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CERTIFICATION TEST REPORT

PART 15.247C

For The Wireless Camera
Model: Vue Camera

FCC ID: WD9-VC2MP

PREPARED FOR:

Avaak, Inc.
5405 Morehouse Dr
San Diego, CA 92121

Prepared on: Jnne 24, 2008

Report Number: 2008 06108695W FCC

Project Number: 103738-1

NEx Number: 108695

Total Pages: 27

DOCUMENT HISTORY

REVISION	DATE	COMMENTS
-	Jnne 24, 2008	Prepared By: Alan Laudani
-	Jnne 24, 2008	Initial Release: Alan 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 June 16, 2008.
- Testing was performed on the unit described in this report on June 16, 2008 to June 20, 2008
- 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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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.

Alan Laudani
EMC Engineer

1. ADMINISTRATIVE DATA AND TEST SUMMARY

Administrative Data

CLIENT:	Avaak, Inc. 5405 Morehouse Dr San Diego, CA 92121
CONTACT: E-Mail:	Giora Goldman giora@avaak.com
DATE (S) OF TEST:	June 16, 2008 to June 20, 2008
EQUIPMENT UNDER TEST (EUT):	Wireless Camera
MODEL: SERIAL NUMBER:	Vue Camera 001
CONDITION UPON RECEIPT:	Suitable for Test
TEST SPECIFICATION:	FCC, Part 15.247, Subpart C Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands and 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

Test Summary

Specification	***Frequency Range***	***Compliance Status***
FCC, CFR 47, Section 15.207	0.15 MHz - 30.00 MHz	NA[1]
FCC, CFR 47, Section 15.209	30 MHz – 10th Harmonic	PASS
FCC CFR 47, §15.247 Plus Bandedge	2404 – 2474 MHz	PASS
RSS-210 - Low Power License Exempt Radio-communication Devices (All Frequency Bands)	2404 – 2474 MHz	PASS

Not Applicable, EUT is battery powered.[1]
The product is scanned from 30MHz to 10th harmonic of the highest fundamental frequency.

Refer to the test results section for further details.

Alan Laudani
EMC Engineer

2. SYSTEM CONFIGURATION

Description and Method of Exercising the EUT

The Vue Camera is a Wireless Camera. It takes continuous video streaming using frequency hopping using frequencies from 2404 to 2474 MHz transmitting to the Vue Network, which forwards this via Ethernet to a computer. It was designated Hand Held by the manufacturer.
It is powered by battery.

The EUT's performance during test was evaluated against the performance criterion specified by applicable test standards. Performance results are detailed in the test results section of this report.

System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Wireless Camera	Avaak, Inc. Model: Vue Camera Serial #: 001	NA

Samples Submitted for Assessment

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

Device Interconnection and I/O Cables

Connection	I/O Cable
No connections	

Design Modifications for Compliance

The following design modifications were made to the EUT during testing.

No design modifications were made to the EUT during testing.

Technical Specifications of the EUT

Manufacturer: Avaak, Inc.

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

Measured Power: 0.036 W

Modulation: Digital

Antenna Connector: Antenna of 0 dBi Integral with RF circuitry.

Power Source: 3 VDC Battery

3. DESCRIPTION OF TEST SITE AND ENVIRONMENT

Description of Test Site

The test site is located at 11696 Sorrento Valley Road, Suite F, San Diego, CA 92121. The site is physically located 18 miles Northwest of downtown San Diego. The general area is a valley 1.5 miles east of the Pacific Ocean. This particular part of the valley tends to minimize ambient levels, i.e. radio and TV broadcast stations and land mobile communications. The three and ten-meter Open Area Test Site (OATS) is located behind the office/lab building. It conforms to the normalized site attenuation limits and construction specifications as set in the EN 55022 (1987), CISPR 16 and 22 (1985) and ANSI C63.4-2001 documents. The OATS normalized site attenuation characteristics are verified for compliance every year, and registered with the Federal Communications Commission under Registration Number 90579 and Industry Canada under 2040B-1 and 2040B-2.

Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	17 – 32 ^{O}C
Humidity range	:	29 - 50%
Pressure range	:	87 - 105 kPa

4. DESCRIPTION OF TESTING METHODS

Introduction

As required in 47 CFR, Parts 2 and 15, the methods employed to test the radiated and conducted emissions (as applicable) of the EUT are those contained within the American National Standards Institute (ANSI) document ANSI C63.4–2003, titled "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." All applicable FCC Rule Sections that provide further guidance for performance of such testing are also observed.

For General Test Configuration please refer to Figure 1 on the following page.

Digital devices sold in Canada are required to comply with the Interference Causing Equipment Standard for Digital Apparatus, ICES-003. These test methods and limits are specified in the Canadian Standards Association's (CSA) Standard C108.8-M1983 (1-1-94 version) and are "essentially equivalent" with FCC, Part 15 and CISPR 22 (EN55022) rules for unintentional radiators per EMCAB-3, Issue 3 (May 1998). No further testing is required for compliance to ICES-003.

Configuration and Methods of Measurements for Conducted Emissions

Section 7 of ANSI C63.4 determines the general configuration of the EUT and associated equipment, as well as the test platform for conducted emissions testing. Tabletop devices are placed on a non-conducting surface 80 centimeters above the ground plane floor and 40 centimeters from the ground plane wall. The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. The EUT is powered via a Line Impedance Stabilization Network (LISN). The emissions are recorded using the required bandwidth of 9 kHz in the quasi-peak mode. The average amplitude is also observed employing a 10 kHz bandwidth to determine the presence of broadband RFI. When such interference is caused by broadband sources (as defined by the FCC and ANSI Rules), the deviation guidelines contained in Section 11.3.1 of ANSI C63.4 are employed, which allows a correction factor of 13 dB to be subtracted from the quasi-peak reading. The emission levels are then compared to the applicable FCC limits to determine compliance.

Configuration and Methods of Measurements for Frequency Identification

When performing all testing of equipment, the actual emissions of the EUT are segregated from ambient signals present within the laboratory or the open-field test range. Preliminary testing is performed to ensure that ambient signals are sufficiently low to allow for proper observation of the emissions from the EUT. Incoming power lines are filtered using a 120 dB, 30-ampere; 115/208-volt filter to assist in reducing ambient signals for tests of levels of conducted emissions. Ambients within the laboratory are compared to those noted at the nearby open-field site to discriminate between signals produced from the EUT and ambient signals. In the event that a significant emission is produced by the EUT at a frequency which is also demonstrating significant ambient signals, the spectrum analyzer is placed in the peak mode, the bandwidth is narrowed, the EUT's signal is centered on the analyzer, the scan width is expanded to 50 kHz while monitoring the audio to ensure that only the EUT signal is present, the analyzer is switched to quasi-peak mode, and the level of the EUT signal is recorded.

Configuration and Methods of Measurements for Radiated Emissions

Section 8 of ANSI C63.4 determines the general configuration and procedures for measuring the radiated emissions of equipment under test. Initially, the primary emission frequencies are identified inside the test lab by positioning a broadband receive antenna one meter from the EUT to locate frequencies of significant radiation. Next, the EUT and associated system are placed on a turntable on a ten meter open area test site (registered with the FCC in accord with its Rules and ANSI C63.4) and the receive antenna is located at a distance of ten meters from the EUT.

The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. All significant radiated emissions are recorded when maximum radiation on each frequency is observed, in accordance with part 8 of ANSI C63.4–2003 and Section 15.33 of the FCC Rules. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to horizontal and vertical polarities, and the turntable is also rotated to determine the worst emitting configuration. The numerical results of the test are included herein to demonstrate compliance.

The numerical results that are applied to the emissions limits are arrived at by the following method:
Example: A=RR+CL+AF
A = Amplitude dBuV/m
RR = Receiver Reading dBuV
CL = cable loss dB
AF = antenna factor dB/m

Example Frequency = 110MHz
18.5 dBuV (spectrum analyzer reading)
+3.0 dB (cable loss @ frequency)
21.5 dBuV
+15.4 dB/m (antenna factor @ frequency)
36.9 dBuV/m Final adjusted value

The final adjusted value is then compared to the appropriate emission limit to determine compliance.

5. Test Results

Radiated Emissions Test Data

Radiated Emissions Data

Job # :	13738-1	Date :	6-18-08	Page	1 of 1
NEX #:		Time :	1330		
		Staff :	AAL		
Client Name :	Avaak			EUT Voltage :	120
EUT Name :	Wireless Camera			EUT Frequency :	60
EUT Model # :	Vue Camera			Phase:	1
EUT Serial # :	001			NOATS	
EUT Config. :	transmit			SOATS	X
				Distance < 1000 MHz:	3 m
				Distance > 1000 MHz:	3 m
Specification :	CFR47 Part 15, Subpart c, 15.247 & **15.205--15.209**				
Loop Ant. #:	NA				
Bicon Ant.#:	NA	Temp. (°C) :	28		
Log Ant.#:	NA	Humidity (%) :	44		
DRG Ant. #	529	Spec An.#:	835		
Cable LF#:	SOATS	Spec An. Display #:	835		
Cable HF#:	40FT	QP #:	NA		
Preamp LF#:	NA	PreSelect#:	NA		
Preamp HF#	317	Duty Cycle Factor	-20 dB		

Quasi-Peak	RBW:	120 kHz
	Video Bandwidth	300 kHz
Peak	RBW:	1 MHz
	Video Bandwidth	3 MHz
Average=	Peak - DCF	

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
2400.0	31.3	28.2	P		1.0	31.3	65.6	96.2	-30.6	Pass	100 kHz RBW
2400.0			A		1.0		45.6	76.2	-30.6	Pass	Limit is 20 dBc
2404.0	76.5	70.5	P		1.1	76.5	110.8	116.2	-5.4	Pass	RBW 3MHz
											VBW 5MHz
4808.0	66.8	65.0	P		1.0	66.8	72.6	**74.0**	-1.4	Pass	
4808.0	31.7	45.0	A		1.0	45	50.8	**54.0**	-3.2	Pass	
7212.0	57.1	48.8	P		1.0	57.1	71.6	**74.0**	-2.4	Pass	
7212.0	37.1	28.8	A		1.0	37.1	51.6	**54.0**	-2.4	Pass	
2440.0	72.2	67.9	P		1.0	72.2	106.5	116.2	-9.7	Pass	RBW 3MHz
											VBW 5MHz
4880.0	69.3	66.1	P		1.0	69.3	73.5	**74.0**	-0.5	Pass	
4880.0	49.3	46.1	A		2.0	49.3	53.5	**54.0**	-0.5	Pass	
7320.0	56.2	48.2	P		1.0	56.2	70.8	**74.0**	-3.1	Pass	
7320.0	36.2	28.2	A		1.0	36.2	50.8	**54.0**	-3.1	Pass	
12200.0	39.6	37.5	P		1.0	39.6	64.1	**74.0**	-9.9	Pass	
12200.0	19.6	17.5	A		1.0	19.6	44.1	**54.0**	-9.9	Pass	
					1.0						
2474.0	72.2	66.9	P		1.0	72.2	106.5	116.2	-9.7	Pass	RBW 3MHz
											VBW 5MHz
4948.0	63.8	57.4	P		1.0	63.8	69.8	**74.0**	-4.2	Pass	
4948.0	43.8	37.4	A		1.0	43.8	49.8	**54.0**	-4.2	Pass	
7422.0	52.2	46.2	P		1.0	52.2	67.1	**74.0**	-6.9	Pass	
7422.0	32.2	26.2	A		1.0	32.2	47.1	**54.0**	-6.9	Pass	
											Band Edge
2483.5	26.4	25.4	P		1.0	31.2	60.7	**74.0**	-13.3	Pass	
2483.5	6.4	5.4	A		1.0	12.9	40.7	**54.0**	-13.3	Pass	

Measurement Notes:

- Emissions reported above, Emissions were searched over a range of 30 MHz to 25000 MHz
- Emissions were measured after installing a fresh battery.
- No other emissions found within 20 dB of the limits or within 20 dB of the output power when using a 100 kHz bandwidth.
- No emissions found while the transmitter is off—in receive mode.
- The EUT was translated thru three axes. Highest emissions recorded.
- Average = Peak + Duty Cycle Factor
- Fundamentals measured with a 3 MHz RBW and 5 MHz VBW as the 20 dB BW was 2.3 MHz.

Example Frequency = 2404 MHz

76.5 dBuV (spectrum analyzer reading)

+5.9 dB (cable loss @ frequency)

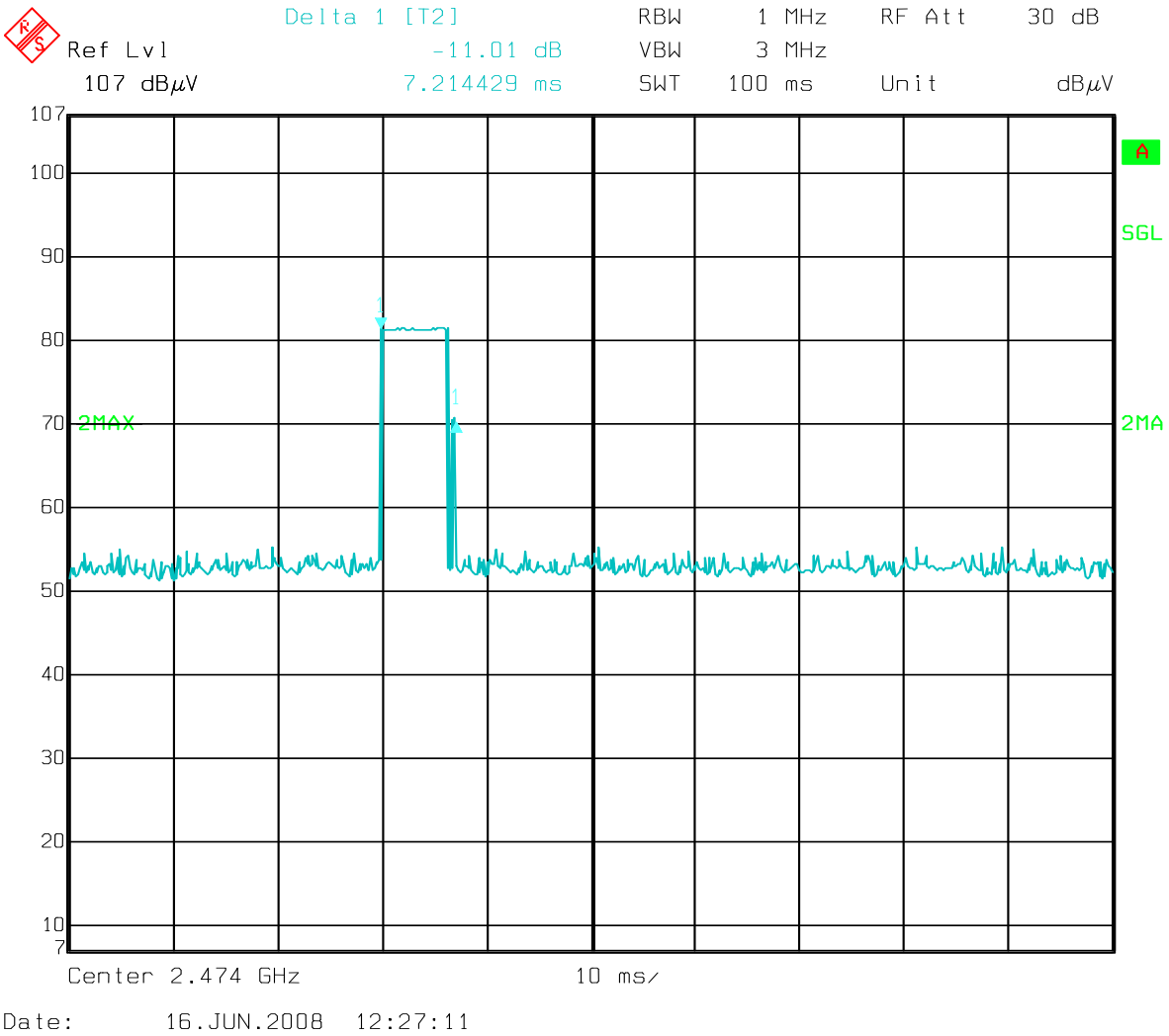
+28.4 dB/m (antenna factor @ frequency)

110.8 dBuV/m Final adjusted value

Duty Cycle Measurement

RSS-210 Annex 8.1(4)

Duty cycle = 7.2 ms in 100 ms
Duty cycle = 0.07
Duty Cycle Factor = 20*log(.07) = -23.1dB
FCC limits DCF to –20dB



Bandwidth

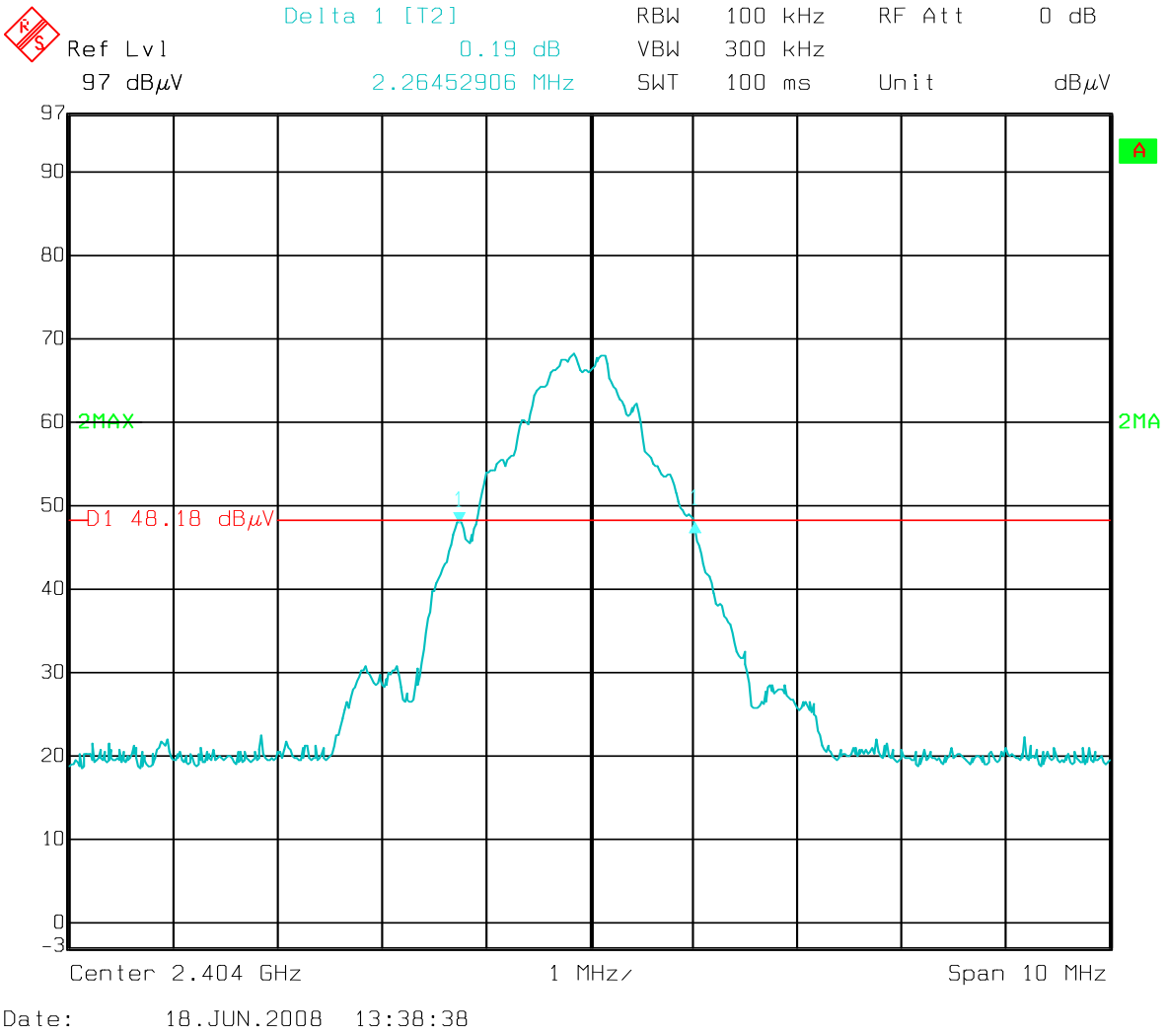
RSS-210 Annex 8.1(4)

(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB 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 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

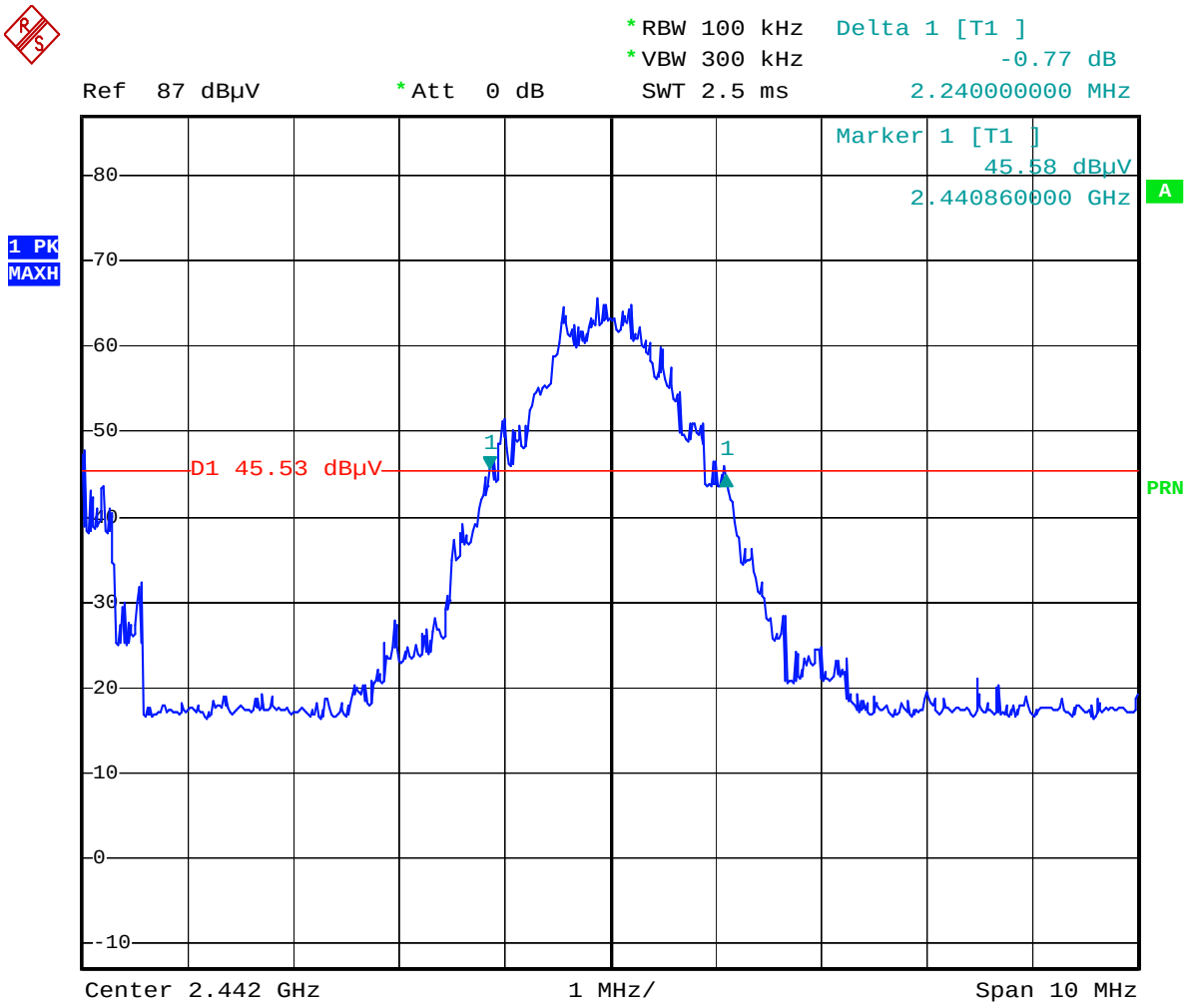
15.247(a)(1) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 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.

Test Results:

20 dB Bandwidth		
Low Channel	**Mid Channel**	**High Channel**
2.26 MHz	2.24 MHz	2.32 MHz


Delta 1 [T2]
RBW 100 kHz
RF Att 0 dB
Ref Lvl
0.19 dB
VBW 300 kHz
97 dBµV
2.26452906 MHz
SWT 100 ms
Unit dBµV
97
90
80
70
60
50
40
30
20
10
0
-3
2MAX
D1 48.18 dBµV
1
A
2MA
Center 2.404 GHz
1 MHz/
Span 10 MHz
Date: 18.JUN.2008 13:38:38

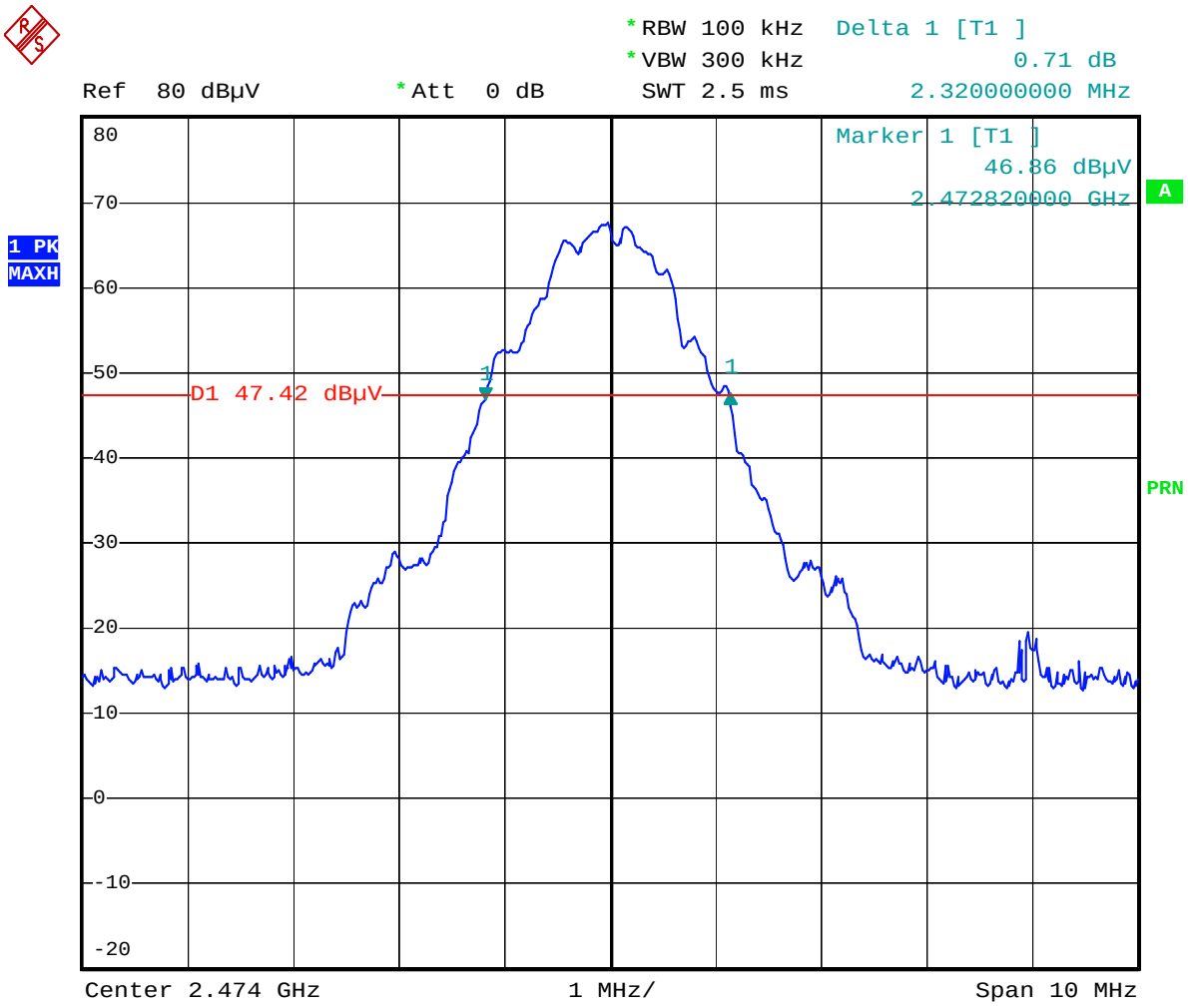
Low Channel



Date: 23.JUN.2008 15:48:43

Mid Channel

High Channel



Date: 24.JUN.2008 13:11:49

Power Level and Radiated Spurious Emissions

RSS-210 Annex 8.4(2)
(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB 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 25kHz or two-thirds of the 20dB 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 of 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.

The EUT was tested in three orthogonal orientations and the worst-case emissions are presented below.
The EUT had no conducted emissions measurement capacity therefore radiated emission measurements were performed.
Power Level Limits 125 mWatt or 116.2 dBuV/m @3m. EUT complies.

$10^{[(\text{Field Strength in dBuV/m} - 120)/20]}$ = Field Strength in V/m

$[(\text{Field Strength in V/m} \times 3\text{m})/5.5]^2$ = Power in Watts

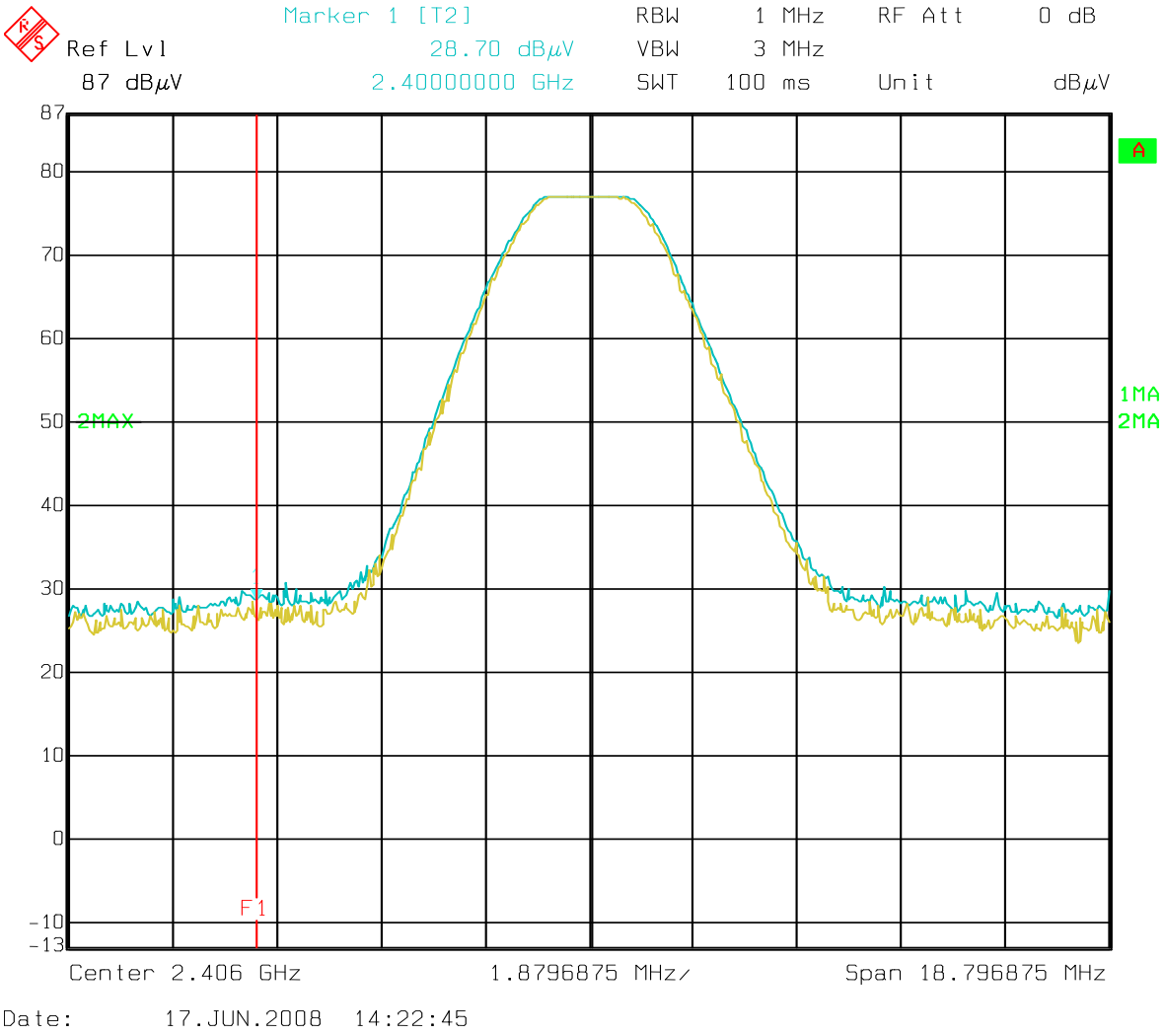
Max HOLD Measured 110.8 dBuV/m @ 3m which translates to a RF power of 0.036 W.

Test Results: from table page 11

Radiated Power		
Low Channel	**Mid Channel**	**High Channel**
110.8 dBuV/m	106.5 dBuV/m	106.5 dBuV/m
15.6 dBm 36 mW	11.3 dBm	11.3 dBm

Antenna has 0dBi gain, therefore conducted output power is equivalent to radiated output power.

Lower Band Edge Non-Hopping



Sample Computations:
Max Reading= Meter Reading +Antenna Factor +Cable Loss

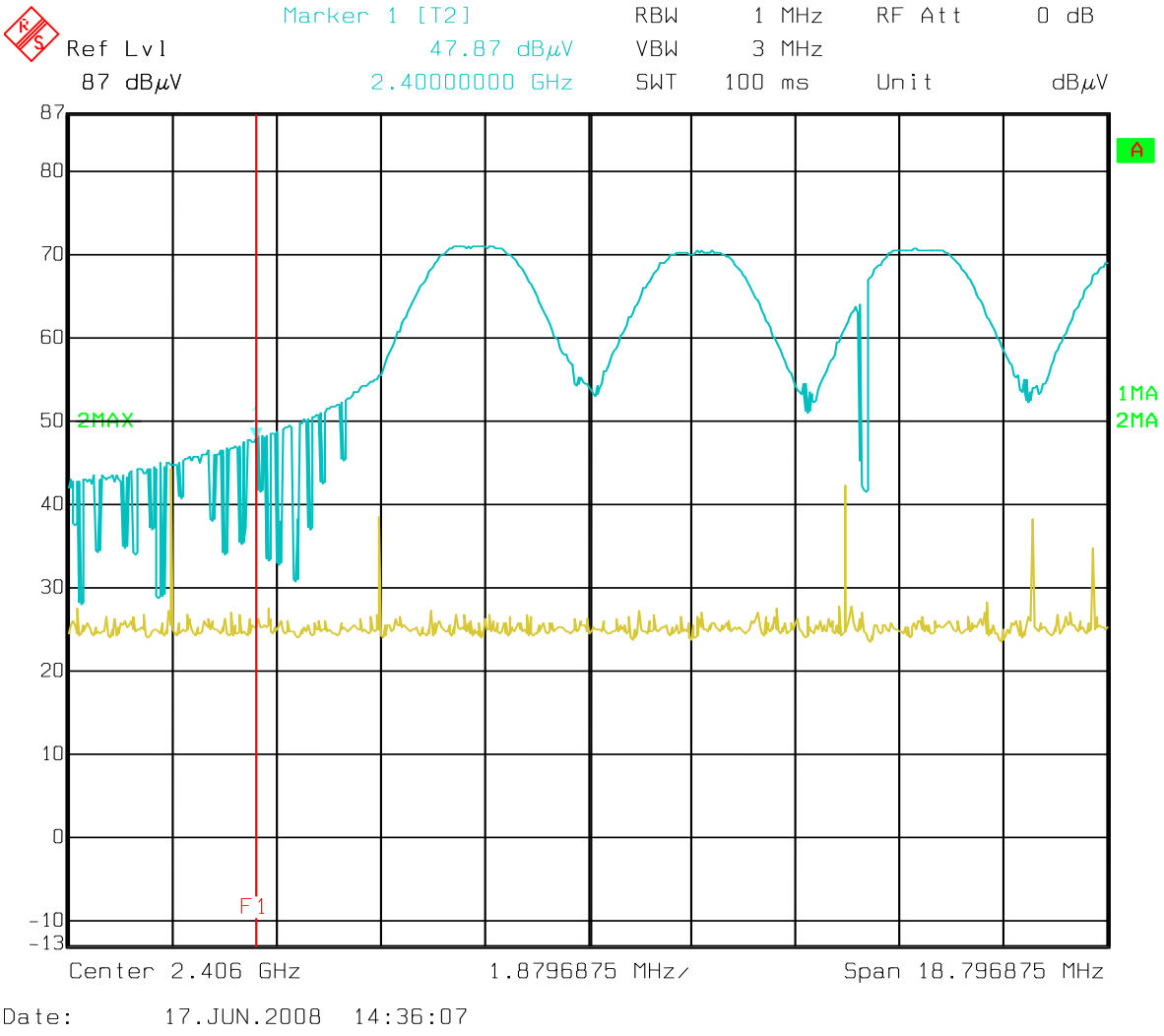
Limit = 20 dBc

Peak 28.7 Measured + 28.4 antenna factor + 5.9 cable loss = 63 dBµV/m

Limit = 110.8 dBµV/m –20 dBc = 90.8 EUT complies

Average = Peak – 20 dB = 43 dBµV/m

Lower Band Edge Hopping

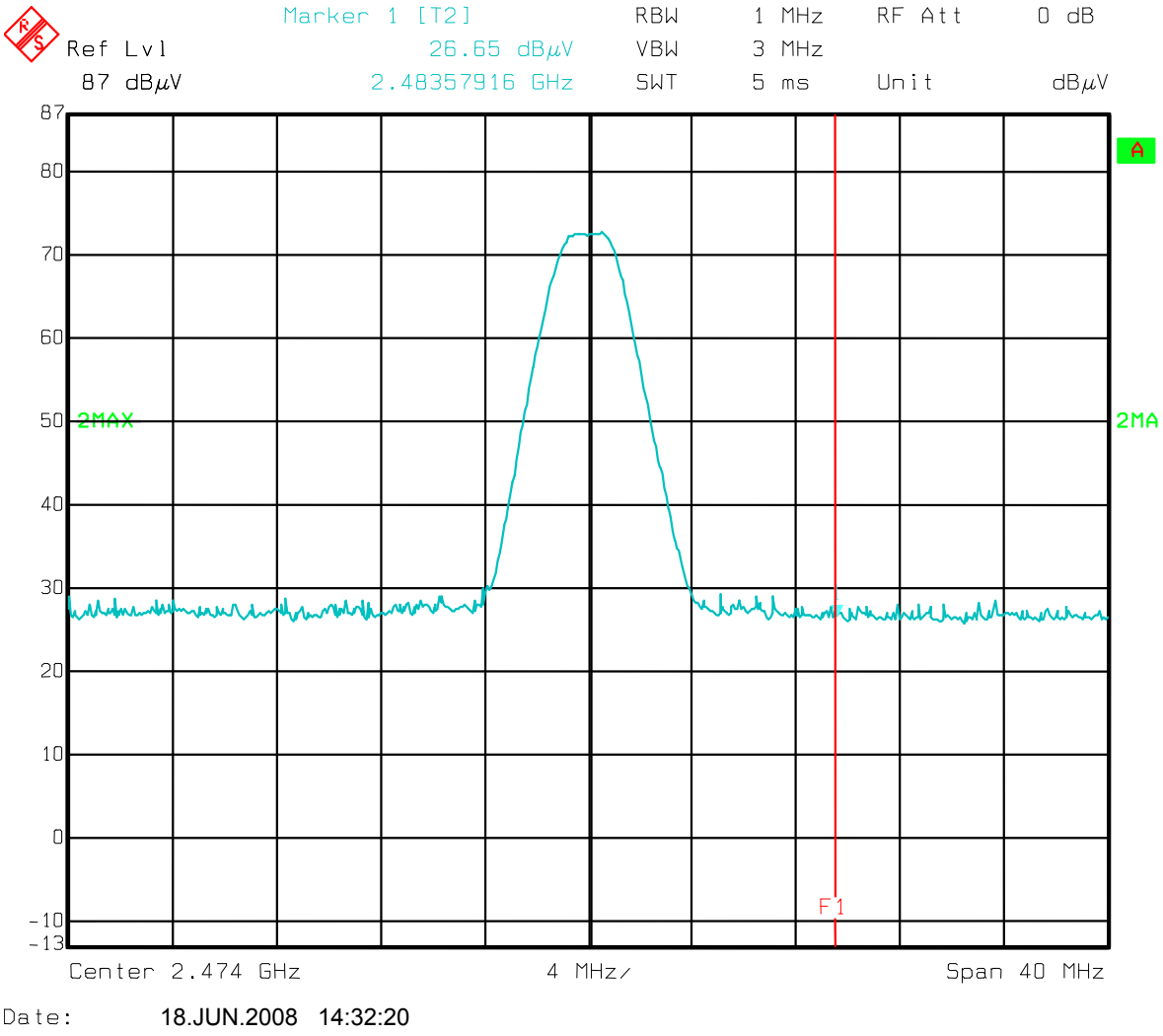


Peak 47.9 + 28.4 + 5.9 = 82.2 dBµV/m

Limit = 110.8 dBµV/m –20 dBc = 90.8 EUT complies

Average = Peak – 20 dB = 62.2 dBµV/m

Upper Band Edge Non-Hopping



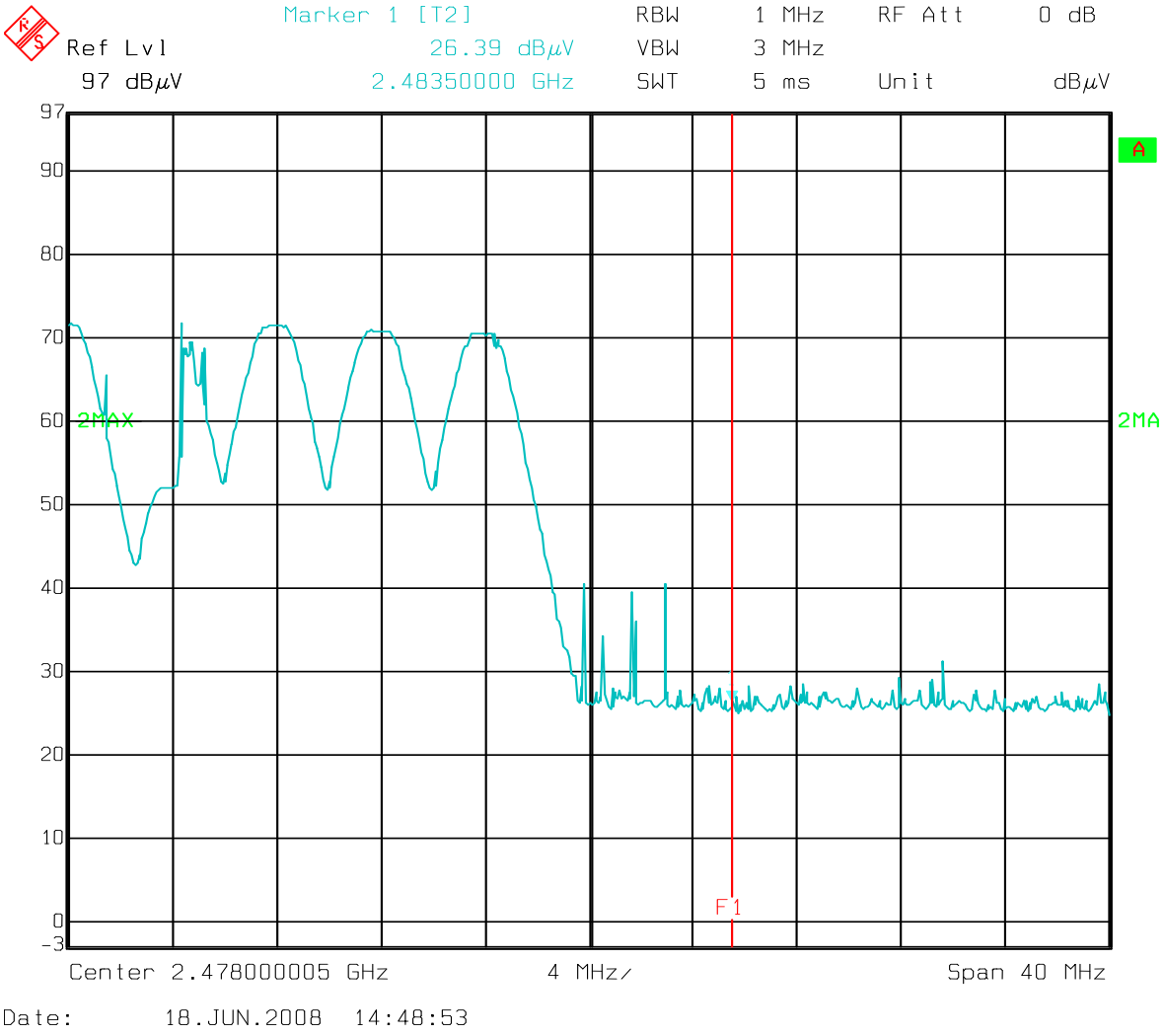
Peak 26.6 + 28.4 + 5.9 = 60.9 dBµV/m

Limit = 74 dBµV/m EUT complies

Average = Peak – 20 dB = 40.9 dBµV/m

Limit = 54 dBµV/m EUT complies

Upper Band Edge Hopping



Peak 26.4 + 28.4 + 5.9 = 60.7dBµV/m

Limit = 74 dBµV/m EUT complies

Average = Peak – 20 dB = 40.7 dBµV/m

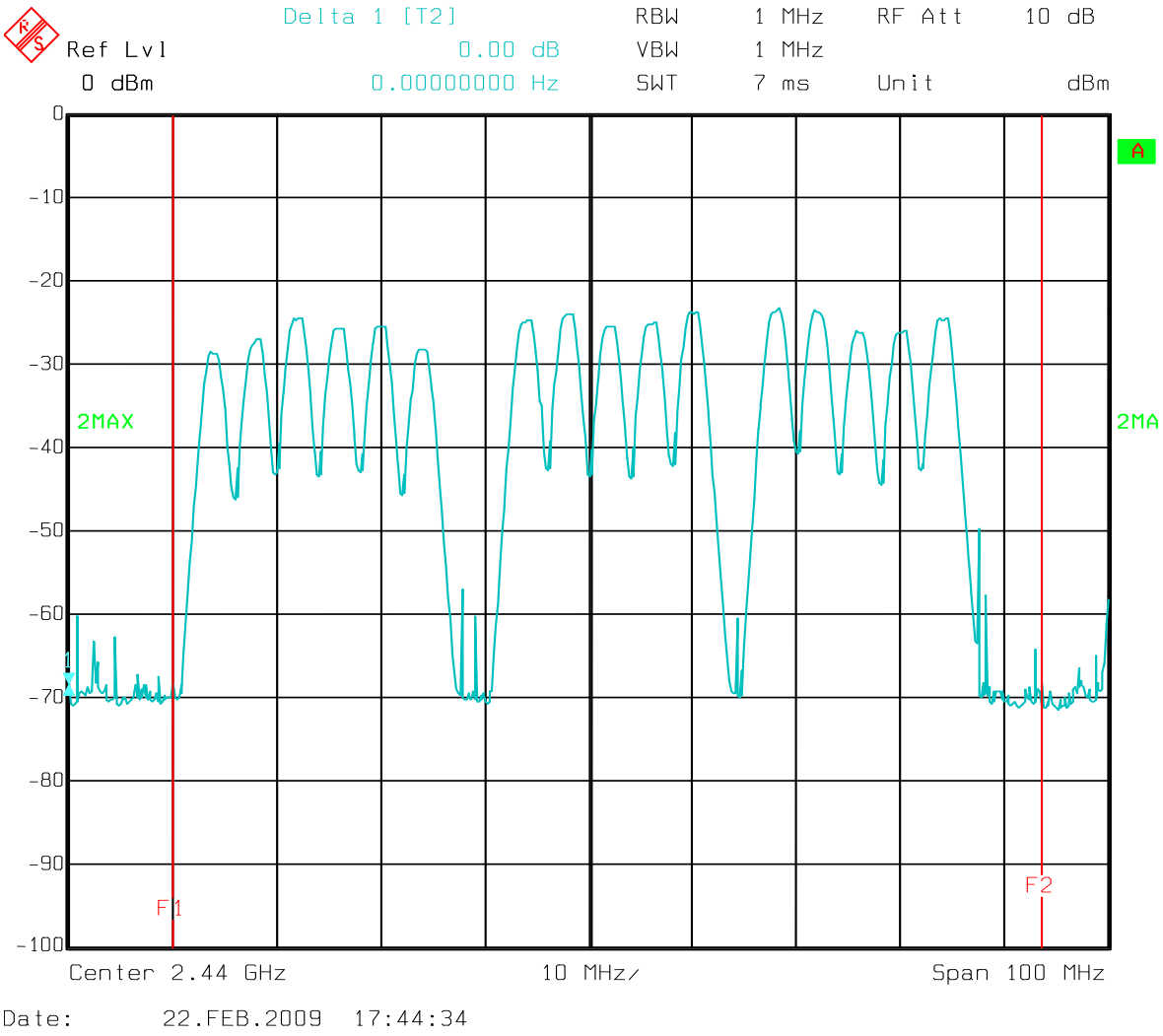
Limit = 54 dBµV/m EUT complies

Number of Hopping Channels

RSS-210 Annex 8.1(4)

(iii) Frequency hopping systems in the 2400-2483.5 MHz band may utilize hopping channels whose 20dB bandwidth is greater than 1 MHz provided the systems use at least 15 non-overlapping channels. The total span of hopping channels shall be at least 75 MHz.

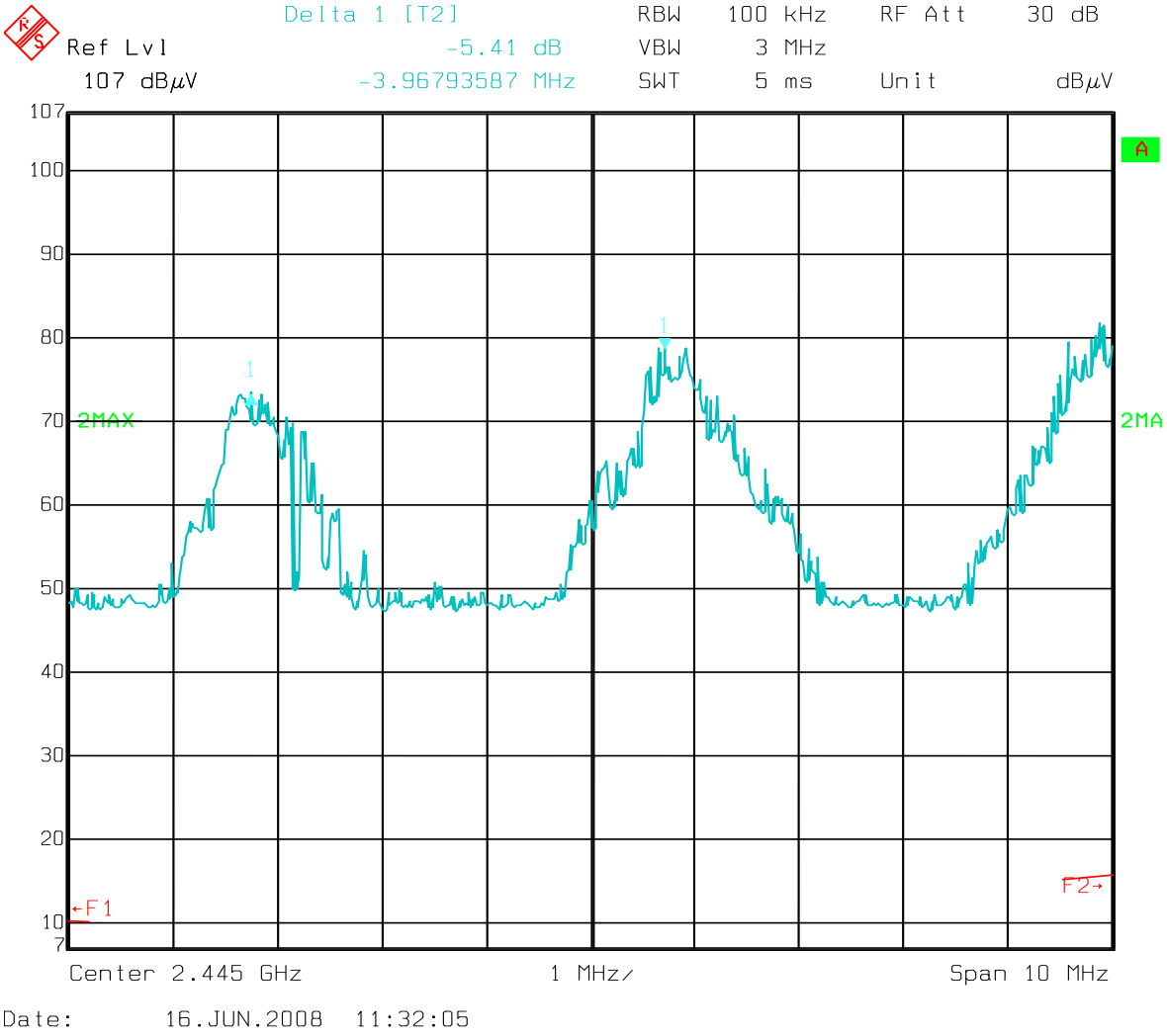
16 hopping channels



Channel Separation

15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB 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 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

Frequency Separation: **3967 MHz**



Time of Occupancy

RSS-210 Annex 8.1(4)

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.

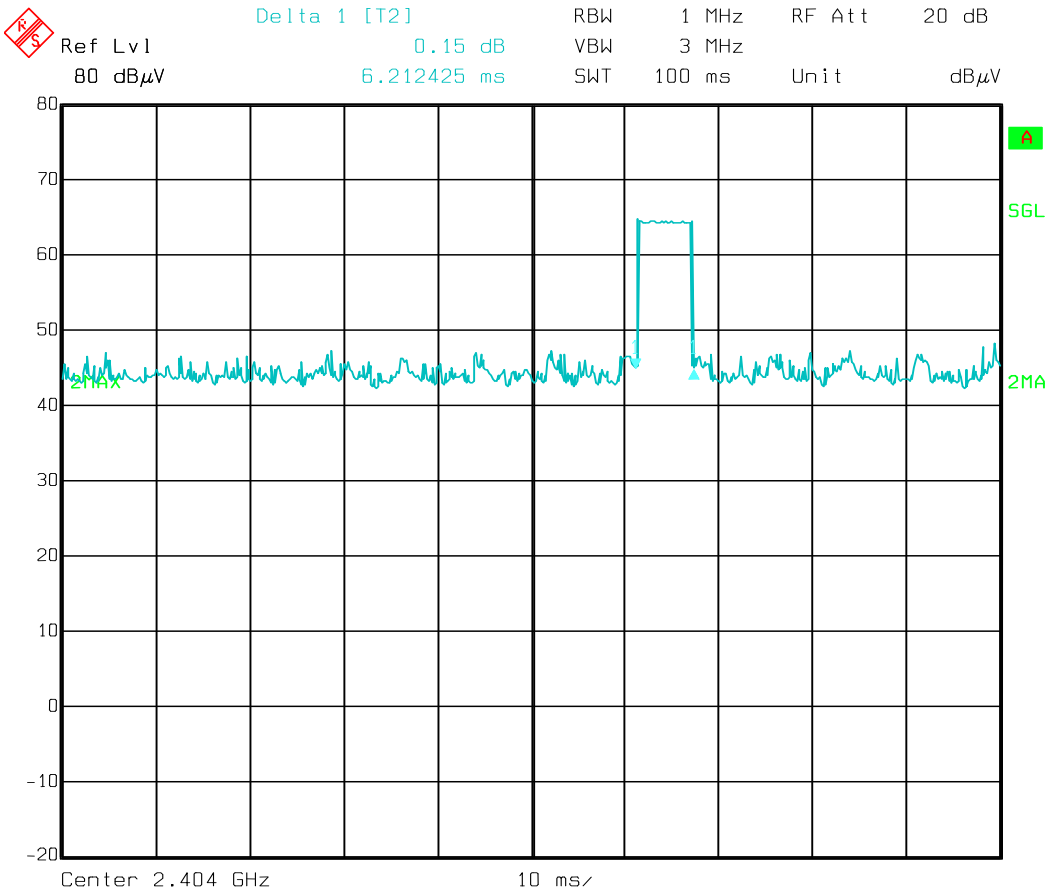
16 channels x 0.4 Seconds = 6 seconds.

6.2 ms on time each time emission is on in channel selected at random.

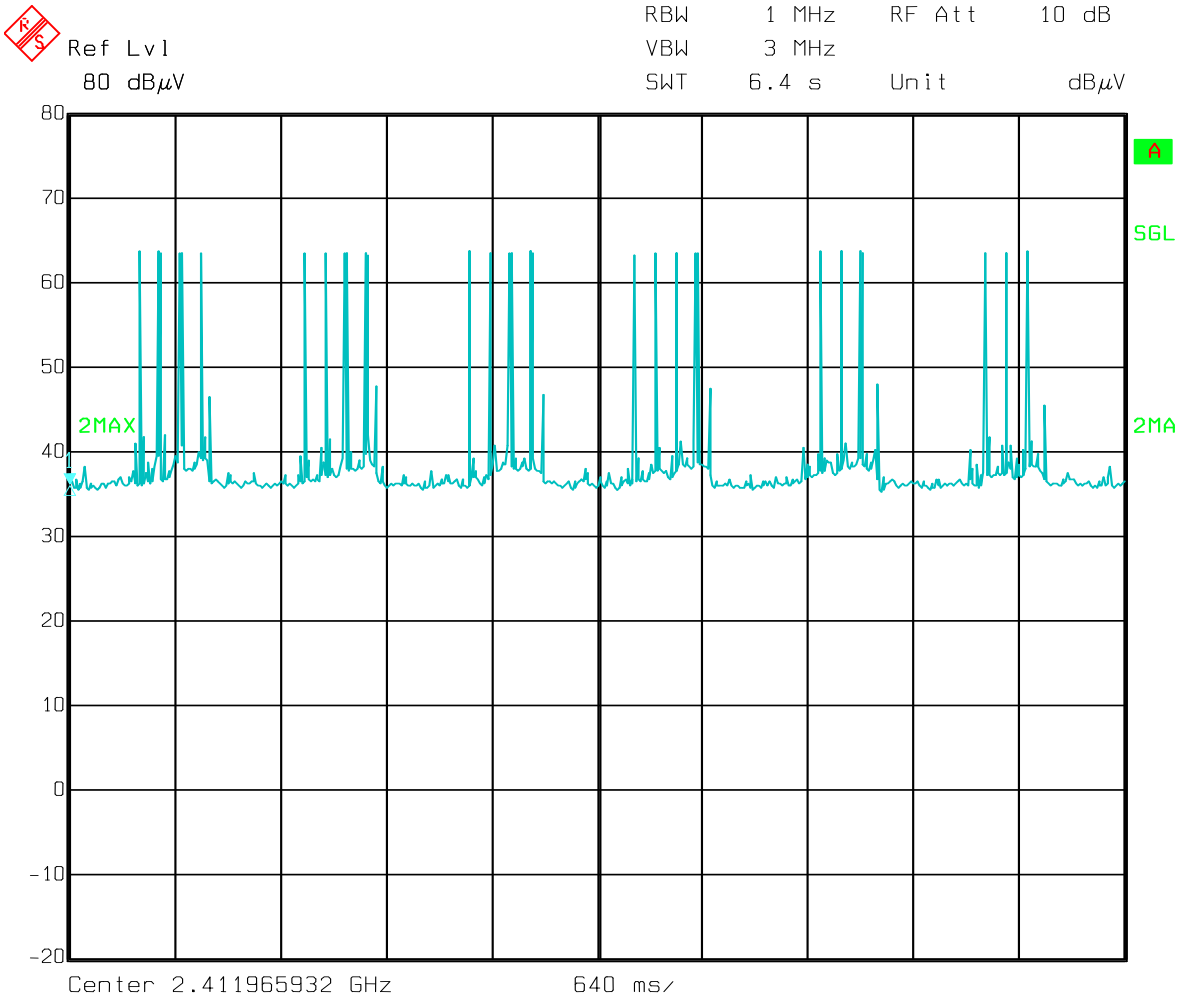
20 count for channel emissions in 6.4 seconds – page 26.

20 x 6.2ms = 124 ms

124 ms < 0.4 seconds



Count 40 Channel Emissions in 6.4 seconds.



Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
115	Antenna, Bicon	EMCO	3104	3020	10-Jan-08	10-Jan-09
110	Antenna, LPA	EMCO	3146	12217	28-Aug-07	28-Aug-08
317	Amplifier	HP	8449A	2749A00167	28-Aug-07	28-Aug-08
529	Antenna, DRWG	EMCO	3115	25056	27-Aug-07	27-Aug-08
625	Antenna, Dbl Ridge Horn	EMCO	3116	2325	01-Apr-08	01-Apr-09
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	27-Jun-07	27-Jun-08
901	Amplifier	Com Power	PA 103	130607	13-Mar-08	13-Mar-09
911	Spectrum Analyzer	Agilent	E4440A	US41421266	18-Mar-08	18-Mar-09