Application Note

/inritsu

CDMA2000/1xEV-DO

MT8820A Radio Communication Analyzer

Contents

1. C	DMA2000 Measurement Software	1
1.1.	SPECIFICATIONS	1
1.2.	MEASUREMENT SPECIFICATION TABLE (C.S.0011–B)	6
13	TX/RX MEASUREMENTS	8
1.3.	1. CDMA2000 Connection	8
1.3.	2. Handoff	8
1.3.	3. Termination	8
1.3.	 3.4.1 Demodulation of Forward Fundamental Channel in Additive White Gaussian Noise 3.5.1 Receiver Sensitivity and Dynamic Range 	9 11
1.3.	6. 4.1 Frequency Accuracy	
1.3.	7. 4.3.1 Time Reference	12
1.3.	8. 4.3.4 Waveform Quality and Frequency Accuracy	13
1.3. 1.3	 4.3.5 Code Domain Power 4.4.1 Range of Open Loop Output Power 	14 15
1.3.	11. 4.4.2 Time Response of Open Loop Power Control	
1.3.	12. 4.4.3 Access Probe Output Power	17
1.3.	13. 4.4.5 Maximum RF Output Power	18
1.3.	14. 4.4.6 Minimum Controlled Output Power	19
1.3.	 4.4.7 Standby Output Power and Galed Output Power 4.4.9 Code Channel to Reverse Pilot Channel Output Power Accuracy 	20 21
1.3.	 4.5.1 Conducted Spurious Emissions	
1.3.	18. 4.5.3 Occupied Bandwidth	23
1.4.	MS REPORT	
15	FUNCTION TESTS	25
1.5.	1. Voice Call	
1.5.	2. External Packet Data	26
2 1	xEV DO Massurament Software	27
Z . 1		
2.1.	SPECIFICATIONS	
2.2.	MEASUREMENT SPECIFICATION TABLE (C.S.0033–0)	28
2.3.	TX/RX MEASUREMENTS	29
2.3.	1. 1xEV–DO Connection	29
2.3.	2. Handoff	29
2.3.	 IErmination 3.1.1.2.1 Demodulation of Forward Traffic Channel in ΔW/GN 	29 30
2.3.	5. 3.1.1.3.1 Receiver Sensitivity and Dynamic Range	
2.3.	6. 3.1.2.1.2 Frequency Accuracy	
2.3.	7. 3.1.2.2.1 Time Reference	
2.3.	8. 3.1.2.2.2 Waveform Quality and Frequency Accuracy	32
2.3.	 3. 1.2.3.1 Range of Open Loop Output Power	
2.3.	11. 3.1.2.3.4 Maximum RF Output Power	35
2.3.	12. 3.1.2.3.5 Minimum Controlled Output Power	
2.3. 2.3.	 3.1.2.3.5 Minimum Controlled Output Power. 3.1.2.3.6 Standby Output Power. 	
2.3. 2.3. 2.3.	 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 1 DBC Channel Output Power. 	35 36 37
2.3. 2.3. 2.3. 2.3. 2.3.	 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. 3.1.2.3.8.1 DRC Channel Output Power. 3.1.2.3.8.2 ACK Channel Output Power 	
2.3. 2.3. 2.3. 2.3. 2.3. 2.3. 2.3.	 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. 3.1.2.3.8.1 DRC Channel Output Power. 3.1.2.3.8.2 ACK Channel Output Power	
2.3. 2.3. 2.3. 2.3. 2.3. 2.3. 2.3. 2.3.	 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. 3.1.2.3.8.1 DRC Channel Output Power. 3.1.2.3.8.2 ACK Channel Output Power	
2.3. 2.3. 2.3. 2.3. 2.3. 2.3. 2.3. 2.3.	 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. 3.1.2.3.8.1 DRC Channel Output Power. 3.1.2.3.8.2 ACK Channel Output Power 3.1.2.3.8.3 Data Channel Output Power. 3.1.2.4.1 Conducted Spurious Emissions 3.1.2.4.3 Occupied Bandwidth. 	

MT8820A-E-F-2

3.	Oth	er	.45
-	3.1.1.	Calibration	45
	3.1.2.	Dynamic Range	46
	3.1.3.	External Loss	46
	3.1.4.	Synchronizing PC Controller and MT8820A	46
	3.1.5.	Speeding Up Control Software	46

2.4.

2.5.

1. CDMA2000 Measurement Software

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1.1. Specifications

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

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	Level range: -30 to +35 dBm	
measurement	Carrier frequency accuracy: $\pm(\text{Set frequency x Reference oscillator accuracy +10 Hz})$	
	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 lor (total level)]:Pilot Channel:-30 to 0 dB, 0.25 dB step or OffFCH, SCH, DCCH:-30 to 0 dB, 0.1 dB step or OffSYNCH, PCH:-30 to 0 dB, 0.25 dB step or OffOCNS:Auto, 0.01 dB step or OffQPCH: (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	
	Specifications	(CDIVIAZ000)

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)		

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: $\pm (\text{Set frequency x Reference oscillator accuracy + 10 Hz})$		
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	Output frequency: 800 to 960 MHz, 1 Hz step		
generator (FM)	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)		
	Frequencycharacteristics(AtFrequencydeviation:4kHz,Modulationfrequency:1kHz for reference):±0.5dB (Modulation frequency:0.3 to 3 kHz)±1.0dB (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	Modulation frequency: 5970 Hz, 6000 Hz, 6030 Hz, or Off		
generator (SAT)	Deviation: Fixed to 2 kHz		

Table 1.1–2 Specifications (AMPS)

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: \pm (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 κΩ
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: $\leq 1 \Omega$
	Maximum output current: 100 mA

Table 1.1-2 Specifications (AMPS) (continued)

Item	Specification	
External packet data	Service Option: SO3	3
	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: F	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)
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	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		$\sqrt{}$
-	Gaussian Noise		
3.4.2	Demodulation of Forward Fundamental Channel in Multipath	Requires Fading Simulator	
	Fading Channel		
3.4.3	Demodulation of Forward Fundamental Channel During Soft		-
	Handoff		
3.4.4	Decision of Power Control Bit for Channels Belonging to Different		-
o =	Power Control Sets During Soft Handoff		
3.4.5	Decision of Power Control Bit for Channels Belonging to Same		-
316	Power Control Sets		
3.4.0	Demodulation of Forward Traffia Channel in Multingth Fading		-
3.4.7	Channel with Closed Loop Power Control (EPC, MODE = '000')		-
348	Demodulation of Forward Traffic Channel in Multinath Fading		
0.4.0	Channel with Closed Loop Power Control (EPC_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')		
2 4 1 2	and Transmit Diversity (UTD or STS)		
3.4.12	Channel Cating		-
3 4 13	Demodulation of Power Control Subchannel During Reverse		
5.4.15	Fundamental Channel Gating		_
3.5	Receiver Performance		
3.5.1	Receiver Sensitivity and Dynamic Range		$\sqrt{}$
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		$\sqrt{}$
4.2	Handoff		\backslash
4.2.1	CDMA to CDMA Hard Handoff	Only Hard Handoff	Р
		Cannot make required	
4.0.0	Transmit Device office Line 1.1	timing measurement.	
4.2.2	Iransmit Power atter Hard Handott		-
4.3	modulation Requirements		
4.3.1			NN
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		$\sqrt{}$
4.3.5	Code Domain Power		٧٧
4.4	RF Output Power Requirements		
4.4.1	Range of Open Loop Output Power		$\sqrt{}$

			510
4.4.2	Time Response of Open Loop Power Control		$\sqrt{\sqrt{1}}$
4.4.3	Access Probe Output Power		$\sqrt{\sqrt{1}}$
4.4.4	Range of Closed Loop Power Control	Only Power Control	Р
4.4.5	Maximum RF Output Power		$\sqrt{}$
4.4.6	Minimum Controlled Output Power		$\sqrt{}$
4.4.7	Standby Output Power and Gated Output Power		$\sqrt{\sqrt{1}}$
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.	$\sqrt{\sqrt{1}}$
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		$\sqrt{\sqrt{1}}$
4.5.2	Radiated Spurious Emissions		_
4.5.3	Occupied Bandwidth		$\sqrt{}$

√√: 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**
- 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.

Frame Err	ron R	ate				
	Confi	dence Level	FER	Err Frames	Transmitted	
F-FCH	Γ	99.4 <mark>%</mark>	0.00 %	0	1014	Pass
F-DCCH	-	<mark>%</mark>	<mark>%</mark>			
F-SCH1	Γ	99.4 <mark>%</mark>	0.00 <mark>%</mark>	0	1024	Pass

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, 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.

Frame Er	ror Rate				
	Confidence Level	FER	Err Frames	Transmitted	
F-FCH	95.0 <mark>%</mark>	0.00 <mark>%</mark>	0	600	Pass
1 TON	00.08	0,000		000	r dss

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, 0FF** 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.

Modulation Analysis			(Meas. C	Count: 1/ 1)
Carrier Frequency	Avg. 1871.249	997 MHz		
Carrier Frequency Error	Avg. -0.0025 0.00	Мах. -0.0025 0.00	Min. -0.0025 0.00	kHz ppm
Rho Time Error	0.99173 1.42	0.99173	0.99173	2U
EVM Peak Vector Error	9.02 27.18	9.02 27.18	9.02 27.18	** %(rms) %
Phase Error Magnitude Error Origin Offset	3.70 6.42 -37.49	3.70 6.42 -37.49	3.70 6.42 -37.49	deg.(rms) %(rms) dB

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, 0FF** 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.

Modulation Analysis			(Meas, C	ount: 1/ 1)
Carrier Frequency	Avg. 1871.249	997 MHz		
	Avg.	Max.	Min.	
Carrier Frequency Error	-0.0025	-0.0025	-0.0025	kHz
	0.00	0.00	0.00	ppm
Rho	0.99173	0.99173	0.99173	
Time Error	1.42	1.42	1.42	us
EVM	9.02	9.02	9.02	%(rms)
Peak Vector Error	27.18	27.18	27.18	8
Phase Error	3.70	3.70	3.70	deg.(nms)
Magnitude Error	6.42	6.42	6.42	%(rms)
Origin Offset	-37.49	-37.49	-37.49	dB

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, 0FF** 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.

Code Domain	Power					(Meas. Count : 1/ 1)				1)
				Walsh No. L	en Ph	Power				
Max Inactiv	ve Cha	annel		4	16 I	-27.85	dB		Pa	22
Channel	Wal:	sh Co	ode			Power				
	No.	Len	Ph		Avg.	Max.	Min.			
R-PICH	0	32	Ι		-5.30	-5.30	-5.30	dB		
R-FCH	- 4	16	Q		-1.55	-1.55	-1.55	dB		
R-DCCH	8	16	Ι		-45.21	-45.21	-45.21	dB		
R-SCH1	1	2	Q		-30.71	-30.71	-30.71	dB		
	2	4	Q		-39.93	-39.93	-39.93	dB		

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**, **1**, **OFF**, **1**, **OFF**, **1**, **OFF**, **1**, **OFF**, **1**, **OFF**, **t** oset 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.
- 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.

Access Probe Power -26.38 dBm/1.23MHz	Access Probe Power		
Access Probe Power = -26.38 dBm/1.23MHz			
	Access Probe Power	26.38 dBm/1.23MHz	

1.3.11. 4.4.2 Time Response of Open Loop Power Control

- Turn on the power of the mobile terminal to perform Registration. 1.
- Execute SCRSEL OLTR to display the Open Loop Time Response screen. 2.
- Execute RC 11 to set Radio Configuration to Fwd. RC1 + Rev. RC1. 3.
- 4. Execute SO 2 to set Service Option to SO2.
- Execute PILOTLVL -7 to set F-PICH Level to -7 dB. 5.
- 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.
- Execute STEPUPSA to perform measurement.
 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.
- Execute SCRSEL APMEAS to display the Access Probe Measurement screen. 2.
- Execute OLVL -65.0 to set Output Level to -65.0 dBm/1.23 MHz. 3.
- Execute **PILOTLVL –5** to set the F–PICH Level to 5 dB. 4.
- Execute MAXRSP 1 to set Max. Response Sequence to 1. 5.
- 6. Execute NUMSTEP 5 to set Number of Steps to 5.
- 7. Execute SWP to perform measurement.
- Execute APBLVL? 1, 5 (command for reading results of 5 access probes) to read the measurement result. 8.
- Execute NOMPWR 3 to set Nominal Power to 3 dB. 9.
- 10. Execute INITPWR 3 to set Initial Power to 3 dB.
- 11. Execute **PWRSTEP 3** to set Power Step to 1 dB.

- Execute NUMSTEP 3 to set Number of Steps to 3.
 Execute MAXRSP 3 to set Max. Response Sequence to 3.
 Execute SWP to perform measurement.
 Execute APBLVL? 1, 9 (command for reading results of 9 access probes) to read the measurement result.

Total 🔼											
Detected Access Probes 9 (Expected Access Probes 9)											
No.	Level		Step		Time		Length		Interval		
1	-11.16	dBm	0.00	dB	2.040	sec	0.520	sec	2.040	sec	
2	-7.75	dBm	3.41	dB	3.080	sec	0.520	sec	0.520	sec	
3	-5.15	dBm	2.60	dB	4.640	sec	0.520	sec	1.040	sec	
4	-11.85	dBm	-6.70	dB	5.680	sec	0.520	sec	0.520	sec	
5	-8.56	dBm	3.28	dB	7.240	sec	0.520	sec	1.040	sec	
6	-4.70	dBm	3.86	dB	8.280	sec	0.520	sec	0.520	sec	
7	-11.82	dBm	-7.12	dB	10.360	sec	0.520	sec	1.560	sec	
8	-8.65	dBm	3.17	dB	11.400	sec	0.520	sec	0.520	sec	
9	-5.00	dBm	3.65	dB	12.440	sec	0.520	sec	0.520	sec	
10		dBm		dB		sec		sec		sec	

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, 0FF** 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.

Power Measurement		(Meas. Count : 1/ 1)				
	Avg.	Max.	Min.			
TX Power	23.06	23.06	23.06	dBm		
	202.485	202.485	202.485	m₩		
Filtered Power	22.98	22.98	22.98	dBm/1.23MHz		
	198.406	198.406	198.406	m₩/1.23MHz		

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.

Power Measurement		(Meas, Count : 1/ 1)					
	Avg.	Max.	Min.				
TX Power	-60.54	-60.54	-60.54	dBm			
	0.882	0.882	0.882	n#			
	00 R0	00 80	00 80				
Filtered Power	-60.78	-60.78	-60.78	dBm/1.23MHz			
	0.836	0.836	0.836	n₩/1.23MHz			

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, 0FF** 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, 1, OFF, 1, OFF, 0N, 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.



Gated Power		(Meas	s. Count :	100/100)	
	Avg.	Max.	Min.		
Gate On Power	5.02	6.52	3.60	dBm	
Gate Off Power	-71.85	-71.48	-72.36	dBm	
On/Off Ratio	76.87	dB			

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.

Code Domain	Power				(Me	(Meas, Count : 1/ 1)				
Max Inacti	ve Cha	innel	W N	laish Io. L 4 [Code en Ph 1 <mark>6 I</mark>	Power -27.85	dB		Pass	
Channel	Wals	:h Co	de			Power				
	No.	Len	Ph		Avg.	Max.	Min.			
R-PICH	0	32	Ι		-5.30	-5.30	-5.30	dB		
R-FCH	4	16	Q		-1.55	-1.55	-1.55	dB		
R-DCCH	8	16	Ι		-45.21	-45.21	-45.21	dB		
R-SCH1	1	2	Q		-30.71	-30.71	-30.71	dB		
	2	4	Q		-39.93	-39.93	-39.93	dB		

4.5.1 Conducted Spurious Emissions 1.3.17.

- 1. Turn on the power of the mobile terminal to perform Registration.
- Execute SCRSEL FMEAS to display the Fundamental Measurement screen. 2.
- Execute 1XALLMEASITEMS OFF, OFF, 1, OFF, 1, OFF, 1, OFF, 1, ON, 1, OFF, OFF to set only Spurious Emissions 3. measurement to On. (This sets the number of measurements to 1.)
- 4. Execute RC 11 to set Radio Configuration to Fwd. RC1 + Rev. RC1.
- Execute SO 2 to set Service Option to SO2. 5.
- Execute PILOTLVL -7 to set F-PICH Level to -7 dB. 6.
- 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 ALLO to set PCB Pattern to AllO (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.

- Execute SPR_DBM1M23 ON to set Spurious Emission dBm/1.23 MHz measurement to On.
 Execute SWP to perform measurement.
 Execute TEMPPASS_SPR? DBC30K, TEMPPASS_SPR? DBM1M, TEMPASS_SPR? DBM1M23 to read the measurement result.

Spurious Emissions View		(Meas, Count :	1/ 1)
Template Pass/Fail	dBc/30kHz dBm/1MHz dBm/1.23MHz	Pass Fail Fail	
Offset Frequency 1.250 to 1.980 MHz	Peak Power -50.13 dBc/ -17.53 dBm/ -17.42 dBm/	'30kHz '1MHz '1.23MHz	
1.980 to 2.250 MHz	-56.39 dBc/ -25.00 dBm/ -24.86 dBm/	'30kHz '1MHz '1.23MHz	
2.250 to 4.000 MHz	-60.21 dBc/ -27.79 dBm/ -27.40 dBm/	'30kHz '1MHz '1.23MHz	

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, 0FF** 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 ALLO to set PCB Pattern to AllO (Up).
- 12. Execute SWP to perform measurement.
- 13. Execute **OBW?** to read the measurement result.

Occupied Bandwidth		(Meas, Count :	1/	1)
Accuried Bandwidth(99.0%)	1 269 MH-	1		
Upper Frequency	0.634 MHz	-		
Lowen Frequency	-0.634 MHz			
Center(Upper+Lower)/2	0.000 MHz			

1.4. **MS Report**

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

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

MS ID	
ESN	F794D800 (Hex)
IMSI (MCC-MNC-MSIN)	*** <mark>-</mark> ** <mark>-</mark> 0000006976 (De

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.



- Move to the System Configuration screen to set [IP Address, Subnet Mask, Default Gateway]. 1. (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.
- Move to the Fundamental Measurement screen to set [Service Option] of Call Processing Parameters to [SO33]. 3.
- Set [Packet Data Mode] of Packet Data Option to [PPP/IP]. 4.
- 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.
- Set the user name and password for dialup of the client PC. Make the dial-up connection. 7.
- User Name: CLIENTPC Password: MX882002A 8.
- 9. The Call Processing state changes to [Connected] and the MT8820A and mobile terminal can communicate.
- Check the connection status by pinging from the client PC or server PC. 10.
- 11. Disconnect from the client PC.

2. 1xEV-DO Measurement Software

2.1. Specifications

|--|

Item	Specification			
Fundamental measurement	Measurement frequency: 300 to 2200 MHz			
Amplitude measurement	Depends on the performance of MX882002A.			
Frequency/Modulation	Measurement level range: -30 to +35 dBm			
measurement	Carrier frequency accuracy: \pm (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 lor) 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)
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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)

3 Physical Layer Minimum Standards 31.1.1 Receiver Minimum Standards W 31.1.2 Demodulation Requirement W 31.1.2 Demodulation of Forward Traffic Channel in Multipath Fading Channel Requires Fading Simulator 31.1.2.1 Demodulation of Forward Traffic Channel in Multipath Fading Requires Fading Simulator 31.1.2.1 Demodulation of Forward Traffic Channel in Multipath Fading Requires Fading Simulator 31.1.2.3 Decision of Power Control Bit for Channels belonging to Bene Power Control Set standardf - 31.1.3.1 Receiver Performance - 31.1.3.2 Single Tone Desensitization Requires SG - 31.1.3.4 Acceiver Performance - - 31.1.3.4 Adjacent Channel Selectivity - - 31.1.3.5 Receiver Blocking Characteristics - - 31.1.4.2 Transmitter Minimum Standards - - 31.2.1 Trequency Requirements - - 31.2.1 Trequency Requirements - - 31.2.2.1 Trequency Requirements		Item	comment	
3.1.1 Poseiver Minimum Standards // 3.1.1.1 Frequency Coverage Requirement // 3.1.1.2 Demodulation Requirements // 3.1.1.2 Demodulation Requirements // 3.1.1.2 Demodulation of Forward Traffic Channel In MURGN Except Pilot Drop // 3.1.1.2.1 Demodulation of Forward Traffic Channel In Multipath Fading Requires Fading Simulator / 3.1.1.2.1 Decision of Power Control Bit for Channels belonging to the Same Power Control Sets during Soft Handoff - - 3.1.1.2.1 Decision of Power Control Sets - - - 3.1.1.2.2 Decision of Power Control Sets - - - 3.1.1.2.3 Receiver Portromance - - - 3.1.1.3.1 Receiver Sensitization Requires SG - - 3.1.1.3.2 Single Tone Desensitization - - - - 3.1.3.3 Receiver Bioching Characteristics - - - - - - - - - - - - - - - - - - <th>3</th> <th>Physical Laver Minimum Standards</th> <th></th> <th></th>	3	Physical Laver Minimum Standards		
3.1.1.1 Frequency Coverage Requirement W 3.1.1.2 Demodulation of Forward Traffic Channel in AWGN Except Pilot Drop W 3.1.1.2.1 Demodulation of Forward Traffic Channel in Multipath Fading Requires Fading Simulator V 3.1.1.2.1 Demodulation of Forward Traffic Channels belonging to Except Pilot Drop W 3.1.1.2.1 Decision of Power Control Bit for Channels belonging to - - 3.1.1.2.5 Demodulation of Reverse Power Control Channel during Soft - - 3.1.1.2.5 Demodulation of Reverse Power Control Channel during Soft - - 3.1.1.3.1 Receiver Performance W - - 3.1.1.3.2 Single Tone Desenstitzation Requires SG - - 3.1.1.3.2 Single Tone Desenstitzation - - - - 3.1.1.3.4 Adjacent Channel Selectivity - - - - 3.1.1.3.6 Receiver Blocking Characteristics - - - - - 3.1.1.4.1 Conducted Spurious Emissions - - - - - - - -	3.1.1	Receiver Minimum Standards		\sim
1.1.1.2 Demodulation Requirements Scept Plict Drop 3.1.1.2.1 Demodulation of Forward Traffic Channel in MVGN Except Plict Drop 3.1.1.2.2 Decision of Power Control Bit for Channels belonging to - J.1.1.2.3 Decision of Power Control Sets during Soft Handoff - 3.1.1.2.4 Decision of Power Control Sets - J.1.1.2.5 Demodulation of Reverse Power Control Channel bunging to the Same Power Control Sets - J.1.1.3.1 Receiver Performance - J.1.1.3.3 Intermodulation Spurious Response Attenuation - J.1.1.3.4 Adjacent Channel Selectivity - J.1.1.3.5 Intermodulation Spurious Response Attenuation - J.1.1.3.6 Receiver Blocking Characteristics - J.1.1.4.1 Limitations of Emissions - J.1.1.4.2 Redurine Requirements - J.1.1.4.1 Conducted Spurious Emissions - J.1.2.1 Frequency Requirements - J.1.2.1 Frequency Accuracy - J.1.2.2 Waddition Requirements - J.1.2.1 Frequency Accuracy -	3.1.1.1	Frequency Coverage Requirement		$\sqrt{}$
3.11.2.1 Demodulation of Forward Traffic Channel in AWGN Except Pliot Drop Vision 3.1.1.2.2 Demodulation of Forward Traffic Channel in Multipath Fading Requires Fading Simulator \vee{Vision 3.1.1.2.3 Decision of Power Control Bit for Channels belonging to	3.1.1.2	Demodulation Requirements		\sim
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 - - 3.1.1.2.4 Decision of Power Control Sets - - 3.1.1.2.5 Demodulation of Reverse Power Control Channel during Soft Handoff - - 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 - - 3.1.1.3.4 Intermodulation Spurious Emissions - - 3.1.1.4 Limitations of Emissions - - 3.1.1.4.1 Receiver Blocking Characteristics - - 3.1.2.1 Frequency Accuracy W W 3.1.2.1 Frequency Accuracy W W 3.1.2.1 Frequency Accuracy W W 3.1.2.2.1 Time Reference W W 3.1.2.2.2 Waveform Qu	3.1.1.2.1	Demodulation of Forward Traffic Channel in AWGN	Except Pilot Drop	$\sqrt{}$
Channel Channels	3.1.1.2.2	Demodulation of Forward Traffic Channel in Multipath Fading	Requires Fading Simulator	
3.1.1.2.3 Decision of Power Control Bit for Channels belonging to - Different Power Control Bit for Channels belonging to the - 3.1.1.2.4 Decision of Power Control Bit for Channels belonging to the - 3.1.1.2.5 Demodulation of Reverse Power Control Channel during Soft - 3.1.1.2.5 Demodulation of Reverse Power Control Channel during Soft - 3.1.1.3.1 Receiver Sensitivity and Dynamic Range W 3.1.1.3.2 Single Tone Desensitization Requires SG V 3.1.1.3.3 Intermodulation Spurious Response Attenuation - - 3.1.1.3.4 Adjacent Channel Selectivity - - - 3.1.1.4.1 Conducted Spurious Emissions - - - 3.1.1.4 Fragmenty Requirements - - - 3.1.2.1 Frequency Coverage - - - 3.1.2.1 Frequency Coverage - - - 3.1.2.1 Frequency Accuracy W - - 3.1.2.1 Frequency Accuracy W - - 3.1.2.1 Frequency Accuracy W	-	Channel	3	
Different Power Control Sets during Soft Handoff	3.1.1.2.3	Decision of Power Control Bit for Channels belonging to		-
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 - 3.1.1.3.1 Receiver Performance - 3.1.1.3.2 Single Tome Desensitization Requires SG √ 3.1.1.3.3 Intermodulation Spurious Response Attenuation - - 3.1.1.3.4 Adjacent Channel Selectivity - - 3.1.1.3.4 Receiver Blocking Characteristics - - 3.1.1.3.4 Receiver Blocking Characteristics - - 3.1.1.4 Limitations of Emissions - - 3.1.1.4 Conducted Spurious Emissions - - 3.1.2.1 Frequency Coverage -////////////////////////////////////		Different Power Control Sets during Soft Handoff		
Same Power Control Sets	3.1.1.2.4	Decision of Power Control Bit for Channels belonging to the		-
3.1.1.2.5 Demodulation of Reverse Power Control Channel during Soft Handoff - 3.1.1.3 Receiver Performance - 3.1.1.3 Receiver Sensitivity and Dynamic Range - 3.1.1.3 Single Tone Desensitization Requires SG - 3.1.1.3.1 Intermodulation Spurious Response Attenuation - - 3.1.1.3.3 Intermodulation Spurious Response Attenuation - - 3.1.1.3.4 Limitations of Emissions - - 3.1.1.4.1 Conducted Spurious Emissions - - 3.1.1.4 Conducted Spurious Emissions - - 3.1.2.1 Frequency Requirements - - 3.1.2.1 Frequency Coverage - - 3.1.2.2 Wouldation Reguirements - - 3.1.2.2.1 Time Reference - - 3.1.2.2.3 Redundant ACK Transmission - - 3.1.2.3.1 Range of Open Loop Power Control - - 3.1.2.3.1 Range of Open Loop Power Control - - 3.1.2.3.1 Range of Open Loop Power Control -		Same Power Control Sets		
31.1.3.1 Receiver Performance W 31.1.3.1 Receiver Sensitivity and Dynamic Range W 31.1.3.2 Single Tone Desensitization Requires SG V 31.1.3.3 Intermodulation Spurious Response Attenuation - - 31.1.3.3 Intermodulation Spurious Response Attenuation - - 31.1.3.4 Adjacent Channel Selectivity - - 31.1.4 Limitations of Emissions - - 31.1.4.1 Conducted Spurious Emissions - - 31.1.4.1 Radiated Spurious Emissions - - 31.1.4.1 Frequency Requirements - - 31.2.1.1 Frequency Accuracy W W 31.2.2.1 Time Reference W - 31.2.2.1 Time Reference W - 31.2.2.2 Waveform Quality and Frequency Accuracy W - 31.2.3.1 Range of Open Loop Output Power Preamble Length cannot be set to 7. - 31.2.3.1 Range of Closed Loop Power Control W - - 31.2.3.3 Range of Closed Loop Pow	3.1.1.2.5	Demodulation of Reverse Power Control Channel during Soft		-
3.1.1.3 Receiver Performance N 3.1.1.3.1 Receiver Sensitivity and Dynamic Range N 3.1.1.3.2 Single Tone Desensitization Requires SG N 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 Conducted Spurious Emissions - - 3.1.1.4 Conducted Spurious Emissions - - 3.1.2.1 Trequency Requirements - - 3.1.2.1.1 Frequency Requirements - - 3.1.2.1 Frequency Accuracy - - 3.1.2.1 Frequency Accuracy - - 3.1.2.1 Frequency Accuracy - - 3.1.2.1 Time Reference - - 3.1.2.2.1 Time Reference - - 3.1.2.3.1 Range of Open Loop Output Power - - 3.1.2.3.1 Range of Open Loop Power Control - N 3.1.2.3.2	2442	Handoff Reseiver Performence		
3.1.1.3.2 Requires SG V 3.1.1.3.3 Intermodulation Spurious Response Attenuation - 3.1.1.3.4 Adjacent Channel Selectivity - 3.1.1.3.5 Receiver Bicking Characteristics - 3.1.1.4 Limitations of Emissions - 3.1.1.4 Limitations of Emissions - 3.1.1.4 Conducted Spurious Emissions - 3.1.1.4 Radiated Spurious Emissions - 3.1.1.4 Radiated Spurious Emissions - 3.1.1.4 Requirements - 3.1.2.1 Frequency Requirements - 3.1.2.2.1 Time Reference - 3.1.2.2.2 Waveform Quality and Frequency Accuracy - 3.1.2.3 Reform Quality and Frequency Accuracy - 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 Only Power Control 3.1.2.3.4 Maximum RF Output Power V 3.1.2.3.5 Minimum Controled Output Power V 3.1.2.3.6 Standby Output Power V 3.1	3.1.1.3	Receiver Performance		
3.1.1.3.2 Single Tolle Desclisit/24001 Intermodulation Spurious Response Attenuation - 3.1.1.3.3 Intermodulation Spurious Response Attenuation - - 3.1.1.3.3 Receiver Blocking Characteristics - - 3.1.1.4.1 Conducted Spurious Emissions - - 3.1.1.4.2 Radiated Spurious Emissions - - 3.1.2.1 Frequency Requirements - - 3.1.2.1.1 Frequency Accuracy - - 3.1.2.1 Frequency Accuracy - - 3.1.2.1 Trequency Coverage - - 3.1.2.1 Trequency Coverage - - 3.1.2.1 Time Reference - - 3.1.2.2.2 Waveform Quality and Frequency Accuracy - - 3.1.2.3.1 Range of Open Loop Output Power Preamble Length cannot be set to 7. - 3.1.2.3.1 Range of Open Loop Power Control - - - 3.1.2.3.1 Range of Closed Loop Power Control - - - 3.1.2.3.3 Range of Closed Loop Power Control - -	31132	Single Tone Desensitization	Poquiros SC	NN N
3.1.1.3.3 Interinductation opticals Attendation - 3.1.1.3.4 Adjacent Channel Selectivity - 3.1.1.3.5 Receiver Blocking Characteristics - 3.1.1.4.1 Conducted Spurious Emissions - 3.1.1.4.1 Conducted Spurious Emissions - 3.1.1.4.1 Conducted Spurious Emissions - 3.1.2.1 Frequency Requirements - 3.1.2.1 Frequency Coverage - 3.1.2.1 Frequency Coverage - 3.1.2.2 Modulation Requirements - 3.1.2.2.1 Time Reference - 3.1.2.2.3 Redundant ACK Transmission - 3.1.2.3 Ref Output Power Requirements - 3.1.2.3 Range of Open Loop Power Control - 3.1.2.3 Range of Closed Loop Power Control - 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 Data Channel Output Power - 3.1.2.3.8 Data Channel Output Power -<	3.1.1.3.Z	Intermedulation Sourious Response Attenuation	Requires 3G	N
3.1.1.3.4 Adjatent Chainer Selectivity - 3.1.1.3.5 Receiver Blocking Characteristics - 3.1.1.4.1 Limitations of Emissions - 3.1.1.4.2 Radiated Spurious Emissions - 3.1.1.4.1 Conducted Spurious Emissions - 3.1.1.4.2 Radiated Spurious Emissions - 3.1.2.1 Frequency Requirements - 3.1.2.1.1 Frequency Accuracy -//-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-	3.1.1.3.3	Adjacent Channel Solactivity		-
3.1.1.3.5 Reterver blocking Orlataberistics - 3.1.1.4 Limitations of Emissions - 3.1.1.4.1 Conducted Spurious Emissions - 3.1.1.4 Radiated Spurious Emissions - 3.1.2 Transmitter Minimum Standards - 3.1.2.1 Frequency Requirements - 3.1.2.1 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 - 3.1.2.3 Redundant ACK Transmission - 3.1.2.3.1 Range of Open Loop Output Power Preamble Length cannot be set to 7. 3.1.2.3.1 Range of Open Loop Power Control Only Power Control 3.1.2.3.3 Range of Open Loop Power Control Only Power Control 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 - 3.1.2.3.8 DCdc Donain Power - 3.1.2.3.8 DRC Channel Output Power - 3.1.2.3	3.1.1.3.4	Adjacent Channel Selectivity		-
3.1.1.4 Limitations of Emissions 3.1.1.4.1 Conducted Spurious Emissions 3.1.1.4.1 Radiated Spurious Emissions 3.1.2 Transmitter Minimum Standards 3.1.2.1 Frequency Requirements 3.1.2.1.1 Frequency Accuracy 3.1.2.1 Frequency Accuracy 3.1.2.1 Frequency Accuracy 3.1.2.2.1 Time Reference 3.1.2.2.2 Waveform Quality and Frequency Accuracy 3.1.2.3 Redundant ACK Transmission 3.1.2.3.1 Range of Open Loop Dower Control 3.1.2.3.3 Range of Open Loop Power Control 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 3.1.2.3.8 Code Domain Power 3.1.2.3.8 Data Channel Output Power	3.1.1.3.5			-
3.1.1.4.1 Conducted Spurious Emissions - 3.1.1.4.2 Transmitter Minimum Standards - 3.1.2 Transmitter Minimum Standards - 3.1.2.1 Frequency Requirements -//-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-/-	3.1.1.4	Limitations of Emissions		
3.1.1.4.2 Radialed Spurious Emissions - 3.1.2 Transmitter Minimum Standards - 3.1.2.1 Frequency Requirements -// 3.1.2.1 Frequency Coverage -// 3.1.2.1 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 - 3.1.2.3.1 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 -// 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 -// 3.1.2.3.8 Code Domain Power -// 3.1.2.3.8 Data Channel Output Power -// 3.1.2.3.8 Data Channel Output Power -// 3.1.2.3.8 Data Channel Output Power -// 3.1.2.4.1 <td>3.1.1.4.1</td> <td>Conducted Spunous Emissions</td> <td></td> <td>—</td>	3.1.1.4.1	Conducted Spunous Emissions		—
3.1.22 Traistituter minimum statuards 3.1.21 Frequency Requirements 3.1.2.1.1 Frequency Accuracy 3.1.2.1.2 Frequency Accuracy 3.1.2.1 Frequency Accuracy 3.1.2.1 Frequency Accuracy 3.1.2.2.1 Modulation Requirements 3.1.2.2.2 Waveform Quality and Frequency Accuracy 3.1.2.3.1 Redundant ACK Transmission 3.1.2.3.2 Redundant ACK Transmission 3.1.2.3.1 Range of Open Loop Output Power 3.1.2.3.1 Range of Open Loop Power Control 3.1.2.3.2 Time Response of Open Loop Power Control 3.1.2.3.3 Range of Closed Loop Power Control 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 3.1.2.3.8 Code Domain Power 3.1.2.3.8 Date Channel Output Power 3.1.2.3.8 Date Channel Output Power 3.1.2.3.8 Data Channel Output Power 3.1.2.3.8 Data Channel Output Power 3.1.2.3.8 Data Channel Output Power 3.1.2.4.1 Conducted Spurious Emissions<	3.1.1.4.2	Radiated Spurious Emissions		-
3.1.2.1 Prequency Accuracy VI 3.1.2.1.1 Frequency Coverage VI 3.1.2.1.2 Frequency Accuracy VI 3.1.2.1.3 Modulation Requirements VI 3.1.2.2.4 Waveform Quality and Frequency Accuracy VI 3.1.2.2.3 Redundant ACK Transmission - 3.1.2.3 Redundant ACK Transmission - 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 Only Power Control 3.1.2.3.3 Range of Closed Loop Power Control Only Power Control 3.1.2.3.4 Maximum RF Output Power VI 3.1.2.3.5 Minimum Controlled Output Power VI 3.1.2.3.6 Standby Output Power VI 3.1.2.3.8 Code Domain Power VI 3.1.2.3.8 DRC Channel Output Power VI 3.1.2.3.8 Data Channel Output Power VI 3.1.2.3.8 Data Channel Output Power VI 3.1.2.3.8 Data Channel Output Power VI 3.1.2.4.1 Conducted Spurious Emissions -	3.1.2	Fraguency Requirements		\sim
3.1.2.1.1 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 – 3.1.2.3.1 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 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 √√ 3.1.2.3.8 DCde Domain Power √√ 3.1.2.3.8 DRC Channel Output Power √√ 3.1.2.3.8 DRC Channel Output Power √√ 3.1.2.3.8 Data Channel Output Power √√ 3.1.2.3.4 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.	31211	Frequency Coverage		
3.1.2.1.2 Prequency Accuracy VV 3.1.2.2 Modulation Requirements VV 3.1.2.2.1 Time Reference VV 3.1.2.2.2 Waveform Quality and Frequency Accuracy VV 3.1.2.2.3 Redundant ACK Transmission - 3.1.2.3.1 Range of Open Loop Output Power Preamble Length cannot be set to 7. 3.1.2.3.1 Range of Open Loop Power Control Only Power Control 3.1.2.3.2 Time Response of Open Loop Power Control Only Power Control 3.1.2.3.4 Maximum RF Output Power VV 3.1.2.3.5 Minimum Controlled Output Power VV 3.1.2.3.6 Standby Output Power VV 3.1.2.3.7 RRI Channel Output Power VV 3.1.2.3.8 Code Domain Power VV 3.1.2.3.8. DRC Channel Output Power VV 3.1.2.3.8. Data Channel Output Power VV 3.1.2.4.1 Conducted Spurious Emissions VV 3.1.2.4.2 Radiated Spurious Emissions VV 3.1.2.4.3 Occupied Bandwidth VV 4.3 Access Channel MAC Protocol VV <tr< td=""><td>31212</td><td></td><td></td><td></td></tr<>	31212			
3.1.2.2 Inductation 3.1.2.2.1 Time Reference 3.1.2.2.2 Waveform Quality and Frequency Accuracy 3.1.2.3 Redundant ACK Transmission 3.1.2.3 Redundant ACK Transmission 3.1.2.3 Reforence 3.1.2.3.1 Range of Open Loop Output Power 3.1.2.3.1 Range of Open Loop Power Control 3.1.2.3.2 Time Response of Open Loop Power Control 3.1.2.3.3 Range of Closed Loop Power Control 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 DRC Channel Output Power 3.1.2.3.8 DRC Channel Output Power 3.1.2.3.8 Data Channel Output Power 3.1.2.3.8 Data Channel Output Power 3.1.2.3.4 ACK Channel Output Power 3.1.2.3.5 Maximum Sisions 3.1.2.4.1 Limitations on Emissions 3.1.2.4.2 Radiated Spurious Emissions 3.1.2.4.3 Occupied Bandwidth 4.3 Access Channel MAC Protocol	3.1.2.1.2	Medulation Bequirements		
3.1.2.2.1 Time Reference √√ 3.1.2.2.3 Redundant ACK Transmission	31221	Time Deference		
3.1.2.2.2 Wateron requercy Accuracy Image: Accuracy 3.1.2.3 Ref 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 Only Power Control 3.1.2.3.3 Range of Closed Loop Power Control Only Power Control 3.1.2.3.4 Maximum RF Output Power Image: Accuracy 3.1.2.3.5 Minimum Controlled Output Power Image: Accuracy 3.1.2.3.6 Standby Output Power Image: Accuracy 3.1.2.3.7 RRI Channel Output power Image: Accuracy 3.1.2.3.8 Code Domain Power Image: Accuracy 3.1.2.3.8 DRC Channel Output Power Image: Accuracy 3.1.2.3.8 Data Channel Output Power Image: Accuracy 3.1.2.3.8 Data Channel Output Power Image: Accuracy 3.1.2.4 Limitations on Emissions Image: Accuracy 3.1.2.4.1 Conducted Spurious Emissions Image: Access Channel MAC Protocol 4.3 Access Probes Output Power Image: Access Channel MAC Protocol 4.3.1.1 Access Probes Output Power Image: Access Channel MAC Pr	31222			
3.1.2.3 RF Output Power Requirements	31223	Pedundant ACK Transmission		N N
3.1.2.3 Range of Open Loop Output Power Preamble Length cannot be set to 7. 3.1.2.3.1 Range of Open Loop Output Power VM 3.1.2.3.2 Time Response of Open Loop Power Control Only Power Control 3.1.2.3.3 Range of Closed Loop Power Control Only Power Control 3.1.2.3.4 Maximum RF Output Power VM 3.1.2.3.5 Minimum Controlled Output Power VM 3.1.2.3.6 Standby Output Power VM 3.1.2.3.7 RRI Channel Output Power VM 3.1.2.3.8 Code Domain Power VM 3.1.2.3.8. DRC Channel Output Power VM 3.1.2.3.8. ACK Channel Output Power VM 3.1.2.3.8. Data Channel Output Power VM 3.1.2.3.8. Data Channel Output Power VM 3.1.2.4.1 Conducted Spurious Emissions VM 3.1.2.4.2 Radiated Spurious Emissions 3.1.2.4.3 Occupied Bandwidth VM 4 MAC Layer Minimum Standards 4.3 Access Channel MAC Protocol 4.3.1.1 Access Channel MAC Protocol <td>3122</td> <td>Reduitant ACK Transmission</td> <td></td> <td>_</td>	3122	Reduitant ACK Transmission		_
3.1.2.3.1 Triange of Open Loop Power Control International Congregation Control of the set to 7. 3.1.2.3.2 Time Response of Open Loop Power Control Only Power Control Image of Closed Loop Power Control 3.1.2.3.3 Range of Closed Loop Power Control Only Power Control Image of Closed Loop Power Control 3.1.2.3.4 Maximum RF Output Power Image of Closed Loop Power Control Image of Closed Loop Power Control 3.1.2.3.5 Minimum Controlled Output Power Image of Closed Loop Power Control Image of Closed Loop Power Control 3.1.2.3.6 Standby Output Power Image of Closed Loop Power Control Image of Closed Loop Power Control 3.1.2.3.8 Code Domain Power Image of Closed Loop Power Image of Closed Loop Power Control 3.1.2.3.8 DRC Channel Output Power Image of Closed Loop Power Image of Closed Loop Power Control 3.1.2.3.8 Data Channel Output Power Image of Closed Loop Power Image of Closed Loop Power Control 3.1.2.3.8 Data Channel Output Power Image of Closed Loop Power Image of Closed Loop Power Control 3.1.2.3.8 Data Channel Output Power Image of Closed Loop Power Image of Closed Loop Power Control 3.1.2.4.1 Conducted Spurious Emissions	31231	Range of Open Loop Output Power	Preamble Length cannot be	
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 √√ 3.1.2.3.6 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. DRC Channel Output Power √√ 3.1.2.3.8. DRC Channel Output Power √√ 3.1.2.3.8. Data Channel Output Power √√ 3.1.2.3.8. Data Channel Output Power √√ 3.1.2.3.8. Data Channel Output Power √√ 3.1.2.4.1 Conducted Spurious Emissions √√ 3.1.2.4.2 Radiated Spurious Emissions - 3.1.2.4.3 Occupied Bandwidth √√ 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-on	5.1.2.5.1		set to 7	N N
3.12.3.3 Range of Closed Loop Power Control Only Power Control P 3.12.3.4 Maximum RF Output Power √√ 3.12.3.5 Minimum Controlled Output Power √√ 3.12.3.6 Standby Output Power √√ 3.12.3.7 RRI Channel Output power √√ 3.12.3.8 Code Domain Power √√ 3.1.2.3.8. DRC Channel Output Power √√ 3.1.2.3.8. DRC Channel Output Power √√ 3.1.2.3.8. Data Channel Output Power √√ 3.1.2.4.1 Conducted Spurious Emissions √√ 3.1.2.4.2 Radiated Spurious Emissions - 3.1.2.4.2 Radiated Spurious Emissions - 3.1.2.4.3 Occupied Bandwidth √√ 4 MAC Layer Minimum Standards - 4.3.1 Default Access Channel MAC Protocol - 4.3.1.1 Access P	3.1.2.3.2	Time Response of Open Loop Power Control		$\sqrt{\sqrt{1}}$
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. DRC Channel Output Power \/\ 3.1.2.3.8. DRC Channel Output Power \/\ 3.1.2.3.8. DRC Channel Output Power \/\ 3.1.2.3.8. Data Channel Output Power \/\ 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	3.1.2.3.3	Range of Closed Loop Power Control	Only Power Control	P
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. DRC Channel Output Power √√ 3.1.2.3.8. DRC Channel Output Power √√ 3.1.2.3.8. 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 - 4.3.1 Default Access Channel MAC Protocol - 4.3.1.1 Access Probes Output Power When ProbeSequenceMax is changed, Session must is changed, Ses	3.1.2.3.4	Maximum RF Output Power		$\sqrt{\sqrt{1}}$
3.1.2.3.6Standby Output Power $\sqrt{\sqrt{10}}$ 3.1.2.3.7RRI Channel Output power $\sqrt{\sqrt{10}}$ 3.1.2.3.8Code Domain Power $\sqrt{\sqrt{10}}$ 3.1.2.3.8.DRC Channel Output Power $\sqrt{\sqrt{10}}$ 3.1.2.3.8.DACK Channel Output Power $\sqrt{\sqrt{10}}$ 3.1.2.3.8.Data Channel Output Power $\sqrt{\sqrt{10}}$ 3.1.2.3.8.Data Channel Output Power $\sqrt{\sqrt{10}}$ 3.1.2.3.8.Data Channel Output Power $\sqrt{\sqrt{10}}$ 3.1.2.4.1Conducted Spurious Emissions $\sqrt{\sqrt{10}}$ 3.1.2.4.2Radiated Spurious Emissions $-$ 3.1.2.4.3Occupied Bandwidth $\sqrt{\sqrt{10}}$ 4MAC Layer Minimum Standards $-$ 4.3Access Channel MAC Protocol $\sqrt{10}$ 4.3.1Default Access Channel MAC Protocol $\sqrt{10}$ 4.3.1.1Access Probes Output Power $\sqrt{10}$	3.1.2.3.5	Minimum Controlled Output Power		$\sqrt{\sqrt{1}}$
3.1.2.3.7RRI Channel Output power $\sqrt[4]{4}$ 3.1.2.3.8DRC Channel Output Power $\sqrt[4]{4}$ 3.1.2.3.8DRC Channel Output Power $\sqrt[4]{4}$ 3.1.2.3.8Data Channel Output Power $\sqrt[4]{4}$ 3.1.2.3.8Data Channel Output Power $\sqrt[4]{4}$ 3.1.2.4Limitations on Emissions $\sqrt[4]{4}$ 3.1.2.4.1Conducted Spurious Emissions $-$ 3.1.2.4.2Radiated Spurious Emissions $-$ 3.1.2.4.3Occupied Bandwidth $\sqrt[4]{4}$ 4MAC Layer Minimum Standards $-$ 4.3Access Channel MAC Protocol $-$ 4.3.1Default Access Channel MAC Protocol $\sqrt[4]{4}$ 4.3.1.1Access Probes Output Power $\sqrt[4]{4}$	3.1.2.3.6	Standby Output Power		$\sqrt{\sqrt{1}}$
3.1.2.3.8 Code Domain Power 3.1.2.3.8. DRC Channel Output Power 1	3.1.2.3.7	RRI Channel Output power		$\sqrt{\sqrt{1}}$
3.1.2.3.8. DRC Channel Output Power √√ 1	3.1.2.3.8	Code Domain Power		\sim
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3.1.2.3.8. 2ACK Channel Output Power $\sqrt{1}$ 3.1.2.3.8. 3Data Channel Output Power $\sqrt{1}$ 3.1.2.4.1Limitations on Emissions $\sqrt{1}$ 3.1.2.4.1Conducted Spurious Emissions $\sqrt{1}$ 3.1.2.4.2Radiated Spurious Emissions $-$ 3.1.2.4.3Occupied Bandwidth $\sqrt{1}$ 4MAC Layer Minimum Standards $\sqrt{1}$ 4.3Access Channel MAC Protocol $-$ 4.3.1Default Access Channel MAC Protocol $\sqrt{1}$ 4.3.1.1Access Probes Output PowerWhen ProbeSequenceMax is changed, Session must be re-onened	1	•		
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3.1.2.3.8. 3Data Channel Output Power $\sqrt{100}$ 3.1.2.4Limitations on Emissions $\sqrt{100}$ 3.1.2.4.1Conducted Spurious Emissions $\sqrt{100}$ 3.1.2.4.2Radiated Spurious Emissions $\sqrt{100}$ 3.1.2.4.3Occupied Bandwidth $\sqrt{100}$ 4MAC Layer Minimum Standards $\sqrt{100}$ 4.3Access Channel MAC Protocol $\sqrt{100}$ 4.3.1Default Access Channel MAC Protocol $\sqrt{100}$ 4.3.1.1Access Probes Output PowerWhen ProbeSequenceMax is changed, Session must be re-onened	2			
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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-onened	4	MAC Layer Minimum Standards		
4.3.1 Default Access Channel MAC Protocol 4.3.1.1 Access Probes Output Power When ProbeSequenceMax is changed, Session must be re-onened	4.3	Access Channel MAC Protocol		
4.3.1.1 Access Probes Output Power When ProbeSequenceMax VV is changed, Session must be re-opened	4.3.1	Detault Access Channel MAC Protocol		
be re-opened	4.3.1.1	Access Probes Output Power	is changed Session must	NN
			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, 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.

Packet	Error Rate				
	Confidence Level	PER	Err Packets	Transmitted	_
FTC	95.0 <mark>%</mark>	0.00 <mark>%</mark>	0	601	Pass

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, 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.

Packet	Error Rate				
	Confidence Level	PER	Err Packets	Transmitted	
FTC	95.0 <mark>%</mark>	0.00 <mark>%</mark>		601	Pass

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.
- Execute SCRSEL FMEAS to display the Fundamental Measurement screen. 2.
- 3. Execute EVALLMEASITEMS OFF, OFF, 1, ON, 1, OFF, 1, OFF, 1, OFF, 1, OFF, 1, OFF to set only Modulation Analysis measurement to On. (This sets the number of measurements to 1.)
- Execute EVAPLI FTAPRTAP to set Application Protocol to FTAP + RTAP. 4.
- Execute TCRATE X4 to set Forward Traffic Channel Data Rate to 307.2 kbps. 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.
- Execute SWP to perform measurement.
 Execute AVG_CARRFERR? to read the result of Carrier Frequency Error measurement.
- Execute AVG_RHO? to read the result of Rho measurement.
 Execute AVG_TAU? to read the result of Time Error measurement.

Modulation Analysis			(Meas, C	Count : 1/ 1)
Carrier Frequency	Avg. 836.999	990 MHz		
Carrier Frequency Error	Avg. -0.0097 -0.01	Max. -0.0097 -0.01	Min. -0.0097 -0.01	kHz ppm
Rho Time Error	0.99793 0.06	0.99793 0.06	0.99793	us
EVM Peak Vector Error Phase Error Magnitude Error Origin Offset	4.57 15.88 2.17 2.55 -48.04	4.57 15.88 2.17 2.55 -48.04	4.57 15.88 2.17 2.55 -48.04	%(rms) % deg.(rms) %(rms) dB

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.
- Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen. 2.
- 3. Execute EVALLMEASITEMS ON, OFF, 1, OFF, 1, OFF, 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.
- Execute **PRBSEQMAX 1** to set Probe Sequence Max to 1. 5.
- 6. Execute **PREAMBLELEN 6** to set Preamble Length to 6.
- Execute OPNLPADJ -78 or OPNLPADJ -81 to set Open Loop Adjust to -78 dB or -81 dB (depending on Band 7. Class).
- Test 1: Execute OLVL -25.0 to set Output Level to -25.0 dBm/1.23 MHz. 8.
 - 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.)

- Execute SWPANDPG to perform measurement. 9
- 10. Execute APPWR? to read the measurement result.
- Execute CALLSO to terminate the call.
 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, 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 ALLO to set PCB Pattern to AllO (Up).
- 13. Execute **SWP** to perform measurement.
- 14. Execute **AVG_PWR?** to read the measurement result.

Power Measurement			(Meas	s. Count : 1/ 1)
	Avg.	Max.	Min.	
TX Power	23.31	23.31	23.31	dBm
	214.192	214.192	214.192	m₩
Filtered Power	23.22	23.22	23.22	dBm/1.23MHz
	209.713	209.713	209.713	m₩/1.23MHz

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, 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.

Power Measurement				(Meas. Count : 1/ 1)			
TX Power	Avg. -56.67	Max. -56.67	Min. -56.67	dBm			
	2.151	2.151	2.151	n₩			
Filtered Power	-60.33	-60.33	-60.33	dBm/1.23MHz			
	0.926	0.926	0.926	n₩/1.23MHz			

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, 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).

Power Measurement			(Meas	s. Count : 1/ 1)
TX Power	Avg. -83.27 4.712	Max. -83.27 4.712	Min. -83.27 4.712	dBm p₩
Filtered Power	-91.94 0.640	-91.94 0.640	-91.94 0.640	dBm/1.23MHz p₩/1.23MHz

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.

Code Domain	Power				(Me	eas. Count	:: 1/	1)
Max Inactiv	ve Char	nnel		Walsh Code No. Len Ph 8 <u>16</u> 1	Power -34.20	dB/Ior	Pas	s
Channel Pilot	₩alst No. I 0	h Co Len 16	de Ph I	Avg. -7.16	Power Max. -7.16	Min. -7.16	dB/Ior	
RRI	0	16	I	-7.20 -0.03	-7.20 -0.03	-7.20 -0.03	dB/Ior dB/Pilot	
DRC	8	16	Q	-4.36 2.81	-4.36 2.81	-4.36 2.81	dB/Ior dB/Pilot	
ACK	4	8	I	-44.72 -37.56	-44.72 -37.56	-44.72 -37.56	dB/Ior dB/Pilot	
Data	2	4	Q	-3.57 3.59	-3.57 3.59	-3.57 3.59	dB/Ior dB/Pilot	T

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.

Code Domain Power	(Meas. Count : 1/ 1)
Waish Code No. Len Ph Max Inactive Channel <u>8</u> 16 <mark>I</mark>	Power -36.50 dB/Ion Pass
Channel Walsh Code	Power
No. Len Ph Avg. Pilot 0 16 I -6.96	Max. Min. -6.96 -6.96 dB/Ior
RRI 0 16 I -6.85	-6.85 -6.85 dB/Ior
DRC 8 16 Q -6.76	-6.76 -6.76 dB/Ior 0.20 0.20 dB/Pilot
ACK 4 8 I -6.85 0.11	-6.85 -6.85 dB/Ior 0.11 0.11 dB/Pilot
Data 2 4 Q -3.17 3.79	-3.17 -3.17 dB/Ior 3.79 3.79 dB/Pilot

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.
- 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 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.

Spurious Emissions View	(Meas. Count : 1/ 1)
Template Pass/Fail	dBc/30kHz Pass dBm/1MHz Fail dBm/1.23MHz Fail
Offset Frequency 0.885 to 1.980 MHz	Peak Power -49.33 dBc/30kHz -16.04 dBm/1MHz -15.96 dBm/1.23MHz
1.980 to 2.250 MHz	-62.98 dBc/30kHz -29.63 dBm/1MHz -29.41 dBm/1.23MHz
2.250 to 4.000 MHz	-66.10 dBc/30kHz -31.42 dBm/1MHz -31.14 dBm/1.23MHz

2.3.19. 3.1.2.4.3 Occupied Bandwidth

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

Occupied Bandwidth		(Meas. C	Count :	1/	/ 1)
Occupied Bandwidth(99.0%)	1.275 MHz	1			
Uppen Frequency	0.641 MHz				
Lower Frequency	-0.634 MHz				
Center(Upper+Lower)/2	0.003 MHz				

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.
- Execute OPNLPADJ -76 to set Open Loop Adjust to -76 dB.
 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.



- 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.

MT8820A-E-F-2

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.

External Loss	Off
Main Output(Fwd.)	0.00 dB
Main Input(Rev.)	0.00 dB
AUX Output(Fwd.)	0.00 dB

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.

/Inritsu

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