



FCC PART 22H, 24E

TEST AND MEASUREMENT REPORT

For

Waxess USA, Inc.

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NewPort Beach, CA 92660, USA

FCC ID: SNBDM1000CE

Report Type: Original Report	Product Type: Dual Mode 850/1900 CDMA & 2.4 GHz FHSS
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Report Number: R1006233-2224	
Report Date: 2010-08-06	
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk “*” (Rev.2)

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1006233-2224	Original Report	2010-08-06

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Waxess USA Inc.'s product, *Model: DM1000CE, FCC ID: SNBDM1000CE* or the "EUT" as referred to in this report, is a Dual Band 850/1900 CDMA with 2.4GHz FHSS cordless phone base unit.

General Specifications:

- Operating Frequency: 824-849 MHz and 1850-1910 MHz
- Modulation: CDMA
- Power Source: Input: 120VAC/60Hz; Output: 9 VDC

1.2 Mechanical Description

The EUT dimension is approximately 200mm (L) x 195 mm (W) x 170 mm (H).

The test data gathered are from typical production sample, serial number: 0006945, provided by the manufacturer.

1.3 Objective

This type approval report is prepared on behalf of *Waxess USA Inc.*, Inc. in accordance with Part 2, Subpart J, Part 22 Subpart H, and Part 24 Subpart E, of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation, frequency stability, band edge, and conducted and radiated margin.

1.4 Related Submittal(s)/Grant(s)

FCC ID: O9EQ26ELITE

FCC ID: SNBDM1000CE, Part 15.247 Measurement Test Report, Project Number: R1006233-247

1.5 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services

Part 24 Subpart E - PCS

Applicable Standards: TIA EIA 98-C, TIA/EIA603-C.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values ranging from +2.0 dB for Conducted Emissions tests and +4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. report QAP-018.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and

December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-C.

The final qualification test was performed with the EUT operating at normal mode.

2.2 EUT Exercise Software

No EUT Exercise Software was used.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Waxess USA Inc.	AC/DC Adapter	AD-48091000	-

2.5 Internal Configuration

Manufacturer	Description	Model	Serial Number
Waxess USA Inc.	Main PCB Board	DM1000CB-2	-
Waxess USA Inc.	Keypad PCB Board	DM1000C Base Key PCB	411000C004A0

2.6 Interface Ports and Cabling

No interface ports and cabling used.

3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§2.1046 §22.913(a), §24.232	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A ¹
§2.1049 §22.917, §24.238	Occupied Bandwidth / Out of Band Emissions	Note ²
§2.1053 §22.917, §24.238	Spurious Radiated Emissions	Compliant
§2.1051 §22.917, §24.238	Spurious Emissions at Antenna Terminals	Note ²
§22.917, §24.238	Band Edge	Note ²
§2.1055 §22.355, §24.235	Frequency Stability	Note ²
§2.1091	RF Exposure	Compliant

Note: ¹ According to FCC §2.1047(d) and part 22H/24E, there is no specific requirement for digital modulation and no oscillator circuit, therefore modulation characteristic is not presented.

² Please refer FCC ID: O9EQ26ELITE.

4 FCC §2.1046, §22.913(a) & §24.232 – RF OUTPUT POWER

4.1 Applicable Standard

According to FCC §22.913 (a), the maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to FCC §24.232 , Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

4.2 Test Procedure

Conducted:

The RF output of the transmitter was connected to the signal generator and the spectrum analyzer through sufficient attenuation.

Radiated:

The EUT was placed on top of non-conducting Foams on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

4.3 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	372 %
ATM Pressure:	101.7 kPa

The testing was performed by Dennis Huang on 2010-07-08 in RF site.

4.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Signal Generator	83650B	361A00276	2010-06-21
Agilent	PSA Series Spectrum Analyzer	E4446A	US44300386	2010-05-28
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
A.H. Systems	Horn Antenna	SAS-200/57	261	2009-09-23
Agilent	Wireless Communication Tester Set	8960	GB44051221	2010-06-11
HP	Pre Amplifier	8449B	3147A00400	2010-02-01
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2010-05-28

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

4.5 Test Results

Conducted Output power:

Please refer FCC ID: O9EQ26ELITE.

The maximum conducted output power for cellular band is 24.38 dBm (274.2 mw)

The maximum conducted output power for PCS band is 23.85 dBm (242.7 mw)

CDMA 850 MHz Band – ERP

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)	
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dBd)	Cable Loss (dB)	Absolute Level (dBm)			
Low Channel (1013) – 824.7 MHz												
824.7	97.45	337	1.83	V	824.7	21.71	0	1	20.71	38.45	-17.74	
824.7	90.25	107	1.0	H	824.7	14.51	0	1	13.51	38.45	-24.94	
Middle Channel (384) – 836.52 MHz												
836.52	97.41	338	1.82	V	836.52	21.58	0	1	20.58	38.45	-17.87	
836.52	94.6	291	1.74	H	836.52	18.77	0	1	17.77	38.45	-20.68	
High Channel (777) – 848.31MHz												
848.31	98.58	327	1.78	V	848.31	23.42	0	1	22.42	38.45	-16.03	
848.31	91.54	127	1.01	H	848.31	16.38	0	1	15.38	38.45	-23.07	

CDMA 1900 MHz Band – EIRP

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dBi)	Cable Loss (dB)	Absolute Level (dBm)		
Low Channel (25) – 1851.25 MHz											
1851.25	95.97	59	1.76	V	1851.25	20.43	8.1	1.34	27.19	33	-5.81
1851.25	88.84	69	1.0	H	1851.25	13.3	8.1	1.34	20.06	33	-12.94
Middle Channel (600) – 1880 MHz											
1880	94.21	238	1.0	V	1880	20.09	8.1	1.34	26.85	33	-6.15
1880	91.54	360	1.0	H	1880	17.42	8.1	1.34	24.18	33	-8.82
High Channel (1175) – 1908.75 MHz											
1908.75	94.06	242	1.0	V	1908.75	19.97	8.1	1.34	26.73	33	-6.27
1908.75	91.49	3	1.92	H	1908.75	17.4	8.1	1.34	24.16	33	-8.84

5 FCC §2.1047 - MODULATION CHARACTERISTIC

5.1 Applicable Standard

According to FCC §2.1047(d), Part 22H and Part 24E, there is no specific requirement for digital modulation and no oscillator circuit, therefore modulation characteristic is not presented.

5.2 Test Result

N/A

6 FCC §2.1049, §22.917 & §24.238 - OCCUPIED BANDWIDTH

6.1 Applicable Standard

Requirements: FCC §2.1049, §22.917 and §24.238.

6.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 kHz (Cellular/PCS) and the 26 dB & 99% bandwidth was recorded.

6.3 Test Results

Please refer FCC ID: O9EQ26ELITE.

7 FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

7.1 Applicable Standard

Requirements: FCC §2.1053, §22.917 and §24.238

7.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 log (TX Power in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts)

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Signal Generator	83650B	361A00276	2010-06-21
Agilent	PSA Series Spectrum Analyzer	E4446A	US44300386	2010-05-28
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
A.H. Systems	Horn Antenna	SAS-200/57	261	2009-09-23
Agilent	Wireless Communication Tester Set	8960	GB44051221	2010-06-11
HP	Pre Amplifier	8449B	3147A00400	2010-02-01
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2010-05-28

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	20~23 °C
Relative Humidity:	55~57 %
ATM Pressure:	99 kPa

The testing was performed by Dennis Huang on 2010-07-08 in 5 meter chamber #3.

7.5 Summary of Test Results

Worst case reading as follows:

Mode: CDMA 850 MHz Band			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel
-16.5	2544	Vertical	848.31 MHz

Mode: CDMA 1900 MHz Band			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel
-8.61	5726.25	Vertical	1908.75 MHz

7.6 Test Results

CDMA 850 MHz Band

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)	
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)			
Low Channel (1013) - 824.7 MHz												
1649.4	60.81	168	1.66	V	1649.4	-39.45	7.8	1.34	-32.99	-13	-19.99	
1649.4	55.6	271	1.0	H	1649.4	-44.66	7.8	1.34	-38.2	-13	-25.2	
Middle Channel (384) - 836.52 MHz												
2509.56	56.18	251	1.0	V	2509.56	-38.46	7.9	1.66	-32.22	-13	-19.22	
2509.56	54.97	34	1.07	H	2509.56	-39.67	7.9	1.66	-33.43	-13	-20.43	
1673.04	53.18	351	2.04	V	1673.04	-47.08	7.8	1.34	-40.62	-13	-27.62	
1673.04	51.67	210	1.0	H	1673.04	-48.59	7.8	1.34	-42.13	-13	-29.13	
High Channel (777) - 848.31 MHz												
2544	58.9	268	1.18	V	2544	-35.74	7.9	1.66	-29.5	-13	-16.5	
2544	56.33	71	1.57	H	2544	-38.31	7.9	1.66	-32.07	-13	-19.07	
1696.62	54.22	95	1.03	V	1696.62	-46.04	7.8	1.34	-39.58	-13	-26.58	
1696.62	52.99	45	1.0	H	1696.62	-47.27	7.8	1.34	-40.81	-13	-27.81	

CDMA 1900 MHz band

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
Low Channel (25) – 1851.25 MHz											
5553.75	52.75	20	1	H	5553.75	-36.02	11.3	2.34	-27.06	-13	-14.06
3702.5	57.03	14	1	H	3702.5	-36.9	10.9	1.68	-27.68	-13	-14.68
5553.75	51.85	321	1	V	5553.75	-36.92	11.3	2.34	-27.96	-13	-14.96
3702.5	53.5	94	1	V	3702.5	-40.43	10.9	1.68	-31.21	-13	-18.21
Middle Channel (600) – 1880 MHz											
5640	52.68	12	1.42	V	5640	-36.09	11.3	2.34	-27.13	-13	-14.13
5640	50.68	28	1	H	5640	-38.09	11.3	2.34	-29.13	-13	-16.13
3760	55.28	12	1	H	3760	-38.65	10.9	1.68	-29.43	-13	-16.43
3760	53.23	64	1	V	3760	-40.7	10.9	1.68	-31.48	-13	-18.48
High Channel (1175) – 1908.75 MHz											
5726.25	59.01	44	1.3	V	5726.25	-29.67	10.4	2.34	-21.61	-13	-8.61
5726.25	54.19	34	1.08	H	5726.25	-34.49	10.4	2.34	-26.43	-13	-13.43
3817.5	56.58	249	1	V	3817.5	-37.25	9.5	1.68	-29.43	-13	-16.43
3817.5	54.74	350	1.39	H	3817.5	-39.09	9.5	1.68	-31.27	-13	-18.27

8 FCC §2.1051, §22.917 & §24.238- SPURIOUS EMISSIONS AT ANTENNA TERMINALS

8.1 Applicable Standard

Requirements: FCC §2.1051, §22.917 and §24.238.

The spectrum shall be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

8.3 Test Results

Please refer FCC ID: O9EQ26ELITE.

9 FCC §22.917 & §24.238 – BAND EDGE

9.1 Applicable Standard

According to FCC §22.917, the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to FCC §24.238, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

9.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

9.3 Test Results

Please refer FCC ID: O9EQ26ELITE.

10 FCC §2.1055, §22.355 & §24.235 – FREQUENCY STABILITY

10.1 Applicable Standard

CFR47 § 2.1055 (a), § 2.1055 (d), §22.355, §24.235

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

10.2 Test Result

Please refer FCC ID: O9EQ26ELITE.

11 FCC §1.1307(b)(1) & §2.1091 - RF EXPOSURE

11.1 Applicable Standard

According to FCC §1.1310 and §2.1091 (Mobile Devices) RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Note: f = frequency in MHz

* = Plane-wave equivalent power density

11.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

CDMA – Cellular Band

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>24.38</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>274.16</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>824.7</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>0</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>1</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.0545</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>0.5498</u>

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<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>23.85</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>242.66</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>1880</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>0</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>1</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm²):</u>	<u>0.048</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm²):</u>	<u>1.0</u>

11.3 Test Result

The device is compliant with the requirement MPE limit for uncontrolled exposure at the distance of 20 cm.