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**CERTIFICATION TEST REPORT**

**PART 15.247C  
IC RSS-210**

**For The Bluetooth Portable Loudspeaker  
Model: JBL On Tour XTB**

**FCC ID: APIJBLONTOURXTB  
IC: 6132C-XTB010SZ**

PREPARED FOR:

**Harman Kardon Inc  
250 Crossways Park Drive  
Woodbury , NY 11797-2915**

Prepared on: **December 12, 2008**

Report Number: **2008 10111547 EMC**

Project Number: **12076-EMC**

NEx Number: **111547**

Total Pages: 37

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## DOCUMENT HISTORY

<b>REVISION</b>	<b>DATE</b>	<b>COMMENTS</b>
-	<b>December 12, 2008</b>	Prepared By: <b>Alan Laudani</b>
-	<b>December 12, 2008</b>	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 **August 4, 2008**.
- Testing was performed on the unit described in this report on **August 4, 2008 to December 12, 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

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## 1. ADMINISTRATIVE DATA AND TEST SUMMARY

### Administrative Data

CLIENT: **Harman Kardon Inc**  
**250 Crossways Park Drive**  
**Woodbury , NY 11797-2915**

CONTACT: **Lewis Iby**  
E-Mail: **liby@harman.com**

DATE (S) OF TEST: **August 4, 2008 to December 12, 2008**

EQUIPMENT UNDER TEST (EUT): **Bluetooth Portable Loudspeaker**

MODEL: **JBL On Tour XTB**

SERIAL NUMBER: **SZ0TB-0000066**

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

<i>Specification</i>	<i>Frequency Range</i>	<i>Compliance Status</i>
FCC, CFR 47, Section 15.207	0.15 MHz - 30.00 MHz	PASS
FCC, CFR 47, Section 15.209	30 MHz – 10 <sup>th</sup> Harmonic	PASS
FCC CFR 47, §15.247 Plus Bandedge	2402 – 2480 MHz	PASS
RSS-210 - Low Power License Exempt Radio-communication Devices (All Frequency Bands)	2402 – 2480 MHz	PASS

Testing was started at 30 MHz as there are no RF signals generated below this frequency.

Alan Laudani  
EMC Engineer

Refer to the test results section for further details.

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## 2. SYSTEM CONFIGURATION

### Description and Method of Exercising the EUT

The JBL On Tour **XTB** is a Bluetooth Portable Loudspeaker. Its function is to provide audio amplification from audio, USB or a Bluetooth paired device. For RF testing, special cables for connecting to both a parallel port and a serial port were added to control the radio circuit board by using test software in a personal computer (PC). The antenna was bypassed by a cable pigtail to provide conducted measurements. The RF circuit was programmed for low, mid or high channel, hopping or single channel mode and disconnected from the PC to be carried into the test set up. The batteries allowed the program to continue as the EUT was returned to be powered by the Wall Wart. Therefore the fresh batteries did not degrade during testing. BlueTooth rf communication is two way continuous. There was no provision made to test in receive mode. FCC section B testing was performed for non-BlueTooth mode when the EUT was exercised with input from a CD player.

The EUT was exercised by a BlueTooth paired device transmitting a stream of MP3 file formatted audio music for standard use mode. This produced digital emissions in hopping mode.

Prescans with the EUT powered by the Wall Wart proved worse case over the EUT powered by 4 1.5 V batteries. Audio cable was inserted in the audio input port. The USB cable was inserted in its port. This USB's only function is to recharge a cell phone with no data connection.

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 - Bluetooth Portable Loudspeaker	Harman Kardon Inc Model: JBL On Tour XTB Serial #: SZ0TB-0000066	12 Vdc
EUT - Power Supply #1	JBL Model: MU15-C120125-A1 PN: 700-0059-001	2 prong Wall Wart 120-240 VAC 50/60 Hz

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### **Device Interconnection and I/O Cables**

Connection	I/O Cable
USB	Non- terminated
Audio Cable	Non- terminated for Bluetooth Mode 1m

### **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.

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## Technical Specifications of the EUT

<b>Manufacturer:</b>	<b>Harman Kardon Inc</b>
<b>Operating Frequency:</b>	2402 MHz to 2480 MHz in the 2400-2483.5 MHz Band
<b>EIRP:</b>	Measured 1.6 mW or 2.1 dBm which fits the range -6.00 dBm to 4.00 dBm claimed by Manufacturer.
<b>Modulation:</b>	Digital
<b>Antenna Connector:</b>	None, internal integral antenna
<b>Power Source:</b>	4 AA batteries or Wall Wart Power Supply

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### **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 – 22 °C
Humidity range	:	29 - 30%
Pressure range	:	87 - 105 kPa
Power supply range	:	120VAC 60Hz (±15%)

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## 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.

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## 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  $\text{dB}\mu\text{V/m}$

RR = Receiver Reading  $\text{dB}\mu\text{V}$

CL = cable loss  $\text{dB}$

AF = antenna factor  $\text{dB/m}$

Example Frequency = 110MHz

18.5  $\text{dB}\mu\text{V}$  (spectrum analyzer reading)

+3.0 dB (cable loss @ frequency)

21.5  $\text{dB}\mu\text{V}$

+15.4 dB/m (antenna factor @ frequency)

36.9  $\text{dB}\mu\text{V/m}$  Final adjusted value

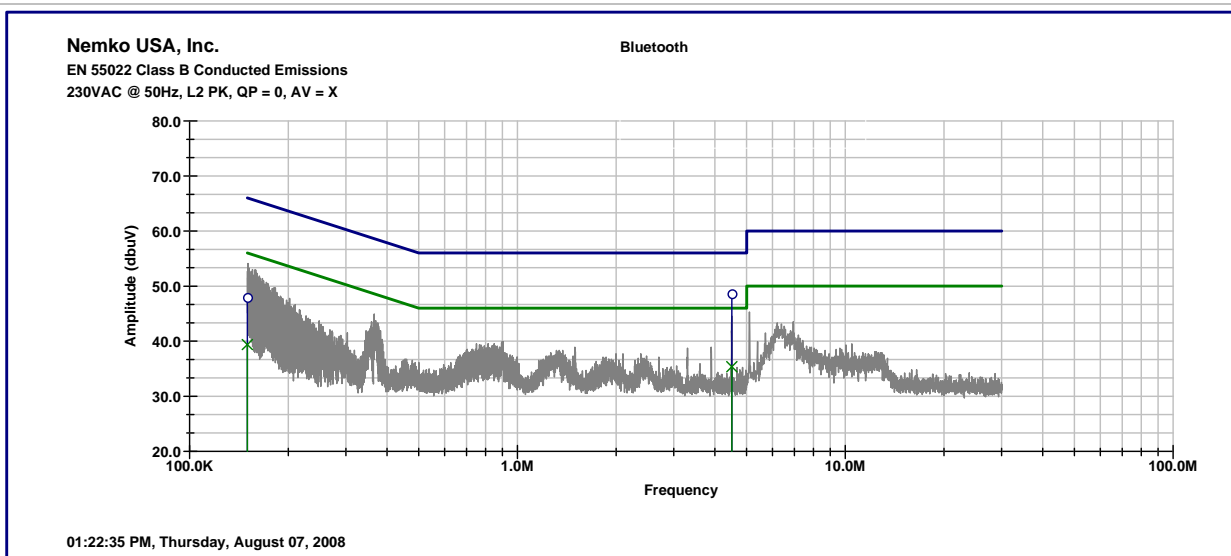
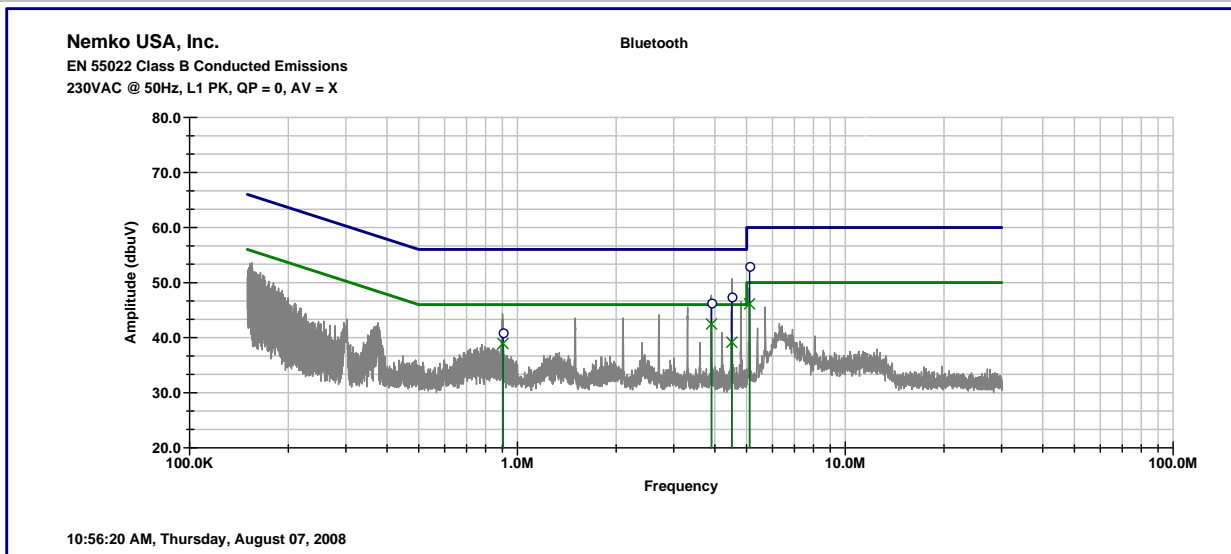
The final adjusted value is then compared to the appropriate emission limit to determine compliance.

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## 5. Test Results

### Conducted Emissions Test Data – Transceiver Mode

Client	Harman Kardon Inc	Temperature	78	°F
PAN #	12076-EMC	Relative Humidity	64	%
EUT Name	Bluetooth Portable Loudspeaker	Barometric Pressure	29.95	Hg
EUT Model	JBL On Tour XTB	Test Location	Enclosure 1	
Governing Doc	CFR 47, Part 15B	Test Engineer	Alan Laudani	
Basic Standard	Sec. 15.207	Date	8-7-08	
Parameters	Peak RBW: 100kHz VBW: 100kHz Quasi-Peak: RBW 9kHz, VBW 30 kHz Average: RBW 9kHz, VBW 30kHz Quasi-Peak Limit Blue Line, Average Limit Green Line			



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## Radiated Emissions Test Data

Digital Emissions reported below, Emissions were searched over a range of 30 MHz to 25000 MHz

No other digital emissions evident within 20 dB of the limits.

RF emissions next page.

Radiated Emissions Data											
Job # :	12076-EMC		Date :	8-4-08		Page	1		of	1	
NEX #:	111547		Time :	1710pm							
			Staff :	aal							
Client Name :	Harmon Multimedia					EUT Voltage :	120				
EUT Name :	Bluetooth Portable Loudspeaker					EUT Frequency :	60				
EUT Model # :	JBL On Tour XTB					Phase:	1				
EUT Serial # :	SZ0TB-0000066					NOATS	X				
EUT Config. :	BlueTooth Music					SOATS					
						Distance < 1000 MHz:	3 m				
						Distance > 1000 MHz:	3 m				
Specification :	CFR47 Part 15, Subpart B, Class B										
Loop Ant. #:	NA		Temp. (°C) :	27							
Bicon Ant.#:	115		Humidity (%) :	45							
Log Ant.#:	111_3m		Spec An.#:	898							
DRG Ant. #	NA		Spec An. Display #:	898							
Cable LF#:	NOATS		QP #:	898							
Cable HF#:	NA		PreSelect#:	899							
Preamp LF#:	NA										
Preamp HF#	NA										
						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
49.0	19.3	15.5	Q	-	1.0	19.3	32.4	40.0	-7.6	Pass	
52.0	17.0	11.3	Q	-	1.0	17	30.6	40.0	-9.4	Pass	
74.0	23.0	12.5	Q	-	1.0	23	33.4	40.0	-6.6	Pass	
147.0	13.8	10.8	Q	-	1.0	13.8	28.5	43.5	-15.0	Pass	
165.0	17.2	10.5	Q	-	1.0	17.2	35.0	43.5	-8.5	Pass	
184.0	11.9	17.5	Q	-	1.0	17.5	38.5	43.5	-5.0	Pass	
245.0	14.7	10.6	Q	-	1.0	14.7	30.1	46.0	-16.0	Pass	
251.0	14.5	10.5	Q	-	1.0	14.5	31.1	46.0	-15.0	Pass	
272.0	10.5	11.0	Q	-	1.0	11	28.7	46.0	-17.4	Pass	
289.0	10.4	10.6	Q	-	1.0	10.6	29.0	46.0	-17.0	Pass	
312.0	10.6	10.8	Q	-	1.0	10.8	30.8	46.0	-15.2	Pass	
344.0	10.3	10.6	Q	-	1.0	10.6	29.9	46.0	-16.1	Pass	

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## RF Emissions.

### RSS-210 Annex 8.5

(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)).

Spurious emissions were searched for from 1000 MHz to 10 times the highest transmit frequency or 25000 MHz. 15.209: 74 Peak, 54 Ave., dBuV/m @ 3m. 15.205 Restricted bands, EUT complies.

### Radiated Emissions Data

Complete YES Job #: 12076-EMC Test #: 1  
Preliminary \_\_\_\_\_ Page 1 of 1

Client Name: Harmon Multimedia  
EUT Name: Bluetooth Portable Loudspeaker  
EUT Model #: JBL On Tour XTB  
EUT Serial #: SZ0TB-0000066  
EUT Config.: Transmit  
Specification: FCC Part 15.247  
Specification: FCC Part 15.205 & 15.209

Date: 12/11/2008  
Time: 930 am  
Staff: aal

Bicon Ant.#: 114 Temp. (deg. C): 15.8  
Log Ant.#: 111 Humidity (%): 80  
DRG Ant. #: 529 EUT Voltage: 120  
Dipole Ant.#: NA EUT Frequency: 60  
Cable#: 40ft Phase: 1  
Preamp#: 317 Location: SOATS  
Spec An.#: 835 Distance: 3 m  
QP #: NA Duty Cycle Factor: -8.7  
Peak Res Bandwidth: 1 MHz  
Peak Video Bandwidth: 1 MHz  
AVE Res Bandwidth: 1 MHz  
AVE Video Bandwidth: 10 Hz

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				
2400.00	29.4	20.7	24.1	15.4	34.2	63.6	54.9	78.2	69.5	-14.6	-14.6	-	1.0	Pass	100 kHz RBW & VBW
2402.00	64.0	55.3	61.0	52.3	34.2	98.2	89.5	116.2	107.5	-18.0	-	-	1.0	Pass	2 MHz VBW & RBW
4804.00	56.4	47.7	53.5	44.8	5.4	61.8	53.1	74.0	54.0	-12.2	-0.9	-	1.0	Pass	1 MHz VBW & RBW
2441.00	59.9	51.2	59.5	50.8	34.2	94.1	85.4	116.2		-22.1		-	1.0	Pass	2 MHz VBW & RBW
4882.00	54.8	46.1	55.1	46.4	6.2	61.3	52.6	74.0	54.0	-12.7	-1.4	-	1.0	Pass	1 MHz VBW & RBW
7323.00	48.4	39.7	47.7	39.0	11.1	59.5	50.8	74.0	54.0	-14.5	-3.2	-	1.0	Pass	1 MHz VBW & RBW
2480.00	57.1	48.4	56.2	47.5	34.2	91.3	82.6	116.2		-24.9		-	1.0	Pass	2 MHz VBW & RBW
4960.00	53.7	45.0	52.5	43.8	6.4	60.1	51.4	74.0	54.0	-13.9	-2.6	-	1.0	Pass	1 MHz VBW & RBW
7440.00	46.5	37.8	45.1	36.4	11.3	57.8	49.1	74.0	54.0	-16.2	-4.9	-	1.0	Pass	1 MHz VBW & RBW
2483.50	26.6	17.9	26.0	17.3	34.2	60.8	52.1	74.0	54.0	-13.2	-1.9	-	1.0	Pass	1 MHz VBW & RBW

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## Duty Cycle Measurement

RSS-210 Annex 8.1(4)

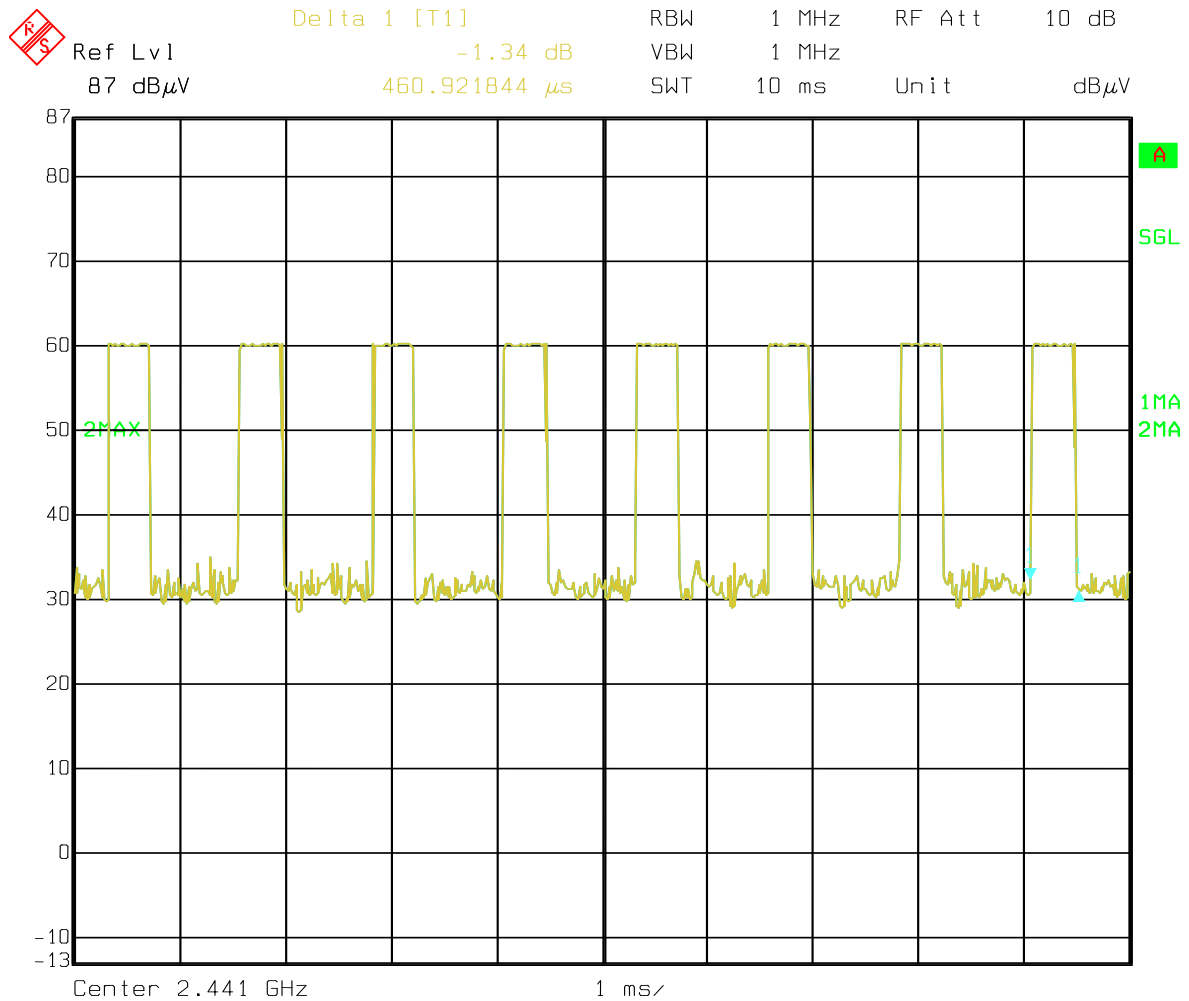
Digital Word = 460.9 microseconds

80 events in 100 ms

Duty cycle = 80 x 460.9 microseconds in 100ms

Duty cycle = 0.3687

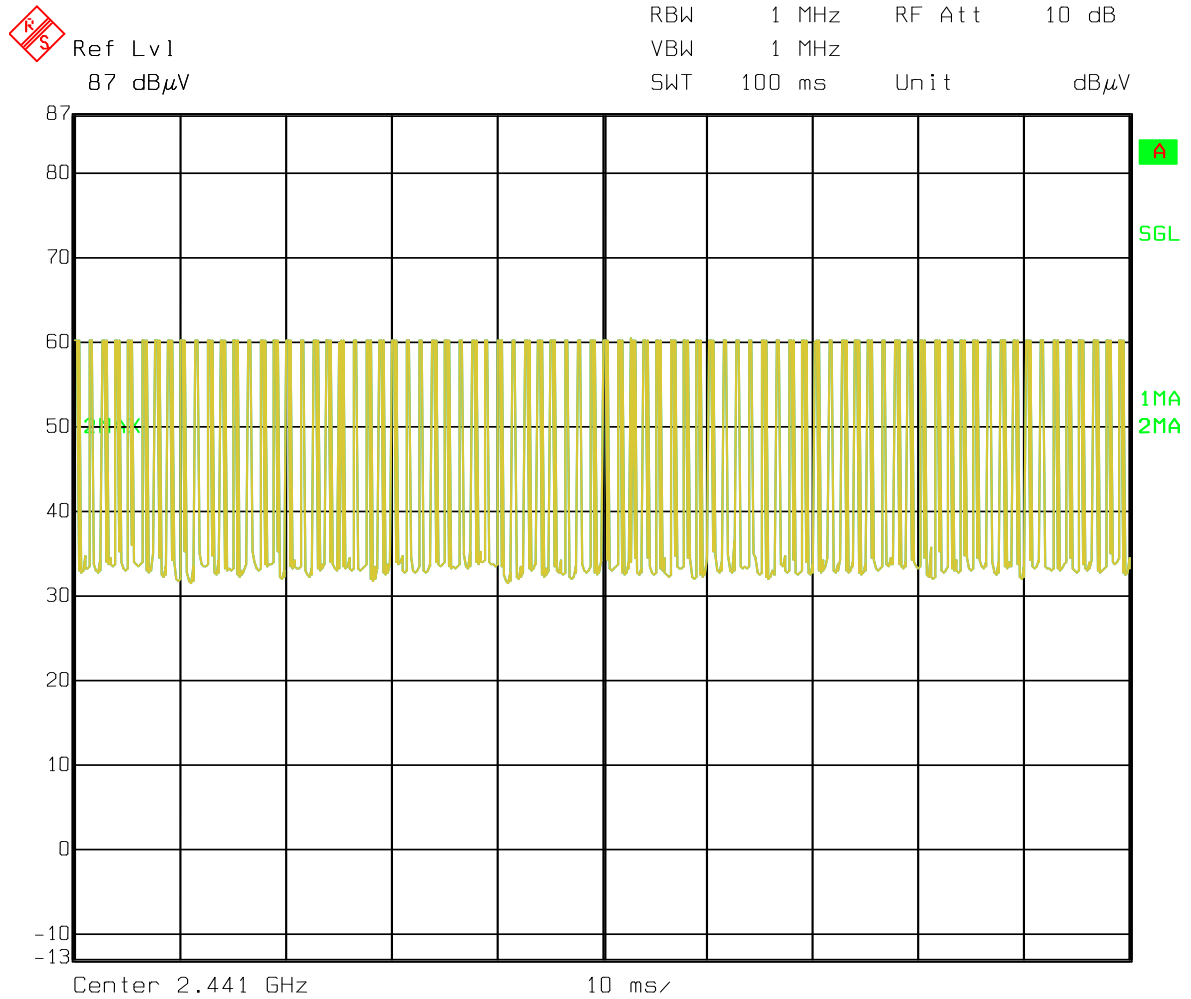
Duty Cycle Factor =  $20 \cdot \log (.3687) = -8.7\text{dB}$



Date: 26.NOV.2008 15:26:44

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80 events in 100 ms

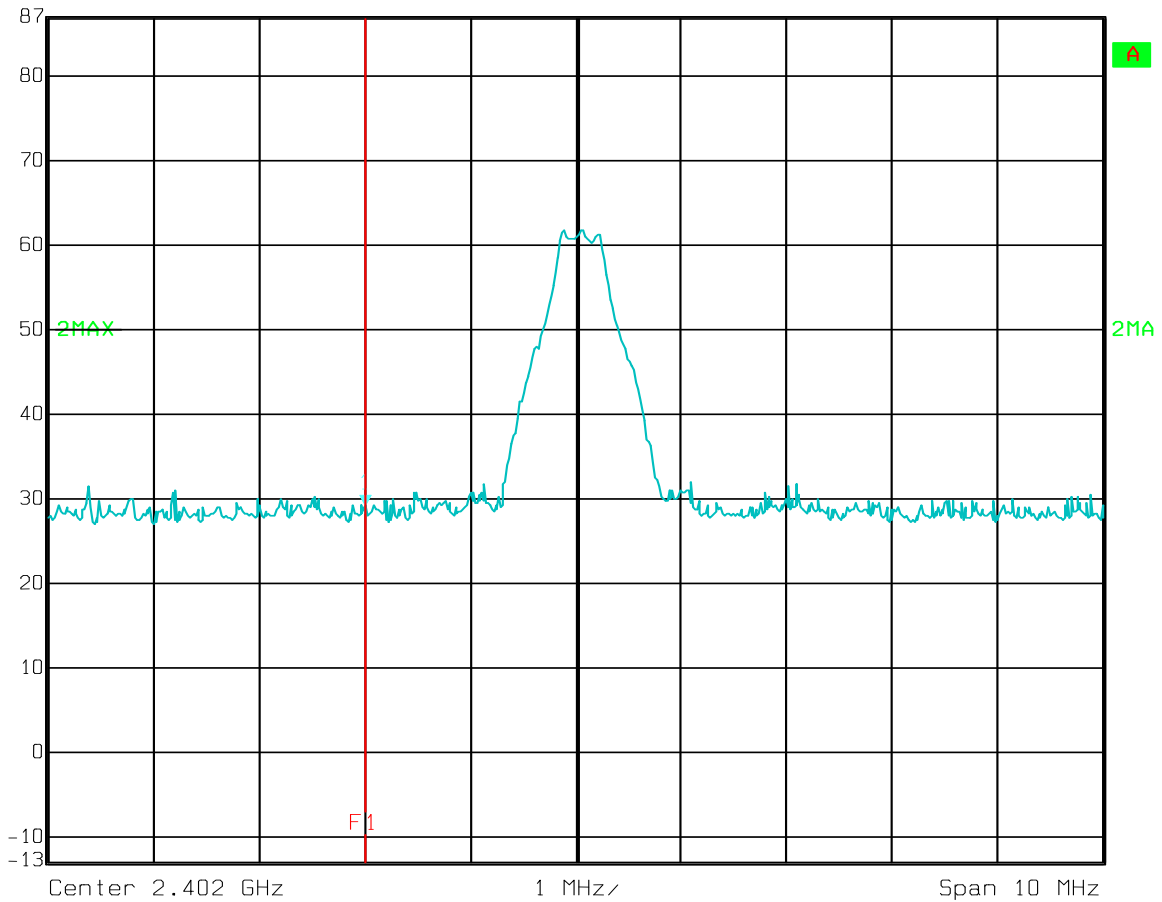


Date: 26.NOV.2008 15:25:47

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## Band Edge

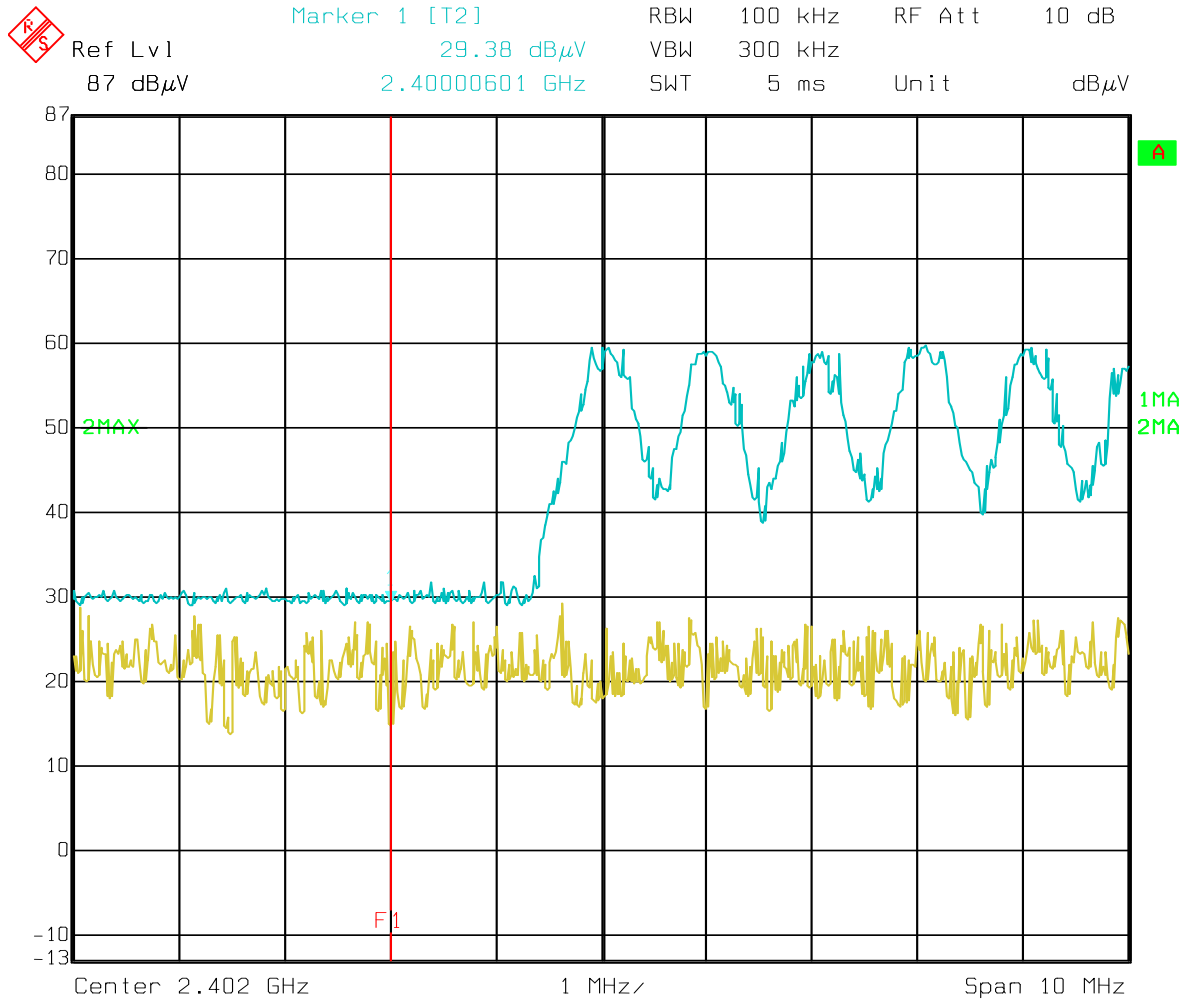

 Marker 1 [T2]      RBW 100 kHz    RF Att 10 dB  
 Ref Lvl 29.23 dB $\mu$ V    VBW 300 kHz  
 87 dB $\mu$ V      2.40000601 GHz    SWT 5 ms    Unit dB $\mu$ V



Date: 26.NOV.2008 15:52:37

Lower Band Edge, Non-Hopping  
 Radiated Measurement @ 3m, Max Hold Peak

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Date: 26.NOV.2008 16:48:40

Lower Band Edge, Hopping

Radiated Measurement @ 3m, Max Hold Peak

**Sample Computations:**

Max Reading= Meter Reading +Antenna Factor +Cable Loss

Peak:  $63.6 = 29.4 + 28.3 + 5.9$

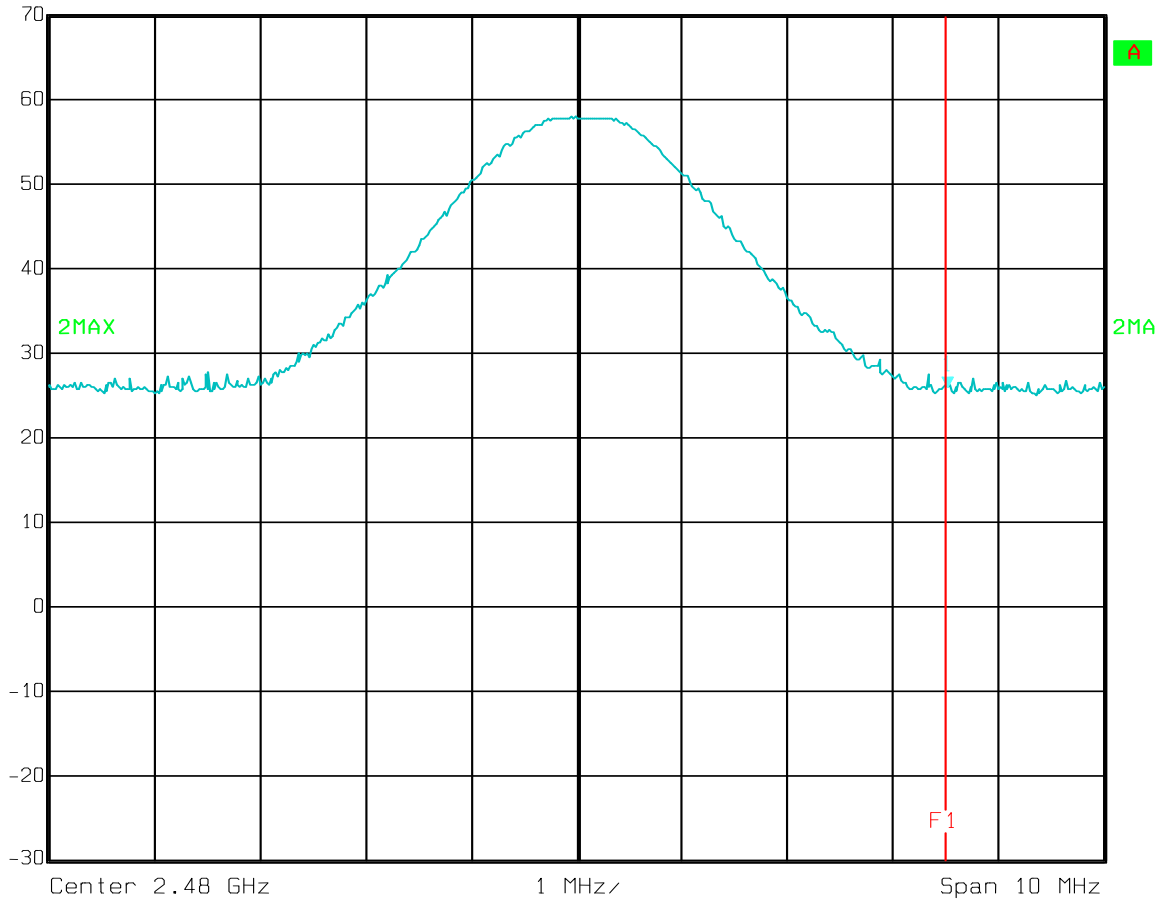
Peak Limit =  $98.2 - 20 \text{ dBc} = 78.2$  EUT complies

Average = Peak + DCF =  $63.5 - 8.7 = 54.9$

Average limit =  $89.5 - 20 \text{ dBc} = 69.5$  EUT complies

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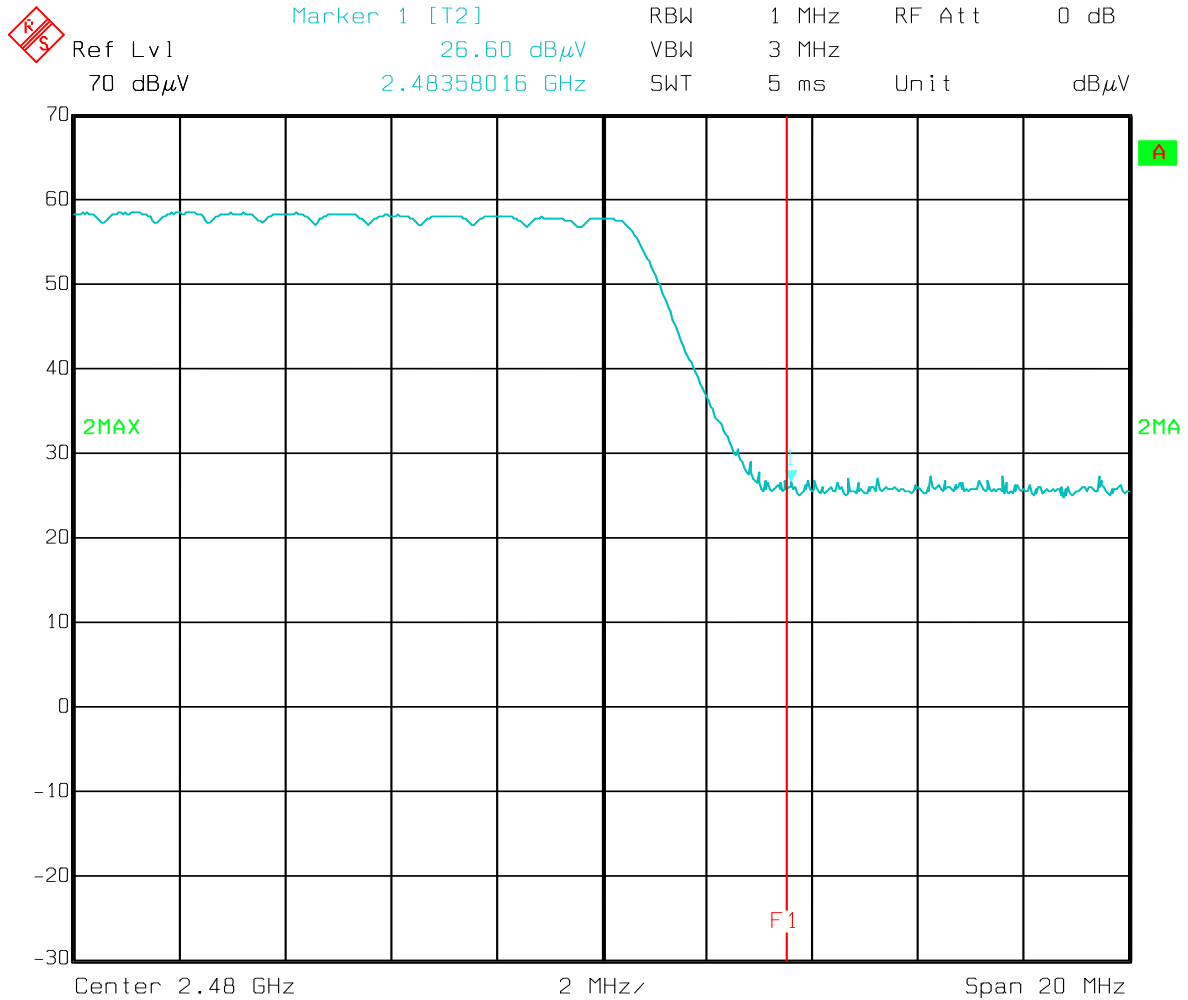

 Marker 1 [T2]      RBW    1 MHz    RF Att    0 dB  
 Ref Lvl                    25.95 dB $\mu$ V    VBW    3 MHz  
 70 dB $\mu$ V                    2.48351703 GHz    SWT    5 ms    Unit    dB $\mu$ V



Date: 26.NOV.2008 17:06:41

Upper Band Edge, Non-Hopping  
 Radiated Measurement @ 3m, Max Hold Peak

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Upper Band Edge, Hopping

Radiated Measurement @ 3m, Max Hold Peak

**Sample Computations:**

Max Reading= Meter Reading +Antenna Factor +Cable Loss

Peak:  $60.8 = 26.6 + 28.3 + 5.9$

Peak Limit = 74 EUT complies

Average = Peak + DCF =  $60.8 - 8.7 = 52.1$

Average limit = 54 EUT complies

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## Bandwidth

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15.247 (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 now greater than 125mW.

15.247(a)(1)

### Test Results:

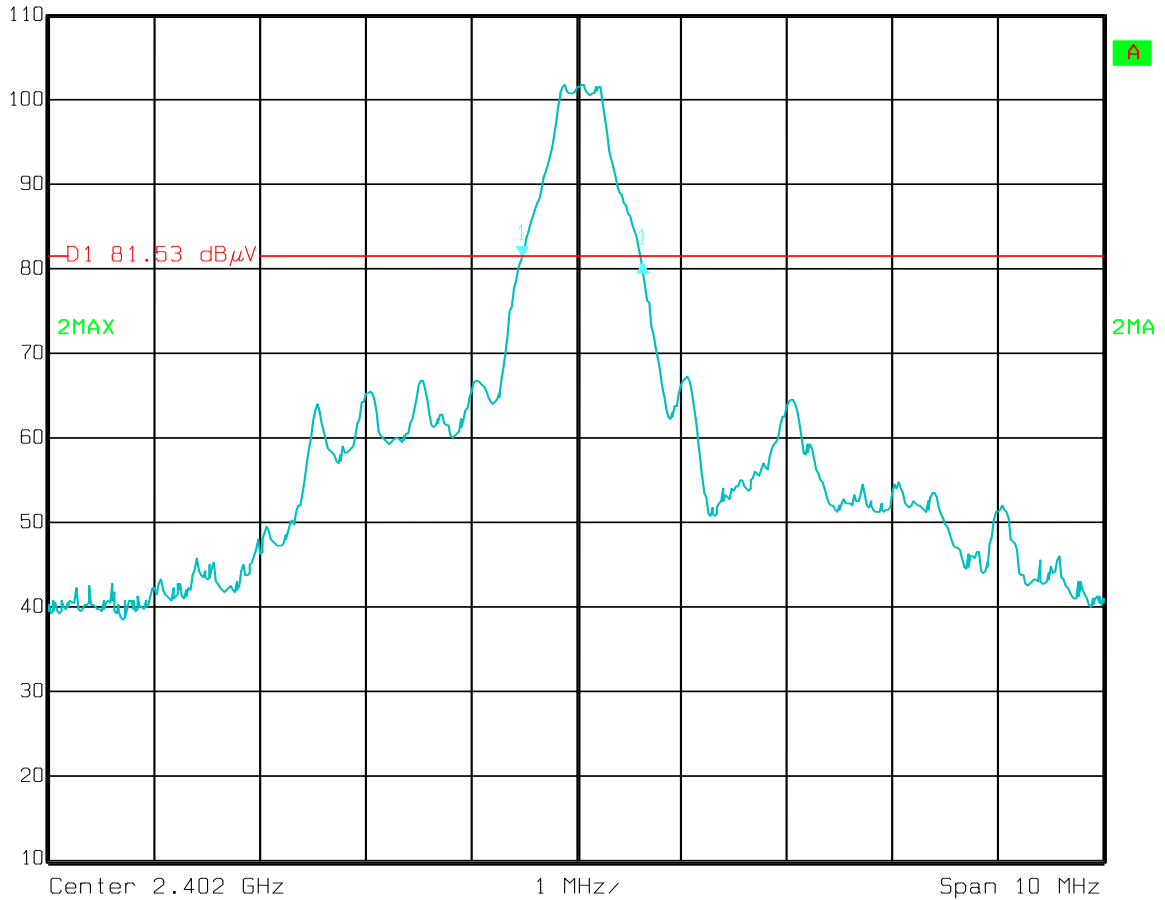
<b>20 dB Bandwidth</b>		
<b>Low Channel</b>	<b>Mid Channel</b>	<b>High Channel</b>
1.13 MHz	1.18 MHz	1.20 MHz

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**Low Channel**



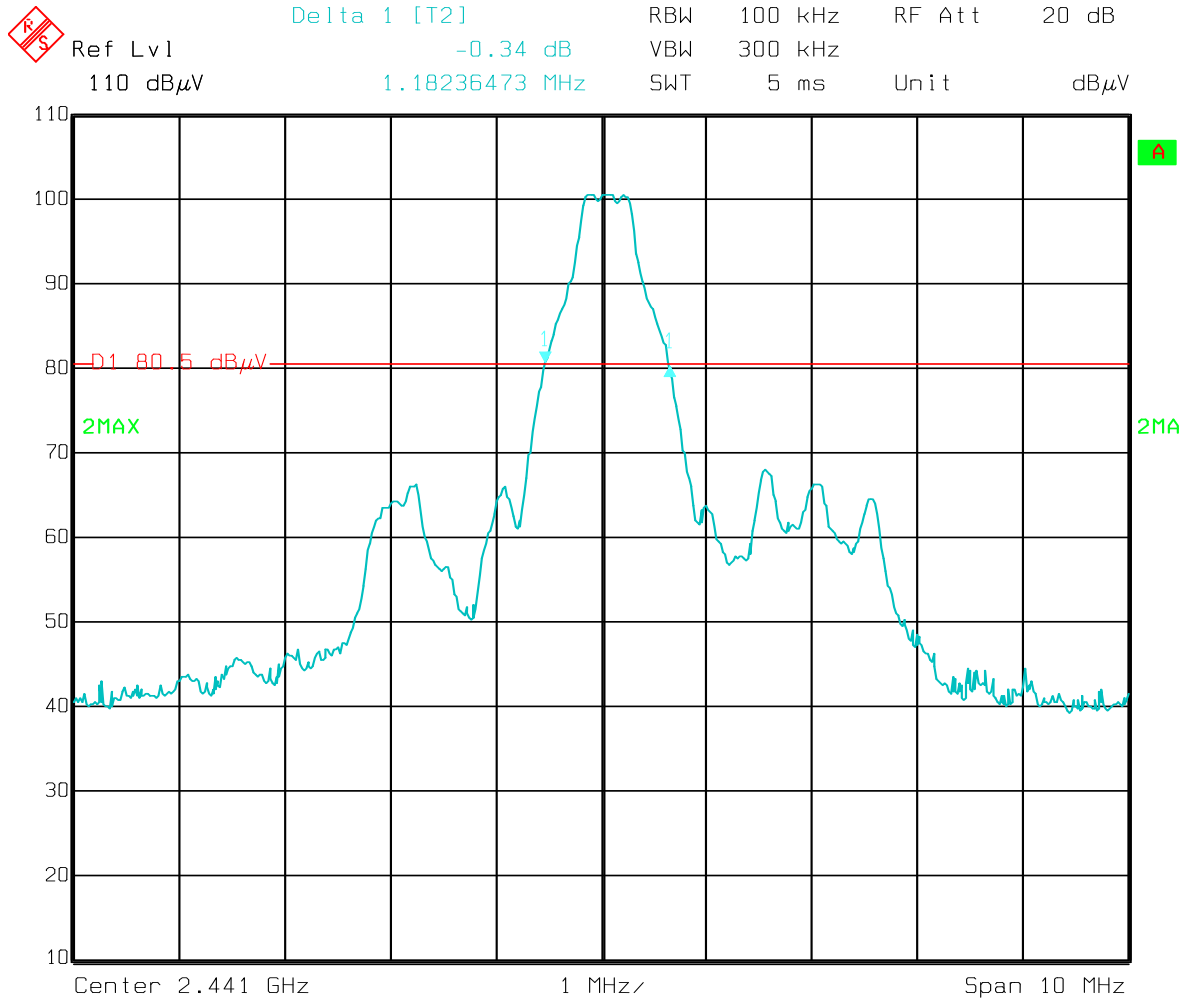
Delta 1 [T2] RBW 100 kHz RF Att 20 dB  
 Ref Lvl -0.36 dB VBW 300 kHz  
 110 dB $\mu$ V 1.13226453 MHz SWT 5 ms Unit dB $\mu$ V



Date: 23.OCT.2008 11:31:31

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**Mid Channel**

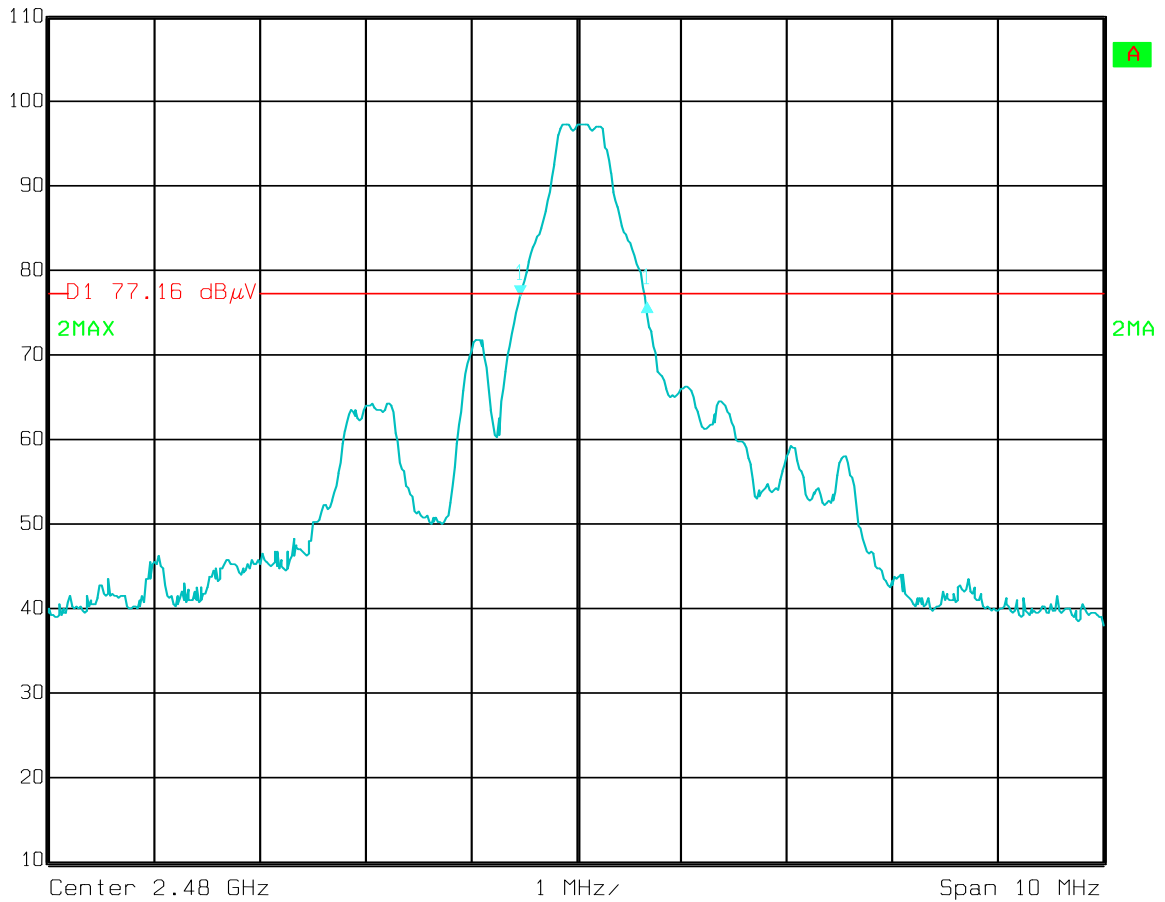


Date: 23.OCT.2008 10:30:37

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### High Channel


 Delta 1 [T2]      RBW 100 kHz      RF Att 20 dB  
 Ref Lvl      -0.40 dB      VBW 300 kHz  
 110 dB $\mu$ V      1.20240481 MHz      SWT 5 ms      Unit dB $\mu$ V



Date: 23.OCT.2008 09:33:20

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## Conducted Output Power

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.

**Test Results:** Power Level Limits 125 mWatt. EUT complies.

When the input power is varied from 120 VAC +/- 15% no change in output power is noticed.

Peak hold detector used on all measurements.

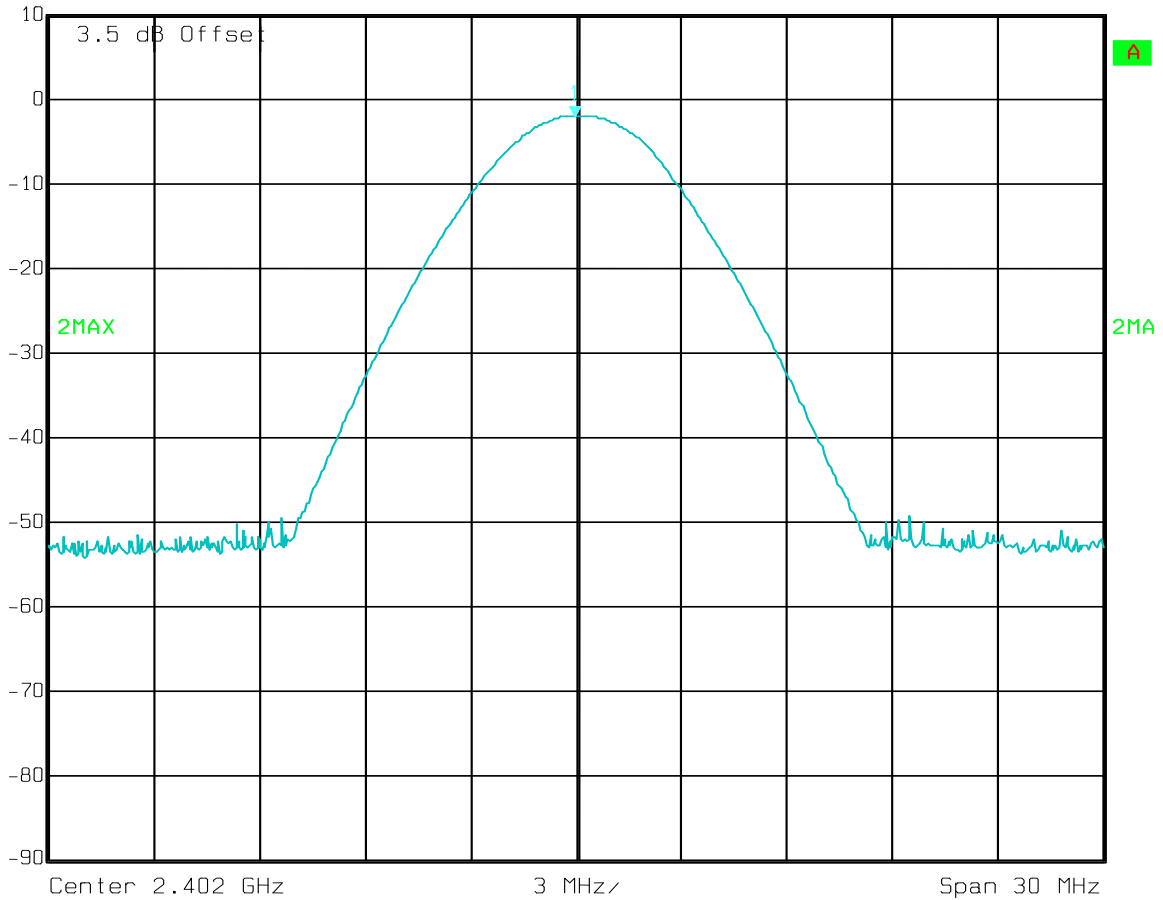
ANTENNA MULTILAYER CHIP, 2.4GHZ, YAGEO, 4.1 dBi max.

	<b>Conducted Output Power dBm</b>	<b>EIRP dBm</b>	<b>EIRP mW</b>
<b>Lowest Channel</b>	-2.02	2.12	1.6
<b>Mid Channel</b>	-3.23	1.33	1.4
<b>Highest Channel</b>	-4.09	0.19	1.0

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Lowest Frequency

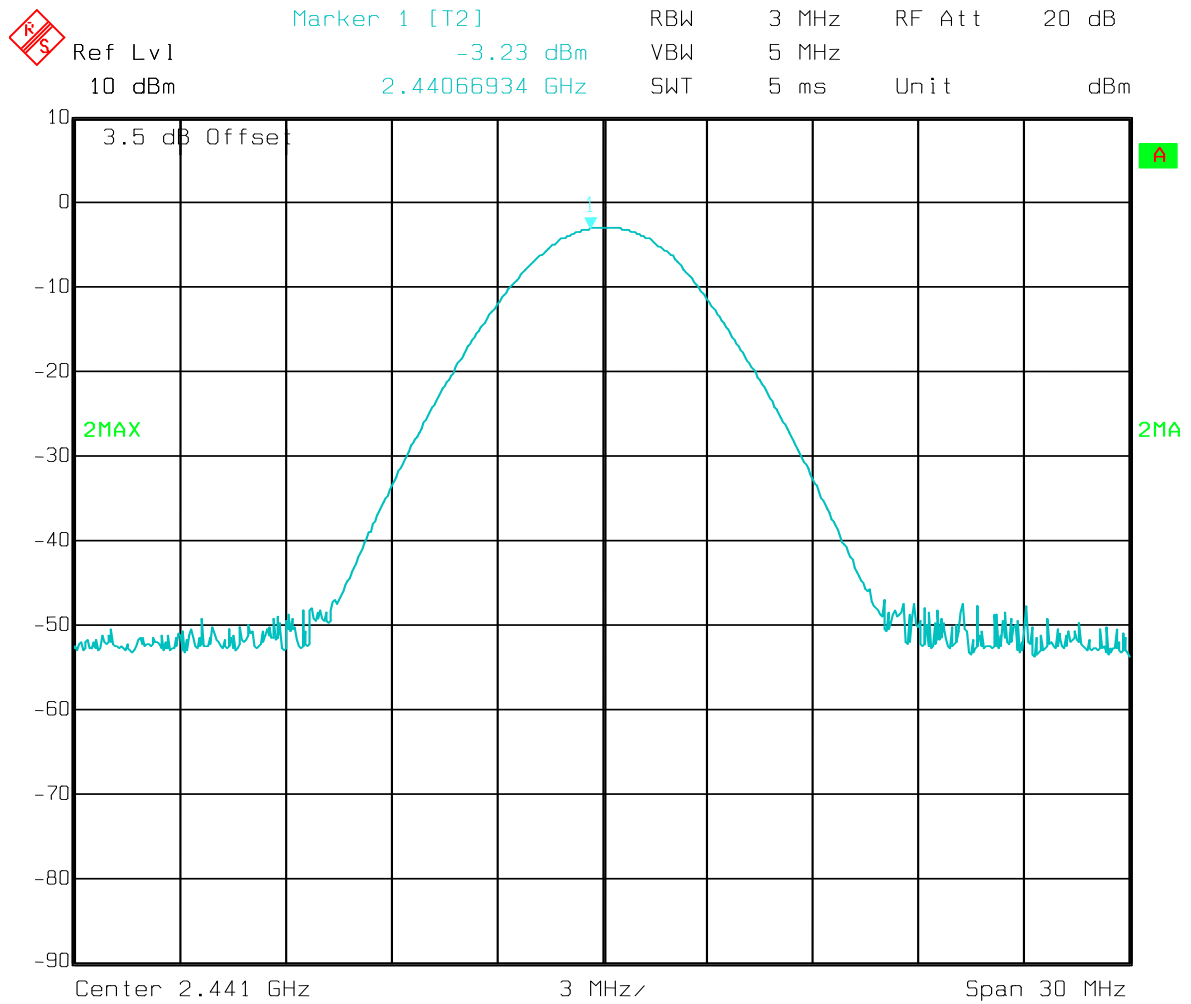

Marker 1 [T2]
RBW 3 MHz
RF Att 20 dB  
Ref Lvl -2.02 dBm
VBW 5 MHz  
10 dBm
2.40196994 GHz
SWT 5 ms
Unit dBm



Date: 23.OCT.2008 11:33:45

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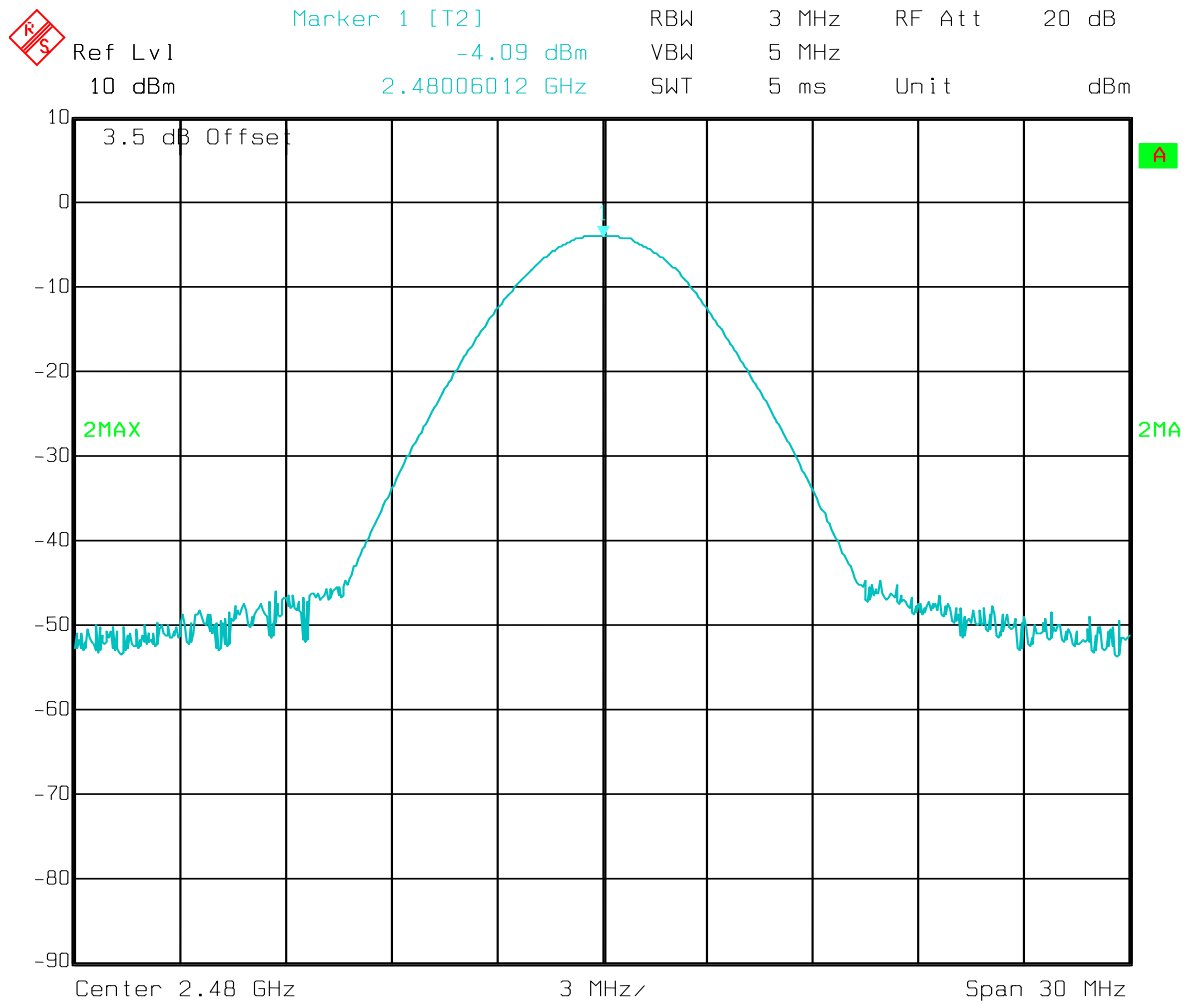
Mid Frequency



Date: 23.OCT.2008 10:01:51

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Highest Frequency



Date: 23.OCT.2008 09:51:14

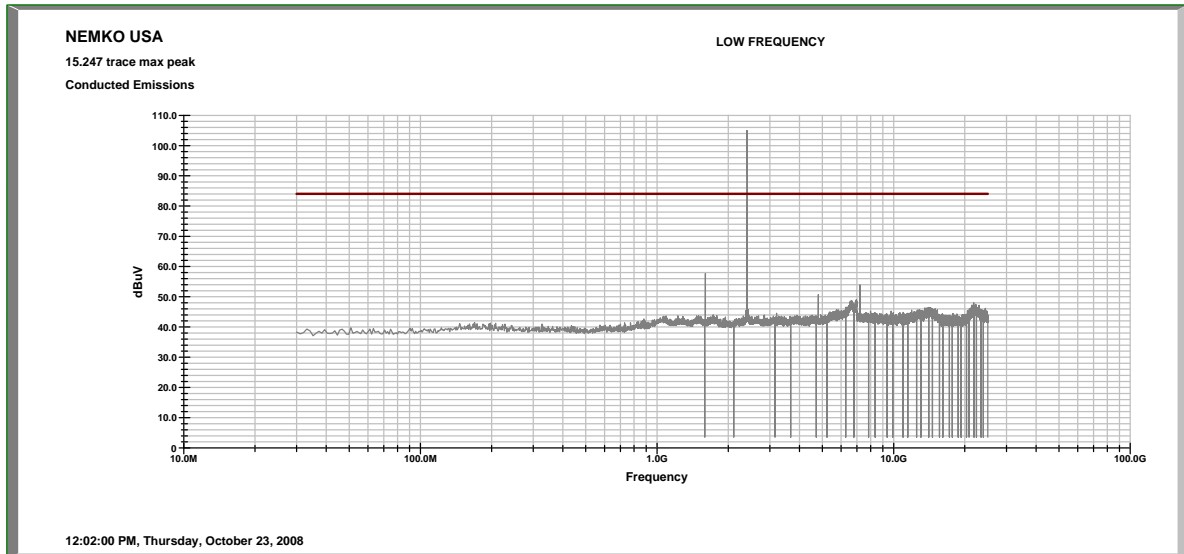
<b>Nemko USA, Inc.</b>		<b>11696 Sorrento Valley Road, Suite F, San Diego, CA 92121</b> <b>Phone (858) 755-5525 Fax (858) 452-1810</b>	
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## Conducted Emissions.

(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)).

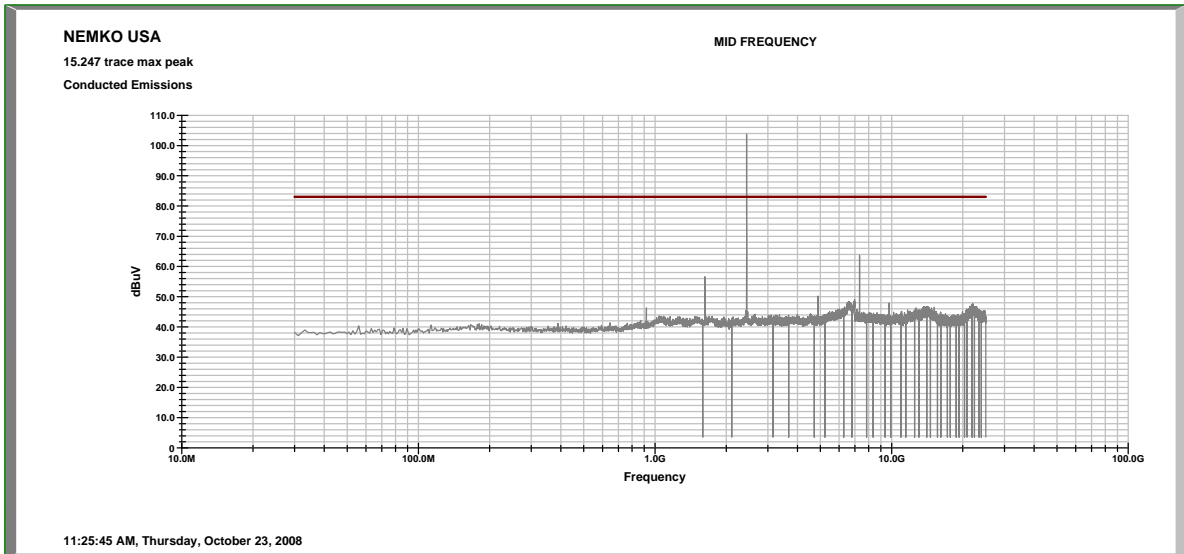
A data collection program directing the spectrum analyzer with a RBW of 100 kHz and VBW of 300 kHz resulted in the following plots for conducted emissions of the lowest, mid and highest frequencies. Peak Max Hold. Limit line at 20 dBc. EUT complies.

Lowest Frequency;

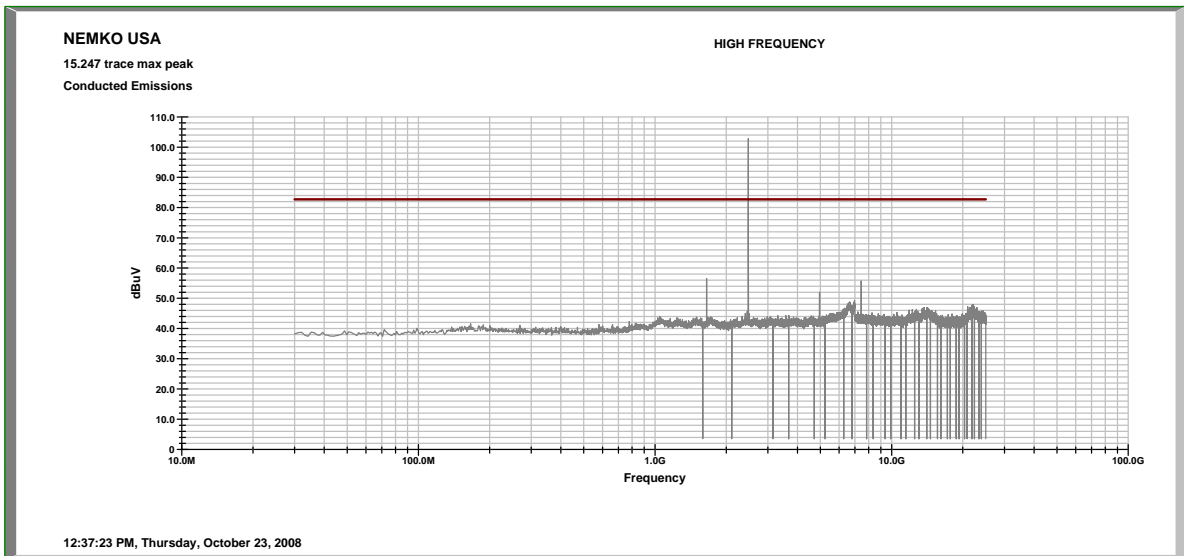


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Mid Frequency;



Highest Frequency;



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## Number of Hopping Channels

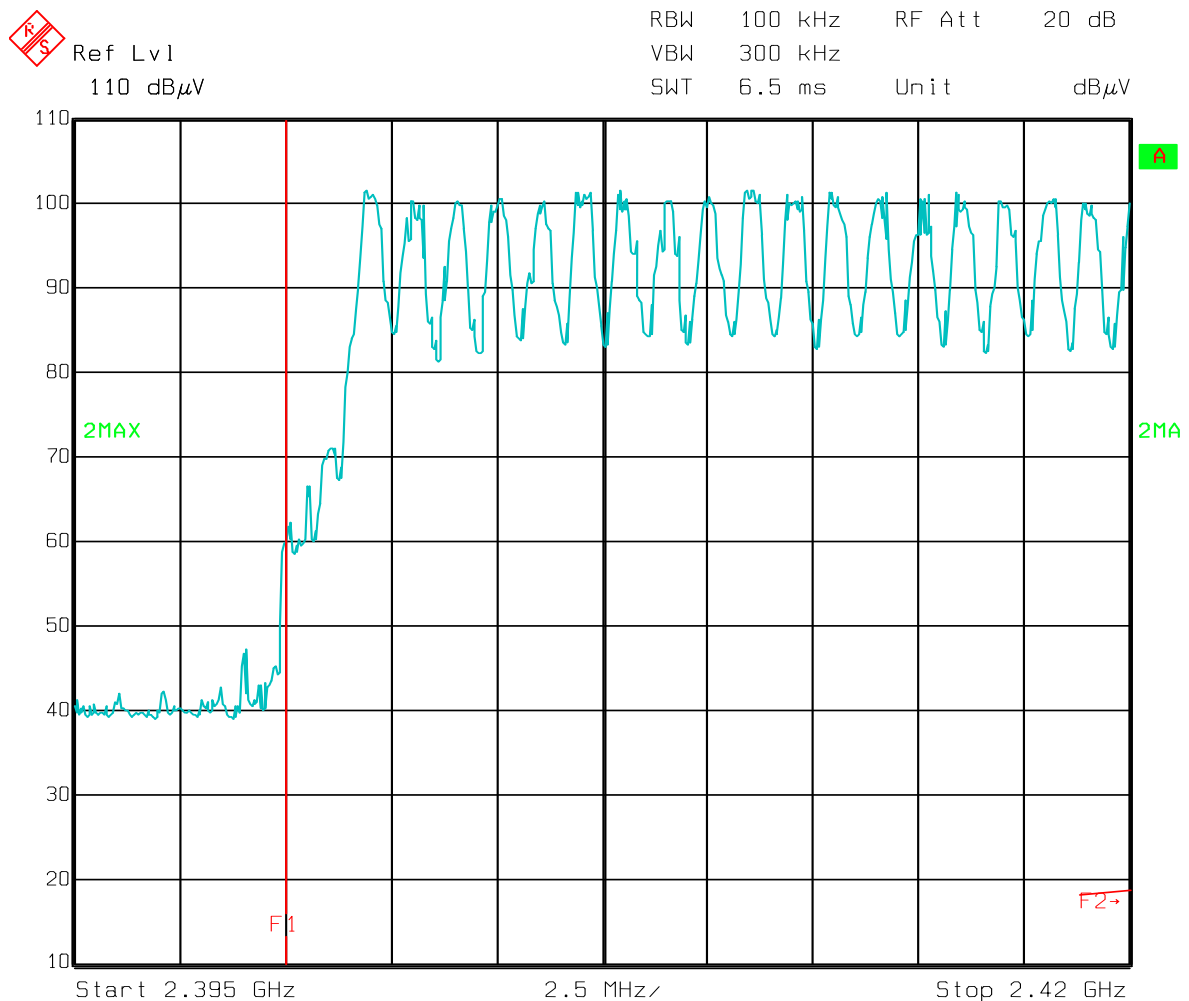
RSS-210 Annex 8.1(4)

(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.

At least 15 hopping channels – **79** counted.

Span = 2480 - 2402 MHz > 75 MHz

18 counted.



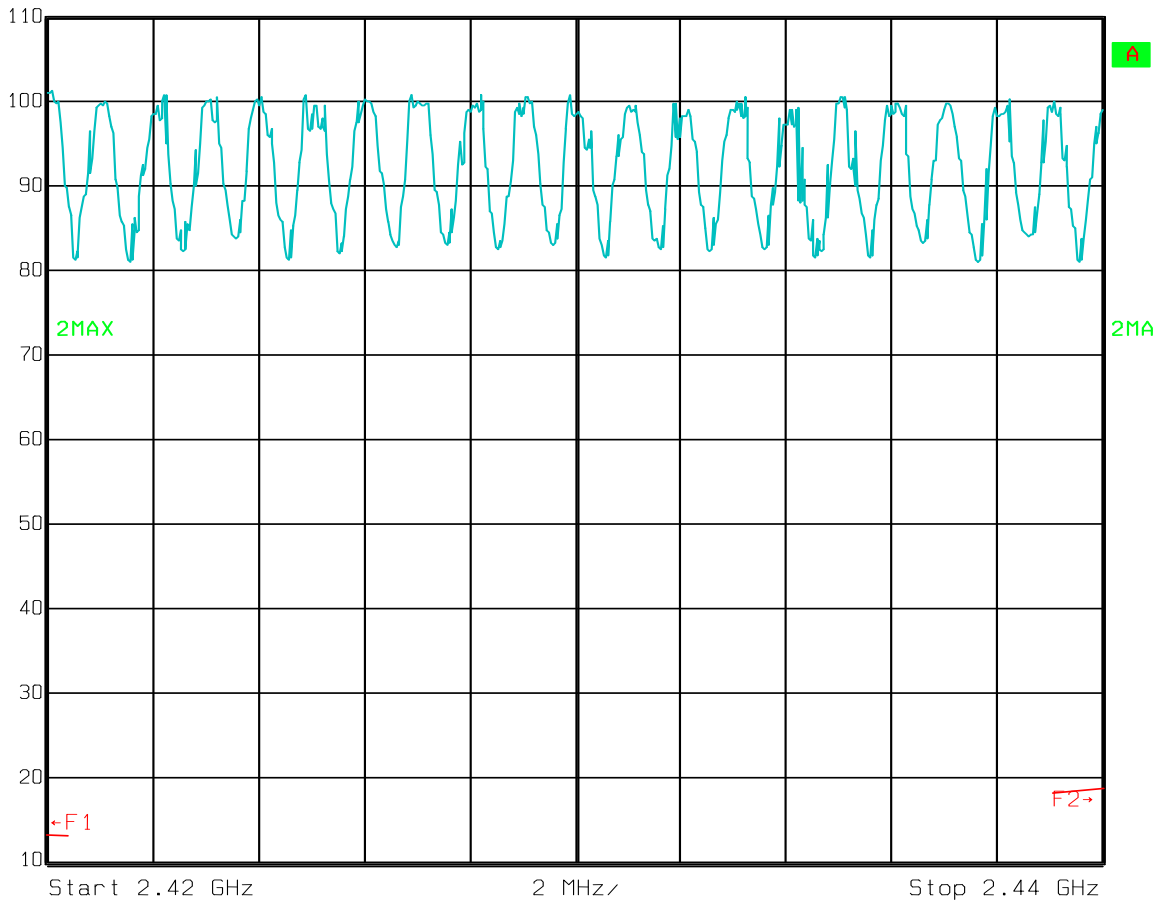
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20 Counted.



Ref Lvl  
110 dB $\mu$ V

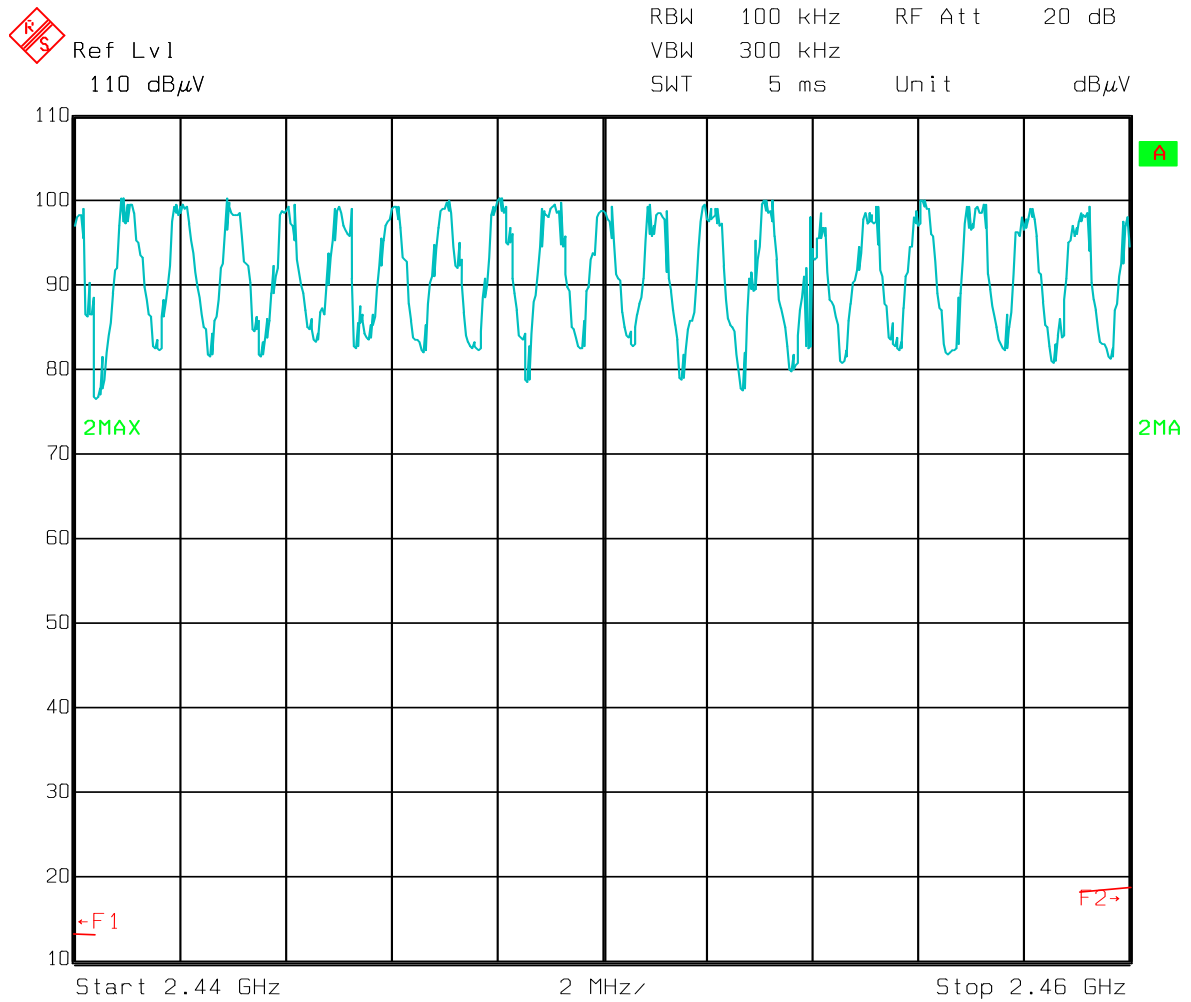
RBW 100 kHz RF Att 20 dB  
VBW 300 kHz  
SWT 5 ms Unit dB $\mu$ V



Date: 23.OCT.2008 13:05:21

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20 counted.

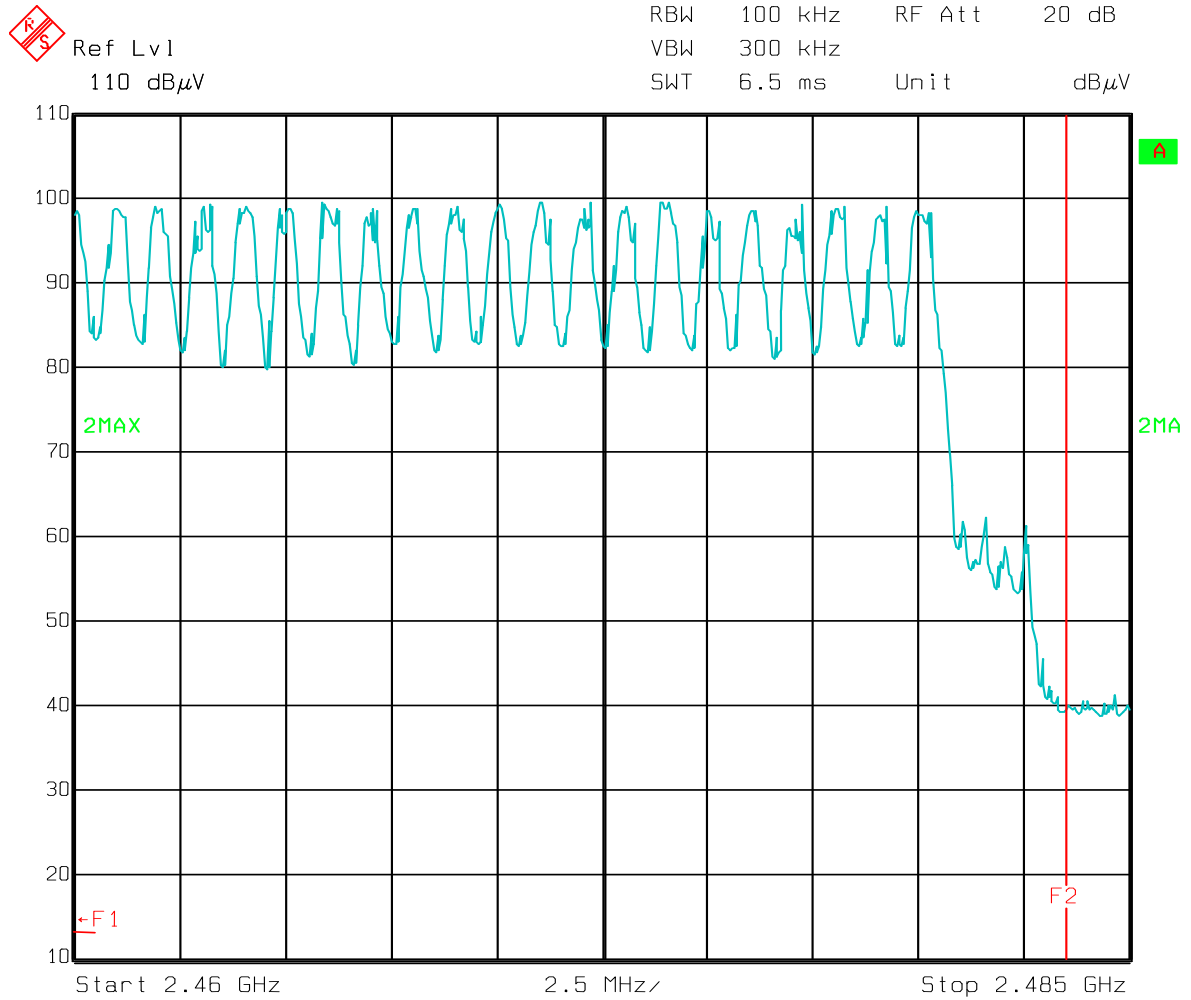


Date: 23.OCT.2008 13:07:04

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21 Counted.

18 +20 +20 +21 = 78



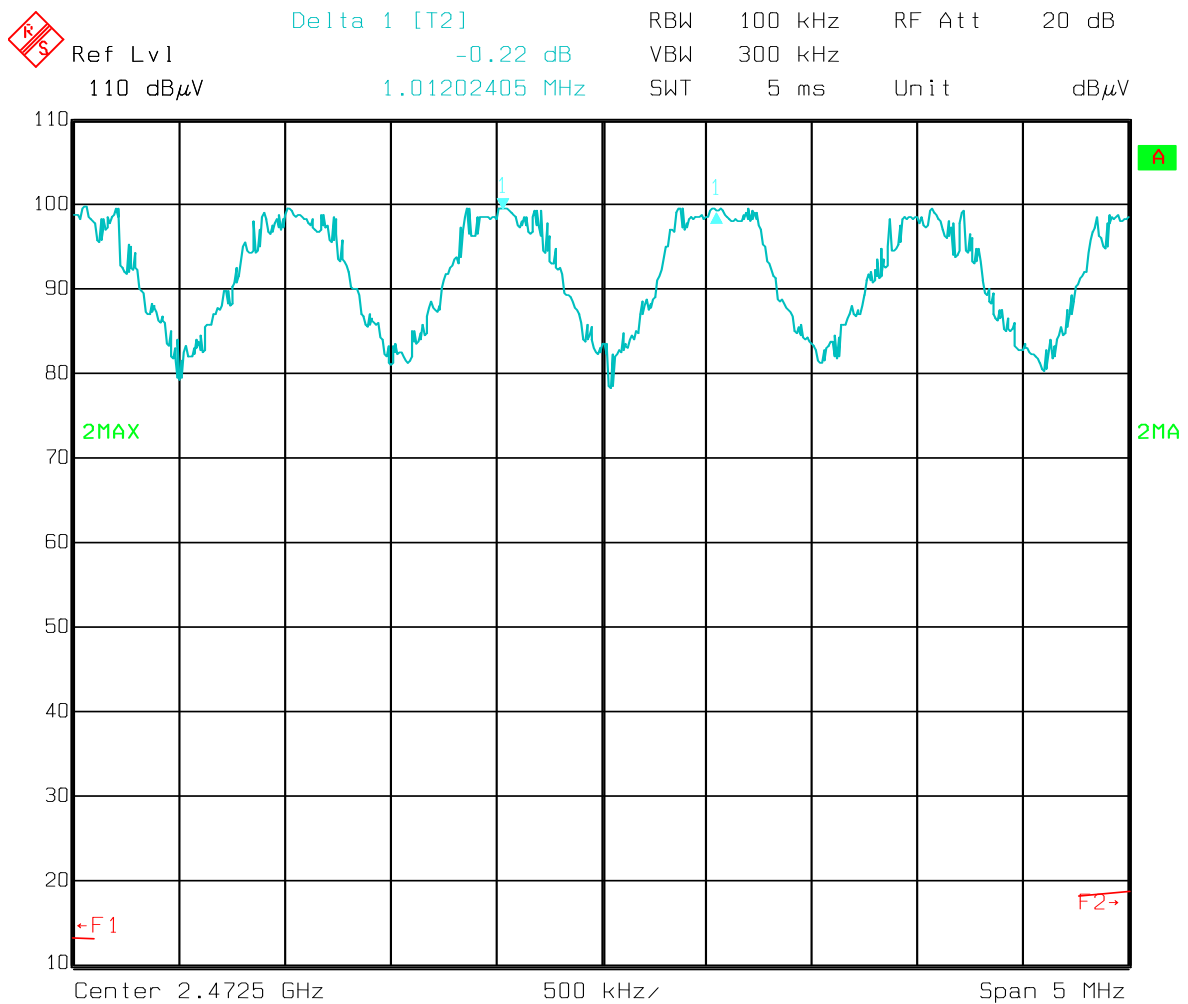
Date: 23.OCT.2008 13:09:18

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## Channel 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.

Frequency Separation: **1.01MHz**



Date: 23.OCT.2008 13:12:02

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## Time of Occupancy

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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.

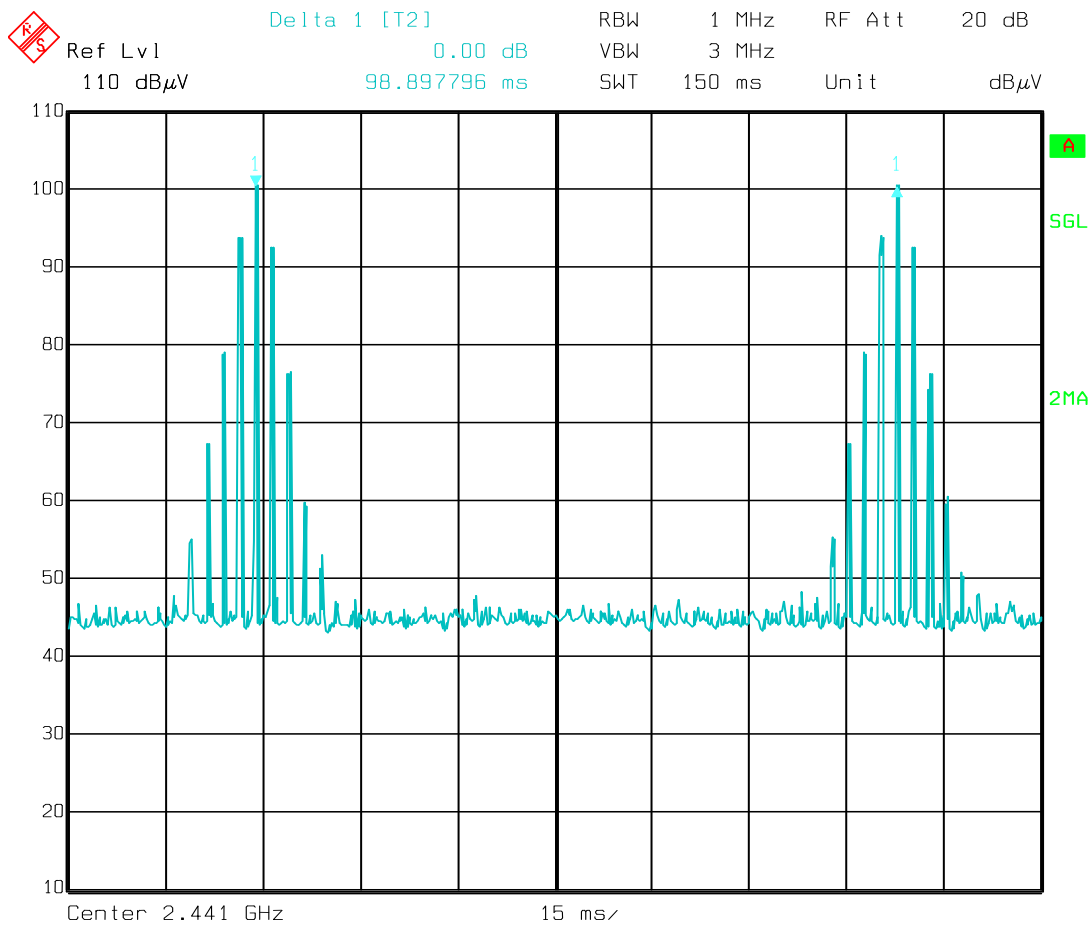
79 channels x 0.4 Seconds = 31.6 seconds.

461 us on time each time emission is on.

Channel emission repeats every 98.9 ms so it is on 319.5 times in 31.6 seconds or 0.147 seconds

$0.000461 \times 31.6 / 0.0989 = 0.147$

147 ms < 0.4 seconds



Date: 23.OCT.2008 13:19:09

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## Test Equipment

<b>Nemko ID</b>	<b>Device</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Cal Date</b>	<b>Cal Due Date</b>
111	Antenna, LPA	EMCO	3146	1382	10-Oct-07	20-Oct-10
114	Antenna, Bicon	EMCO	3104	2997	10-Jan-08	10-Jan-09
115	Antenna, Bicon	EMCO	3104	3020	15-Sep-07	19-Sep-8
317	Preamplifier	HP	8449A	2749A00167	31-Mar-08	31-Mar-09
438	Quasi-Peak Adapter	HP	85650A	2521A00618	21-Mar-08	21-Mar-09
529	Preamplifier	HP	8449A	2749A00167	31-Mar-08	31-Mar-09
542	High Pass Filter	Solar	7801-5.0	838132	11-Apr-08	11-Apr-09
684	Transient Limiter	HP	11974A	3107A02636	05-Sep-07	05-Sep-08
625	Antenna, Dbl Ridge Horn	EMCO	3116	2325	01-Apr-08	01-Apr-09
805	LISN	Solar	9348-50-R-24-BNC	941718	14-Jan-08	14-Jan-09
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	27-Jun-08	27-Jun-09
839	Spectrum Analyzer	HP	85662A	3014A18995	21-Mar-08	21-Mar-09
840	Spectrum Analyzer Display	HP	8566B	2416A00394	21-Mar-08	21-Mar-09
898	EMI Receiver & filter set	HP	8546A	3625A00348	09-May-08	09-May-09
899	Filter Section	HP	85460A	3448A00288	09-May-08	09-May-09