Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA

TEL:+82 31 322 2333 FAX:+82 31 322 2332

FCC and IC EVALUATION REPORT FOR CERTIFICATION

Applicant :

SK telesys Co., Ltd.
10F Chorim Bldg.6-3, Sunae-Dong, Bundang-Gu,
Seongnam-Si
Seoul, Korea, (Post code : 150-871)

Dates of Issue : March 6, 2010
Test Report No. : NK-10-R-012-2
Test Site : Nemko Korea Co., Ltd.

FCC ID	VAWSMT-CW230
Brand Name	**SK telesys**
Contact Person	**SK telesys Co., Ltd.** **10F Chorim Bldg.6-3, Sunae-Dong, Bundang-Gu, Seongnam-Si** **Mr. Seung Moon Lee** **phone No. : +82 31 786-5764**

Applied Standard: FCC 47 CFR Part 15
Classification: FCC part 15 Digital modulation Transmitter
EUT Type: WiMAX CPE

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Mar. 06. 2010

Tested By : Minchul Shin
Engineer

Mar. 06. 2010

Reviewed By : H.H. Kim
Manager & Chief Engineer

TABLE OF CONTENTS

1.	**Scope**	**4**
2.	**Introduction (Site Description)**	**5**
3.	**Test Conditions & EUT Information**	**6**
	3.1 Operation During Test	6
	3.2 Support Equipment	6
	3.3 Setup Drawing	7
	3.4 EUT Information	8
4.	**Summary of Test Results**	**9**
5.	**Recommendation / Conclusion**	**10**
6.	**Antenna Requirements**	**10**
7.	**Description of Test**	**11**
	7.1 Conducted Emissions	11
	7.2 Radiated Emissions	12
	7.3 6 dB Bandwidth	13
	7.4 Maximum Peak Output Power	13
	7.5 Peak Power Spectral Density	14
	7.6 Conducted Spurious Emissions	14
8.	**Test Data**	**15**
	8.1 Conducted Emissions	15
	8.2 Radiated Emissions	18
	8.3 6 dB Modulated Bandwidth	19
	8.4 Peak Power Output	23
	8.5 Power Spectral Density	24
	8.6 Conducted Spurious Emissions	28
	8.7 Radiated Spurious Emissions	37

9 Accuracy of Measurement **47**

10. Test Equipment **49**

Appendix A: Labelling Requirement **50**

Appendix B: Photographs of Test Set-up **51**

Appendix C: EUT Photographs **53**

1. SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

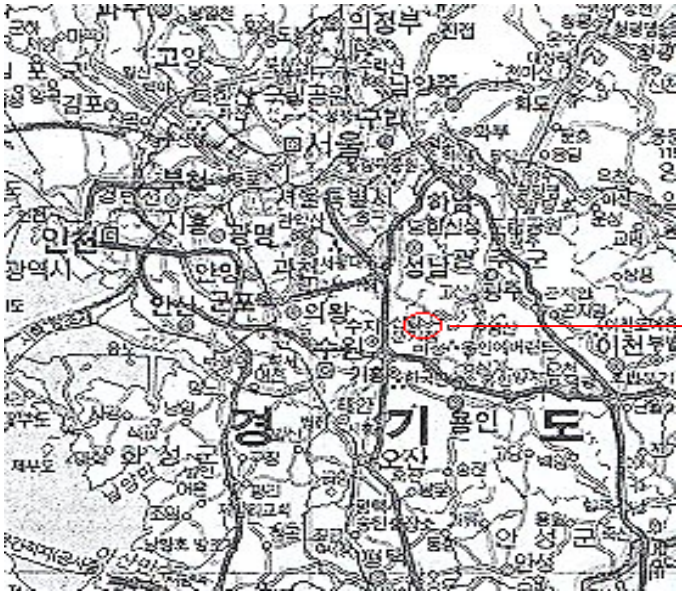
Responsible Party :	SK telesys Co., Ltd.
Contact Person :	Mr. Seung Moon Lee Tel No. : +82 31 786 5764
Manufacturer :	SK telesys Co., Ltd. 10F Chorim Bldg. 6-3, Sunae-Dong, Bundang-Gu, Seongnam-Si

- FCC ID: VAWSMT-CW230
- Model: SMT-CW230
- Brand Name: SK telesys
- EUT Type: WiMAX CPE
- Classification: FCC part 15 Digital modulation Transmitter
- Applied Standard: FCC 47 CFR Part 15 subpart C
- Test Procedure(s): ANSI C63.4 (2003)
- Dates of Test: Jan. 14, 2010 ~ Feb. 07, 2010
- Place of Tests: Nemko Korea Co., Ltd.

2. INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions emanating from **SK telesys Co., Ltd.**
FCC ID : **VAWSMT-CW230.**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address is 300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA.
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilo-meters (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 2003.



Nemko Korea Co., Ltd.
EMC Lab.
300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA 449-852
Tel)+82-31-322-2333

Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

3. TEST CONDITIONS & EUT INFORMATION

3.1 Operation During Test

The EUT was measured at WLAN Traffic mode with the maximum output power in accordance with the manufacturer's specifications.

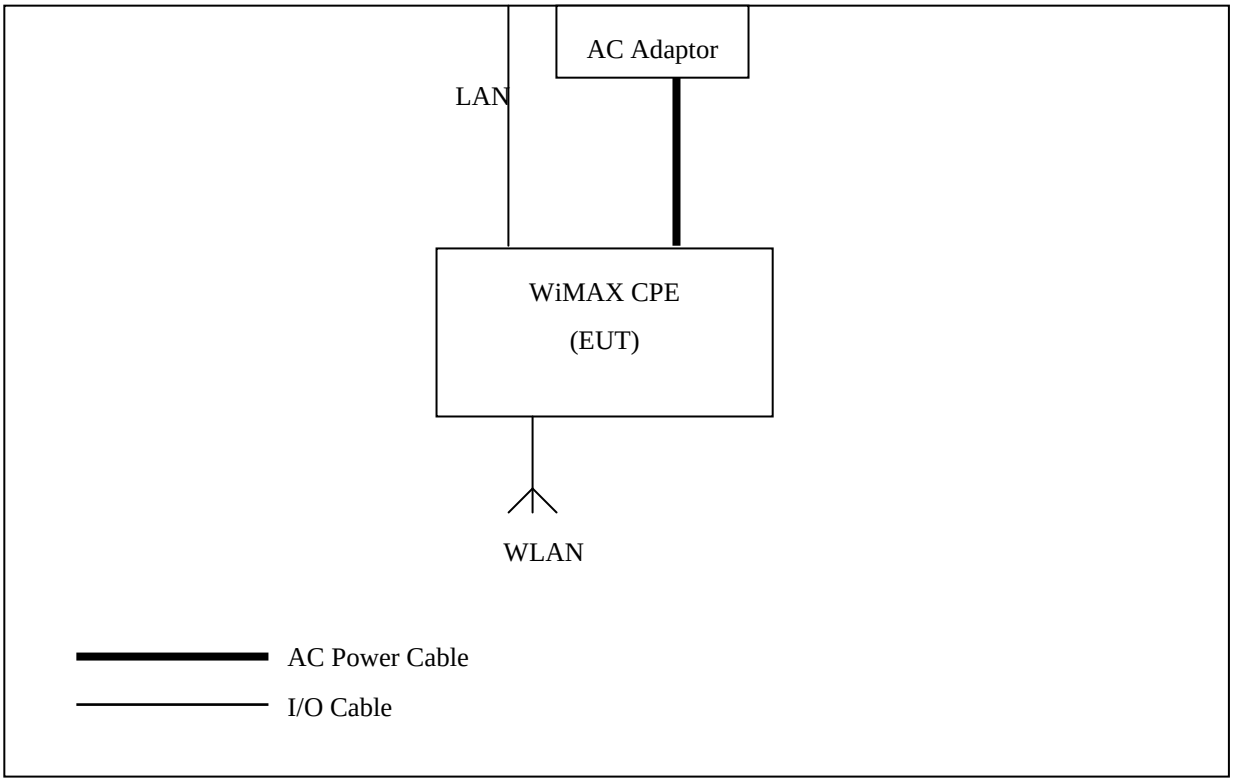
Power setting level

Test frequency		2412 MHz	2437 MHz	2462 MHz
802.11b Mode	Power Level	3	3	5
	Data rate	11	11	11
802.11g Mode	Power Level	3	3	5
	Data rate	54	54	54

3.2 Support Equipment

WiMAX CPE (EUT)	SK telesys Co., Ltd. FCC ID: VAWSMT-CW230	S/N: N/A
AC Adaptor	Ktec® Model : KSAC0500200W1US 1.8 m shielded power cable	FCC Verification S/N: N/A

3.3 Setup Drawing



3.4 EUT Information (WLAN part)

The EUT is the **SK telesys Co.,Ltd WiMAX CPE FCC ID: VAWSMT-CW230.**

Specifications:

Category:	WiMAX CPE
Model Name:	SMT-CW230
Brand Name:	SK telesys
Frequency of Operation	2412MHz ~ 2462MHz
Power Output (Conducted)	11.48 dBm (0.014 W)
Channels	11 channel
Data Rate	802.11b Mode :11/5.5/2/1 802.11g Mode : 54/48/36/24/18/12/9/6
Antenna Gain (Max)	-2.77 dBi
Spreading	802.11b :DSSS 802.11 g : OFDM
Modulations	BPSK, QPSK, 16QAM, 64QAM
Temperature Range	-20 ℃ ~ +50 ℃
Voltage	Input :AC 100~240V output :5.0 Vdc Adapter
Dimensions (W x H x D)	246 mm X 128 mm x 43 mm
Weight	56.5 g (Without Adapter)
Remarks:	-

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	Result	Remark
Conducted Emission	15.107 15.207	Complies	
Radiated Emission	15.109 15.205 15.209	Complies	
6 dB Bandwidth	15.247(a)(2)	Complies	
Peak Power Output	15.247(b)(3)	Complies	
Power Spectral Density	15.247(e)	Complies	
Conducted Spurious Emission	15.247(d)	Complies	
Radiated Spurious Emission	15.247(d)	Complies	
Maximum Permissible Exposure	1.1307(b)	Complies	

5. RECOMMENDATION/CONCLUSION

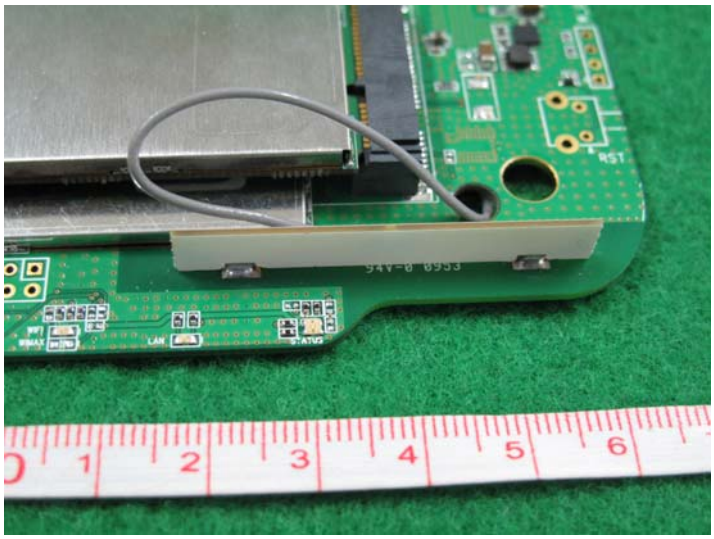
The data collected shows that the **SK telesys WiMAX CPE FCC ID: VAWSMT-CW230** is in compliance with Part 15 Subpart C 15.247 of the FCC Rules.

6. ANTENNA REQUIREMENTS

§15.203 of the FCC Rules part 15 Subpart C

: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna of the **SK telesys WiMAX CPE FCC ID: VAWSMT-CW230** is **permanently attached** and there are no provisions for connection to an external antenna. It complies with the requirement of §15.203.



7. DESCRIPTION OF TESTS

7.1 Conducted Emissions

The Line conducted emission test facility is located inside a 4 X 7 X 2.5 meter shielded enclosure. It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1m X 1.5m wooden table 0.8m height is placed 0.4m away from the vertical wall and 1.5m away from the side of wall of the shielded room Rohde & Schwarz (ESH3-Z5) and Kyoritsu (KNW-407) of the 50ohm/50uH Line Impedance Stabilization Network(LISN) are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISN s are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2".
If DC power device, power will be derived from the source power supply it normally will be powered from
and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentine fashion) to a 1 meter length.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver.
(Rohde & Schwarz ESCS30).
The detector function were set to CISPR quasi-peak mode & average mode.
The bandwidth of receiver was set to 9KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

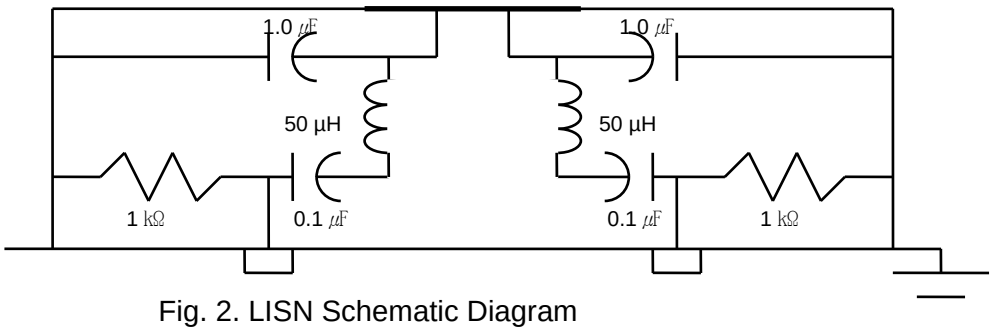


Fig. 2. LISN Schematic Diagram

7.2 Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found. The spectrum was scanned from 9 kHz to 30 MHz using Loop Antenne(EMCO, 6502) and 30 to 1000 MHz using Bi-conical log Antenna(ARA, LPB-2520/A). Above 1 GHz, Horn antenna (Scwarzbeck BBHA 9120D: upto 18 GHz , BBHA9170 : upto 40 GHz) was used. Final Measurements were made outdoors at 3 or 10 m test range using Loop Antenne(EMCO, 6502) and Logbicon Super Antenna (Schwarzbeck, VULB9166) or Horn antenna.(Scwarzbeck BBHA 9120D: upto 18 GHz , BBHA9170 : upto 40 GHz).
The test equipment was placed on a wooden table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
Each frequency found during pre-scan measurements was reexamined and investigated using EMI test receiver.(ESCS30) The detector function was set to CISPR peak mode or quasi-peak mode or average mode and the band-width of the receiver was set to 120 kHz or 1MHz depending on the frequency or type of signal. The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non- metallic 1.0 X 1.5 meter table. The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.

Each EME reported was calibrated using the R/S signal generator.

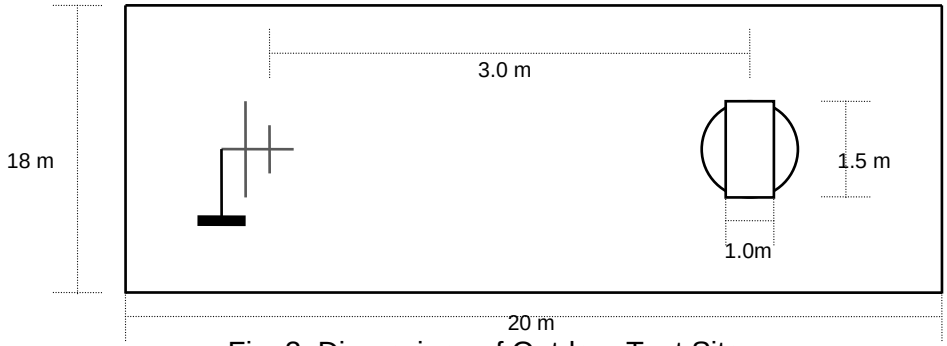
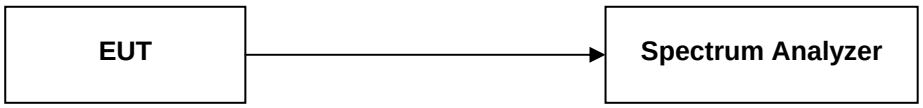


Fig. 3. Dimensions of Outdoor Test Site

7.3 6 dB Bandwidth

Test Setup

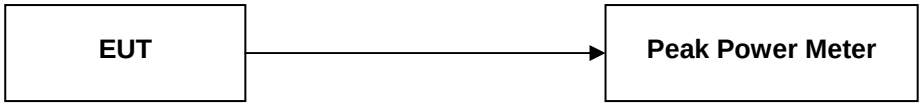


Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the spectrum analyzer. The RBW and VBW of spectrum analyzer are set to 100 kHz.
The sweep time is coupled.
The spectrum analyzer is set for peak detected and Max hold scan mode.

7.4 Maximum Peak Output Power

Test Setup

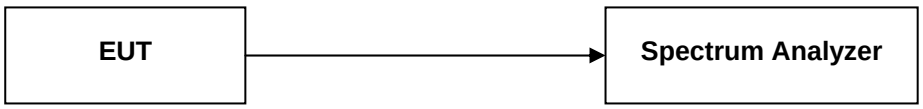


Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the Peak Power Meter.

7.5 Peak Power Spectral Density

Test Setup

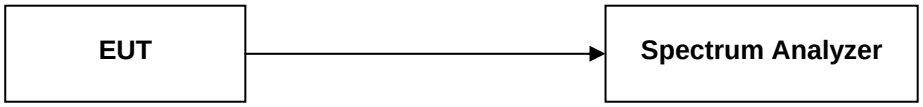


Test Procedure

The transmitter is connected to the Spectrum analyzer.
The maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer.
The RBW of spectrum analyzer is set to 3 kHz and VBW is set to 3 kHz.
The sweep time is set to Span/3 kHz and video averaging is turned off.
The PPSD is the highest level found across the emission in any 3 kHz band.

7.6 Conducted Spurious Emissions

Test Setup



Test Procedure

The transmitter is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to 1 MHz and VBW is set to the 1 MHz.
Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the Lowest, Middle and highest channels.

8. TEST DATA

8.1 Conducted Emissions

FCC §15.207, 15.107

Frequency	Level(dBμV)		*)Factor	**) Line	Limit(dBμV)		Margin(dB)	
(MHz)	Q-Peak	Average	(dB)		Q-Peak	Average	Q-Peak	Average
0.18	44.6	28.6	0.2	N	64.5	54.5	19.9	25.9
0.23	41.2	25.6	0.2	N	62.4	52.4	21.2	26.8
0.35	38.6	24.9	0.2	N	59.0	49.0	20.4	24.1
0.41	37.7	23.5	0.1	N	57.6	47.6	19.9	24.1
16.22	37.2	35.1	1.3	N	60.0	50.0	22.8	14.9
23.12	34.7	33.8	1.8	N	60.0	50.0	25.3	16.2

Line Conducted Emissions Tabulated Data

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.
3. Factor = LISN + Cable Loss
4. LINE : L =Line , N = Neutral
5. The limit is on the FCC Part section 15.207(a), 15.107(a).

PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Line)***

NEMKO KOREA (NK-10-R-012) 24 Jan 2010 11:40

Conducted Emissions

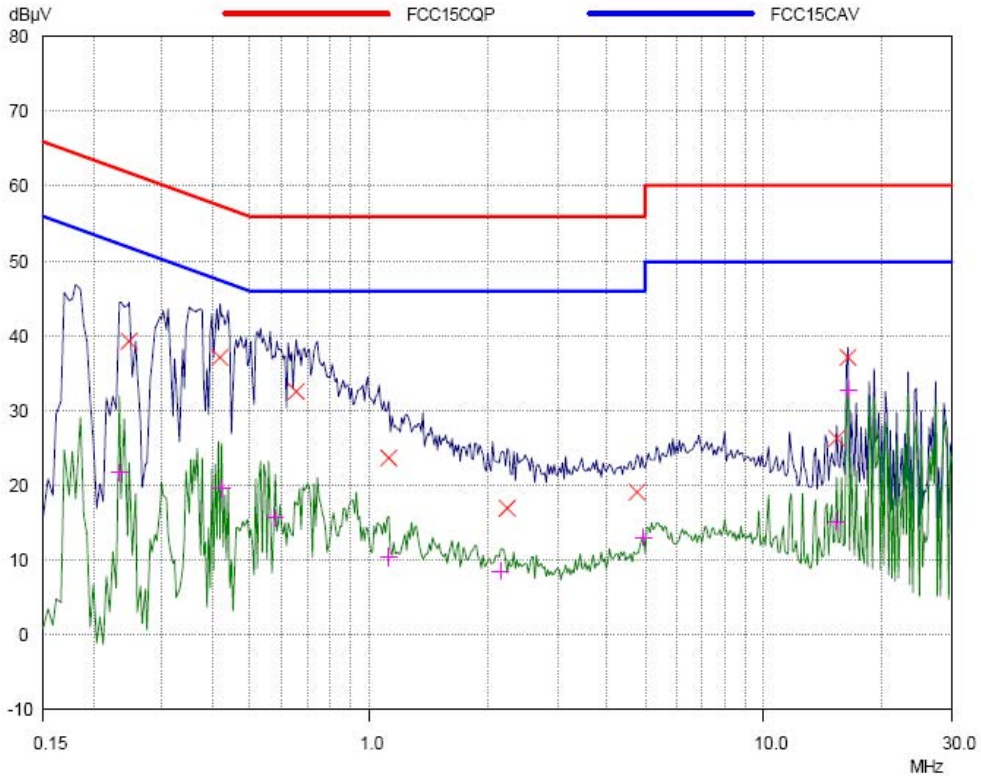
EUT:	EUT
Manuf:	SK telesys Co.,Ltd
Op Cond:	a.c. 120 V / 60 Hz (WLAN Traffic Mode)
Operator:	Min-Chul, Shin
Test Spec:	FCC Part 15 Subpart C
Comment:	MODEL : SMT-CW230
	LINE : LINE-PE
Result File:	r012l.dat : SK telesys_WLAN

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	2	150kHz	30MHz	ESH3_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	8
	Acc Margin:	60 dB



PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Neutral)***

NEMKO KOREA (NK-10-R-012) 24 Jan 2010 11:26

Conducted Emissions

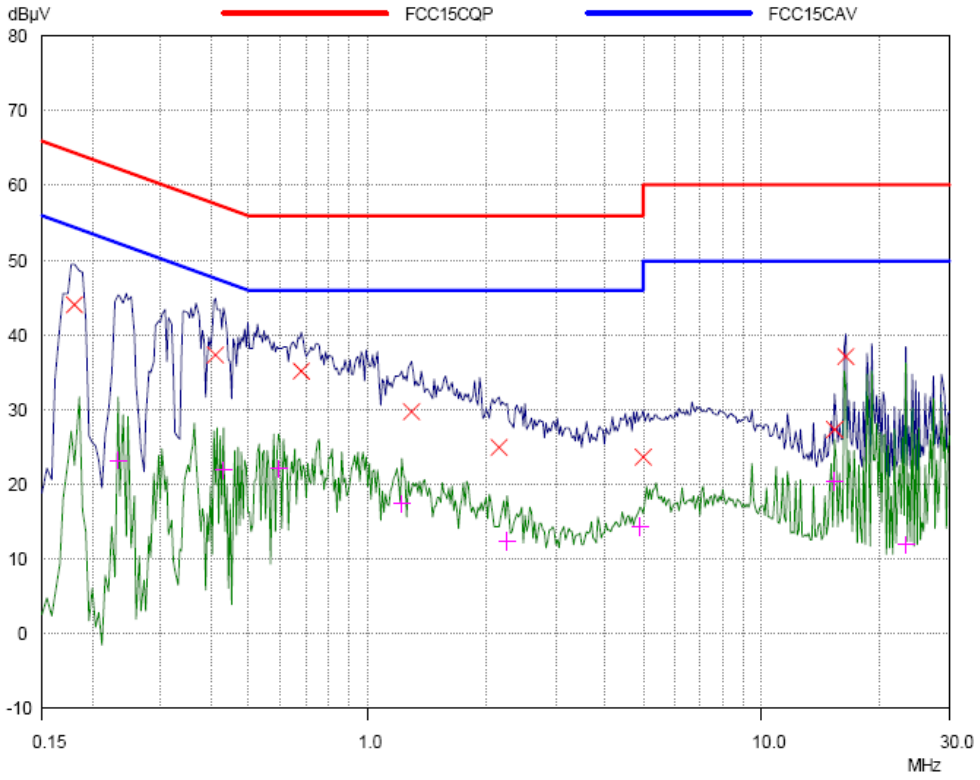
EUT:	EUT
Manuf:	SK telesys Co.,Ltd
Op Cond:	a.c. 120 V / 60 Hz (WLAN Traffic Mode)
Operator:	Min-Chul, Shin
Test Spec:	FCC Part 15 Subpart C
Comment:	MODEL : SMT-CW230
	LINE : NEUTRAL-PE
Result File:	r012n.dat : SK telesys_WLAN

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	ESH3_NEUT

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 8
Acc Margin: 60 dB

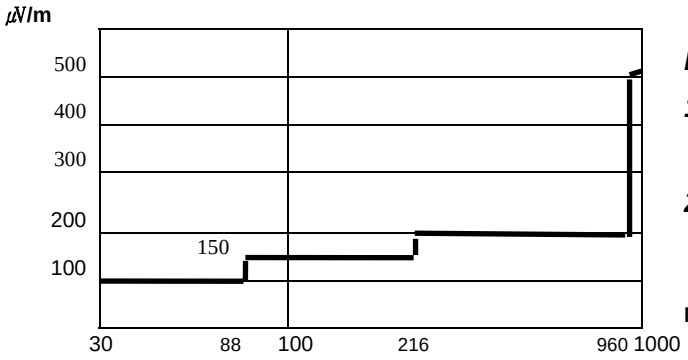


8.2 Radiated Emissions

FCC §15.209, 15. 205, 15.109

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Antenna Heights (cm)	Turntable Angles (°)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
69.06	47.8	V	150	297	-17.1	30.7	40.0	9.3
113.10	50.9	V	100	57	-19.9	31.0	43.5	12.5
125.00	55.4	V	166	253	-17.1	38.3	43.5	5.2
128.00	48.4	V	100	175	-17.1	31.3	43.5	12.2
250.00	46.2	V	166	290	-15.5	30.7	46.0	15.3
500.00	41.4	H	244	39	-8.9	32.5	46.0	13.5

Radiated Measurements at 3 meters



NOTES:

1. All modes were measured and the worst-case emission was reported.

2 The radiated limits are shown on Fig 4.

Above 1GHz the limit is 500 μV/m.

Fig. 4. Limits at 3 meters

NOTES:

1. *Pol. H = Horizontal V = Vertical

2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Measurements using CISPR quasi-peak mode.

4. The limit is on the FCC Part section 15.209(a).

8.3 6 dB Modulated Bandwidth

FCC §15.247(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

802.11b mode

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	10306	500	9806.00
Middle	2437	10667	500	10167.00
High	2462	10293	500	9793.00

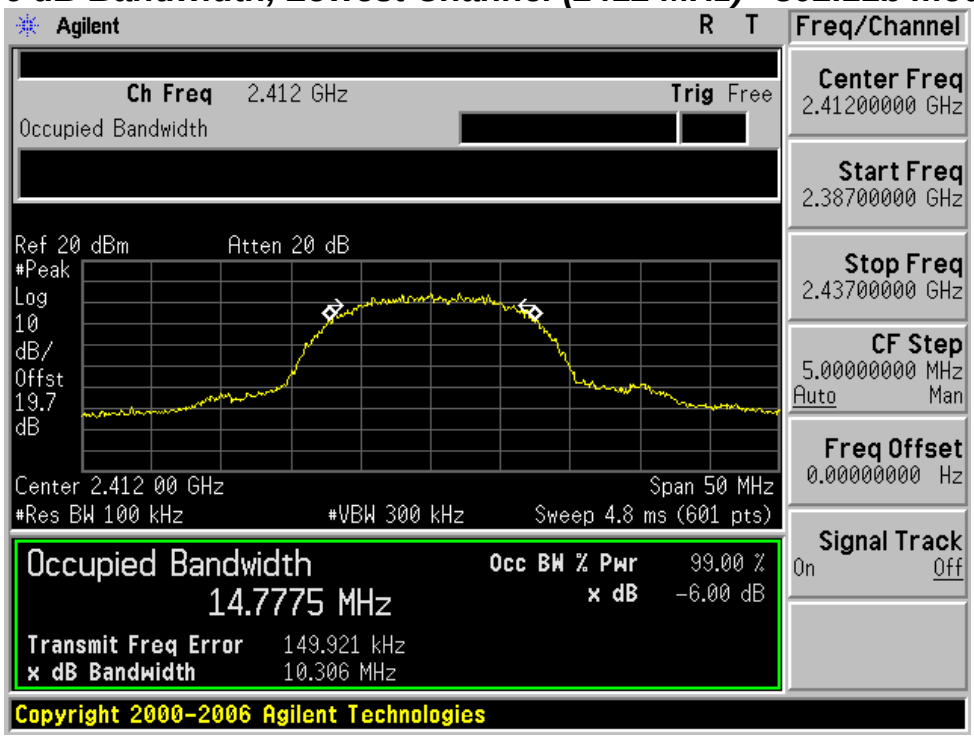
802.11g mode

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	16396	500	15896.00
Middle	2437	16461	500	15961.00
High	2462	16446	500	15946.00

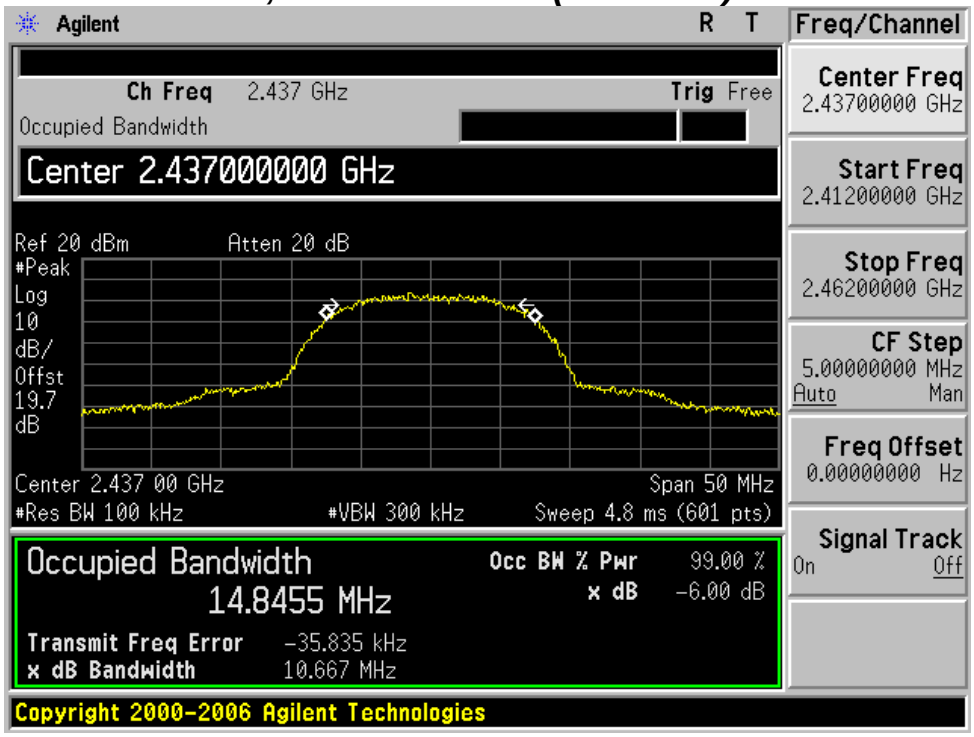
PLOTS OF EMISSIONS

802.11b mode

6 dB Bandwidth, Lowest Channel (2412 MHz) - 802.11b mode

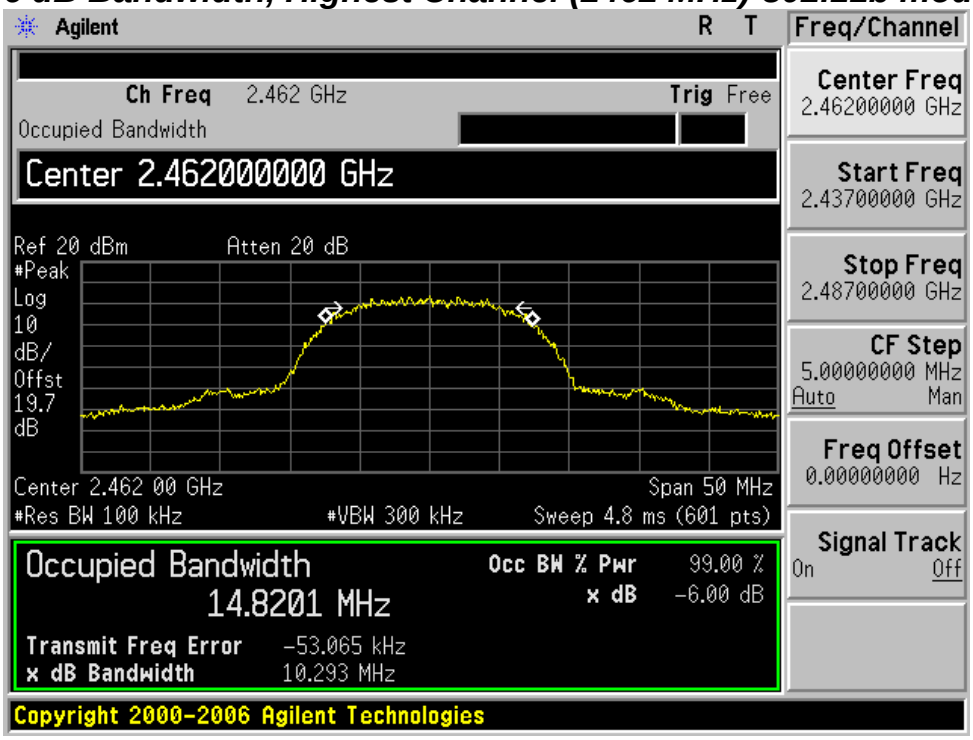


6 dB Bandwidth, Middle Channel (2437 MHz)- 802.11b mode



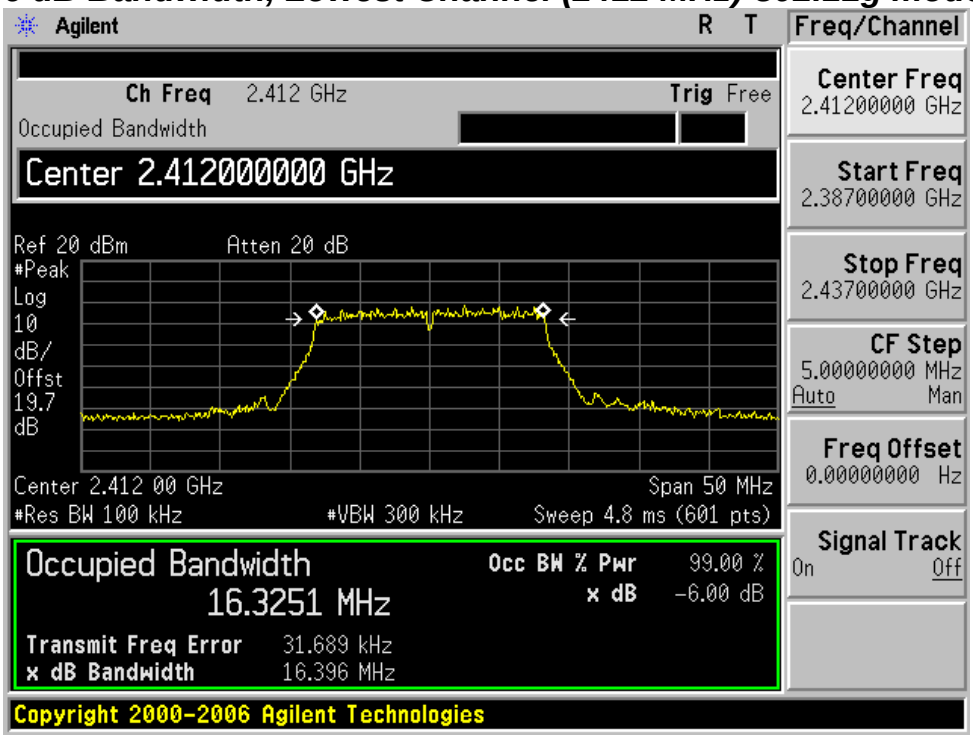
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)-802.11b mode



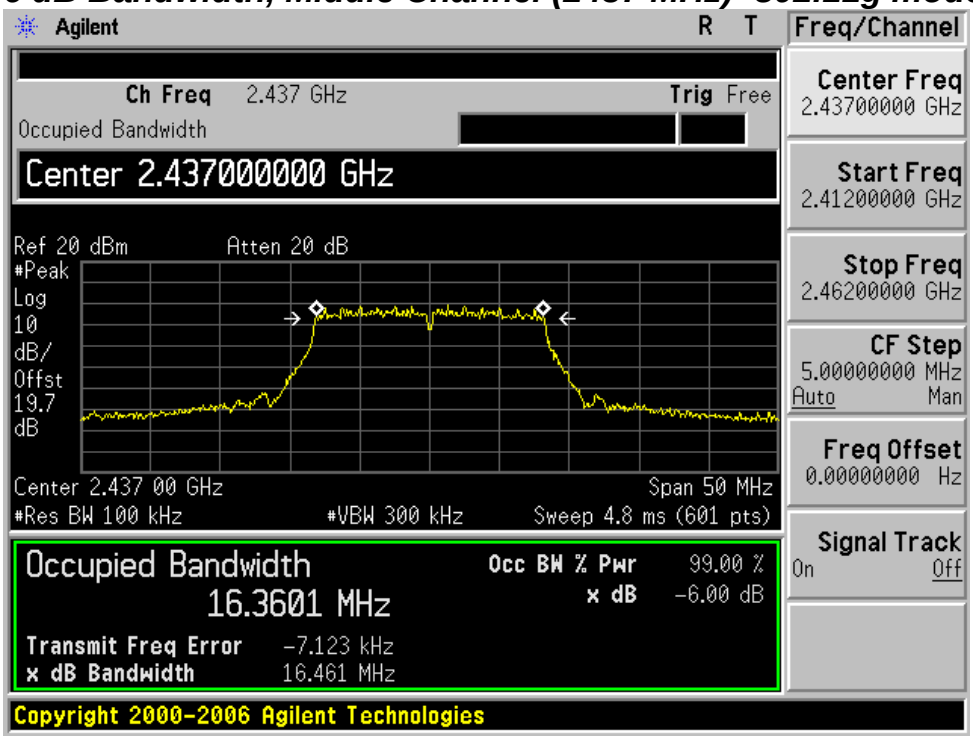
802.11g mode

6 dB Bandwidth, Lowest Channel (2412 MHz)-802.11g mode

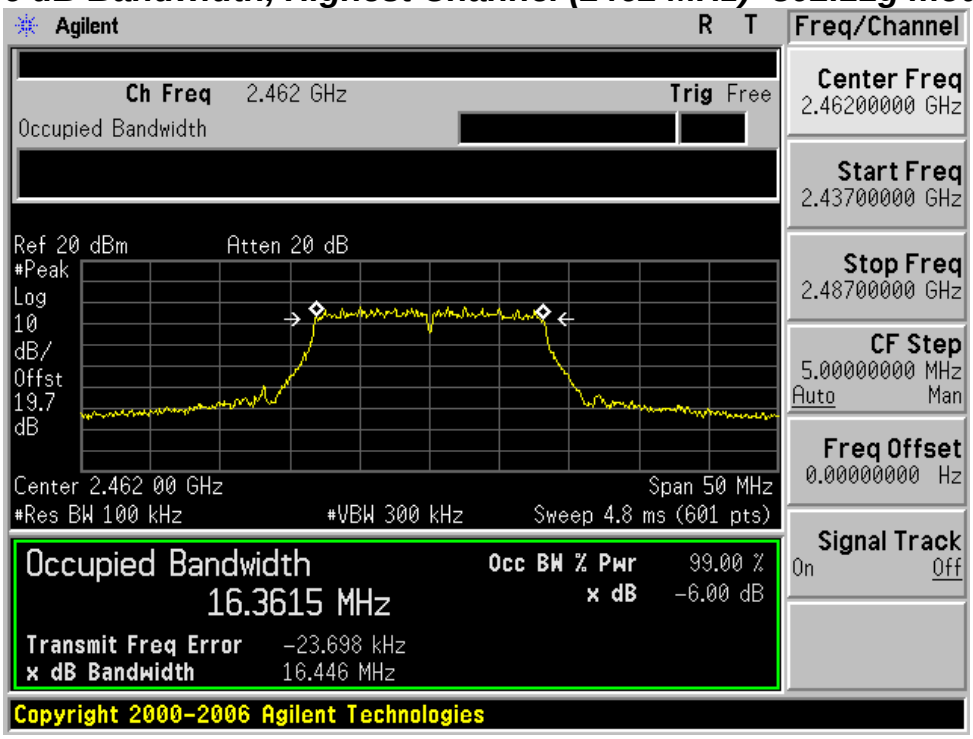


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz) -802.11g mode



6 dB Bandwidth, Highest Channel (2462 MHz) -802.11g mode



8.4 Peak Power Output

FCC §15.247(b)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

802.11b mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)
Low	2412	11.10	30
Middle	2437	11.48	30
High	2462	10.63	30

802.11g mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)
Low	2412	8.94	30
Middle	2437	9.54	30
High	2462	8.89	30

8.5 Power Spectral Density

FCC §15.247(e)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

802.11b mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)
Low	2412	-12.75	8
Middle	2437	-12.35	8
High	2462	-13.79	8

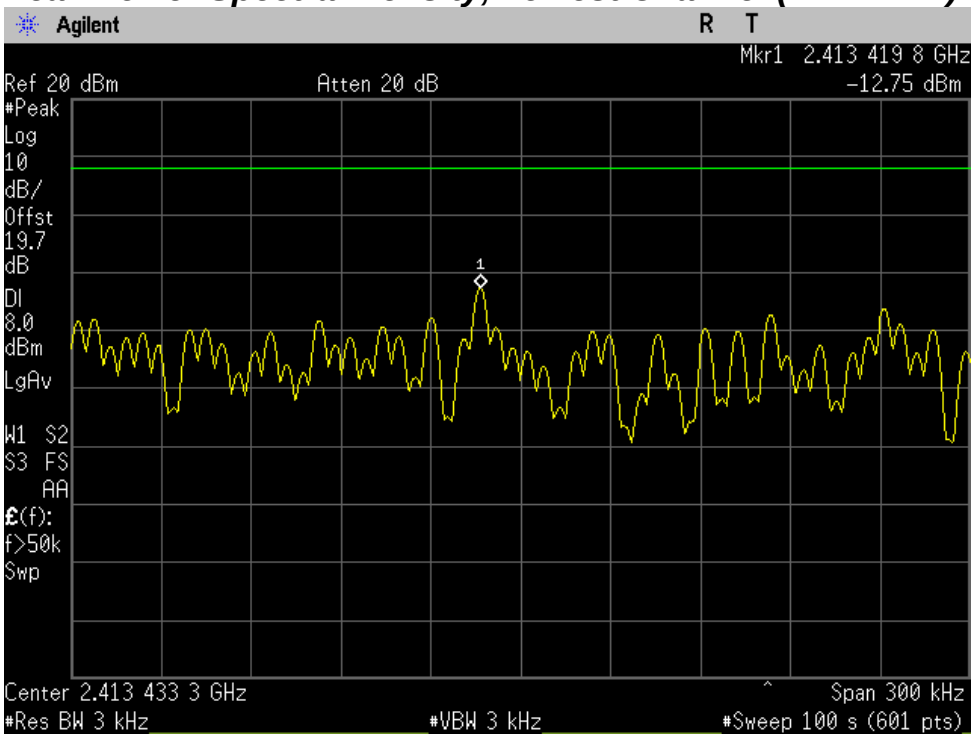
802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)
Low	2412	-19.78	30
Middle	2437	-19.14	30
High	2462	-20.27	30

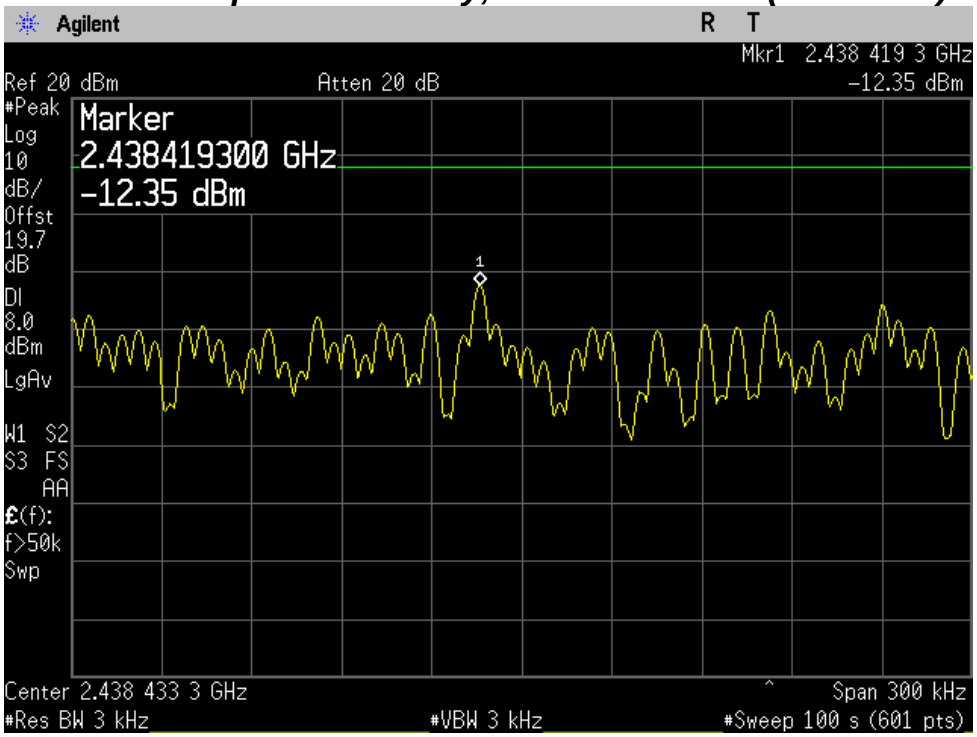
PLOT OF TEST DATA

802.11b mode

Peak Power Spectral Density, Lowest Channel (2412 MHz)

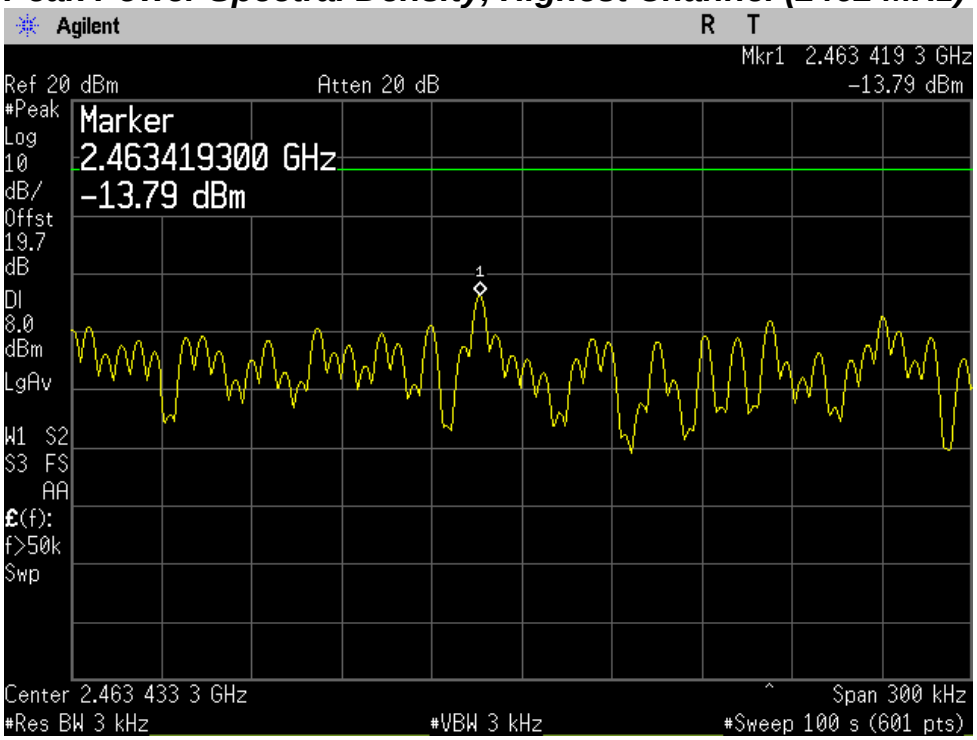


Peak Power Spectral Density, Middle Channel (2437 MHz)



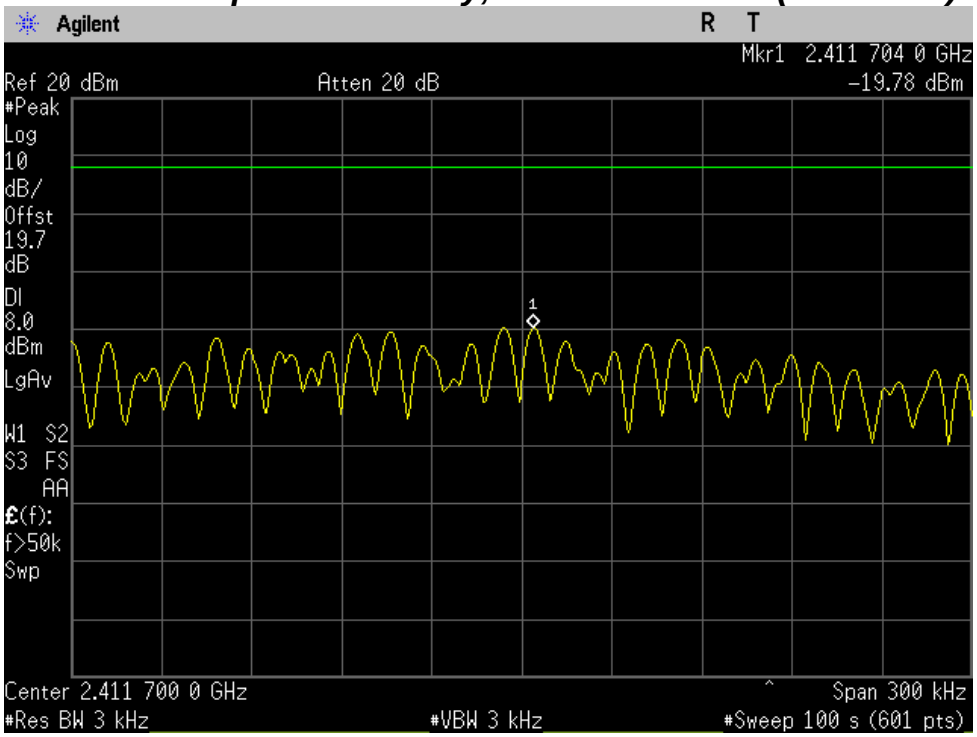
PLOT OF TEST DATA

Peak Power Spectral Density, Highest Channel (2462 MHz)



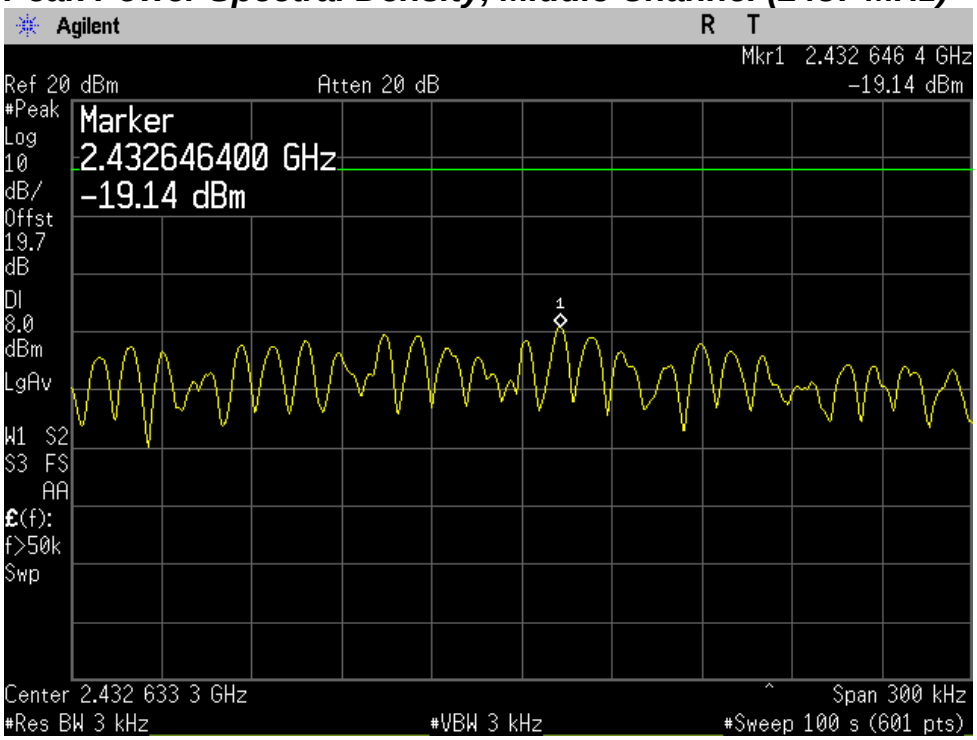
802.11g mode

Peak Power Spectral Density, Lowest Channel (2412 MHz)

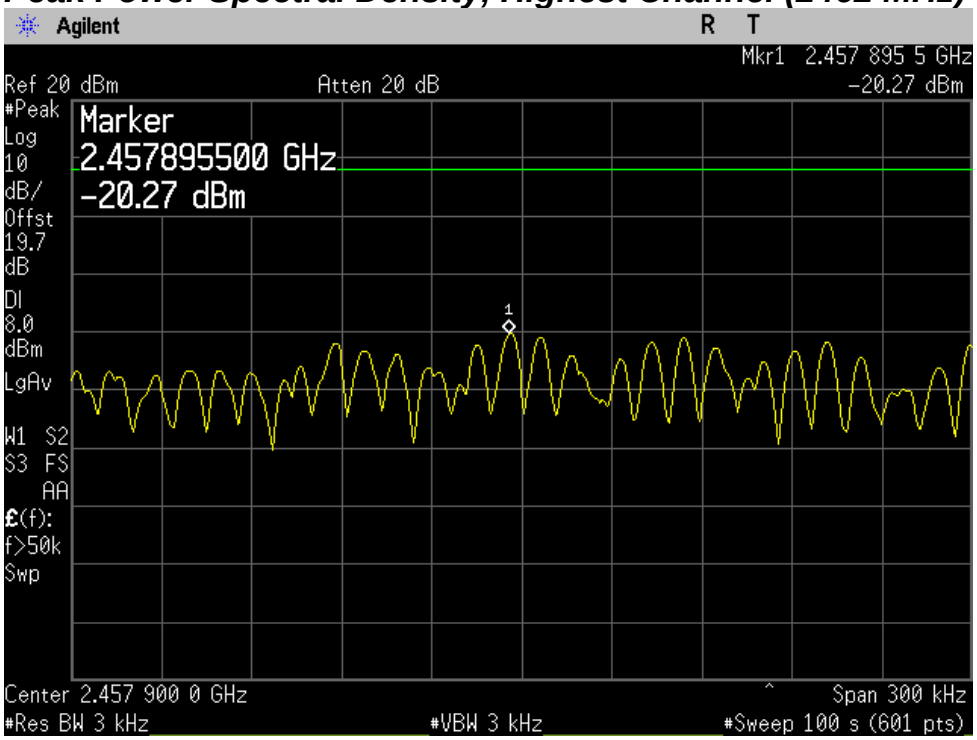


PLOT OF TEST DATA

Peak Power Spectral Density, Middle Channel (2437 MHz)



Peak Power Spectral Density, Highest Channel (2462 MHz)



8.6 Conducted Spurious Emissions

FCC §15.247(d)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

802.11b mode

Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	2412	More than 20 dBc	20
Middle	2437	More than 20 dBc	20
High	2462	More than 20 dBc	20

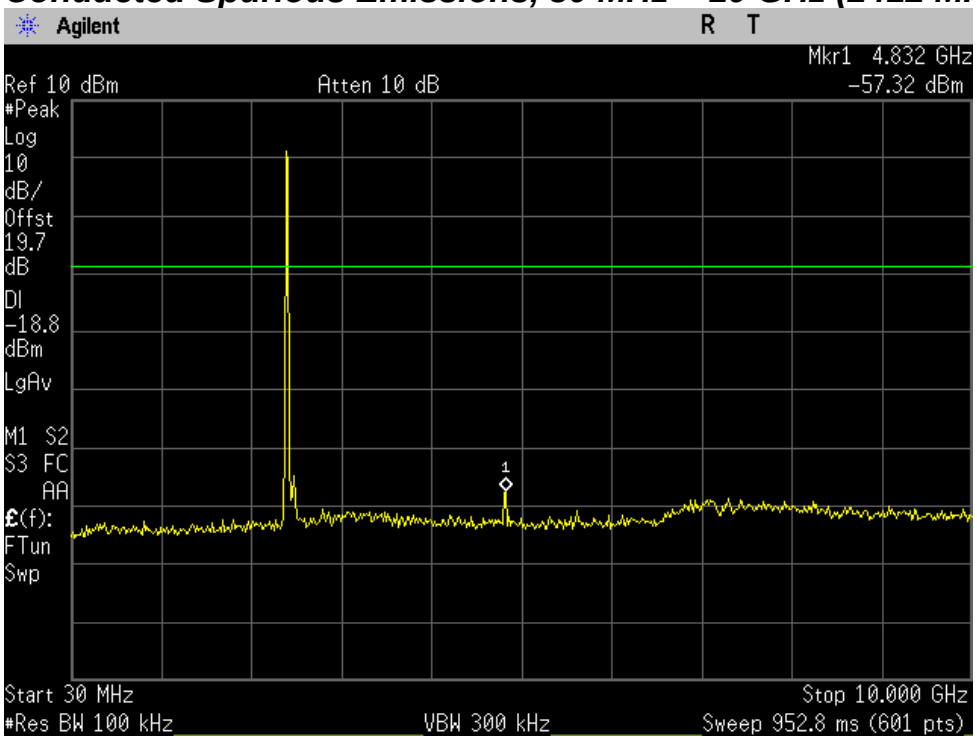
802.11g mode

Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	2412	More than 20 dBc	20
Middle	2437	More than 20 dBc	20
High	2462	More than 20 dBc	20

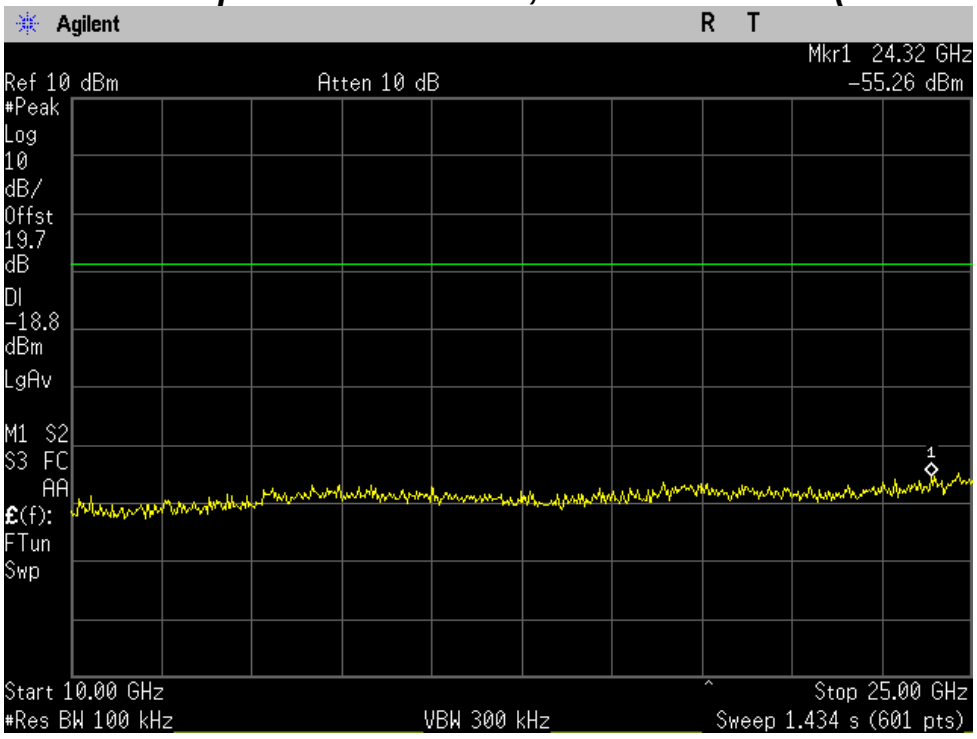
PLOT OF TEST DATA

802.11b mode

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2412 MHz)

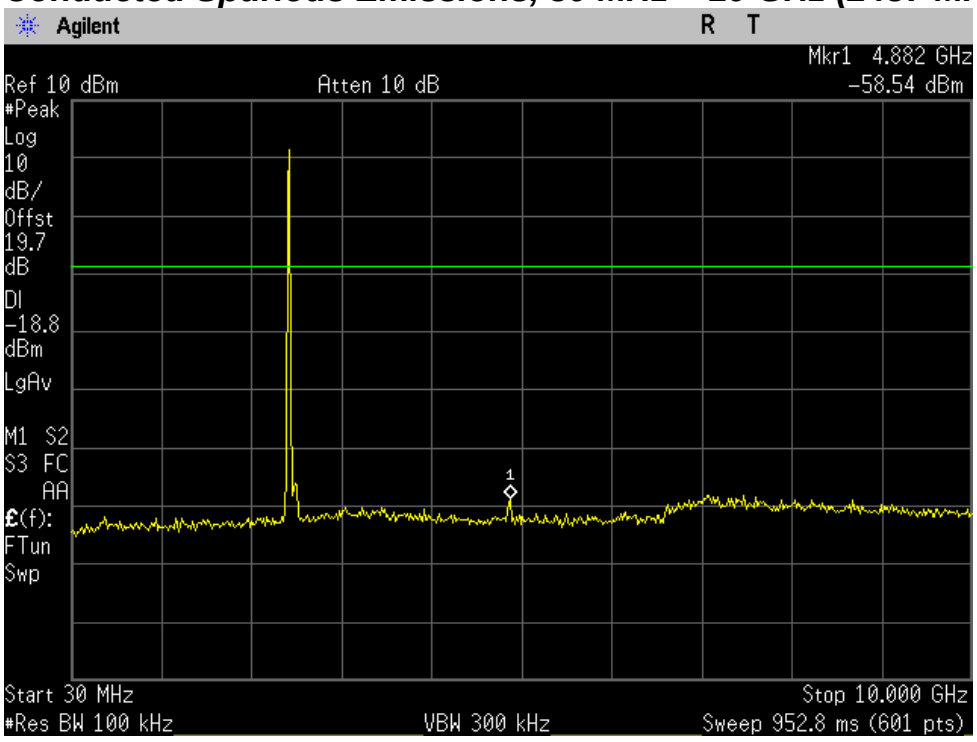


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

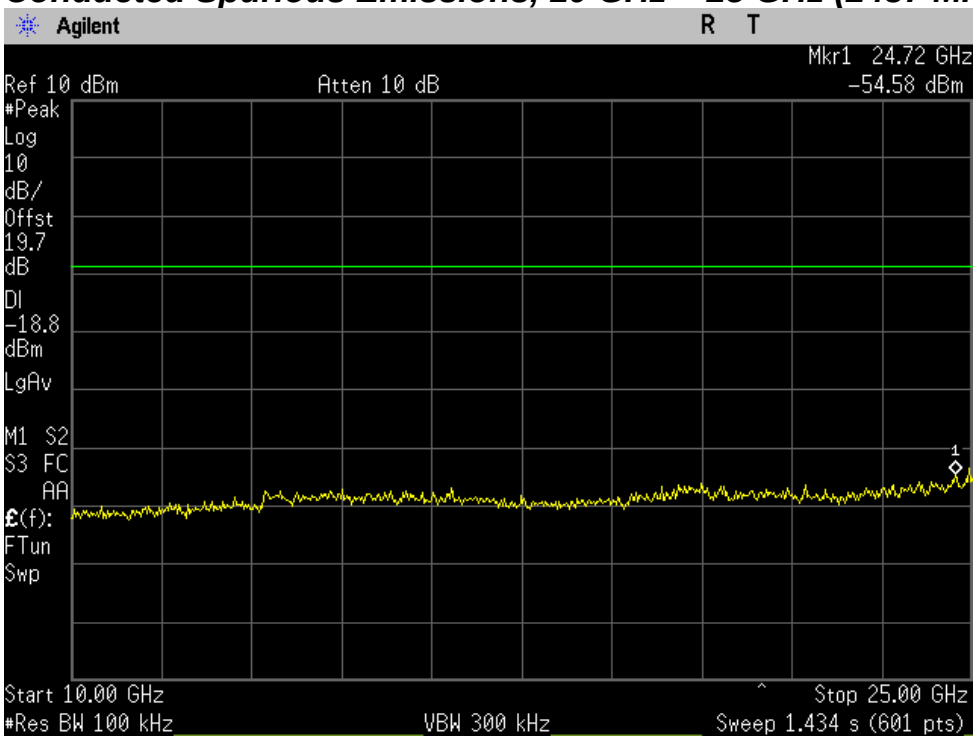


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2437 MHz)

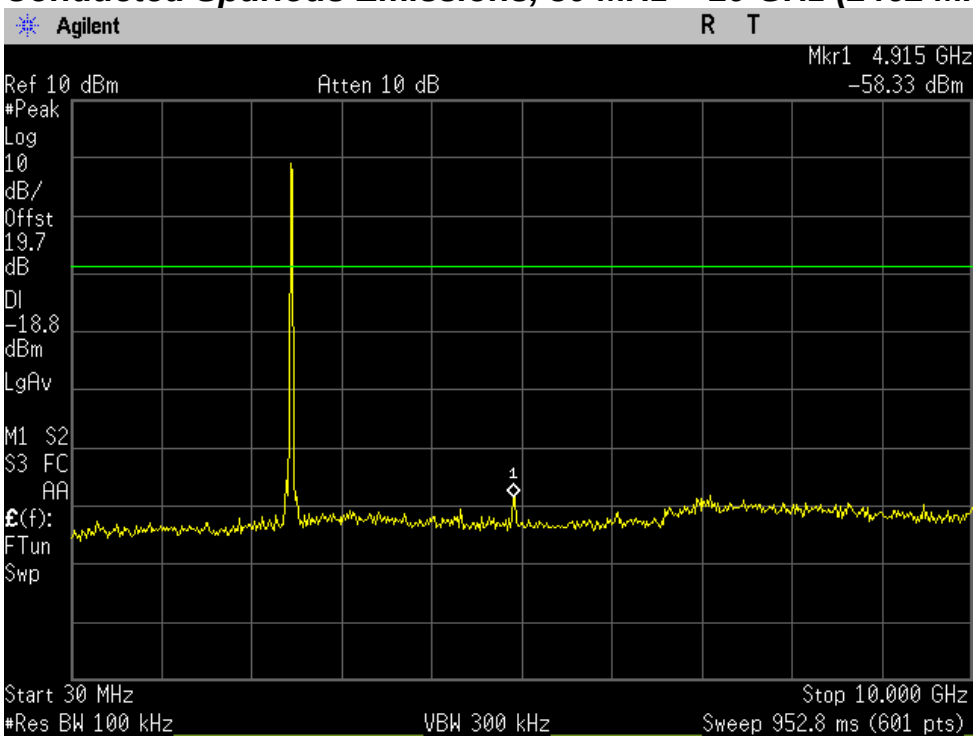


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

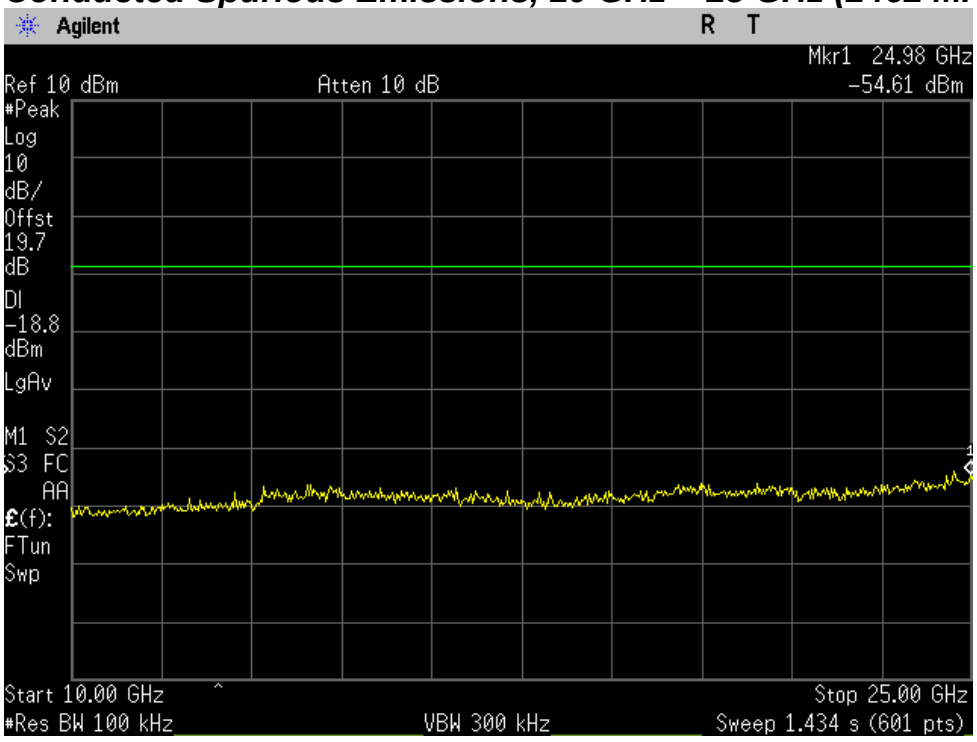


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2462 MHz)



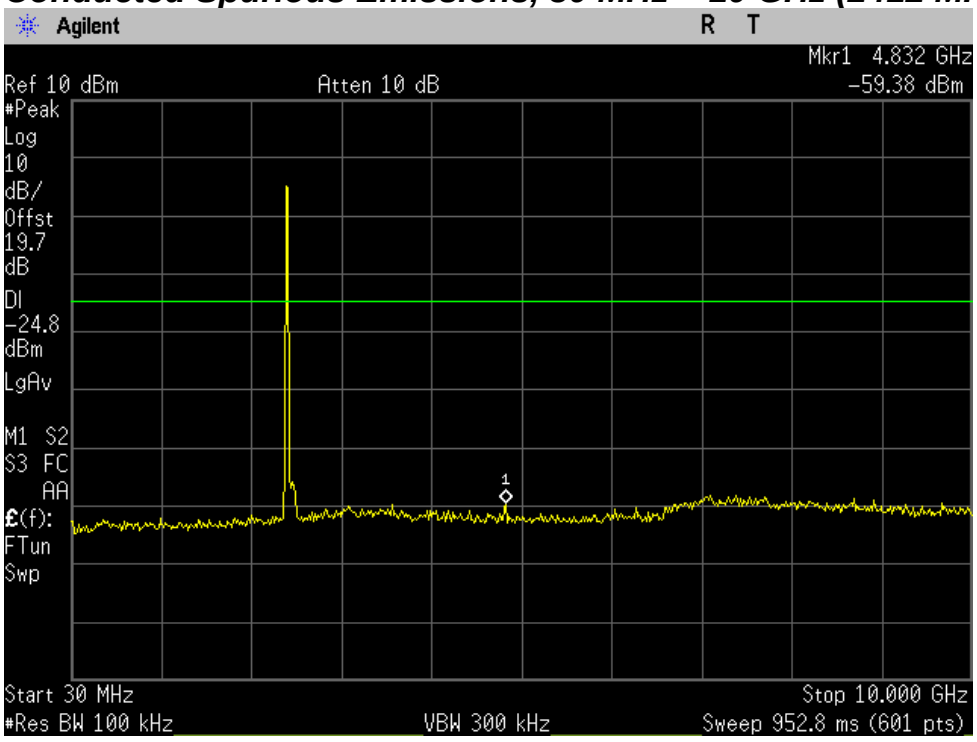
Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2462 MHz)



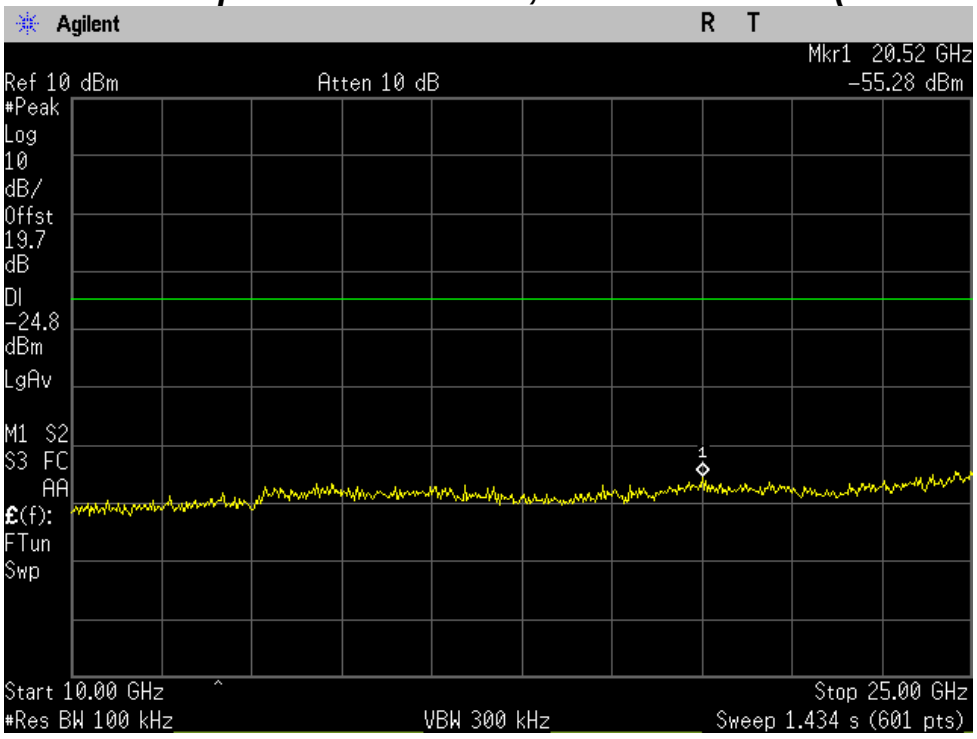
PLOT OF TEST DATA

802.11g mode

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2412 MHz)

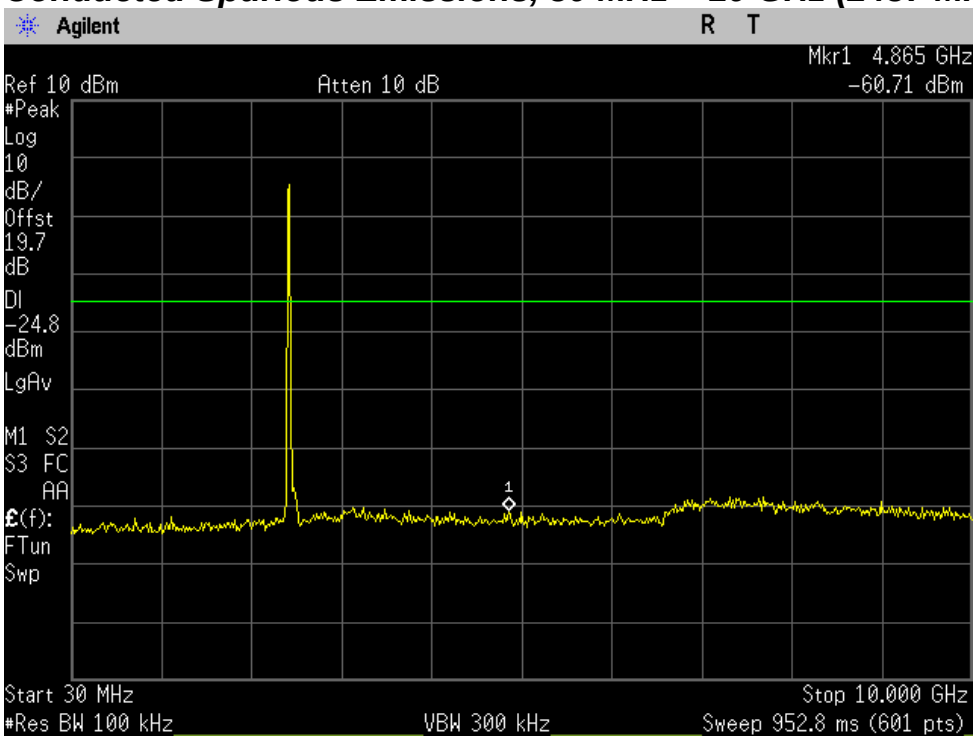


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

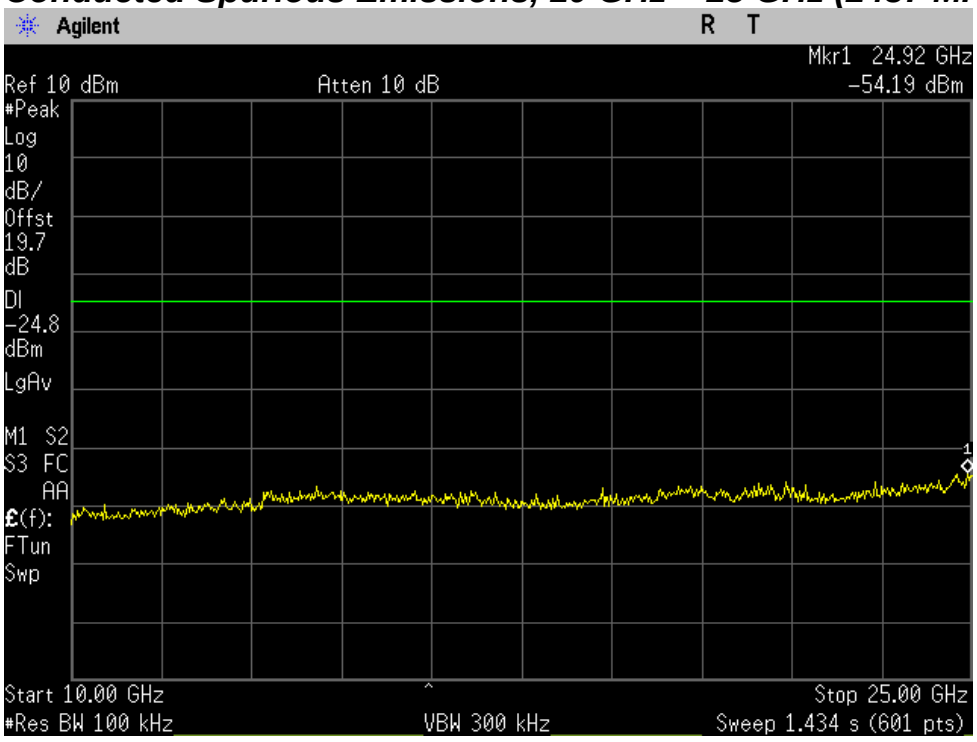


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2437 MHz)

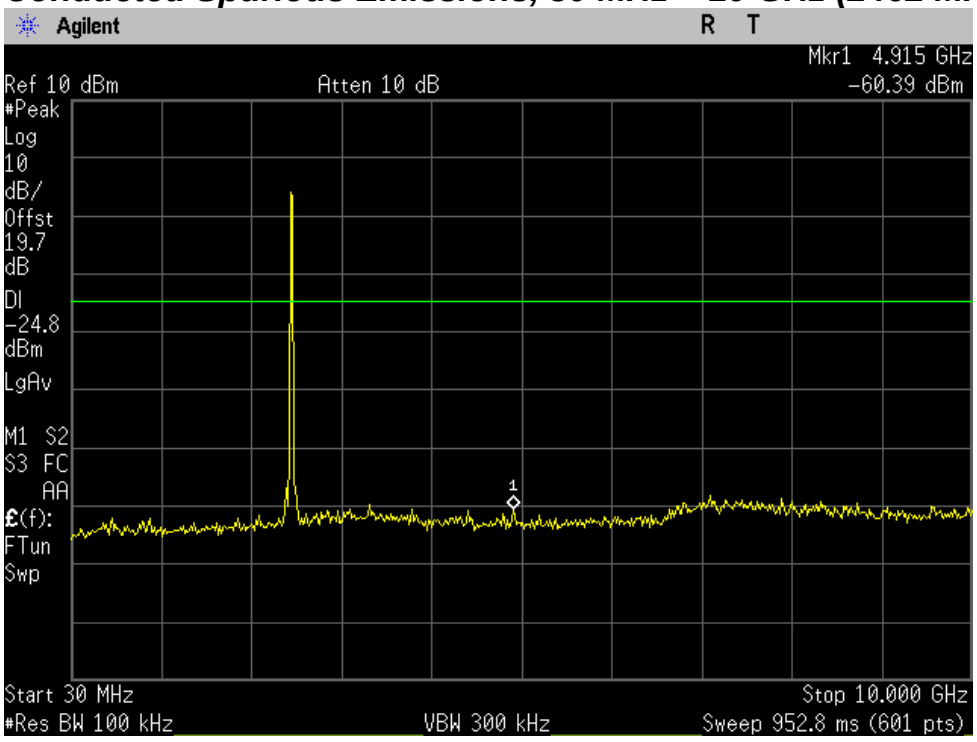


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

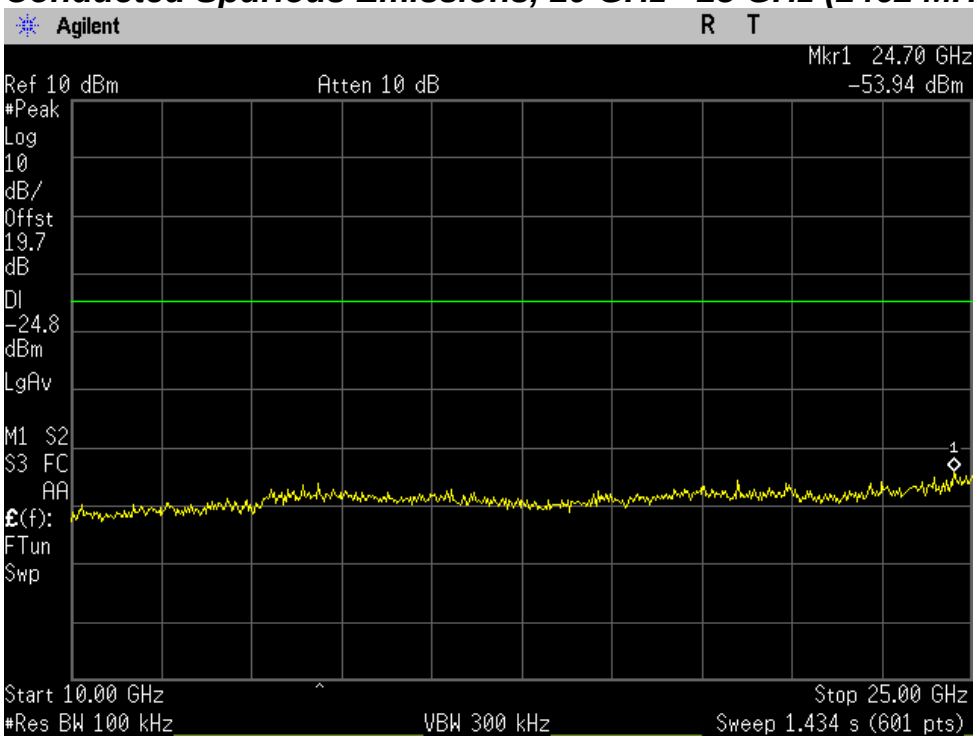


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2462 MHz)



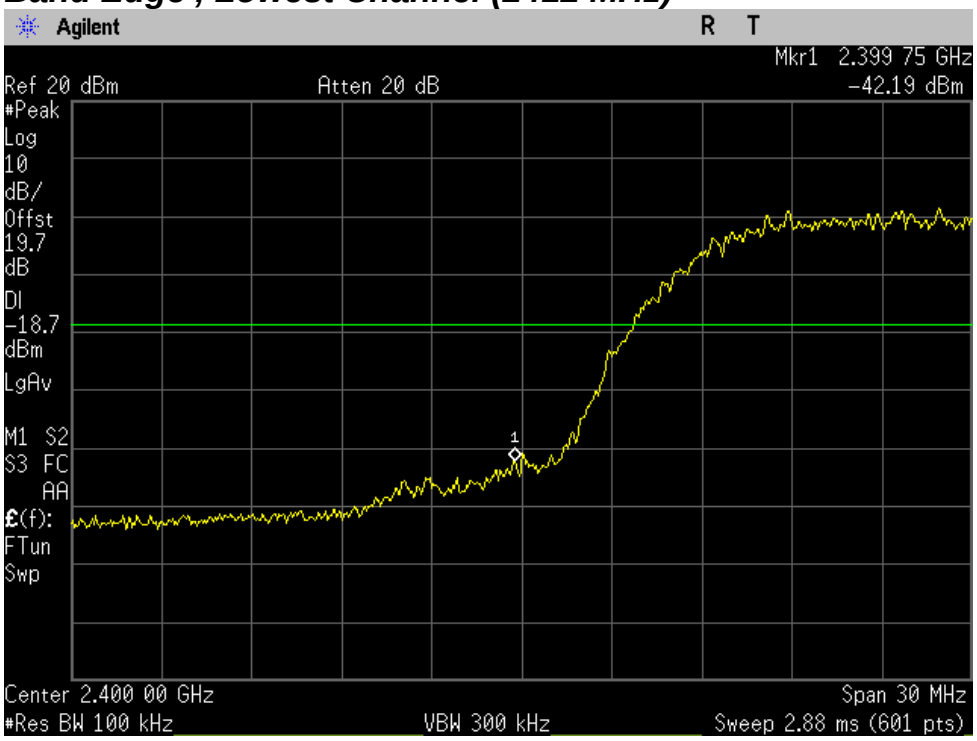
Conducted Spurious Emissions, 10 GHz ~25 GHz (2462 MHz)



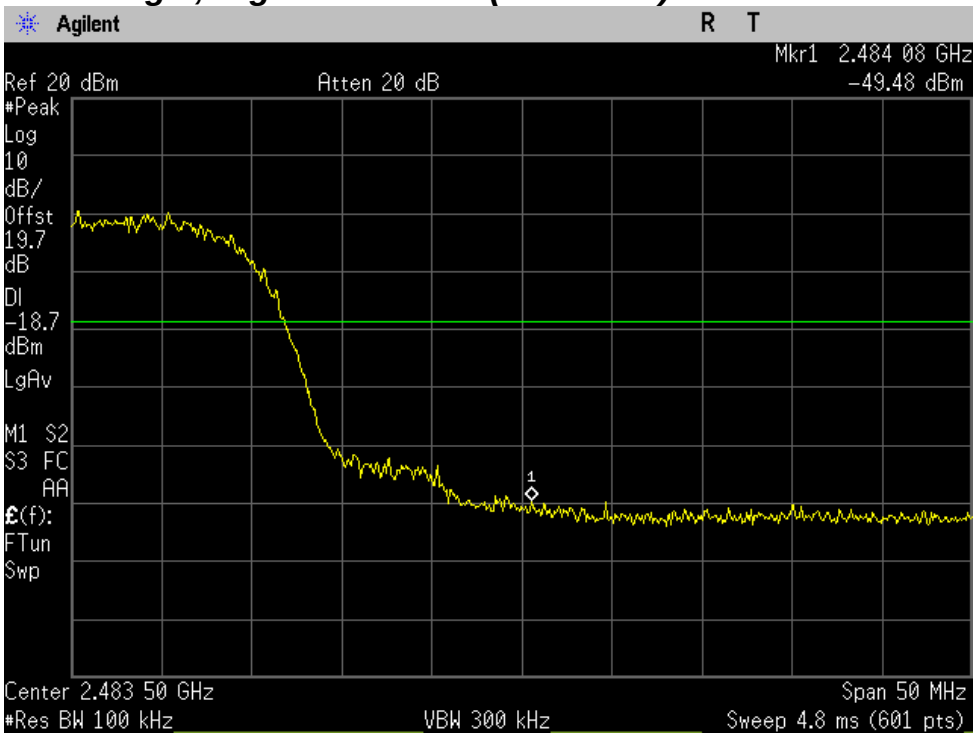
PLOT OF TEST DATA

802.11b mode

Band Edge , Lowest Channel (2412 MHz)



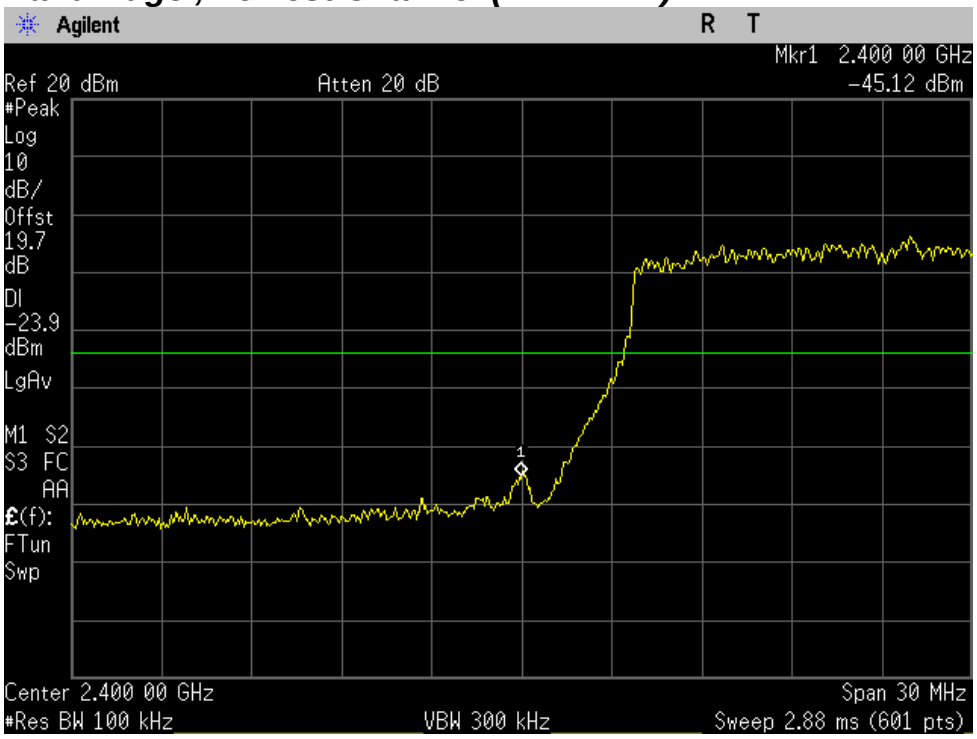
Band Edge , Highest Channel(2462 MHz)



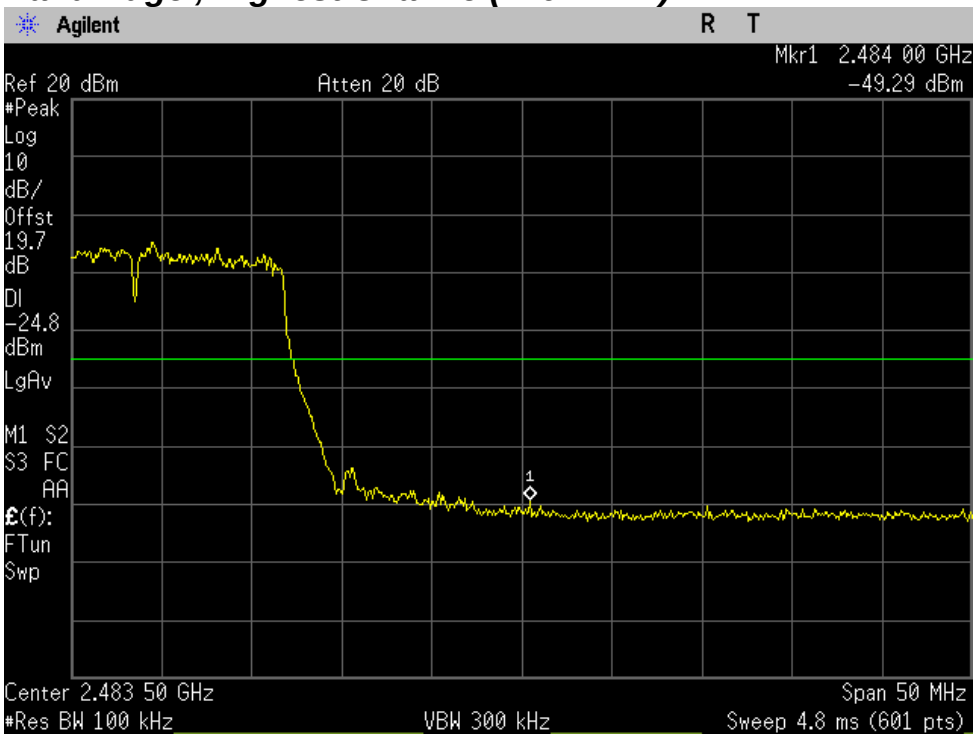
PLOT OF TEST DATA

802.11g mode

Band Edge , Lowest Channel (2412 MHz)



Band Edge , Highest Channel(2462 MHz)



8.7 Radiated Spurious Emissions

FCC §15.247(d)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

802.11b mode

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4824	39.3	V	average	8.70	48.0	54.0	6.0
4824	47.4	V	peak	8.70	56.1	74.0	17.9

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874	38.8	V	average	8.90	47.7	54.0	6.3
4874	49.2	V	peak	8.90	58.1	74.0	15.9

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4924	37.1	V	average	9.00	46.1	54.0	7.9
4924	47.4	V	peak	9.00	56.4	74.0	17.6

802.11g mode

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4824	34.2	V	average	8.70	43.1	54.0	10.9
4824	44.8	V	peak	8.70	53.7	74.0	20.3

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874	34.5	V	average	8.90	43.4	54.0	10.6
4874	44.1	V	peak	8.90	53.0	74.0	21.0

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4924	33.6	V	average	9.00	42.6	54.0	11.4
4924	42.9	V	peak	9.00	51.9	74.0	22.1

1. *Pol. H =Horizontal V=Vertical

2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Other spurious are under 20 dB below Fundamental.

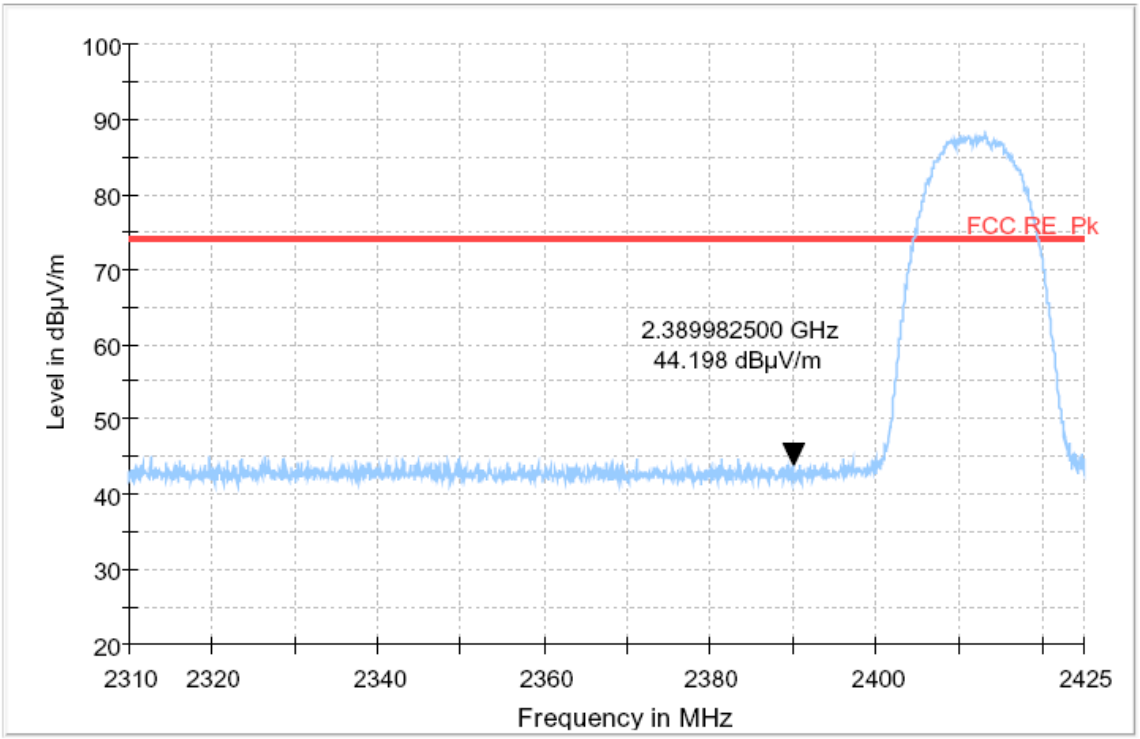
4. For measurements the resolution bandwidth is set to 1 MHz and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

5. The spectrum is measured from 9 kHz to 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the fifth harmonic for this device.

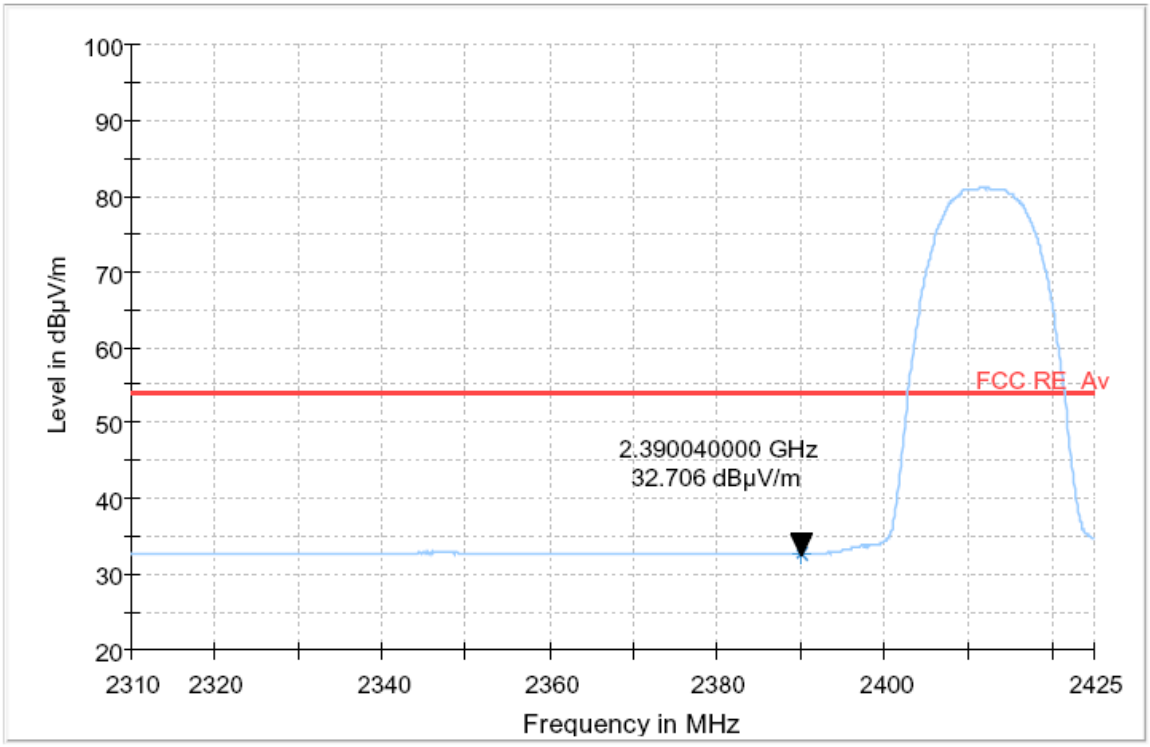
PLOT OF TEST DATA

802.11b mode

Restricted Band Spurious Emissions, Lowest channel(Horizontal, Peak)

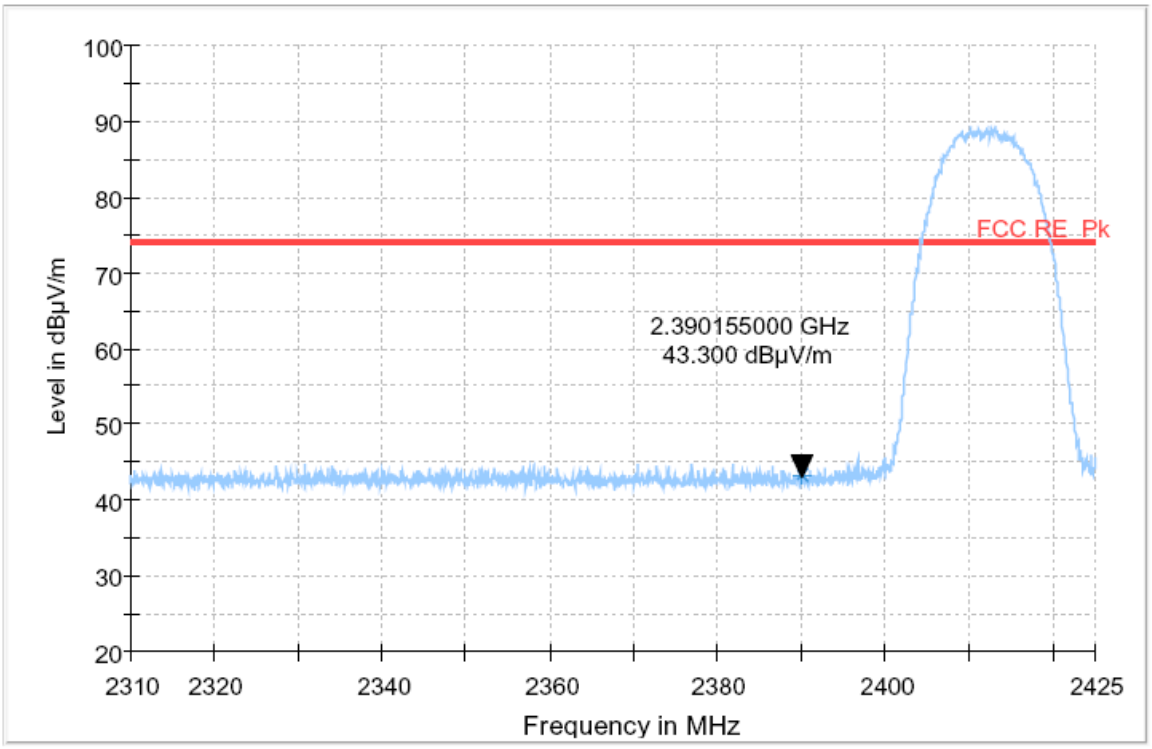


Restricted Band Spurious Emissions, Lowest channel(Horizontal, Average)

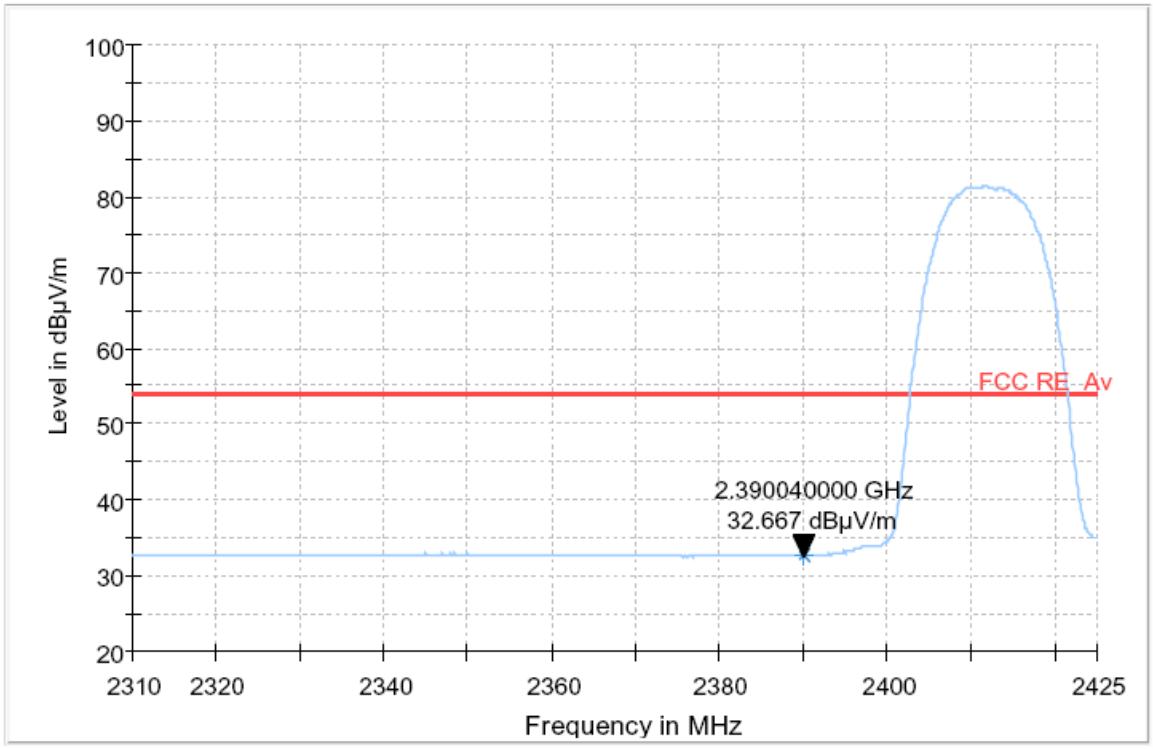


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Lowest channel(Vertical, Peak)

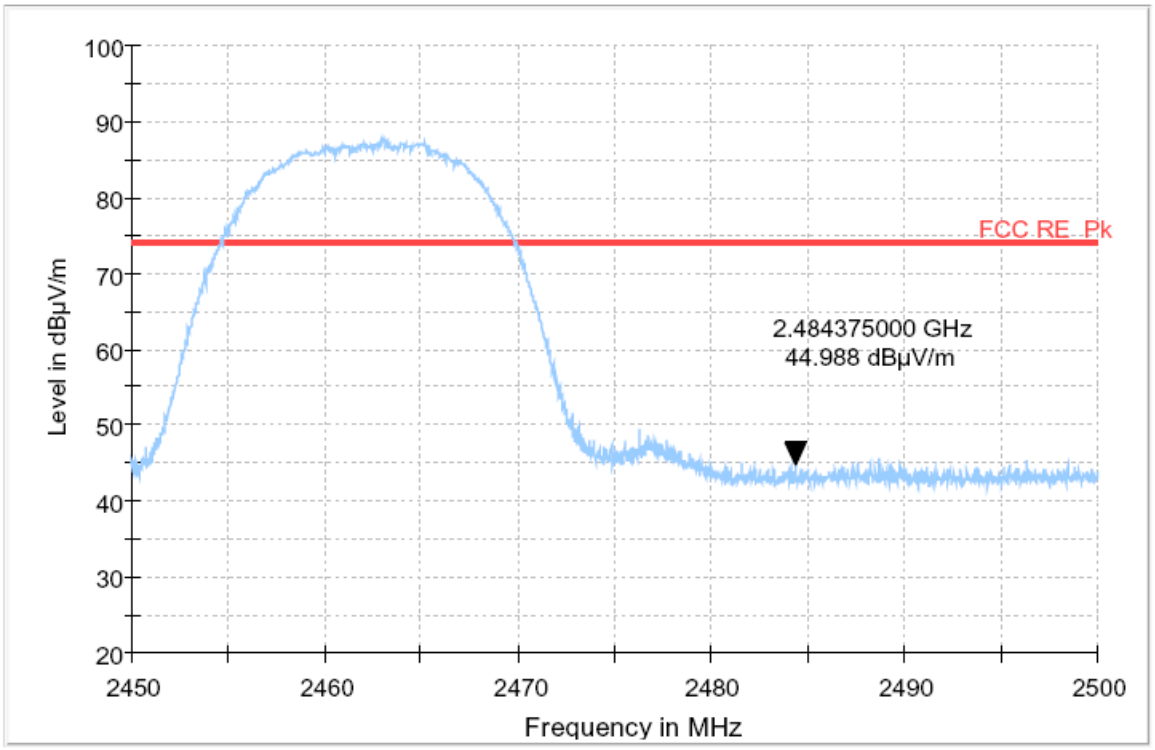


Restricted Band Spurious Emissions, Lowest channel(Vertical, Average)

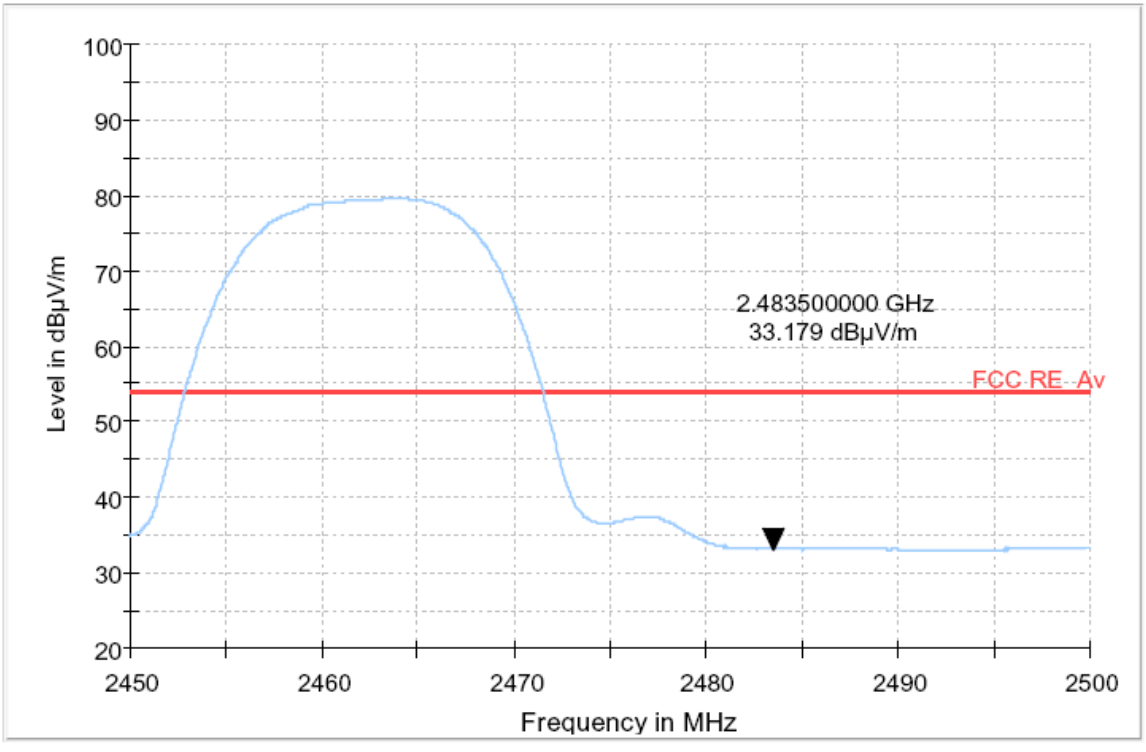


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Highest channel(Horizontal, Peak)

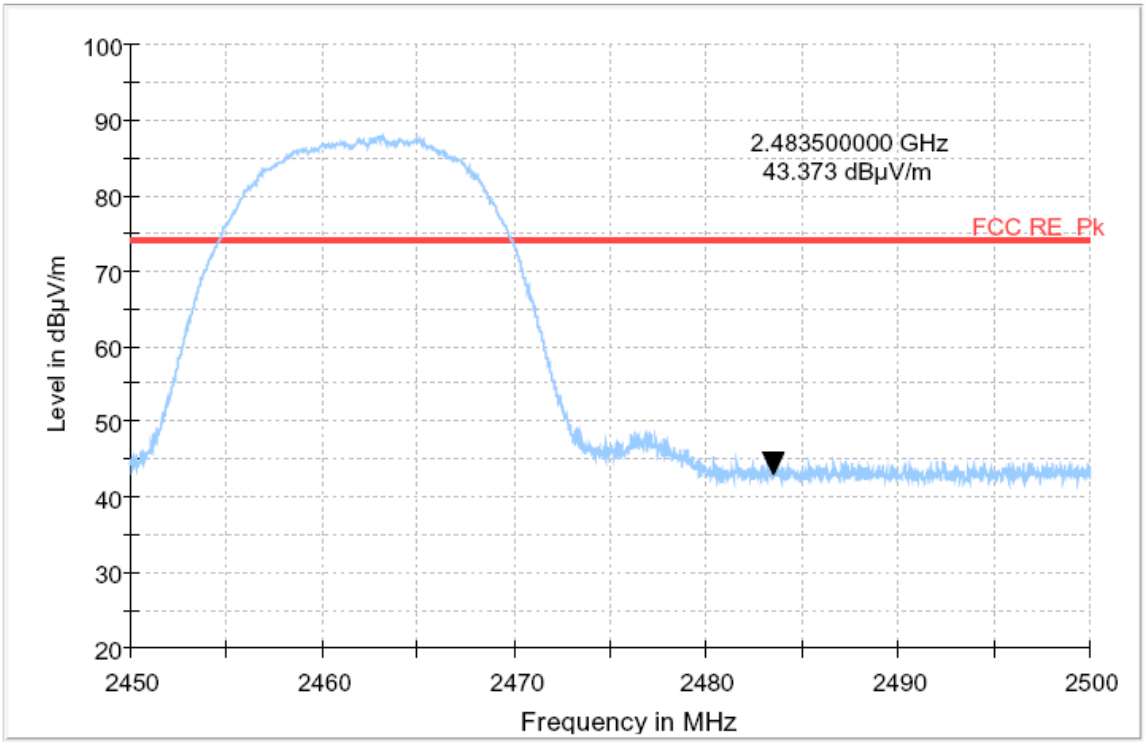


Restricted Band Spurious Emissions, Highest channel(Horizontal, Average)

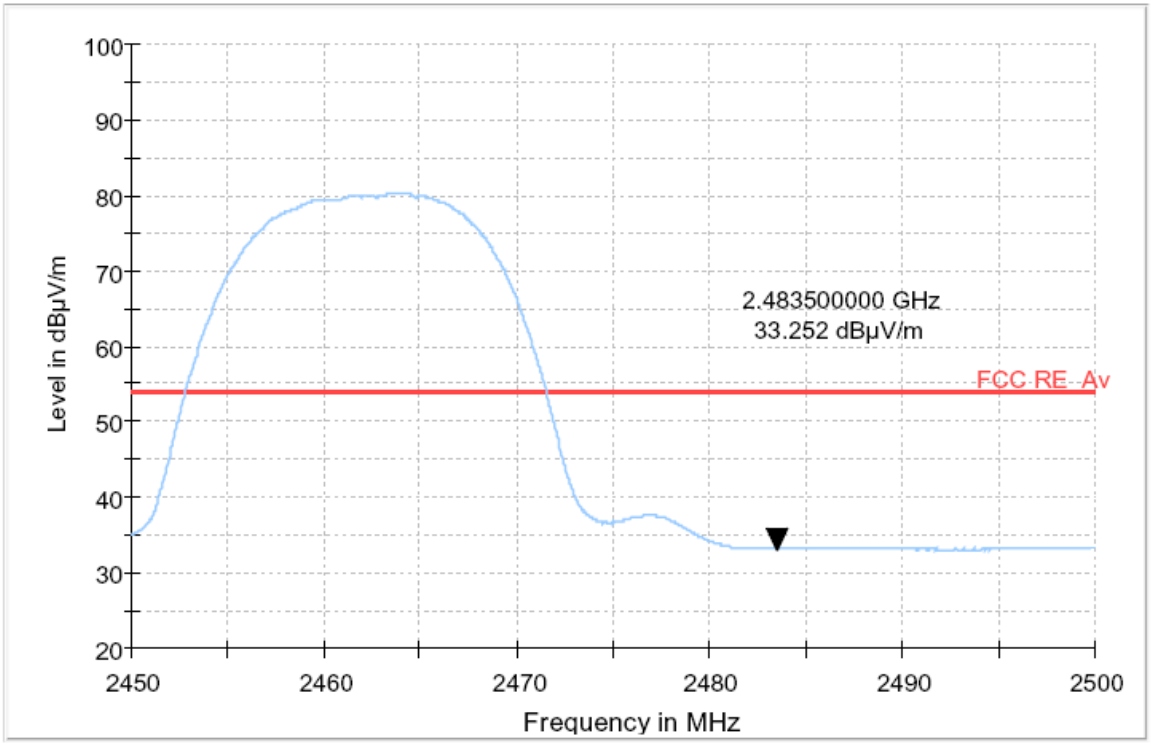


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Highest channel(Vertical, Peak)



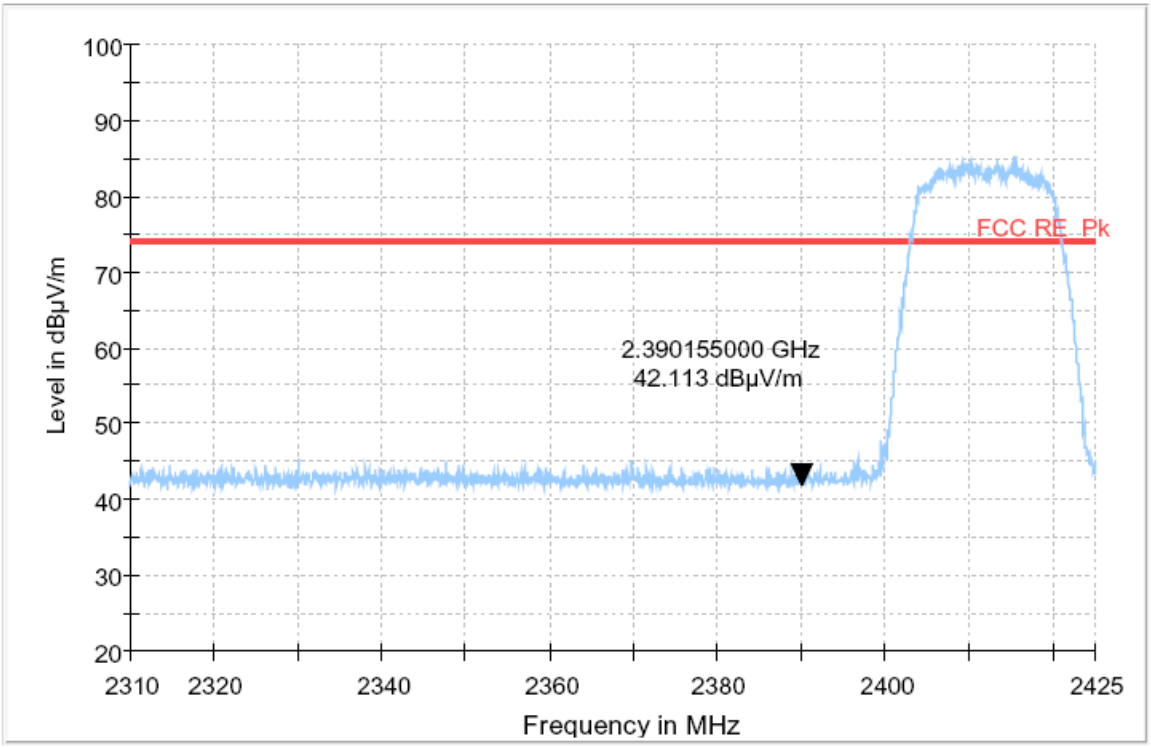
Restricted Band Spurious Emissions, Highest channel(Vertical, Average)



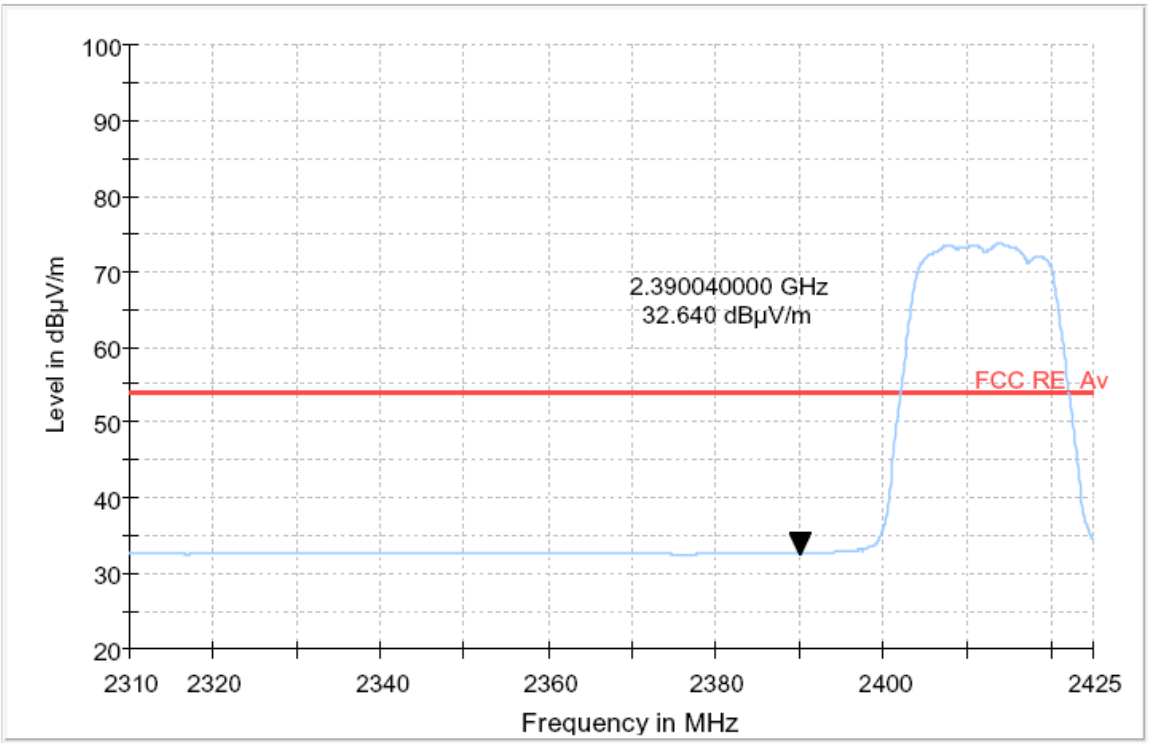
PLOT OF TEST DATA

802.11g mode

Restricted Band Spurious Emissions, Lowest channel(Horizontal, Peak)

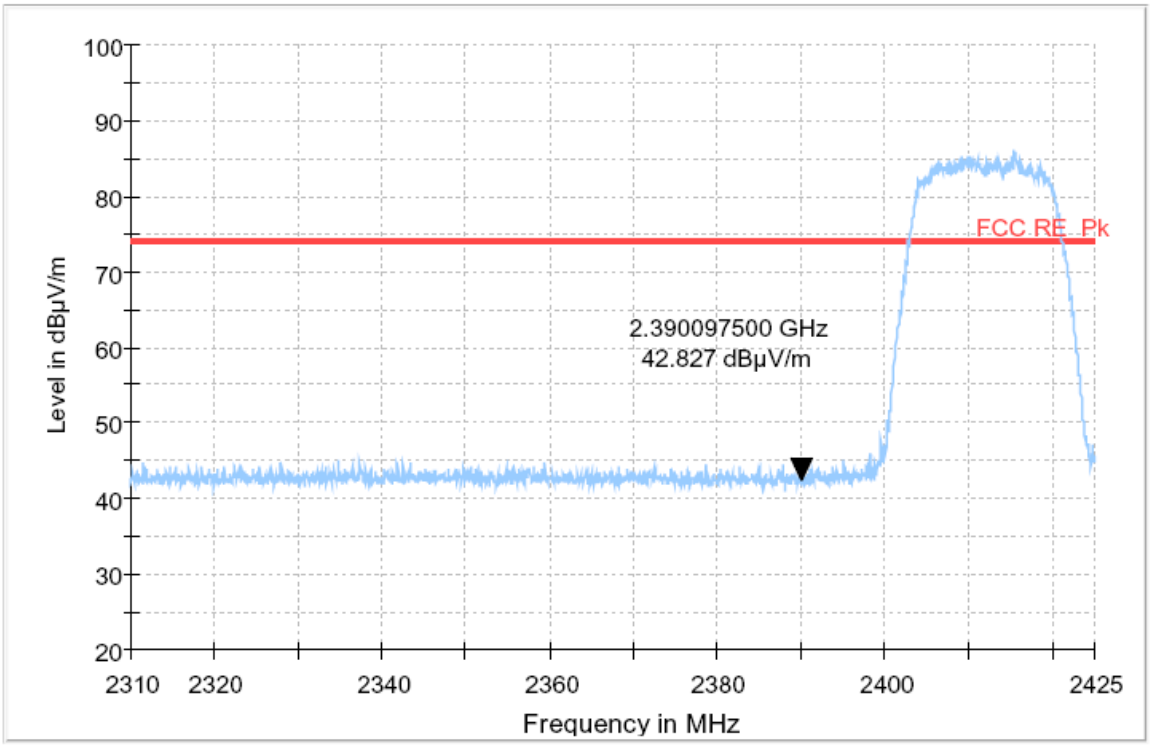


Restricted Band Spurious Emissions, Lowest channel(Horizontal, Average)

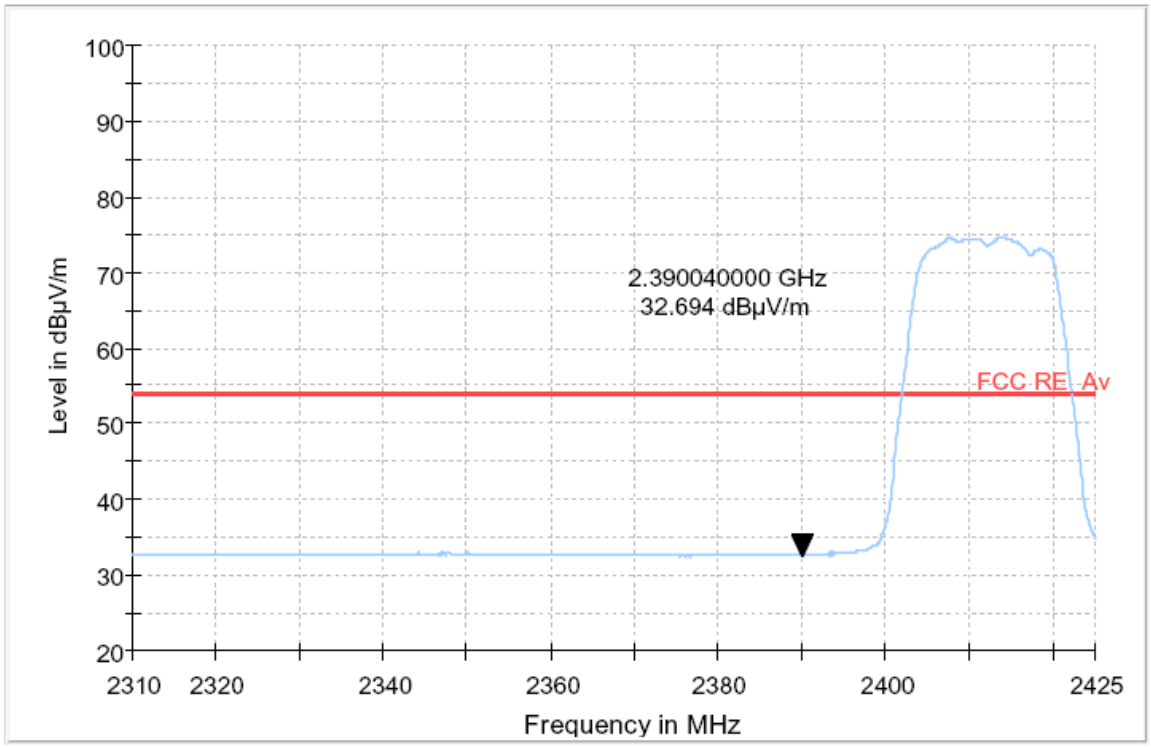


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Lowest channel(Vertical, Peak)

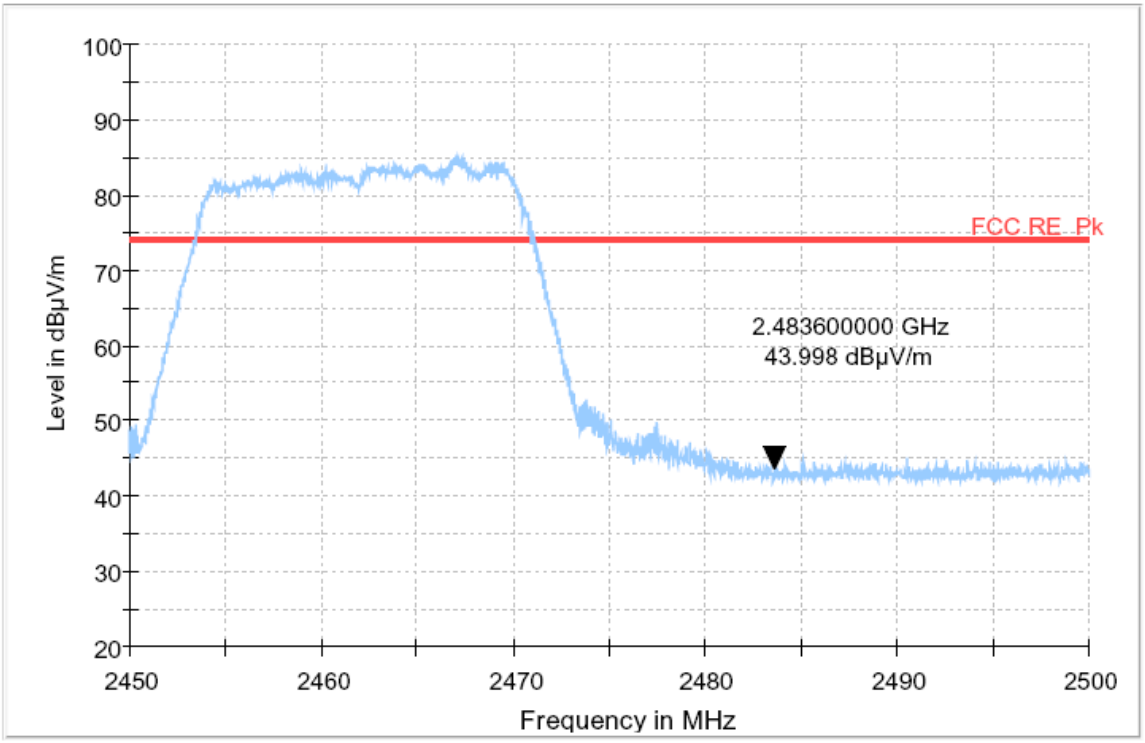


Restricted Band Spurious Emissions, Lowest channel(Vertical, Average)

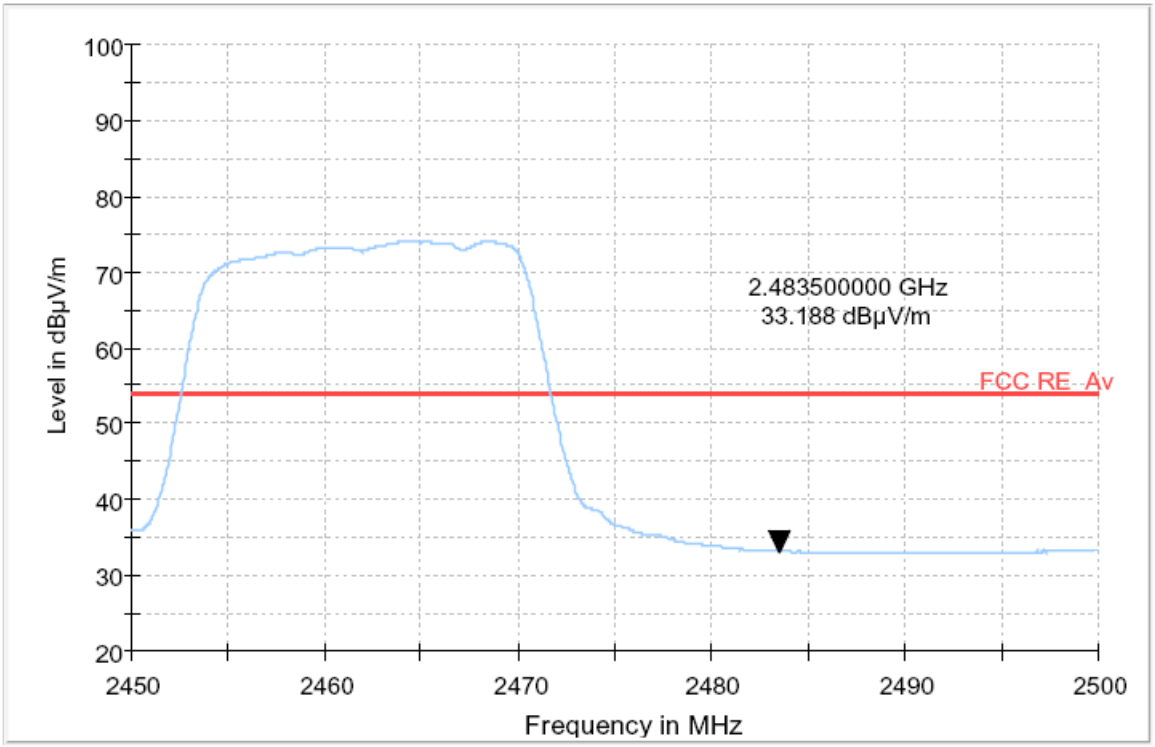


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Highest channel(Horizontal, Peak)

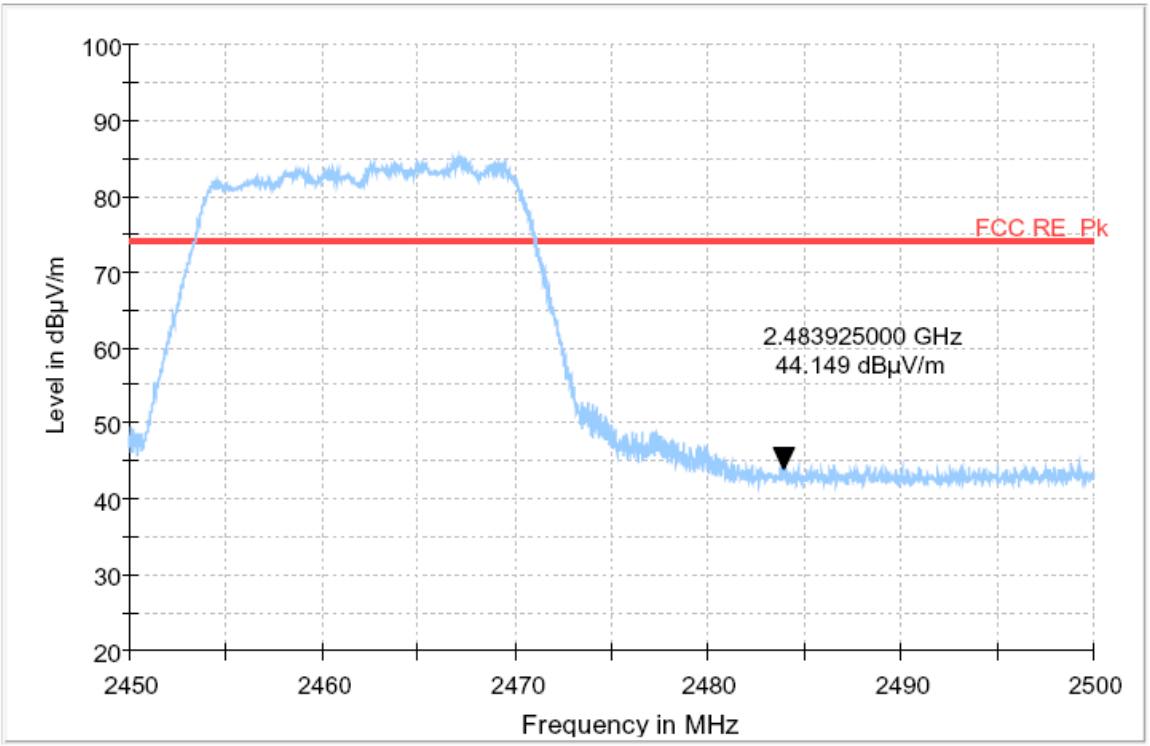


Restricted Band Spurious Emissions, Highest channel(Horizontal, Average)

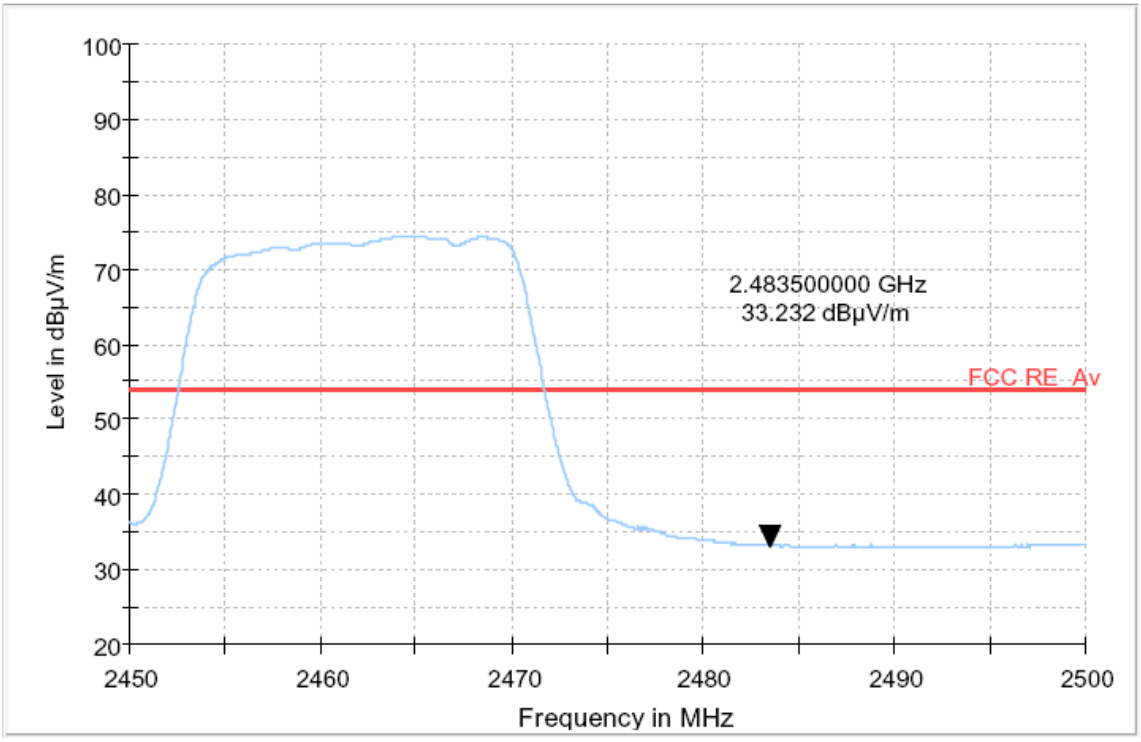


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Highest channel(Vertical, Peak)



Restricted Band Spurious Emissions, Highest channel(Vertical, Average)



9. ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

1. Conducted Uncertainty Calculation

Source of Uncertainty	Xi	Uncertainty of Xi		Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
		Value (dB)	Probability Distribution				
Receiver reading	***RI***	± 0.1	normal 1	1.000	0.1	1	0.1
Attenuation AMN-Receiver	***LC***	± 0.08	normal 2	2.000	0.04	1	0.04
AMN Voltage division factor	***LAMN***	± 0.8	normal 2	2.000	0.4	1	0.4
Sine wave voltage	***dVSW***	± 2.00	normal 2	2.000	1.00	1	1.00
Pulse amplitude response	***dVPA***	± 1.50	rectangular	1.732	0.87	1	0.87
Pulse repetition rate response	***dVPR***	± 1.50	rectangular	1.732	0.87	1	0.87
Noise floor proximity	***dVNF***	± 0.00	-	-	0.00	1	0.00
AMN Impedance	***dZ***	± 1.80	triangular	2.449	0.73	1	0.73
ⓐ Mismatch	***M***	+ 0.70	U-Shaped	1.414	0.49	1	0.49
ⓑ Mismatch	***M***	- 0.80	U-Shaped	1.414	- 0.56	1	- 0.56
Measurement System Repeatability	***RS***	0.05	normal 1	1.000	0.05	1	0.05
Remark	ⓐ: AMN-Receiver Mismatch : + ⓑ: AMN-Receiver Mismatch : -						
Combined Standard Uncertainty	Normal			± 1.88			
Expended Uncertainty U	Normal (k = 2)			± 3.76			

2. Radiation Uncertainty Calculation

Source of Uncertainty	Xi	Uncertainty of Xi		Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
		Value (dB)	Probability Distribution				
Receiver reading	***RI***	± 0.10	normal 1	1.000	0.10	1	0.10
Sine wave voltage	***dVsw***	± 2.00	normal 2	2.000	1.00	1	1.00
Pulse amplitude response	***dVpa***	± 1.50	rectangular	1.732	0.87	1	0.87
Pulse repetition rate response	***dVpr***	± 1.50	rectangular	1.732	0.87	1	0.87
Noise floor proximity	***dVnf***	± 0.50	normal 2	2.000	0.25	1	0.25
Antenna Factor Calibration	***AF***	± 1.50	normal 2	2.000	0.75	1	0.75
Attenuation Antenna-receiver	***CL***	± 0.52	normal 2	2.000	0.26	1	0.26
Antenna Directivity	***AD***	± 1.00	rectangular	1.732	0.58	1	0.58
Antenna Factor Height Dependence	***AH***	± 0.50	rectangular	1.732	0.29	1	0.29
Antenna Phase Centre Variation	***AP***	± 0.30	rectangular	1.732	0.17	1	0.17
Antenna Factor Frequency Interpolation	***AI***	± 0.30	rectangular	1.732	0.17	1	0.17
Site Imperfections	***SI***	± 4.00	triangular	2.449	1.63	1	1.63
Measurement Distance Variation	***DV***	± 0.10	rectangular	1.732	0.06	1	0.06
Antenna Balance	***Dbal***	± 0.90	rectangular	1.732	0.52	1	0.52
Cross Polarisation	***DCross***	± 0.90	rectangular	1.732	0.52	1	0.52
ⓐ Mismatch	***M***	+ 0.25	U-Shaped	1.414	0.18	1	0.18
ⓑ Mismatch	***M***	- 0.26	U-Shaped	1.414	- 0.18	1	- 0.18
ⓒ Mismatch	***M***	+ 0.98	U-Shaped	1.414	0.69	1	0.69
ⓓ Mismatch	***M***	- 1.11	U-Shaped	1.414	- 0.79	1	- 0.79
Measurement System Repeatability	***RS***	0.09	normal 1	1.000	0.09	1	0.09
Remark	ⓐ: Biconical Antenna-receiver Mismatch : + (< 200 MHz) ⓑ: Biconical Antenna-receiver Mismatch : - (< 200 MHz) ⓒ: Log Periodic Antenna-receiver Mismatch : + (≧ 200 MHz) ⓓ: Log Periodic Antenna-receiver Mismatch : - (≧ 200 MHz)						
Combined Standard Uncertainty	Normal			± 2.63 (< 200 MHz) ± 2.74 (≧200 MHz)			
Expended Uncertainty U	Normal (k = 2)			± 5.26 (< 200 MHz) ± 5.48 (≧200 MHz)			

10. TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESCS 30	833364/020	Mar. 28 2009	1 year
2	*Test Receiver	R & S	ESCS 30	100302	Nov. 11 2009	1 year
3	*Amplifier	HP	8447F	2805A03427	Jul. 20 2009	1 year
4	*Amplifier	Sonoma Instrument	310N	291916	Jul. 22 2009	1 year
5	*Pre Amplifier	HP	8449B	3008A00107	Feb. 12 2009	1 year
6	*Pre Amplifier	HP	8447F	2805A03406	Apr. 09 2009	1 year
7	*Pre Amplifier	Agilent	83051A	3950M00201	Jun. 15 2009	1 year
8	*Spectrum Analyzer	Agilent	E4440A	MY44303257	Jul. 20 2009	1 year
9	*Spectrum Analyzer	Agilent	E4440A	MY44022567	Sep. 04 2009	1 year
10	*Spectrum Analyzer	R & S	FSP40	100361	Sep. 04 2009	1 year
11	*Loop Antenna	EMCO	6502	8911-2436	Jan. 11 2009	2 year
12	*Spectrum Analyzer	R & S	FSP40	100361	Sep. 04 2009	1 year
13	*Power Meter	R & S	NRVS	835360/002	Feb. 12 2009	1 years
14	*Peak Power Sensor	R & S	NRV-Z32	836019/028	Nov. 11 2009	1 years
15	*Biconical Log Anter	ARA	LPB-2520/A	1209	Dec. 08 2008	2 years
16	*Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-508	Dec.11 2008	2 years
17	*Horn Antenna	SCHWARZBECK	BBHA9170	9170223	Jun. 16 2008	2 years
18	*Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-257	Apr. 21 2008	2 years
19	Signal Generater	R & S	SMP02	833286/003	Jul. 20 2009	1 year
20	*LISN	R & S	ESH3-Z5	833874/006	Nov. 11 2009	1 year
21	*LISN	R & S	ESH2-Z5	100227	Feb. 13 2009	1 year
22	*Position Controller	DAEIL EMC	N/A	N/A	N/A	N/A
23	*Turn Table	DAEIL EMC	N/A	N/A	N/A	N/A
24	*Antenna Mast	DAEIL EMC	N/A	N/A	N/A	N/A
25	*Anechoic Chamber	EM Eng.	N/A	N/A	N/A	N/A
26	*Shielded Room	EM Eng.	N/A	N/A	N/A	N/A
27	*Position Controller	Seo-Young EMC	N/A	N/A	N/A	N/A
28	*Turn Table	Seo-Young EMC	N/A	N/A	N/A	N/A
29	*Antenna Mast	Seo-Young EMC	N/A	N/A	N/A	N/A
30	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
31	*Shielded Room	Seo-Young EMC	N/A	N/A	N/A	N/A

***) Test equipment used during the test**