



Nemko USA, Inc.
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Test Report: 2008 06108616 CIPA FCC

Project number: 13605-1

Applicant: CIPA USA Inc.
3350 Griswold Road
Port Huron, MI 48060

Equipment Under Test (EUT): RV Leveler


Model: 03000

FCC ID: WEX03000

IC Number: 7861A-03000

In Accordance With: FCC Part 15 Subpart C, 15.249
CANADA, IC RSS-Gen, IC RSS 210

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121

Authorized By: 
Alan Laudani, RF/EMC Test Engineer

Date: June 12, 2008

Total Number of Pages: 25

Section 1. Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15; Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

This Radio Standards Specification (RSS) sets out the requirements for license exempt low-power intentional radiators. The applicable standard for low-power intentional radiators in Canada, corresponding to FCC Part 15 Subpart C, is RSS-210. The two are very closely harmonized in terms of permitted frequencies, types of operation, and other technical requirements. The test results reported in this report are deemed satisfactory evidence of compliance with Industry Canada Standard RSS-210.

The assessment summary is as follows:

Apparatus Assessed: Transmitter (Handheld Remote Control)

Specification: FCC Part 15 Subpart C, 15.249
IC RSS 210, Issue 7, June 2007

Compliance Status: Complies

Exclusions: None

Non-compliances: None

Report Release History:

REVISION	DATE	COMMENTS
-	06-12-2008	Prepared By: Ferdinand S. Custodio
-	06-12-2008	Initial Release: Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

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This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY: 
Ferdinand S. Custodio, EMC Test Engineer

Date: June 12, 2008

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Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test were identified as follows:

RV Level – CIPA Model 03000 consisting of RV Level Base

Engineering sample, serial number not available during assessment



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2.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
001	RV Level Base	NA

2.3 Theory of Operation

The 03000 is a RV wireless leveller. This product provides the end user with an efficient and time-saving method to accurately level his/her RV. The easy-to-read LED indicator lights up the green LEDs when it's level and red LEDs when it's not. The handheld wireless display communicates with the base to let you know when the unit is level. This product works great for positioning campers from inside the cab of the tow vehicle, positioning levelling jacks/block and chocks. The RV Level Base is the transmitter while the RV Level Hand-Held Module is receiver only.

2.4 Technical Specifications of the EUT

Manufacturer:	CIPA USA Inc.
Operating Frequency:	2450 MHz in the 2.4 to 2.4835 GHz Band
Rated Power:	1.6mW
Modulation:	GFSK
Type of Transceiver:	2.4 GHz RF module integrated CMOS radio frequency (RF) transceiver block with internal 64byte buffered framer
Antenna Data:	Integral
Power Source:	(1X 9V) PP3 alkaline batteries for the RV Level Base

Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz,
and 24.0–24.25 GHz

RSS-Gen General Requirements and Information for the Certification of
Radiocommunication Equipment

RSS-210 Low-power License-exempt Radiocommunication Devices (All
Frequency Bands): Category I Equipment

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	20.9-24.0 °C
Humidity range	:	44-48%
Pressure range	:	86 - 106 kPa
Voltage	:	(1X) 9V Battery

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Specification: FCC Part 15 Subpart C, 15.249**3.4 Test Equipment**

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
114	Antenna, Bicon	EMCO	3104	2997	10-Jan-08	10-Jan-09
110	Antenna, LPA	Electrometrics	LPA-25	1217	10-Jan-08	10-Jan-09
674	Spectrum Analyzer	HP	8568B	2007A00910	11-Apr-08	11-Apr-09
675	Spectrum Analyzer Display	HP	85662A	2005A01282	11-Apr-08	11-Apr-09
676	Quasi-Peak Adapter	HP	85650A	2430A00576	11-Apr-08	11-Apr-09
919	Preamplifier	Spacek Labs MM-Wave Technology	100MHz to 40GHz	3M12 (SLK-35-3) and 3M13 (SLKa-35-4)	12-Mar-08	12-Mar-10
902	pre amp	Sonoma	310 N	185803	10-Jul-07	10-Jul-08
877	Antenna, DRG Horn, .7-18GHz	AH Systems	SAS-571	688	10-Jul-07	10-Jul-08
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	20-Jun-07	20-Jun-08
911	Spectrum Analyzer	Agilent	E4440A	US41421266	18-Mar-08	18-Mar-09
625	Antenna, Dbl Ridge Horn	EMCO	3116	2325	01-Apr-08	01-Apr-09

Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications performed during the assessment.

4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Test Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.

Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results.

The column headed "Required" indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant
Y Yes: Mandatory i.e. the apparatus shall conform to these test.
N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 FCC Part 15 Subpart C Test Results

Part 15	Test Description	Required	Result
15.207 (a)	Powerline Conducted Emissions	N ¹	
15.205 (a) IC RS-210 2.2	Radiated Emissions within Restricted Bands	Y	Pass
15.215 (c) IC RS-Gen 4.6.1	Occupied Bandwidth	Y	Pass
15.249 (a) IC RS-210 2.6	Radiated Emissions not in Restricted Bands	Y	Pass
Part 15B RSS-GEN 4.10	Receiver Spurious Emissions	Y	Pass

Notes:

¹EUT is a device which only employs battery power for operation and does not operate from the AC power lines or contain provisions for AC operation.

Spurious Emissions was measured on the receiver (handheld unit) to show compliance with IC RSS General Receiver requirements, however no emissions were detected.

Appendix A: Test Results

Clause 15.205(a) Restricted Bands of Operation

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
¹ 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	(²)
13.36–13.41			

Test Conditions:

Sample Number:	001	Temperature:	24 C
Date:	06/11/2008	Humidity:	44 %
Modification State:	Transmit/Receive	Tester:	Ferdinand Custodio
		Laboratory:	Shield Room 2/SOATS

Test Results:

No emissions observed - See Attached Plots.

Additional Observations:

The Spectrum was searched from 30MHz up to 26.5 GHz.

These results apply to emissions found in the restricted bands defined in FCC Part 15 Subpart C, 15.205.

Only the Hand-Held Module was verified on three orthogonal axis. Both EUT were tested with new batteries.

All verifications were performed at 3m with a Quasi Peak detector.

There were no emissions observed other than the fundamental as evident from the following prescans performed inside a shield room at 1 meter. Spurious harmonics were verified under Clause 15.249(a).

The only emission observed below 1GHz is 181MHz which was verified to be KFMB TV8 San Diego operating between 180-186MHz.

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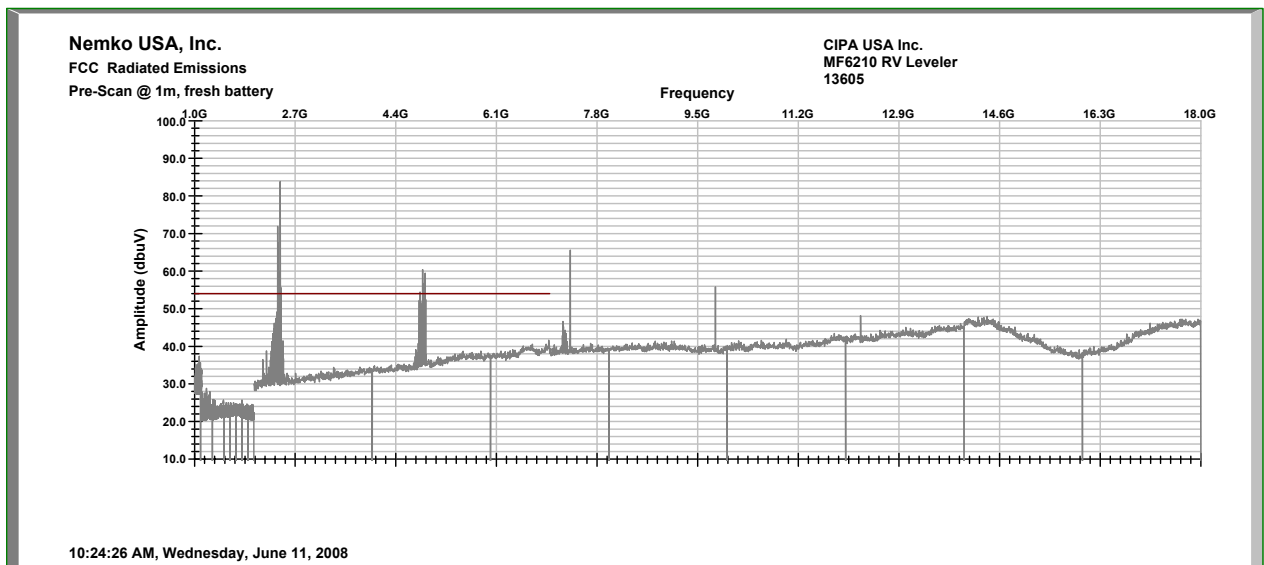
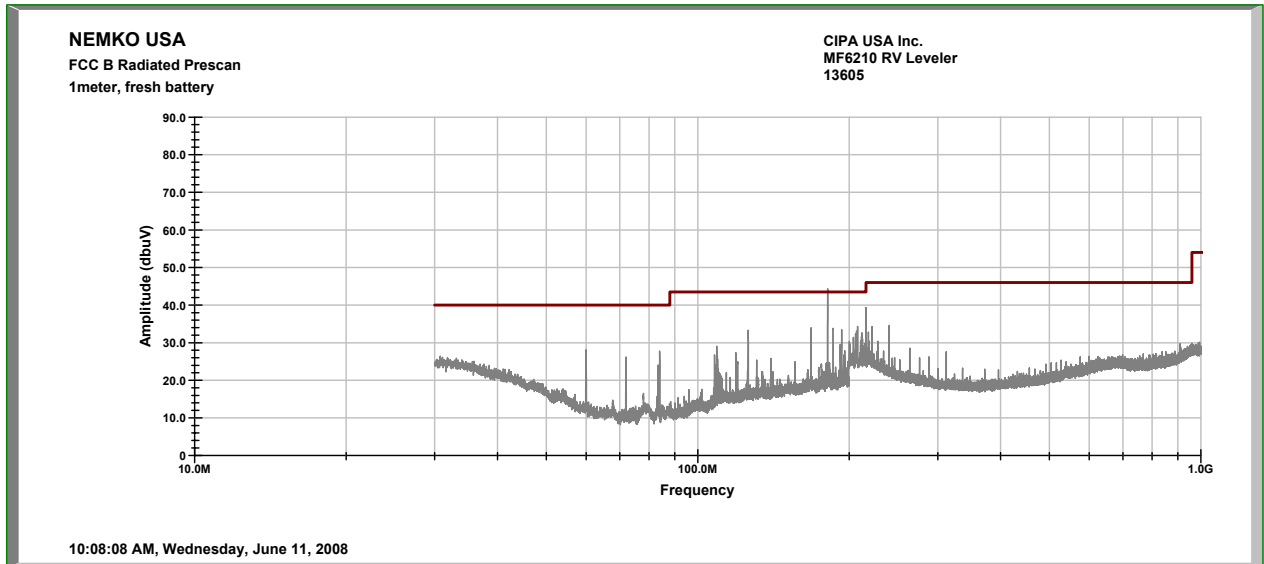
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Specification: FCC Part 15 Subpart C, 15.249

Prescans @ 1 meter (Both Units)



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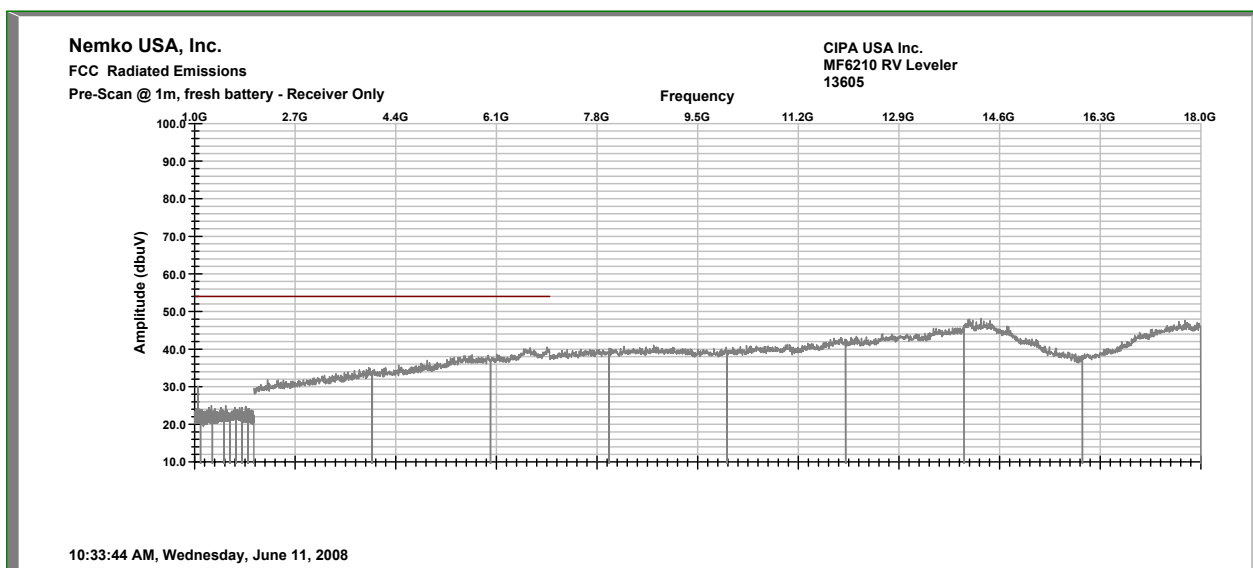
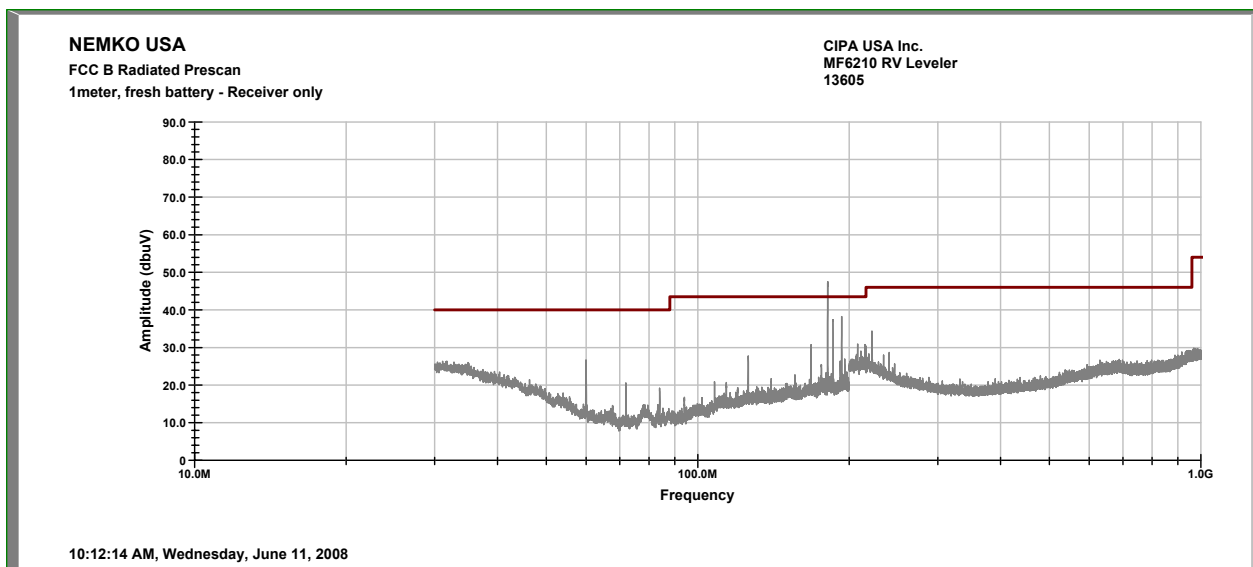
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Prescans @ 1 meter (Hand-Held Module only)



Clause 15.215(c) Occupied Bandwidth

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Sec. 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Conditions:

Sample Number:	001	Temperature:	20.9
Date:	06/11/2008	Humidity:	48
Modification State:	Transmit	Tester:	Ferdinand Custodio
		Laboratory:	SOATS

Test Results:

See Attached Plots.

Additional Observations:

Frequency span set to capture all products of the modulation process including the emission skirts.

Video bandwidth set to 3 times the 100kHz resolution bandwidth.



Measured Occupied Bandwidth is **2.917MHz**.

Clause 15.249(a) Radiated Emissions not in Restricted Bands

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

(c) Field strength limits are specified at a distance of 3 meters.

(d) 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.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Test Conditions:

Sample Number:	001	Temperature:	20.9
Date:	6/11/2008	Humidity:	48
Modification State:	Transmit	Tester:	Ferdinand Custodio
		Laboratory:	SOATS

Test Results:

See Attached Plots.

Additional Observations:

The Spectrum was searched from 30 MHz up to 26.5 GHz.

The EUT was tested with new battery.

Tested as used with orientation level to the ground plane.

All measurements were measured at 3m using peak hold detector.

Average values were computed using the formula:

$$\text{Average} = \text{Peak} - 20 \log (\text{Duty Cycle Correction Factor})$$

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Resolution bandwidth used for fundamental measurements is 3MHz which is greater than measured occupied bandwidth of 2.917MHz.

Spurious measured at RBW1 MHz, VBW 3MHz, peak hold.

Radiated Emissions Data

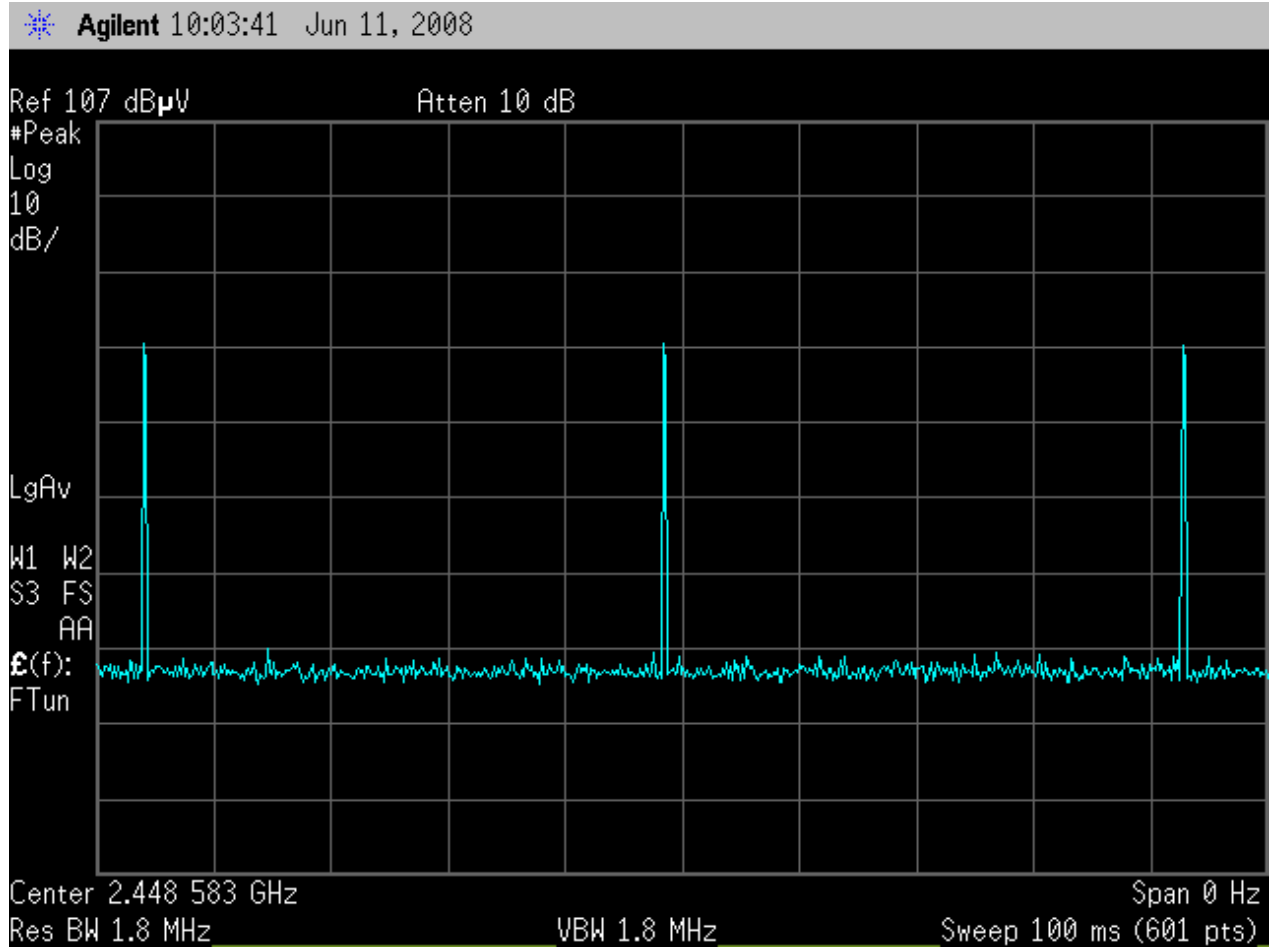
Complete YES Job #: 13605-1 Test #: 1
Preliminary _____ Page 1 of 1

Client Name : CIPA USA Inc.
EUT Name : RV Leveler
EUT Model # : 03000
EUT ANTENNA Part # : _____
EUT Serial # : _____
EUT Config. : Transmit
FCC Part 15.249
Specification : FCC Part 15.209 (a)

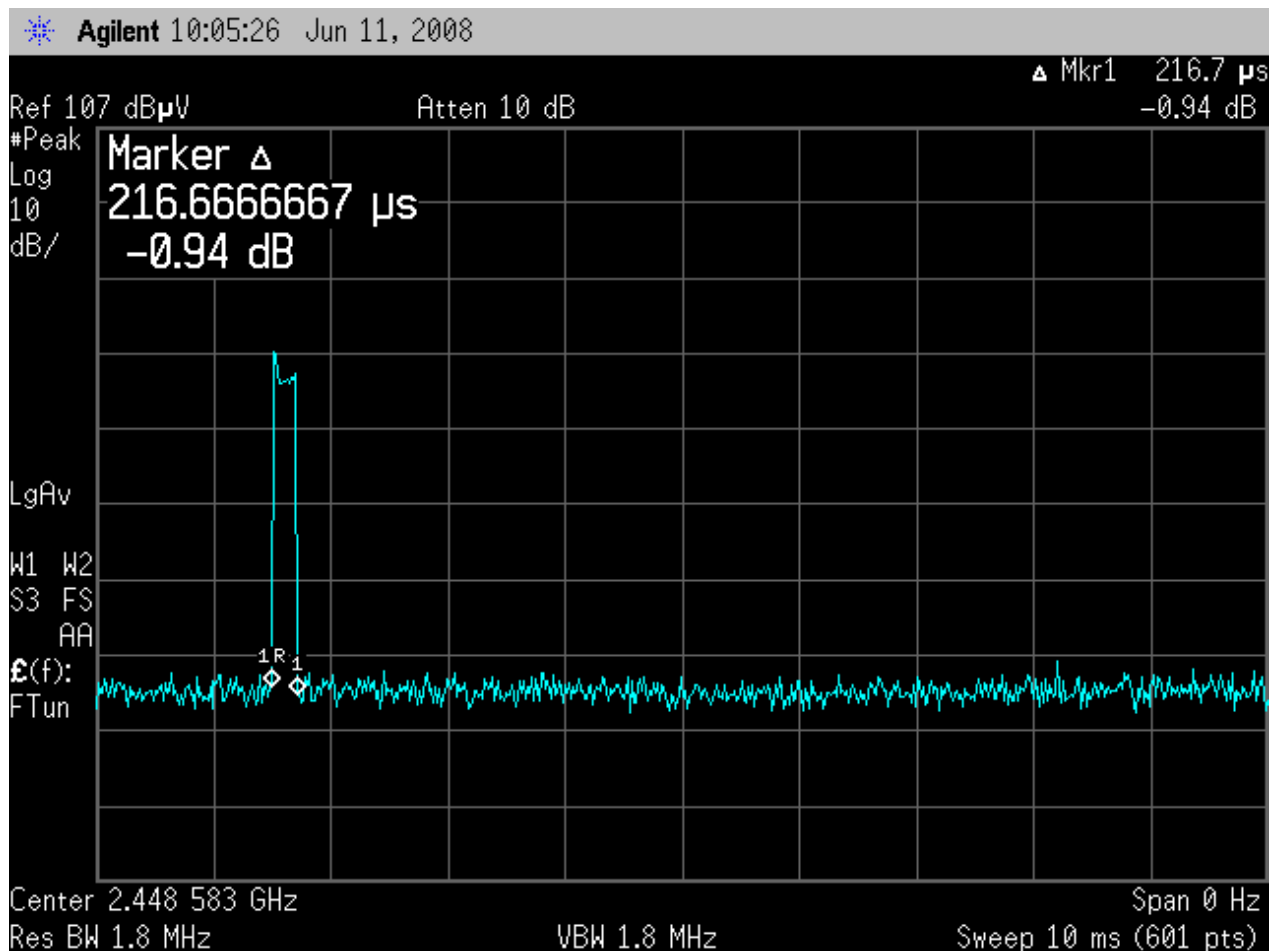
Rod. Ant. #: NA Temp. (deg. C) : 20.9 Date : 6/11/2008
Bicon Ant.#: NA Humidity (%) : 48 Time : 12NN
Log Ant.#: NA EUT Voltage : 9V Battery Staff : FSCustodio
DRG Ant. # 877 EUT Frequency : _____ Photo ID: _____
Dipole Ant.#: NA Phase: _____ Peak Res Bandwidth: 3 MHz
Cable#: 40ft Location: SOATS Peak Video Bandwidth 3 MHz
Preamp#: 919 Distance: 3 m
Spec An.#: 911 Duty Cycle Factor 0.65%
QP #: NA

Meas. Freq. (MHz)	Vertical (dBuV)		Horizontal (dBuV)		CF (db)	Max Level (dBuV/m)		Spec. Limit (dBuV/m)		Margin dB		EUT Rotation	Ant. Height	Pass Fail Unc.	Comment
	pk	av	pk	av		pk	av	pk	av	pk	av				
2450.00	61.9	41.9	58.0	38.0	35.4	97.3	77.3	114.0	94.0	-16.7	-16.7			Pass	No Preamp
4900.00	55.6	35.6	55.6	35.6	10.0	65.6	45.6	74.0	54.0	-8.4	-8.4			Pass	
7350.00	44.1	24.1	44.1	24.1	17.8	61.9	41.9	74.0	54.0	-12.1	-12.1			Pass	Noise Floor
9800.00	41.6	21.6	41.6	21.6	26.7	68.2	48.2	74.0	54.0	-5.8	-5.8			Pass	Noise Floor

Duty Cycle Calculations:



On time in 100ms



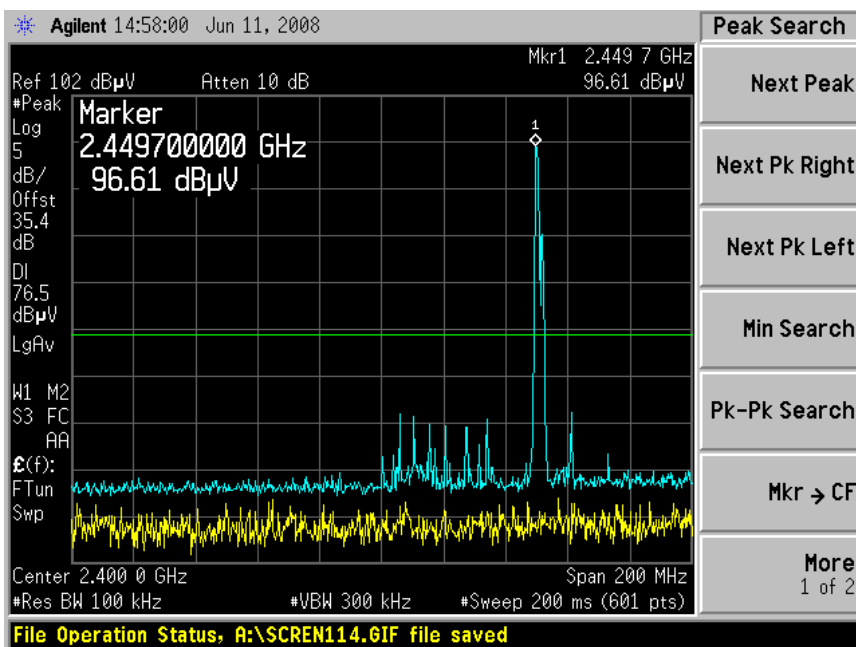
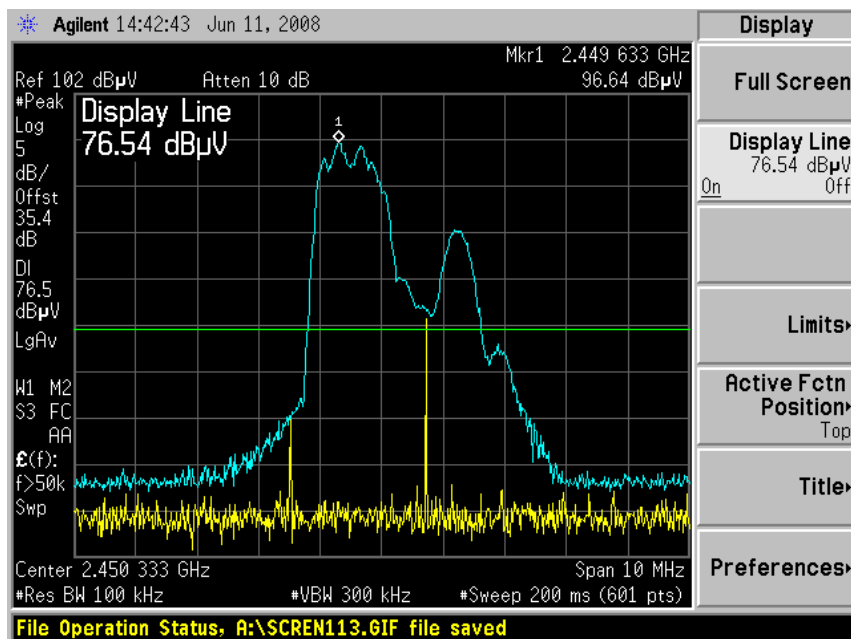
On Time = 216.66 μs x 3 emissions = 650 μs

Duty Cycle = 0.65 ms/100 ms
= 0.0065

Duty Cycle Factor = 20 x Log (0.0065) < -20 (minimum allowed by FCC)

DC Correction Factor = -20

Band Edge Measurements:



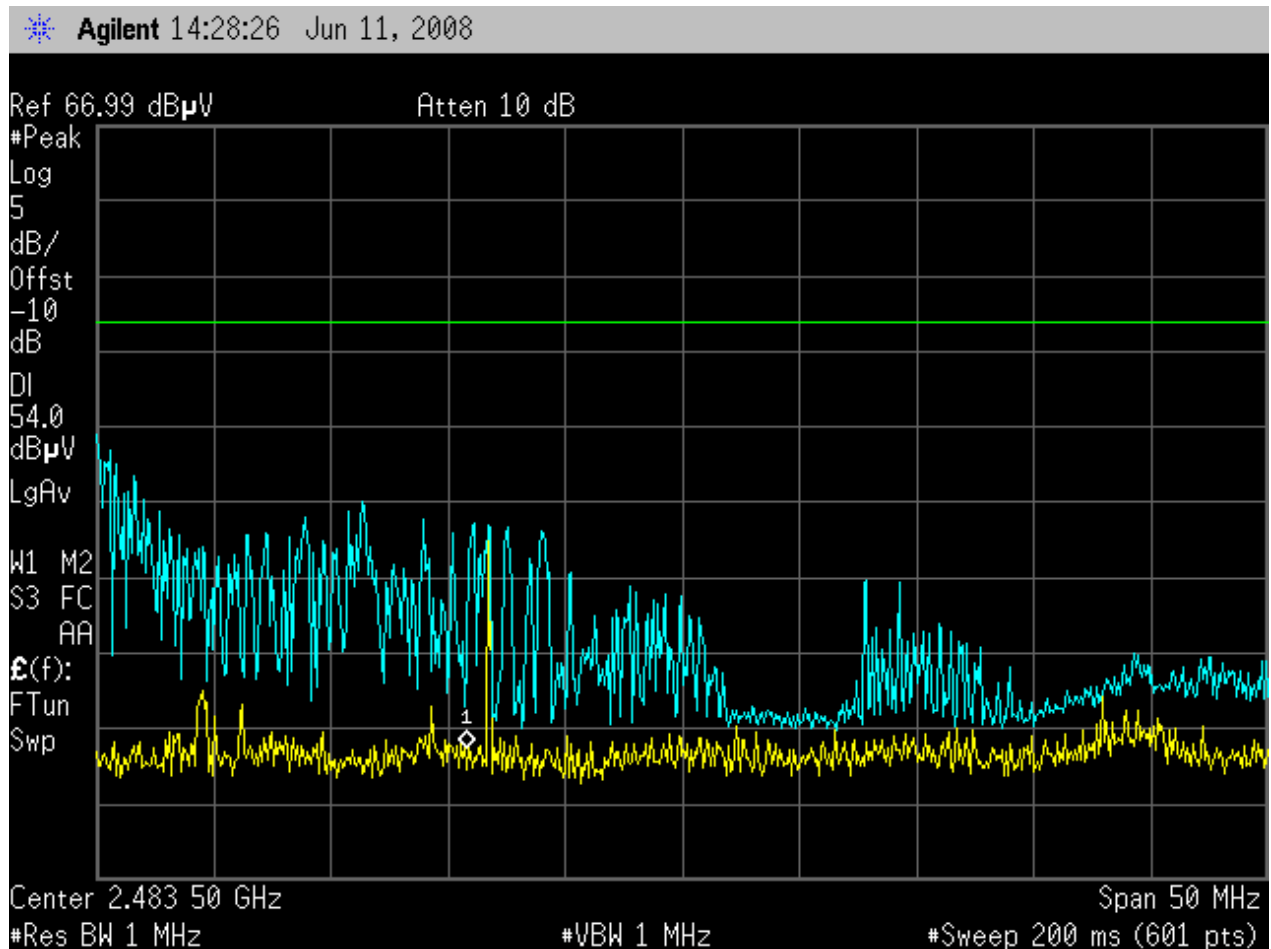
Center Frequency = 2400 MHz (Lower Band Edge)

Peak = 96.5 dBμV

Limit Line = 96.5 dBμV – 20 dB

= 76.5 dBμV

Offset = 35.4 = 29.5 ant. factor + 5.9 cable loss



Peak meets Average Limit.

Center Frequency = 2483.5 MHz (Upper Band Edge)
Display Line = Average Limit = 54 dBμV
Detector Used = Peak

Test Notes: Amplifier (Asset # 919) used to improved noise floor.
Offset = -10 dB = -45.4 preamp + 29.5 ant. factor + 5.9 cable loss