Nemko USA, Inc.
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CERTIFICATION TEST REPORT

Report Number:	2010 08154507 FCC2
Project Number:	54533-1
Applicant:	Avaak 5405 Morehouse Dr. San Diego, CA 92121
Equipment Under Test (EUT): Model: FCC ID: IC:	Wireless Gateway GW2010 WD9-GW2010 7764A-GW2010
In Accordance With:	FCC Part 15 Subpart C, 15.247 RSS-210, Issue 7, June 2007
Tested By:	Nemko USA Inc. 11696 Sorrento Valley Road, Suite F San Diego, CA 92121
Authorized By:	 Alan Laudani, Wireless/EMC Engineer
Date:	August 10, 2010
Total Number of Pages:	44

DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-	August 10, 2010	Prepared By: A. Laudani
-	August 10, 2010	Initial Release: A. Laudani

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to Chapter 10 (Test Reports) Requirements of ANSI C63.4 (2003) “Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”:

- The unit described in this report was received at Nemko USA, Inc.'s facilities on August 2, 2010.
- Testing was performed on the unit described in this report on August 2, 2010 to August 4, 2010.
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), Industry Canada, NVLAP or any other government agency.

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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 is 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.

The assessment summary is as follows:

Apparatus Assessed:	Wireless Gateway Model GW2010
Specification:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 7 June 2007 Annex 8 IC RSS-Gen Issue 2 June 2007
Date Received in Laboratory:	August 2, 2010
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

CERTIFICATION

Nemko USA, Inc., an independent Electromagnetic Compatibility (EMC) Test Laboratory, produced this Test Report and performed the Radio Frequency Interference (RFI) testing and data evaluation contained herein.

Nemko USA, Inc.'s measurement facility is currently registered with the United States Federal Communications Commission (FCC) in accordance with the provisions of 47 United States Code (CFR) Part 2, Subpart I, Section 2.948(a). A current description of Nemko USA, Inc.'s measurement facility is on file with the FCC. Nemko USA Inc. has additionally satisfied the FCC that it complies with the requirements set forth in 47 CFR Part 2, Subpart I, Section 2.948(d) regarding the accreditation of EMC laboratories.

The RFI testing, test data collection and test data evaluation were accomplished in accordance with the ANSI C63.4–2003 Standard, and in accordance with the applicable sections of the FCC rules (47 CFR Parts 2 and 15). The testing was also accomplished in accordance with Industry Canada's ICES-003 standard for unintentional radiating device per EMCAB-3, Issue 3 (May 1998). The administrative summary of this test report provides a description of the test sample.

I hereby certify that the test data, test data evaluation, and equipment configurations used to compile this test report are a true and accurate representation of the test sample's radio frequency interference characteristics as of the test date(s), and, for the design of the test sample.

TESTED BY:

_____ Date: August 10, 2010
A. Laudani, EMC Test Engineer

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Section 2: Equipment Under Test

2.1 Product Description

The GW2010 is a Wireless Gateway. The EUT is a wireless device that is connected to a computer or network. It receives data from remote wireless cameras and sends back acknowledgements of messages received. It uses frequency hopping with 16 channels.

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Wireless Gateway	Avaak Model: GW2010 Engineering Sample	N/A
EUT: Repeater Power Supply	Leader Electronics Inc. Model: MU05-J050100-A1 SN: NA	2 prong wall wart
Support: Laptop	Dell Model: Insprion 1545 SN: 15632716933	Laptop PS cable
Support: Laptop Power Supply	Dell Model: LA65NS2-00 SN: CN-0NX061-71615-03U-20CA	1m, unshielded, 18 AWG, 3-wire, IEC connector

CONNECTION	I/O CABLE
Laptop to Gateway	1.5m, shielded, 26AWG, CAT 5 cable

2.2 Technical Specifications of the EUT

Manufacturer: Avaak

Operating Frequency: 2404 MHz to 2474 MHz in the 2400-2483.5 MHz Band

Rated Power: 297 mW

Modulation: FSK

Antenna Connector/Data: Integral/ 0 dBi

Power Source: 120 VAC, 60 Hz

Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247
Operation within the bands 902-928 MHz, 2400-2483.5 MHz,
5725-5850 MHz and 24.0-24.25 GHz bands.

RSS-210, Issue 7, June 2007
Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

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	:	24 – 25 ^{o}C
Humidity range	:	42 - 76 %
Pressure range	:	87 - 105 kPa
Power supply range	:	+/- 1% of rated voltages

3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
110	Antenna, LPA	EMCO	3146	1217	1/10/2009	2/10/2011
114	Antenna, Bicon	EMCO	3104	2997	3/5/2010	3/5/2012
147	LISN	EMCO	3825/2	9009-1700	9/10/2009	9/10/2010
317	Preamplifier	HP	8449A	2749A00167	5/7/2010	5/7/2011
395	LISN	Solar	9348-50-R-24-BNC	941718	4/9/2010	4/9/2011
542	High Pass Filter	Solar	7801-5.0	838132	5/6/2010	5/6/2011
625	Antenna, Dbl Ridge Horn	EMCO	3116	2325	2/1/2010	2/1/2012
813	Multimeter	Fluke	111	78130060	9/1/2009	9/1/2010
682	Transient Limiter	HP	11947A	3107A02633	1/26/2010	1/26/2011
674	Spectrum Analyzer	HP	8568B	2007A00910	5/14/2010	5/14/2011
675	Spectrum Analyzer Display	HP	85662A	2005A01282	5/14/2010	5/14/2011
676	Quasi-Peak Adapter	HP	85650A	2430A00576	5/14/2010	5/14/2011
752	Antenna, DRWG	EMCO	3115	4943	11/12/2008	11/12/2010
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	7/12/2010	7/12/2011
897	Spectrum Analyzer	Rohde & Schwarz	FSP7	837620/009	10/14/2009	10/14/2010
898	EMI Receiver & filter set	HP	8546A	3625A00348	6/22/2010	6/22/2011
899	Filter Section	HP	85460A	3448A00288	6/22/2010	6/22/2011
901	pre amp	Sonoma	310 N	130607	4/20/2010	4/20/2011
NA	Regulating Transformer	TDGC	0-250 Vac	NA	NCR	NCR
N/A	2040B-1 OATS	SOATS IC Registration Number				

Registration of the OATS are on file with the Federal Communications Commission, under Registration Number 90579, the VCCI under registration number R-3027, and are also registered with Industry Canada under Site Numbers 2040B-1 and 2040B-2.

Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during 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.

Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results

§ 15.247 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

RSS-210, Issue 7, June 2007

Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

RSS-Gen Issue 2 June 2007

General Requirements and Information for the Certification of Radiocommunication Equipment

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 Test Results

Part 15C	RSS-210	Test Description	Required	Result
15.247 (a)(1)	RSS-210 A8.1 (a)	20% & 99% Bandwidth	Y	Pass
15.257 (b)(1)	A8.4(2)	Maximum peak output power	Y	Pass
15.247 (d)	RSS-210 2.2(b)	Radiated Emissions within Restricted Bands	Y	Pass
15.247(a)(1)	A8.1(b)	Carrier Frequency Separation	Y	Pass
15.247(d)	A8.5	Out-of-band Emissions	Y	Pass
15.247(a)(1)(iii)	A8.1(d)	Number of Hopping Frequencies	Y	Pass
15.207	RSS-GEN 7.2.2	Transmitter and Receiver AC Power Lines Conducted Emission Limit	Y	Pass
15.247(a)(1)(iii)	A8.1(d)	Time of Occupancy (Dwell Time)	Y	Pass
	RSS-GEN 4.8	Receiver Spurious Emissions	Y	Pass

Notes:

Spurious Emissions was measured when the unit is in receive mode to show compliance with IC RSS General Receiver requirements.

Appendix A: Test Results

Conducted Limits

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 frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

RSS-Gen 7.2.2
The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network. Except when the requirements applicable to a given device state otherwise, for any licence-exempt radio communication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.
The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network. A description of the method of measurement that is acceptable to Industry Canada is found in RSS-212.

Test Conditions:

Sample Number:	GW2010	Temperature:	25
Date:	August 2, 2010	Humidity:	73%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Shield Room 2

Test Results: See Attached Plots.

Additional Observations:

- Green limit line is Average limit and blue limit line is Quasi-peak limit.
- Instrumentation settings are 9kHz RBW/30kHz VBW for Average measurements and 100kHz RBW/100kHz VBW for Peak measurements.

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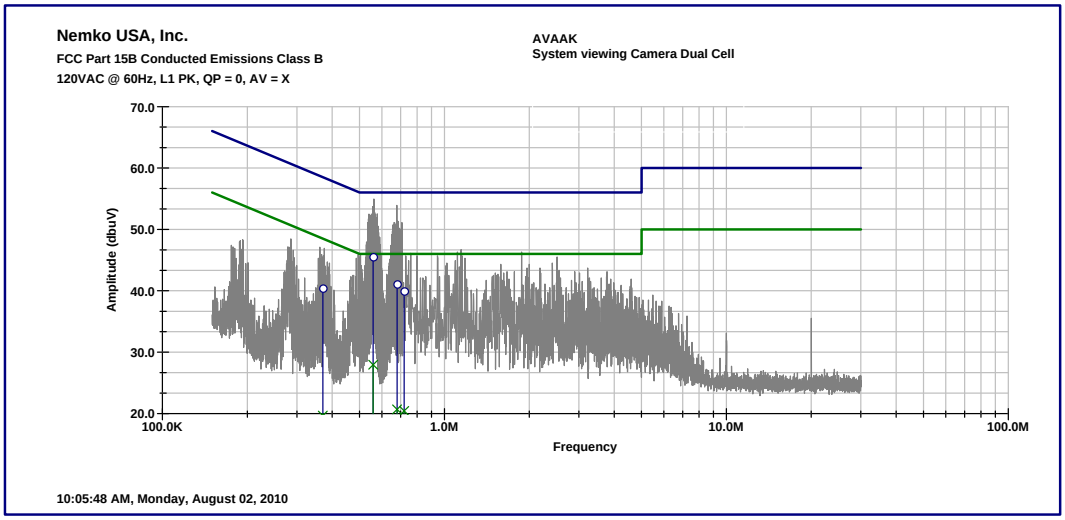
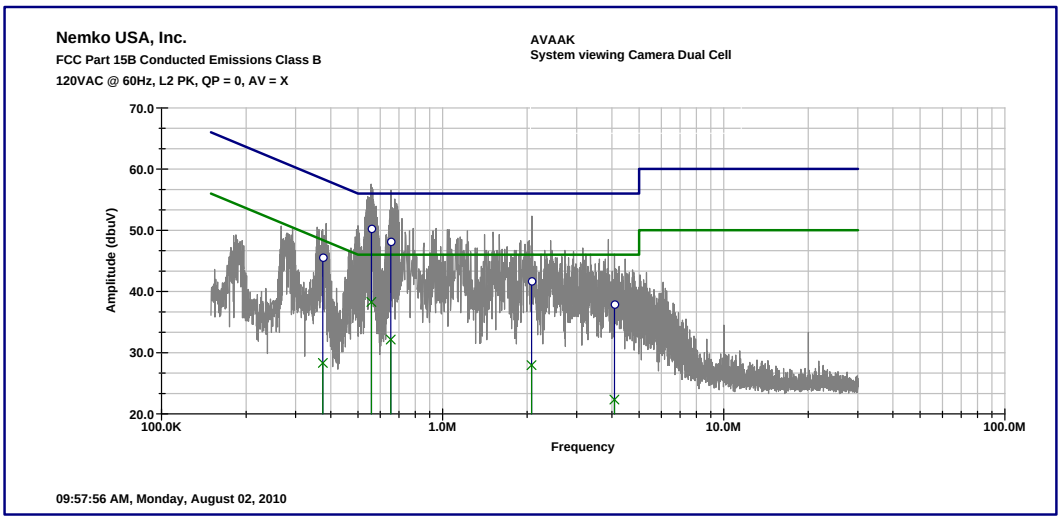
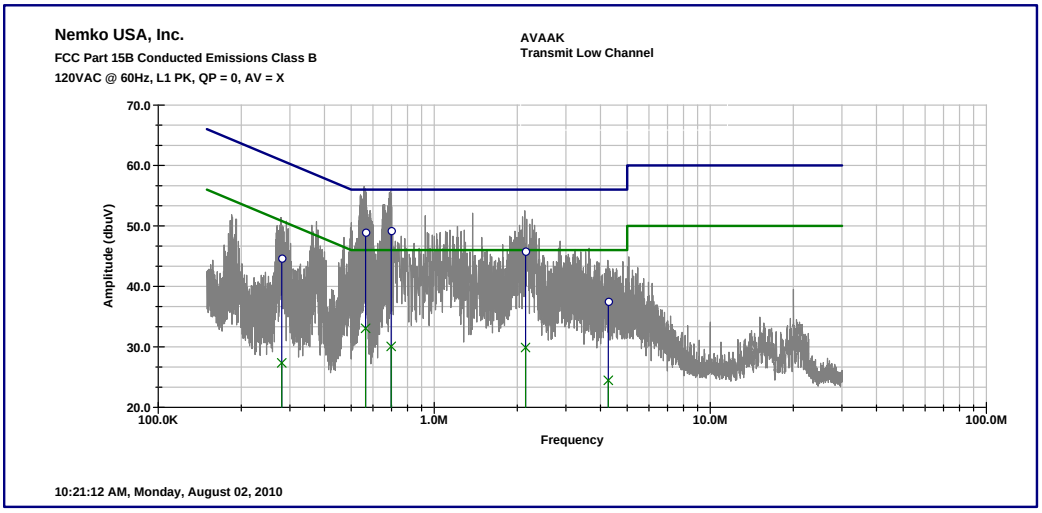
Gateway receiving data from Dual Cell camera

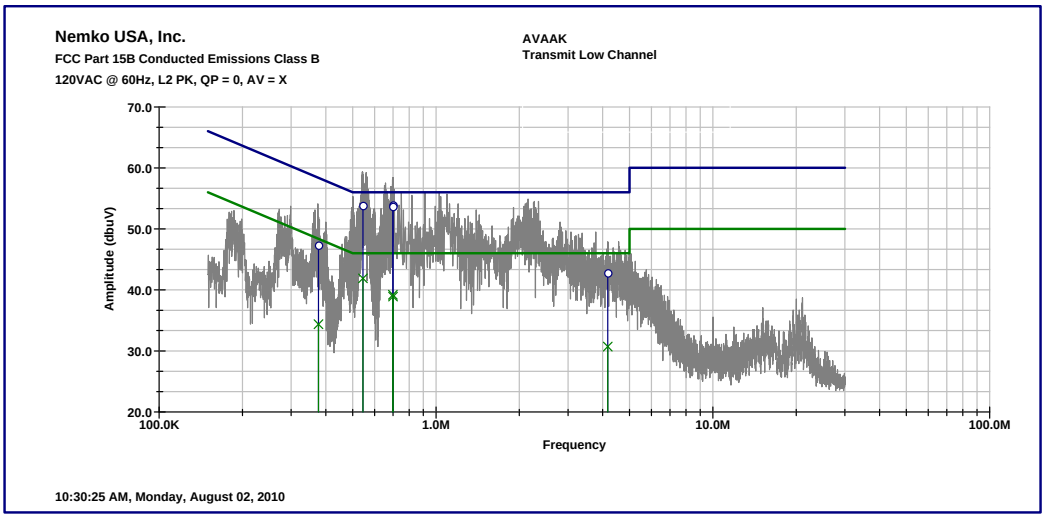




line 1						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
370.6	40.4	19.7	58.5	48.5	-18.1	-28.8
558.5	45.5	27.9	56.0	46.0	-10.5	-18.1
679.2	41.1	20.7	56.0	46.0	-14.9	-25.3
720.0	40.0	20.4	56.0	46.0	-16.0	-25.6
line 2						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
549.5	41.9	24.0	56.0	46.0	-14.1	-22.0
674.1	42.2	20.9	56.0	46.0	-13.8	-25.1
1211.0	38.6	19.5	56.0	46.0	-17.4	-26.5

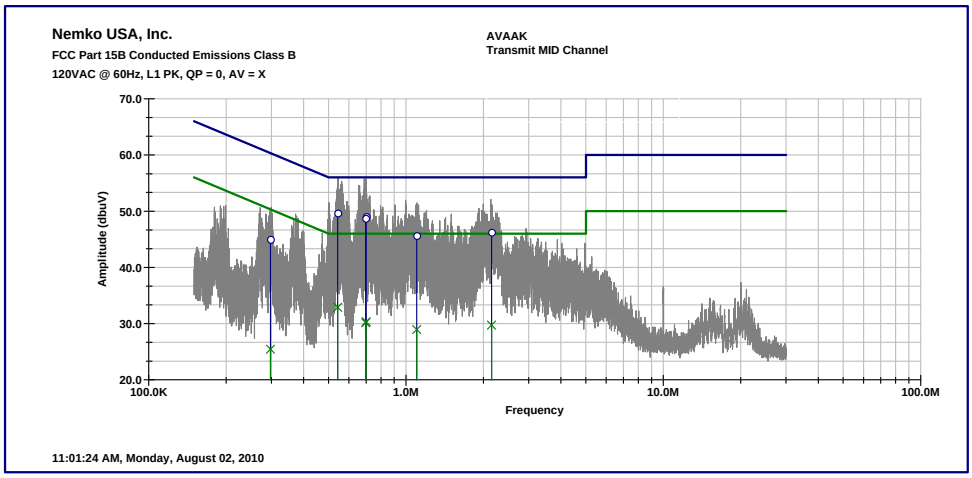
Gateway made to continuously transmit.

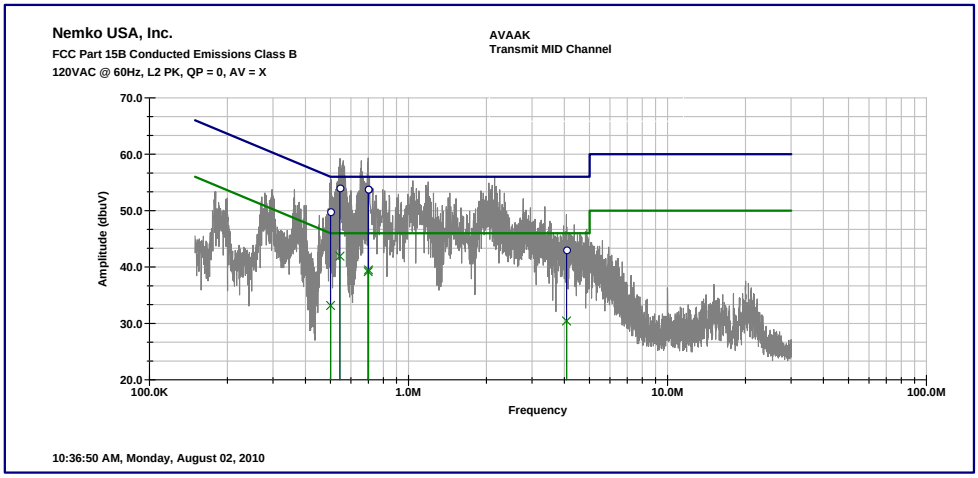




line 1						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
376.3	47.3	34.4	58.4	48.4	-11.0	-14.0
544.6	53.8	41.9	56.0	46.0	-2.2	-4.1
698.1	53.7	39.2	56.0	46.0	-2.3	-6.8
699.1	53.9	38.9	56.0	46.0	-2.1	-7.1
4170.6	42.8	30.7	56.0	46.0	-13.2	-15.3
line 2						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
280.3	44.7	27.3	60.8	50.8	-16.1	-23.5
563.8	49.0	33.1	56.0	46.0	-7.1	-12.9
698.0	49.2	30.1	56.0	46.0	-6.8	-15.9
2139.8	45.8	29.9	56.0	46.0	-10.2	-16.1
4270.8	37.5	24.5	56.0	46.0	-18.5	-21.6

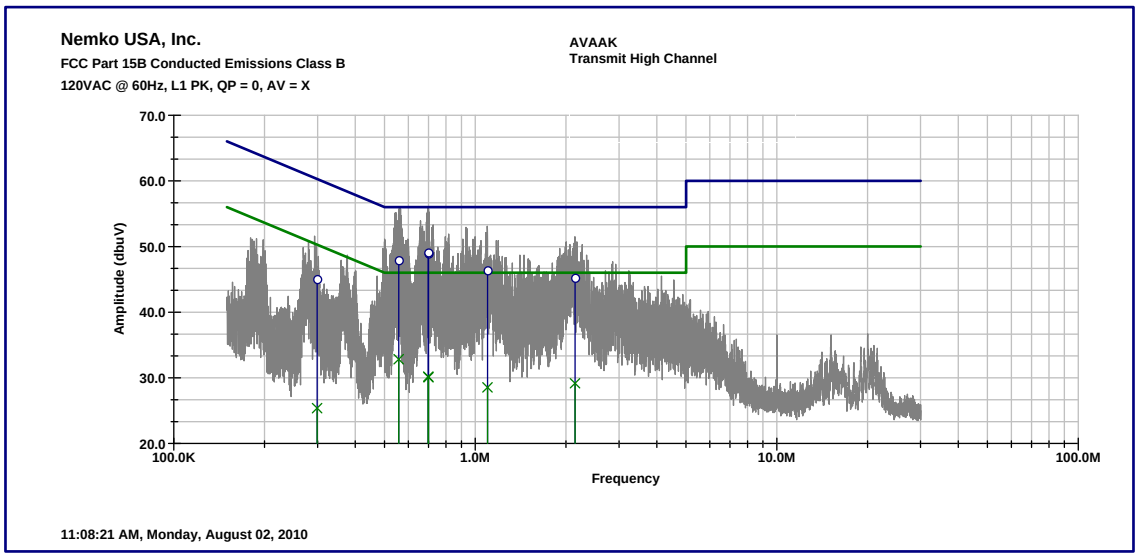
Gateway made to continuously transmit.

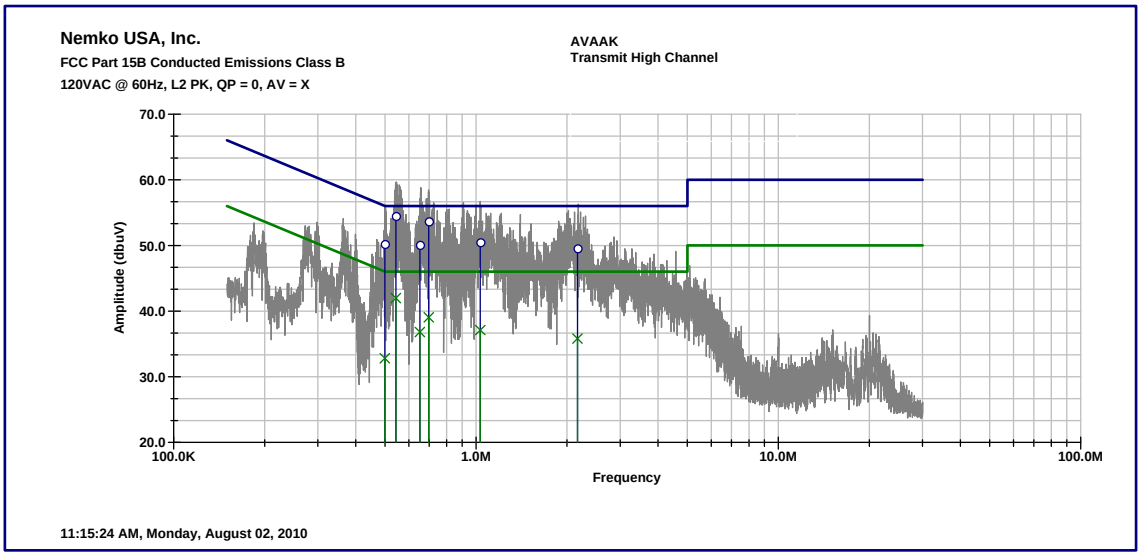




line 1						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
297.6	45.0	25.4	60.3	50.3	-15.3	-24.9
543.0	49.7	32.9	56.0	46.0	-6.3	-13.1
696.9	48.7	30.1	56.0	46.0	-7.3	-15.9
700.5	49.0	30.3	56.0	46.0	-7.0	-15.7
1101.3	45.6	28.9	56.0	46.0	-10.4	-17.1
2149.2	46.3	29.7	56.0	46.0	-9.8	-16.3
line 2						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
500.2	49.8	33.2	56.0	46.0	-6.2	-12.8
543.6	54.0	41.9	56.0	46.0	-2.0	-4.1
699.2	53.8	39.2	56.0	46.0	-2.2	-6.8
701.1	53.8	39.5	56.0	46.0	-2.2	-6.5
4074.0	43.0	30.4	56.0	46.0	-13.0	-15.6

Gateway made to continuously transmit





line 1						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
298.8	45.0	25.4	60.3	50.3	-15.2	-24.9
557.2	47.9	32.8	56.0	46.0	-8.1	-13.2
698.4	49.1	30.2	56.0	46.0	-6.9	-15.8
699.6	48.9	30.1	56.0	46.0	-7.1	-15.9
1098.2	46.4	28.5	56.0	46.0	-9.6	-17.5
2142.2	45.2	29.2	56.0	46.0	-10.8	-16.8
line 2						
Frequency	Measured		Limit		Margin	
(kHz)	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
499.3	50.2	32.8	56.0	46.0	-5.8	-13.2
543.1	54.5	42.0	56.0	46.0	-1.5	-4.0
651.9	50.1	36.8	56.0	46.0	-5.9	-9.2
697.6	53.7	39.0	56.0	46.0	-2.3	-7.0
1032.7	50.5	37.1	56.0	46.0	-5.5	-8.9
2165.7	49.6	35.8	56.0	46.0	-6.4	-10.2

20dB Bandwidth/ 99% Bandwidth

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.

RSS-210 A8.1 (a)
The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hop set. The hop set shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hop set while the long-term distribution appears evenly distributed.

Test Conditions:

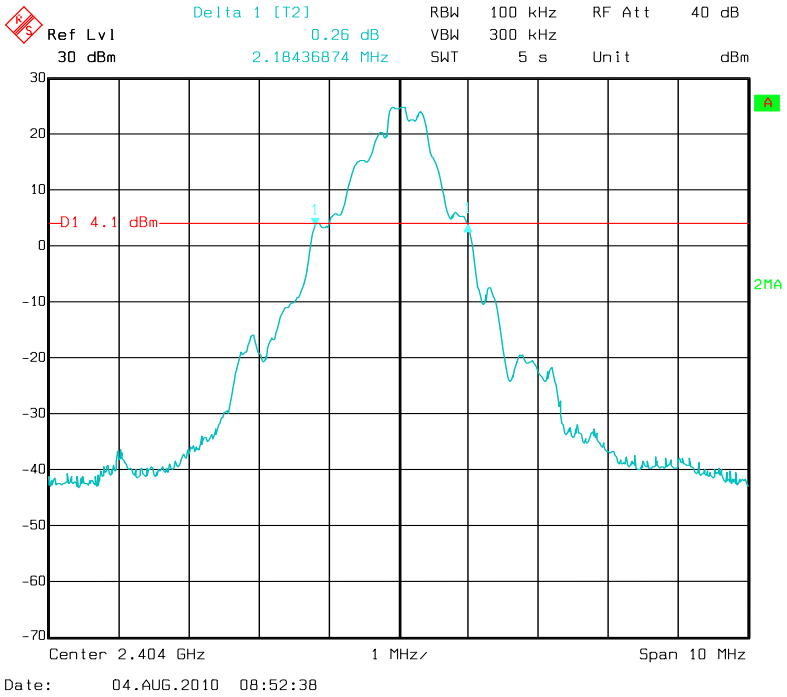
Sample Number:	GW2010	Temperature:	25
Date:	August 4, 2010	Humidity:	44
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Ground plane 2

Test Results:

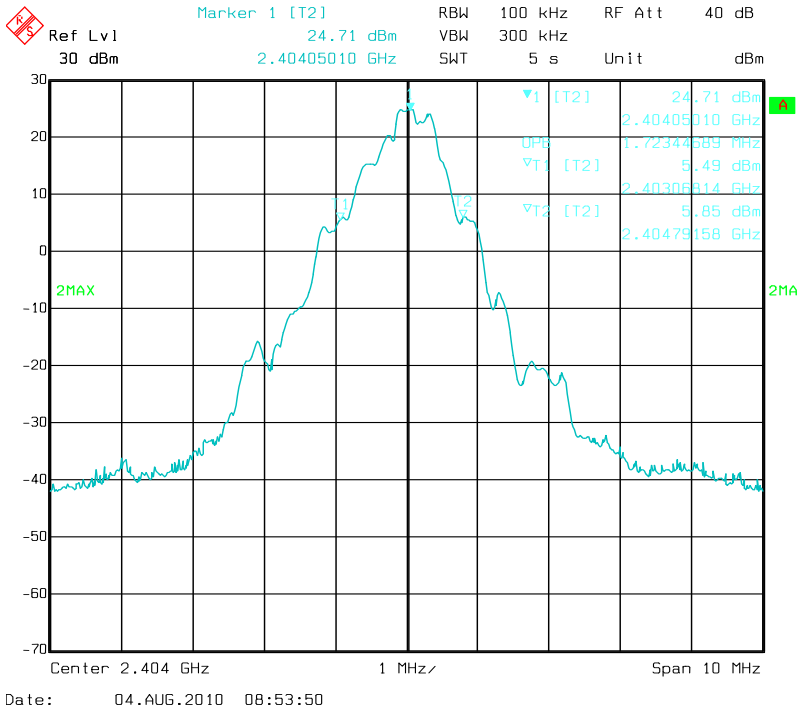
See Attached Plots.

Additional Observations:

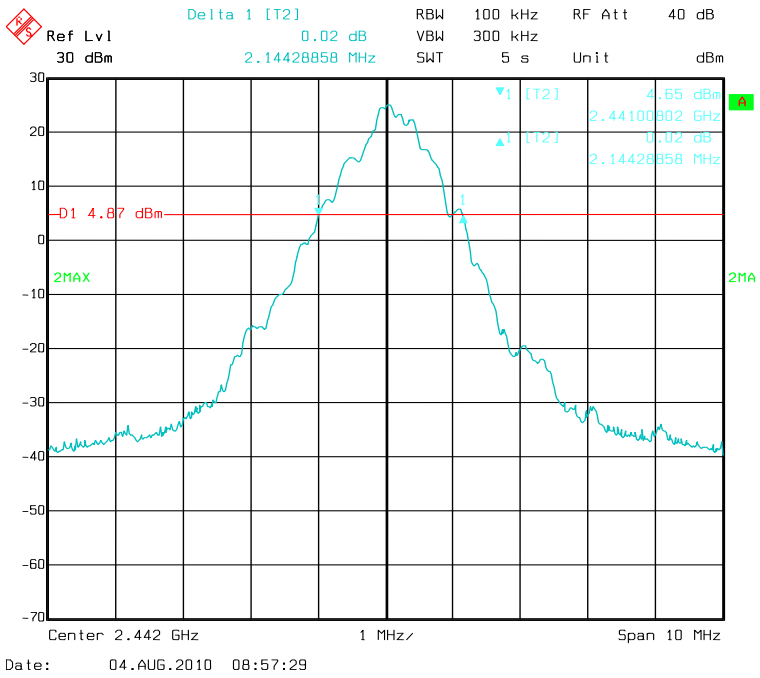
This is a conducted test.
The EUT with the integral antenna removed and replaced with a SMA connector is connected directly to the input of the spectrum analyzer.
RBW set to 100kHz and VBW to 300kHz. Detector function is set to Peak and the trace to Max Hold.
While the EUT is transmitting at it's maximum data rate and allowed to stabilize, emission peak is determined.
A display line is drawn 20dB from this point. The points where the line intersects the emission determined the bandwidth for each channel investigated.
For 99% bandwidth, the client is asked for the declared necessary bandwidth and this is entered into the Spectrum Analyzer for the channel bandwidth and the function for Channel power = 99% is activated. Max hold on this plot is presented.



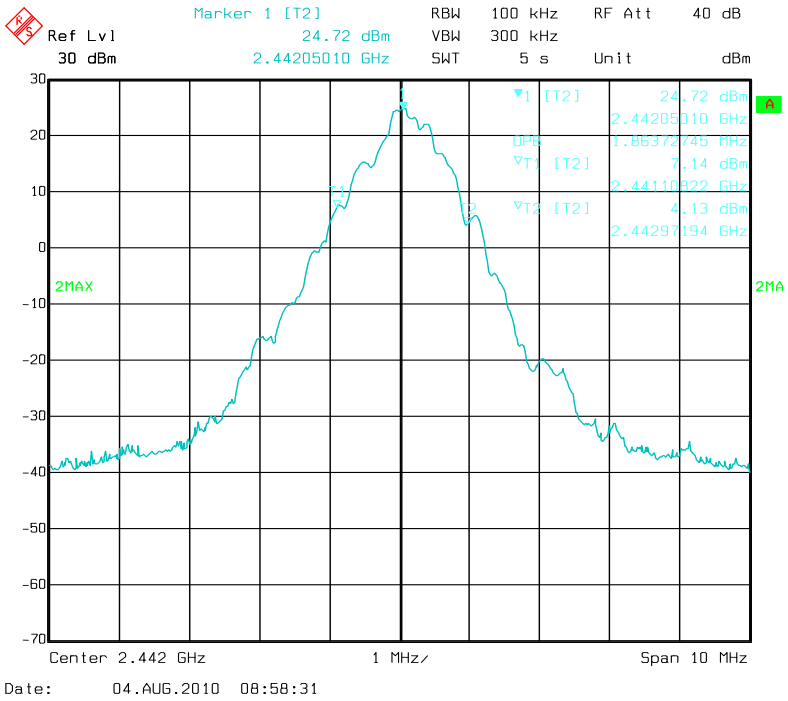
LOW Channel 20dB bandwidth = 2.18 MHz



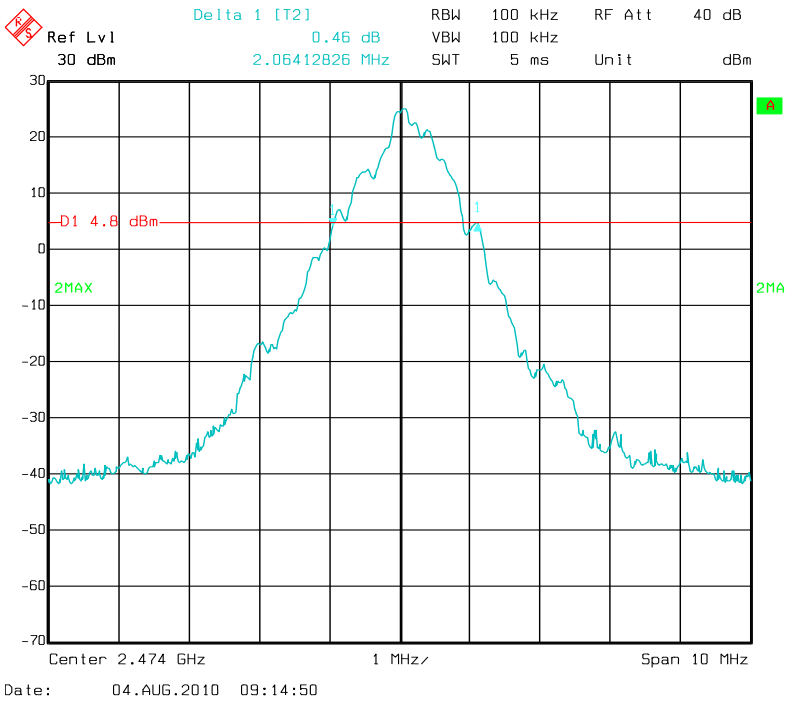
LOW Channel 99% bandwidth = 2.40 MHz



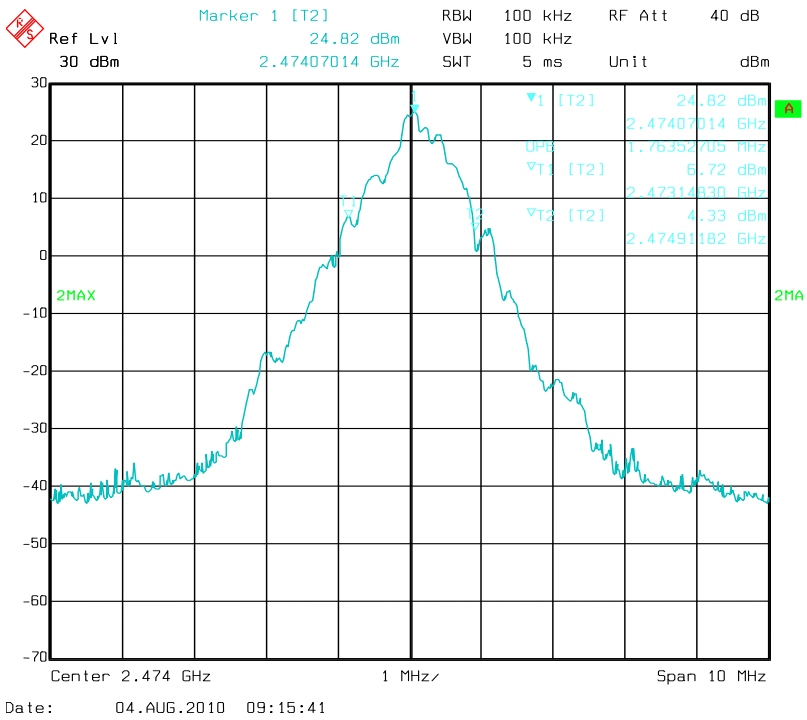
MID Channel 20dB bandwidth = 2.14 MHz



MID Channel 99% bandwidth = 2.44 MHz



HIGH Channel 20dB bandwidth = 2.06 MHz



HIGH Channel 99% bandwidth = 2.47 MHz

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Spurious RF Conducted Emissions

15.247 (d) I
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Sec. 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a) (see Sec. 15.205(c)).

A8.5 Out-of-band Emissions
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

Test Conditions:

Sample Number:	GW2010	Temperature:	25 °C
Date:	August 4, 2010	Humidity:	44%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Shield Room 2

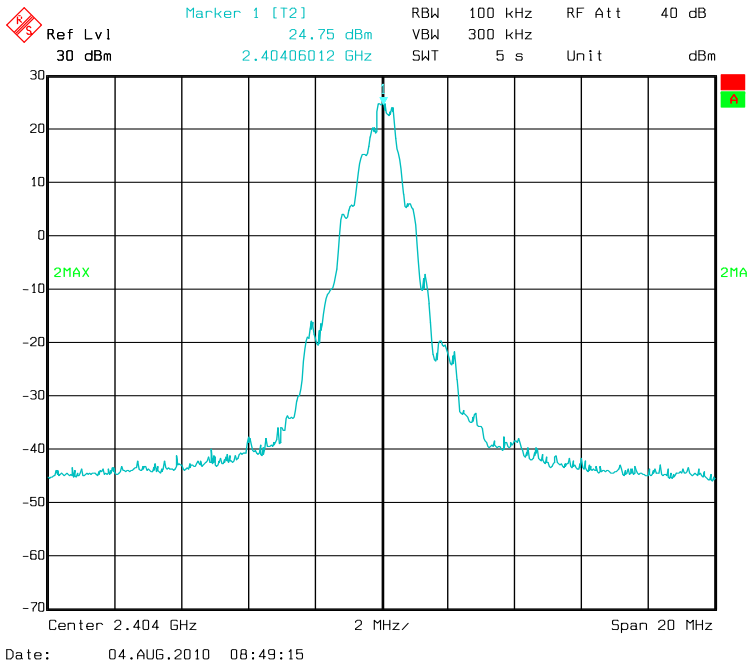
Test Results:

See attached plots.

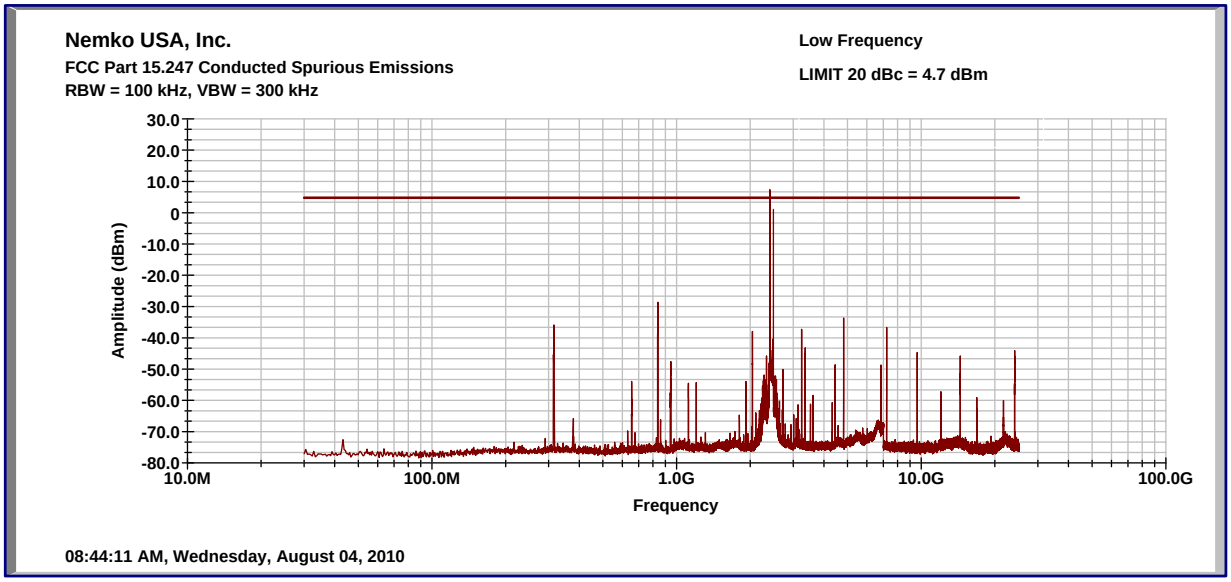
Additional Observations:

- RBW =100kHz
- Sweep = Auto
- Detector function = peak.
- Trace = Max hold
- No offset used, EUT connected directly to the spectrum analyzer.

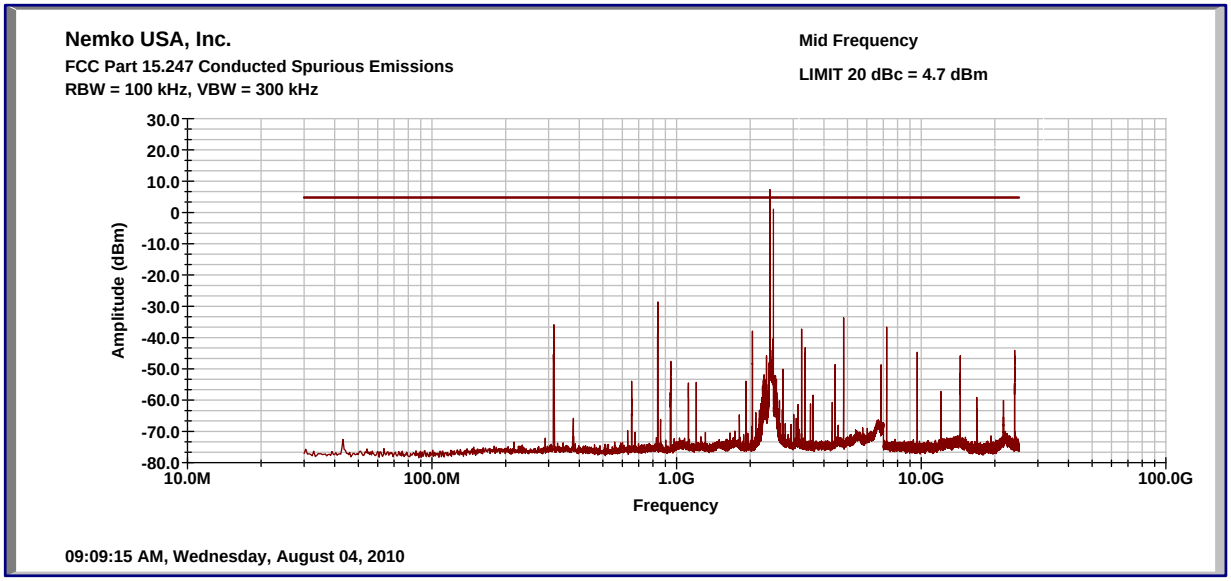
Low Channel:



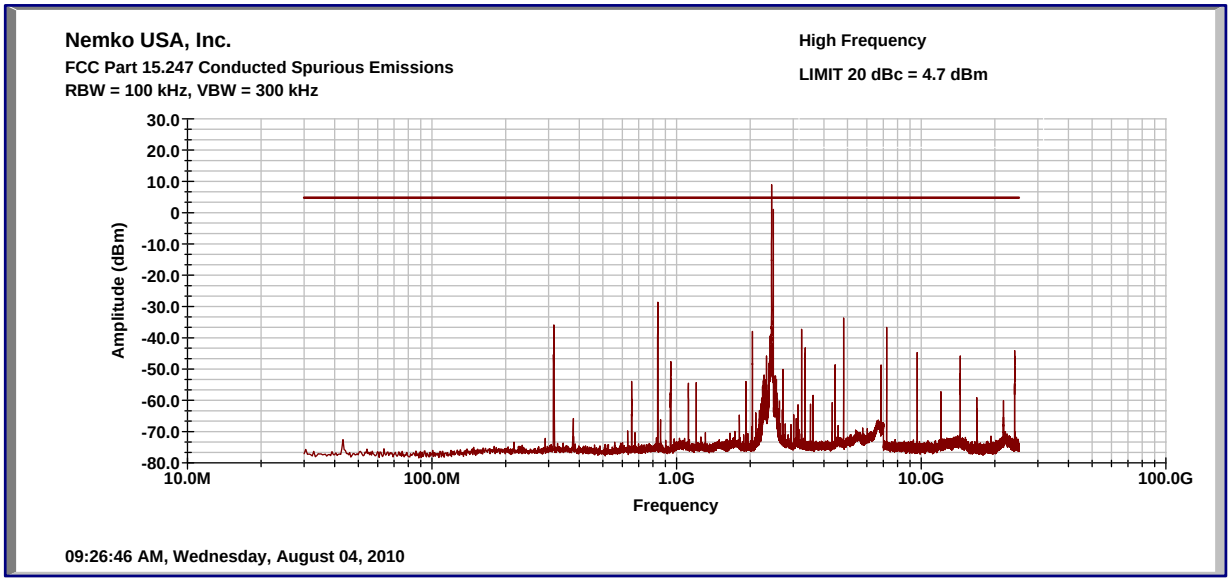
Limit line 20dBc from measurement above.



Mid Channel:



High Channel:



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Radiated Emissions within Restricted Bands

15.247 (d)
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. *Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).*

RSS 210 2.2(b)
Unwanted emissions falling into restricted bands of Table 1 shall meet Tables 2 and 3 limits. It should also be noted that unwanted emissions falling in non-restricted bands do not need to be suppressed to a level lower than the Table 2 and 3 limits.

Test Conditions:

Sample Number:	GW2010	Temperature:	24
Date:	August 4, 2010	Humidity:	50%
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	SOATS

Test Results:

See attached plots.

Additional Observations:

- RBW/VBW =1MHz above 1GHz while RBW 120kHz/VBW 300kHz below 1GHz using Quasi-Peak detector.
- Sweep = Auto
- Detector function = peak.
- Trace = Max hold
- The Spectrum was searched from 30MHz to the 10th Harmonic, 25000 MHz. There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Digital emissions below 600 MHz do not change with channel frequency.
- “rb” for restricted band.

Radiated Emissions Data

Job # : 54533-1 Date : 8-2-2010 Page 1 of 1
NEX #: 154507 Time : 1245
Staff : aal

Client Name : AVAAK
EUT Name : Gateway
EUT Model # : GW2010
EUT Serial # : engr sample
EUT Config. : Transmitting
Dual Camera

EUT Voltage : 120
EUT Frequency : 60
Phase: 1
NOATS
SOATS X
Distance < 1000 MHz: 10 m
Distance > 1000 MHz: 3 m

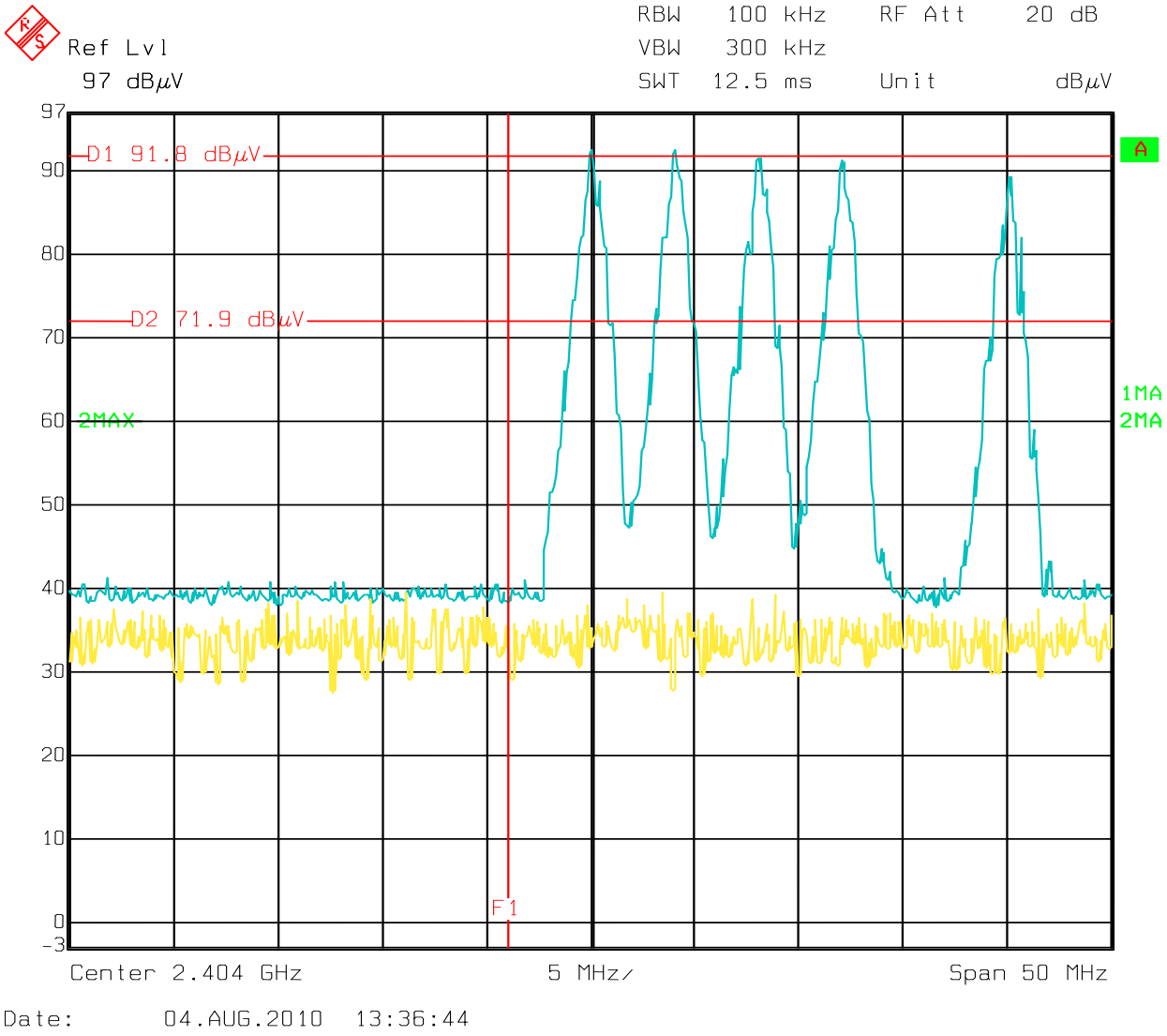
Specification : CFR47 Part 15, Subpart B, Class B
Loop Ant. #: NA
Bicon Ant.#: 114_3m Temp. (°C) : 21
Log Ant.#: 110_3m Humidity (%) : 50
DRG Ant. # 752 Spec Analyzer #: 898 835
Cable LF#: SOATS Analyzer Display #: 898 835
Cable HF#: 40ft_blue Quasi-Peak Detector #: 898
Preamp LF#: NA Preselector #: 899
Preamp HF# 317

Quasi-Peak	RBW: 120 kHz		
	Video Bandwidth 300 kHz		
Peak	RBW: 1 MHz		
	Video Bandwidth 3 MHz		
Average	RBW: 1 MHz		
	Video Bandwidth 10 Hz		

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
33.0	14.0	13.0	Q	-	1.0	14.0	27.3	40.0	-12.7	Pass	
48.0	14.2	16.4	Q	-	1.0	16.4	28.6	40.0	-11.4	Pass	
125.0	14.2	13.8	Q	-	1.0	14.2	27.7	43.5	-15.8	Pass	
216.0	13.3	15.6	Q	-	1.0	15.6	28.9	46.0	-17.1	Pass	
250.0	13.7	21.1	Q	-	1.0	21.1	35.2	46.0	-10.8	Pass	
300.0	16.5	15.0	Q	-	1.0	16.5	33.4	46.0	-12.6	Pass	
350.0	16.1	9.2	Q	-	1.0	16.1	33.8	46.0	-12.3	Pass	
400.0	15.4	9.1	Q	-	1.0	15.4	34.3	46.0	-11.7	Pass	
450.0	13.3	8.7	Q	-	1.0	13.3	32.6	46.0	-13.4	Pass	
500.0	3.7	6.5	Q	-	1.0	6.5	27.2	46.0	-18.8	Pass	
550.0	8.1	6.2	Q	-	1.0	8.1	30.2	46.0	-15.9	Pass	
600.0	9.4	11.4	Q	-	1.0	11.4	34.3	46.0	-11.7	Pass	
2483.5	28.0	27.9	P	-	1.0	28.0	63.0	74.0	-11.0	Pass	single channel
2483.5	15.8	14.8	A	-	1.0	15.8	50.8	54.0	-3.2	Pass	
2474.0	83.1		P	-	1.0	83.1	119.6				marker delta
2483.5	33.1		P	-	1.0	33.1	69.6	74.0	-4.3	Pass	hopping
2402.0											
4808.0	43.8	42.2	P	-	1.0	43.8	54.9	74.0	-19.0	Pass	rb
4808.0	23.8	22.2	A	-	1.0	23.8	34.9	54.0	-19.0	Pass	rb
7206.0	44.7	45.7	P	-	1.0	45.7	63.1	74.0	-10.9	Pass	
7206.0	24.7	25.7	A	-	1.0	25.7	43.1	54.0	-10.9	Pass	
9616.0	44.4	46.6	P	-	1.0	46.6	68.8	74.0	-5.2	Pass	
9616.0	24.4	26.6	A	-	1.0	26.6	48.8	54.0	-5.2	Pass	
12018.0	40.6	42.8	P	-	1.0	42.8	67.8	74.0	-6.1	Pass	rb
12018.0	20.6	22.8	A	-	1.0	22.8	47.8	54.0	-6.1	Pass	rb
2442.0											
4884.0	51.9	51.3	P	-	1.0	51.9	63.0	74.0	-10.9	Pass	rb
4884.0	31.9	31.3	A	-	1.0	31.9	43.0	54.0	-10.9	Pass	rb
7326.0	48.2	49.8	P	-	1.0	49.8	67.5	74.0	-6.4	Pass	rb
7326.0	28.2	29.8	A	-	1.0	29.8	47.5	54.0	-6.4	Pass	rb
9768.0	45.5	44.4	P	-	1.0	45.5	68.0	74.0	-6.0	Pass	
9768.0	25.5	24.4	A	-	1.0	25.5	48.0	54.0	-6.0	Pass	
12210.0	44.4	43.6	P	-	1.0	44.4	69.9	74.0	-4.0	Pass	rb
12210.0	24.4	23.6	A	-	1.0	24.4	49.9	54.0	-4.0	Pass	rb
2474.0	81.4					81.4	116.4				
4948.0	51.3	51.9	P	-	1.0	51.9	63.1	74.0	-10.9	Pass	rb
4948.0	31.3	31.9	A	-	1.0	31.9	43.1	54.0	-10.9	Pass	rb
7422.0	53.3	49.9	P	-	1.0	53.3	71.0	74.0	-3.0	Pass	rb
7422.0	33.3	29.9	A	-	1.0	33.3	51.0	54.0	-3.0	Pass	rb
9896.0	45.8	45.2	P	-	1.0	45.8	68.1	74.0	-5.9	Pass	
9896.0	25.8	25.2	A	-	1.0	25.8	48.1	54.0	-5.9	Pass	
12370.0	45.7	45.8	P	-	1.0	45.8	71.3	74.0	-2.6	Pass	rb
12370.0	25.7	25.8	A	-	1.0	25.8	51.3	54.0	-2.6	Pass	rb

Bandedge Measurement (Low Channel Hopping)



Low Channel 2404 MHz (Peak Measurement)

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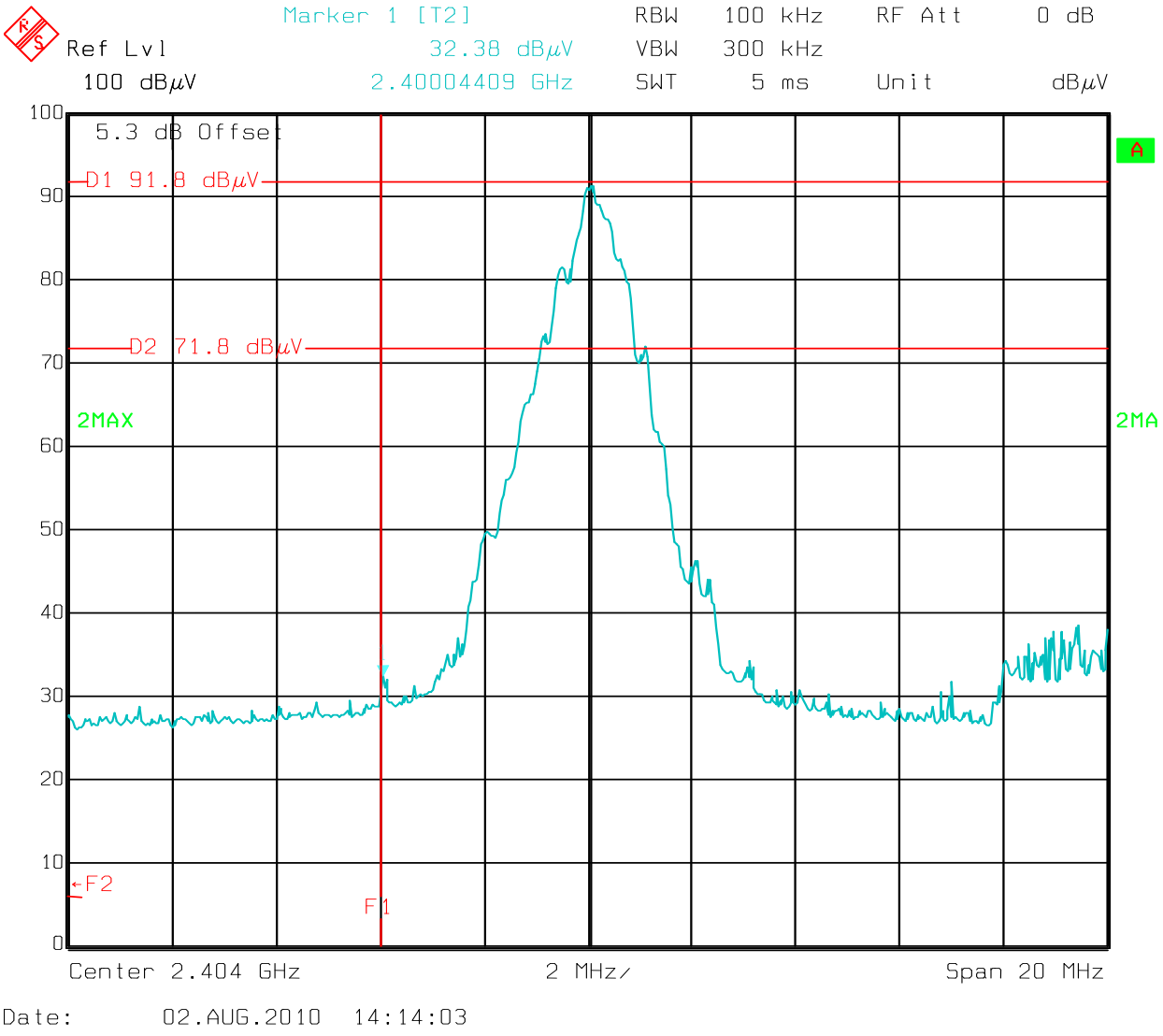
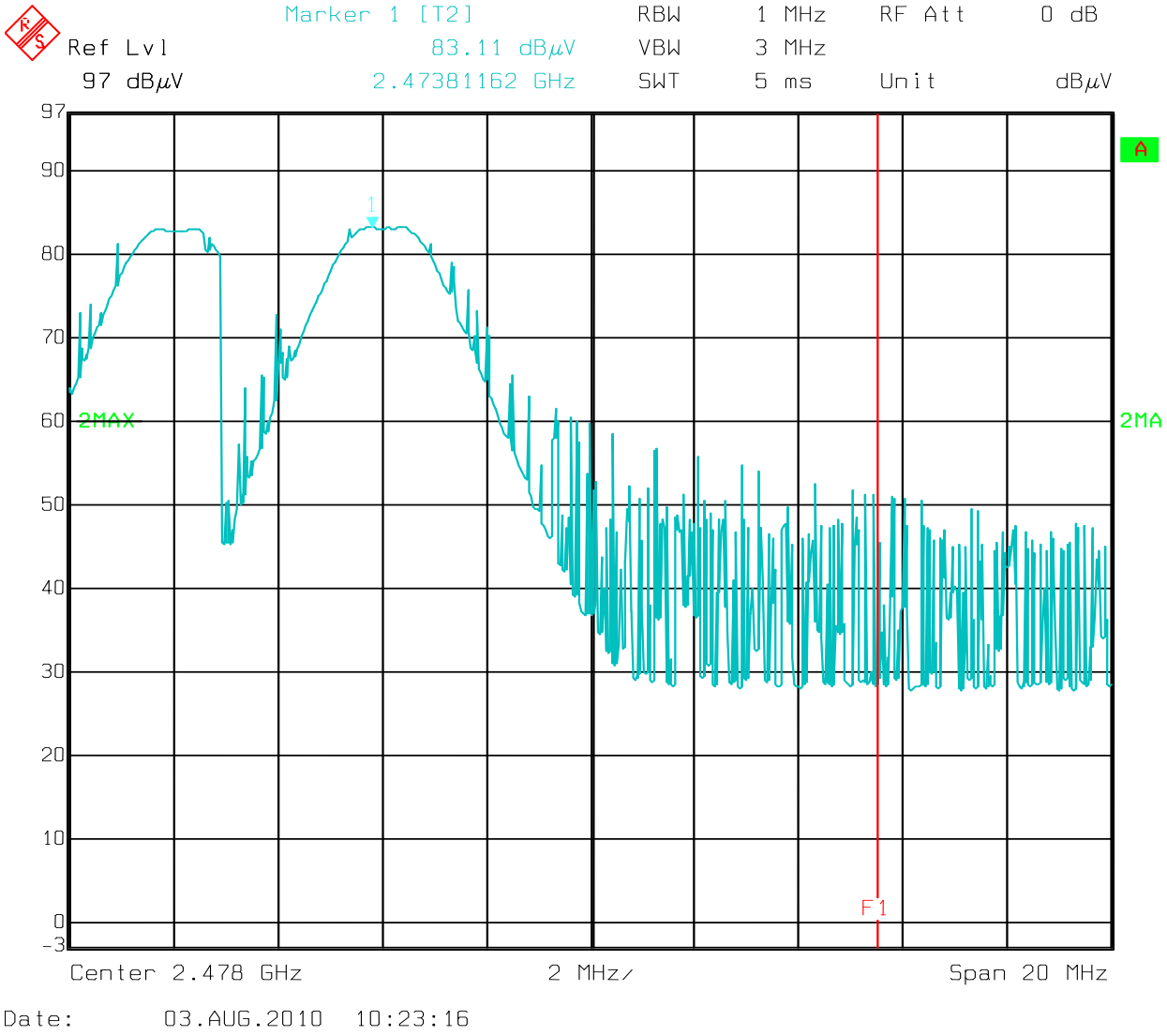
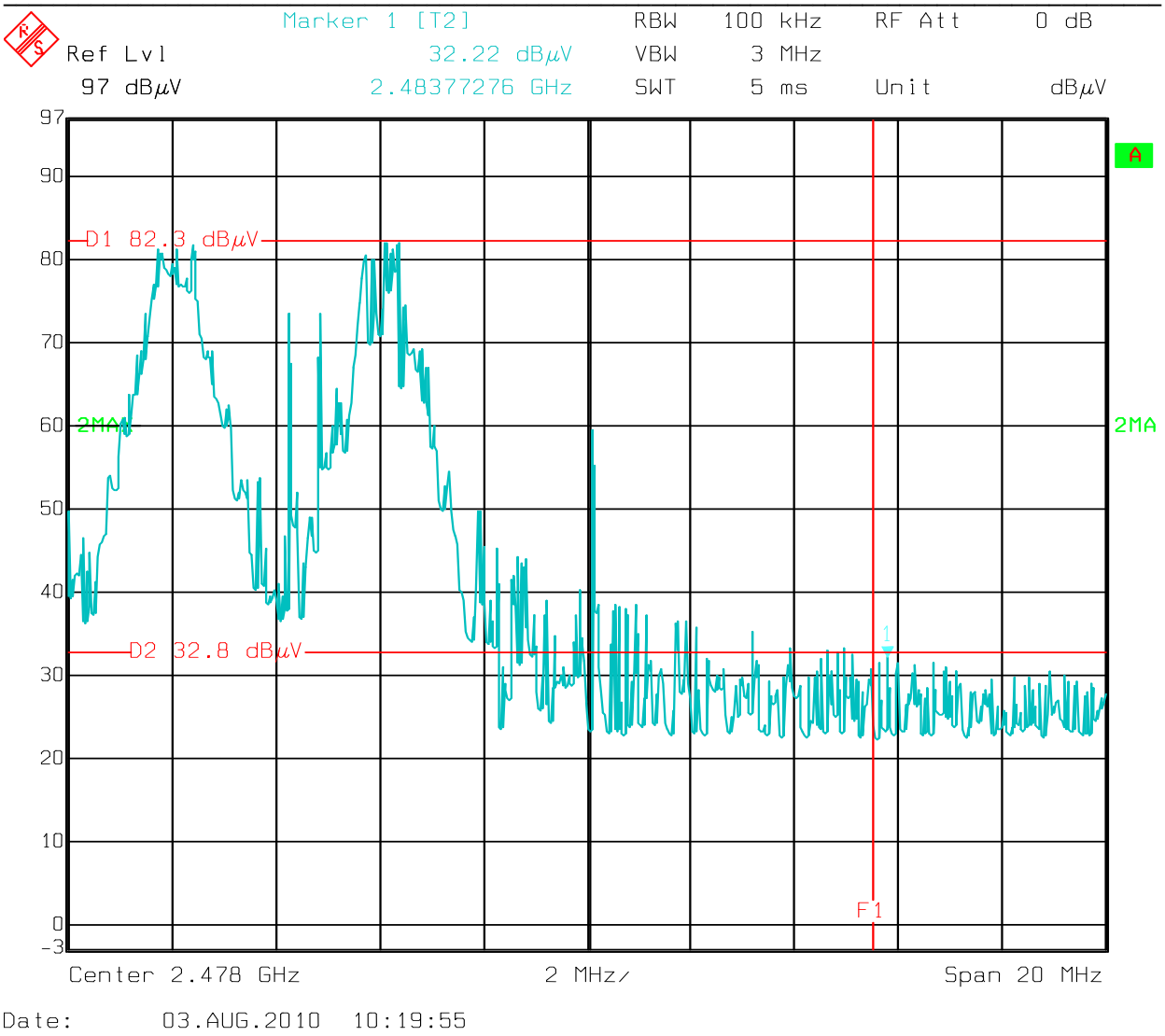
Bandedge Measurement (Low Channel Non-Hopping)



Bandedge Measurement (High Channel Hopping using Marker-Delta Method)



High Channel (2474MHz using 1MHz RBW/ 3MHz VBW)
Shows need for marker-delta method for digital spurs splashing thru band edge.
Inband peak is 83.1 dBµV/m



Marker Delta Band-Edge Computation:

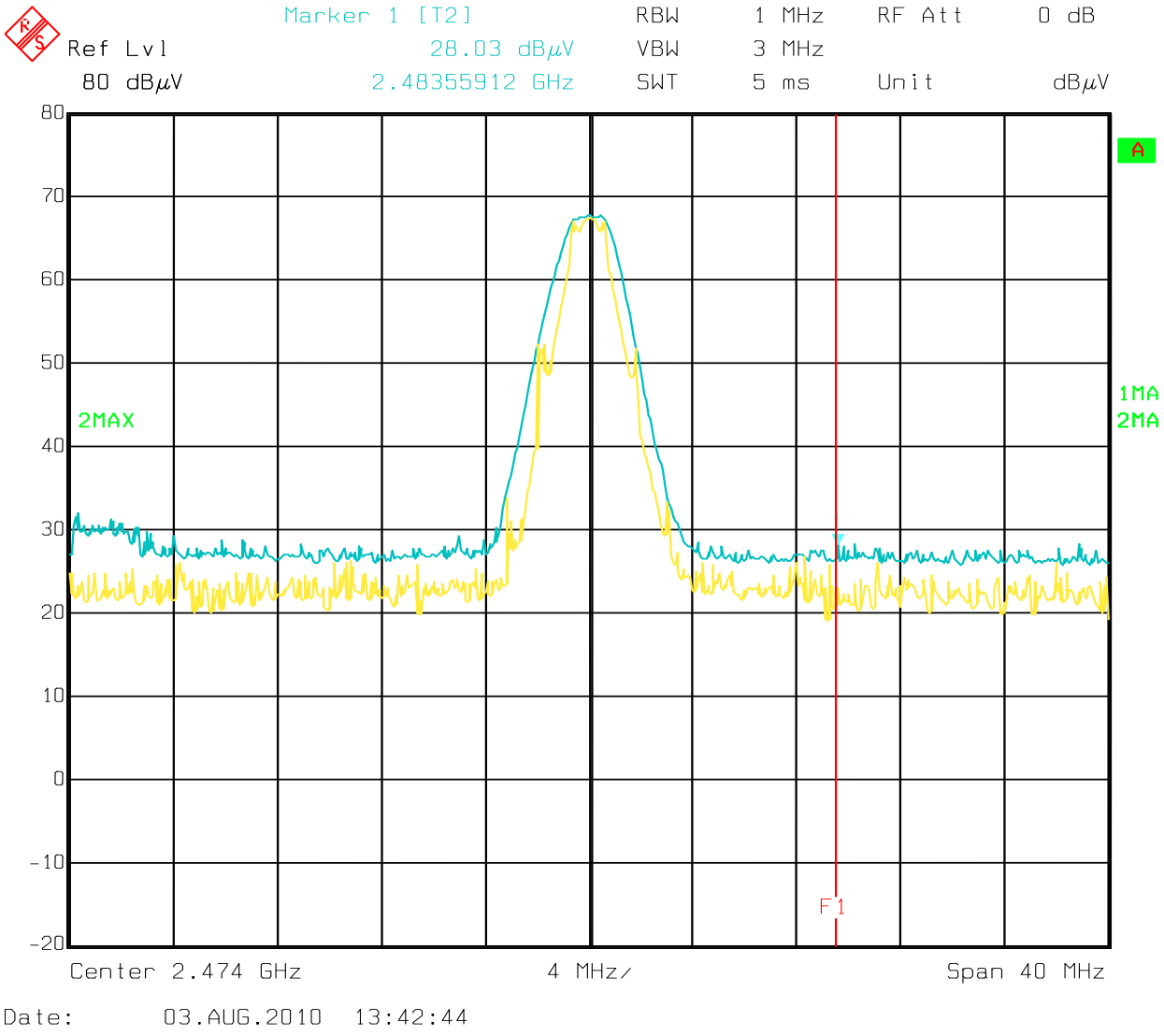
Peak of fundamental @ 1MHz RBW/3 MHzVBW is 83.1dBµV

Delta of peak of fundamental and band-edge @ 100kHz RBW/VBW =
= 82.3 dBµV –32.8 dBµV = 49.5 dBµV

Result = Peak – Delta = 83.1 – 49.5 = 33.6 dBµV
33.6 dBuV plus antenna factor 27.3 dB/m and cable loss 7.7dB = 63.9 dBµV/m

63.9 dBµV/m < 74.0 dBµV/m, EUT complies for Peak.
DCF = -20 dB
Average: 63.9 dBµV/m – 20 dB = 43.9 dBµV/m < 54 dBµV/m, EUT complies .

Bandedge Measurement (High Channel Non-Hopping)



High Channel (2474MHz using 1MHz RBW/ 3MHz VBW)

28.0 dBuV plus antenna factor 27.3 dB/m and cable loss 7.7dB = 63.0 dBµV/m

63.0 dBµV/m < 74.0 dBµV/m, EUT complies for Peak.
DCF = -20 dB
63.0 dBµV/m –20 dB < 54.0 dBµV/m, EUT complies for Average.

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Maximum Peak Output Power

15.257 (b)(1)
For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

A8.4(2)
For frequency hopping systems operating in the band 2400-2483.5 MHz employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4W.

Test Conditions:

Sample Number:	GW2010	Temperature:	24 °C
Date:	August 4, 2010	Humidity:	50 %
Modification State:	Lo/Mid/High Channels	Tester:	A. Laudani
		Laboratory:	Ground plane 2

Additional Observations:

- Conductive measurement with minimum offset of hardline “pigtail” soldered onto circuit board --cutting out integral antenna.
- Autotransformer was used to vary power input 120 VAC +/- 15% and this resulted in no significant output power differences.
- RBW was greater than 20 dB bandwidth.
- Detector peak, max hold.

Test Results:

Channel	Frequency (MHz)	Measured Output Power Conducted dBm	Measured Output Power Conducted mW	Gain	EIRP dBm
Low	2404	24.73	297	0	24.73
Mid	2442	24.58	287	0	24.58
High	2474	24.55	285	0	24.55

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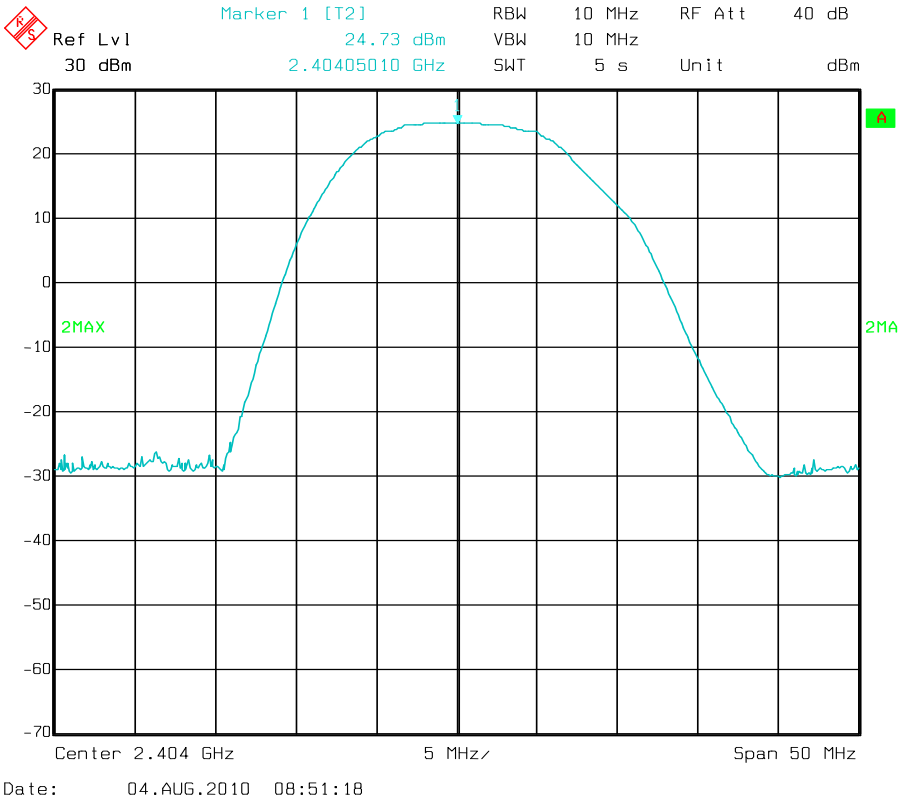
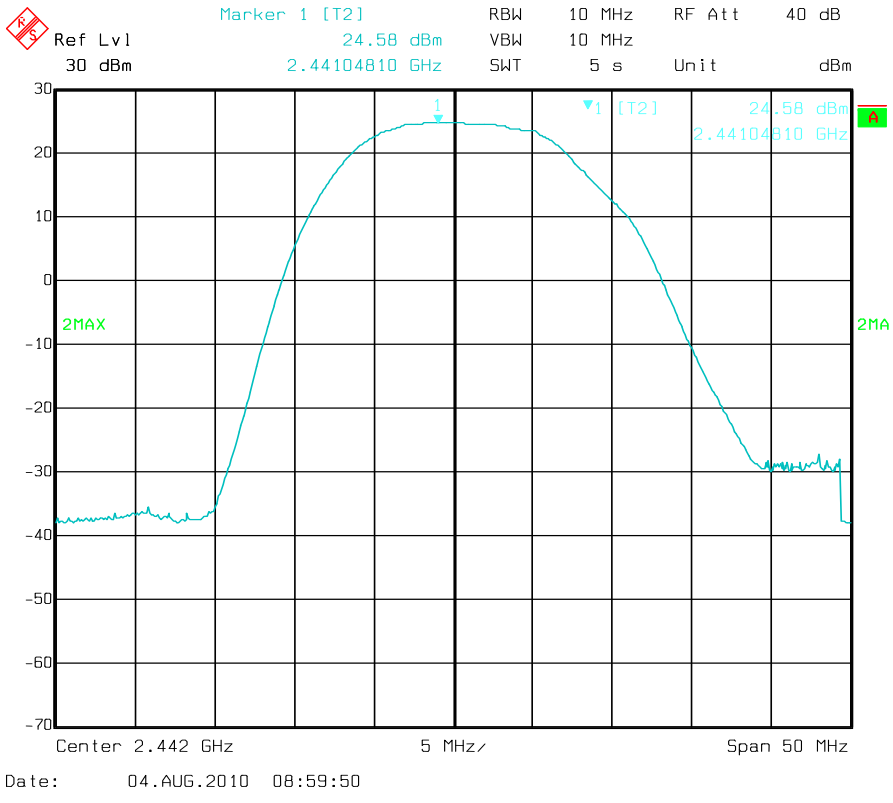
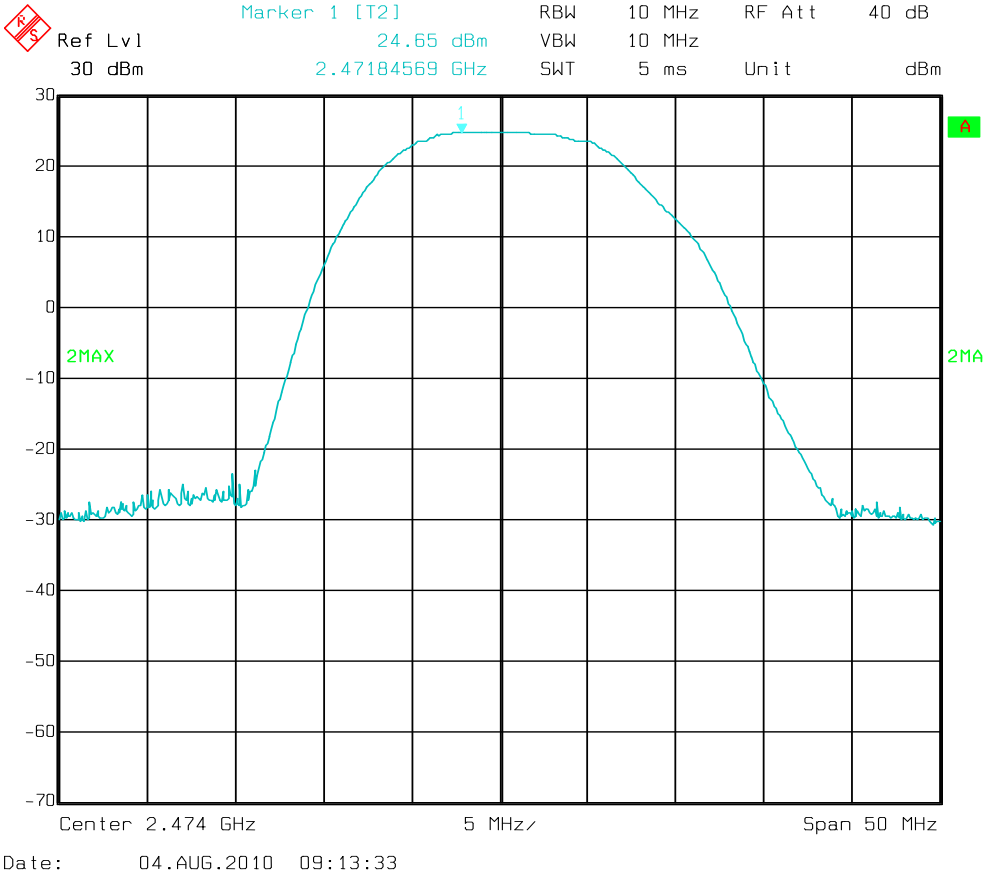
Plots:

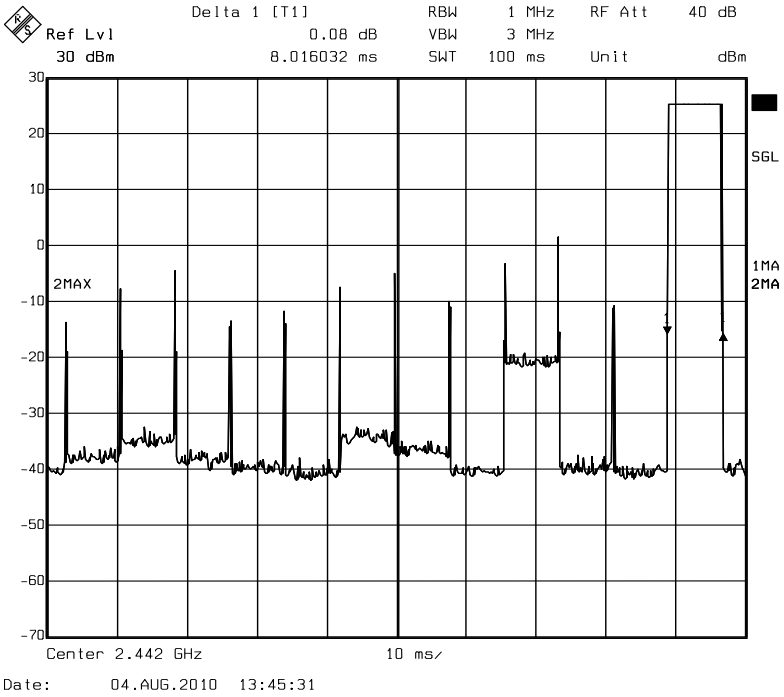




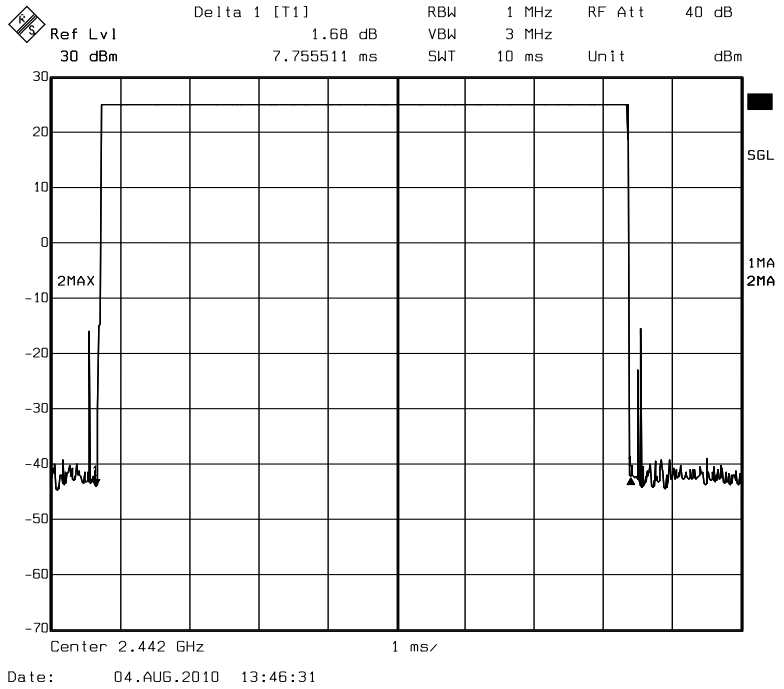

Marker 1 [T2]
RBW 10 MHz
RF Att 40 dB
Ref Lvl
24.65 dBm
VBW 10 MHz
30 dBm
2.47184569 GHz
SWT 5 ms
Unit dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
2MAX
2MA
A
Center 2.474 GHz
5 MHz/
Span 50 MHz
Date: 04.AUG.2010 09:13:33

Duty Cycle Computation

One emission in 100 ms



"Zoomed" in for accurate time



Duty Cycle = 7.75ms/100ms = 8%
Duty Cycle Factor = *-20 dB since duty cycle is <10%*

Carrier Frequency Separation

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.

A8.1(b)
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 band 2400-2483.5 MHz 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 0.125 W. 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.

Test Conditions:

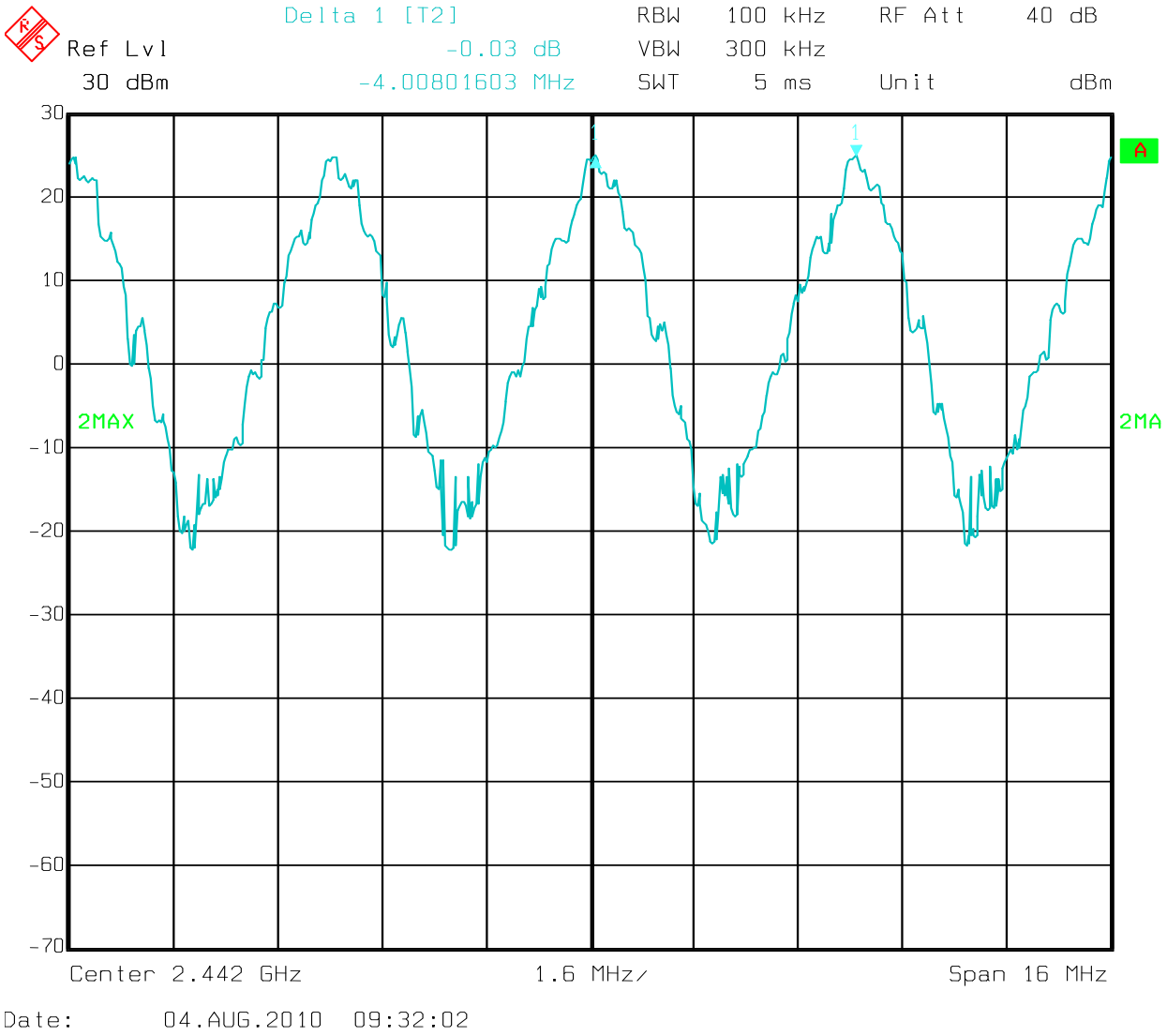
Sample Number:	GW2010	Temperature:	24
Date:	August 4, 2010	Humidity:	44%
Modification State:	Hopping	Tester:	A. Laudani
		Laboratory:	Ground Plane 2

Test Results:

Passed - See attached plots.

Additional Observations:

- Span is set wide enough to capture the peaks of two adjacent channels.
- RBW is 1% of the span.
- Sweep = Auto
- Detector function = peak.
- Trace = Max hold
- Measured Carrier Frequency Separation should be greater than 1.5MHz (⅔ of 20dB Bandwidth)



Carrier Frequency Separation: 4.0 MHz

Number of Hopping Frequencies

15.247(a)(1)(iii)
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

A8.1(d)
Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

Test Conditions:

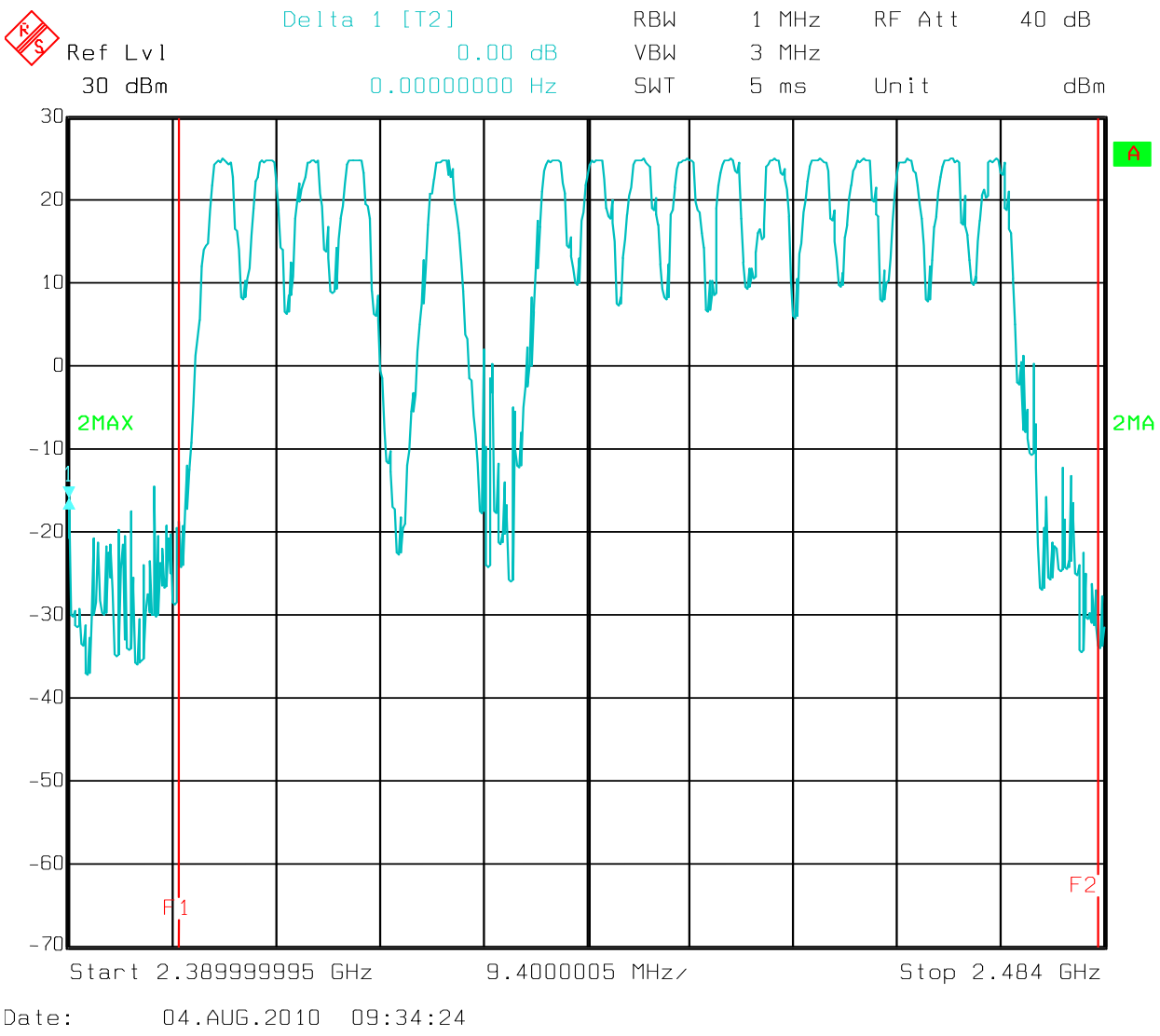
Sample Number:	GW2010	Temperature:	24
Date:	August 4, 2010	Humidity:	44%
Modification State:	Hopping	Tester:	A. Laudani
		Laboratory:	Ground plane 2

Test Results:

Passed - See attached plots.

Additional Observations:

- Span is set to the frequency band of operation.
- RBW is 1% of the span.
- Sweep = Auto
- Detector function = peak.
- Trace = Max hold



Number of Hopping Frequencies: 16

Time of Occupancy (Dwell Time)

15.247(a)(1)(iii)
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

A8.1(d)
Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. 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. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

Test Conditions:

Sample Number:	GW2010	Temperature:	21
Date:	August 4, 2010	Humidity:	50
Modification State:	Two adjacent channels	Tester:	A. Laudani
		Laboratory:	Shield Room 2

Test Results: 7.75 ms x 51 = 0.395s

Passed - See attached plots.

Additional Observations:

- Span is set to zero centered on a hopping channel.
- RBW is 1MHz.
- Sweep = 6.4 seconds (0.4 second x 16 hopping channels)
- Detector function = peak.
- Trace = Max hold

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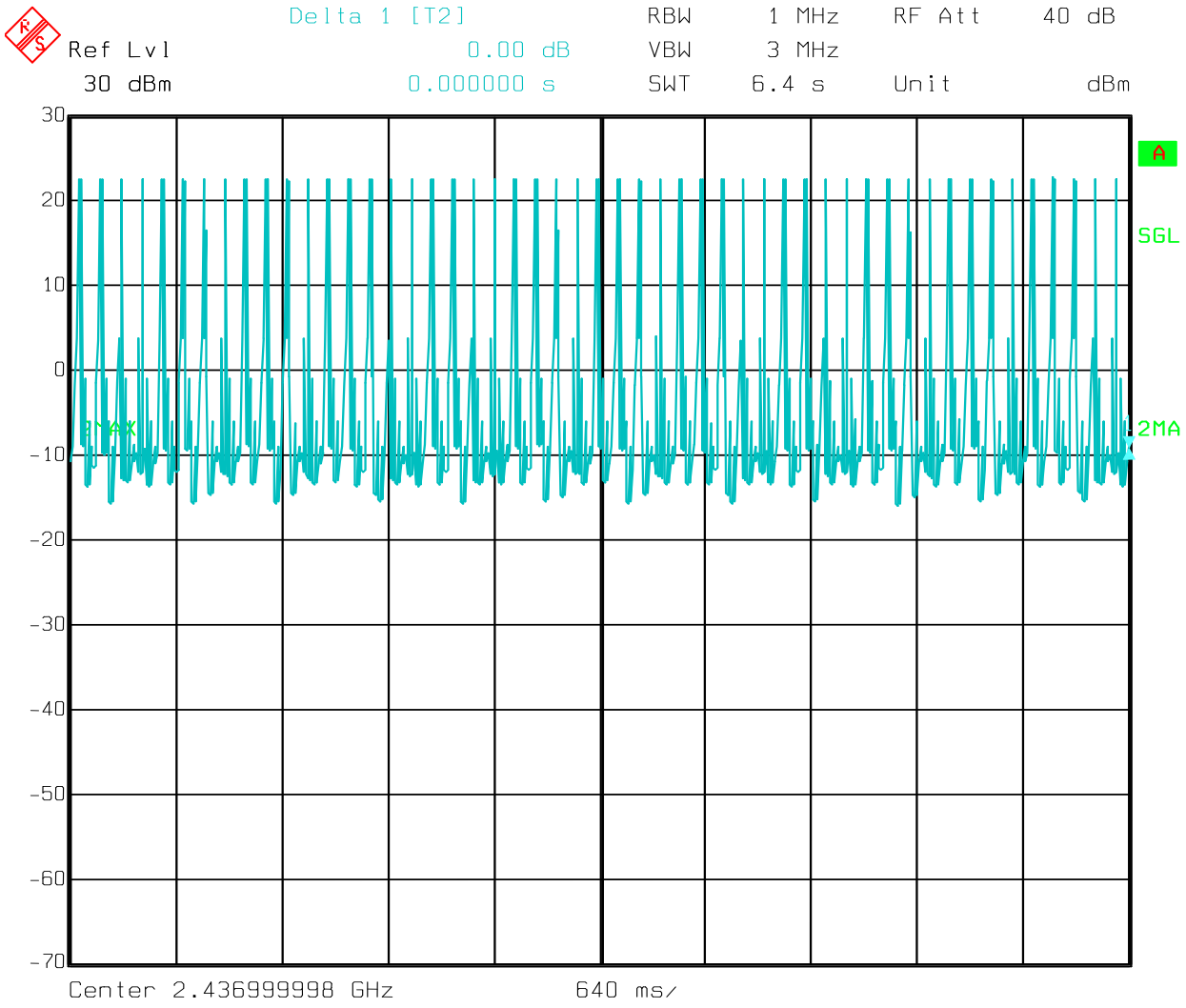
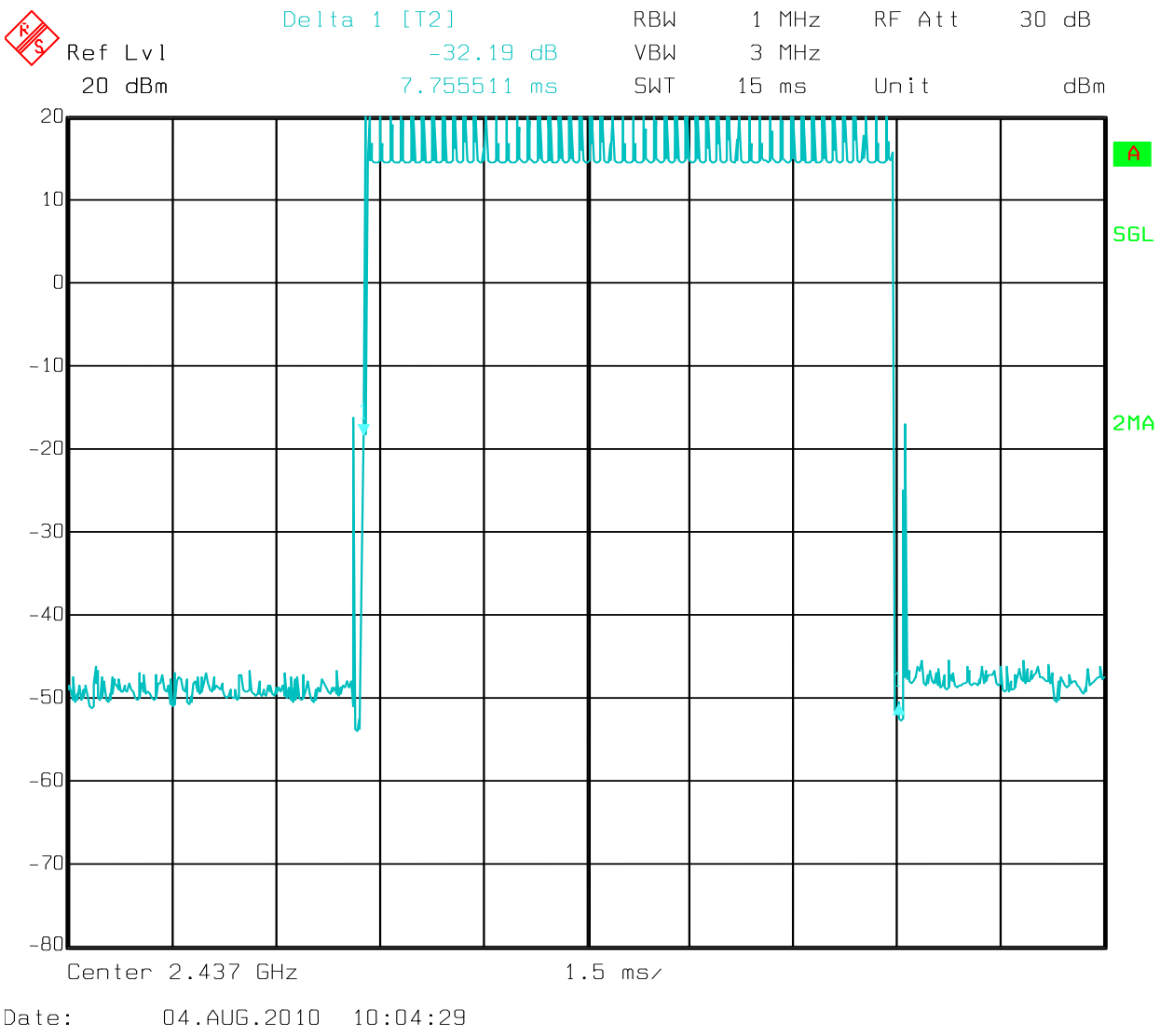
Count 51




Delta 1 [T2]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-32.19 dB
VBW 3 MHz
20 dBm
7.755511 ms
SWT 15 ms
Unit dBm
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
A
SGL
2MA
Center 2.437 GHz
1.5 ms/
Date: 04.AUG.2010 10:04:29

Radiated Emissions –Receive mode

RSS-GEN 4.8

Test Conditions:

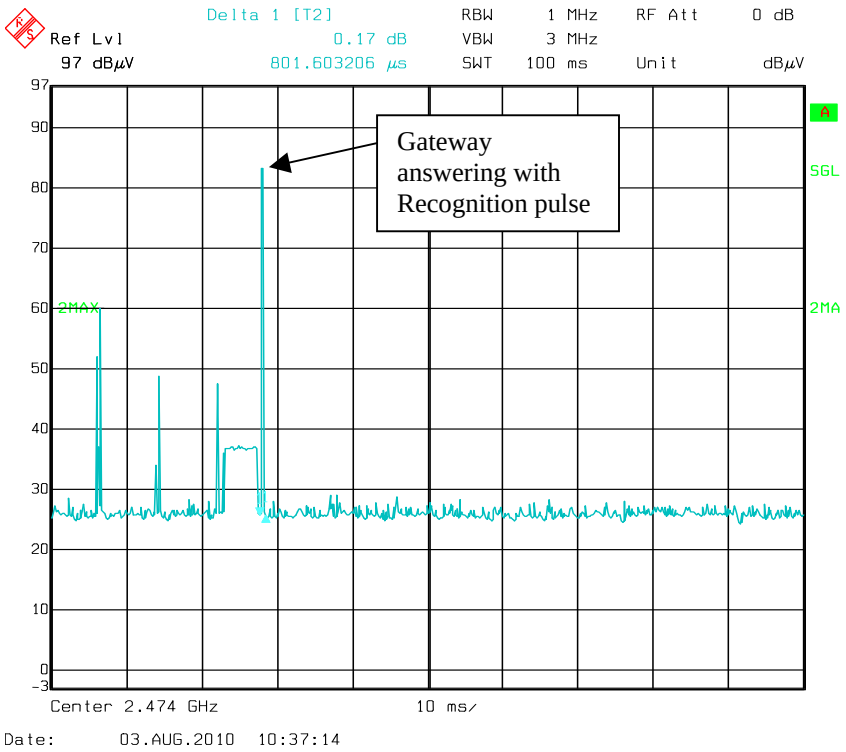
Sample Number:	GW2010	Temperature:	21
Date:	August 3, 2010	Humidity:	50
Modification State:	Receive	Tester:	A. Laudani
		Laboratory:	NEMKO OATS

Test Results:

Passed - See attached table
Limits meet Table 1 of RSS-Gen
Emissions were searched over a range of 30 MHz to 10000 MHz

Additional Observations:

Transmits only to answer Camera's transmitter:



Radiated Emissions Data

Job # :	54533-1	Date :	8-2-2010	Page	1 of 1
NEX #:	154507	Time :	1500		
		Staff :	aal		

Client Name :	AVAAK	EUT Voltage :	120
EUT Name :	Gateway	EUT Frequency :	60
EUT Model # :	GW2010	Phase:	1
EUT Serial # :	engr sample	NOATS	
EUT Config. :	Receiving and Transmitting normal use	SOATS	X
	Dual Camera	Distance < 1000 MHz:	10 m
		Distance > 1000 MHz:	3 m

Specification :	CFR47 Part 15, Subpart B, Class B			
Loop Ant. #:	NA			
Bicon Ant.#:	114_3m	Temp. (°C) :	21	
Log Ant.#:	110_3m	Humidity (%) :	50	
DRG Ant. #	752	Spec Analyzer #:	898	835
Cable LF#:	SOATS	Analyzer Display #:	898	835
Cable HF#:	40ft_blue	Quasi-Peak Detector #:	na	
Preamp LF#:	NA	Preselector #:	na	
Preamp HF#	317			

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average	RBW:	1 MHz
	Video Bandwidth	10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading **Vertical**	Meter Reading **Horizontal**	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
33.0	14.0	13.0	Q	-	1.0	14.0	27.3	40.0	-12.7	Pass	
48.0	14.2	16.4	Q	-	1.0	16.4	28.6	40.0	-11.4	Pass	
125.0	14.2	13.8	Q	-	1.0	14.2	27.7	43.5	-15.8	Pass	
216.0	13.3	15.6	Q	-	1.0	15.6	28.9	46.0	-17.1	Pass	
250.0	13.7	21.1	Q	-	1.0	21.1	35.2	46.0	-10.8	Pass	
300.0	16.5	15.0	Q	-	1.0	16.5	33.4	46.0	-12.6	Pass	
350.0	16.1	9.2	Q	-	1.0	16.1	33.8	46.0	-12.3	Pass	
400.0	15.4	9.1	Q	-	1.0	15.4	34.3	46.0	-11.7	Pass	
450.0	13.3	8.7	Q	-	1.0	13.3	32.6	46.0	-13.4	Pass	
500.0	3.7	6.5	Q	-	1.0	6.5	27.2	46.0	-18.8	Pass	
550.0	8.1	6.2	Q	-	1.0	8.1	30.2	46.0	-15.9	Pass	
600.0	9.4	11.4	Q	-	1.0	11.4	34.3	46.0	-11.7	Pass	