

FCC PART 15.249
EMI MEASUREMENT AND TEST REPORT

For

Roadmaster(USA) Corp.

41 James Way Eatontown, NJ 07724 USA

FCC ID: UHIVRBCS300WCA

August 25, 2006

This Report Concerns: ☒ Original Report	Equipment Type: Wireless Backup Camera
Test Engineer: Charmi Peng <i>Charmi Peng</i>	
Report No.: RSZ06081101	
Test Date: August 24, 2006	
Reviewed By: EMC Manager: Boni Baniqued <i>Boni Baniqued</i>	
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approval, or endorsement by NVLAP, NIST or any agency of the US Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The Roadmaster(USA) Corp. 's product, model number: VRBCS300W or the "EUT" as referred to in this report is a Wireless Backup Camera. The EUT is measured approximately 21.5 cm L x 3.2 cm W x 3.4 cm H, rated input voltage: DC 12 battery.

** The test data gathered are from production sample, serial number: 0608020 provided by the manufacturer, we received EUT on 2006-8-11.*

Objective

This Type approval report is prepared on behalf of *Roadmaster(USA) Corp.* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203,15.205,15.207,15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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

Test Facility

The Test site used by Bay Area Compliance Lab Corp. (ShenZhen) to collect radiated and conducted emission measurement data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China .

Test site at Bay Area Compliance Lab Corp. (ShenZhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. 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 has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Lab Corp. (ShenZhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm>

External I/O Cable

Cable Description	Length (M)	From/Port	To
Unshielded Uudetachable DC Cable	2.82	EUT	DC Battery

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Equipment Modifications

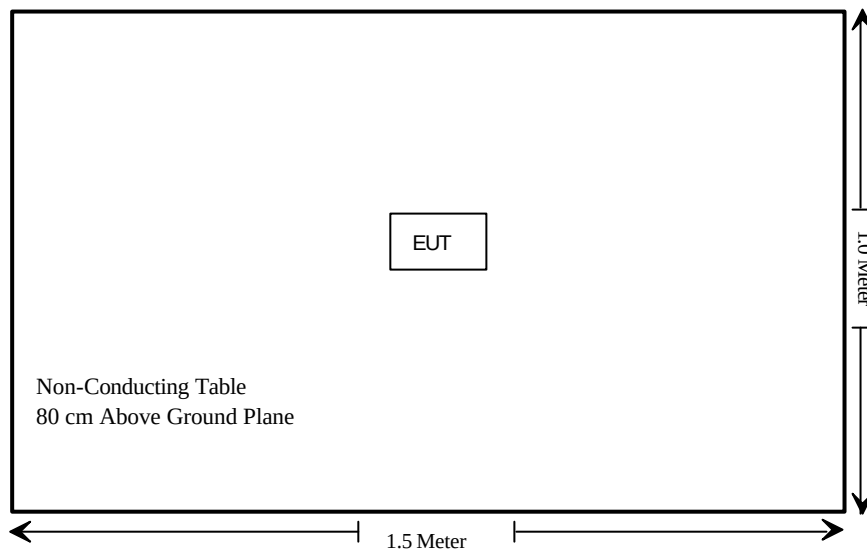
Bay Area Compliance Lab Corp. (ShenZhen) has not done any modification on the EUT.

Configuration of Test Setup



EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203	Antenna Requirement	Compliant
§ 15.205(a), § 15.209(a), § 15.249(a)	Radiated Emission	Compliant*
§ 15.249(d)	Out of band emission	Compliant

* Within measurement uncertainty

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

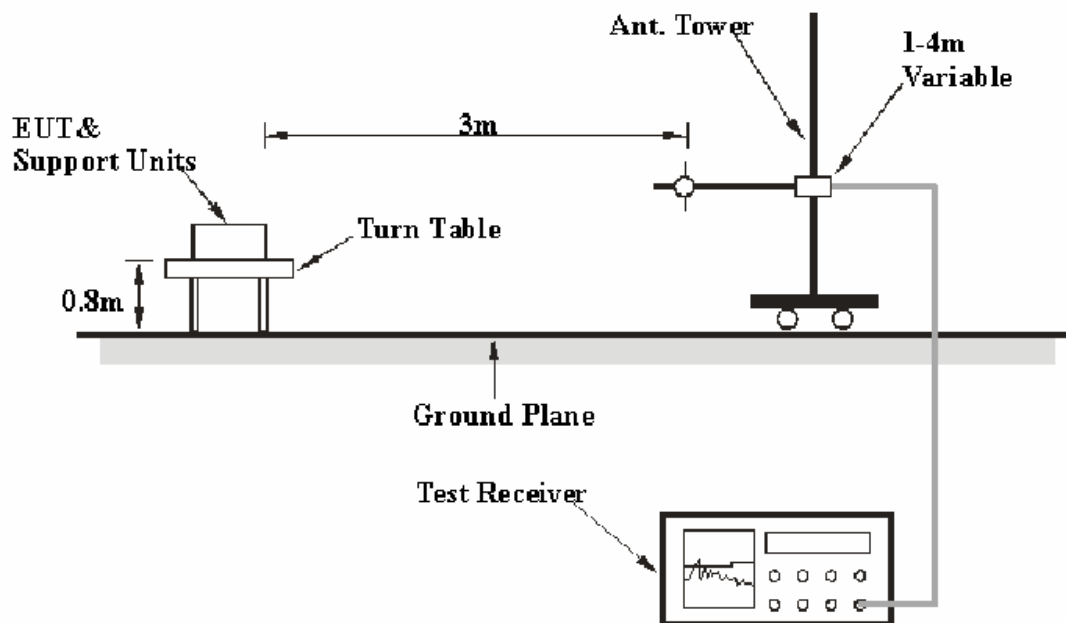
Antenna Connector Construction

The EUT antenna was permanently attached antenna, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

§15.205 §15.209(a) §15.249(a) - RADIATED EMISSION**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 best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Lab Corp. (ShenZhen) is ± 4.0 dB.

EUT Setup

The radiated emission and out of band emission tests were performed in the 3 meters chamber A&B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.249 limits.

The EUT was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 25000 MHz.

During the radiated emission and out of band emission test, the test receiver was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
30 – 1000 MHz	100 kHz	300 kHz
1000 MHz – 25000 MHz	1MHz	3 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2006-8-17	2007-8-17
HP	Amplifier	HP8447E	1937A01046	2006-8-17	2007-8-17
Sunol Sciences	Broadband Antenna	JB1	A0409042	2006-4-28	2007-4-28
Agilent	Spectrum Analyzer	8564E	3943A01781	2005-12-8	2006-12-8
HP	Preamplifier	8449B	3008A00277	2006-8-17	2007-8-17
SUNOL SCIENCES	Horn Antenna	DRH-118	A052604	2006-7-20	2007-7-20

* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

For the radiated emissions test, the EUT 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.

All data was recorded in the peak and average detection mode.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.249, with the worst margin reading of:

30-1000MHz:

Transmitting Mode: **0.9 dB** at **108.004775 MHz** in the **Vertical** polarization.

Above 1000MHz:

Transmitting Mode (Low channel): **-5.99 dB** at **2414MHz** in the **Horizontal** polarization.
Transmitting Mode (Middle channel): **-8.99 dB** at **2432 MHz** in the **Horizontal** polarization.
Transmitting Mode (High channel): **-10.99 dB** at **2468 MHz** in the **Horizontal** polarization.

Test Data

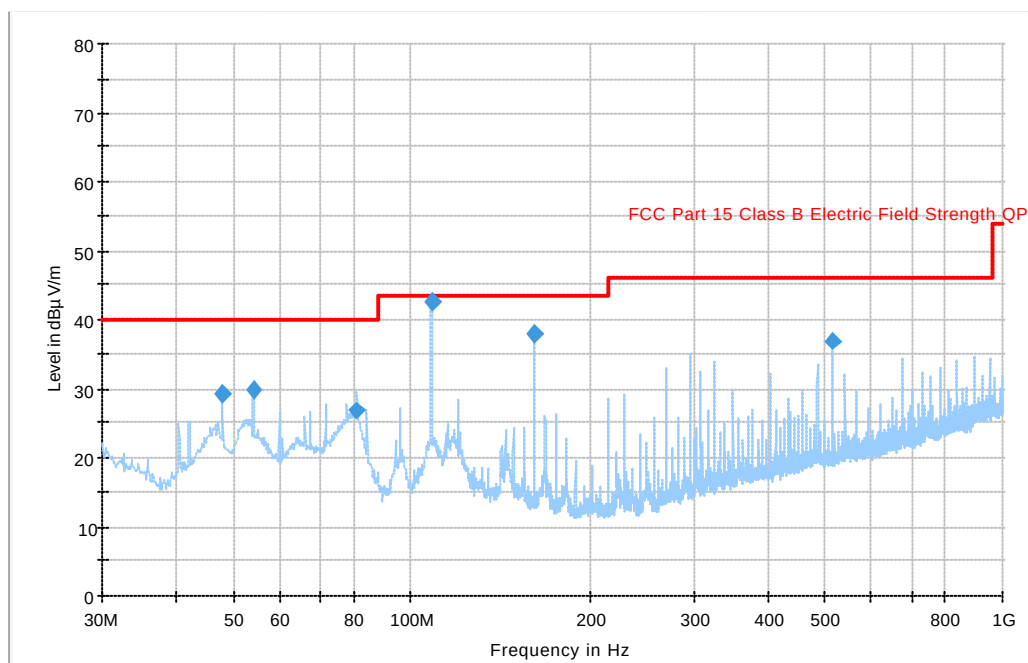
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	53%
ATM Pressure:	1000mbar

The testing was performed by Charmi Peng on 2006-8-24.

Test mode: Transmitting

30-1000MHz



Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
47.999525	29.3	100.0	V	33.0	-17.5	10.7	40.0
53.992725	29.9	99.0	V	186.0	-18.8	10.1	40.0
81.010650	26.8	99.0	V	0.0	-18.3	13.2	40.0
108.004775	42.6	99.0	V	86.0	-14.8	0.9*	43.5
161.998000	38.1	99.0	V	254.0	-13.7	5.4	43.5
512.986375	36.8	175.0	H	2.0	-6.6	9.2	46.0

Test mode: Transmitting

Above 1000MHz:

Frequency	Meter Reading	Detector	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier Gain	Corr. Ampl.	FCC Part 15.249		
MHz	dBuV/m	PK/QP/AV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	Comment
Above 1 GHz, Low Channel												
2414	92.0	AV	263	1.4	H	27.4	3.61	35.0	88.01	94	-5.99	Fundamental
2414	86.0	AV	45	1.0	V	27.4	3.61	35.0	82.01	94	-11.99	Fundamental
4828	38.83	AV	180	1.6	V	31.3	4.64	33.4	41.37	54	-12.63	Harmonic
4828	37.67	AV	270	1.6	H	31.3	4.64	33.4	40.21	54	-13.79	Harmonic
7242	32.50	AV	261	1.0	H	35.4	4.51	33.7	38.71	54	-15.29	Harmonic
7242	32.33	AV	90	1.2	V	35.4	4.51	33.7	38.54	54	-15.46	Harmonic
2414	97.5	PK	20	1.2	H	27.4	3.61	35.0	93.51	114	-20.49	Fundamental
4828	50.17	PK	49	1.2	H	31.3	4.64	33.4	52.71	74	-21.29	Harmonic
4828	50.17	PK	250	1.0	V	31.3	4.64	33.4	52.71	74	-21.29	Harmonic
7242	46.17	PK	180	1.3	H	35.4	4.51	33.7	52.38	74	-21.62	Harmonic
7242	46.00	PK	180	1.0	V	35.4	4.51	33.7	52.21	74	-21.79	Harmonic
2414	92.5	PK	18	1.6	V	27.4	3.61	35.0	88.51	114	-25.49	Fundamental

Frequency	Meter Reading	Detector	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier Gain	Corr. Ampl.	FCC Part 15.249		
MHz	dBuV/m	PK/QP/AV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	Comment
Above 1 GHz, Middle Channel												
2432	89.0	AV	197	1.6	H	27.4	3.61	35.0	85.01	94	-8.99	Fundamental
4864	39.33	AV	109	1.2	H	31.3	4.64	33.4	41.87	54	-12.13	Harmonic
4864	38.33	AV	180	1.6	V	31.3	4.64	33.4	40.87	54	-13.13	Harmonic
2432	83.0	AV	182	1.2	V	27.4	3.61	35.0	79.01	94	-14.99	Fundamental
7296	32.67	AV	45	1.0	H	35.4	4.51	33.7	38.88	54	-15.12	Harmonic
7296	32.50	AV	90	1.2	V	35.4	4.51	33.7	38.71	54	-15.29	Harmonic
4864	51.50	PK	45	1.0	V	31.3	4.64	33.4	54.04	74	-19.96	Harmonic
2432	97.33	PK	197	1.6	H	27.4	3.61	35.0	93.34	114	-20.66	Fundamental
7296	46.33	PK	90	1.2	V	35.4	4.51	33.7	52.54	74	-21.46	Harmonic
7296	46.17	PK	180	1.0	H	35.4	4.51	33.7	52.38	74	-21.62	Harmonic
4864	49.67	PK	109	1.2	H	31.3	4.64	33.4	52.21	74	-21.79	Harmonic
2432	91.33	PK	182	1.2	V	27.4	3.61	35.0	87.34	114	-26.66	Fundamental

Frequency	Meter Reading	Detector	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier Gain	Corr. Ampl.	FCC Part 15.249		
MHz	dBuV/m	PK/QP/AV	Degree	Meter	H / V	dB	dB	dB	dBuV/m	Limit dBuV/m	Margin dB	Comment
Above 1 GHz, High Channel												
2468	87.00	AV	157	1.2	H	27.4	3.61	35.0	83.01	94	-10.99	Fundamental
7404	34.67	AV	240	1.3	H	35.4	4.51	33.7	40.88	54	-13.12	Harmonic
7404	34.50	AV	150	1.2	V	35.4	4.51	33.7	40.71	54	-13.29	Harmonic
4936	37.67	AV	19	1.0	H	31.3	4.64	33.4	40.21	54	-13.79	Harmonic
4936	35.00	AV	360	1.6	V	31.3	4.64	33.4	37.54	54	-16.46	Harmonic
2468	80.33	AV	238	1.2	V	27.4	3.61	35.0	76.34	94	-17.66	Fundamental
7404	49.17	PK	240	1.3	H	35.4	4.51	33.7	55.38	74	-18.62	Harmonic
7404	47.33	PK	150	1.2	V	35.4	4.51	33.7	53.54	74	-20.46	Harmonic
2468	96.83	PK	157	1.2	H	27.4	3.61	35.0	92.84	114	-21.16	Fundamental
4936	50.17	PK	19	1.0	H	31.3	4.64	33.4	52.71	74	-21.29	Harmonic
4936	48.67	PK	360	1.0	V	31.3	4.64	33.4	51.21	74	-22.79	Harmonic
2468	89.00	PK	238	1.2	V	27.4	3.61	35.0	85.01	114	-28.99	Fundamental

* Within measurement uncertainty

§15.249(d) – OUT OF BAND EMISSION

Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Test 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 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 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2006-8-17	2007-8-17
HP	Amplifier	HP8447E	1937A01046	2006-8-17	2007-8-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2006-4-28	2007-4-28
Agilent	Spectrum Analyzer	8564E	3943A01781	2005-12-8	2006-12-8
HP	Preamplifier	8449B	3008A00277	2006-8-17	2007-8-17
SUNOL SCIENCES	Horn Antenna	DRH-118	A052604	2006-7-20	2007-7-20

* **Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

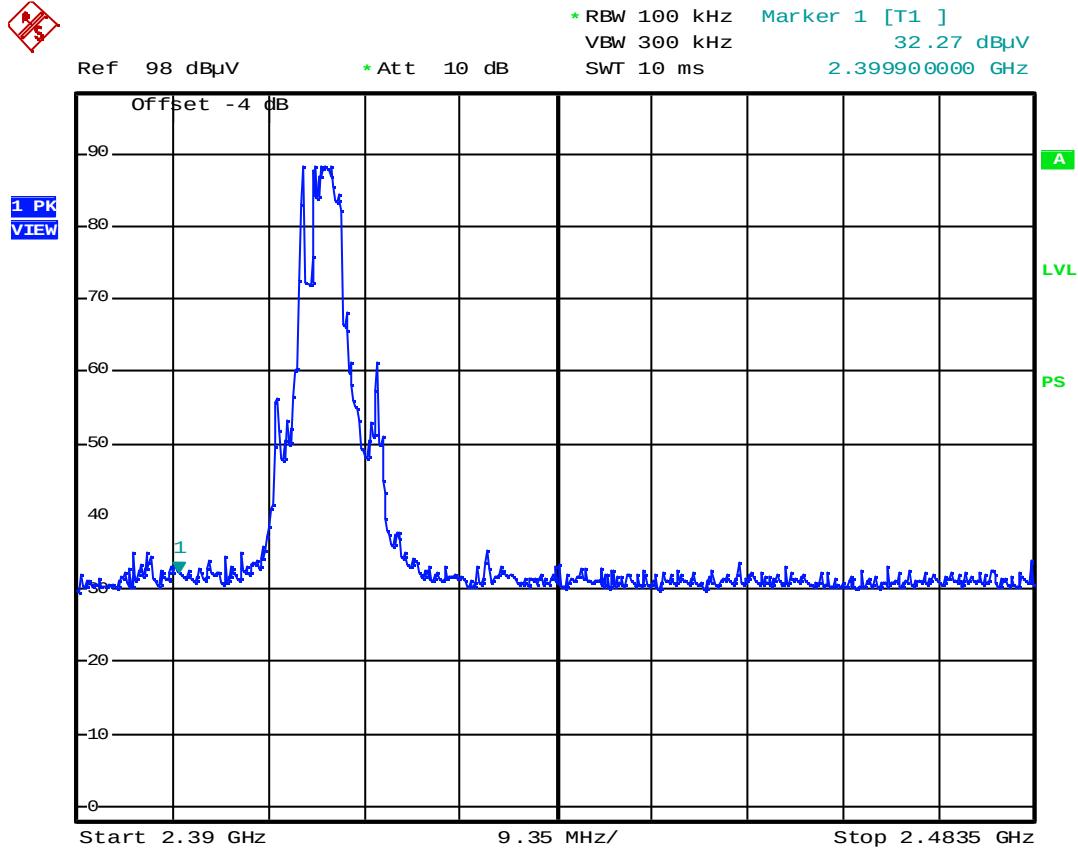
Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	1016mbar

The testing was performed by Charmi Peng on 2006-8-24.

Test Mode: Transmitting

Frequency (MHz)	Emission (dBuV/m)	Limit (dBuV/m)
2483.6	30.86	54
2399.9	32.27	54

Lowest Channel



Bandedge Low channel (2400)

Date: 24.AUG.2006 09:18:52

Highest Channel



Bandedge High channel (2483.5)

Date: 24.AUG.2006 09:22:26