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For MT8820B Radio Communication Analyzer

MX882002C CDMA2000 Measurement Software MX882003C

1xEV-DO Measurement Software



MX882002C CDMA2000 Measurement Software

Advanced high-speed measurement method and batch measurement supporting the manufacture of CDMA2000[®] terminals

The MX882002C CDMA2000 Measurement Software is for measuring Rx and Tx performance of mobile terminals conforming to the IS-2000 standard, today's most widespread 3G technology. It uses advanced DSP and parallel measurement to cut manufacturing inspection times for mobile terminals. Multiple measurements can be selected for simultaneous processing and individual sample sizes can be set for each measurement.

User-selected measurements can be grouped and measured with just one function, offering fast Pass/Fail evaluation and reliable repeatability optimized for high-speed production.

The built-in GPIB interface supports easy configuration of automated test systems for CDMA2000 1X terminal manufacturing, R&D, and application development.

CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA).

• CDMA2000 1X Measurement Items

Tests	3GPP2 C.S0011	Test items
Receiver	3. 4. 1	Demodulation of Forward Traffic Channel in Additive White Gaussian Noise
Receiver	3. 5. 1	Receiver Sensitivity and Dynamic Range
	4. 1	Frequency Accuracy
	4. 3. 1	Time Reference
	4. 3. 4	Waveform Quality and Frequency Accuracy
	4. 3. 5	Code Domain Power
	4. 4. 1	Range of Open Loop Output Power (Access Channel)
Transmitter	4. 4. 2	Time Response of Open Loop Power Control
nansmiller	4. 4. 3	Access Probe Output Power
	4. 4. 5	Maximum RF Output Power
	4. 4. 6	Minimum Controlled Output Power
	4. 4. 7	Standby Output Power and Gated Output Power
	4.4.9	Code Channel to Reverse Pilot Channel Output Power Accuracy (2.2)
	4. 5. 1	Conducted Spurious Emissions
	4. 5. 3	Occupied Bandwidth



Transmitter Measurements

Transmitter Power

The CDMA2000 1X terminal Tx power can be measured with the power control bits set to maximum or minimum, alternating bits, or with closed loop power control. In addition, maximum, minimum, and average values of measured power results are displayed when the number of measurement samples is 2 or more. This is very useful for evaluating statistical variations in mobile terminal characteristics. This feature also supports other measurements.

RC Fwd3/Rev <fundamental measurement=""> Output M</fundamental>	3 Connected (SO 55) ain	Phone-2	Phone-1 CDMA2000
Parameter Fundamental	MS Report		
CDMA2000 1X : End	MS Power :-3	6.3 dBm	Fundamental
Power Measurement			T A Power
Avg. Max TX Power -36.52 -36 222.936 222.	:. Min. 1.52 -36.52 dBm 936 222.936 nW		
Filtered Power -36.62 -36 217.891 217.	.62 <u>-36.62</u> dBm/1.23 891 <u>217.891</u> n₩/1.23M	MHz Hz	
Departing Mode Item List Detail			
Standard <u>CDMA2000 1X</u>	2		
Call Processing <u>On</u> Call Drop <u>On 5.0</u> sec			
Channel and Level Item List <u>Detail</u>			
Band Class <u>3: JTAC</u>	S Band		123

Access Probe Power

The first access probe from the CDMA2000 1X terminal is captured by the level trigger to measure average power. This value is held after terminating the probe measurement once even in the Continuous Measurement mode, which is convenient for the Open Loop Output Power measurement described in C.S0011 of the 3GPP2 standard.



Modulation Analysis

Frequency, frequency error (in kHz and ppm), ρ (waveform quality), τ (time error), EVM, peak vector error, phase error, magnitude error and origin offset are measured simultaneously.

 <fundamental measurement=""></fundamental>	RC Fwd3/Rev3 Conn Output Main	ected (SO 55)	Phone-2	Phone-1 CDMA2000
Parameter FL CDMA2000 1X : F	indamental nd	MS Report MS Power :-2	1.4 dBm	Fundamental
Modulation Analysis		(Meas, Count :	1/ 1)	T A Modulation
	Avg.			G Analysis
Carrier Frequency	915.950000 MH			
Cappion Engluones Engla	Avg. Max.	Min.		
	0.00 0.0	0 0.00 ppn		
Rho	0.99625 0.9962	5 0.99625		
Time Error	0.18 0.1	8 0.18 us		
EVM Peak Vector Error	6.12 6.1 14.82 14.8	2 6.12 %(rms)		
Phase Error	2.04 2.0	4 2.04 deg(n		
Origin Offset	-54.36 -54.3	6 -54.36 dB		
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Code Domain Power

The CDMA2000 1X terminal code domain power and error are measured when Reverse RC is set to 3 or more. The R-PICH, R-FCH, and R-SCH powers are all displayed along with the maximum power and channel numbers for inactive channels. In addition, Pass/Fail evaluation is performed to determine whether or not the inactive channel power satisifies the specifications.

<fundamental< th=""><th>Measuremen</th><th>RC Fwd3/Rev3 t> Output Ma</th><th>Connected</th><th>(SO 55)</th><th>Phone-2</th><th>Phone-1 CDMA2000</th></fundamental<>	Measuremen	RC Fwd3/Rev3 t> Output Ma	Connected	(SO 55)	Phone-2	Phone-1 CDMA2000
Panamet	ten	Fundamental	MSI	Report		
CDM	A2000 1X :	End	MS	Power :-38	5.6 dBm	Fundamental
Code Domain	Power		(M	eas. Count :	1/ 1)	T A Code Domain
		Walsh Code				G Power
		No. Len Ph				
Max Inactiv		4 16 I	-29.73		Pass	
Channel						
		Avg.	Max.	Min.		
R-PICH		-5.30	-5.30	-5.30 dE		
R-FCH P-DCCU		-1.54	-1.54	-1.54 db		
B-SCH1		-34.44	-34,44	-34, 44 dF		
		-36.89	-36.89	-36.89 dE		
Operating Mo	de Item Lis	t <u>Detail</u>			<u> </u>	
Standard	CDM	2000 18				
Call Process	ing On					
Call Drop	On	5.0 sec				123

Occupied Bandwidth

Occupied bandwidth measurement can be user-defined in the range of 80% to 99.9% for the ratio of in-band power to total power.

RC Fwd3/Rev3 (<fundamental measurement=""> Output Main</fundamental>	Connected (SO 55) 1	Phone-2	Phone-1 CDMA2000
CDM02000 1X - End	MS Report	: 2 dPm	Fundamental
Occupied Bandwidth	(Meas, Count :	1/ 1)	r ciriciaillei rcan
Occupied Bandwidth(99.0%) 1.275 Upper Frequency 0.643 Lower Frequency -0.643 Penter (Insert Journey) /2 0.000	МНz 1 МНz 1 МНz 4 МН z		
	1112		
			Refresh Call
uperating Mode Item List <u>Detail</u>			*
Standard <u>CDMA2000 1X</u>			MS Power Control
Call Processing <u>On</u> Call Drop <u>On 5.0</u> sec			Register MS
Channel and Level Item List <u>Detail</u>			Handoff
Band Class <u>3: JTACS E</u>	Band	V	123

Spurious Emission

Pass/Fail evaluation of spurious emissions is easy. Spurious levels within ± 4 MHz of the center frequency are compared with the template. The default for each band is a standard 3GPP2 template, saving setup time. In addition, the templates can be customized for any requirement and either 1 or 1.23 MHz bandwidth measurements can be performed as necessary.

RC Fy <fundamental measurement=""> Ou</fundamental>	d3/Rev3 Connected (SO 55) Hput Main	Phone-2	Phone-1 CDMA2000
Parameter Fundam	ental MS Report		
CDMA2000 1X : End	MS Power :-1	0.6 dBm	Fundamental
Spurious Emissions View Template Pass/Fail	(Meas, Count : dBo/30kHz Pass dBm/1MHz Pass dBm/1MHz Pass		T A Spurious G Emissions
Offset Frequency 0.885 to 1.980 MHz	Peak Power -54.37 dBc/30kHz -54.99 dBn/1MHz -54.69 dBn/1.23MHz		
1.980 to 2.250 MHz	-63.37 dBc/30kHz -60.90 dBn/1MHz -60.05 dBn/1.23MHz		
2.250 to 4.000 MHz	-64.23 dBc/30kHz -61.22 dBn/1MHz -60.36 dBn/1.23MHz		
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Gated Power Measurement

Gated Power is measured at RC1 or 2. Gated On Power, Gated Off Power and the On/Off Ratio are measured simultaneously on screen.

<funda< th=""><th>RC Fw nental Measurement> Ou</th><th>d1/Rev1 Connected (SO : tput Main</th><th>Phone-2</th><th>Phone-1 CDMA2000</th></funda<>	RC Fw nental Measurement> Ou	d1/Rev1 Connected (SO : tput Main	Phone-2	Phone-1 CDMA2000
F	Parameter Fundam	ental MS Report	t	_
	CDMA2000 1X : End	MS Poi	wer :1,5 dBm	Gated Power
		View Window		Set Data
Gated	Power			Rate to
[dB]	Scope : Slot	Gati		1200005
10			Avg. 1.63 dBm	* Seeno
0		Gati	e Off Power	ocope
-10			Avg. <u>-50.55</u> dBm	
10		Un/I	Jff Ratio	Marker
-20	_		AVg. 52.18 db	On Off
-20		Pour		
-30			80 0 us: -45 68 dB	
-40			-5.5 us; -45.39 dB	
F 0			1.5 us: -0.66 dB	
-50		12	48.5 us: 0.03 dB	
-60		12	55.5 us: -49.98 dB	
		13	30.0 us: <mark>-78.02</mark> dB	Tomplata
-70				Setup
-80	Dago	les and a second		
_90				Close
-8)	1330 Fus1		
Channe	I: 76 CH Input Freq.:	915.950000 MHz Input		1 2 3

A graph of the spurious emission waveform offers an at-a glance check of whether the waveform satisfies the 3GPP2 standard template.



Access Probe Power Measurement

The Access Probe Power screen measures the Access Probe transmitted continuously from a CDMA2000 1X terminal. (During measurement, Ack is not returned to the Access Probe from a CDMA2000 1X terminal.) In addition to the level of each probe, the difference from the last probe level, probe detection time, probe transmission time and probe interval are measured simultaneously.

Idle(Regist) Access Probe Meas >			Phone-2	Phone-1 CDMA2000	
Parameter	Access Prob	e MS	Report		001112000
CDMA2000	1X : End	٢	1S Power :-'	74.1 dBm	Access Probe
Total Detected Access P	robes 5	(Expected A	nness Probes		A Total
No.1 to No.40					T No. 1 A to G No. 40
No. Level 1 -33.20 dBm 2 -32.48 dBm 3 -33.25 dBm 4 -32.25 dBm	Step 0.00 dB 0.72 dB -0.78 dB	Time 1.400 sec 2.440 sec 4.000 sec 5.040 sec	Length I 0.520 sec 0.520 sec 0.520 sec 0.520 sec	interval 1.400 sec 0.520 sec 1.040 sec 0.520 cec	T No. 41 A to G No. 80 T No. 81 A to
5 -33.27 dBn 6 dBn 7 dBn 8 dBn	-0.02 dB dB dB	6.080 sec sec sec	0.520 sec sec sec sec	0.520 sec sec sec sec	G No. 120 T No. 121 A to G No. 160
Operating Mode Iter	n List <u>Detail</u>				T No. 161 A to G No. 200
Standard Call Processing Call Drop	<u>CDMA2000 1X</u> Dn <u>Dn 5.0</u> sec				T No.201 A to G No.241 T 2 3

Open Loop Time Response Screen

The Open Loop Time Response screen is used to measure the time response of the CDMA2000 1X terminal open loop power control. Changes in the mobile terminal Tx power are measured between 100 ms from the point where the power of the forward link signal power changed.



Receiver Measurements

Frame Error Rate

The Frame Error Rate (FER) and Pass/Fail evaluation can be performed in SO2, SO9, SO55 and SO32 (TDSO) to display the FER, error frame count, Tx frame count, confidence level and Pass/Fail results.



Call Processing

Connection Test

The Call Processing function supports connection tests, such as location registration, origination, termination, disconnection from network, and disconnection from mobile terminal. Service Options 1, 2, 3, 9, 33, 55, and 32768 are supported. A basic voice function can be tested by using loopback during a call.

<fundamental measurement=""></fundamental>	: Output Mair	Idle(Regist) 1	Phone-2 	F	Phone-1 DMA2000
Parameter Fur	ndamental	MS Report			
CDMA2000 1X		MS Power	:-74.3 dBm		Parameter
Call Processing Parameters	Item List De	etail			T A Operating G Mode
Radio Configuration Service Option MS Orig. SO Negotiation	6: 15-2 Fwd.RC3 S0 55 NW.Cont	3 + Rev.RC3 : Loopback			T Channel A and G Level
ECAM ASSIGN_MODE	0: Traf	fic Channel			<mark>T</mark> ACode Channel <mark>G</mark> Parameters
ECAM/CAM BYPASS_ALERT_ANSWER Layer 2 Address Type	Bypass	Data Only			T Call A Processing G Parameters
Max Slot Cycle Index	Ō				T BSID A and G Paging
<u>BS ID and Paging</u> Item List System Identification (SID)	Detail				<mark>T</mark> A Access <mark>G</mark> Parameters
Network Identification (NIL BS Identification (BASE_ID))) 1				T Fundamental A Measurement G Parameters
Paging				v	1 2 3

Mobile Terminal Report Monitor

This screen displays the periodically reported CDMA2000 1X terminal status.

RC Fwd3/Rev3 Connected (SO 55) Phone-2 <fundamental measurement=""> Output Main</fundamental>	Phone-1 CDMA2000
Parameter Fundamental MS Report	_
CDWAZ000 1X : End MS Power :-41,5 dBm	MS Report
Frane Error Rate Confidence Level FER Err Franes Transmitted F-FCH <u>95.0</u> ¢ <u>0.00</u> ¢ <u>0</u> <u>600</u> <u>Pass</u>	T MS ID G
WS 10	-
ESN SC005F84 (Hex) D/SI (MCC-MIC-//SIN) ##1-[#4 -2222222222 (Dec)	
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Handoff Function

The Handoff window is used to set parameters after Handoff [Band Class Channel, Protocol Revision (P_REV), Radio Configuration Service Option], and to perform Handoff according to the preset parameters.



MT8820B-003 CDMA2000 Measurement Hardware, MX882002C CDMA2000 Measurement Software

Amplitude measurement	Frequency: 300 to 2700 MHz Input level: -65 to +35 dBm (Main Input/Output) Measurement accuracy: ±0.5 dB (-25 to +35 dBm), ±0.7 dB (-55 to -25 dBm), ±0.9 dB (-65 to -55 dBm) (Filtered Power measurement, after Full cal, Input Level Setting) Linearity: ±0.2 dB (0 to -40 dB, ≥-55 dBm), ±0.4 dB (0 to -40 dB, ≥-65 dBm) (Filtered Power measurement, Input Level Setting for reference)
Frequency/Modulation measurement	Frequency: 300 to 2700 MHz Input level: –30 to +35 dBm Carrier frequency accuracy: ±(Set frequency × reference oscillator accuracy + 10 Hz) Residual waveform quality: >0.999 Residual EVM: <2% rms
Occupied bandwidth	Input level: -10 to +35 dBm
Code domain power	Can be measured at Reverse RC3/RC4. Input level: –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 2700 MHz (1 Hz step) Channel level [Relative level to lor (total level)] Pilot channel: -30 to 0 dB, 0.25 dB step or off FCH, SCH: -30 to 0 dB, 0.1 dB step or off SYNC, PCH: -30 to 0 dB, 0.25 dB step or off OCNS: Auto, 0.01 dB step or off QPCH channel level (relative level to pilot channel): -5 to +2 dB (1 dB step) or off Channel level accuracy: <±0.2 dB (typ.) (≥-20 dB)
Error rate measurement	FER (Frame Error Rate) measurement: FER measurement with service option 2, 9, 55 and 32 (TDSO) Display items: FER, Confidence level, Sample frame count, Error frame count
Call processing	 Band class: BC 0 to 10 Call control: Location registration, Origination, Termination, Disconnection from network, Disconnection from mobile terminal Paging channel data rate: Full 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 QPCH Data Rate: Full Fwd. FCH Data Rate: Full Fwd. FCH Data Rate: Full (RC3, RC4, RC5) Fwd. DCCH Data Rate: International (RC3, RC4, RC5) Fwd. DCCH Walsh Code: 10, 14, 26, 30, 42, 46, 58, 62 Fwd. DCCH Walsh Code: 10, 14, 26, 30, 42, 46, 58, 62 Fwd. DCCH Walsh Code: 10, 14, 26, 30, 42, 46, 58, 62 Fwd. DCCH Walsh Code: 10, 14, 26, 30, 42, 46, 58, 62 Fwd. SCH: Max. 1 channel Fwd. SCH data rate RC3: 9.6, 19.2, 38.4, 76.8, 153.6 Kbps RC5: 14.4, 28.8, 57.6, 115.2, 230.4 Kbps Access channel: Access Ch. Rev. closed loop power control mode: Closed loop, All 1 (all down), Alternate, All 0 (all up) 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 (only when the MT8815B/MT8820B-011 audio board is installed.)

MX882002C-002 CDMA2000 External Packet Data

Direct RF connection between CDMA2000 1X terminal and application server

The MX882002C-002 CDMA2000 External Packet Data is an optional software application that adds CDMA2000 1X packet data communications to the MX882002C Measurement Software option. It supports transfer of packet data between a local or network application server and an Internet-enabled CDMA2000 1X terminal via an Ethernet connection to the MT8820B. The following two packet data transfer modes are supported.

Data Loopback Mode

IIn this test mode, Radio Link Protocol (RLP) data is looped back to the RLP stack in the MT8820B and transmitted via forward link.

IP Data Communications Mode

This mode provides a predictable and controllable test "pipe" between the Internet (or other local application server) and CDMA2000 1X terminal in the native RF environment that is simulated by the base station emulator in the MT8820B hardware.

This mode provides an IP network connection to a CDMA2000 1X terminal and supports the CDMA2000 Packet Data Sevice Option (SO33), RLP, Point to Point Protocol (PPP), Internet Protocol (IP), and direct Ethernet connection.



Example of IP Data Communications Mode

MX882002C-002 CDMA2000 External Packet Data

Service option	SO33		
Radio configuration	F-RC3 + R-RC3, F-RC4 + R-RC3		
Signaling ch FCH			
Querra la secontra la ch	Encoding: Convolutional, Turbo		
Supplemental ch	Data rates: 9.6, 19.2, 38.4, 76.8, 153.6 Kbps		
RLP (Radio Link Protocol)	RLP3		
	RLP loopback, PPP/IP		
Packet data mode	RLP loopback: The mode to loopback the RLP data unit received in reverse link to forward link PPP/IP: The mode to transfer IP packet data between a CDMA2000 1X terminal and a server		

American Mobile Phone System (AMPS)

Transmitter Measurements

When the MX882002C CDMA2000 Measurement Software is installed in a main frame with the MT8820B Audio Board (Option 011), measurement of the RF characteristics of AMPS terminals as well as output and measurement of audio signals (requires MT8820B-011) are supported.

Transmitter Power

This function measures the output power of an AMPS terminal.

<fundamental< th=""><th>Measurement> Output Main</th><th>Off</th><th>Phone-2</th><th>Phone-1 CDMA2000</th></fundamental<>	Measurement> Output Main	Off	Phone-2	Phone-1 CDMA2000
Paramet	ter Fundamental		-	
	AMPS : End	MS Power :-44	1.4 dBm	Fundamental
Powen Measur TX Powen	Avg. Max. -44.16 -44.1 38.349 38.34	(Heas. Count : Min. 6 6 -44.16 dBn 9 38.349 mH	1/1)	T A Power B Heasurement
Fundamental	Measurement Parameters Ite	m List <u>Detail</u>		
Tx Measureme Power Measu Frequency E FM Measurem	nt Setup rement <u>On</u> Meas. rror <u>Off</u> Meas. ent <u>Off</u> Meas.	Count <u>1</u> Count <u>1</u> Count <u>1</u>		1 2 3

Frequency Error

The Frequency (kHz) and frequency error (ppm) are measured simultaneously on one screen.

<fundamental measurement=""> Output Main</fundamental>	Off	Phone-2	Phone-1 CDMA2000
AMPS : End	MS Power :-4	4.4 dBm	Fundamental
Frequency Error Avg. Carrier Frequency 825,029990 Avg. Avg. Carrier Frequency Error -0.01	(Heas, Count : MHz Max. Min. .0.097 -0.097 kHz -0.01 -0.01 ppm	1/ 1)	Set Relative
Tx Measurement Setup			
Power Measurement <u>Off</u> Meas Frequency Error <u>On</u> Meas. FM Measurement <u>Off</u> Meas.	. Count <u>1</u> . Count <u>1</u> . Count <u>1</u>		
FM Deviation / AF Level / Distortion	n / Audio Frequency	V	123

FM Measurement

The FM Deviation, AF Level, Distortion, and Audio Frequency are measured simultaneously on one screen.

<fundamental measurem<="" th=""><th>ent> Output</th><th>Of Main</th><th>f</th><th>Phone-2</th><th></th><th>Phone-1 CDMA2000</th></fundamental>	ent> Output	Of Main	f	Phone-2		Phone-1 CDMA2000
Parameter	Fundament	al 🛛				
AMPS : 1	End		MS Po	wer :-44,4 dBm		Fundamental
FM Measurement			(Meas.	Count : 1/	1) 🔺	T
						A FM
	Avg.	Max.	Min.			
FM Deviation	5.6117	5.6117	5.6117			
	8.3319	8.3319	8.3319	kHz((P-P)/2)		
	8.3025	8.3025	8.3025	kHz(+P)		
	-8.3613	-8.3613	-8.3613	kHz(-P)		
	Avg.	Max.	Min.			
AF Level	5.6116	5.6116	5.6116	KHZ(PMS)		
	0.3360	0.3360	0.3360	$\operatorname{KHZ}((P-P)/2)$		
	0.3100	0.3100	0.3106	KNZ(+P)		
	-0.3013	-0.3013	-0.0010			
AF Level (Belative)	0.00	0.00	0.00	dB(rms)		
	3,44	3,44	3,44	dB((P-P)/2)		
	3.41	3.41	3,41	dB(+P)		
	3.46	3.46	3.46	dB(-P)		
	Avg.	Max.	Min.			
Distortion	1.43	1.43	1.43			

Audio Measurement

Frequency, Level, SINAD (Signal to Noise And Distortion) and Distortion are measured simultaneously on one screen.

<fundamental measure<="" th=""><th>ment> Output Main</th><th>Off</th><th>Phone-2</th><th>Phone-1 CDMA2000</th></fundamental>	ment> Output Main	Off	Phone-2	Phone-1 CDMA2000
Parameter	Fundamental			
AMPS :	End	MS Powe	r :-44.4 dBm	Fundamental
Audio Measurement ((Source = AF Input)	Avg. Max.	(Meas. Cu	ount: 1/ 1)
Frequency	1000.0 1000	.0 1000.0 Hz	(nesk)	
Relative	-0.01 -0.0	01 -0.01 dB		
Distortion	0.66 0.6	66 0.66 X 58 -43.58 dB		
Filter De-Emphasis	Off Off			
Expandor Audio Measurement	Off On Meas	. Count <u>1</u>		

MT8820B-011 Audio board, MX882002C CDMA Measurement Software (requires option 003)

	Frequency range: 800 to 960 MHz
	Measurement level range: -65 to +35 dBm (Main Input/Output)
	Accuracy: (After calibration, at Input Level setting value)
Frequency/Amplitude	±0.5 dB (-25 to +35 dBm), ±0.7 dB (-55 to -25 dBm), ±0.9 dB (-65 to -55 dBm)
measurement	*Main Input/Output, after calibrated by internal power meter
	l inearity: (Filter Power measurement, referenced to input l evel setting value)
	+0.2 dB (0 to -40 dB > 55 dBm) +0.4 dB (0 to -40 dB > -65 dBm)
	Measurement level range: -30 tot-35 dBm
RF Frequency	Carrier fraguency accuracy + (set fraguency × reference oscillator accuracy + 10 Hz)
	Carlet nequency accuracy. 2 (set nequency x reference oscillator accuracy + 10112)
FM magaziramant	Measurement level lange 50 to +55 dbill
Fivi measurement	
	Demodulation requency range: 30 Hz to 20 kHz
	Accuracy: indicated value $\pm 2\%$ + residual FM (at 1 kHz demodulation frequency)
Deviation measurement	Frequency response: ±0.5 dB (demodulation frequency 30 Hz to 20 KHz, referenced to 1 KHz, 5-KHz deviation)
	Residual FM: <10 Hz rms (demodulation frequency 300 Hz to 3 kHz)
Demodulation distortion	Demodulation distortion: <0.3% (demodulation frequency: 1 kHz, demodulation bandwidth 0.3 to 3 kHz, deviation 5 kHz)
	Output frequency range: 800 to 960 MHz, 1 Hz steps
	Deviation: 0 to 20 kHz, 5 Hz steps
	Modulation signal: Internal modulation only, sine wave, setting frequency range 20 Hz to 10 kHz,
	(5 Hz steps)
	Deviation accuracy: $\pm (3.5 + 10 \text{ Hz})$
Analog RF signal	(at 1 kHz modulation frequency, demodulation bandwidth 300 Hz to 3 kHz)
generator (FM)	Frequency response: ±0.5 dB (modulation frequency: 0.3 to 3 kHz)
	+1.0 dB (modulation frequency: 20 Hz to 10 kHz)
	(4 Hz deviation modulation frequency: referenced to 1 kHz)
	Modulation deviation: <= 50 dB
	(modulation requerey: 1 kHz, deviation: >4 kHz, demodulation bandwidth; at 0.3 to 3 kHz)
	(including from the density) - Triz, deviation. 24 Kiz, demodulation bandwidth, at 0.5 to 5 Kiz)
Analog RF signal	
generator (SAT)	
	Frequency range: 50 HZ to 10 KHZ
	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 + 0.5 Hz)
	Level measurement
AF measurement	Accuracy: ±0.2 dB (≥10 mV peak), ±0.4 dB (≥1 mV peak, ≥1 kHz)
	SINAD measurement
	Measurement range: ≥60 dB (≥1000 mV peak), ≥54 dB (≥50 mV peak), ≥46 dB (≥10 mV peak)
	(At Frequency: 1 kHz)
	Distortion ratio measurement
	Measurement range (At Frequency: 1 kHz):
	$\leq 60 \text{ dB}$ (>1000 mV peak) $\leq 54 \text{ dB}$ (>50 mV peak) $\leq 46 \text{ dB}$ (>10 mV peak)
	Input impedance
	Errore and the second s
	Accuracy, ±(Set frequency x reference oscillator accuracy + 0.1 Hz)
	Set range: 0 to 5 V peak (AF Output connector)
	Set resolution: 1 mV (≤5 V peak), 100 µV (≤500 mV peak), 10 µV
AF output	(≤50 mV rms)
	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

MX882003C 1xEV-DO Measurement Software

Advanced high-speed measurement method and batch measurement supporting the manufacture of 1xEV-DO terminals

The MX882003C 1xEV-DO Measurement Software^{*1} is for measuring the performance of mobile terminals conforming to the 1xEV-DO standard (CDMA2000[®] 1X Evolution Data Only defined in the 3GPP2 standard). It uses advanced DSP and parallel measurements to cut manufacturing and inspection times for 1xEV-DO terminals. Several measurement items can be selected freely for batch measurement and a one-touch operation allows each selected batch measurement item to be executed repeatedly for the specified number of times. Pass/Fail evaluation of the main measurement items, including transmission frequency, modulation accuracy, output power, Code Domain power, and PER, is quick and easy.

The built-in GPIB interface supports easy configuration of automated test systems for 1xEV-DO production lines and on-site maintenance.

*1: Requires MT8820B-003, MT8820B-004 and MX882002C

CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA).

Tests	3GPP2 C.S0033	Test items
Dessiver	3.1.1.1	Frequency Coverage Requirement
Receiver	3.1.1.3.1	Receiver Sensitivity and Dynamic Range
	3.1.2.1	Frequency Requirement
	3.1.2.2.1	Time Reference
	3.1.2.2.2	Waveform Quality and Frequency Accuracy
	3.1.2.3.2	Time Response of Open Loop Power Control
	3.1.2.3.4	Maximum RF Output Power
Transmitter	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
	3.1.2.4.1	Conducted Spurious Emissions
	3.1.2.4.3	Occupied Bandwidth

• 1xEV-DO Measurement Items



Transmitter Measurements

Code Domain Power

The 1xEV-DO terminal code domain error is measured. The PICH (pilot-ch), RRI, DRC, ACK and Data powers are all displayed along with the maximum power and channel numbers of inactive channels on one screen. In addition, Pass/Fail evaluation is performed to determine whether or not the inactive channel power satisifies the specifications.





The Open Loop Time Response screen is used to measure the time response of the $1 \times EV$ -DO terminal open loop power control. Changes in the terminal transmitted power are measured between 100 ms from the point where the power of the forward link signal changed.



*Output power, modulation analysis, occupied bandwidth, etc., can be measured similarly to the MX882002C.

Access Probe Power

The first access probe from the 1xEV-DO terminal is captured by the level trigger to measure the average power. This value is held after terminating the probe measurement once even in the Continuous Measurement mode, which is convenient for the Open Loop Output Power measurement described in C.S0033 of the 3GPP2 standard.

		Connected (RTAP)	Phone-2	Phone-1
<fundamental measuremen<="" td=""><td>t> Output Ma</td><td>in</td><td></td><td>CDMA2000</td></fundamental>	t> Output Ma	in		CDMA2000
Parameter	Fundamental	AT Report		
1xEV-DO : E	Ind	AT Power	:-42,7 dBm	Fundamental
Access Probe Power				_ I
Assess Darks During	E4 00 JD /4 0			Arccess Probe G Power
Access Probe Power	-51.28 dBm/1.2			
Access Probe Power	<u>On</u>			
Timeout	30 sec			
Power Measurement	Off Meas	. Count <u>1</u>		
Measurement Mode	Normal			
Modulation Analysis	Off Meas	. Count <u>1</u>		
Code Domain Power	Uff Meas	. Count <u>1</u>		
OPUL Potto	Utt Meas	. Count <u>1</u>		
Detect Mode	Positive P	eak		
Spurious Emissions	Off Meas	. Count 1		
dBm/1MHz	Off			
dBm/1.23MHz	Off			
Template Setup	Template S	Setup 🕼		
Detect Mode	Avenage			

Receiver Measurement

Packet Error Rate

PER (Packet Error Rate) measurement and Pass/Fail evaluation can be performed in FTAP todisplay the PER, error packet count, transmission packet count, confidence level, and Pass/Fail results.

Connected (FTAP) Phone-2 <fundamental measurement=""> Output Main</fundamental>	Phone-1 CDMA2000
Parameter Fundamental AT Report	Fundamental
Packet Error Rate	r unuallierrtar
Confidence Louis DED Ene Deducte Teacenitted	
FTC 95.0 0 0.00 Pass	Close
	Session
De Manuarant Octor	Refresh Call
Packet Error Rate <u>On</u>	AT Douron
Specified PER 0.5 %	Control
Meas. Stop Mode <u>On</u>	
Confidence Level 95.0 %	
	Handoff
Packet Data Uption Item List <u>Detail</u>	
AT Address	1 2 3

Call Processing



The Call Processing function supports connection tests, such as Open Session, Closed Session, AT Origination, AN Release, and AT Release.

Idle(Session Opened) Phone-2 F <fundamental measurement=""> Output Main 0</fundamental>	Phone-1 CDMA2000
Parameter Fundamental AT Report	
1xEV-DO : End AT Power :-73.8 dBm	Parameter
Dode Domain Power (Meas. Count : 1/ 1)	T A Operating <mark>G</mark> Mode
No. Len Ph. Power Max Inactive Channel 3 16 1 <u>-31.59</u> dB/Ion <u>Pass</u>	T Channel A and G Level
Constant Relation Constant Con	<mark>T</mark> Physical A Channel <mark>G</mark> Parameters
Application Protocol RTAP	T Call A Processing G Parameters
AN ID Item List Detail	A AN ID G
Sector 10 0000000 0000000 0000000 0000000 000000	T A Access <mark>G</mark> Parameters
Access Parameters Item List Detail	T Fundamental A Measurement G Parameters

Terminal Report Monitor

This screen displays the periodically reported 1xEV-DO terminal status.

<fundamental measurement=""></fundamental>	Idle (Session Opened) Photo Output Main	ne-2 Phone-1 CDMA2000
1vEV-DO - End	AT Power -73 7	dRm AT Benort
Power Measurement	(Meas, Count : 1)	0/ 10) T A Hardware ID
TX Power -43.6 43.2	Max. Min. 4 <u>4 -43.39</u> <u>-43.81</u> dBm 0 45.801 <u>41.586</u> n₩	
Handware ID 1	d <u>ao ed ao od ao-21 oous</u>	
Hardware ID Type Hardware ID Length Hardware ID[0]-[7]	0x010000 0x04 (Hex) 4 (Dec) 0x88888888	
Hardware ID[8]-[15] Hardware ID[16]-[23] Hardware ID[24]-[31]		
		123

MT8820B-004 1xEV-DO Measurement Hardware, MX882003C 1xEV-DO Measurement Software

Amplitude measurement	Dependent on the performance of MX882002C
Modulation analysis	Frequency: 300 to 2700 MHz Input level: –30 to +35 dBm Carrier frequency accuracy: reference oscillator accuracy +10 Hz Residual waveform quality: >0.999 Residual EVM: <2% rms
Code domain power	Input level: −10 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 2700 MHz (1 Hz step) Channel level: Pilot channel, MAC channel, Control channel, Traffic channel, All 0 dB (reference lor) PN offset: 0 to 511 Wave quality: >0.99 (pilot only, AWGN Off) AWGN: AWGN Level: -20 to +12 dB (relative to CDMA signal) or Off Maximum output level of CDMA signal at AWGN on: -28 dBm (at Main output) -18 dBm (at AUX output)
Error rate measurement	PER (Packet Error Rate) measurement: PER measurement with FTAP Display items: PER, Confidence level, Sample packet count, Error packet count
Call processing	 Band class: BC0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Call control: Open Session, Close Session, AT Origination, NW Origination, AT Release, NW Release, Hard Handoff, Softer Handoff Rev. closed loop power control mode: Closed loop, Alternate, All 0 (all up), All 1 (all down) Test application protocol: RTAP, FTAP, FTAP + RTAP

MX882003C-002 1xEV-DO External Packet Data

Direct RF connection between 1xEV-DO terminal and application server

The MX882003C-002 1xEV-DO External Packet Data is an optional software application that adds 1xEV-DO external packet data communications to the MX882003C 1xEV-DO External Measurement Software option. It supports transfer of packet data between a local or network application server and an Internet-enabled CDMA2000 1xEV-DO terminal via an Ethernet connection to the MT8820B. The IP data communications mode is supported as described below.

IP Data Communications Mode

This mode provides a predictable and controllable test "pipe" between the Internet (or other local application server) and 1xEV-DO terminal in the native RF environment that is simulated by the base station simulator in the MT8820B hardware. This mode provides an IP network connection to a 1xEV-DO terminal and supports Default Packet Point to Point Protocol (PPP), Internet Protocol (IP), and direct Ethernet connection.





Specifications

MX882003C-002 1xEV-DO external packet data

Application Protocol	Default Packet
Packet Data Mode	PPP/IP (transfers IP packet data between 1xEV-DO terminal and server)

CDMA2000 1X/1xEV-DO Synchronous Function

For Functional Tests of CDMA2000 1X and CDMA2000 1xEV-DO

By using the MX882002C and MX882003C with two MT8820B units or one MT8820B unit with the Parallelphone^{*1} measurement option, the CDMA2000 1X and 1xEV-DO forward link signals can be output with synchronized system times, supporting function tests of terminals for both CDMA2000 1X and 1xEV-DO systems.^{*2}

*1: Parallelphone is the registered trademark of Anritsu Corporation

*2: This function cannot be used when MX882000C W-CDMA Measurement Software is loaded Please perform unload, when MX882000C is loaded





One MT8820B unit and Parallelphone

Ordering Information

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

	Model/Order No.	Name	Model/Order No.	Name
		Main frame	W2464AE	MX882000C Operation Manual*4
	MT8820B	Radio Communication Analyzer	W2770AE	(supplied with MX882000C) MX882001C Operation Manual ^{*4}
		Standard accessories	14/070045	(supplied with MX882001C)
		Power Cord, 2.6 m: 1 pc	W2789AE	(supplied with MX882002C)
	Z0906A	ANR-CFX00T64 (CF card, 64 MB): 1 pc	W2792AE	MX882003C Operation Manual ^{*4}
	CA68ADP	PC card Adapter: 1 pc		(supplied with MX882003C)
	W2778AE	MT8815B/MT8820B operation manual (CD-ROM):1 copy	W2766AE	MX88205xC Operation Manual ^{*4} (supplied with MX88205xC)
		Ontions	W2772AE	MX88207xC Operation Manual ^{*4}
	MT8820B-001	W-CDMA Measurement Hardware		(supplied with MX88207xC)
	MT8820B-002	TDMA Measurement Hardware		
	MT8820B-003	CDMA2000 Measurement Hardware		Warranty
	MT8820B-004	1xEV-DO Measurement Hardware	MT8820B-ES210	Extended Two Year Warranty Service
	MT8820B-011	Audio Board	MT8820B-ES310	Extended Three Year Warranty Service
	MT8820B-012	Parallel Phone Measurement Hardware	MT8820B-ES510	Extended Five Year Warranty Service
	MT8820B-101	W-CDMA Measurement Hardware Retrofit		
	MT8820B-102	TDMA Measurement Hardware Retrofit	Dania	Application parts
	MT8820B-103	CDMA2000 Measurement Hardware Retrofit	P0019	
	MT8820B-104	1xEV-DO Measurement Hardware Retrofit	P0027	W-CDMA/GSM Test USIM
	MT8820B-111	Audio Board Retrofit	A0013	Handset
	MT8820B-112	Parallel Phone Measurement Hardware Retrofit	J1249	CDMA2000 Cable [D-sub (15 pin, P-type) • D-sub (15 pin,P-type), used in combination with J1267 (sold separately)]
		Softwares	J1267	CDMA2000 cross-over cable [D-sub (9 pin, P-type) • D-sub (9 pin, P-type), reverse cable, used with J1249
	MX882000C	W-CDMA Measurement Software		(sold separately)]
	MX882000C-001	W-CDMA Voice Codec	J0576B	Coaxial Cord (N-P • 5D-2W • N-P), 1 m
		(requires MT8820B-011 and MX882000C)	J0576D	Coaxial Cord (N-P • 5D-2W • N-P), 2 m
	MX882000C-011	HSDPA Measurement Software	J0127A	Coaxial Cord (BNC-P • RG58A/U • BNC-P), 1 m
		(requires MT8820B-001, MX882000C and MX882050C)	J0127C	Coaxial Cord (BNC-P • RG58A/U • BNC-P), 0.5 m
	MX882001C	GSM Measurement Software (requires MT8820B-002)	J0007	GPIB Cable, 1 m
	MX882001C-001	GSM Voice Codec (requires MT8820B-011 and MX882001C)	J0008	GPIB Cable, 2 m
	MX882001C-002	GSM External Packet Data (requires MX882001C)	MN8110B	I/O Adapter (for call processing I/O)
	MX882001C-011	EGPRS Measurement Software (requires MX882001C)	B0332	Joint Plate (4 pcs/set)
	MX882002C	CDMA2000 Measurement Software	B0333G	Rack Mount Kit
		(requires MT8820B-003)	B0499	Carrying Case (hard with protective cover and casters)
	MX882002C-002	CDMA2000 External Packet Data (requires MX882002C)	B0499B	(hard type, with protective cover, without casters)
	MX882003C	1xEV-DO Measurement Software	W2776AF	MT8815B/MT8820B Operation Manual (booklet)
		(requires MT8820B-003, MT8815B-004 and MX882002C)	W27654E	MX882000C Operation Manual (booklet)
	MX882003C-002	1xEV-DO External Packet Data (requires MX882003C)	W2771AE	MX882001C Operation Manual (booklet)
	MX882010C	Parallel Phone Measurement Software*1	W27904F	MX882002C Operation Manual Papel Operation (booklet)
		hardware sets (2 board/set) and one measurement	W2791AF	MX882002C Operation Manual Remote Control (booklet)
		Software]*1	W2793AF	MX882003C Operation Manual Panel Operation (booklet)
	MX882050C	W-CDMA Call Processing Software*2	W2794AF	MX882003C Operation Manual Remote Control (booklet)
	MY0000500 000	(requires MX882000C)	W2767AE	MX88205xC Operation Manual (booklet)
	MX882050C-002	W-CDMA External Packet Data 2, 00 (requires MX882050C)	W2773AF	MX88207xC Operation Manual (booklet)
	MX882050C-003	W-CDMA Video Priorie Test ~ (requires MX882050C)		
	MX882050C-009		 *1: The measurement hardware supporting the Parallel Phone Measurement Software are the MT8820B-001, MT8820B-002, MT8820B-003, MT8820B-004, which can be installed simultaneously *2: For terminal connection, contact your Anritsu sales representative *3: The MX882050C pre-installs the integrity protection functionality *4: Supplied as CD-ROM *5: The Test USIM001 only supports the W-CDMA mode. When GSM 	
	IVI⊼882050C-011	(requires MX882000C-011)		
	MX882070C	W-CDMA Ciphering Software ^{*2} (requires MX882050C)		
ļ	MX882051C	W-CDMA Call Processing Software ^{*2}		
		(requires MX882000C)		
	MX882051C-002	W-CDMA External Packet Data ^{*2, *3} (requires MX882051C)	connection is required, use the P0027	
	MX882051C-003	W-CDMA Video Phone Test*2 (requires MX882051C)	 Parallelphone™ i CF[®] card is a reg 	s a registered trademark of Anritsu Corporation jistered trademark of SanDisk Corporation in the USA
l	MX882071C	vv-CDIVIA Ciphering Software ^{*2} (requires MX882051C)	and is licensed to	the CFA (Compact Flash Association)

Anritsu Corporation

5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan Phone: +81-46-223-1111 Fax: +81-46-296-1264

• U.S.A

Anritsu Company 1155 East Collins Blvd., Richardson, TX 75081, U.S.A. Toll Free: 1-800-267-4878 Phone: +1-972-644-1777 Fax: +1-972-671-1877

Canada

Anritsu Electronics Ltd. 700 Silver Seven Road, Suite 120, Kanata, Ontario K2V 1C3, Canada Phone: +1-613-591-2003 Fax: +1-613-591-1006

• Brazil Anritsu Eletrônica Ltda.

Praca Amadeu Amaral, 27 - 1 Andai 01327-010-Paraiso-São Paulo-Brazil Phone: +55-11-3283-2511 Fax: +55-11-3288-6940

• U.K.

Anritsu EMEA Ltd. 200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K. Phone: +44-1582-433200 Fax: +44-1582-731303

• France

Anritsu S.A. 9 Avenue du Québec, Z.A. de Courtabœuf 91951 Les Ulis Cedex, France Phone: +33-1-60-92-15-50 Fax: +33-1-64-46-10-65

Germany

Anritsu GmbH Nemetschek Haus, Konrad-Zuse-Platz 1 81829 München, Germany Phone: +49-89-442308-0 Fax: +49-89-442308-55

 Italy Anritsu S.p.A. Via Elio Vittorini 129, 00144 Roma, Italy Phone: +39-6-509-9711 Fax: +39-6-502-2425

Sweden Anritsu AB Borgafjordsgatan 13, 164 40 KISTA, Sweden

Phone: +46-8-534-707-00 Fax: +46-8-534-707-30 Finland

Anritsu AB

Teknobulevardi 3-5, FI-01530 VANTAA, Finland Phone: +358-20-741-8100 Fax: +358-20-741-8111

• Denmark Anritsu A/S

Kirkebjerg Allé 90, DK-2605 Brøndby, Denmark Phone: +45-72112200 Fax: +45-72112210

United Arab Emirates Anritsu EMEA Ltd.

Dubai Liaison Office P O Box 500413 - Dubai Internet City Al Thuraya Building, Tower 1, Suit 701, 7th Floor Dubai, United Arab Emirates Phone: +971-4-3670352 Fax: +971-4-3688460

• Singapore Anritsu Pte. Ltd.

10, Hoe Chiang Road, #07-01/02, Keppel Towers, Singapore 089315 Phone: +65-6282-2400 Fax: +65-6282-2533

Specifications are subject to change without notice.

• P.R. China (Hong Kong)

Anritsu Company Ltd. Suite 923, 9/F., Chinachem Golden Plaza, 77 Mody Road, Tsimshatsui East, Kowloon, Hong Kong, P.R. China Phone: +852-2301-4980 Fax: +852-2301-3545 • P.R. China (Beijing)

Anritsu Company Ltd.

Beijing Representative Office Room 1515, Beijing Fortune Building,

No. 5, Dong-San-Huan Bei Road, Chao-Yang District, Beijing 10004, P.R. China Phone: +86-10-6590-9230 Fax: +86-10-6590-9235

Korea

Anritsu Corporation, Ltd. 8F Hyunjuk Building, 832-41, Yeoksam Dong, Kangnam-ku, Seoul, 135-080, Korea Phone: +82-2-553-6603 Fax: +82-2-553-6604

Australia

Anritsu Pty. Ltd. Unit 21/270 Ferntree Gully Road, Notting Hill, Victoria 3168, Australia Phone: +61-3-9558-8177 Fax: +61-3-9558-8255

Taiwan

Anritsu Company Inc. 7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan Phone: +886-2-8751-1816 Fax: +886-2-8751-1817

India

Anritsu Corporation

India Liaison Office Unit No. S-3, Second Floor, Esteem Red Cross Bhavan, No. 26, Race Course Road, Bangalore 560 001, India Phone: +91-80-32944707 Fax: +91-80-22356648

Please Contact:	
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