most common mobile terminal in Japan.

Transmitter Measurements
Transmission measurement includes measurements of transmission power, occupied bandwidth, modulation accuracy, adjacent channel power and transmission speed of PDC terminals.

Receiver Measurements
Bit error rate can be measured on receipt of demodulation data and clocks output from a PDC terminal by controlling the PDC terminal with external PC etc. This measurement can be performed in parallel with transmission measurement.

* Please refer to an individual catalogue of MX882004A PDC Measurement Software for details.
The MT8820A-02 TDMA Measurement Hardware, in combination with MX882005A PHS Measurement Software, is able to measure main Tx and Rx measurements of PHS terminals/base stations which are spreading throughout the world centering on Asia including Japan. The combined use of MX882005A-11 ADVANCED PHS Measurement Software enables the measurement of main Tx and Rx characteristics on Advanced PHS.

**Transmitter Measurements**
RF Power, Carrier-off Leakage Power, Frequency, and Modulation Accuracy of PHS terminals/base stations are measured simultaneously and can be displayed. Advanced PHS measurement, Modulation of D8PSK and 16QAM, can be performed similarly to the PHS measurement.

**Receiver Measurements**
Bit error rate can be measured on receipt of demodulation data and clocks output from a PHS terminal/base station by controlling the terminal with external PC etc. This measurement can be performed in parallel with transmission measurement. Also Bit error rate can be measured on receipt with a Advanced PHS terminal/base station.

* Please refer to an individual catalogue of MX882005A PHS Measurement Software for details.
Real-time Voice Encoding and Decoding

The MX88200B-01 W-CDMA (MX882001A-01 GSM) Voice Codec is optional software that brings real-time voice encoding and decoding to the W-CDMA (GSM) Measurement Software. Installation of this and the MT8820A Option 11 (Audio Board) achieves end-to-end communication testing with handsets. In addition, the audio measuring function enables transmission/reception audio measurements to be performed while a call is connected.

**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 output from AF Output connector is inputted to the mobile terminal microphone. Then the MT8820A demodulates uplink 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.
Parallelphone Measurement Function

- With Parallelphone Measurement Software and Hardware

Enables connection and simultaneous measurement of two different mobile terminals

With the Parallelphone\(^1\) measurement option enabled by installing the MT8820A-12, a MT8820A can measure two different mobile terminals by connecting them via its second RF, AF, GPIB and Ethernet ports.

The MT8820A is equipped with two RF, AF, GPIB and Ethernet ports, respectively, enabling independent control for each. Using the MT8820A-12 promotes further reduction in cost (return on direct investment, energy saving) and space in the production of various mobile terminals, greatly contributing to the improvement of production efficiency.

For example, when a W-CDMA terminal is connected to the Mobile Terminal 1 side and another W-CDMA terminal to the Mobile Terminal 2 side, two mobile terminals with the same communication system (W-CDMA in this case) can be tested simultaneously.

The MT8820A supports parallel phone measurement\(^2\) for the W-CDMA/HSDPA, GSM/GPRS/EGPRS, cdma2000 1x, cdma2000 1xEV-DO, PDC and PHS/ADVANCED PHS communication systems.

\(^1\): Parallelphone is the registered trademark of Anritsu Corporation.

\(^2\): All measurement hardware can be implemented together.

![Parallelphone Measurement Function Diagram]

**Specifications**

MX882010A Parallel Phone Measurement Software

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main2 Input/Output, AUX2 Output</td>
<td>Identical to Main1 Input/Output and AUX1 Output specified by the MT8820A and the measurement software installed in the MT8820A.</td>
</tr>
<tr>
<td>AF2 Input, Output</td>
<td>Identical to AF1 Input and Output specified by the measurement software. These are enabled only when the MT8820A-11 Audio Board is installed.</td>
</tr>
</tbody>
</table>

\* The MT8820A-12 (32) Parallel Phone Measurement Hardware requires MX882010A Parallel Phone Measurement Software and corresponding measurement software and measurement hardware (e.g. For W-CDMA PPM two boards and one measurement software is required)
External Packet Data
- With Measurement Software Option

Test function for packet communication data transfer

External Packet Data software option enables to perform data transfer to/from external equipment via an Ethernet port in the rear of MT8820A. Installing the Measurement Software option 02 series (MX882051A-02/MX882001A-02/MX882002A-02/MX882003A-02) realizes end-to-end data transfer between an application server connected to the MT8820A and a W-CDMA (GPRS, cdma2000 1x, cdma2000 1xEV-DO) terminals or a client PC connected to a W-CDMA (GPRS, cdma2000 1x, cdma2000 1xEV-DO) terminals, enabling various application tests to be performed.

Sample MT8820A connection

* Please refer to the individual catalogues of MX882000B, MX882001A, MX882002A/MX882003A Measurement Software for details.
W-CDMA Video Phone Test
- With Measurement Software Option

End-to-end test function for video phones between two MT8820A units

W-CDMA video phone test realizes data transfer between two MT8820As via an Ethernet port in the rear of MT8820A. When the MX88205xA-03 W-CDMA Video Phone Test option is installed in the mainframe, end-to-end testing can be performed between two W-CDMA video phone terminals connected to two MT8820As respectively.

Sample MT8820A connection: when MT8820A is two sets

Sample MT8820A connection: when MT8820A is one set (Parallelphone measurement correspondence)

* Please refer to an individual catalogue of MX882000B W-CDMA Measurement Software for details.
The functional test of mobile terminal corresponding to two systems, cdma2000 1x and cdma2000 1xEV-DO, is realized.

Using the MX882002A and MX882003A with two MT8820A units or one MT8820A unit with the Parallelphone\(^1\) measurement option installed, cdma2000 1x and 1xEV-DO Forward Link signals with their system times synchronized can be output. This function allows the performance of functional tests for mobile terminal supporting both the cdma2000 1x and 1xEV-DO systems\(^2\).

\(^1\): Parallelphone is the registered trademark of Anritsu Corporation.

\(^2\): This function cannot be used when MX882000B W-CDMA Measurement Software is loaded. Please perform unload, when MX882000B is loaded.
Connection Test
The call processing function enables performance of various connection tests including location registration, terminal call origination, network call origination, disconnection from mobile terminal and disconnection from network. During a call, the user’s speech can be looped back from the mobile terminal to provide a simple voice communication test.

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.

Mobile Terminal Report Monitor
Mobile terminal status can be displayed based on the measurement report that the mobile terminal sends back to the tester. "RX Level" monitoring shows the downlink RF signal level received by the mobile terminal.

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 a command 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. Since the step size of the control program is also reduced, this provides a real benefit to the user for the creation of a control program that is easy to read and maintain.
1. Function: Executes function menu
2. Screen Control: Switches between operation window and display window, etc.
3. Measure: Selects measurement mode and starts and stops measurement
4. Channel/Level: Sets input/output channels, frequency and level
5. Call: Calls mobile terminal and disconnects communications link
6. Utility: Saves and reads parameter settings, etc.
7. Cursor/Data Entry: Confirms cursor movement and input of parameter settings
8. Memory Card: Slot for Type II PCMCIA card used to save and recall measured data and measurement conditions and for updating measurement software.
9. Handset 1/2: A handset is connected to the RJ11 connector. End to end test between mobile terminal and MT8820A can be performed.
10. AF 1/2: Input/output connectors for audio measurement
11. Connectors for mobile terminal: For RF measurement of mobile terminal (N and SMA types)
12. 10Base T-1/2: For external data transmission when using the external packet data option.
## Specifications

### MT8820A (Mainframe)

**General**
- **Frequency range:** 30 to 2700 MHz
- **Max. input level:** +35 dBm
- **Impedance:** 50 Ω
- **VSWR:**
  - ≤ 1.2 (≤ 1.6 GHz)
  - ≤ 1.25 (1.6 to 2.2 GHz)
  - ≤ 1.3 (> 2.2 GHz)
- **Connector:** N type

**Auxiliary 1 output connector**
- **Impedance:** 50 Ω
- **VSWR:** ≤ 1.3 (≤ 10 dBm)
- **Connector:** SMA type

**Reference oscillator**
- **Frequency:** 10 MHz
- **Level:** TTL
- **Startup characteristics:** ≤ ±5 x 10⁻⁸ (at 10 min after startup referenced to frequency 24 h after startup)
- **Aging rate:** ≤ ±2 x 10⁻⁸/year
- **Temperature characteristics:** ≤ ±5 x 10⁻⁸
- **Connector:** BNC type

**External reference input**
- **Frequency:** 10 MHz or 13 MHz (±1 ppm)
- **Level:** ≥ 0 dBm
- **Impedance:** 50 Ω
- **Connector:** BNC type

**RF signal generator**
- **Frequency**
  - **Frequency range:** 30 to 2700 MHz (setting range: 0.4 to 2700 MHz)
- **Setting resolution:** 1 Hz
- **Accuracy:** Due to reference oscillator accuracy
- **Output level**
  - **Level range:** –140 to –10 dBm (Main 1), –130 to 0 dBm (AUX 1)
  - **Resolution:** 0.1 dB
  - **Accuracy:** ±1.0 dB (–120 to –10 dBm, Main 1, after calibration), ±1.0 dB (–110 to 0 dBm, AUX 1, after calibration)
- **Signal purity**
  - **Non-harmonic spurious:** ≤ –50 dBc (at offset frequency: ≥ 100 kHz, except Uplink frequency – Downlink frequency + 4.1825 GHz), ≤ –40 dBc [spurious of (4.8 GHz – Downlink frequency GHz) GHz at ≥ 2.1 GHz]
  - **Harmonics:** ≤ –25 dBc
- **Uninterrupted level variation**
  - **Variable range:** 0 to –30 dB
  - **Resolution:** 1 dB

**Others**
- **Display**
  - Color 8.4" TFT LCD, 640 x 480 dots
- **External control**
  - GPIB: Control from external host with main unit as device (excluding some functions such as power-on), no external device control
- **Interface functions:** SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2

**Power supply**
- **100 to 120/200 to 240 Vac (–15%/+15%, 250 V max.), 47.5 to 63 Hz, ≤ 300 VA (with Option 01), ≤ 650 VA (with all Options)**

**Dimensions and mass**
- 426 (W) x 221.5 (H) x 498 (D) mm (excluding projections), ≤ 27 kg (with Option 01), ≤ 34 kg (with all Options)

**Environmental conditions**
- **Operating temperature and humidity:** 0 to +50°C, ≤ 95% (no condensation)
- **Storage temperature and humidity:** –20 to +60°C, ≤ 95% (no condensation)
- **LVD:** EN61010-1: 2001 (Pollution Degree 2)
# Ordering Information

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

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<td>W-CDMA Measurement Hardware</td>
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<td>MT8820A-02</td>
<td>W-CDMA Measurement Hardware</td>
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<tr>
<td>MT8820A-03</td>
<td>CDM2000 Measurement Hardware</td>
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<tr>
<td>MT8820A-04</td>
<td>1xEVDO Measurement Hardware</td>
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<tr>
<td>MT8820A-11</td>
<td>Audio Board</td>
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<tr>
<td>MT8820A-12</td>
<td>Parallel Phone Measurement Hardware</td>
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<tr>
<td>MT8820A-21</td>
<td>W-CDMA Measurement Hardware retrofit</td>
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<td>MT8820A-22</td>
<td>TDMA Measurement Hardware retrofit</td>
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<td>MT8820A-23</td>
<td>CDM2000 Measurement Hardware retrofit</td>
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<td>MT8820A-24</td>
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<tr>
<td>MT8820A-31</td>
<td>Audio Board</td>
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<td>MT8820A-32</td>
<td>Parallel Phone Measurement Hardware retrofit</td>
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## Softwares

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<td>W-CDMA Measurement Software</td>
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<td>MX882000B-01</td>
<td>W-CDMA Voice Codec</td>
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<td>MX882001A</td>
<td>HISDP Measurement Software</td>
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<td>MX882001A-01</td>
<td>GSM Measurement Software (requires MT8820A-02)</td>
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<tr>
<td>MX882001A-03</td>
<td>GSM Voice Codec (requires MT8820A-11 and MX8820B0B)</td>
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<tr>
<td>MX882001A-07</td>
<td>EGPRS Measurement Software (requires MX8820A-03)</td>
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<td>MX882002A</td>
<td>CDM2000 Measurement Software (requires MT8820A-03)</td>
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<td>MX882002A-01</td>
<td>CDM2000 External Packet Data (requires MX8820B0A)</td>
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<td>MX882002A-03</td>
<td>1xEVDO Measurement Software (requires MX8820B0A)</td>
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<td>MX882002A-05</td>
<td>EGPRS Measurement Software (requires MT8820A-02)</td>
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<td>EGPRS Measurement Software (requires MX8820A-02)</td>
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## Option Software

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<tr>
<td>MX882008A</td>
<td>CFA (Compact Flash Association) ity Plm protective cover)</td>
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</tbody>
</table>
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