Product Brochure

For MT8820B Radio Communication Analyzer

MX882001C
GSM Measurement Software

MX882001C-011
EGPRS Measurement Software
Advanced High-speed Measurement Method and Batch Measurement Supporting the Manufacture of GSM/GPRS Terminals

The MX882001C GSM Measurement Software supports measurement of transmitters and receivers of digital mobile terminals conforming to GSM/GPRS/EGPRS—the world’s most widely used digital mobile standard. When the MX882001C GSM Measurement Software and MX882000C W-CDMA Measurement Software are installed in the MT8820B main frame, the Tx and Rx characteristics of dual-mode W-CDMA/GSM terminals, which are becoming very popular worldwide, can be evaluated using a single MT8820B unit.

Anritsu’s advanced DSP (Digital Signal Processing) and parallel-measurement technologies greatly reduce test times on automated production lines as well as when testing mobile terminals. Any combination of test parameters can be set, facilitating speedy batch measurement, and the number of measurements for each measurement item can be set independently.

At GSM measurement, selected measurement items can be batch-processed by one-touch operation, supporting easy, fast Go/No-Go evaluation of major test items including frequency error, modulation accuracy, transmit power, output RF spectrum, and BER.

At GPRS measurement, frequency error, modulation accuracy and transmit power are measured using a Test Mode A connection, while BLER with selected multislot class and coding scheme is measured using either a Test Mode B or BLER connection.

The built-in GPIB interface enables the MT8820B to be integrated into automated test systems for after-sales maintenance, as well as into automated production lines.

*: Requires MX882001C-011 for EGPRS measurement

### GSM Measurements

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### GPRS Measurements

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<td>Mobile Terminal Report Monitor (Multislot Class, etc)</td>
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MX882001C GSM Measurement Software

GSM

Transmitter Measurements

Transmit Power

When two or more measurements are made, the maximum, average, and minimum results are displayed, supporting evaluation of the GSM terminal transmit power. This functionality is also supported 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 µs resolution.

Burst Waveform Display

Burst waveforms can be displayed graphically, and a magnified display of the entire time slot and burst-on interval, as well as the rising and falling edges, supports easy evaluation of whether the burst waveform is within the limits of the power time template.

Rising Edge

Falling Edge

Entire Time Slot
Modulation Analysis

The frequency, frequency error (in kHz and ppm), phase error, and peak phase error can be measured simultaneously. The amplitude error of the burst-on interval can be measured too.

Receiver Measurements

Error Rate Test

The uplink RF signal, which is looped back from GSM terminal, is demodulated by controlling the GSM terminal in the loopback condition to measure the frame error, bit error, and CRC error rates. The error rate for TCH/FS, TCH/HS, TCH/EFS, TCH/AFS and TCH/AHS can be measured. The FAST BER mode is also available. Transmitter measurements can be run in parallel with error-rate measurements as well.

Output RF Spectrum

The spectrum can be measured at a total of 25 frequency points within the range of ±2 MHz of the carrier frequency. “Modulation” is the spectrum resulting from the modulated signal around the center of the burst signal, while “Switching” is the spectrum resulting from the rising and falling edges of the burst signal. In addition to using advanced DSP technology, parallel measurement supports faster display of the output RF spectrum.
Mobile Terminal Report Monitor

The GSM terminal status can be displayed as a periodic report sent by the GSM terminal to the MT8820B. The downlink RF signal level at the GSM receiver can be checked with the Rx level reported from the GSM terminal.

GPRS

Multislot Class and Coding Scheme

Various combinations of uplink/downlink slots can be selected for GPRS terminals with class 1 to 11.

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

Measurement Function

The MX882001C GSM Measurement Software supports GPRS measurement and terminals supporting both GSM and GPRS can be tested much faster because the software switches quickly between GSM and GPRS measurements.

Call Processing

Connection Tests

Various connection tests, such as registration, call origination from terminal and network, terminal disconnect, and network disconnect, can be tested using the call processing functionality. Moreover, simple voice communication can be tested during a call using voice loopback.
Connection Type

Test Mode A, Test Mode B, and BLER connections are supported. In Test Mode A for transmitter measurements, the GPRS terminal generates pseudorandom data during uplink on PDTCH. At BLER measurement, the GPRS terminal calculates block errors in received data at downlink and reports the result to the MT8820B at uplink. The MT8820B calculates the block error rate using the report from the GPRS terminal.

Transmitter Measurements

The transmitter measurements listed below can be made with the Test Mode A connection as in GSM measurement.
- Power versus time (template mask)
- Frequency error
- Phase error (rms and peak)
- Output RF spectrum

Receiver Measurement

Block Error Rate
The block error rate can be measured using the block error reported from the GPRS terminal with the BLER connection.

Call Processing

The following functions can be tested using call processing.
- Location registration
- Connection
- Communication
- Disconnection
After connection, GPRS terminal generates uplink slot, enabling Transmission measurement and BLER measurement.
Voice Communication Test and Audio Measurement

The optional MX882001C-001 GSM Voice Codec supports real-time voice encoding and decoding in software, so end-to-end communication with terminals can be tested by installing this option and the MT8820B-011 Audio Board. In addition, the audio transmitter and receiver can be tested while calling.

End-to-End Communications Testing

Connection of a handset to the MT8820B RJ11 connector enables end-to-end communications testing between the MT8820B and a GSM terminal.

Audio Transmitter Measurement

The tone signal from the MT8820B AF Output connector is supplied to the microphone of the GSM terminal and the audio transmitter characteristics of the GSM terminal can be measured using the MT8820B to demodulate the uplink RF signal and to measure the level, frequency, and distortion of demodulated tone signal.

Audio Receiver Measurement

The tone signal demodulated by the GSM terminal is supplied to the MT8820B AF Input connector and the audio receiver characteristics of the GSM terminal can be measured by using the MT8820B to measure the level, frequency, and distortion of the tone signal at the AF Input.
The MX882001C-002 GSM External Packet Data option supports data transfer to/from external equipment via the Ethernet port on the back panel of the MT8820B. The MX882001C-002 can test end-to-end data transfer both in the local environment, such as the connection between the application server connected to the MT8820B and GPRS terminal, as well as in an almost-real environment, such as the connection between equipment connected to a LAN and GPRS terminal.

**External Packet Test**

Sample MT8820B Connection
MX882001C-011 EGPRS Measurement Software

Utilizing an Advanced High-speed Measuring Method and Offering Batch Measurements to Support EGPRS Terminal Production

The MX882001C-011 EGPRS Measurement Software supports Tx and Rx measurements of terminals supporting the enhanced GPRS system or EGPRS. It supports both the MCS-1 to MCS-4 coding schemes using GMSK modulation as well as the MCS-5 to MCS-9 coding schemes using 8PSK modulation. And installing the MX882001C-011 EGPRS Measurement Software supports EGPRS as the Operating Mode.

At EGPRS measurement, frequency error, modulation accuracy, and transmit power are measured using a Test Mode A connection, while BLER with selected multislot class and modulation and coding scheme is measured using a BLER connection; both transmitter and receiver are tested by loopback at the physical layer using an SRB loopback connection.

• EGPRS Measurements

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<th>Transmitter Measurements</th>
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</tbody>
</table>
Transmitter Measurements

Transmit Power

When two or more measurements are made, the maximum, average, and minimum results are displayed, supporting evaluation of the transmit power distribution of the EGPRS terminal. This functionality is also supported for other measurements.

Power vs. Time

The power can be measured with 0.1 µs resolution at five measurement points within the rising and falling edges of the burst signal. Burst waveforms can be displayed graphically, and a magnified display of the entire time slot and burst-on interval as well as the rising and falling edges supports easy evaluation of whether the burst waveform is within the limits of the power time template.

Modulation Analysis

The frequency, frequency error (in kHz and ppm), phase error, and peak phase error of GMSK modulated signals can be measured simultaneously. The EVM, peak EVM, 95th percentile EVM and origin offset of 8PSK modulated signals can also be measured.

Output RF Spectrum

The spectrum can be measured at a total of 25 frequency points within the range of ±2 MHz of the carrier frequency. “Modulation” is the spectrum resulting from the modulated signal around the center of the burst signal, while “Switching” is the spectrum resulting from the rising and falling edges of the burst signal. In addition to using advanced DSP technology, parallel measurement supports faster display of the output RF spectrum.
Receiver Measurements

Bit Error Rate Measurement

At SRB loopback (Switched Radio Block loopback), the bit error rate can be measured using the MT8820B-demodulated uplink RF signal looped back from the EGPRS terminal. The error rate can be measured in parallel with transmitter measurements.

Block Error Rate Measurement

At BLER connection, the EGPRS terminal calculates block errors in received data at downlink and reports the result to the MT8820B at uplink. The MT8820B calculates the block error rate using the report from the EGPRS terminal.

Call Processing

Connection Tests

The following functions can be tested using call processing.

- Location registration
- Connection
- Communication
- Disconnection

After connection, EGPRS terminal generates uplink slot, enabling Transmission measurement and BLER measurement.

Mobile Terminal Report Monitor

The EGPRS terminal status can be displayed as a periodic report sent by the EGPRS terminal to the MT8820B for checking information such as Multislot Class and BEP (Bit Error Probability).
Reduced RF Adjustment Times
Linked with Chipset Adjustment Function

Installing the MX882001C-041 GSM High-speed Adjustment cuts the RF adjustment time, running in synchronization with the chipset adjustment function on GSM terminal. And it runs IQ Capturing Measurement.

The measurement runs Fundamental Measurement screen. The measurement can’t run Fundamental Measurement, and IQ Capturing Measurement, or High-Speed Adjustment Measurement when the measurement is effective. The measurement runs with Remote Control only.

High-speed Adjustment Measurement
GSM High-speed Adjustment Measurement function adjusts both Tx and Rx. This function consists of Rx Sweep used for Rx adjustment and Tx Sweep used for Tx adjustment.

IQ Capturing Measurement
IQ Capturing Measurement converts from UL signal to Band-limited Base band signal and output sampling IQ binary data.
### Specifications

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<th>MX882001C GSM Measurement Software</th>
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</table>
| **Frequency/Modulation Measurement** | Frequency: 300 to 2700 MHz  
Input level: –30 to +40 dBm (average power of burst signal, Main)  
Measurement items: Normal burst, RACH  
Carrier frequency accuracy: ±(Set frequency × Reference oscillator accuracy +10 Hz) (When measuring Normal Burst)  
±(Set frequency × Reference oscillator accuracy +20 Hz) (When measuring RACH)  
Residual phase error: ≤0.5˚ rms, 2˚ peak |
| **Amplitude Measurement** | Frequency: 300 to 2700 MHz  
Input level: –30 to +40 dBm (average power of burst signal, Main)  
Measurement items: Normal burst, RACH  
Measurement accuracy: ±0.5 dB (–20 to +40 dBm), ±0.7 dB (–30 to –20 dBm)  
*After calibration  
Linearly: ±0.2 dB (–40 to 0 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 |
| **Output RF Spectrum Measurement** | Frequency: 300 to 2700 MHz  
Input level: –10 to +40 dBm (average power of burst signal, Main)  
Measurement item: Normal burst  
Measurement points: ±100, ±200, ±250, ±400, ±800, ±1000, ±1200, ±1400, ±1600, ±1800, ±2000 kHz  
Measurement range in modulation area: ≤–55 dB (≤250 kHz offset), ≤–66 dB (≥400 kHz offset)  
*Average of 10 measurements  
Measurement range in transient area: ≤–57 dB (≥400 kHz offset) |
| **RF Signal Generator** | Output frequency: 300 to 2700 MHz (1 Hz step)  
Phase error: ≤1˚ rms, 5˚ peak  
Output patterns: CCH, TCH, CCH + TCH  
TCH Data: PN9, PN15, ALL 0, ALL 1, Fixed Pattern (PAT0 to PAT9) |
| **Error Rate Measurement** | GSM: Error rate measurement of frame, bit and CRC  
• Loopback data inserted in uplink TCH  
• Serial data input via call processing I/O port on back panel  
GPRS: Block error rate measurement  
• Number of blocks received from terminal and inserted in uplink TCH  
• Number of USF reception blocks of terminal |
| **Call Processing** | 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, Loopback on/off  
GPRS  
• Test Mode A, Test Mode B, BLER |
| **Channel Coding** | FS, EFS, HS0, HS1, AFS, AHS0, AHS1 |
| **Coding Scheme** | CS-1, CS-2, CS-3, CS-4 |
| **Frequency Bands** | GSM450, GSM480, GSM710, GSM750, T-GSM810, GSM850, P-GSM, E-GSM, R-GSM, DCS1800, PCS1900 |
## MT8820B-011 Audio Board, MX882001C-001 GSM Voice Codec

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**Codec Level Adjustment**
- Encoder input gain: –3 to +3 dB, 0.01 dB step
- 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 step
- Setting range: 0 to 5 Vpeak (AF Output)
- Setting resolution: ±1 mVpeak = 500 mVpeak, 10 μVpeak = 50 mVpeak
- Accuracy: ±0.2 dB (≥10 mVpeak, ±50 Hz), ±0.3 dB (≥10 mVpeak, <50 Hz)
- Waveform distortion: ±30 kHz band, ≤–60 dB (500 mVpeak, ≤5 kHz), ≤–54 dB (≥70 mVpeak)
- Output impedance: ≤1 Ω
- Max. output current: 100 mA

**AF Input**
- Frequency range: 50 Hz to 10 kHz
- Input voltage range: 1 mVpeak to 5 Vpeak (AF Input)
- Max. allowable input voltage: 30 Vrms
- Input impedance: 100 kΩ

**Frequency Measurement**
- Accuracy: ± (Reference oscillator accuracy +0.5 Hz)

**Level Measurement**
- Accuracy: ±0.2 dB (≥10 mVpeak, ±50 Hz), ±0.4 dB (≤1 mVpeak, ≥1 kHz)

**SINAD Measurement**
- At frequency 1 kHz in ≤30 kHz band:
  - ±80 dB (≥1000 mVpeak), ±54 dB (≥50 mVpeak), ±46 dB (≥10 mVpeak)
- At frequency 1 kHz in ≤30 kHz band:
  - ≤–60 dB (≥1000 mVpeak), ≤–54 dB (≥50 mVpeak), ≤–46 dB (≥10 mVpeak)

**Distortion Rate Measurement**
- At frequency 1 kHz in ≤30 kHz band:
  - ≤–60 dB (≥1000 mVpeak), ≤–54 dB (≥500 mVpeak), ≤–46 dB (≥50 mVpeak)

## MT8820B-002 TDMA Measurement Hardware, MX882001C-011 EGPRS Measurement Software

**Frequency/Modulation Measurement**
- Frequency: 300 to 2700 MHz
- Input level: –30 to +40 dBm (average power of burst signal, Main)
- Measurement items: Normal burst (GMSK, 6PSK), RACH
- Carrier frequency accuracy:
  - ±(Set frequency × Reference oscillator accuracy +10 Hz) (When measuring Normal Burst)
  - ±(Set frequency × Reference oscillator accuracy +20 Hz) (When measuring RACH)
- Residual phase error (GMSK): ≤0.5˚ rms, 2˚ peak
- Residual EVM (8PSK): ≤1.5% rms
- Waveform display: Phase error versus bit number, Amplitude error versus bit number, EVM versus bit number

**Amplitude Measurement**
- Frequency: 300 to 2700 MHz
- Input level: –30 to +40 dBm (average power of burst signal, Main)
- 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

**Output RF Spectrum Measurement**
- Frequency: 300 to 2700 MHz
- Input level: –10 to +40 dBm (average power of burst signal, Main)
- Measurement item: Normal burst (GMSK, 8PSK)
- Measurement points: ±100, ±200, ±250, ±300, ±400, ±500, ±1000, ±1200, ±1400, ±1600, ±2000 kHz
- Measurement range in modulation area: ≤–55 dB (≤250 kHz offset), ≤–66 dB (≥400 kHz offset)
- Measurement range in transient area: ≤–57 dB (≥400 kHz offset)

**RF Signal Generator**
- Output frequency: 300 to 2700 MHz (1 Hz step)
- Phase error: ≤1˚ rms, 5˚ peak
- Modulation accuracy (8PSK): ≤3% rms
- Output patterns: OCH, TCH, OCH + TCH
- TCH Data: PN9, PN15, ALL 0, ALL 1, Fixed Pattern (PAT0 to PAT9)

**Error Rate Measurement**
- Error rate measurement of bit and block
  - Loopback data inserted in uplink TCH,
  - Number of blocks received from terminal and inserted in uplink TCH

**Call Processing**
- Call controlling: Location registration, Connection, Termination, Data transfer via EGPRS
- Terminal controlling: Output level, Timing advance, Test Mode A, BLER, SRB Loopback

**Coding Scheme**
- MCS1 to MCS4 (GMSK), MCS5 to MCS9 (8PSK)

**Puncturing Scheme**
- P1, P2, P3
**Ordering Information**

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

The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

<table>
<thead>
<tr>
<th>Model/Order No.</th>
<th>Name</th>
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<tr>
<td>MT8820B</td>
<td>Main frame Radio Communication Analyzer</td>
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<tr>
<td>Z0956A</td>
<td>Power Cord, 2.6 m: 1 pc</td>
</tr>
<tr>
<td>CA68ADP</td>
<td>ADF, CF40T256 (CF card, 256 MB): 1 pc</td>
</tr>
<tr>
<td>W2778AE</td>
<td>PC Card Adapter: 1 pc</td>
</tr>
<tr>
<td>MT8815B/MT8820B Operation Manual (CD-ROM):</td>
<td>1 copy</td>
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**Options**

- MT8820B-001: W-CDMA Measurement Hardware
- MT8820B-002: TDMA Measurement Hardware
- MT8820B-003: CDMA2000 Measurement Hardware
- MT8820B-004: 1xEV-DO Measurement Hardware
- MT8820B-005: 1xEV-DO Measurement Hardware
- MT8820B-006: TD-SCDMA Measurement Hardware
- MT8820B-011: Audio Board Retrofit
- MT8820B-012: Parallel Phone Measurement Hardware
- MT8820B-031: W-CDMA Measurement Hardware Lite
- MT8820B-032: TDMA Measurement Hardware Lite
- MT8820B-033: CDMA2000 Time Offset CAL For GPS SG

**Software**

- MX882000C: W-CDMA Measurement Software (requires MT8820B-001 and MX882000C)
- MX882000C-001: W-CDMA Voice Codec (requires MT8820B-001 and MX882000C)
- MX882000C-011: HSDPA Measurement Software
- MX882000C-012: HSDPA H-Set 6 Throughput Test (requires MT8820B-001, MX882000C, MX882000C-011, and MX882000C)
- MX882000C-013: HSDPA High Data Rate (requires MT8820B-001, MX882000C, MX882000C-011, and MX882000C)
- MX882000C-021: HSUPA Measurement Software (requires MT8820B-001, MX882000C, MX882000C-011, and MX882000C)
- MX882010C: GSM Measurement Software (requires MT8820B-002)
- MX882010C-001: Voice Codec (requires MT8820B-001-11 and MX882010C)
- MX882010C-002: GSM External Packet Data (requires MX882010C)
- MX882010C-011: EGPRS Measurement Software (requires MX882010C)
- MX882010C-012: GSM High-Speed Adjustment (requires MX882010C)
- MX882010C-021: CDMA2000 Measurement Software (requires MT8820B-002-003)
- MX882010C-022: CDMA2000 External Packet Data (requires MX882010C)
- MX882010C-023: 1xEV-DO Measurement Software
- MX882010C-024: 1xEV-DO External Packet Data (requires MX882010C)
- MX882010C-025: PHS Measurement Software (requires MT8820B-002)
- MX882010C-026: Advanced PHS Measurement Software (requires MX882005C)
- MX882010C-027: 1xEV-DO Rev. A Measurement Software (requires MT8820B-003, MT8820B-005, and MX882000C)
- MX882010C-028: 1xEV-DO External Data Packet (requires MX882006C)
- MX882010C-029: 1xEV-DO Rev. A Measurement Software (requires MT8820B-006C)
- MX882010C-030: TD-SCDMA Measurement Software
- MX882010C-031: TD-SCDMA Voice Codec (requires MT8820B-011 and MX882007C)
- MX882010C-032: TD-SCDMA Video Phone Test (requires MT8820B-011)
- MX882010C-033: TD-SCDMA HSUPA Measurement Software
- MX882010C-034: Parallel Phone Measurement Software
- MX882030C: W-CDMA Measurement Software Lite
- MX882030C-001: W-CDMA Voice Codec (requires MT8820B-011 and MX882030C)
- MX882030C-002: W-CDMA Band RJ (requires MX882030C-050)
- MX882030C-003: W-CDMA Band X (requires MX882030C-050)
- MX882030C-004: HSDPA Measurement Software (requires MX882030C)

**Applications**

- P0019: TEST USIM01
- P0035B: W-CDMA/GSM Test USIM
- A0013: Handset
- J129: CDMA2000 Cable
- J127: CDMA2000 Cross Cable
- J057B: Coaxial Cord (N-PD-SD-2W-N): 1 m
- J057D: Coaxial Cord (N-PD-SD-2W-N): 2 m
- J012A: Coaxial Cord (BNC-P-RG58AU-BNC-P): 1 m
- J012C: Coaxial Cord (BNC-P-RG58AU-BNC-P): 0.5 m
- J0007: GPIB Cable, 1 m
- J000P: GPIB Cable, 2 m
- MN8110B: I/O Adapter (for call processing I/O)
- B033: Joint Plate (4 pcs/set)
- B034: Rack Mount Kit
- B049: Carrying Case (hard type, with protective cover and casters)
- B049B: Carrying Case (hard type, with protective cover, without casters)
- W2776AE: MT8820B/MT8820B Operation Manual (booklet)
- W2765AE: MT882000C Operation Manual (booklet)
- W2711AE: MT882001C Operation Manual (booklet)
- W2790AE: MT882002C Operation Manual Panel Operation (booklet)
- W2791AE: MT882002C Operation Manual Remote Control (booklet)
- W2793AE: MT882003C Operation Manual Panel Operation (booklet)
- W2794AE: MT882003C Operation Manual Remote Control (booklet)
- W2796AE: MT882005C Operation Manual (booklet)
- W2693AE: MT882006C Operation Manual (booklet)
- W2931AE: MT882006C Operation Manual Remote Control (booklet)
- W2940AE: MT882007C Operation Manual (booklet)
- W2894AE: MT882030C Operation Manual (booklet)
- W2895AE: MT882031C Operation Manual (booklet)
- W2771AE: MT88207C Operation Manual (booklet)

**Warranty**

- MT8820B-ES210: Extended Two Year Warranty Service
- MT8820B-ES310: Extended Three Year Warranty Service
- MT8820B-ES510: Extended Five Year Warranty Service
- MT8820B-ES550: Extended Five Year Warranty Service

*1: The MT8820B-004 hardware supports IS-856-D (1xEV-DO Rev. 0) RF measurements but does not support IS-856-A (1xEV-DO Rev. A) measurements.
2: The following measurement measurements support the ParallelPhone measurement.
3: For terminal connectivity, contact your Anritsu sales representative.
4: These options preinstall the integrity protection function.
5: This Test USIM can be used on only W-CDMA mode.
6: When the connection of GSM or TD-SCDMA is necessary, the United States and is licensed to CFA (Compact Flash Association).
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Specifications are subject to change without notice.

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