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TEST REPORT

FCC Part 15.247 & IC RSS-210

APPLICANT	Remington Elsag Law Enforcement Systems
ADDRESS	870 Remington Drive P.O. Box 700 Madison, NC 87025 USA
FCC ID	VTFADM3
MODEL NUMBER	ADM3
PRODUCT DESCRIPTION	802.11b/g WiFi Access Point
DATE SAMPLE RECEIVED	August 30, 2007
DATE TESTED	January 7, 2008
TESTED BY	Richard Block
APPROVED BY	Mario R. de Aranzeta
TIMCO REPORT NO.	2956AUT7TestReport.pdf
TEST RESULTS	☒ PASS ☐ FAIL

ACCREDITED

Test Certificate #0955-01

TABLE OF CONTENTS

ATTESTATION

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025:2005 requirements.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

ACCREDITED

Certificate #0955-01

Authorized by: Mario de Aranzeta

Signature:

Function: Lab Supervisor/Engineer

Date: February 4, 2008

REPORT SUMMARY

Purpose of Test:	To demonstrate the DUT is compliant with FCC Pt 15.247 and Industry Canada RSS-210 requirements for a 2.4 GHz 802.11b/g radio.
Disclaimer:	The test results relate only to the items tested.
Applicable Standards:	Pt 15.247, ANSI C63.4: 2003, FCC Rules
Related Reports:	1) 2956BUT7TestReport.pdf 2) 2956BUT7TestReport.pdf per Pt 15.109 for Digital interface portion

TEST ENVIRONMENT AND TEST SETUP

Test Facilities:	All measurements were made at one or more of the test sites of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669 USA .
Laboratory Test Conditions:	Temperature: 26°C, Humidity: 55%
Test Exercise:	The DUT was set in continuous transmit mode of operation.
Deviation to the Standards:	There was no deviation from the standard.
Modification to the DUT:	No modification was made.
Supporting Accessories:	None

DUT DESCRIPTION

Manufacturer:	Remington Elsag Law Enforcement Systems
Product Description	Camera System with 802.11b/g WiFi Access Point
FCC ID:	VTFADM3
Model Number:	ADM3
Brand Name:	Remington
Operating Frequency:	2.4 GHz
Max. Output Pwr:	0.05 Watts
Type of Modulation:	DSSS (CCK and OFDM)
EUT Power Source:	Primary Power – 12 Vdc
	Secondary Power – N/A
Test Item:	Pre Production
Type of Equipment	Mobile
Antennas	mag mount whip
Antenna Connector	Reverse SMA

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/20/07	3/19/10
3-Meter OATS	TEI	N/A	N/A	Listed 2/5/09	2/5/12
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 5/11/07	5/10/10
Analyzer Open-Frame Tower Preamplifier	HP	8449B	3008A01075	CAL 7/22/09	7/22/11
Analyzer Open-Frame Tower Quasi-Peak Adapter	HP	85650A	2043A00305	CAL 7/22/09	7/22/11
Analyzer Open-Frame Tower RF Preselector	HP	85685A	3107A01282	CAL 7/22/09	7/22/11
Analyzer Open-Frame Tower Spectrum Analyzer	HP	8566B/85662A	2627A03154/2648A14276	CAL 7/22/09	7/22/11
Antenna: Biconnical	Eaton	94455-1	1057	CAL 1/15/08	1/15/10
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 10/1/09	10/1/11
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/13/07	12/13/09
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/1/09	10/1/11
LISN	Electro-Metrics	EM-7820	2682	CAL 9/24/09	0/24/11
Signal Generator	HP	8640B	2308A21464	CAL 8/4/09	8/4/11

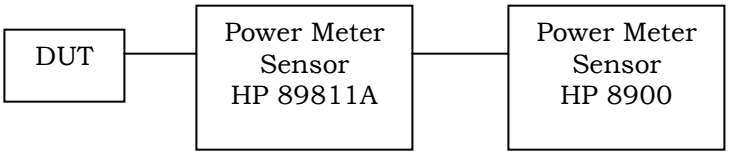
TEST PROCEDURES

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003. The measurement used a 50uH LISN. The spectrum was scanned from 0.15 to 30 MHz.

Bandwidth 6dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=1.0MHz and the video bandwidth (VBW) >=RBW and the span set as shown on plot.

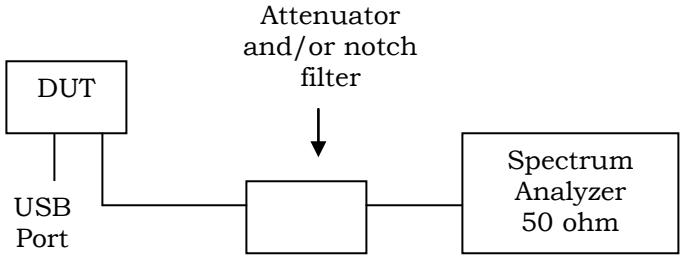
RF Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Output Power Test Setup Diagram



Antenna Conducted Spurious Emissions: The RBW=100 kHz, VBW>= RBW and the span set to 10.0MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = >RBW and the span to 50MHz.

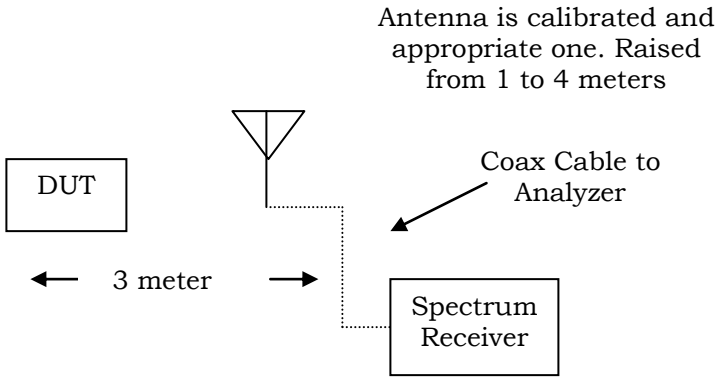
RF Conducted Spurious Emissions Test Setup Diagram



Radiation Interference: The test procedure used was ANSI C63.4-2003 using a Agilent spectrum analyzer with a preselector. The bandwidth (RBW) of the spectrum analyzer was 100 kHz up to 1GHz and 1.0MHz above 1GHz with an appropriate sweep speed. The VBW was always greater than or equal to the RBW unless notes. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

Radiated Spurious Emissions Into Adjacent Restricted Band: An inband plot of the fundamental emission at the lowest and highest frequencies was made using the RBW and detector function required by C63.4-2003 and FCC Rules.

Radiated Spurious Emissions: The procedure used was ANSI C63.4-2003 & the FCC/OET Guidance on Measurements for Direct Sequence Spread Spectrum Systems – Public Notice 54797 Dated July 12, 1995.



DUT is placed 80 cm above groundplane on a rotatable platform

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: 15.207

Requirements:

Emission Frequency (MHz)	Conducted Limit (dBµV)	
	Quasi-peak (QP)	Average (AV)
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50
* Decreases with the logarithm of the frequency.		

Test Data: Not applicable because the DUT is battery operated exclusively.

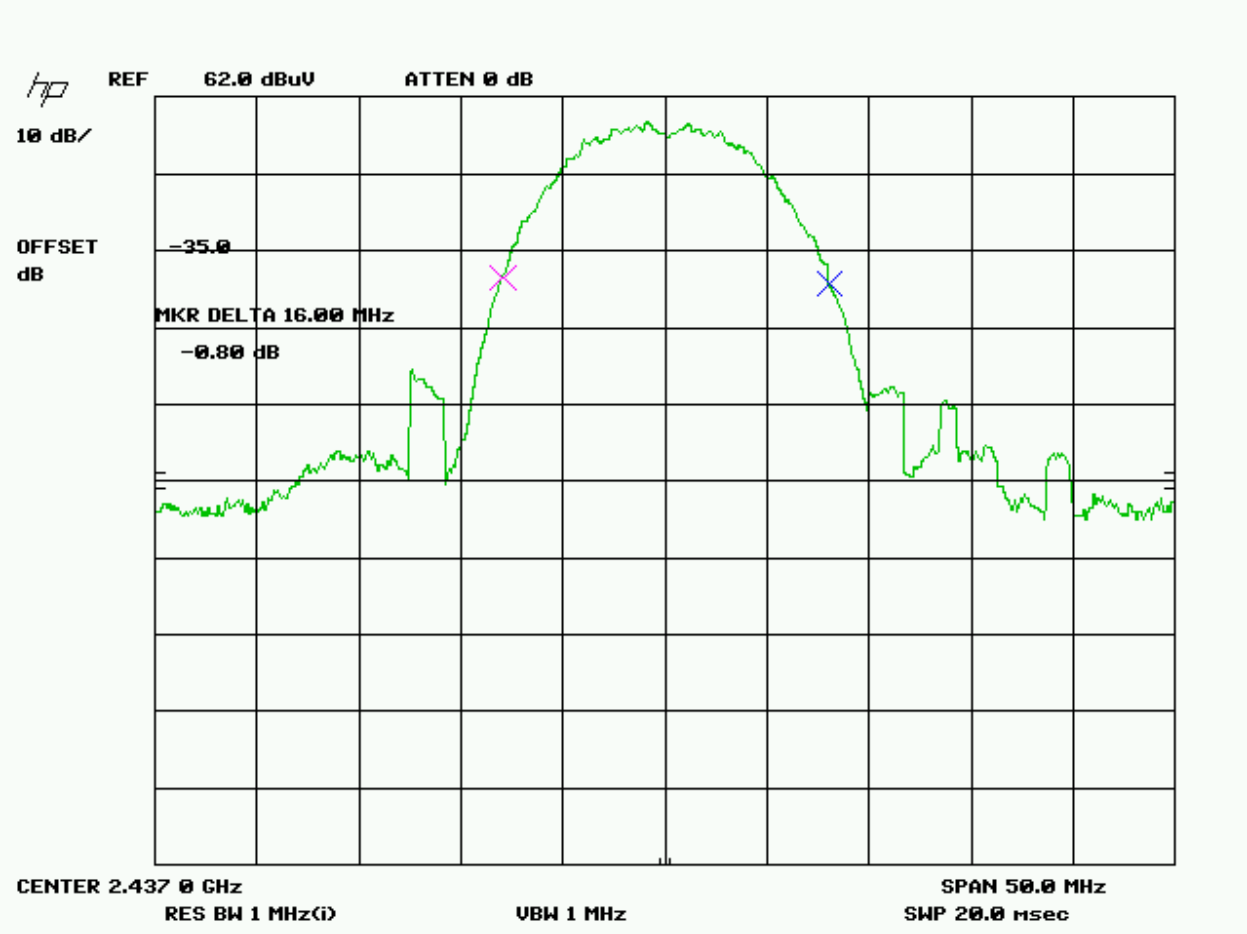
OCCUPIED BANDWIDTH

Rules Part No.: 15.247(a)(2)

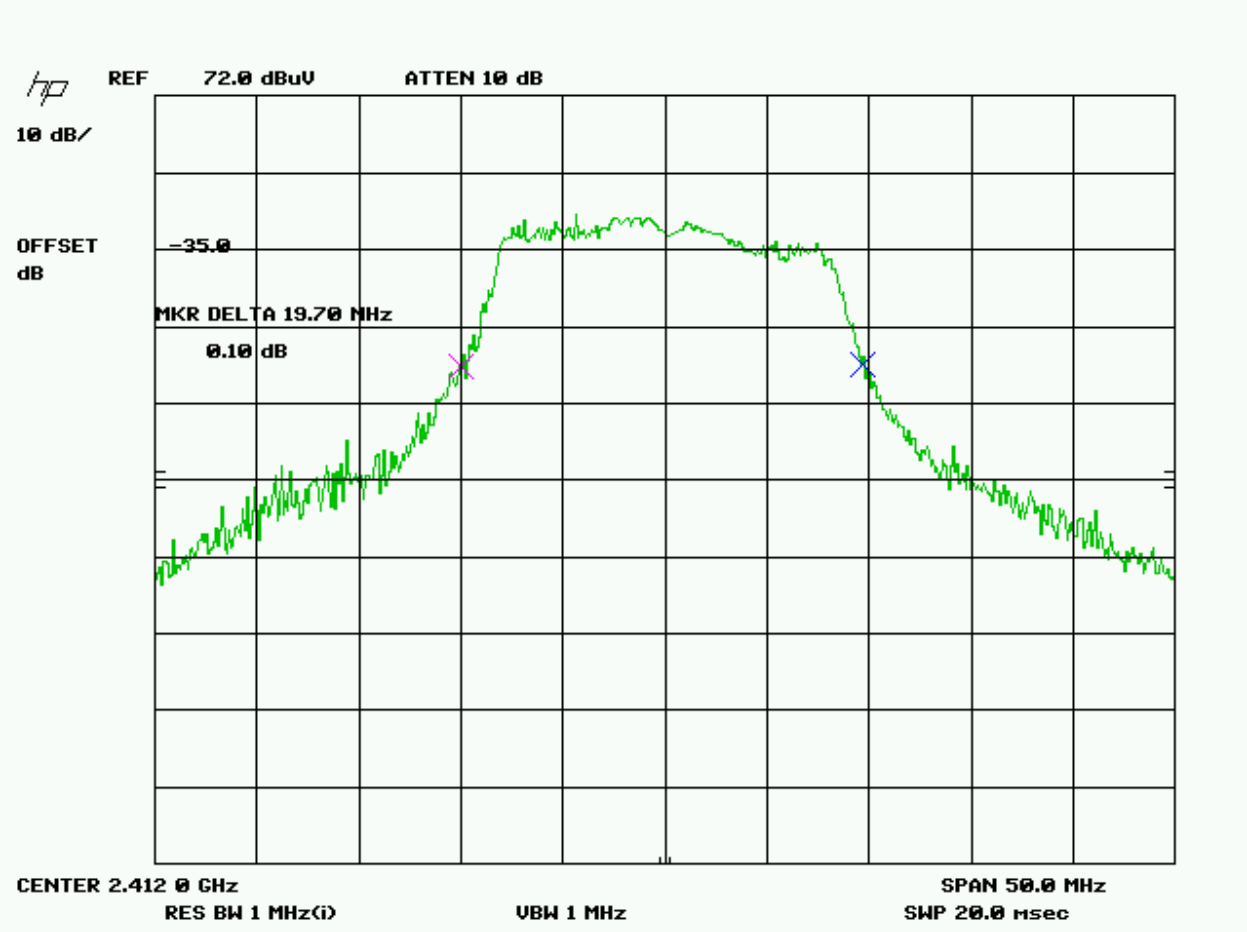
Requirements: The 6.0dB bandwidth must be greater than 500 kHz.

Test Data:

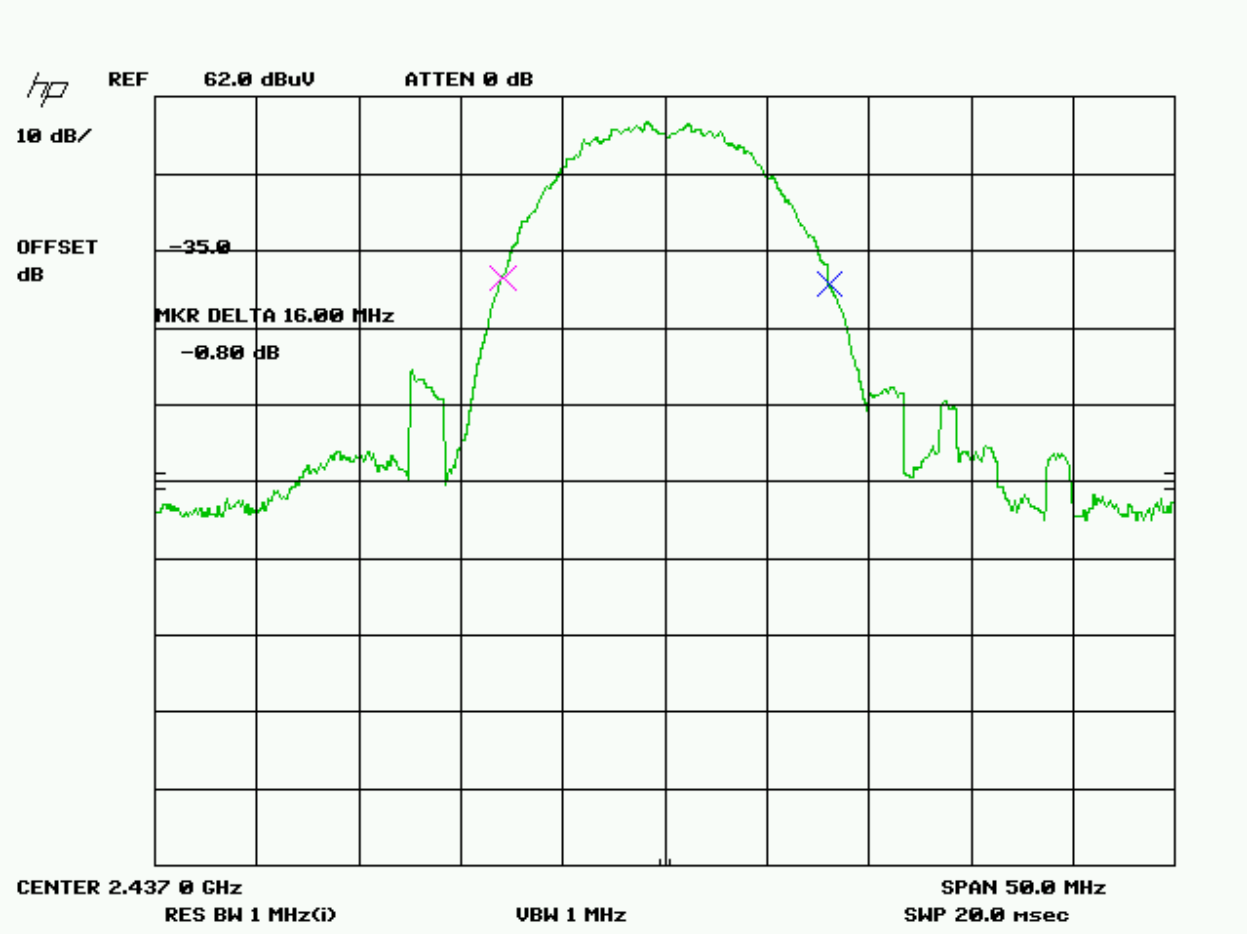
802.11b 6dB Bandwidth



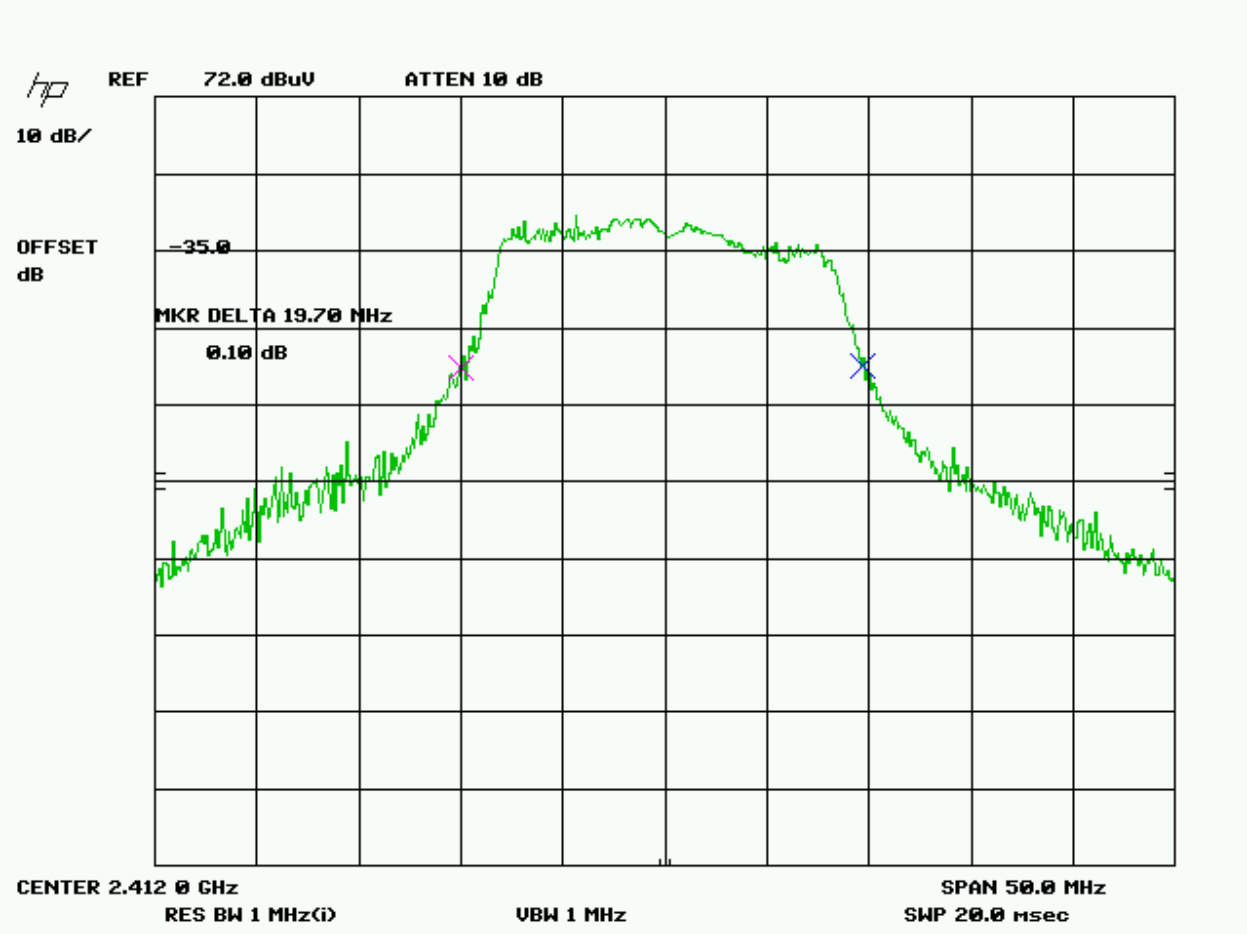
802.11g 6 dB Bandwidth



802.11b 20 dB Bandwidth



802.11g 20 dB Bandwidth



RF POWER OUTPUT

Rules Part No.: 15.247(b)

Requirements: 1 Watt or +30 dBm conducted

Test Data: 802.11b

Frequency MHz	Power output mW	dBm
2412	50	17
2437	50	17
2462	40	16

802.11g

Frequency MHz	Power output mW	dBm
2412	32	15
2437	35.5	15.5
2462	32	15

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Rules Part No.: Pt 15.247 (c), Pt 2.1051

Requirements: Emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

Test Data:

802.11b

2412 MHz	Emissions dBc
4824	53
7236	59
9648	59
12060	58

2437 MHz	Emissions dBc
4874	51
7311	58
9748	58
12185	58
14622	58
17059	60

2462 MHz	Emissions dBc
4924	53
7368	58
9848	58
12310	58
14772	58
17234	61

802.11g

2412 MHz	Emissions dBc
4824	60
7236	60
9648	60
12060	60

2437 MHz	Emissions dBc
4874	59
7311	60
9748	61
12185	60
14622	61
17059	62

2462 MHz	Emissions dBc
4924	59
7368	61
9848	61
12310	60
14772	61
17234	62

FIELD STRENGTH OF SPURIOUS EMISSIONS: 802.11b

Rules Part No.: 15.247(c), 15.205 &15.209(b)

Requirements:

§15.247(c)& §15.205	
(Fundamental) Frequency	(Field Strength) Limits
902 – 928MHz	127.37dBuV/m
2.4 – 2.4835GHz	127.37dBuV/m
Restricted Bands	54 dBuV/m @3m
§15.209	
30 - 88 MHz	40 dBuV/m @3m
88 -216 MHz	43.5 dBuV/m @3m
216 -960 MHz	46 dBuV/m @3m
ABOVE 960 MHz	54dBuV/m

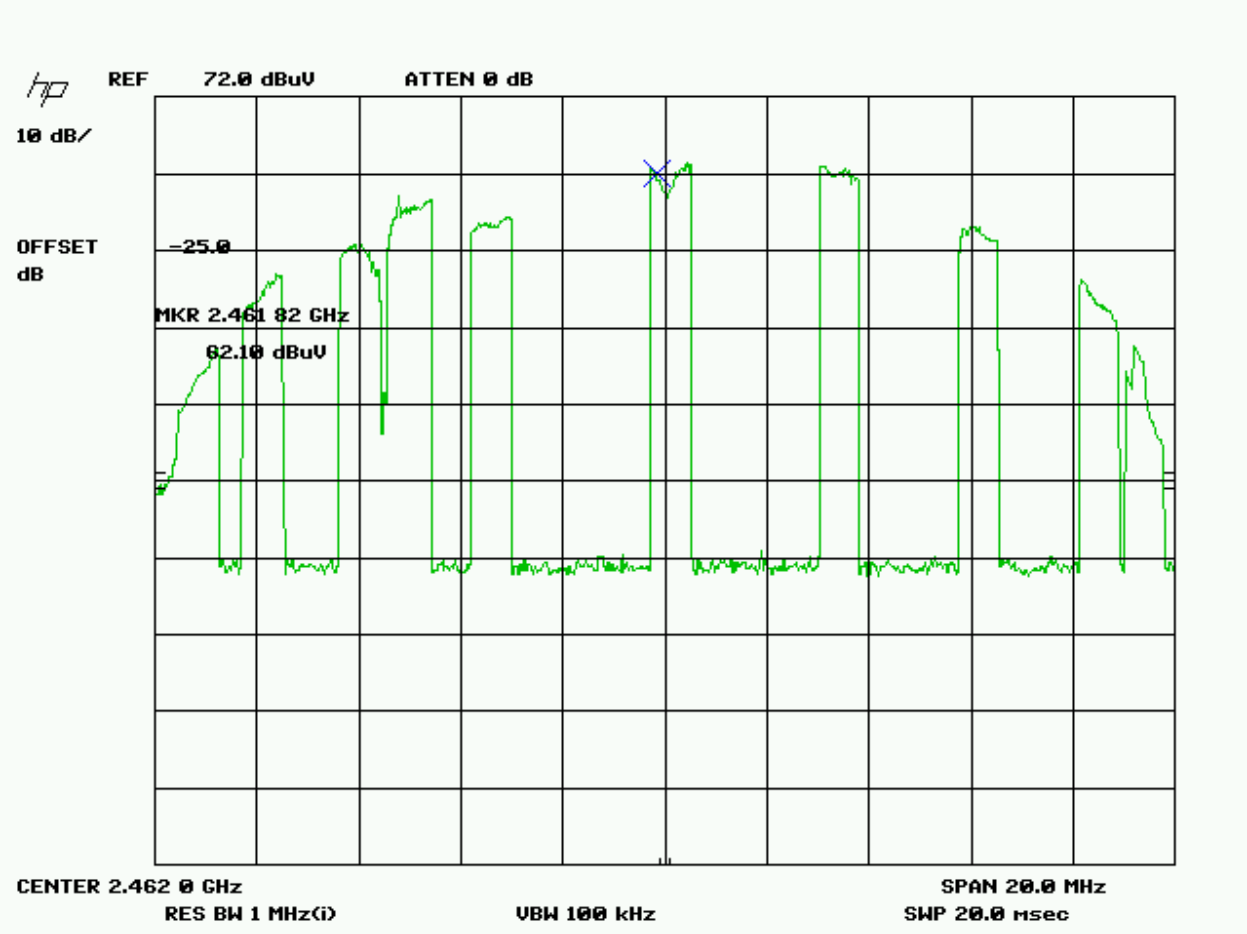
Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBuV/m). Spurious not in a restricted band must be 20 dBc.

Test Data: 802.11b

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Duty cycle dB	Field Strength dBuV/m	Margin dB
2,412.0	2,412.00	70.7	V	3.19	32.27	6	106.16	21.22
2,412.0	4,824.0Pk	27.2	V	4.91	34.10	6	60.21	13.79
2,412.0	4,824.0Av	18.5	V	4.91	34.10	6	51.51	2.49
2,437.0	2,437.00	69.0	V	3.21	32.34	6	104.55	22.83
2,437.0	4,874.0pk	23.3	V	4.94	34.10	6	56.34	17.66
2,437.0	4,874.0Av	20.8	V	4.94	34.10	6	53.84	0.16
2,462.0	2,462.00	69.0	V	3.22	32.40	6	104.62	22.76
2,462.0	4,924.0Pk	24.4	V	4.96	34.10	6	57.46	16.54
2,462.0	4,924.0Av	19.7	V	4.96	34.10	6	52.76	1.24

All readings are peak unless marked otherwise by an 'A'.
*Harmonics were checked through the 10th harmonic.

DUTY CYCLE



The waveform has a duty cycle of 50% which is correction factor of 6 dB.

FIELD STRENGTH OF SPURIOUS EMISSIONS: 802.11g

Rules Part No.: 15.247(c), 15.205 &15.209(b)

Requirements:

§15.247(c)& §15.205	
(Fundamental) Frequency	(Field Strength) Limits
902 – 928MHz	127.37dBuV/m
2.4 – 2.4835GHz	127.37dBuV/m
Restricted Bands	54 dBuV/m @3m
§15.209	
30 - 88 MHz	40 dBuV/m @3m
88 -216 MHz	43.5 dBuV/m @3m
216 -960 MHz	46 dBuV/m @3m
ABOVE 960 MHz	54dBuV/m

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBuV/m). Spurious not in a restricted band must be 20 dBc.

Test Data: 802.11g

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
2,412.0	2,412.00	71.5	V	3.19	32.27	106.96	20.42
2,412.0	4,824.0Pk	19.6	V	4.91	34.10	58.61	15.39
2,412.0	4,824.0Av	14.7	V	4.91	34.10	53.71	0.29
2,437.0	2,437.00	71.5	V	3.21	32.34	107.05	20.33
2,437.0	4,874.0Pk	15.8	V	4.94	34.10	54.84	19.16
2,437.0	4,874.0Av	13.3	V	4.94	34.10	52.34	1.66
2,462.0	2,462.00	71.0	V	3.22	32.40	106.62	20.76
2,462.0	4,924.0Pk	19.8	V	4.96	34.10	58.86	15.14
2,462.0	4,924.0Av	14.6	V	4.96	34.10	53.66	0.34

RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

Rules Part No.: Pt 15.205

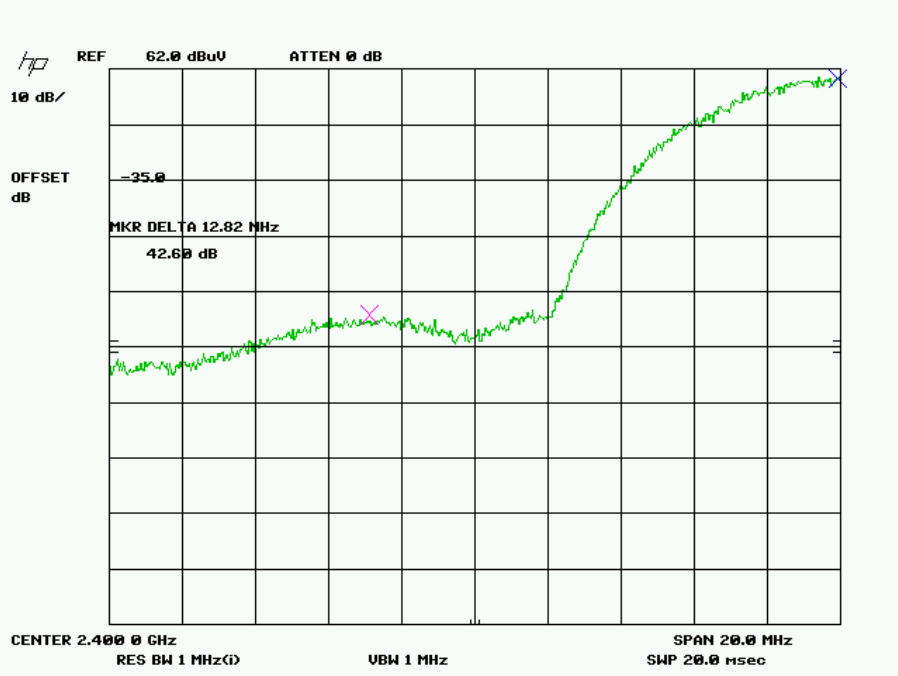
Requirements: Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.

Test Data: The plots are presented below.

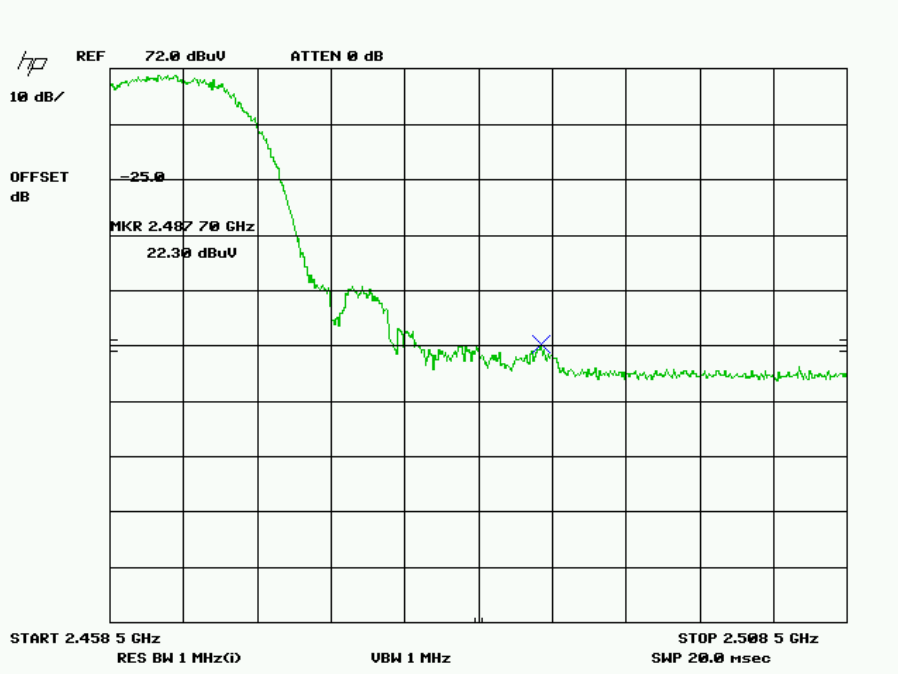
802.11b

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m		Field Strength dBuV/m	Margin dB
2,412.0	2,386.0Pk	25.5	V	3.17	32.20		60.87	13.13
2412	2386 Ave	17.6	V	3.17	32.20		52.97	1.03
2462	2487.7Pk	22.38	V	3.25	32.5		58.13	15.87
2462	2483.5Av	13.0	V	3.24	32.46		48.7	5.30

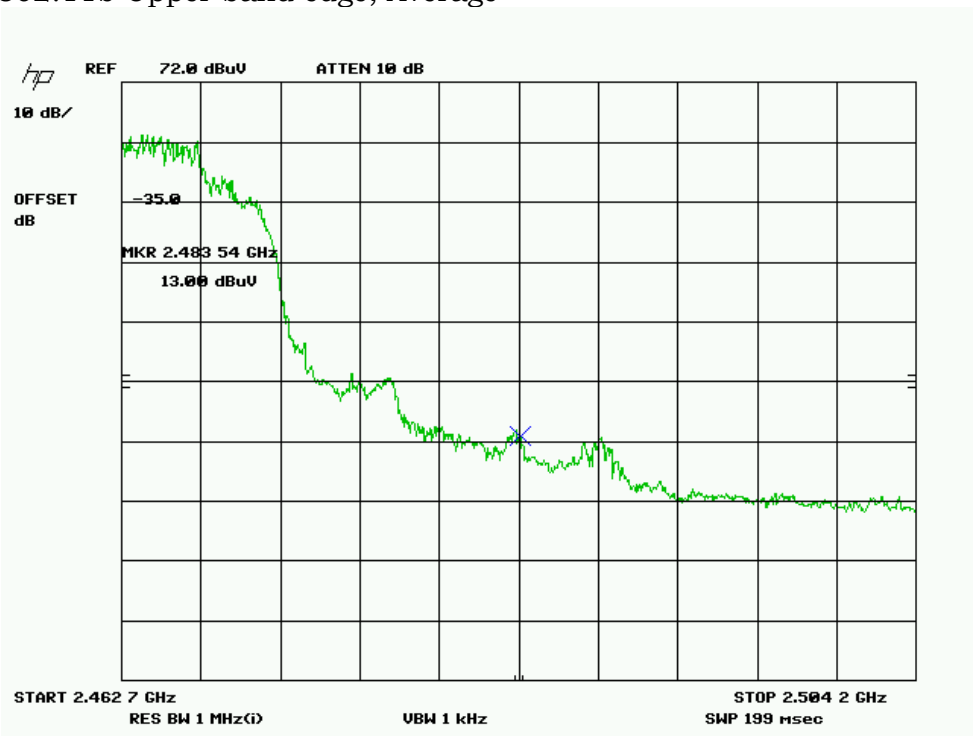
802.11b, Lower Band Edge, Peak (meets 20 dBc)



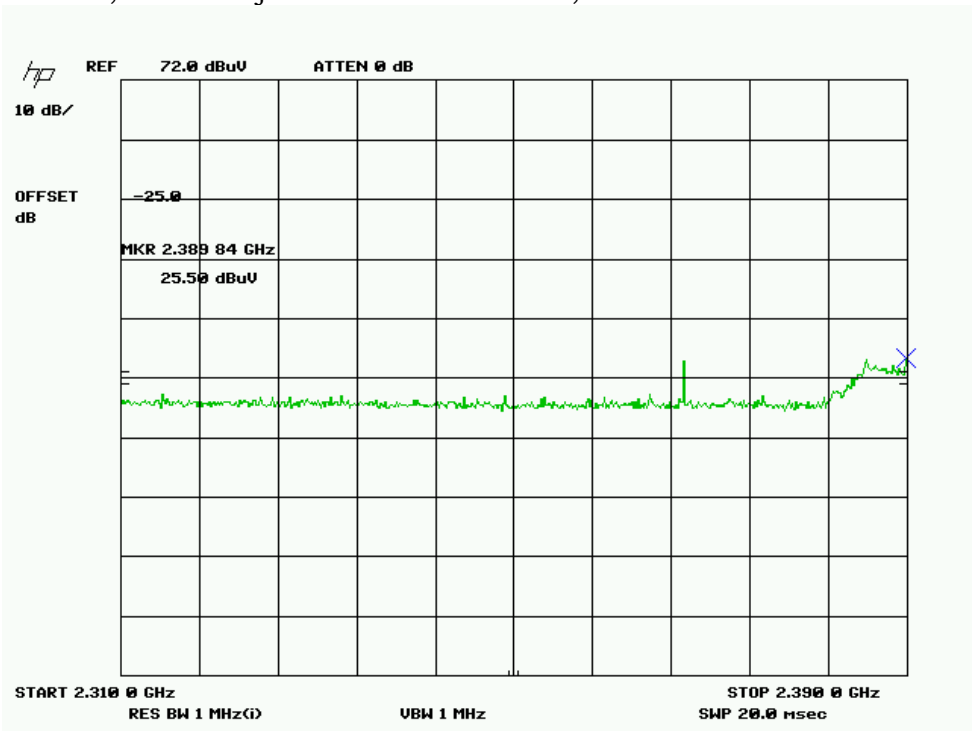
802.11b, Upper Band Edge, Peak



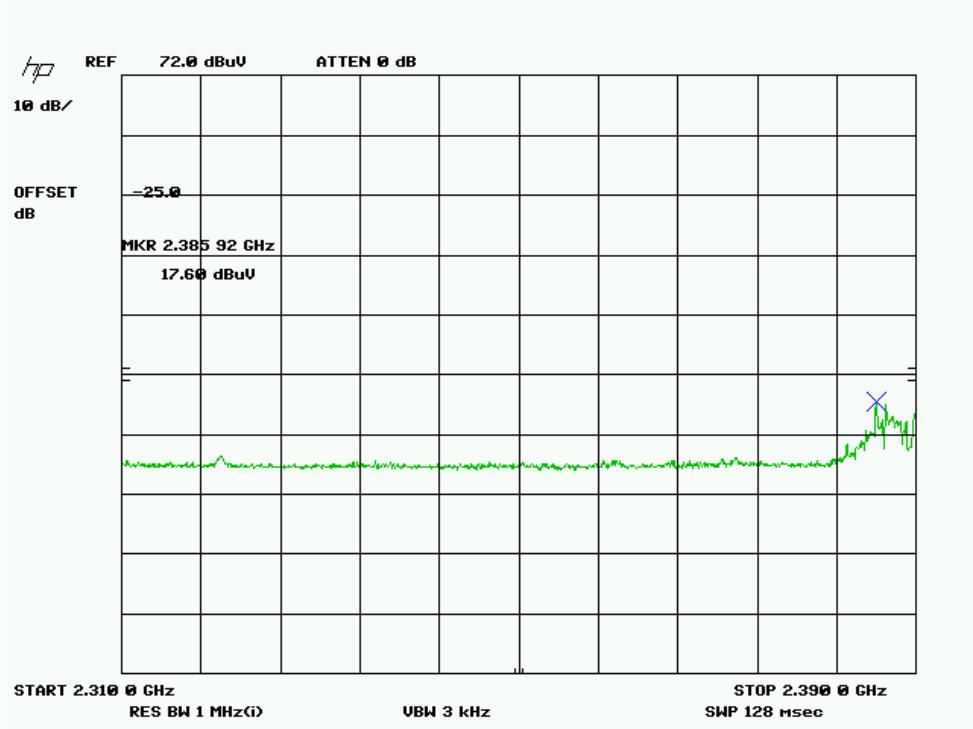
2462 MHz, 802.11b Upper band edge, Average



2412 MHz, 802.11b, Lower adjacent restricted band, Peak



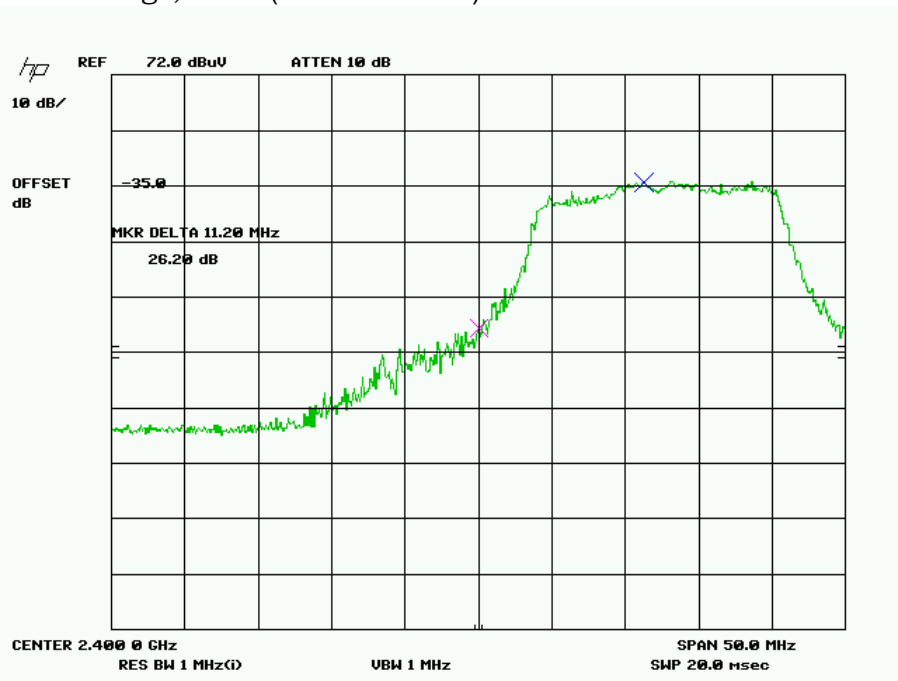
2412 MHz, 802.11b, Lower adjacent restricted band, Average



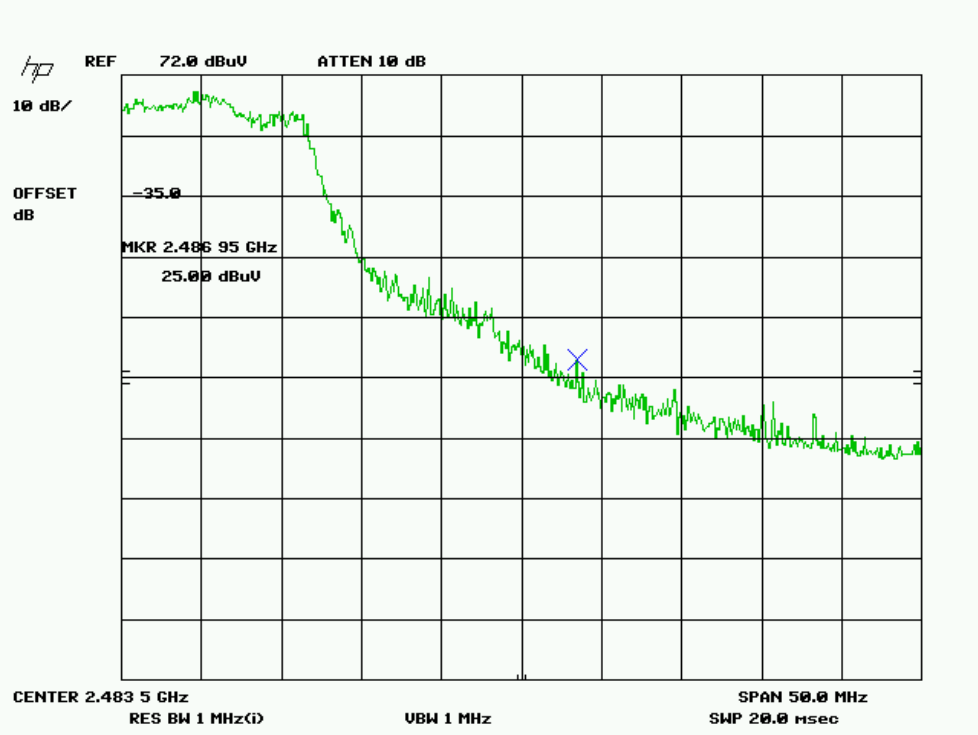
Test Data: 802.11g

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
2,412.0	2,389.0Pk	18.2	V	3.17	32.21	53.58	00
2,462.0	2,483.5Ave	13.0	V	3.24	32.46	53.70	0.30
2462	2486.0Pk	26.0	V	3.25	32.50	61.75	12.25

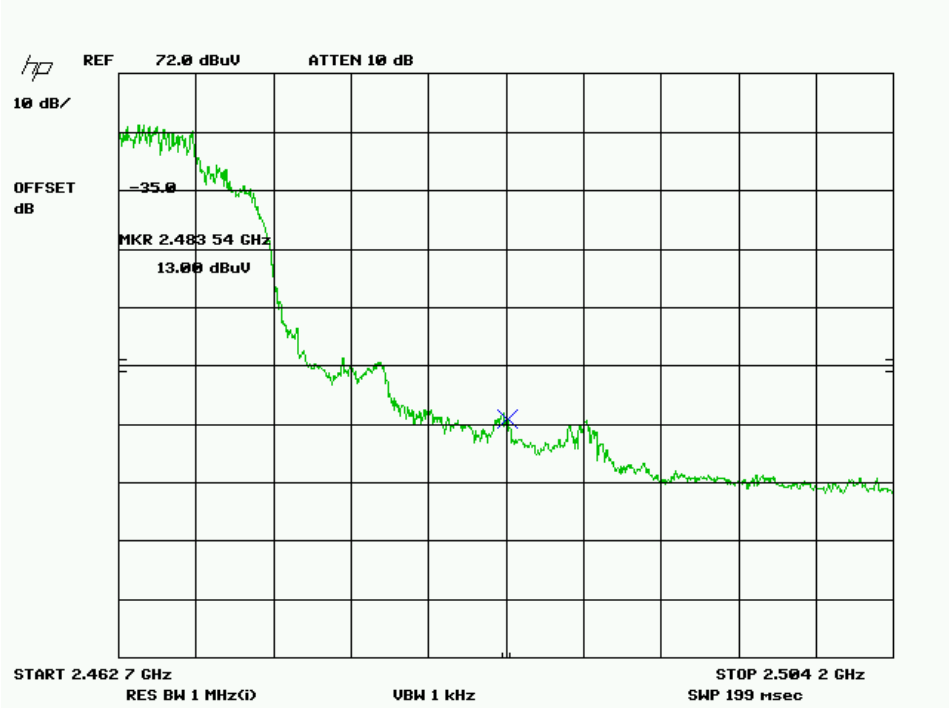
802.11g. Lower Band Edge, Peak (meets 20 dBc)



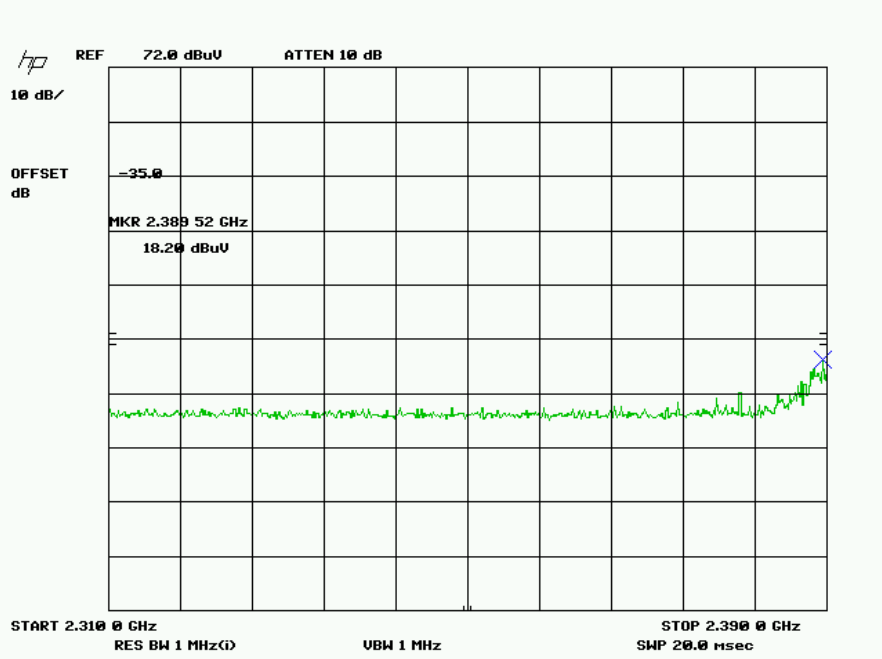
802.11g, Upper Bandedge, Peak



802.11g, Restricted band, upper bandedge, Average



2412 MHz 802.11g, Lower Adjacent restricted band, Peak



POWER SPECTRAL DENSITY

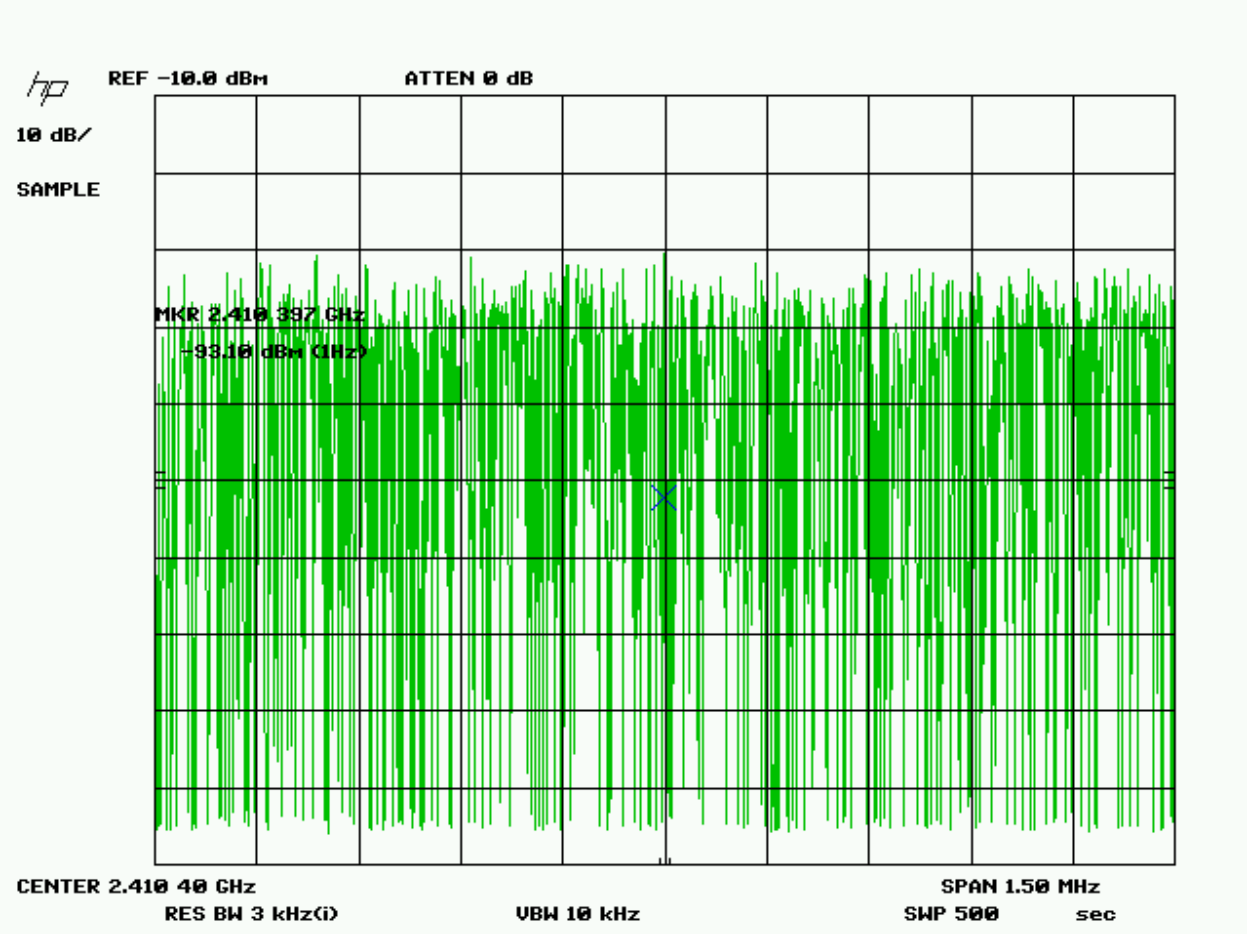
Rules Part No.: 15.247(d)

Requirements: The peak level measured must be no greater than +8.0dBm.

Test Data: See plots below

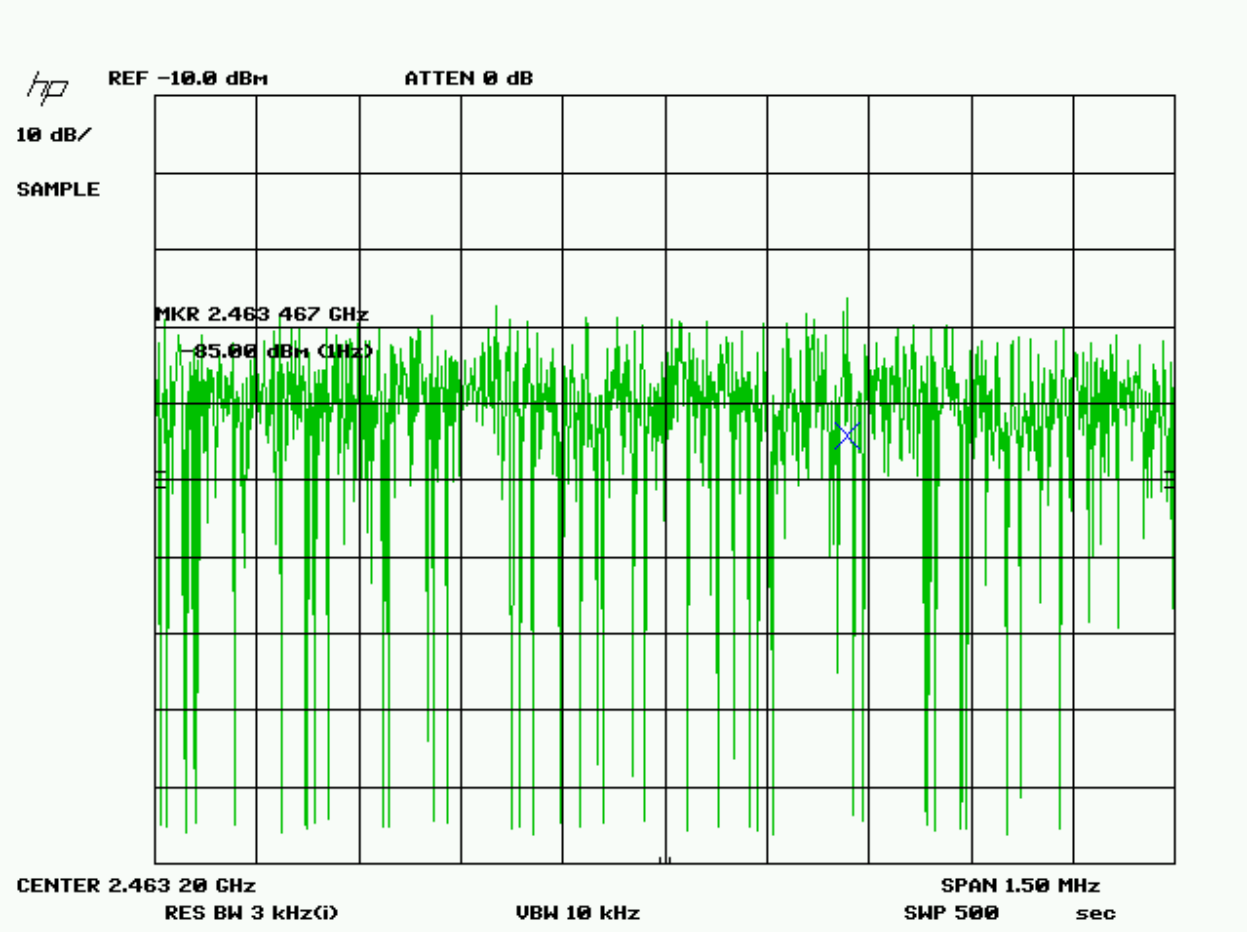
Three places in the band were measured and the worst case presented.

802.11b Power spectral density



-93.1 dBm from plot
+35 dB CF from 1 Hz to 3 kHz
+20 dB attenuators used
-38.1 dBm

802.11g Power spectral density



-85.0 dBm from plot
+35 dB CF from 1 Hz to 3 kHz
+20 dB attenuators used
-30 dBm