Application Note

Anritsu

CDMA2000/1xEV-DO

MT8820A
Radio Communication Analyzer

Contents

1. CDMA2000 Measurement Software

1.1. Specifications

Functions related to AMPS can only be used when the MT8802A−11 Audio Board option is installed.

Table 1.1–1 Specifications (CDMA2000)

Item	Specification
Fundamental measurement	Measurement frequency: 300 to 2200 MHz
Magnitude measurement	Measurement level: −65 to +35 dBm Measurement accuracy: (Filtered Power measurement, after Full Cal, referenced to Input Level setting value) ±0.5 dB (−25 to +35 dBm) ±0.7 dB (−55 to −25 dBm) ±0.9 dB (−65 to −55 dBm) Linearity: (Filtered Power measurement, referenced to Input Level setting value) ±0.2 dB (0 to −40 dB, ≥−55 dBm) ±0.4 dB (0 to −40 dB, ≥−65 dBm)
Frequency/Modulation measurement	Level range: −30 to +35 dBm Carrier frequency accuracy: ±(Set frequency x Reference oscillator accuracy +10 Hz) Modulation accuracy: Residual Waveform Quality: >0.999 Residual EVM: <2% rms
Occupied bandwidth	Measurement level: −10 to +35 dBm
Code domain power	Can be measured when Reverse−RC set to 3 or 4 Measurement level range: −30 to +35 dBm Measurement accuracy: ±0.2 dB (code power ≥−15 dBc) ±0.4 dB (code power ≥−23 dBc)
FER	FER measurement with Service Option 2, 9, 55 and 32 (TDSO) Indicated items: FER, confidence level, sample frame count, error frame count
RF Signal generator	Output frequency range: 300 to 2200 MHz, 1 Hz step Channel level [(relative level to Ior (total level)]: Pilot Channel: −30 to 0 dB, 0.25 dB step or Off FCH, SCH, DCCH: −30 to 0 dB, 0.1 dB step or Off SYNCH, PCH: −30 to 0 dB, 0.25 dB step or Off OCNS: Auto, 0.01 dB step or Off QPCH: (relative level to Pilot Channel) −5 to +2 dB, 1 dB step or Off Channel level accuracy: <±0.2 dB typ. (≥−20 dB) PN offset: 0 to 511 can be set. Waveform quality: >0.99 (Pilot only, AWGN Off) AWGN AWGN level: −20 to +12 dB (relative level to CDMA signal)or Off Maximum output level of CDMA at AWGN On: −28 dBm (at MAIN output) −18 dBm (at AUX output)

Table 1.1−1 Specifications (CDMA2000) (continued)

Item	Specification
Call processing	Band Class: BC0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Call control: Location registration, Origination, Termination, Network disconnection, Terminal disconnection Radio Configuration: F–RC1+R–RC1, F–RC2+R–RC2, F–RC3+R–RC3, F–RC4+R–RC3, F–RC5+R–RC4 Service Option: SO 1, 2, 3, 9, 32, 33, 55, 32768 PCH Data Rate: Full QPCH Data rate: Full Fwd. FCH Data Rate: Full, Half, Quarter or Eighth can be set for RC1 to RC5 Fwd. Walsh Code: 10, 14, 26, 30, 42, 46, 58, 62 Fwd. DCCH Data Rate: Full at RC3 to 5 Fwd. DCCH Walsh Code: 10, 14, 26, 30, 42, 46, 58, 62 Fwd. SCH: 1 channel maximum Fwd. SCH Data Rate: RC 3: 9.6, 19.2, 38.4, 76.8, 153.6 kbps RC 4: 9.6, 19.2, 38.4, 76.8, 153.6 kbps RC 5: 14.4, 28.8, 57.6, 115.2, 230.4 kbps Access Probe: Access Channel usable Rev. Closed Loop Power Control modes: Closed Loop, Alternate, All 0 (All up), All 1 (All down) Supported protocols: IS–95B, J–STD–008C, ARIB T–53, Korean PCS, IS–2000 (SR1) Handoff: Universal Handoff, Band Class/Channel Handoff, Protocol Revision handoff, RC/SO Handoff, Analog Handoff (requires MT8820A−11 Audio Board)

Table 1.1–2 Specifications (AMPS)

Item	Specification
Fundamental measurement	Measurement frequency: 800 to 960 MHz
Magnitude measurement	Measurement level: −65 to +35 dBm Measurement accuracy: (After Full Cal, Input Level setting) ±0.5 dB (−25 to +35 dBm) ±0.7 dB (−55 to −25 dBm) ±0.9 dB (−65 to −55 dBm) Linearity: (Input Level setting for reference) ±0.2 dB (0 to −40 dB, ≥−55 dBm), ±0.4 dB (0 to −40 dB, ≥−65 dBm)
RF frequency	Measurement level: −30 to +35 dBm Carrier frequency accuracy: ±(Set frequency x Reference oscillator accuracy + 10 Hz)
FM measurement	Measurement level: −30 to +35 dBm Measurement frequency deviation: 0 Hz to 20 kHz Demodulation frequency: 30 Hz to 20 kHz
Deviation measurement	Measurement accuracy (At Demodulation frequency: 1 kHz): Indicated value ±2% + Residual FM Frequency characteristics (At Demodulation frequency: 30 Hz to 20 kHz, 1 kHz reference, Frequency deviation: 5 kHz): ±0.5 dB Residual FM (At Demodulation frequency: 300 Hz to 3 kHz): <10 Hz rms
Demodulation distortion	Demodulation distortion (At Demodulation frequency: 1 kHz, Demodulation frequency band: 0.3 to 3 kHz, Frequency deviation: 5 kHz): < 0.3 %
Analog RF signal generator (FM)	Output frequency: 800 to 960 MHz, 1 Hz step Frequency deviation: 0 to 20 kHz, Resolution: 5 Hz Modulation signal: Internal modulation only, sine wave, set frequency: 20 Hz to 10 kHz, Resolution: 5 Hz Deviation accuracy (At Modulation frequency: 1 kHz, Demodulation frequency bandwidth: 300 Hz to 3 kHz): ± (3.5%+10 Hz) Frequency characteristics (At Frequency deviation: 4 kHz, Modulation frequency: 1 kHz for reference): ±0.5 dB (Modulation frequency: 0.3 to 3 kHz) ±1.0 dB (Modulation frequency: 50 Hz to 20 kHz) Modulation distortion (At Modulation frequency: 1 kHz, Frequency deviation: 4 kHz or higher, Demodulation frequency band: 0.3 to 3 kHz): ≤−50 dB
Analog RF signal generator (SAT)	Modulation frequency: 5970 Hz, 6000 Hz, 6030 Hz, or Off Deviation: Fixed to 2 kHz

Table 1.1−2 Specifications (AMPS) (continued)

Item	Specification
AF Measurement	Input frequency Frequency range: 50 Hz to 10 kHz Input level Input voltage range: 1 mV peak to 5 V peak (AF Input connector) Maximum allowable input voltage: 30 V rms Frequency measurement Reference oscillator accuracy: ± (Reference oscillator frequency + 0.5 Hz) Level measurement Accuracy: ±0.2 dB (≥10 mV peak, ≥50 Hz) ±0.4 dB (≥1 mV peak, ≥1 kHz) SINAD Measurement Measurement range: (At Frequency: 1 kHz): ≥60 dB (≥1000 mV peak) ≥54 dB (≥50 mV peak) ≥46 dB (≥10 mV peak) Distortion ratio measurement Measurement range: (At Frequency: 1 kHz): ≤60 dB (≥1000 mV peak) ≤54 dB (≥50 mV peak) ≤46 dB (≥10 mV peak) Input impedance 100 kΩ
AF Output	Output frequency Frequency range: 30 Hz to 10 kHz Set resolution: 1 Hz Accuracy: ±(Set frequency x Reference oscillator accuracy +0.1 Hz) Output level Set range: 0 V peak to 5 V peak (AF Output connector) Set resolution: 1 mV (≤5 V peak), 100 μV (≤500 mV peak), 10 μV (≤50 mV peak) Accuracy: ±0.2 dB (≥10 mV peak, ≥50 Hz) ±0.3 dB (≥10 mV peak, < 50 Hz) Waveform distortion (At Band ≤30 kHz) ≤−60 dB (≥500 mV peak, ≤5 kHz) ≤−54 dB (≥70 mV peak) Output impedance: ≤1 Ω Maximum output current: 100 mA

Table 1.1–3 Specifications (MX882002A−02 CDMA2000 External Packet Data)

Item	Specification
External packet data	Service Option: SO33 Radio Configuration: F–RC3+R–RC3, F–RC4+R–RC3 Signalling Ch: FCH Supplemental Ch: Encoding: Convolutional, Turbo Data Rates: 9.6, 19.2, 38.4, 76.8, 153.6 kbps RLP (Radio Link Protocol): RLP3 Packet Data Mode: RLP Loopback, PPP/IP RLP Loopback: Mode for loopback of Reverse Link signal traffic data to mobile terminal on RLP3 PPP/IP: Mode for transferring IP packet data between mobile terminal and server PC

1.2. Measurement Specification Table (C.S.0011-B)

	Item	comment	
3	**CDMA RECEIVER MINIMUM STANDARD**		
3.4	**Forward Traffic Channel Demodulation Performance**		
3.4.1	Demodulation of Forward Fundamental Channel in Additive White Gaussian Noise		√√
3.4.2	Demodulation of Forward Fundamental Channel in Multipath Fading Channel	Requires Fading Simulator	√
3.4.3	Demodulation of Forward Fundamental Channel During Soft Handoff		–
3.4.4	Decision of Power Control Bit for Channels Belonging to Different Power Control Sets During Soft Handoff		–
3.4.5	Decision of Power Control Bit for Channels Belonging to Same Power Control Sets		–
3.4.6	Demodulation of Power Control Subchannel During Soft Handoff		–
3.4.7	Demodulation of Forward Traffic Channel in Multipath Fading Channel with Closed Loop Power Control (FPC_MODE = ‘000’)		–
3.4.8	Demodulation of Forward Traffic Channel in Multipath Fading Channel with Closed Loop Power Control (FPC_MODE = ‘010’)		–
3.4.9	Demodulation of Forward Traffic Channel in Multipath Fading Channel with Outer Loop Power Control and Closed Loop Power Control (FPC_MODE = ‘000’, ‘001’ and ‘010’)		–
3.4.10	Demodulation of Forward Traffic Channel in Multipath Fading Channel with Closed Loop Power Control (FPC_MODE = ‘000’) and Transmit Diversity (OTD or STS)		–
3.4.11	Demodulation of Forward Traffic Channel in Multipath Fading Channel with Closed Loop Power Control (FPC_MODE = ‘010’) and Transmit Diversity (OTD or STS)		–
3.4.12	Demodulation of Power Control Subchannel During Reverse Pilot Channel Gating		–
3.4.13	Demodulation of Power Control Subchannel During Reverse Fundamental Channel Gating		–
3.5	**Receiver Performance**		
3.5.1	Receiver Sensitivity and Dynamic Range		√√
3.5.2	Single Tone Desensitization	Requires SG	√
3.5.3	Intermodulation Spurious Response Attenuation		–
3.5.4	Adjacent Channel Selectivity		–
3.5.5	Receiver Blocking Characteristics		–
3.6	**Limitations of Emissions**		
3.6.1	Conducted Spurious Emissions		–
3.6.2	Radiated Spurious Emissions		–
3.7	**Supervision**		
3.7.1	Paging Channel or Forward Common Control Channel		–
3.7.2	Forward Traffic Channel		–
4	**CDMA TRANSMITTER MINIMUM STANDARD**		
4.1	Frequency Accuracy		√√
4.2	**Handoff**		
4.2.1	CDMA to CDMA Hard Handoff	Only Hard Handoff Cannot make required timing measurement.	P
4.2.2	Transmit Power after Hard Handoff		–
4.3	**Modulation Requirements**		
4.3.1	Time Reference		√√
4.3.2	Reverse Pilot Channel to Code Channel Time Tolerance		–
4.3.3	Reverse Pilot Channel to Code Channel Phase Tolerance		–
4.3.4	Waveform Quality and Frequency Accuracy		√√
4.3.5	Code Domain Power		√√
4.4	**RF Output Power Requirements**		
4.4.1	Range of Open Loop Output Power		√√

4.4.2	Time Response of Open Loop Power Control		√√
4.4.3	Access Probe Output Power		√√
4.4.4	Range of Closed Loop Power Control	Only Power Control	P
4.4.5	Maximum RF Output Power		√√
4.4.6	Minimum Controlled Output Power		√√
4.4.7	Standby Output Power and Gated Output Power		√√
4.4.8	Power Up Function Output Power		–
4.4.9	Code Channel to Reverse Pilot Channel Output Power Accuracy	Except Enhanced Access Channel Header, Enhanced Access Channel Data and Reverse Common Control Channel Data.	√√
4.4.10	Reverse Pilot Channel Transmit Phase Discontinuity		–
4.4.11	Reverse Traffic Channel Output Power During Changes in Data Rate		–
4.5	**Limitations on Emissions**		
4.5.1	Conducted Spurious Emissions		√√
4.5.2	Radiated Spurious Emissions		–
4.5.3	Occupied Bandwidth		√√

√√: Support | √: Requires external equipment (SPA or SG) | P: Partially Supported | –: Not Supported

1.3. Tx/Rx Measurements

The description of measurement procedures in/after this paragraph assumes that the control software is created by GPIB. Refer to the operation manual for details of GPIB commands and manual operations. GPIB commands are written in bold red.

1.3.1. CDMA2000 Connection

Measurement is performed by connecting a mobile terminal. The connection procedures are below.

1. Execute ***RST** to initialize parameters.
2. Set Band Class and Channel.
   Example: Execute **BANDCLASS 0** to set Band Class to 0.
   Execute **CHAN 500** to set Channel to 500.
3. Turn on the power of the mobile terminal.
4. Execute **CALLSTAT?** and wait for the response to change to 2 (= Idle (Regist)).
5. Set Radio Configuration.
   Ex) Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
6. Set Service Option. Example: Execute SO2 to set Service Option to SO2.
7. Execute **CALLSA** to perform connection.
8. Execute **CALLSTAT?** and wait for the response to change to 7 (= Connected).

1.3.2. Handoff

1. Execute **HOBAND 0** to set Handoff Band Class to 0.
2. Execute **HOCHAN 100** to set Handoff Channel to 100.
3. Execute **HO** to perform Band Class/Channel Handoff.

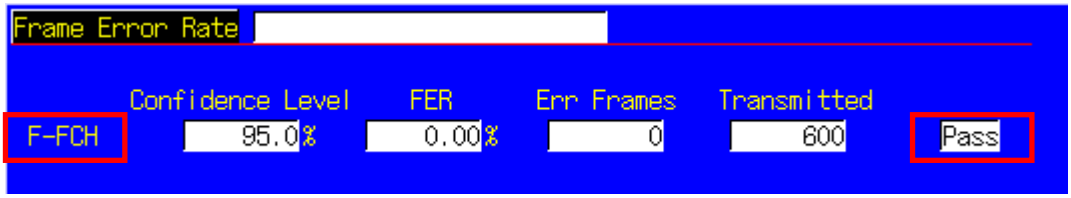
1.3.3. Termination

1. Execute **CALLSO** to perform disconnection.
2. Execute **CALLSTAT?** and wait for response to change to 2 (= Idle (Regist)).

1.3.4. 3.4.1 Demodulation of Forward Fundamental Channel in Additive White Gaussian Noise

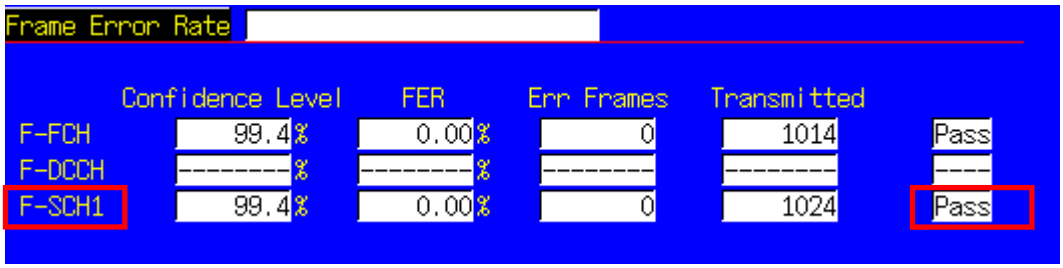
Example at loopback

1. Turn on the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON, OFF** to set only Frame Error Rate to On
4. Execute **RC11** to set Radio Configuration to Fwd. RC_1 + Rev. RC_1.
5. Execute **SO 2** to set Service Option to SO_2.
6. Execute **FERCONF 95** to set Confidence Level to 95%.
7. Execute **FERSTOP ON** to set Meas. Stop Mode to On.
8. Execute **UFER 0.5** to set FER Limit to 0.5%.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −55.0** to set Output Level to −55.0 dBm/1.23 MHz.
11. Execute **AWGNLVL ON** to set AWGN to On.
12. Execute **AWGNPWR 1** to set AWGN Level to 1 dB.
13. Execute **PILOTLVL −7** to set F−PICH level to −7.0 dB.
14. Execute **FCHLVL −16.3** to set F−FCH level to −16.3 dB.
15. Execute **DATARATE 0** to set F−FCH Data Rate to 9600.
16. Execute **FER 3** to set specified FER to 3.0%.
17. Execute **SWP** to perform measurement.
18. Execute **FERPASS? FCH** to read the measurement result.
19. Change parameters in each test and repeat steps 13 to 17.
20. Execute **AWGNLVL OFF** to set AWGN to Off.



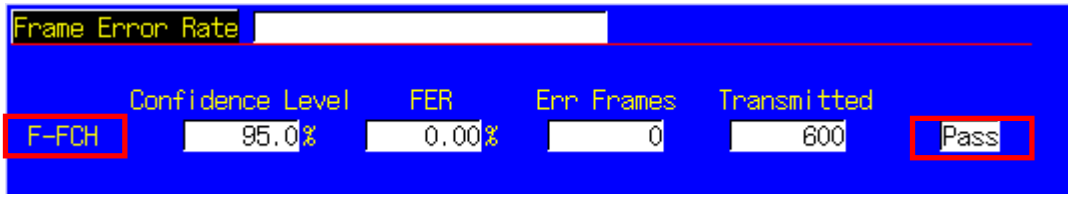
Example of TDSO (Test Data Service Option)

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON, OFF** to set only FER measurement to On.
4. Execute **RC 33** to set Radio Configuration to Fwd. RC3 + Rev. RC3.
5. Execute **SO 32** to set Service Option to SO32.
6. Execute **FERCONF 95** to set Confidence Level to 95%.
7. Execute **FERSTOP ON** to set Meas. Stop Mode to On.
8. Execute **UFER 0.5** to set FER Limit to 0.5%.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −55.0** to set Output Level to −55.0 dBm.
11. Execute **AWGNLVL ON** to set AWGN to On.
12. Execute **AWGNPWR 1** to set AWGN Level to 1 dB.
13. Execute **FCHLVL −7.0** to set F−FCH Level to −7.0 dB.
14. Execute **SCHLVL −13.6** to set F−SCH Level to −13.6 dB.
15. Execute **SCHRATE 0** to set F−SCH Data Rate to 19200 bps.
16. Execute **FER 5.0** to set specified FER to 5.0%.
17. Execute **SWP** to perform measurement.
18. Execute **FERPASS? SCH1** to read the measurement result.
19. Change parameters in each test and repeat the steps 13 to 17.
20. Execute **AWGNLVL OFF** to set AWGN to Off.



1.3.5. 3.5.1 Receiver Sensitivity and Dynamic Range

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON, OFF** to set only FER measurement to On.
4. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
5. Execute **SO 2** to set Service Option to SO2.
6. Execute **FERCONF 95** to set Confidence Level to 95%.
7. Execute **FERSTOP ON** to set Meas. Stop Mode to On.
8. Execute **ULFER 5** to set FER Limit to 0.5%.
9. Execute **AWGNLVL OFF** to set AWGN to OFF.
10. Execute **CALLSA** to perform connection
11. Execute **PILOTLVL −7** to set F−PICH Level to −7.0 dB.
12. Execute **FCHLVL −15.6** to set F−FCH Level to −15.6 dB.
13. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
14. Execute **FER 0.5** to set specified FER to 0.5%.
15. Execute **OLVL −104.0** to set Output Level to −104.0 dBm/1.23 MHz.
16. Execute **SWP** to perform measurement.
17. Execute **FERPASS? FCH** to read the measurement result.
18. Execute **OLVL −25.0** to set Output Level to −25.0 dBm/1.23 MHz.
19. Execute **SWP** to perform measurement.
20. Execute **FERPASS? FCH** to read the measurement result.

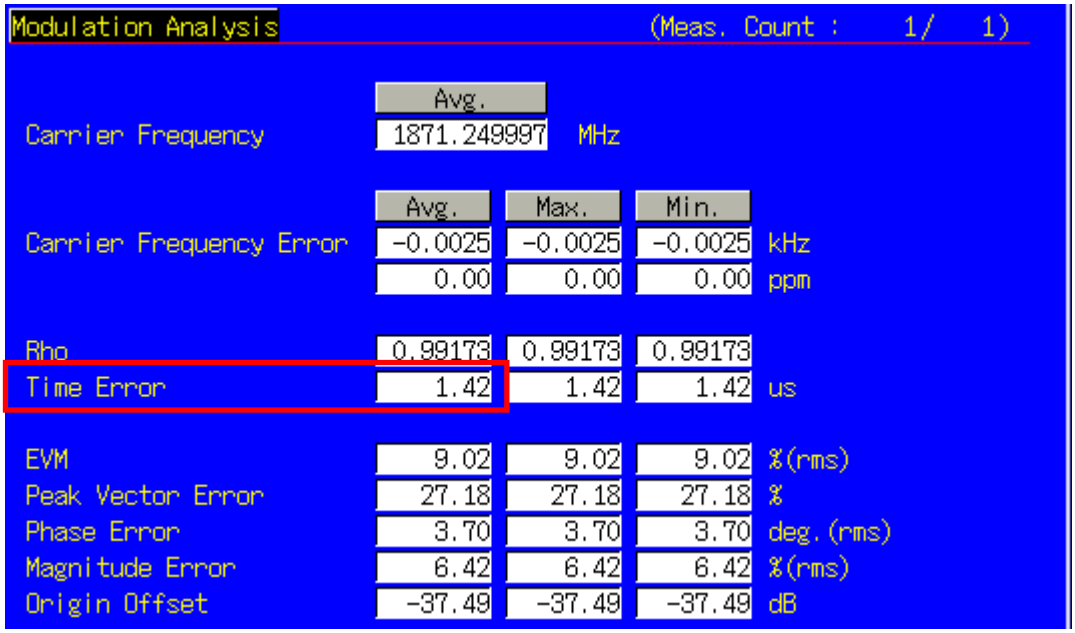


1.3.6. 4.1 Frequency Accuracy

Refer to 1.3.8 4.3.4 Waveform Quality and Frequency Accuracy.

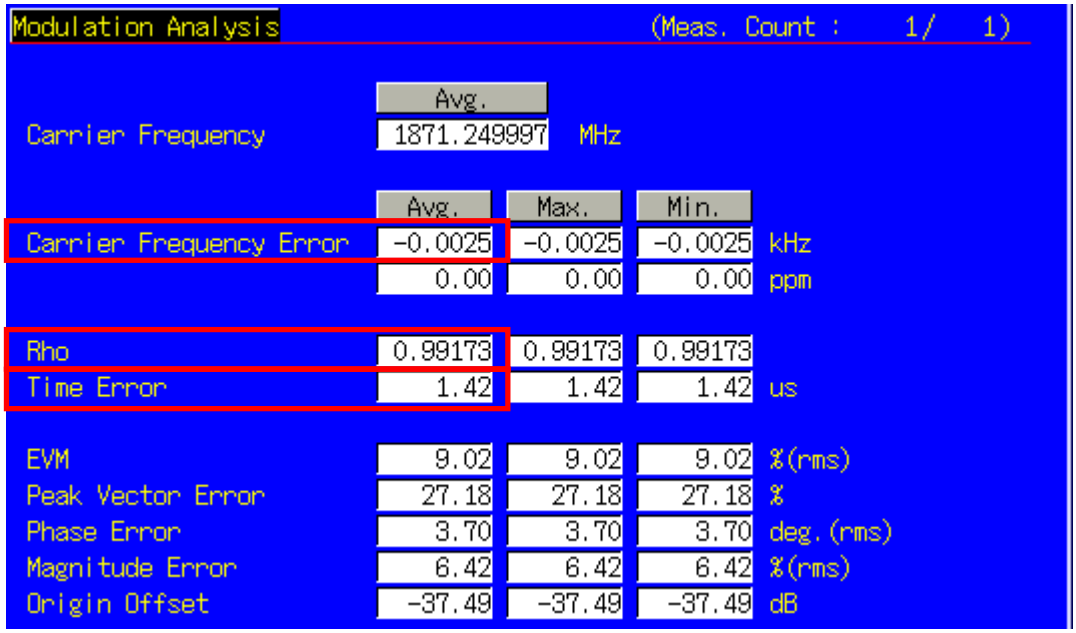
1.3.7. 4.3.1 Time Reference

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Modulation Analysis measurement to On. (This sets the number of measurements to 1.)
4. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
5. Execute **SO 2** to set Service Option to SO2.
6. Execute **PILOTLVL −7** to set F−PICH level to –7 dB.
7. Execute **FCHLVL −14** to set F−FCH level to –14 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −75.0** to set Output Level to −75.0 dBm.
11. Execute **SWP** to perform measurement.
12. Execute **AVG_TAU?** to read the measurement result.



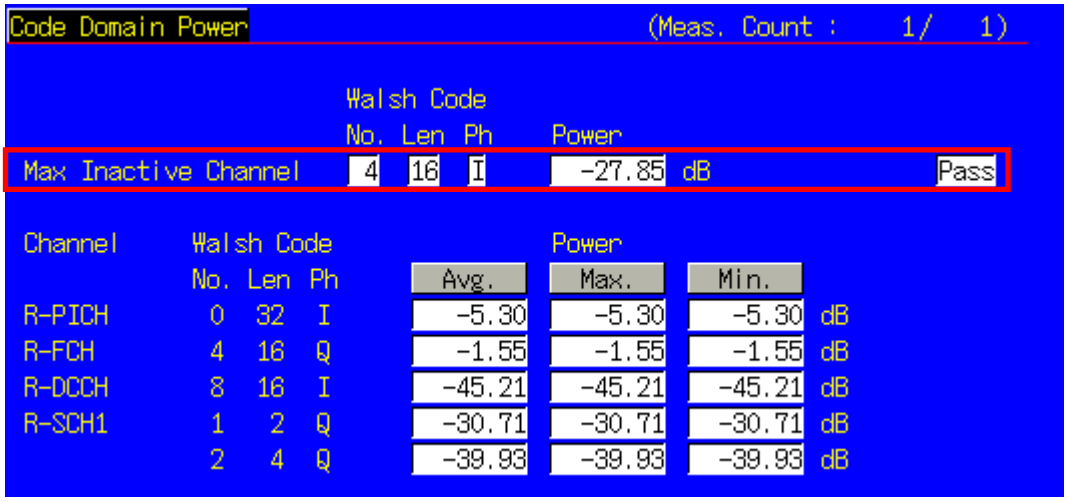
1.3.8. 4.3.4 Waveform Quality and Frequency Accuracy

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Modulation Analysis measurement to On. (This sets the number of measurement times to 1.)
4. When performing with Radio Configuration Fwd. RC 1 + Rev. RC3, execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1. When performing with Radio Configuration Fwd. RC 3 + Rev. RC3, execute RC 33 to set Radio Configuration to Fwd. RC3 + Rev. RC3.
5. When performing with Radio Configuration Fwd. RC 1 + Rev. RC3, execute **SO 2** to set Service Option to SO2. When performing with Radio Configuration Fwd. RC 3 + Rev. RC3, execute **SO 55** to set Service Option to SO55.
6. Execute **PILOTLVL −7** to set F−PICH level to –7 dB.
7. Execute **FCHLVL −7.4** to set F−FCH level to −7.4 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
9. Execute **CALLSA** to perform connection.
10. When performing with Radio Configuration Fwd. RC 1 + Rev. RC3, execute **OLVL −75.0** to set Output Level to −75.0 dBm/1.23 MHz.
    When performing with Radio Configuration Fwd. RC 3 + Rev. RC3, execute **OLVL −101.0** to set Output Level to −101.0 dBm/1.23 MHz.
11. Execute **PCBPAT ALT** to set PCB Pattern to Alternate.
12. Execute **SWP** to perform measurement.
13. Execute **AVG_CARRFERR?** to read the result of Carrier Frequency Error measurement.
14. Execute **AVG_RHO?** to read the result of Rho measurement.
15. Execute **AVG_TAU?** to read the result of Time Error measurement.



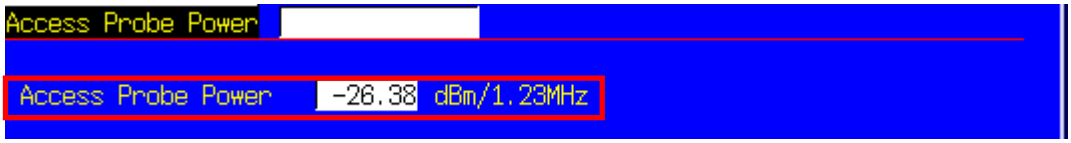
1.3.9. 4.3.5 Code Domain Power

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Code Domain Power measurement to On. (This sets the number of measurements to 1.)
4. Execute **RC 33** to set Radio Configuration to Fwd. RC3 + Rev. RC3.
5. Execute **SO 55** to set Service Option to SO55.
6. Execute **PILOTLVL –7** to set F−PICH Level to –7 dB.
7. Execute **FCHLVL −7.4** to set F−FCH Level to −7.4 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −101.0** to set Output Level to −101.0 dBm/1.23 MHz.
11. Execute **SWP** to perform measurement.
12. Execute **MAXINACTCODE? JUDGE** to read the measurement result.



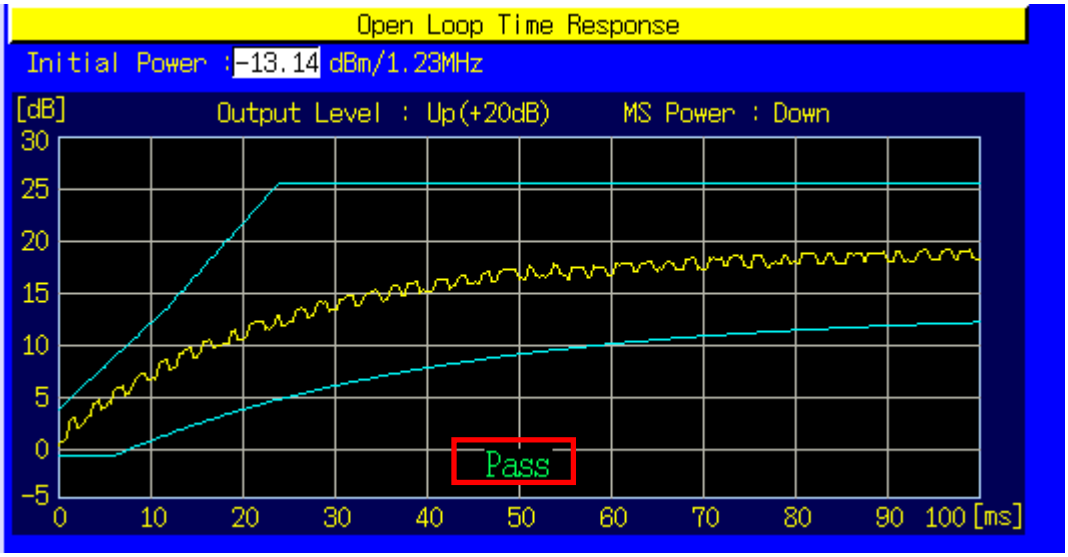
1.3.10. 4.4.1 Range of Open Loop Output Power

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS ON, OFF, 1, OFF, 1OFF, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Access Probe Power to On.
4. Execute **PAMSZ 16** to set Preamble Length to 16 frames.
5. Execute **MAXRSP 1** to set Max. Response Sequence to 1.
6. Test 1: Execute **OLVL −25.0** to set Output Level to −25.0 dBm/1.23 MHz.
   Test 2: Execute **OLVL −65.0** to set Output Level to −65.0 dBm/1.23 MHz.
   Test 3: Execute **OLVL −98.3** to set Output Level to −98.3 dBm/1.23 MHz.
   (The above is the case for Band Class 0 and Mobile Station Class II. Values vary depending on Band Class and Mobile Station Class.)
7. Execute **SWPANDPG** to perform measurement.
8. Execute **APPWR?** to read the measurement result.
9. Execute **CALLSO** to terminate the call.
10. Repeat the steps 6 to 9 for Test 2 and Test 3.



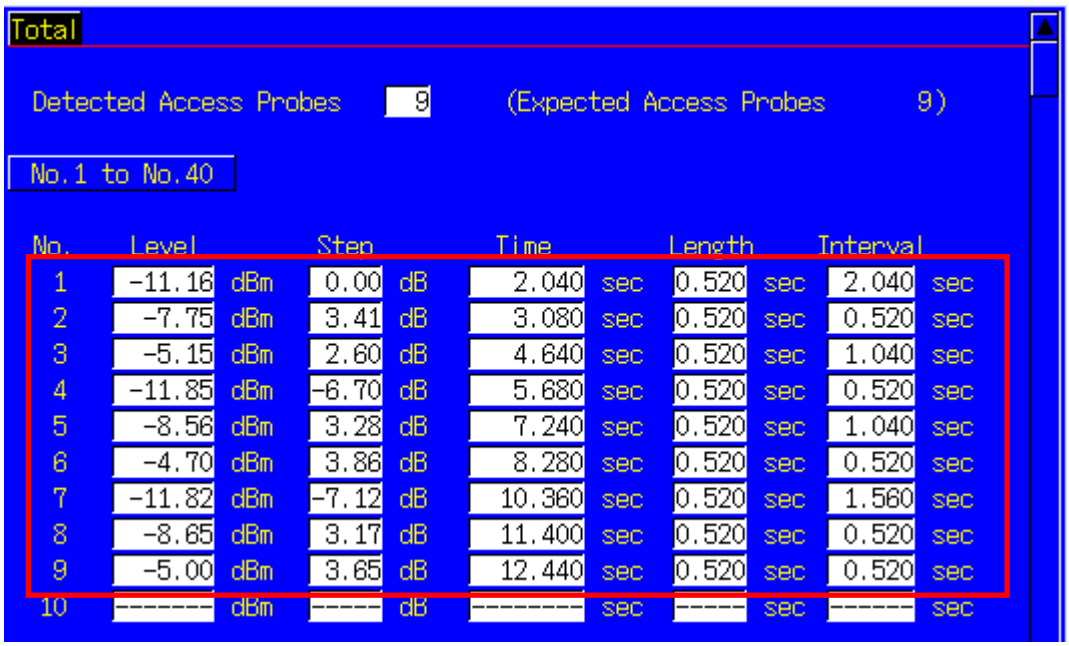
1.3.11. 4.4.2 Time Response of Open Loop Power Control

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL OLTR** to display the Open Loop Time Response screen.
3. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
4. Execute **SO 2** to set Service Option to SO2.
5. Execute **PILOTLVL –7** to set F−PICH Level to –7 dB.
6. Execute **FCHLVL −7.4** to set F−FCH Level to −7.4 dB.
7. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
8. Execute **CALLSA** to perform connection.
9. Execute **OLVL −60.0** to set Output Level to −60.0dBm/1.23 MHz.
10. Execute **STEPUPSA** to perform measurement.
11. Execute **TEMPPASS_OLTR?** to read the measurement result.
12. Execute **STEPDNSA** to perform measurement.
13. Execute **TEMPPASS_OLTR?** to read the measurement result.
14. Execute **STEPDNSA** to perform measurement.
15. Execute **TEMPPASS_OLTR?** to read the measurement result.
16. Execute **STEPUPSA** to perform measurement.
17. Execute **TEMPPASS_OLTR?** to read the measurement result.



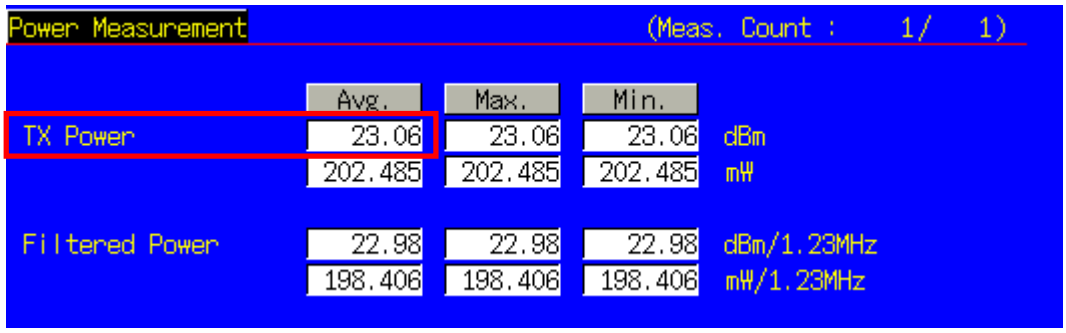
1.3.12. 4.4.3 Access Probe Output Power

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL APMEAS** to display the Access Probe Measurement screen.
3. Execute **OLVL −65.0** to set Output Level to −65.0 dBm/1.23 MHz.
4. Execute **PILOTLVL –5** to set the F−PICH Level to – 5 dB.
5. Execute **MAXRSP 1** to set Max. Response Sequence to 1.
6. Execute **NUMSTEP 5** to set Number of Steps to 5.
7. Execute **SWP** to perform measurement.
8. Execute **APBLVL? 1, 5** (command for reading results of 5 access probes) to read the measurement result.
9. Execute **NOMPWR 3** to set Nominal Power to 3 dB.
10. Execute **INITPWR 3** to set Initial Power to 3 dB.
11. Execute **PWRSTEP 3** to set Power Step to 1 dB.
12. Execute **NUMSTEP 3** to set Number of Steps to 3.
13. Execute **MAXRSP 3** to set Max. Response Sequence to 3.
14. Execute **SWP** to perform measurement.
15. Execute **APBLVL? 1, 9** (command for reading results of 9 access probes) to read the measurement result.



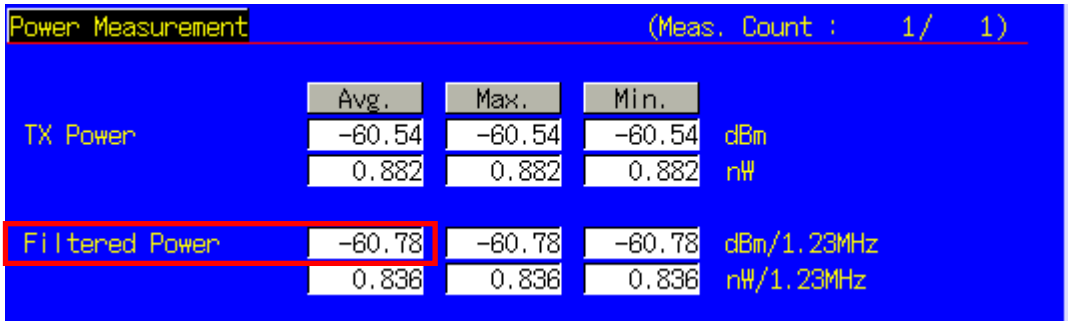
1.3.13. 4.4.5 Maximum RF Output Power

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Power Measurement to On.
4. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
5. Execute **SO 2** to set Service Option to SO2.
6. Execute **PILOTLVL −7** to set F−PICH Level to –7 dB.
7. Execute **FCHLVL −7.4** to set F−FCH Level to −7.4 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −104.0** to set Output Level to −104.0 dBm/1.23 MHz.
11. Execute **PCBPAT ALL0** to set PCB Pattern to All0 (Up).
12. Execute **ILVL 23** to set Input Level to 23 dBm.
    (Here, the number of measurements is set to 1.)
13. Execute **SWP** to perform measurement.
14. Execute **AVG_POWER?** to read the measurement result.



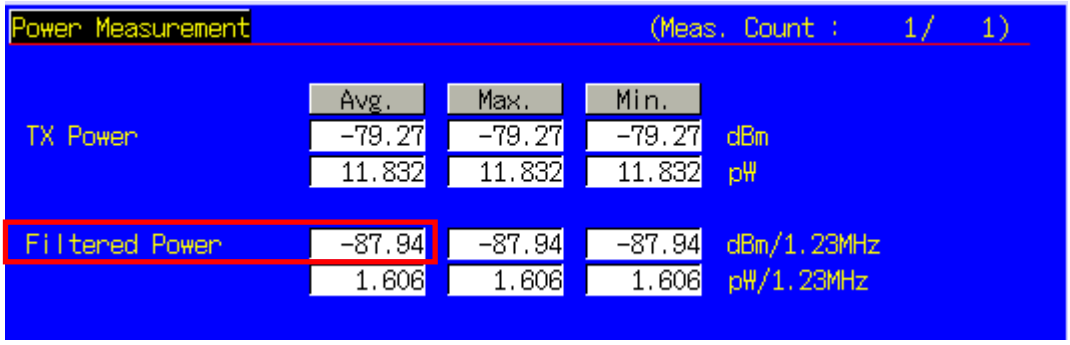
1.3.14. 4.4.6 Minimum Controlled Output Power

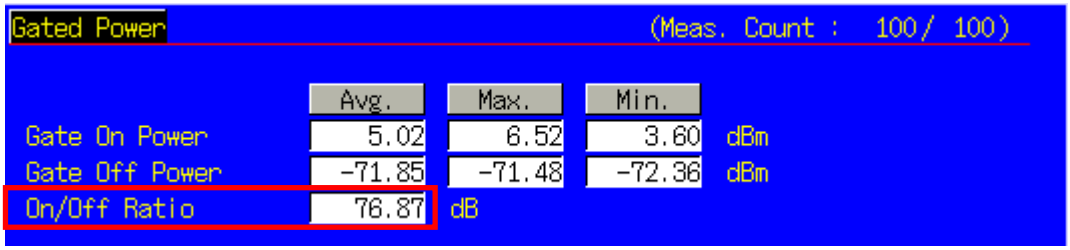
1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Power Measurement to On. (This sets the number of measurements to 1.)
4. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
5. Execute **SO 2** to set Service Option to SO2.
6. Execute **PILOTLVL −7** to set F−PICH Level to –7 dB.
7. Execute **FCHLVL −7.4** to set F−FCH level to −7.4 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL –25.0** to set Output Level to –25.0 dBm/1.23 MHz.
11. Execute **PCBPAT ALL1** to set PCB Pattern to All1 (Down).
12. Execute **ILVL −60** to set Input Level to –60 dBm.
13. Execute **SWP** to perform measurement.
14. Execute **AVG_FILTPWR?** to read the measurement result.



1.3.15. 4.4.7 Standby Output Power and Gated Output Power

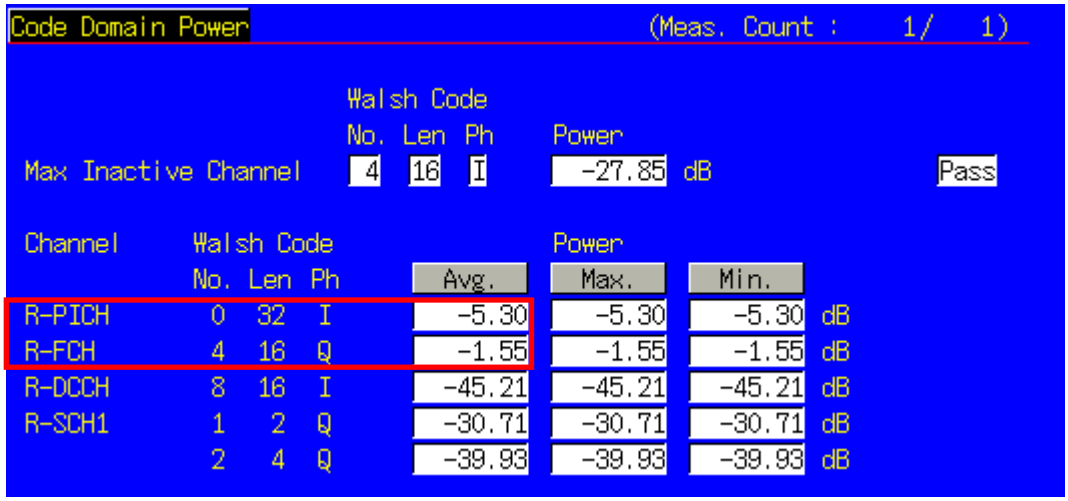
1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Gated Power measurement to On. (This sets the number of measurements to 1.)
4. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
5. Execute **SO 2** to set Service Option to SO2.
6. Execute **OLVL −75.0** to set Output Level to −75.0 dBm.
7. Execute **PILOTLVL −7** to set F−PICH level to –7 dB.
8. Execute **FCHLVL −7.4** to set F−FCH level to −7.4 dB.
9. Execute **SWP** to perform measurement.
10. Execute **AVG_FILTPWR?** to read the measurement result. Perform bandwidth conversion (1 MHz/1.23 MHz).
11. Execute **CALLSA** to perform connection.
12. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, ON, 100** to set only Gated Power measurement to On. (This sets the number of measurements to 100.)
13. Execute **DATARATE 3** to set F−FCH Data Rate to 1200 bps.
14. Execute **PCBPAT ALT** to set PCB Pattern to Alternate.
15. Execute **SWP** to perform measurement.
16. Execute **RATIO?** to read the measurement result.
17. Execute **TEMPPASS GPWR** to read the measurement result.





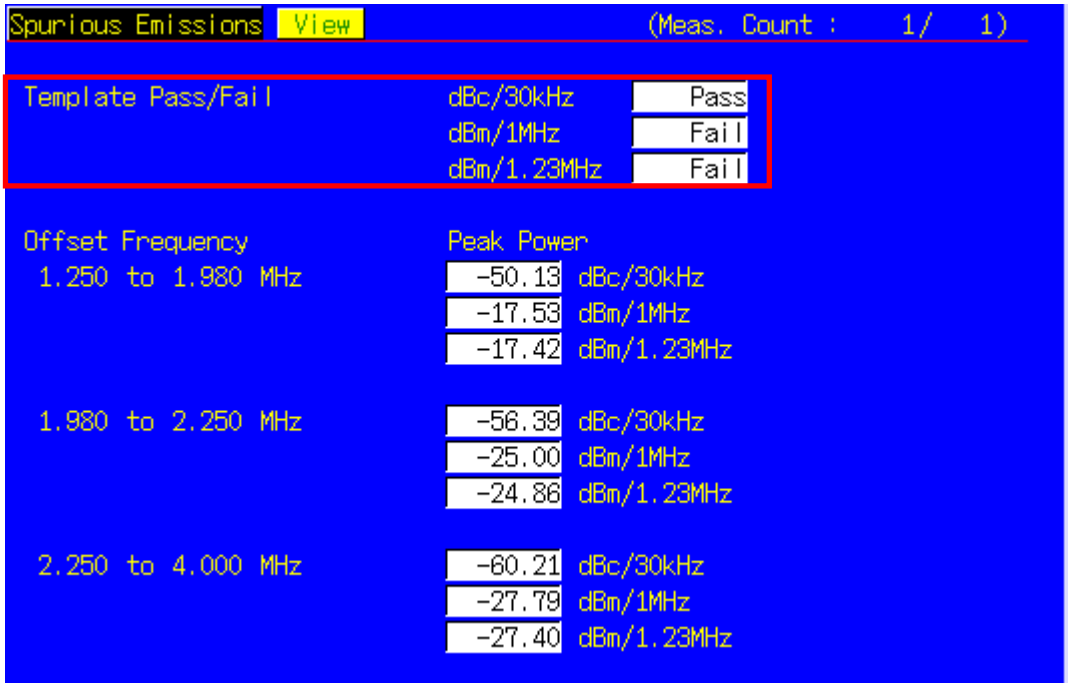
1.3.16. 4.4.9 Code Channel to Reverse Pilot Channel Output Power Accuracy

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF, OFF** to set only Code Domain Power measurement to On. (This sets the number of measurements to 1.)
4. Execute **RC 33** to set Radio Configuration to Fwd. RC3 + Rev. RC3.
5. Execute **SO 55** to set Service Option to SO55.
6. Execute **PILOTLVL −7** to set F−PICH Level to –7 dB.
7. Execute **FCHLVL −7.4** to set F−FCH Level to −7.4 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −65.0** to set Output Level to −65.0 dBm/1.23 MHz.
11. Execute **PCBPAT ALT** to set PCB Pattern to Alternate.
12. Execute **SWP** to perform measurement.
13. Execute **AVG_REVPILOTCDP?** and **AVG_REVFCHCDP?** to read the measurement result and find the difference between the R−PICH Level and R−FCH Level.



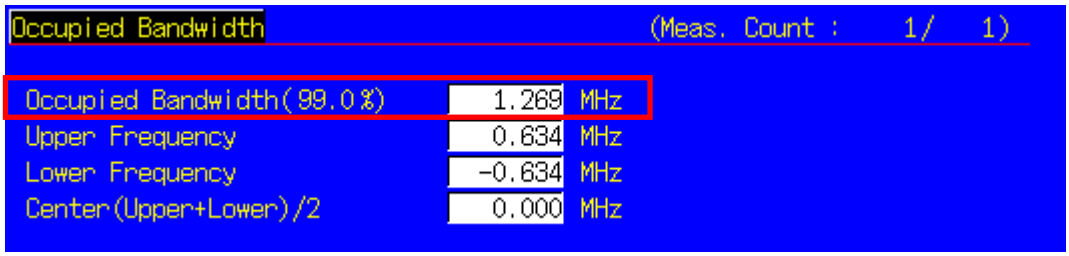
1.3.17. 4.5.1 Conducted Spurious Emissions

1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON, 1, OFF, OFF** to set only Spurious Emissions measurement to On. (This sets the number of measurements to 1.)
4. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
5. Execute **SO 2** to set Service Option to SO2.
6. Execute **PILOTLVL −7** to set F−PICH Level to –7 dB.
7. Execute **FCHLVL −7.4** to set F−FCH Level to −7.4 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps .
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −104.0** to set Output Level to −104.0 dBm/1.23 MHz.
11. Execute **PCBPAT ALL0** to set PCB Pattern to All0 (Up).
12. Execute **ILVL 23** to set Input Level to 23 dBm.
13. Execute **SPR_DBM1M ON** to set Spurious Emission dBm/1 MHz measurement to On.
14. Execute **SPR_DBM1M23 ON** to set Spurious Emission dBm/1.23 MHz measurement to On.
15. Execute **SWP** to perform measurement.
16. Execute **TEMPPASS_SPR? DBC30K**, **TEMPPASS_SPR? DBM1M**, **TEMPASS_SPR? DBM1M23** to read the measurement result.



1.3.18. 4.5.3 Occupied Bandwidth

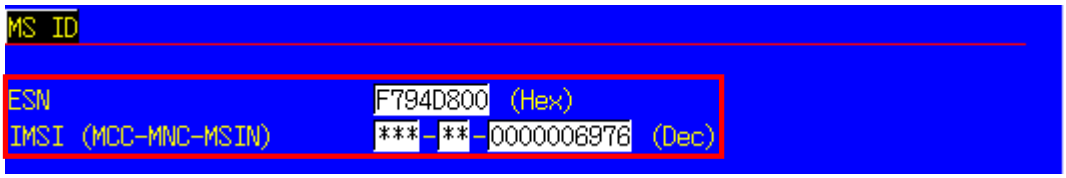
1. Turn on the power of the mobile terminal to perform Registration.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **1XALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF, OFF** to set only Occupied Bandwidth measurement to On. (This sets the number of measurements to 1.)
4. Execute **RC 11** to set Radio Configuration to Fwd. RC1 + Rev. RC1.
5. Execute **SO 2** to set Service Option to SO2.
6. Execute **PILOTLVL −7** to set F−PICH Level to –7 dB.
7. Execute **FCHLVL −7.4** to set F−FCH Level to −7.4 dB.
8. Execute **DATARATE 0** to set F−FCH Data Rate to 9600 bps.
9. Execute **CALLSA** to perform connection.
10. Execute **OLVL −104.0** to set Output Level to −104.0 dBm/1.23 MHz.
11. Execute **PCBPAT ALL0** to set PCB Pattern to All0 (Up).
12. Execute **SWP** to perform measurement.
13. Execute **OBW?** to read the measurement result.



1.4. MS Report

ESN and IMSI reported by the mobile terminal can be read.

1. Execute **CALLRFR** and initialize the MS Report value.
2. Turn on the power of the mobile terminal to perform Registration.
3. Execute **MSREP_ESN?** and **MSREP_IMSI?** To read ESN and IMSI.



1.5. Function Tests

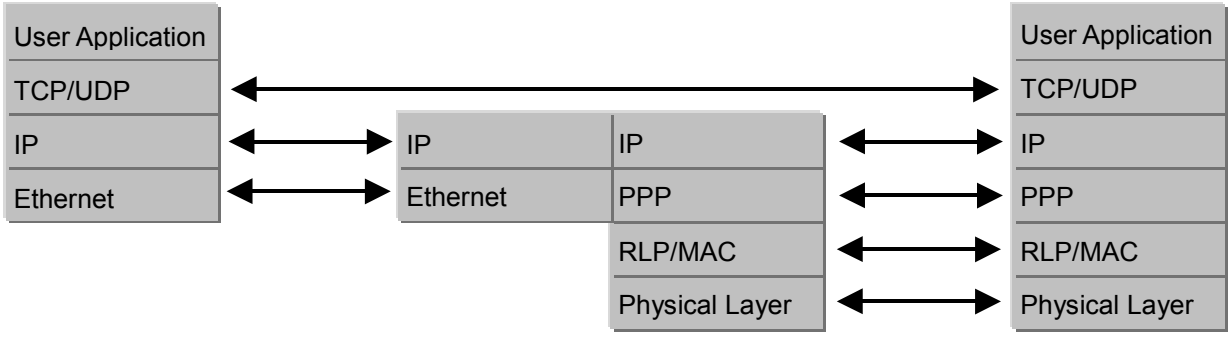
1.5.1. Voice Call

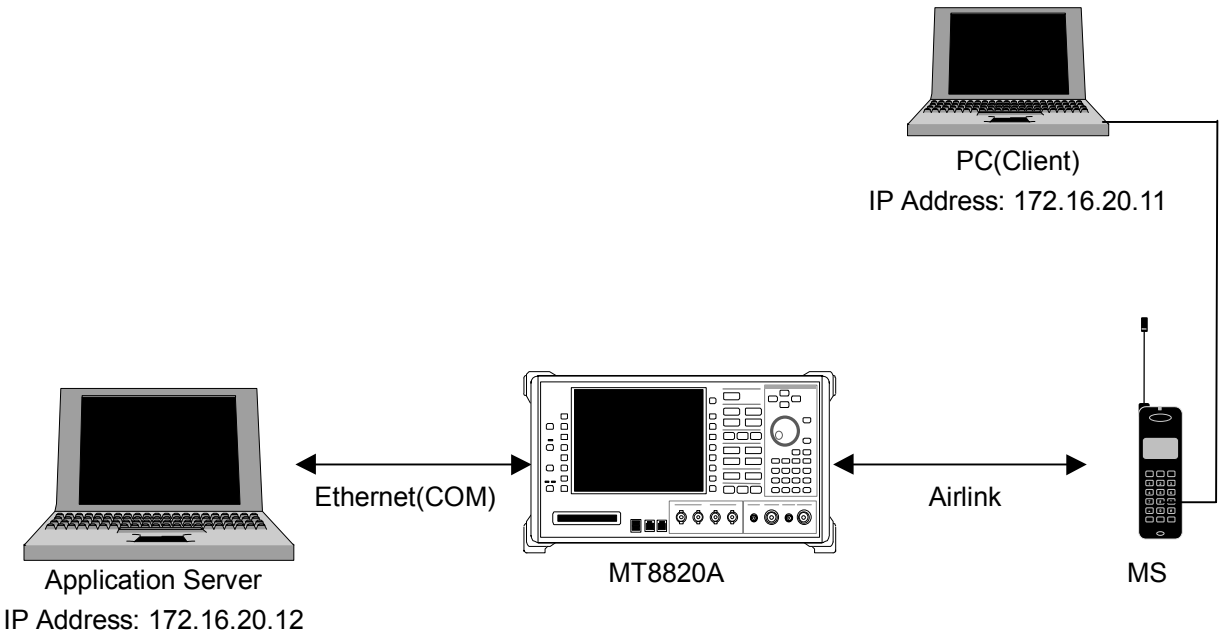
In CDMA2000, the Voice Call (Service Option: SO3) test can be performed with the Call Processing function.
The following describes an example of the Origination test.

1. Turn on the power of the mobile terminal to perform Registration.
2. Set [Radio Configuration] of Call Processing Parameters to [Fwd.RC3 + Rev.RC3].
3. Set [Service Option] of Call Processing Parameters to [SO 3].
4. Make a call from the mobile terminal to any telephone number.
   The Call Processing state changes to [MS Originating].
5. The Call Processing state changes to [Connected] and the MT8820A and the mobile terminal can communicate.
   The Voice Call test can be performed in this state, using echo−back.
6. Terminate the call from the mobile terminal or MT8820A. Press the [End Call] key if terminating from the MT8820A.
   Call Processing state changes to [MS Releasing] or [NW Releasing].

1.5.2. External Packet Data

The MX882002A−02 CDMA2000 External Packet Data option supports data transfer between equipment connected via the Ethernet port on the back panel and a mobile station.





1. Move to the System Configuration screen to set [IP Address, Subnet Mask, Default Gateway].
   (e.g. IP Address : 172.16.20.12, Subnet Mask: 255.255.255.0, Default Gateway: 172.16.20.1)
2. Toggle the power off and on to enable the new settings.
3. Move to the Fundamental Measurement screen to set [Service Option] of Call Processing Parameters to [SO33].
4. Set [Packet Data Mode] of Packet Data Option to [PPP/IP].
5. Set [IP Address] of Packet Data Option. (e.g. 172.16.20.11)
6. Turn on the power of the mobile terminal to perform Registration.
7. Set the user name and password for dialup of the client PC. Make the dial−up connection.
8. User Name: CLIENTPC
   Password: MX882002A
9. The Call Processing state changes to [Connected] and the MT8820A and mobile terminal can communicate.
10. Check the connection status by pinging from the client PC or server PC.
11. Disconnect from the client PC.

2. 1xEV-DO Measurement Software

2.1. Specifications

Table 2.1 Specifications (1xEV-DO)

Item	Specification
Fundamental measurement	Measurement frequency: 300 to 2200 MHz
Amplitude measurement	Depends on the performance of MX882002A.
Frequency/Modulation measurement	Measurement level range: −30 to +35 dBm Carrier frequency accuracy: ±(Set frequency x Reference oscillator accuracy + 10 Hz) Modulation accuracy: Residual waveform quality: >0.999 Residual EVM: <2% rms
Occupied bandwidth	Depends on performance of MX882002A
Code domain power	Measurement level range: −30 to +35 dBm Measurement accuracy: ±0.2 dB (code power ≥−15 dBc) ±0.4 dB (code power ≥−23 dBc)
RF Signal generator	Output frequency: 300 to 2200 MHz, 1 Hz step Channel: All 0 dB (referenced to Ior) for Pilot channel, MAC channel, Control channel and Traffic channel. PN Offset: 0 to 511 Waveform quality: >0.99 (Pilot only, AWGN Off) AWGN AWGN level: −20 to +12 dB (relative level to CDMA signal) or Off Maximum output level of CDMA at AWGN On: −28 dBm (MAIN output) −18 dBm (AUX output)
Call processing	Band Class: BC 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Call control: Close Session, Open Session, AT Origination, NW Origination, AT Release, NW Release, Hard Handoff, Softer Handoff Rev. Closed Loop Power Control modes: Closed Loop, Alternate, All 0 (All up), All 1 (All down) Test Application Protocol: FTAP (Forward Test Application Protocol), RTAP (Reverse Test Application Protocol), FTAP + RTAP

Table 2.1–2 Specifications (MX882003A−02 1xEV−DO External Packet Data)

Item	Specification
External packet data	Application Protocol: Default Packet Communication mode: PPP/IP (IP packet data transferred between access terminal and server PC)

2.2. Measurement Specification Table (C.S.0033-0)

	Item	comment	
3	**Physical Layer Minimum Standards**		
3.1.1	**Receiver Minimum Standards**		
3.1.1.1	Frequency Coverage Requirement		√√
3.1.1.2	**Demodulation Requirements**		
3.1.1.2.1	Demodulation of Forward Traffic Channel in AWGN	Except Pilot Drop	√√
3.1.1.2.2	Demodulation of Forward Traffic Channel in Multipath Fading Channel	Requires Fading Simulator	√
3.1.1.2.3	Decision of Power Control Bit for Channels belonging to Different Power Control Sets during Soft Handoff		–
3.1.1.2.4	Decision of Power Control Bit for Channels belonging to the Same Power Control Sets		–
3.1.1.2.5	Demodulation of Reverse Power Control Channel during Soft Handoff		–
3.1.1.3	**Receiver Performance**		
3.1.1.3.1	Receiver Sensitivity and Dynamic Range		√√
3.1.1.3.2	Single Tone Desensitization	Requires SG	√
3.1.1.3.3	Intermodulation Spurious Response Attenuation		–
3.1.1.3.4	Adjacent Channel Selectivity		–
3.1.1.3.5	Receiver Blocking Characteristics		–
3.1.1.4	**Limitations of Emissions**		
3.1.1.4.1	Conducted Spurious Emissions		–
3.1.1.4.2	Radiated Spurious Emissions		–
3.1.2	**Transmitter Minimum Standards**		
3.1.2.1	**Frequency Requirements**		
3.1.2.1.1	Frequency Coverage		√√
3.1.2.1.2	Frequency Accuracy		√√
3.1.2.2	**Modulation Requirements**		
3.1.2.2.1	Time Reference		√√
3.1.2.2.2	Waveform Quality and Frequency Accuracy		√√
3.1.2.2.3	Redundant ACK Transmission		–
3.1.2.3	**RF Output Power Requirements**		
3.1.2.3.1	Range of Open Loop Output Power	Preamble Length cannot be set to 7.	√√
3.1.2.3.2	Time Response of Open Loop Power Control		√√
3.1.2.3.3	Range of Closed Loop Power Control	Only Power Control	P
3.1.2.3.4	Maximum RF Output Power		√√
3.1.2.3.5	Minimum Controlled Output Power		√√
3.1.2.3.6	Standby Output Power		√√
3.1.2.3.7	RRI Channel Output power		√√
3.1.2.3.8	**Code Domain Power**		
3.1.2.3.8.1	DRC Channel Output Power		√√
3.1.2.3.8.2	ACK Channel Output Power		√√
3.1.2.3.8.3	Data Channel Output Power		√√
3.1.2.4	**Limitations on Emissions**		
3.1.2.4.1	Conducted Spurious Emissions		√√
3.1.2.4.2	Radiated Spurious Emissions		–
3.1.2.4.3	Occupied Bandwidth		√√
4	MAC Layer Minimum Standards		
4.3	Access Channel MAC Protocol		
4.3.1	Default Access Channel MAC Protocol		
4.3.1.1	Access Probes Output Power	When ProbeSequenceMax is changed, Session must be re−opened.	√√

√√: Support | √: Requires external equipment (SPA or SG) | P: Partially Supported | –: Not Supported

2.3. Tx/Rx Measurements

2.3.1. 1xEV‐DO Connection

Measurement is performed by connecting an access terminal as described below.

1. Execute ***RST** to initialize the parameters.
2. Turn on the power of the access terminal.
3. Execute **CALLSTAT?** and wait for the response to change to 2 (= Idle (Session Opened)).
4. Execute **EVAPLI RTAP** to set Application Protocol to RTAP.
5. Execute **CALLSA** to perform connection.
6. Execute **CALLSTAT?** and wait for the response to change to 7 (= Connected).

2.3.2. Handoff

1. Execute **HOBAND 0** to set Handoff Band Class to 0.
2. Execute **HOCHAN 100** to set Handoff Channel to 100.
3. Execute **HO** to perform Handoff.

2.3.3. Termination

1. Execute **CALLSO** to disconnect the call.
2. Execute **CALLSTAT?** and wait for the response to change to 2 (= Idle (Session Opened)).

2.3.4. 3.1.1.2.1 Demodulation of Forward Traffic Channel in AWGN

1. Turn on the power of the access terminal to open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON** to set only Packet Rate to On.
4. Execute **EVAPLI FTAP** to set Application Protocol to FTAP.
5. Execute **PCKTACT 100** to set FTAP Packet Activity to 100.
6. Execute **CCRATE 38K** to set Control Channel Data Rate to 38.4 kbps.
7. Execute **OLVL −55.0** to set Output Level to −55.0 dBm.
8. Execute **PERCONF 95** to set Confidence Level to 95%.
9. Execute **PERSTOP ON** to set Meas. Stop Mode to On.
10. Execute **ULPER 0.5** to set PER Limit to 0.5%.
11. Execute **CALLSA** to perform connection.
12. Execute **AWGNLVL ON** to set AWGN to On.
13. Test 1: Execute **AWGNPWR −15.4** to set AWGN Level to −15.4 dB.

Execute **TCRATE XC** to set Forward Traffic Channel Data Rate to 2457.6 kbps.
Execute **PER 1.0** to set Specified PER to 1.0%.

14. Execute **SWP** to perform measurement
15. Execute **PERPASS?** to read the measurement result.
16. Test 2: Execute **AWGNPWR −13.4** to set AWGN Level to −13.4 dB.

Execute **TCRATE XC** to set Forward Traffic Channel Data Rate to 2457.6 kbps.
Execute **PER 1.0** to set Specified PER to 1.0%.
Execute **AWGNPWR −10.8** to set AWGN Level to −10.8 dB.

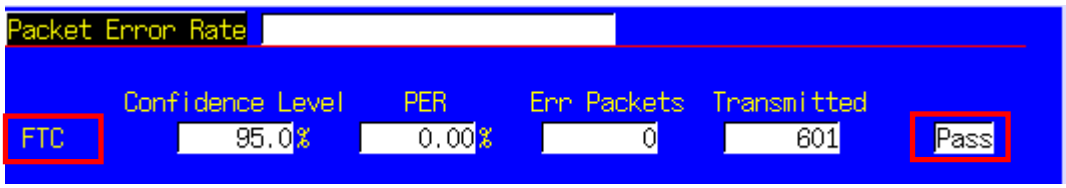
17. Repeat steps 14 to 16.
18. Test 3: Execute **AWGNPWR −10.8** to set AWGN Level to −10.8 dB.

Execute **TCRATE XB** to set Forward Traffic Channel Data Rate to 1843.2 kbps.
Execute **PER 0.5** to set Specified PER to 0.5%.

19. Repeat steps 14 to 16.
20. Test 4: Execute **AWGNPWR −10.1** to set AWGN Level to −10.1 dB.

Execute **TCRATE XB** to set Forward Traffic Channel Data Rate to 1843.2 kbps.
Execute **PER 1.0** to set Specified PER to 1.0%.

21. Repeat Tests 5 to 20.
22. Execute **AWGNLVL OFF** to set AWGN to Off.



2.3.5. 3.1.1.3.1 Receiver Sensitivity and Dynamic Range

1. Turn on the power of the access terminal to open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON** to set only Packet Error Rate measurement to On.
4. Execute **EVAPLI FTAP** to set Application Protocol to FTAP.
5. Execute **PCKTACT 100** to set FTAP Packet Activity to 100.
6. Execute **PER 1.0** to set Specified PER to 1.0%..
7. Execute **PERCONF 95** to set Confidence Level to 95%.
8. Execute **PERSTOP ON** to set Meas. Stop Mode to On.
9. Execute **ULPER 0.5** to set PER Limit to 0.5%.
10. Execute **CALLSA** to perform connection.
11. Test 1: Execute **TCRATE X4** to set Forward Traffic Channel Data Rate to 307.2 kbps.

Execute **OLVL −105.5** to set Output Level to −105.5 dBm/1.23 MHz.

12. Execute **SWP** to perform measurement.
13. Execute **PERPASS?** to read the measurement result.
14. Test 2: Execute **TCRATE X4** to set Forward Traffic Channel Data Rate to 307.2 kbps.

Execute **OLVL –25.0** to set Output Level to –25.0 dBm/1.23 MHz.

15. Repeat steps 12 to 13.
16. Test 3: Execute **TCRATE XC** to set Forward Traffic Channel Data Rate to 2457.6kbps

Execute **OLVL –25.0** to set Output Level to –25.0 dBm/1.23 MHz.

17. Repeat steps 12 to 13.

2.3.6. 3.1.2.1.2 Frequency Accuracy

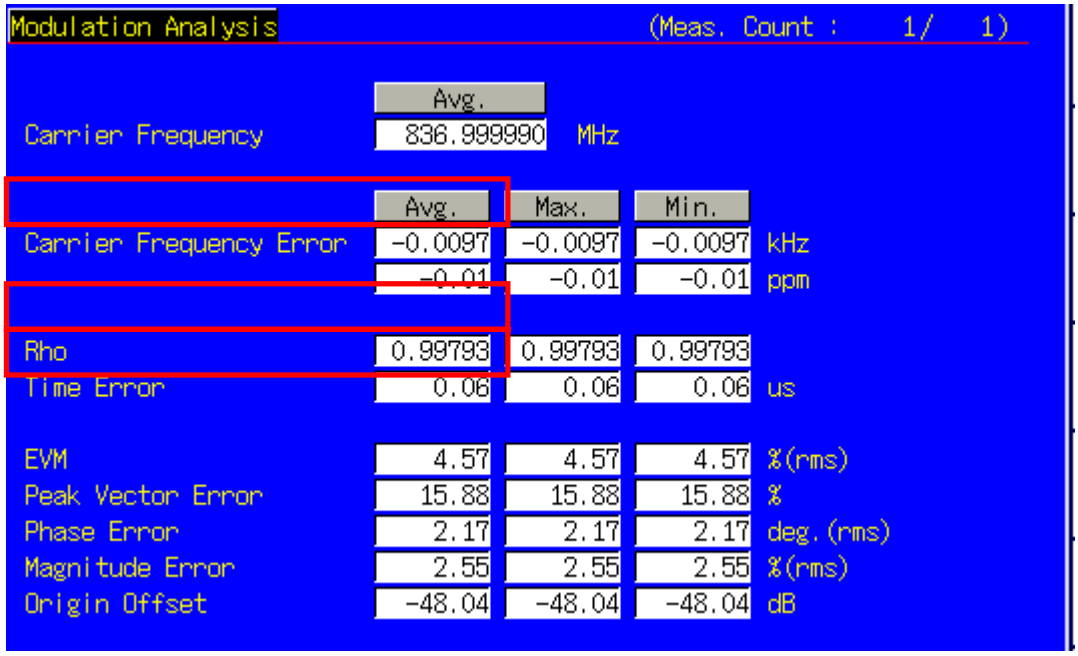
Refer to 2.3.8. 3.1.2.2.2 Waveform Quality and Frequency Accuracy.

2.3.7. 3.1.2.2.1 Time Reference

Refer to 2.3.8. 3.1.2.2.2 Waveform Quality and Frequency Accuracy.

2.3.8. 3.1.2.2.2 Waveform Quality and Frequency Accuracy

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF** to set only Modulation Analysis measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI FTAPRTAP** to set Application Protocol to FTAP + RTAP.
5. Execute **TCRATE X4** to set Forward Traffic Channel Data Rate to 307.2 kbps.
6. Execute **EVRDATARATE 9K6** to set Reverse Data Channel Data Rate to 9.6 kbps.
7. Execute **CALLSA** to perform connection.
8. Execute **OLVL –75.0** to set Output Level to −75.0 dBm/1.23 MHz.
9. Execute **SWP** to perform measurement.
10. Execute **AVG_CARRFERR?** to read the result of Carrier Frequency Error measurement.
11. Execute **AVG_RHO?** to read the result of Rho measurement.
12. Execute **AVG_TAU?** to read the result of Time Error measurement.

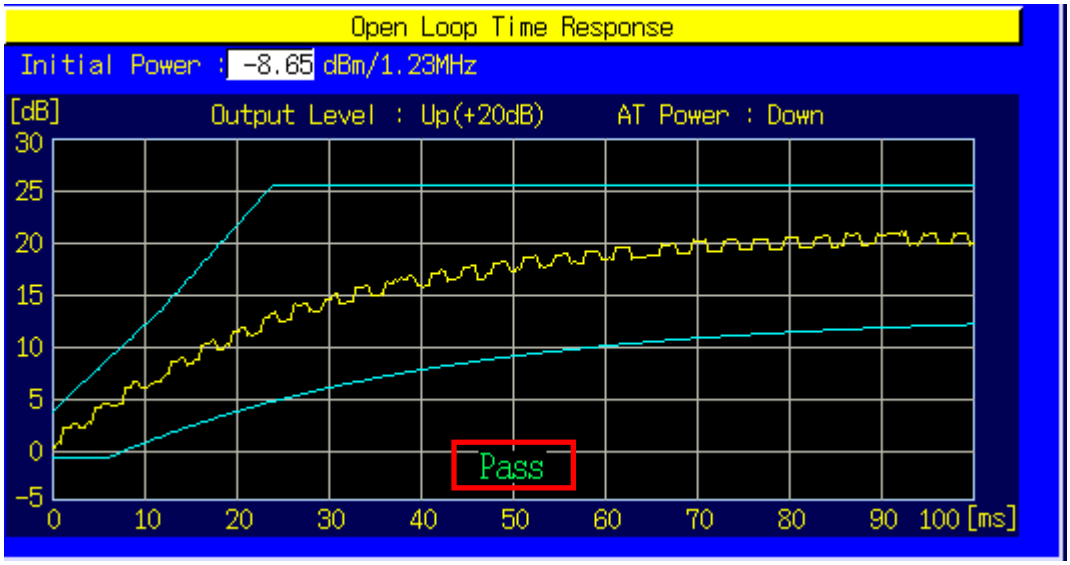


2.3.9. 3.1.2.3.1 Range of Open Loop Output Power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS ON, OFF, 1, OFF, 1OFF, 1, OFF, 1, OFF, 1, OFF** to set only Access Probe measurement to On.
4. Execute **EVPWRSTEP 0** to set Power Step to 0 dB.
5. Execute **PRBSEQMAX 1** to set Probe Sequence Max to 1.
6. Execute **PREAMBLELEN 6** to set Preamble Length to 6.
7. Execute **OPNLPADJ −78** or **OPNLPADJ −81** to set Open Loop Adjust to –78 dB or –81 dB (depending on Band Class).
8. Test 1: Execute **OLVL −25.0** to set Output Level to −25.0 dBm/1.23 MHz.
   Test 2: Execute **OLVL −65.0** to set Output Level to −65.0dBm/1.23 MHz.
   Test 3: Execute **OLVL −98.3** to set Output Level to −98.3dBm/1.23 MHz.
   (The above is the case for Band Class 0 and access terminal Class II. Values vary depending on Band Class and Access Terminal Class.)
9. Execute **SWPANDPG** to perform measurement.
10. Execute **APPWR?** to read the measurement result.
11. Execute **CALLSO** to terminate the call.
12. Repeat steps 8 to 11 for Test 2 and Test 3.

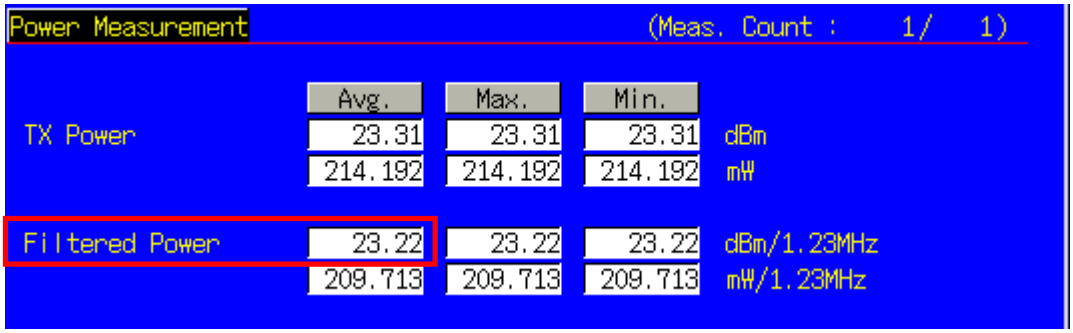
2.3.10. 3.1.2.3.2 Time Response of Open Loop Power Control

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL OLTR** to display the Open Loop Time Response screen.
3. Execute **EVAPLI RTAP** to set Application Protocol to RTAP.
4. Execute **EVRDATARATE 9K6** to set Reverse Data Channel Data Rate to 9.6 kbps.
5. Execute **CALLSA** to perform connection.
6. Execute **OLVL −60.0** to set Output Level to −60.0dBm/1.23 MHz.
7. Execute **STEPUPSA** to perform measurement.
8. Execute **TEMPPASS_OLTR?** to read the measurement result.
9. Execute **STEPDNSA** to perform measurement.
10. Execute **TEMPPASS_OLTR?** to read the measurement result.
11. Execute **STEPDNSA** to perform measurement.
12. Execute **TEMPPASS_OLTR?** to read the measurement result.
13. Execute **STEPUPSA** to perform measurement.
14. Execute **TEMPPASS_ OLTR?** to read the measurement result.



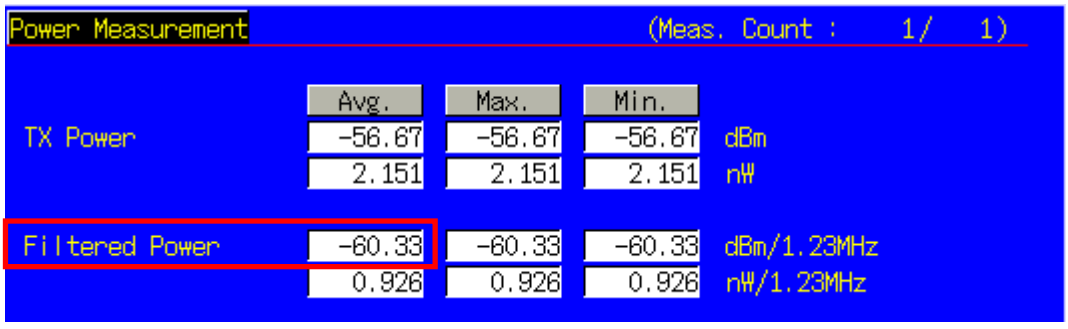
2.3.11. 3.1.2.3.4 Maximum RF Output Power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF** to set only Power Measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI FTAPRTAP** to set Application Protocol to FTAP + RTAP.
5. Execute **OPNLPADJ −81** or **OPNLPADJ −84** to set Open Loop Adjust to –81 dB or –84 dB (depending on Band Class).
6. Execute **PRBINIADJ 15** to set Probe Initial Adjust to 15 dB.
7. Execute **EVPWRSTEP 7.5** to set Power Step to 7.5 dB.
8. Execute **TCRATE X4** to set Forward Traffic Channel Data Rate to 307.2 kbps.
9. Execute **EVRDATARATE 153K6** to set Reverse Data Channel Data Rate to 153.6 kbps.
10. Execute **CALLSA** to perform connection.
11. Execute **OLVL −105.5** to set Output Level to −105.5 dBm.
12. Execute **PCBPAT ALL0** to set PCB Pattern to All0 (Up).
13. Execute **SWP** to perform measurement.
14. Execute **AVG_PWR?** to read the measurement result.



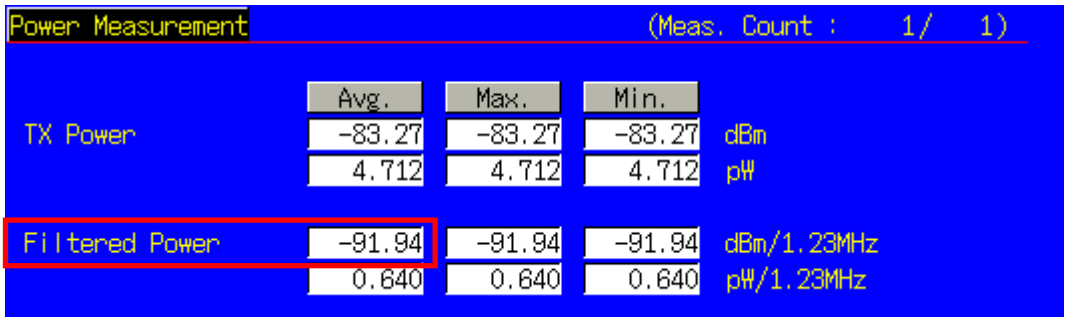
2.3.12. 3.1.2.3.5 Minimum Controlled Output Power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF** to set only Power Measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI RTAP** to set Application Protocol to RTAP.
5. Execute **EVRDATARATE 9K6** to set Reverse Data Channel Rate to 9.6 kbps.
6. Execute **CALLSA** to perform connection.
7. Execute **OLVL −25.0** to set Output Level to −25.0 dBm/1.23 MHz.
8. Execute **PCBPAT ALL1** to set PCB Pattern to All1 (Down).
9. Execute **SWP** to perform measurement.
10. Execute **AVG_FILTPWR?** to read the measurement result.



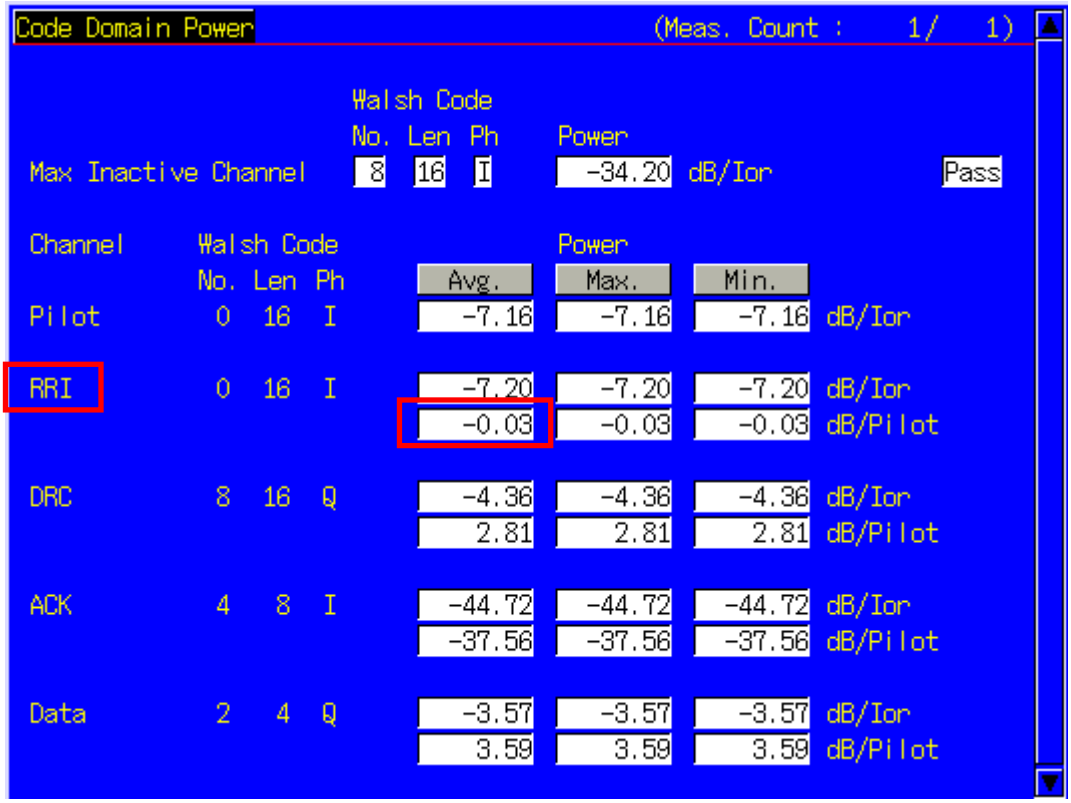
2.3.13. 3.1.2.3.6 Standby Output Power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF** to set only Power Measurement to On. (This sets the number of measurements to 1.)
4. Execute **OLVL −75.0** to set Output Level to −75.0 dBm.
5. Execute **SWP** to perform measurement.
6. Execute **AVG_FILTPWR?** to read the measurement result. Perform bandwidth conversion (1 MHz/1.23 MHz).



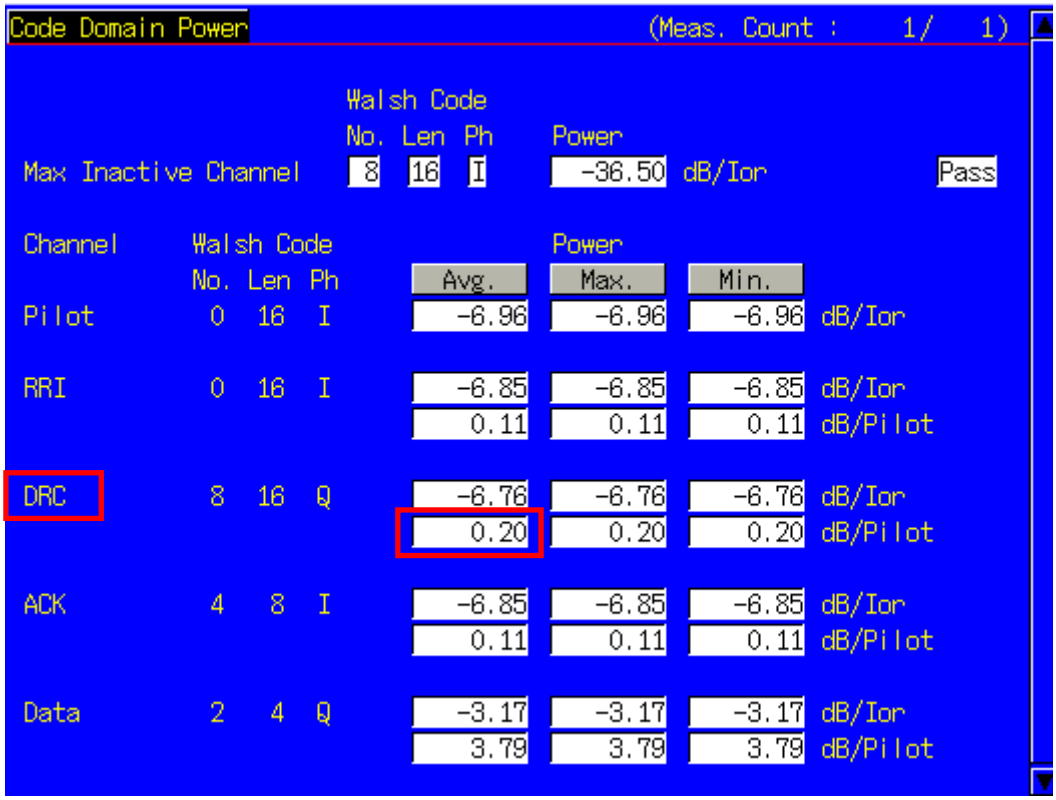
2.3.14. 3.1.2.3.7 RRI Channel Output power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF** to set only Code Domain Power measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI RTAP** to set Application Protocol to RTAP.
5. Execute **EVRDATARATE 9K6** to set Reverse Data Channel Data Rate to 9.6 kbps.
6. Execute **CALLSA** to perform connection.
7. Execute **OLVL −75.0** to set Output Level to −75.0 dBm/1.23 MHz.
8. Execute **SWP** to perform measurement.
9. Execute **AVG_RRICDP? PILOT** to read the measurement result.



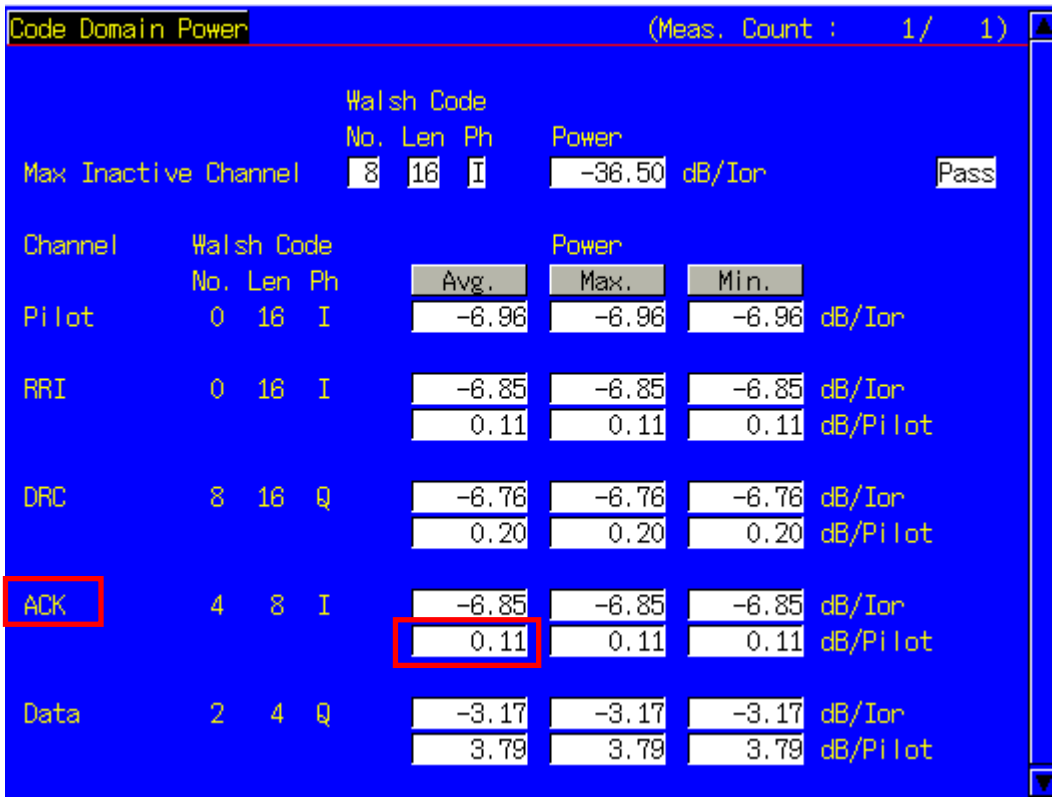
2.3.15. 3.1.2.3.8.1 DRC Channel Output Power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF** to set only Code Domain Power measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI FTAP** to set Application Protocol to FTAP.
5. Execute **DRCPWR 0** to set DRC Channel Gain to 0 dB.
6. Execute **CALLSA** to perform connection.
7. Execute **OLVL −75.0** to set Output Level to −75.0 dBm.
8. Execute **SWP** to perform measurement.
9. Execute **AVG_DRCCDP? PILOT** to read the measurement result.
10. Execute **DRCPWR 3** to set DRC Channel Gain to 3 dB. Repeat the steps 8 to 9.



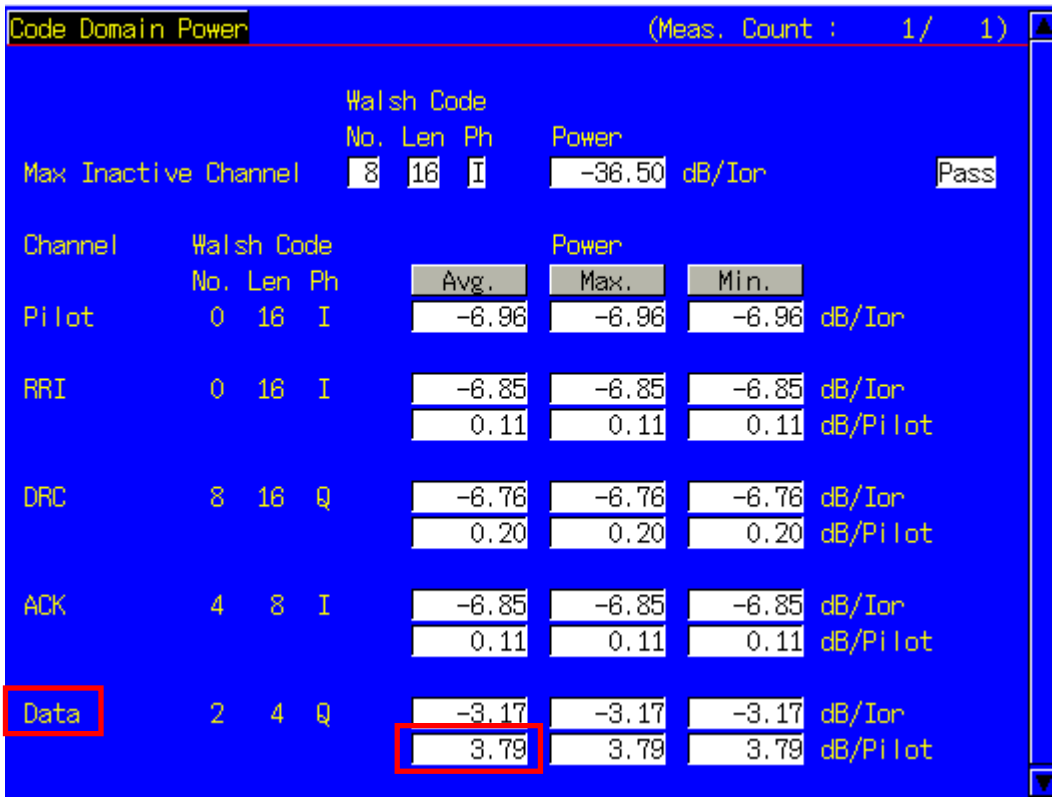
2.3.16. 3.1.2.3.8.2 ACK Channel Output Power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF** to set only Code Domain Power measurement to On. (This set the number of measurements to 1.)
4. Execute **EVAPLI FTAP** to set Application Protocol to FTAP.
5. Execute **ACKPWR 0** to set ACK Channel Gain to 0 dB.
6. Execute **CALLSA** to perform connection.
7. Execute **OLVL −75.0** to set Output Level to −75.0 dBm.
8. Execute **SWP** to perform measurement.
9. Execute **ACKCDP? PILOT** to read the measurement result.
10. Execute **ACKPWR 3** to set ACK Channel Gain to 3 dB. Repeat steps 8 and 9.



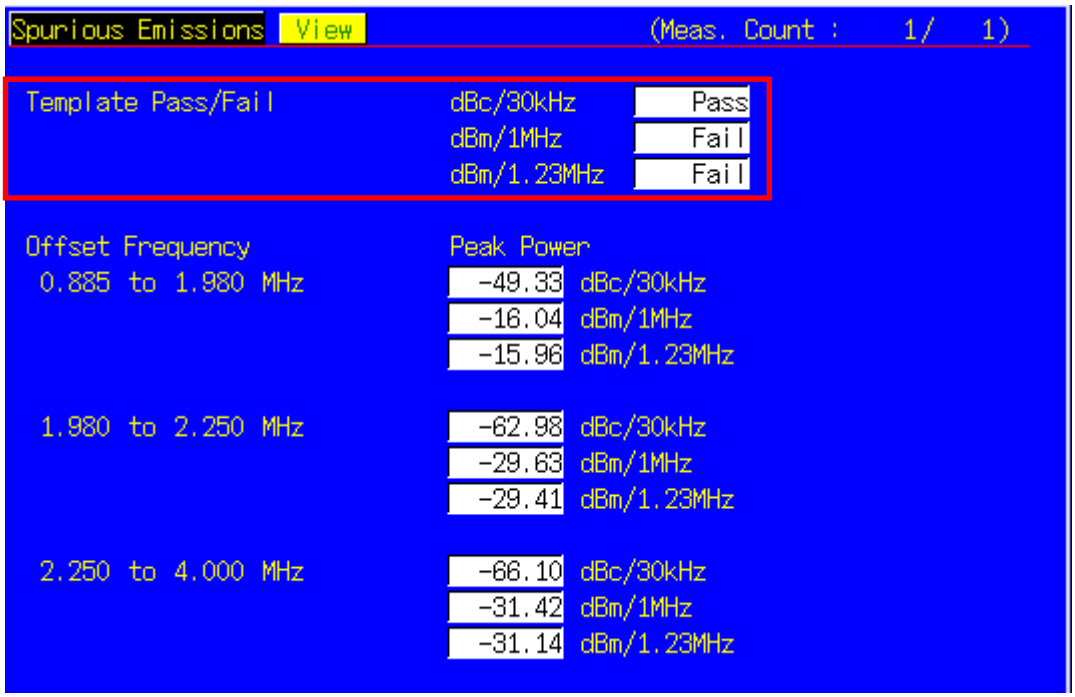
2.3.17. 3.1.2.3.8.3 Data Channel Output Power

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF** to set only Code Domain Power measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI FTAPRTAP** to set Application Protocol to FTAP + RTAP.
5. Execute **EVRDATARATE 9K6** to set Reverse Data Channel Data Rate to 9.6 kbps.
6. Execute **CALLSA** to perform connection.
7. Execute **OLVL −75.0** to set Output Level to −75.0 dBm.
8. Execute **SWP** to perform measurement.
9. Execute **AVG_DATACDP? PILOT** to read the measurement result.
10. Execute **EVRDATARATE 19K2** to set Reverse Data Channel Data Rate to 19.2 kbps. Repeat steps 8 and 9.
11. Execute **EVRDATARATE 38K4** to set Reverse Data Channel Data Rate to 38.4 kbps. Repeat steps 8 and 9.
12. Execute **EVRDATARATE 76K8** to set Reverse Data Channel Data Rate to 76.8 kbps. Repeat steps 8 and 9.
13. Execute **EVRDATARATE 153K6** to set Reverse Data Channel Data Rate to 153.6 kbps. Repeat steps 8 and 9.



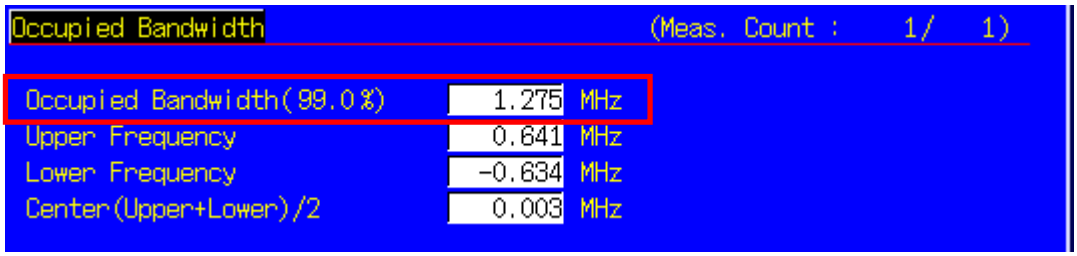
2.3.18. 3.1.2.4.1 Conducted Spurious Emissions

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON, 1, OFF** to set only Spurious Emissions measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI FTAPRTAP** to set Application Protocol to FTAP + RTAP.
5. Execute **OPNLPADJ −81** or **OPNLPADJ −84** to set Open Loop Adjust to −81dB or −84dB (depending on Band Class).
6. Execute **PRBINIADJ 15** to set Probe Initial Adjust to 15 dB.
7. Execute **EVPWRSTEP 7.5** to set Power Step to 7.5 dB.
8. Execute **TCRATE X4** to set Forward Traffic Channel Data Rate to 307.2 kbps.
9. Execute **EVRDATARATE 153K6** to set Reverse Data Channel Data Rate to 153.6 kbps.
10. Execute **CALLSA** to perform connection.
11. Execute **OLVL −105.5** to set Output Level to −105.5 dBm/1.23 MHz.
12. Execute **PCBPAT ALL0** to set PCB Pattern to All0 (Up).
13. Execute **SPR_DBM1M ON** to set Spurious Emission dBm/1 MHz measurement to On.
14. Execute **SPR_DBM1M23 ON** to set Spurious Emission dBm/1.23 MHz measurement to On.
15. Execute **SWP** to perform measurement.
16. Execute **TEMPPASS_SPR? DBC30K**, **TEMPPASS_SPR? DBM1M**, **TEMPASS_SPR? DBM1M23** to read the measurement result.



2.3.19. 3.1.2.4.3 Occupied Bandwidth

1. Turn on the power of the access terminal and open the Session.
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **EVALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, ON, 1, OFF, 1, OFF** to set only Occupied Bandwidth measurement to On. (This sets the number of measurements to 1.)
4. Execute **EVAPLI FTAPRTAP** to set Application Protocol to FTAP + RTAP.
5. Execute **TCRATE X4** to set Forward Traffic Channel Data Rate to 307.2 kbps.
6. Execute **EVRDATARATE 9K6** to set Reverse Data Channel Rate to 9.6 kbps.
7. Execute **CALLSA** to perform connection.
8. Execute **OLVL −105.5** to set Output Level to −105.5 dBm.
9. Execute **PCBPAT ALL0** to set PCB Pattern to All0 (Up).
10. Execute **SWP** to perform measurement.
11. Execute **OBW?** to read the measurement result.



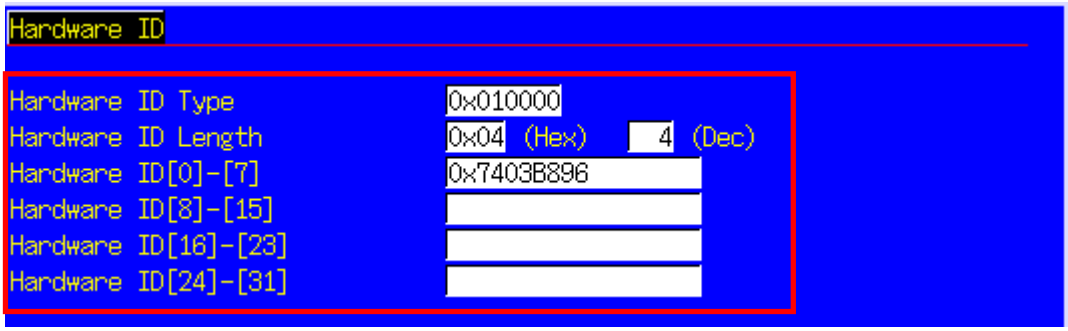
2.3.20. 4.3.1.1 Access Probes Output Power

1. Turn on the power of the access terminal and open the Session
2. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
3. Execute **OPNLPADJ –76** to set Open Loop Adjust to –76 dB.
4. Execute **PRBNUMSTEP 5** to set Probe Num Step to 5.
5. Execute **PRBSEQMAX1** to set Probe Sequence Max to 1.
6. Execute **CALLSA** to perform connection.
7. Execute **OLVL −65.5** to set Output Level to −65.5 dBm/1.23 MHz.
8. Execute **SWP** to perform measurement.
9. Execute **PBNUM?** to read the measurement result.
10. Execute **APBLVL? 1, 5** to read the measurement result.
11. Execute **OLVL –68** to set Output Level to −68 dBm/1.23 MHz.
12. Execute **OPNLPADJ –79** to set Open Loop Adjust to –79 dB.
13. Execute PRBINIADJ 6 to set Probe Initial Adjust to 6 dB.
14. Execute **PRBNUMSTEP 3** to set Probe Num Step to 3.
15. Execute EVPWRSTEP 3.0 to set Power Step to 3.0 dB.
16. Execute **PRBSEQMAX3** to set Probe Sequence Max to 3.
17. Toggle the power to the access terminal off and on to reopen the Session.
18. Execute **PBNUM?** to read the measurement result.
19. Execute **APBLVL? 1, 9** to read the measurement result.

2.4. AT Report

The Hardware ID Type, Hardware ID Length and Hardware ID reported by the access terminal can be read.

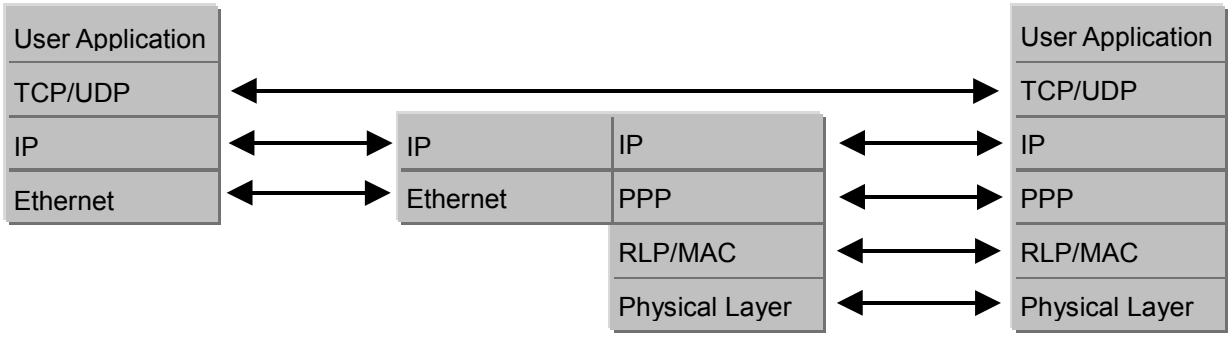
1. Execute **CALLRFR** and initialize AT Report.
2. Turn on the power of the access terminal and open the Session.
3. Execute **ATREP_HDIDTYPE?**, **ATREP_HDIDLEN?**, **ATREP_HDID?** to read Hardware ID Type, Hardware ID Length and Hardware ID.

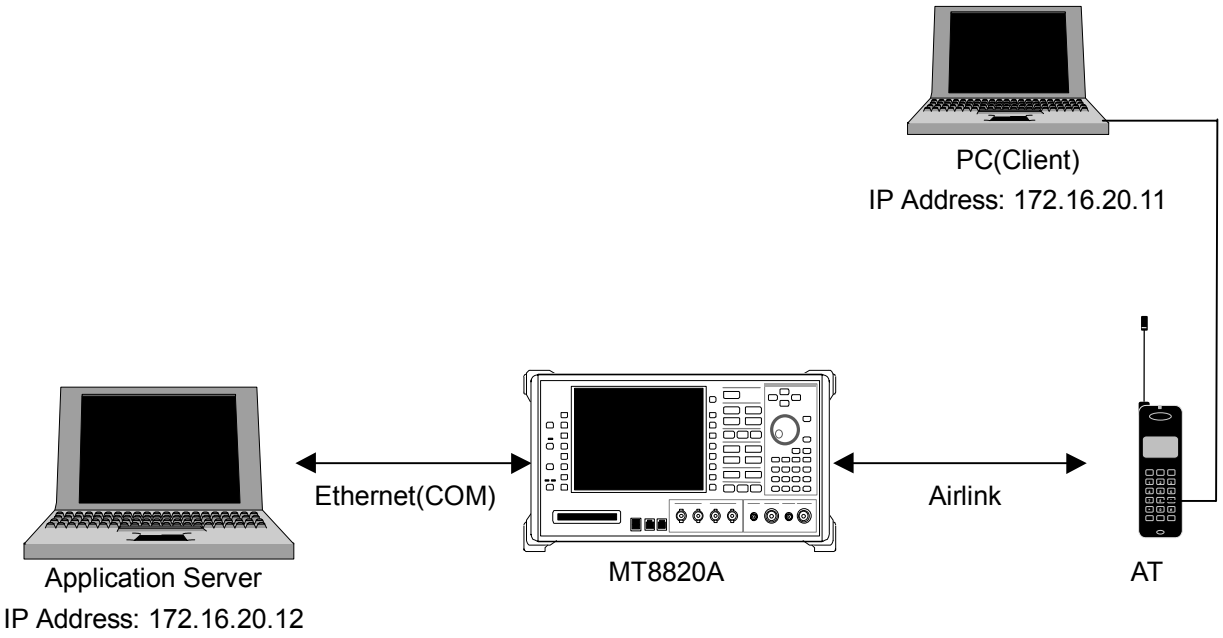


2.5. Function Tests

2.5.1. External Packet Data

The MX882003A−02 1XEV−DO External Packet Data option supports data transfer between equipment connected via the Ethernet port on the back panel and the access terminal.



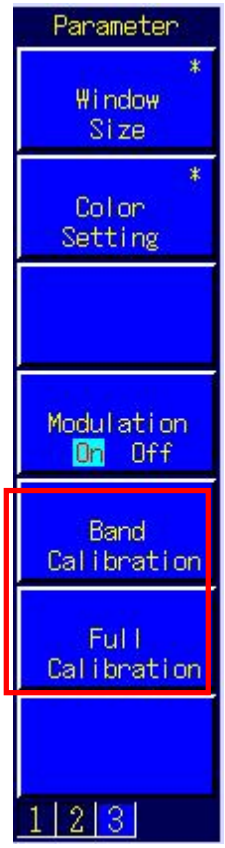


1. Move to the System Configuration screen to set [IP Address, Subnet Mask, Default Gateway].
   (e.g. IP Address : 172.16.20.12, Subnet Mask: 255.255.255.0, Default Gateway: 172.16.20.1)
2. Toggle the power off and on to enable the new settings.
3. Move to the Fundamental Measurement screen to set [Application Protocol] of Call Processing Parameters to [Default Packet].
4. Set [IP Address] of Packet Data Option (e.g. 172.16.20.11).
5. Turn on the power of the access terminal and open the Session.
6. Set the user name and password for dialup of the client PC. Perform dial−up connection.
7. User Name: CLIENTPC
   Password: MX882003A
8. The Call Processing state changes to [Connected] and the MT8820A and access terminal can communicate.
9. Check the connection status by pinging from the client PC or server PC.
10. Disconnect from the client PC.

3. Other

3.1.1. Calibration

Drift in the level accuracy due to internal temperature changes is calibrated to ensure flat frequency characteristics for the input and output level accuracy. There are two commands to perform calibration using a standalone MT8820A: Band Calibration (**BANDCAL**) and Full Calibration (**FULLCAL**). Band Calibration performs calibration in the CDMA2000 1x band, or all Band Classes supported by this measurement software (30 to 2700 MHz).
Full Calibration includes the contents executed by Band Calibration but takes more time than Band Calibration. Use Full Calibration after seasonal temperature changes and software version upgrades. When performing Full Calibration, wait at least 1 hour after power−on to warm-up.
Use Band Calibration at intervals when temperature changes can be ignored. For example, perform Band Calibration once when measuring a mobile terminal.

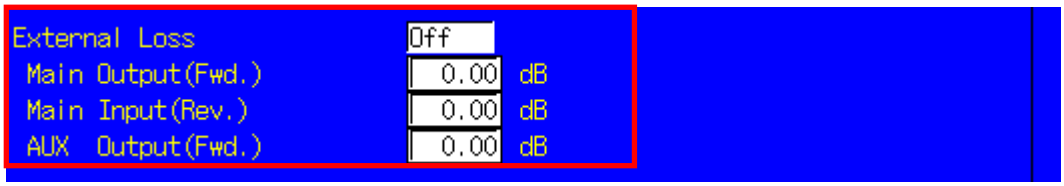


3.1.2. Dynamic Range

The MT8820A measurement linearity is guaranteed in the range of –40 dB up to the Input Level. In addition, a peak level of +10 dB over the Input Level is treated as over-level. As a consequence, set the MT8820A for an input level range of –40 to + 4 dB.

3.1.3. External Loss

The MT8820A can set an offset value for External Loss, such as cable loss.
Main Output (Fwd.), Main Input (Rev.), and Aux Output (Fwd.) can each be set for External Loss. The External Loss values are enabled when External Loss is On. In addition, the values can be saved in each Band Class.
Moreover, when External Loss is set to Common, the settings at the Common External Loss screen are used.



For example, use the following procedure to set the loss value for Main Output (Fwd.) to 3.0 dB and Main Input (Rev.) loss to 5 dB for Band Class 0.

1. Execute **EXTLOSSW ON** to enable Main Output (Fwd.), Main Input (Rev.), and Aux Output (Fwd.) for External Loss.
2. Execute **OEXTLOSS 0,3.0** to set the Main Output (Fwd.) loss to 3 dB.
3. Execute **IEXTLOSS 0,5.0** to set the Main Input (Fwd.) loss to 5 dB.

3.1.4. Synchronizing PC Controller and MT8820A

When multiple GPIB commands are sent from a PC controller to a connected MT8820A, commands may be queued in the MT8820 buffer after sending from the PC has been completed and some considerable time may be required to complete processing of the queued commands. At this time, if a query such as **ESR?** is executed after the command is sent, the GPIB drives waits until the query response is returned, so it is possible to confirm that command processing is completed at the MT8820A.

For example, when the RSSI value is read by the mobile terminal after the MT8820A Output Level is changed, such as at adjustment at RSSI measurement, control of the MT8820A and reading of the measured result from the mobile terminal must be synchronized using the procedure shown below.

1. Set the channel, etc.
2. Execute **OLVL –90.0** to set Output Level to −90.0 dBm/1.23 MHz.
3. Execute **ESR?** to wait until the response is returned.
4. Wait for the time required for RSSI measurement at the mobile terminal.
5. Get the RSSI value from the mobile terminal.

However, even when Phone1 and Phone2 are controlled simultaneously using Parallelphone, processing for one side sometimes keeps the other side waiting, so we recommend using a program that always sends the query and waits for the response after the command has been sent.

3.1.5. Speeding Up Control Software

The simplest method for speeding up the control software is to set the MT8820A screen to off by executing the **SCREEN OFF** command.

Anritsu

Specifications are subject to change without notice.

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