Lab Code: 200167-0

FCC PART 15.247

TEST AND MEASUREMENT REPORT

For

Waxess USA, Inc.

4533 MacArthur Blvd, Suite 276,

NewPort Beach, CA 92660, USA

FCC ID: SNBDM1000CE

Report Type:	**Product Type:**
Original Report	Dual Mode 850/1900 CDMA & 2.4 GHz FHSS

Test Engineer:	Dennis Huang
Report Number:	R1006233-247
Report Date:	2010-08-06
Reviewed By:	Victor Zhang Test Engineer, RF Lead
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1006233-247	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.

General Specifications:

- Operating Frequency: 2401.06 – 2482.27MHz
- Modulation: 2.4GHz band: FHSS
- Power Source: Input: 120VAC/60Hz; Output: 9 VDC

1.2 Mechanical Description of EUT

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.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, and C.

1.4 Related Submittal(s)/Grant(s)

FCC ID: SNBDM1000C
FCC ID: SNBDM1000CE with FCC 22H/24E Measurement Test Report Number: R1006233-2224

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in 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 range from $\pm$2.0 for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

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

1.7 Test Facility

The semi-anechoic chambers used by BACL to collect radiated and conducted emissions measurement data is located in the building at it's facility in Sunnyvale, California, USA.

BACL's test sites 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 have 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 complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464 and VCCI Registration No.: C-2698 and R-2463. The test site has been approved by the FCC 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 system was configured for testing in accordance with ANSI C63.4-2003.
The EUT was tested in the testing mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

The software is provided by customer. The EUT exercise program used during radiated testing was designed to exercise the system components.

Radio Mode	Low Channel (MHz)	Middle Channel (MHz)	High Channel (MHz)
2.4 GHz FHSS	2401.056	2441.664	2482.272

2.3 Special Accessories

N/A.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Power Supply Information

Manufacturers	Descriptions	Models	Serial Numbers
Waxess USA Inc.	AC/DC Adapter	AD-48091000	-

2.6 Local Support Equipment

No Local Support Equipment.

2.7 EUT Internal Configuration

Manufacturers	Descriptions	Models	Serial Numbers
Waxess USA Inc.	Main PCB Board	DM1000CB-2	-
Waxess USA Inc.	Keypad PCB Board	DM1000C Base Key PCB	411000C004A0

2.8 Interface Ports and Cabling

No interface ports and cabling used.

3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.203	Antenna Requirements	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Restricted Band and Unwanted Emissions	Compliant
§2.1051 & 15.247(d)	Spurious Emissions at Antenna Port	Note[1]
§15.247 (a)(1)	20 dB Bandwidth & 99% Bandwidth	Note[1]
§15.247 (a)(1)	Hopping Channel Separation	Note[1]
§15.247 (a)(1)(iii)	Number of Hopping Frequencies Used	Note[1]
§15.247 (a)(1)(iii)	Dwell Time	Note[1]
§15.247 (b)(3)	Maximum Peak Output Power	Note[1]
§15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Note[1]
§15.247(i) & §2.1091	RF Exposure	Note[1]

Note[1] Please refer to FCC ID: SNBDM1000C.

4 FCC §15.203 - Antenna Requirement

4.1 Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Antenna Connected Construction

The gain of antenna used for transmitting is 0 dBi by default and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

☒ **Compliant** ☐ **N/A**

5 FCC §15.207 – Conducted Emissions

5.1 Applicable Standard

According to FCC §15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56[1]	56 to 46[1]
0.5-5	56	46
5-30	60	50

[1] *Decreases with the logarithm of the frequency*

5.2 EUT Setup

The conducted emissions tests were performed in the 5-meter test chamber, using the setup in accordance with ANSI C63.4-2003 measurement procedures. The specifications used were in accordance with FCC Part 15.207 limits.

The adapter of control board was connected to a 120 V, 60 Hz AC mains power source.

5.3 Test Procedure

During the conducted emissions test, the power cord of the EUT was connected to the mains outlet of the LISN.

Maximizing procedure was performed on the six (6) highest provided emissions of the EUT.

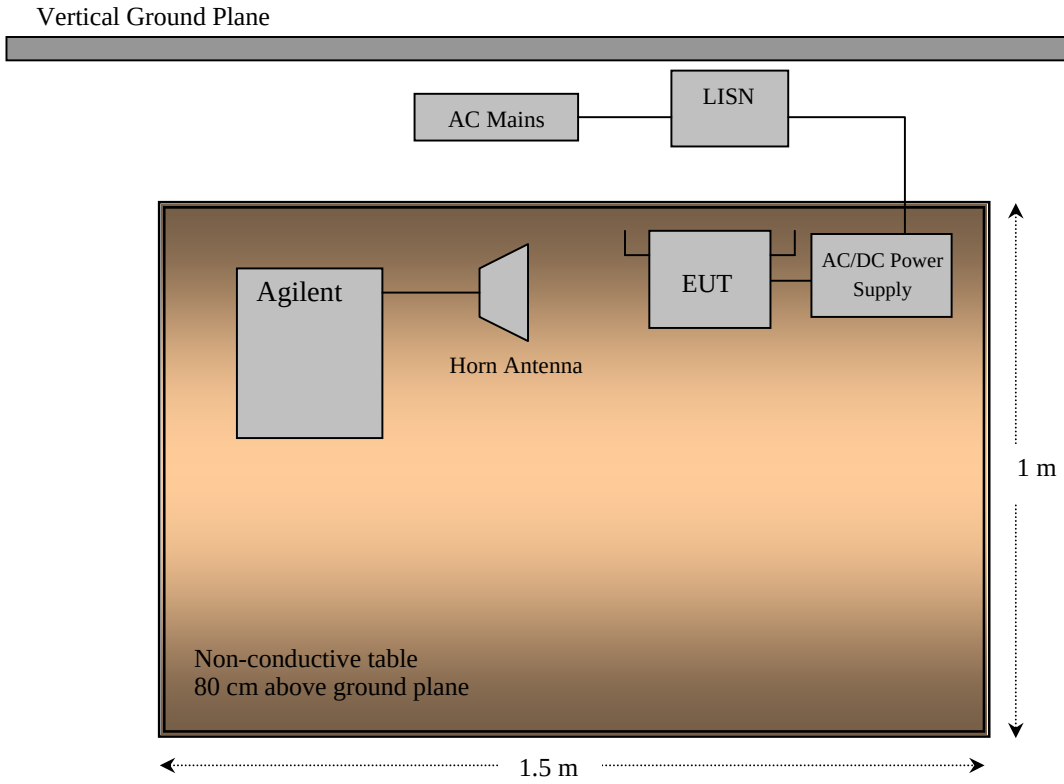
All data was recorded in the quasi-peak and average detection mode. Quasi-Peak readings are distinguished with a “QP”. Average readings are distinguished with an “Ave”.

5.4 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100338	2010-06-24
Solar Electronics	LISN	9252-R-24-BNC	511205	2010-06-25

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

5.5 Test Setup Block Diagrams



5.6 Test Environmental Conditions

Temperature:	15~18 ºC
Relative Humidity:	44~50 %
ATM Pressure:	101.2~102.3kPa

Testing was performed by Dennis Huang on 2010-07-14 at 5m chamber 3.

5.7 Test Result:

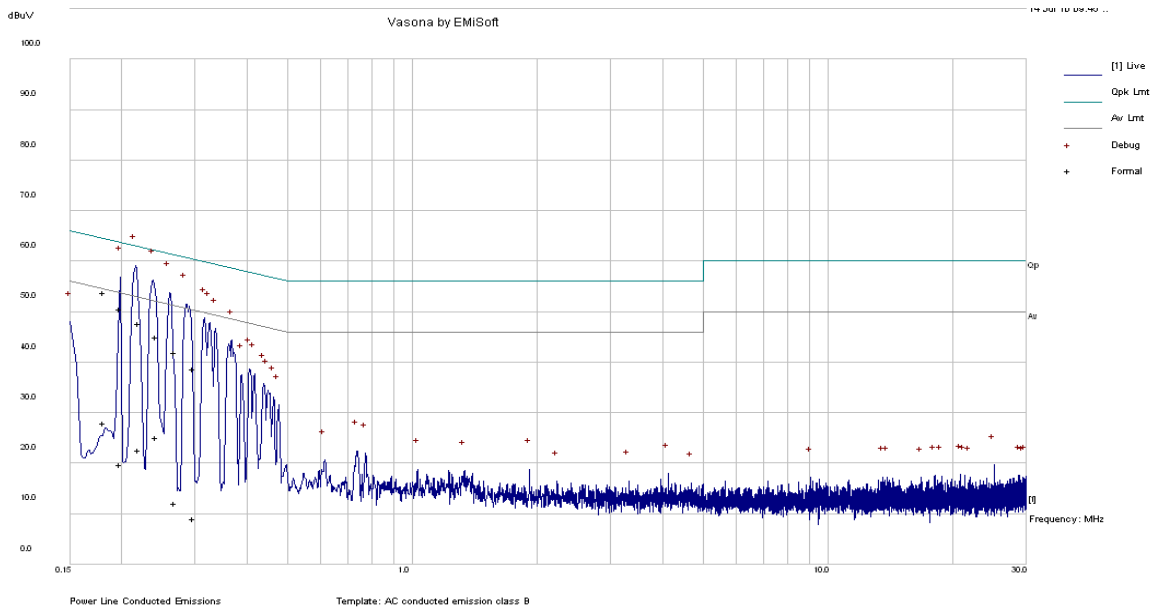
According to the data hereinafter, the EUT complied with the FCC Part 15.207 Conducted emissions limits and had the worst margin of:

-5.96 dB at 0.168957 MHz in the Neutral conductor, 120V/60Hz

5.8 Conducted Emissions Test Data

Worst Case Transmit Mode: Middle Channel – 2441.664 MHz

120 V/60 Hz, Line:



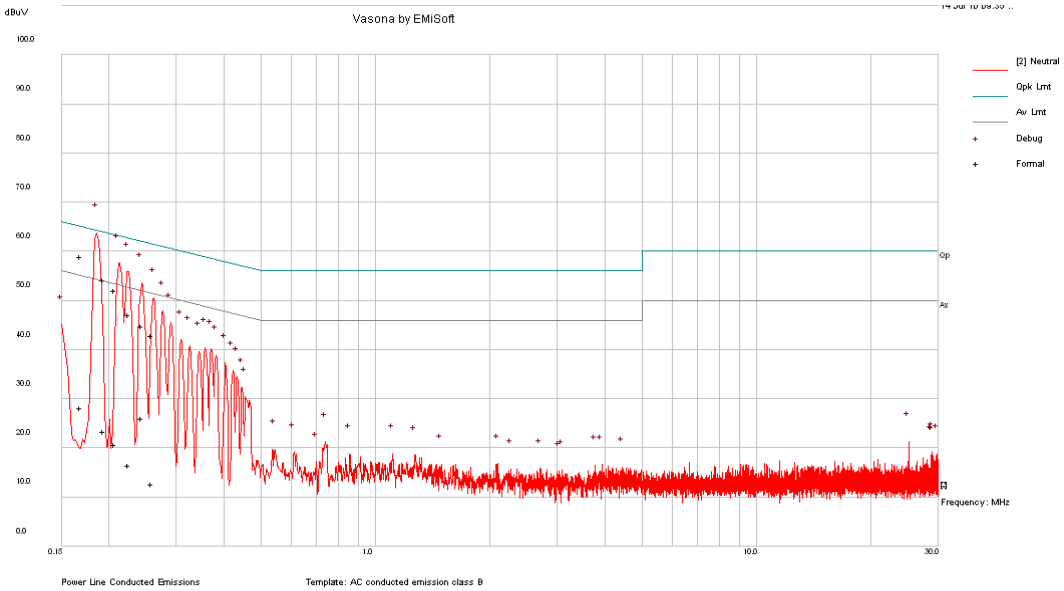
QP Measurement Results

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.198985	50.61	L	63.65	-13.04
0.219733	47.78	L	62.83	-15.05
0.181421	53.85	L	64.42	-10.57
0.242065	45.12	L	62.03	-16.90
0.269304	42	L	61.14	-19.14
0.298732	38.67	L	60.28	-21.60

Average Measurement Results

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.198985	19.71	L	53.65	-33.94
0.219733	22.62	L	52.83	-30.21
0.181421	28.02	L	54.42	-26.40
0.242065	25.17	L	52.03	-26.86
0.269304	12.17	L	51.14	-38.97
0.298732	8.99	L	50.28	-41.29

120 V/60 Hz Neutral:



QP Measurement Results

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.168957	59.06	N	65.01	-5.96
0.193976	54.3	N	63.86	-9.56
0.207214	52.07	N	63.32	-11.25
0.226157	47.11	N	62.59	-15.48
0.24393	44.84	N	61.96	-17.12
0.259916	42.92	N	61.43	-18.51

Average Measurement Results

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (L/N)	Limit (dBµV)	Margin (dB)
0.168957	28.1	N	55.01	-26.91
0.193976	23.34	N	53.86	-30.53
0.207214	20.67	N	53.32	-32.64
0.226157	16.44	N	52.59	-36.15
0.24393	26.1	N	51.96	-25.86
0.259916	12.64	N	51.43	-38.79

6 FCC §15.205, §15.209 & §15.247(D) – Restrict Band and Unwanted Emissions

6.1 Applicable Standard:

As per FCC §15.205, Restricted bands of operation

(a) Except as shown in §15.205 paragraphs (d), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	MHz	GHz	GHz
0.090 – 0.110	8.291 – 8.294	16.69475 – 16.69525	156.7 – 156.9	1435 – 1626.5	3.332 – 3.339	10.6 – 12.7
0.495 – 0.505	8.362 – 8.366	25.5 – 25.67	162.0125 –167.17	1645.5 – 1646.5	3.3458 – 3.358	13.25 – 13.4
2.1735 – 2.1905	8.37625 – 8.38675	37.5 – 38.25	167.72 – 173.2	1660 – 1710	3.600 – 4.400	14.47 – 14.5
4.125 – 4.128	8.41425 – 8.41475	73 – 74.6	240 – 285	1718.8 – 1722.2	4.5 – 5.15	15.35 – 16.2
4.17725 – 4.17775	12.29 – 12.293	74.8 – 75.2	322 – 335.4	2200 – 2300	5.35 – 5.46	17.7 – 21.4
4.20725 – 4.20775	12.51975 – 12.52025	108 – 121.94	399.9 – 410	2310 – 2390	7.25 – 7.75	22.01 – 23.12
6.215 – 6.218	12.57675 – 12.57725	123 – 138	608 – 614	2483.5 – 2500	8.025 – 8.5	23.6 – 24.0
6.26775 – 6.26825	13.36 – 13.41	149.9 – 150.05	960 – 1240	2690 – 2900	9.0 – 9.2	31.2 – 31.8
6.31175 – 6.31225	16.42 – 16.423	156.52475 – 156.52525	1300 – 1427	3260 – 3267	9.3 – 9.5	36.43 – 36.5
						Above 38.6

(b) Except as provided in FCC §15.205 paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e), regardless of the field strength limits specified elsewhere in this Subpart, the provisions of this Section apply to emissions from any intentional radiator.

As per FCC §15.209 Radiated emission limits, general requirements.

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009- 0.490	2400/F(kHz)	300
0.490 -1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 (1)	3
88 - 216	150 (1)	3
216 - 960	200 (1)	3
Above 960	500	3

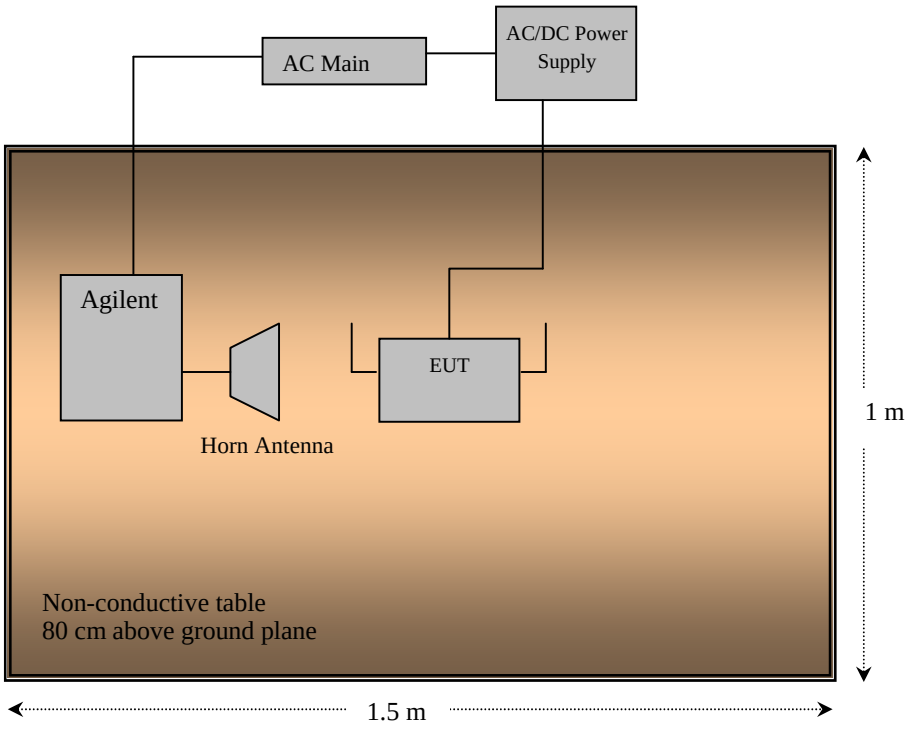
(1) *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c)).

6.2 Test Setup

The radiated emissions tests were performed in the 3-meter semi-anechoic chamber test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15C & IC RSS-210 limits.

6.3 Test Setup Diagram



6.4 Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz/VBW = 300 kHz/Sweep = Auto

Above 1000 MHz:

Peak: RBW = 1MHz/VBW = 1MHz/Sweep = Auto
Average: RBW = 1MHz/VBW = 10Hz/Sweep = Auto

6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Cable Loss, and Attenuator Factor adding to the Indicated Reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Cable Loss + Attenuator Factor

For example, a Corrected Amplitude of 34.08 dBuV/m = Indicated Reading (23.85 dBuV) + Cable Factor (0.22 dB) + Attenuator Factor (10dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit.

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial Number	Calibration Date
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
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09
HP	Pre Amplifier	8449B	3147A00400	2010-02-01
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2010-05-28

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

6.7 Test Environmental Conditions

Temperature:	15~18 ºC
Relative Humidity:	44~50 %
ATM Pressure:	101.2~102.3kPa

Testing was performed by Dennis Huang on 2010-07-14 at 5m Chamber3.

6.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15C emissions limits, and had the worst margin of:

Co-Location with CDMA 850 MHz Band Radio

30-1000 MHz:

Worst Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-20.72	30.28388	Horizontal	High, 30-1000 MHz

Above 1 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
0.31	4802	Vertical	Low, 1-25 GHz

Co-Location with CDMA 1900 MHz Band Radio

30-1000 MHz:

Worst Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
-20.72	30.28388	Horizontal	High, 30-1000 MHz

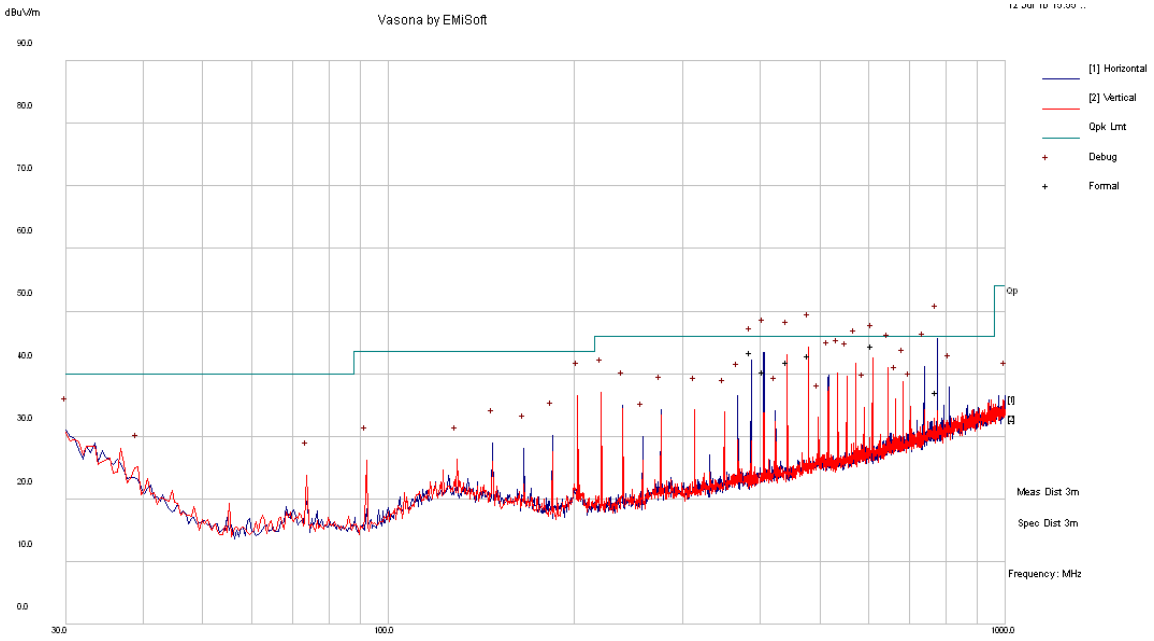
Above 1 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Channel, Range**
0.54	4960	Vertical	High, 1-25 GHz

6.9 Radiated Emissions Test Result Data:

Co-Location with CDMA 850 MHz Band Radio – Low Channel 824.7 MHz

30 MHz – 1 GHz @ 5 Meter Chamber 3, Worst Case Configuration: Middle Channel 2441.664 MHz

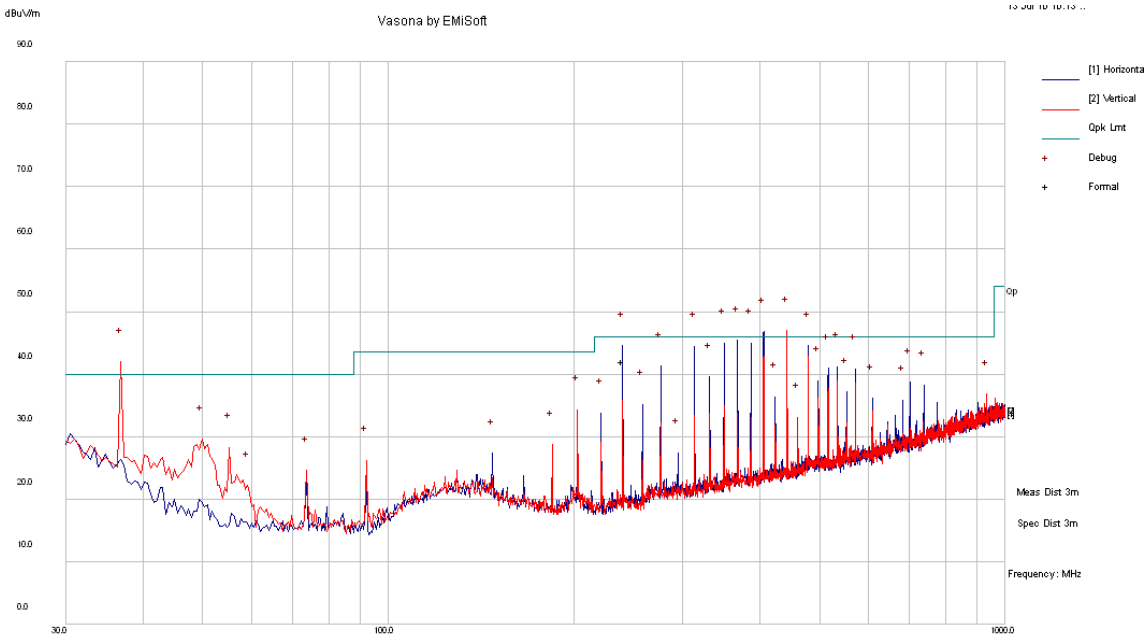


Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
774.1413	37.08	100	H	352	46	-8.92
479.242	43	92	V	354	46	-3
405.5418	40.31	107	V	250	46	-5.69
442.3498	41.95	114	V	352	46	-4.05
608.265	44.54	93	V	43	46	-1.46
387.0735	43.46	92	H	329	46	-2.54

Co-Location with CDMA 1900 MHz Band Radio – Middle Channel 1880 MHz

30 MHz – 1 GHz @ 5 Meter Chamber 3, Worst Case Configuration: Middle Channel 2441.664 MHz



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
239.6223	42.05	98	H	132	46	-3.95
276.4875	44.73	92	H	154	46	-1.27
331.77	45.89	99	H	49	46	-0.11
608.3553	24.72	239	H	149	46	-21.28
258.0553	38.88	93	H	160	46	-7.12
73.741	25.36	92	V	234	40	-14.64

1 – 25 GHz:

Co-Location with CDMA 850 MHz Band Radio – Low Channel 824.7 MHz

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2401.056 MHz, measured at 3 meters											
3226.7	41.02	360	1	H	30.2	3.77	28	46.99	74	-27.01	Peak
3226.7	46.01	66	1.28	V	30.2	3.77	28	51.98	74	-22.02	Peak
3226.7	24.91	360	1	H	30.2	3.77	28	30.88	54	-23.12	Ave
3226.7	39.68	66	1.28	V	30.2	3.77	28	45.65	54	-8.35	Ave
3601.5	43.55	142	1	H	30.2	3.77	28	49.52	74	-24.48	Peak
3601.5	54.17	72	1.28	V	30.2	3.77	28	60.14	74	-13.86	Peak
3601.5	42.11	142	1	H	30.2	3.77	28	48.08	54	-5.92	Ave
3601.5	53.01	72	1.28	V	30.2	3.77	28	58.98	54	4.98	Ave
4802	43.21	81	1.38	H	34	4.52	27.5	54.23	74	-19.77	Peak
4802	44.63	341	1.29	V	34	4.52	27.5	55.65	74	-18.35	Peak
4802	39.98	81	1.38	H	34	4.52	27.5	51.0	54	-3.0	Ave
4802	42.67	341	1.29	V	34	4.52	27.5	53.69	54	-0.31	Ave
Middle channel 2441.664 MHz measured at 3 meters											
3266.66	40.22	360	1	H	30.2	3.67	28	46.09	74	-27.91	Peak
3266.66	47.86	324	1.25	V	30.2	3.67	28	53.73	74	-20.27	Peak
3266.66	24.11	360	1	H	30.2	3.67	28	29.98	54	-24.02	Ave
3266.66	41.71	324	1.25	V	30.2	3.67	28	47.58	54	-6.42	Ave
3660	43.69	143	1	H	30.2	3.79	27.9	49.78	74	-24.22	Peak
3660	49.09	202	1	V	30.2	3.79	27.9	55.18	74	-18.82	Peak
3660	38.97	143	1	H	30.2	3.79	27.9	45.06	54	-8.94	Ave
3660	46.51	202	1	V	30.2	3.79	27.9	52.6	54	-1.4	Ave
4883	41.22	65	1	H	34	4.53	27.4	52.35	74	-21.65	Peak
4883	43.99	305	1.23	V	34	4.53	27.4	55.12	74	-18.88	Peak
4883	30.4	65	1	H	34	4.53	27.4	41.53	54	-12.47	Ave
4883	40.28	305	1.23	V	34	4.53	27.4	51.41	54	-2.59	Ave
High channel 2482.272 MHz measured at 3 meters											
3478.76	42.85	39	1.59	H	30.2	3.65	28	48.7	74	-25.3	Peak
3478.76	44.11	132	1.25	V	30.2	3.65	28	49.96	74	-24.04	Peak
3478.76	37.47	39	1.59	H	30.2	3.65	28	43.32	54	-10.68	Ave
3478.76	39.97	132	1.25	V	30.2	3.65	28	45.82	54	-8.18	Ave
3723	39.8	17	1	H	30.2	3.88	27.9	45.98	74	-28.02	Peak
3723	43.98	202	1.16	V	30.2	3.88	27.9	50.16	74	-23.84	Peak
3723	29.37	17	1	H	30.2	3.88	27.9	35.55	54	-18.45	Ave
3723	39.77	202	1.16	V	30.2	3.88	27.9	45.95	54	-8.05	Ave
4964	43.51	62	1.1	H	34	4.46	27.4	54.57	74	-19.43	Peak
4964	45.49	87	1.12	V	34	4.46	27.4	56.55	74	-17.45	Peak
4964	39.4	62	1.1	H	34	4.46	27.4	50.46	54	-3.54	Ave
4964	41.79	87	1.12	V	34	4.46	27.4	52.85	54	-1.15	Ave

Co-Location with CDMA 1900 MHz Band Radio – Low Channel 1880 MHz

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2401.056 MHz, measured at 3 meters											
3601.5	46.85	144	1	H	30.2	3.77	28	52.82	74	-21.18	Peak
3601.5	47.52	74	1.47	V	30.2	3.77	28	53.49	74	-20.51	Peak
3601.5	43.72	144	1	H	30.2	3.77	28	49.69	54	-4.31	Ave
3601.5	44.58	74	1.47	V	30.2	3.77	28	50.55	54	-3.45	Ave
4802	43	82	1.32	H	34	4.52	27.5	54.02	74	-19.98	Peak
4802	45.14	341	1.29	V	34	4.52	27.5	56.16	74	-17.84	Peak
4802	38.48	82	1.32	H	34	4.52	27.5	49.5	54	-4.5	Ave
4802	41.79	341	1.29	V	34	4.52	27.5	52.81	54	-1.19	Ave
Middle channel 2441.664 MHz measured at 3 meters											
3660	43.69	143	1	H	30.2	3.79	27.9	49.78	74	-24.22	Peak
3660	49.09	202	1	V	30.2	3.79	27.9	55.18	74	-18.82	Peak
3660	38.97	143	1	H	30.2	3.79	27.9	45.06	54	-8.94	Ave
3660	46.51	202	1	V	30.2	3.79	27.9	52.6	54	-1.4	Ave
4883	40.31	65	1	H	34	4.53	27.4	51.44	74	-22.56	Peak
4883	44.21	305	1.23	V	34	4.53	27.4	55.34	74	-18.66	Peak
4883	31.39	65	1	H	34	4.53	27.4	42.52	54	-11.48	Ave
4883	40.38	305	1.23	V	34	4.53	27.4	51.51	54	-2.49	Ave
High channel 2482.272 MHz measured at 3 meters											
3723	39.8	17	1	H	30.2	3.88	27.9	45.98	74	-28.02	Peak
3723	43.87	202	1.16	V	30.2	3.88	27.9	50.05	74	-23.95	Peak
3723	29.37	17	1	H	30.2	3.88	27.9	35.55	54	-18.45	Ave
3723	39.36	202	1.16	V	30.2	3.88	27.9	45.54	54	-8.46	Ave
4960	43.84	62	1.1	H	34	4.46	27.4	54.9	74	-19.1	Peak
4960	46.6	87	1.12	V	34	4.46	27.4	57.66	74	-16.34	Peak
4960	39.77	62	1.1	H	34	4.46	27.4	50.83	54	-3.17	Ave
4960	42.4	87	1.12	V	34	4.46	27.4	53.46	54	-0.54	Ave

Restricted Band:

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC Part 15C		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Lowest Channel											
2328.67	42.72	297	1	H	30.3	3.02	27.8	48.24	74	-25.76	Peak
2328.67	54.09	151	1.23	V	30.3	3.02	27.8	59.61	74	-14.39	Peak
2328.67	30.82	297	1	H	30.3	3.02	27.8	36.34	54	-17.66	Ave
2328.67	43.2	151	1.23	V	30.3	3.02	27.8	48.72	54	-5.28	Ave
Highest Channel											
2483.5	41.55	360	1	H	30.3	3.02	27.8	47.07	74	-26.93	Peak
2483.5	42.12	360	1	V	30.3	3.02	27.8	47.64	74	-26.36	Peak
2483.5	31.62	360	1	H	30.3	3.02	27.8	37.14	54	-16.86	Ave
2483.5	32.32	360	1	V	30.3	3.02	27.8	37.84	54	-16.16	Ave

7 FCC §15.247(a)(1) – 20 dB Channel Bandwidth

7.1 Applicable Standard

According to FCC§15.247(a)(l), the maximum 20 dB bandwidth of the hopping channel shall be presented.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

7.3 Measurement Results

Please refer to FCC ID: SNBDM1000C.

8 FCC §15.247(a)(1) - Hopping Channel Separation

8.1 Applicable Standard

According to §15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

8.3 Measurement Results

Please refer to FCC ID: SNBDM1000C.

9 FCC §15.247(a)(1)(iii) - Number Of Hopping Frequencies Used

9.1 Applicable Standard

According to FCC §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

9.3 Measurement Result

Please refer to FCC ID: SNBDM1000C.

10 FCC §15.247(a)(1)(iii) - Dwell Time

10.1 Applicable Standard

According to FCC §15.247 (a)(1)(iii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

10.3 Measurement Results:

Please refer to FCC ID: SNBDM1000C.

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11 FCC §15.247(b)(1) - Maximum Peak Output Power

11.1 Applicable Standard

According to FCC §15.247(b)(1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt. For all other frequency hopping system in the 2400 – 2483.5 MHz band, the maximum peak output power of the transmitter shall not exceed 0.125 Watt.

11.2 Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

11.3 Measurement Result

Please refer to FCC ID: SNBDM1000C.

12 FCC §15.247(d) - Band Edges

12.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

12.3 Measurement Results

Please refer to FCC ID: SNBDM1000C.

13 FCC §15.247(d) - Spurious Emissions at Antenna Port

13.1 Applicable Standard

According to FCC §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

13.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.

4. Set the SA on View mode and then plot the result on SA screen.

5. Repeat above procedures until all frequencies measured were complete.

13.3 Measurement Result

Please refer to FCC ID: SNBDM1000C.

14 FCC §15.247(i) - RF Exposure

14.1 Applicable Standard

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 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 (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	(1) 100	30
1.34-30	824/f	2.19/f	(1) $180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
(1) = Plane-wave equivalent power density

14.2 MPE Prediction

Prediction 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

Maximum peak output power at antenna input terminal (dBm):	23.1
Maximum peak output power at antenna input terminal (mW):	204.2
Prediction distance (cm):	20
Prediction frequency (MHz):	2441.664
Maximum Antenna Gain, typical (dBi):	0
Maximum Antenna Gain (numeric):	1
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0406
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

14.3 Test Result

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.0406 mW/cm^2. Limit is $1mW/cm^2$