Nemko Korea Co., Ltd.

155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-852 KOREA, REPUBLIC OF
TEL:+82 31 330-1700 FAX:+82 31 322 2332

FCC and IC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Samsung Medison Co., Ltd.
42, Teheran-ro, 108-gil, Gangnam-gu,
Seoul, Korea
(Post code : 135-282)
Attn. : Hyungwook. Lee

Dates of Issue : March 31, 2015
Test Report No. : NK-14-R-191
Test Site : Nemko Korea Co., Ltd.

FCC ID **IC**	**2ADCFWLM720B** **12432A-WLM720B**
Brand Name	**SAMSUNG**
Contact Person	**Samsung Medison Co., Ltd.** **42, Teheran-ro, 108-gil, Gangnam-gu,** **Seoul, Korea, 135-282** **Hyungwook. Lee** **Telephone No. : +82-2-563-6528**

Applied Standard: FCC 47 CFR Part 15C and IC RSS-247 Issue 1
Classification: Digital Transmission System
EUT Type: Wifi module

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 C63.10 - 2013. 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.

Jun 15, 2015
Tested By : Wonho Son
Engineer

Jun 15. 2015
Reviewed By : Deokha Ryu
Technical Manager

TABLE OF CONTENTS

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 subpart C and IC RSS-247 Issue 1.

Responsible Party :	Samsung Medison Co., Ltd.
Contact Person :	Hyungwook. Lee
Manufacturer :	Samsung Medison Co., Ltd. 42, Teheran-ro, 108-gil, Gangnam-gu, Seoul, Korea 135-282

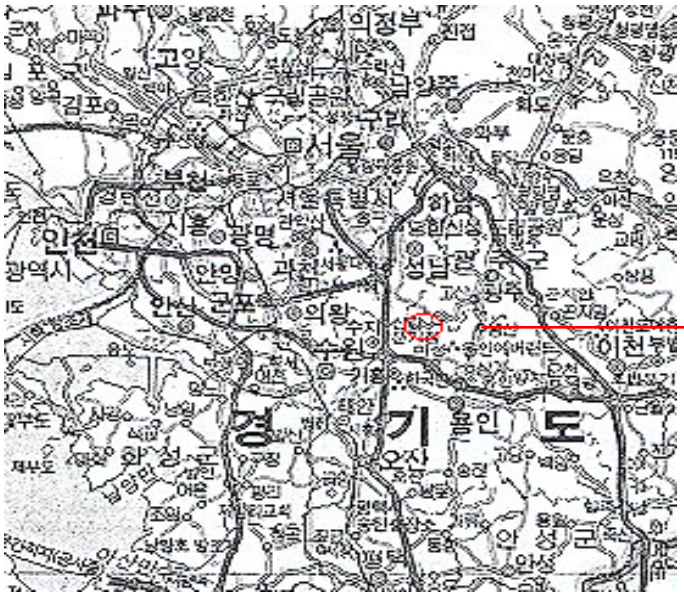
- FCC ID: 2ADCFWLM720B
- IC : 12432A-WLM720B
- Model: WLM720B
- Brand Name: SAMSUNG
- EUT Type: Wifi module
- Classification: Digital modulation Transmitter
- Applied Standard: FCC 47 CFR Part 15 subpart C and IC RSS-247 Issue 1
- Test Procedure(s): ANSI C63.10 - 2013 and FCC guidance of 558074 D01 v03r02 and FCC guidance of 662911 D01 v02r01
- Dates of Test: September 24, 2014 ~ November 10, 2014
- Place of Tests: Nemko Korea Co., Ltd.

2. INTRODUCTION

2.1 Test facility

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 9 kHz to 40 GHz (ANSI C63.4-2003), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009) were used in determining radiated and conducted emissions emanating from **Samsung Medison Co., Ltd.**
FCC ID : 2ADCFWLM720B and **IC : 12432A-WLM720B**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory***.
The site address is 155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-852 KOREA, REPUBLIC OF.
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 (18 miles) 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.

155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-852 KOREA, REPUBLIC OF
Tel)+82-31-330-1700
Fax)+82-31-322-2332

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.

2.2 Accreditation and listing

Accreditation type		Accreditation number
FC	FCC part 15/18 Filing site	Registration No. 97992
	CAB Accreditation for DOC	Designation No. KR0026
KOLAS	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. 155
Industry Canada	Canada IC Registered site	Site No. 2040E
VCCI	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
IECEE CB SCHEME	EMC CBTL	-
방송통신위원회	KCC(RRL)Designated Lab.	Registration No. KR0026
	SASO registered Lab and Certification Body	Registration No. 2008-15

3. TEST CONDITIONS & EUT INFORMATION

3.1 Operation During Test

During the test, the EUT was connected to laptop PC and then a test program was executed to operate EUT continuously (Duty cycle ≥ 98%).
The EUT was tested at the lowest channel, middle channel and the highest channel with the maximum output power in accordance with the manufacturer's specifications. The worst data were recorded in the report.

The EUT was programmed with the following output power setting that was used during testing:

Test frequency		2412 MHz	2437 MHz	2462 MHz
802.11b	Power Level	33	33	33
802.11g	Power Level	37	37	37
802.11n(HT20)	Power Level	37	37	37

Test frequency		2422 MHz	2437 MHz	2452 MHz
802.11n(HT40)	Power Level	35	35	35

Table of test modes and channels :

Frequency band	Mode	Test Channel (CH)	Frequency (MHz)
2.4 GHz	802.11b,g,n(HT20)	1	2412
		6	2437
		11	2462
	802. 11n(HT40)	3	2422
		6	2437
		9	2452

Table of test modes for 2.4 GHz band:

Test Items	Mode	Data rate (Mbps)	Test Channel (CH)
Conducted Emissions	802.11n(HT20)	MCS8	6
Radiated Emissions	802.11n(HT20)	MCS8	6
6 dB Bandwidth	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(HT20)	MCS8	1/6/11
	802.11n(HT40)	MCS8	3/6/9
Peak Output Power	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(HT20)	MCS8	1/6/11
	802.11n(HT40)	MCS8	3/6/9
Peak Power Spectral Density	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(HT20)	MCS8	1/6/11
	802.11n(HT40)	MCS8	3/6/9
Conducted Spurious Emission, Radiated Spurious Emission, Band edge Emission	802.11b	1	1/6/11
	802.11g	6	1/6/11
	802.11n(HT20)	MCS8	1/6/11
	802.11n(HT40)	MCS8	3/6/9

Antenna Tx mode information:

Frequency band	Mode	Antenna TX mode	Support MIMO
2.4 GHz	802.11b,g	■ 1TX, □ 2TX	□ Yes, ■ No
	802.11n(HT20) 802.11n(HT40)	□ 1TX, ■ 2TX	■ Yes, □ No

Note(s) :

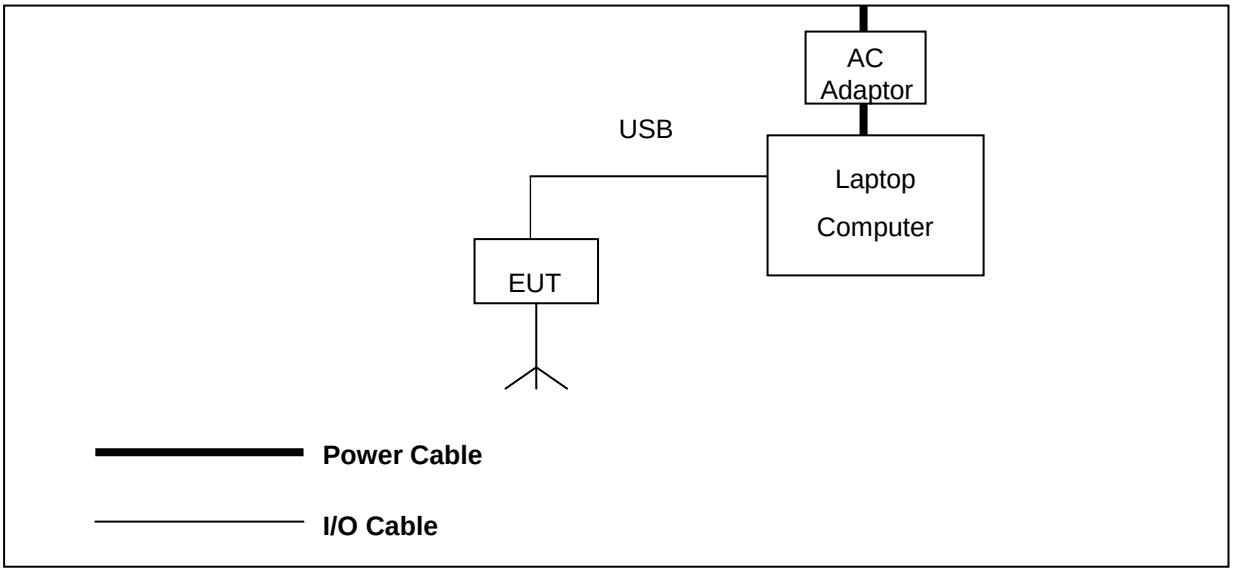
1. The EUT support both chains transmit and receive simultaneously for 802.11n(HT20 / HT40).

2. The EUT support the antenna with TX diversity function for 802.11b/g

3.2 Support Equipment

EUT	Samsung Medison Co., Ltd. FCC ID: GC2894452ADCFWLM720B	S/N: N/A
Laptop Computer	HP Model : G62-355TU 1.0 m unshielded USB cable	FCC DOC S/N : CNF0452FN3
AC/DC Adapter	Lite-on Technology (Changzhou) Co., Ltd. Model : PPP009L-E 1.5 m unshielded power cable	FCC DOC S/N :WBGST0A3UZOFQ6

3.3 Setup Drawing



3.4 EUT Information

The EUT is the **Wifi module FCC ID : 2ADCFWLM720B, IC : 12432A-WLM720B**

Specifications for Audio transmitting:

Category	Wifi module
Model Name	WLM720B
Frequency of Operation	802.11b,g,n(HT20) : 2412 MHz ~ 2462 MHz 802.11n(HT40) : 2422 MHz ~ 2452 MHz
Power Output (Conducted)	802.11b : 14.61 dBm 802.11g : 11.90 dBm 802.11n (HT20) : 13.98 dBm 802.11n (HT40) : 11.85 dBm
Channels	802.11b,g,n (HT20) : 11 ch 802.11n (HT40) : 7 ch
Antenna Gain (peak)	Ant 1 : 3.29 dBi Ant 2 : 3.29 dBi
Antenna Setup	802.11b, g : 1Tx / 1Rx 802.11n (HT20, HT40) : 2Tx / 2Rx
Modulations	DSSS(BPSK,QPSK,CCK) for 802.11b OFDM(BPSK,QPSK,16QAM,64QAM) for 802.11g,n
Temperature Range	-10 ℃ ~ +50 ℃
Voltage	3.3 Vdc
Dimensions (W x H)	22 mm x 20 mm
Weight	About 2 g
H/W Status	P0
S/W Status	s1.00.0239
Remarks	-

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	IC Paragraph No.	Result	Remark
Conducted Emission	15.207	RSS-GEN 8.8	Complies	
Radiated Emission	15.209	RSS-GEN 8.9	Complies	
6 dB Bandwidth	15.247(a)(2)	RSS-247 Issue 1 5.2(1)	Complies	
Maximum Peak Output Power	15.247(b)(3)	RSS-247 Issue 1 5.4(4)	Complies	
Power Spectral Density	15.247(e)	RSS-247 Issue 1 5.2(2)	Complies	
Conducted Spurious Emission	15.247(d)	RSS-247 Issue 1 5.5	Complies	
Radiated Spurious Emission	15.247(d)	RSS-247 Issue 1 5.5	Complies	

5. RECOMMENDATION/CONCLUSION

The data collected shows that the **Wifi module FCC ID : 2ADCFWLM720B, IC : 12432A-WLM720B** 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 **Wifi module FCC ID : 2ADCFWLM720B, IC : 12432A-WLM720B** 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 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 1.5 m away from the side of wall of the shielded room Rohde & Schwarz (ESH3-Z5) and (ESH2-Z5) of the 50 ohm/50 µH Line Impedance Stabilization Network (LISN) are bonded to the shielded room. The EUT is powered from the Rohde & Schwarz LISN (ESH3-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH2-Z5). Power to the LISNs 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 (serpentinefashion) 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 functions were set to CISPR quasi-peak mode & average mode. The bandwidth of receiver was set to 9 kHz. 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; whichever determined the worst case emission.

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

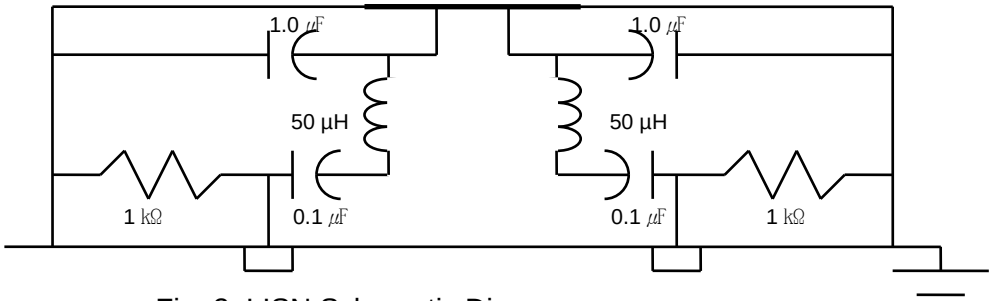


Fig. 2. LISN Schematic Diagram

7.2 Radiated Emissions

The measurement was performed at the test site that is specified in accordance with ANSI C63.4-2003 and ANCI C63.10-2009.

The spurious emission was scanned from 9 kHz to 30 MHz using Loop Antenna(Rohde&Schwarz, HFH2-Z2) and 30 to 1000 MHz using Trilog broadband test antenna(Schwarzbeck, VULB 9163). Above 1 GHz, Horn antenna (Schwarzbeck BBHA 9120D: up to 18 GHz, Q-par Angus QSH20S20 : 18 to 26.5 GHz, QSH22K20: up to 40 GHz) was used.

For emissions testing at below 1GHz, The test equipment was placed on turntable with 0.8 m above ground. For emission measurements above 1 GHz, The test equipment was placed on turntable with 1.5 m above ground. support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, cable, wire arrangement and mode of operation that has the highest amplitude relative to the limit was selected. Then, the turn table was rotated from 0˚ to 360˚ and an antenna mast was moved from 1 m to 4 m height to maximize the suspected highest amplitude signal. The final maximized level was recorded.

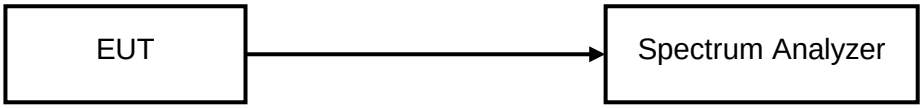
At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection. At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in KDB “558074 D01 DTS Meas Guidance v03r02” in section 12.2.4 and 12.2.5.1. Peak emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = max hold. Average emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = RMS, Trace averaging in power averaging (RMS) mode over a minimum of 100 traces, when the EUT was configured to transmit with duty cycle ≥ 98 percent.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100	3
88–216	150	3
216–960	200	3
Above 960	500	3

Radiated Emissions Limits per 47 CFR 15.209(a)

7.3 6 dB Bandwidth

Test Setup

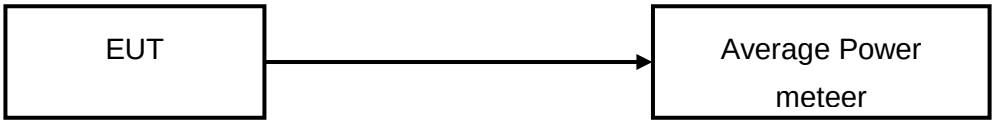


Test Procedure

EUTs 6 dB bandwidth is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level. The spectrum analyzer setting is as follows.
RBW = 100 kHz
VBW ≥ 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
The bandwidth measurement function on the spectrum analyzer is used to measure the 6 dB bandwidth.

7.4 Maximum Conducted (average) Output Power

Test Setup

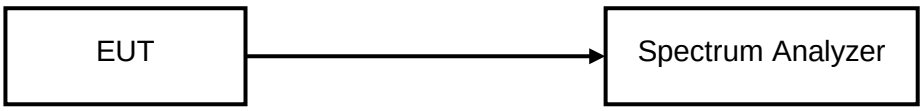


Test Procedure

EUTs Maximum Conducted Output Power is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

7.5 Power Spectral Density (average)

Test Setup



Test Procedure

EUTs Power Spectral Density is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

Center frequency = DTS channel center frequency

Span = at least 1.5 times the DTS bandwidth

RBW : 3 kHz ≤RBW ≤ 100 kHz

VBW ≥ 3 x RBW

Detector = power averaging (RMS)

Ensure that the number of measurement points = sweep ≥ span/RBW

Sweep time = auto couple

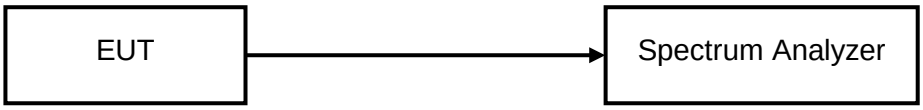
Employ trace averaging (RMS) = minimum of 100 traces

Use the peak marker function to determine the maximum amplitude level

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.6 Conducted Spurious Emissions

Test Setup



Test Procedure

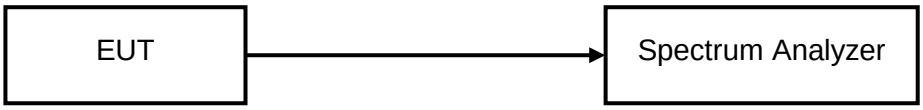
EUTs Conducted spurious emissions are measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level. The spectrum analyzer setting is as follows.

1) Reference Level
Center frequency = DTS channel center frequency
Span ≥ 1.5 times the DTS bandwidth
RBW = 100 kHz
VBW ≥ 3 x RBW
Detector = peak
Sweep time = auto couple
Trace mode = max hold
Allow trace to fully stabilize.
The peak search function on the spectrum analyzer is used to determine the maximum PSD level.

2) Unwanted Emissions
Set the center frequency and span to encompass frequency range to be measured.
RBW = 100 kHz
VBW ≥ 3 x RBW
Detector = peak
Sweep time = auto couple
Trace mode = max hold
Allow trace to fully stabilize.
The peak marker function on the spectrum analyzer is used to determine the maximum amplitude level of all unwanted emissions outside of the authorized frequency band. The unwanted emissions are attenuated by at least the minimum requirements specified.

7.7 Duty Cycle

Test Setup



Test Procedure

EUTs duty cycle are measured at middle channel with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level. The spectrum analyzer setting is as follows.

Center frequency = Center frequency of the transmission
Span = zero
RBW = 8 MHz
VBW = 8 MHz
Detector = peak
Sweep time = 3 ms
Trace mode = view
The marker function on the spectrum analyzer is used to determine the duty cycle.

Following the result of the duty cycle measurement according to the above test procedure, the duty cycle was 100 %.

8. TEST DATA

8.1 Conducted Emissions

FCC §15.207, RSS-Gen

Frequency (MHz)	Level(dBµV)		*)Factor (dB)	**) Line	Limit(dBµV)		Margin(dB)	
	Q-Peak	Average			Q-Peak	Average	Q-Peak	Average
0.15	49.2	36.2	10.3	N	66.0	56.0	16.8	19.8
0.17	49.1	38.3	10.4	N	65.0	55.0	15.9	16.7
0.19	53.1	42.0	10.4	L	64.0	54.0	10.9	12.0
0.21	49.1	33.0	10.4	L	63.2	53.2	14.1	20.2
0.23	45.4	37.1	10.4	N	62.4	52.4	17.0	15.3
0.25	43.3	35.0	10.4	N	61.8	51.8	18.5	16.8

Line Conducted Emissions Tabulated Data

Note(s):

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. * Correction factor was included to test level (dBuV)*

*4. ** LINE : L = Line , N = Neutral*

5. The limit is on the FCC Part section 15.207(a).

PLOTS OF EMISSIONS

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

NEMKO KOREA (NK-14-R-191) 10 Nov 2014 10:49

Conducted Emissions

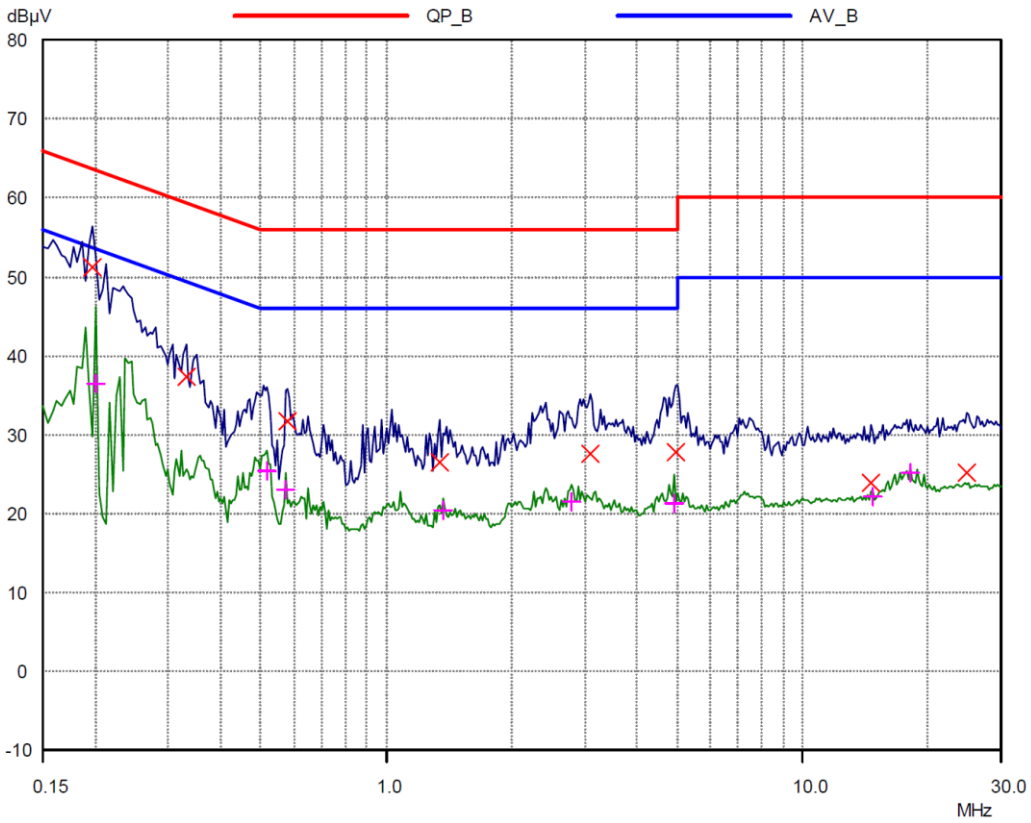
EUT:	Wifi module
Manuf:	Samsung Medison Co., Ltd.
Op Cond:	a.c. 120 V / 60 Hz
Operator:	Wonho Son
Test Spec:	FCC Part 15
Comment:	MODEL : WLM720B
	LINE : LINE-PE
Result File:	r191-l.dat : New Measurement

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	20 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	ESH3_Z5_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-14-R-191) 10 Nov 2014 10:39

Conducted Emissions

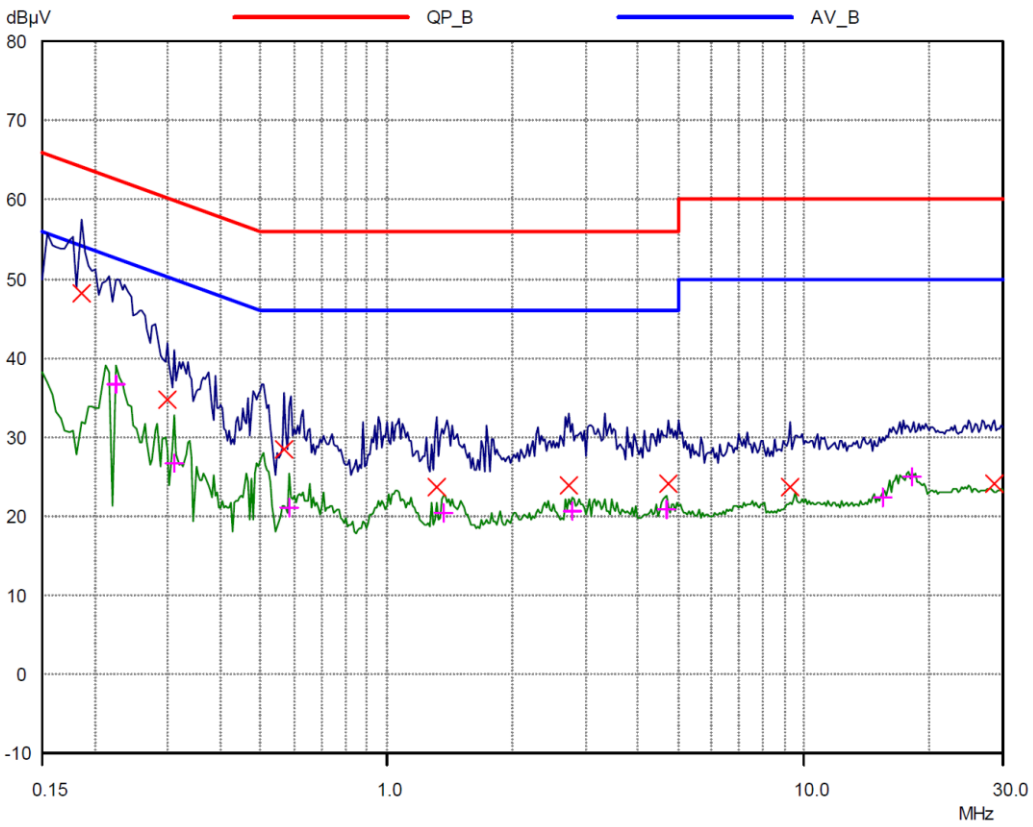
EUT:	Wifi module
Manuf:	Samsung Medison Co., Ltd.
Op Cond:	a.c. 120 V / 60 Hz
Operator:	Wonho Son
Test Spec:	FCC Part 15
Comment:	MODEL : WLM720B
	LINE : NEUTRAL-PE
Result File:	r191-n.dat : New Measurement

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	20 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	ESH3_Z5_Neutral

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



8.2 Radiated Emissions

FCC §15.209 / IC RSS-Gen

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)
146.55	42.20	H	221	134	-27.1	15.1	43.5	28.4
266.63	40.50	H	130	263	-21.7	18.8	46.0	27.2
319.98	42.60	H	100	332	-20.0	22.6	46.0	23.4
331.43	35.50	V	100	192	-19.6	15.9	46.0	30.1
400.01	46.60	H	100	115	-17.3	29.3	46.0	16.7
883.70	34.20	H	330	181	-9.4	24.8	46.0	21.2

Radiated Measurements at 3meters

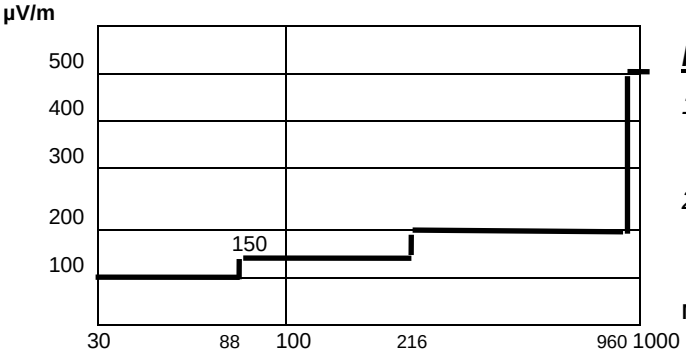


Fig. 3. Limits at 3 meters

Note(s):

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

2 The radiated limits are shown on Figure 3.

Above 1 GHz the limit is 500 µV/m.

*3. *Pol. H = Horizontal, V = Vertical*

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

5. Measurements using CISPR quasi-peak mode.

8.3 6 dB Modulated Bandwidth

FCC §15.247(a)(2) / IC RSS-247 Issue 1, 5.2(1)

Test Mode : Lowest channel, Middle channel and Highest channel

802.11b mode

Chain 0

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	10106	500	9606
Middle	2437	10110	500	9610
High	2462	10107	500	9607

Chain 1

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	10106	500	9606
Middle	2437	10099	500	9599
High	2462	10099	500	9599

802.11g mode

Chain 0

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	16628	500	16128
Middle	2437	16625	500	16125
High	2462	16614	500	16114

Chain 1

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	16630	500	16130
Middle	2437	16629	500	16129
High	2462	16629	500	16129

802.11n (HT20) mode

Chain 0

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	17866	500	17366
Middle	2437	17859	500	17359
High	2462	17869	500	17369

Chain 1

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	17806	500	17306
Middle	2437	17765	500	17265
High	2462	17810	500	17310

802.11n (HT40) mode

Chain 0

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2422	36521	500	36021
Middle	2437	36529	500	36029
High	2452	36526	500	36026

Chain 1

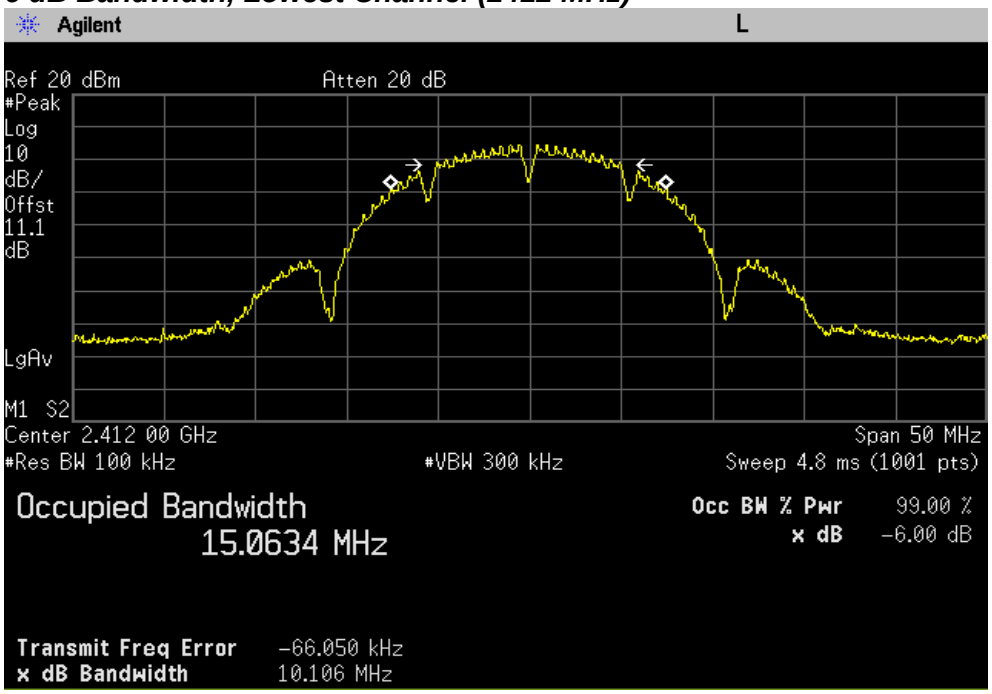
Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2422	36509	500	36009
Middle	2437	36482	500	35982
High	2452	36480	500	35980

PLOTS OF EMISSIONS

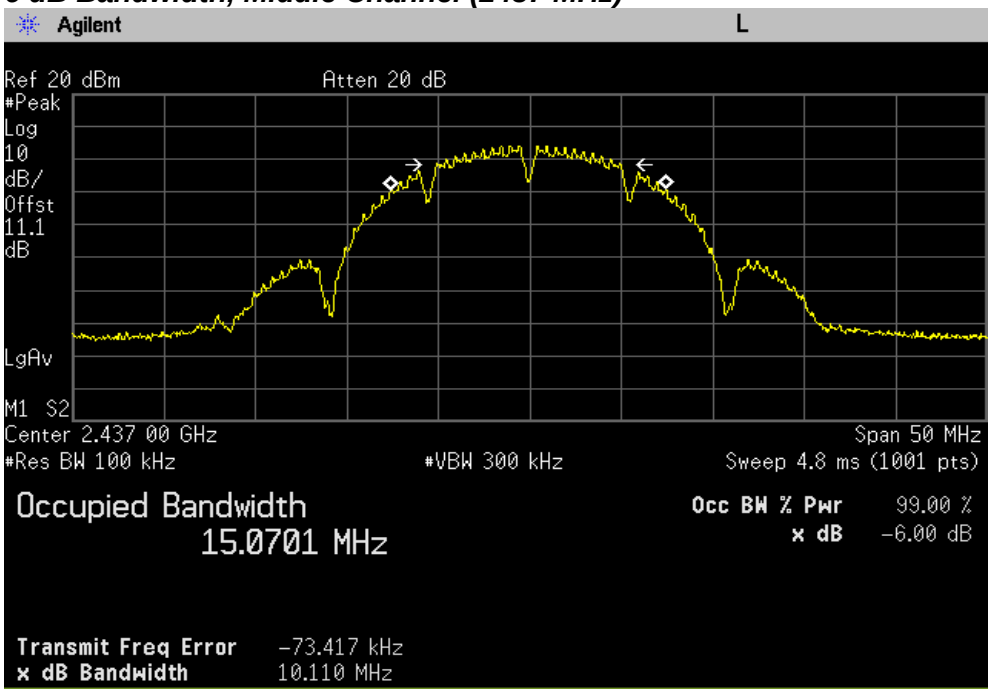
802.11b mode

Chain 0

6 dB Bandwidth, Lowest Channel (2412 MHz)

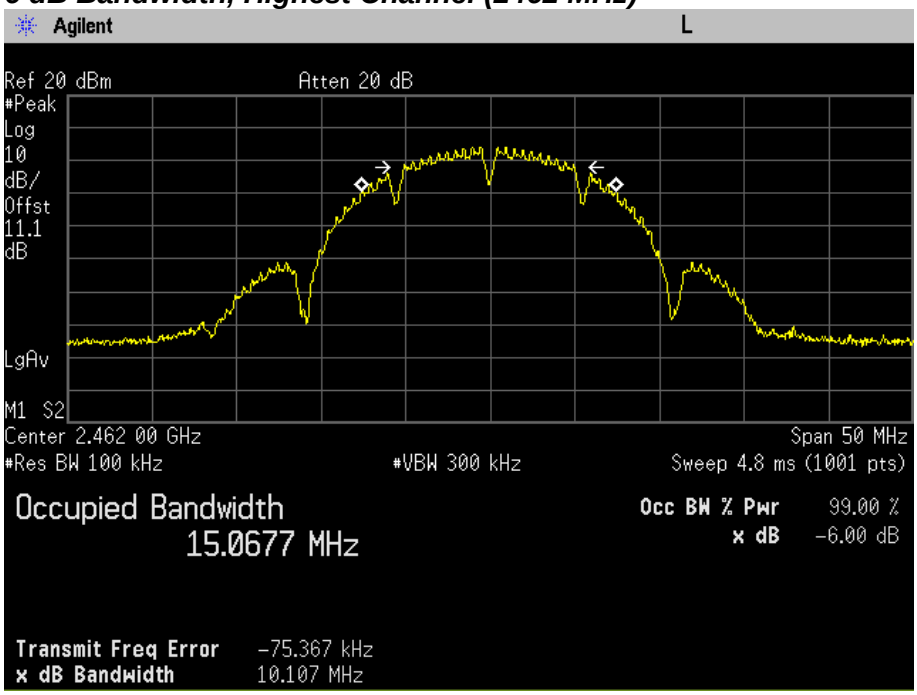


6 dB Bandwidth, Middle Channel (2437 MHz)



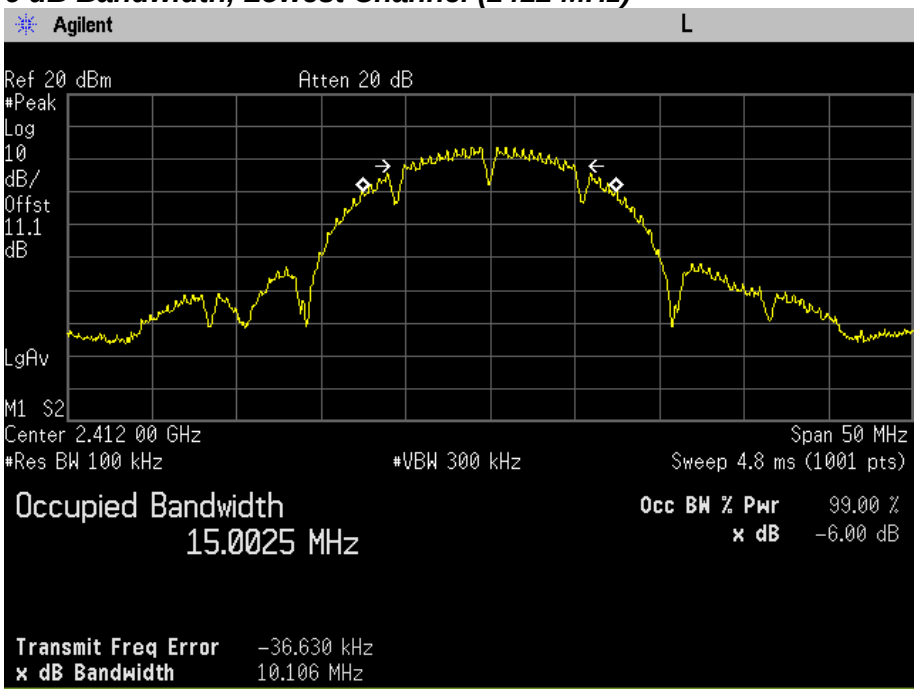
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)



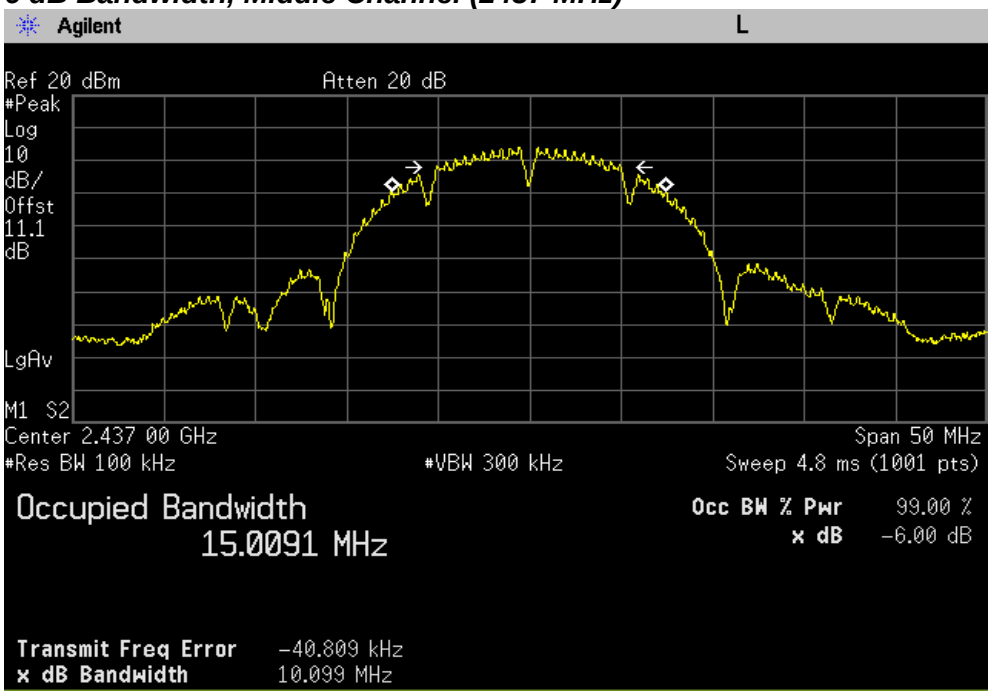
Chain 1

6 dB Bandwidth, Lowest Channel (2412 MHz)

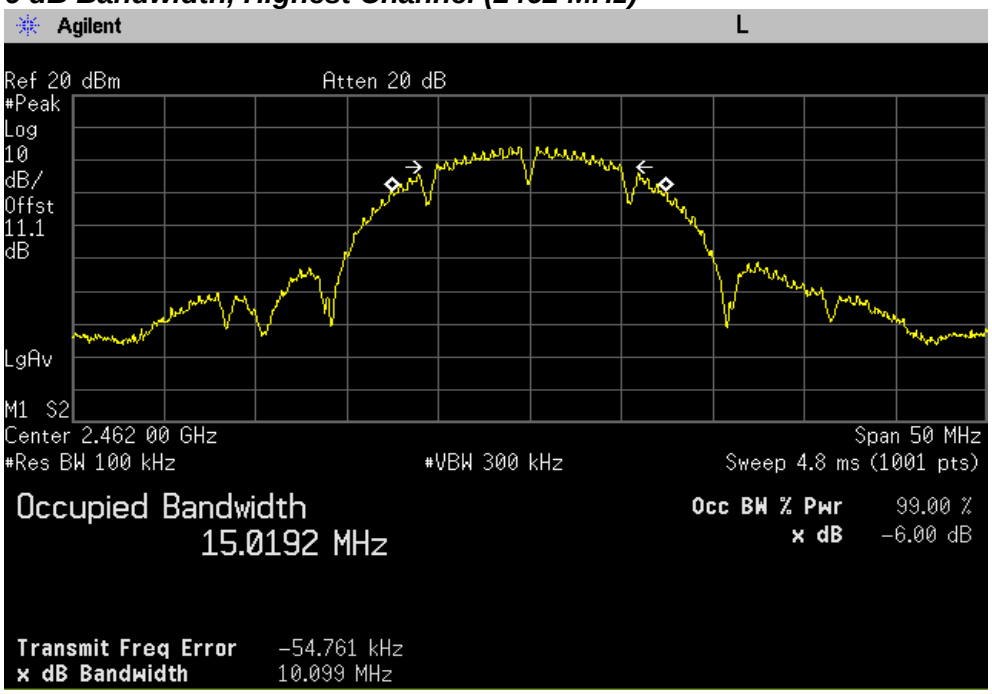


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2462 MHz)

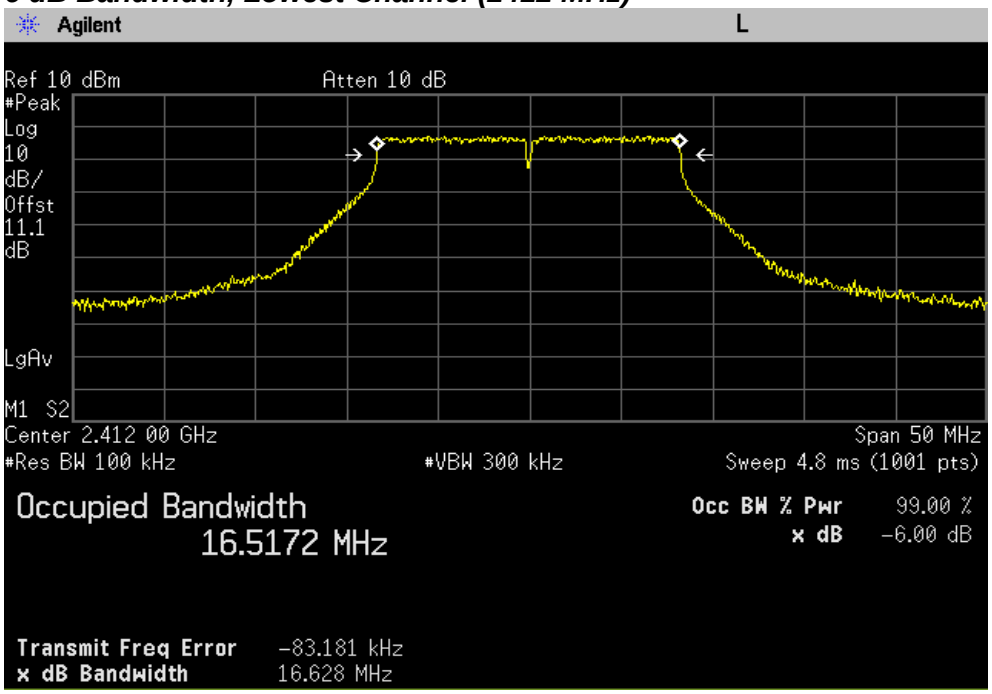


PLOTS OF EMISSIONS

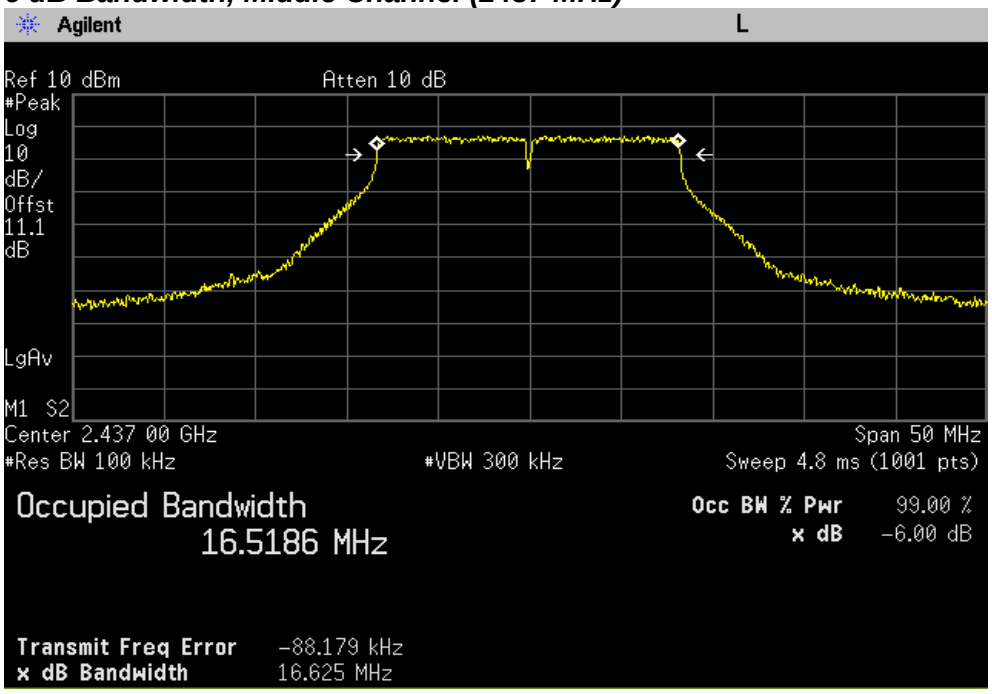
802.11g mode

Chain 0

6 dB Bandwidth, Lowest Channel (2412 MHz)

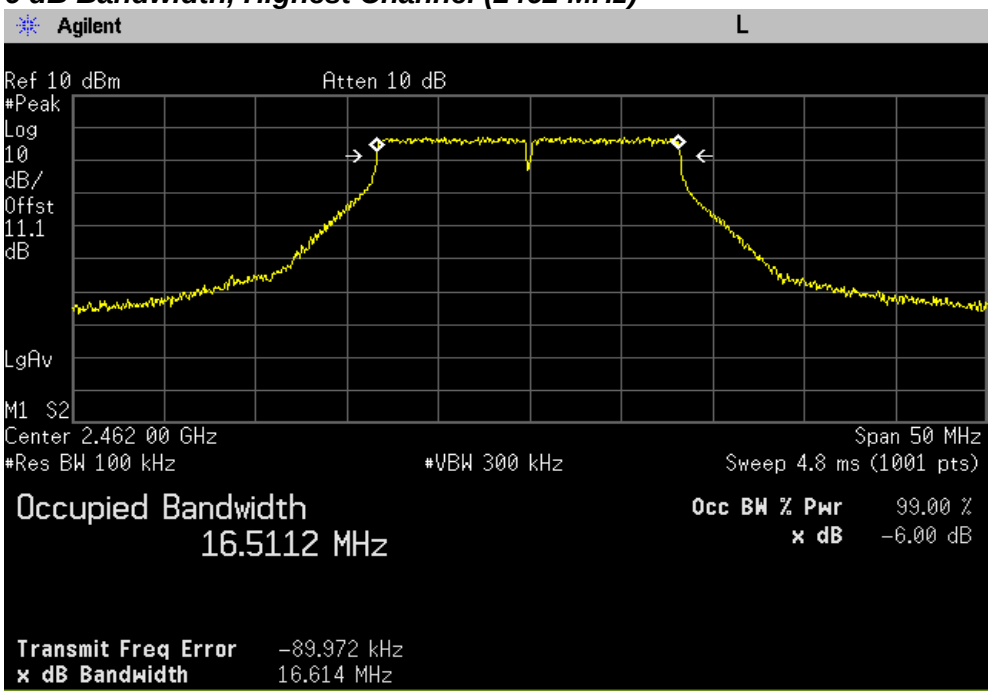


6 dB Bandwidth, Middle Channel (2437 MHz)



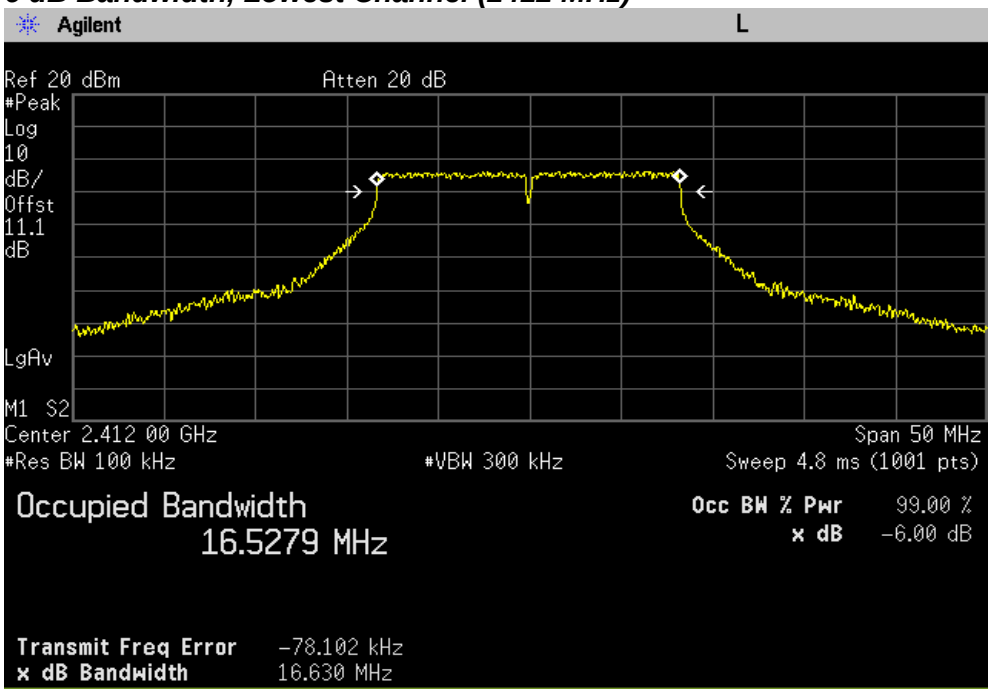
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)



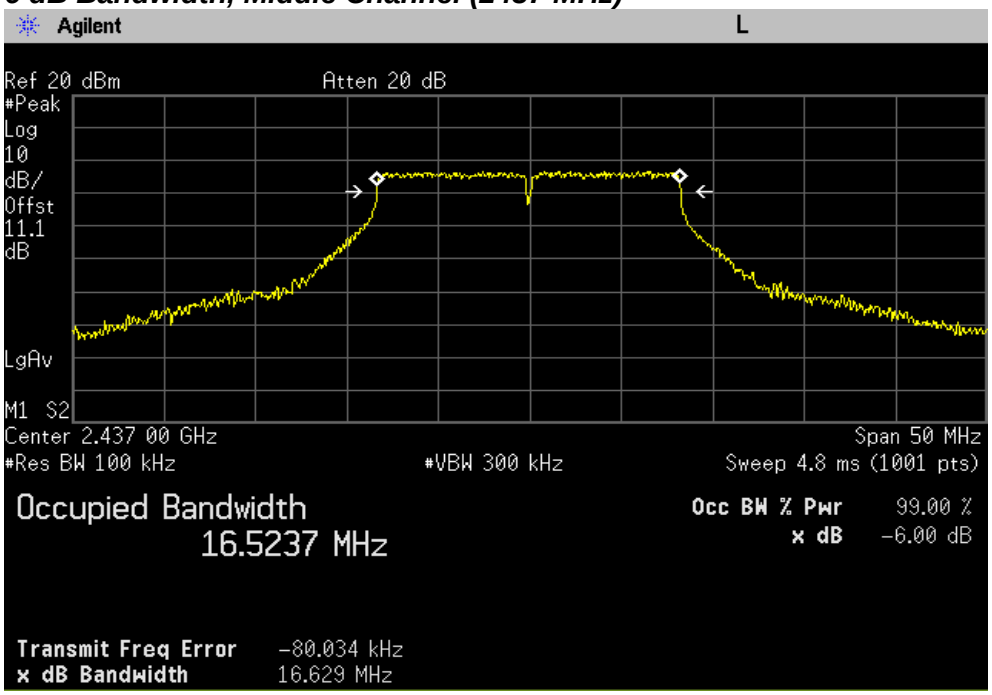
Chain 1

6 dB Bandwidth, Lowest Channel (2412 MHz)

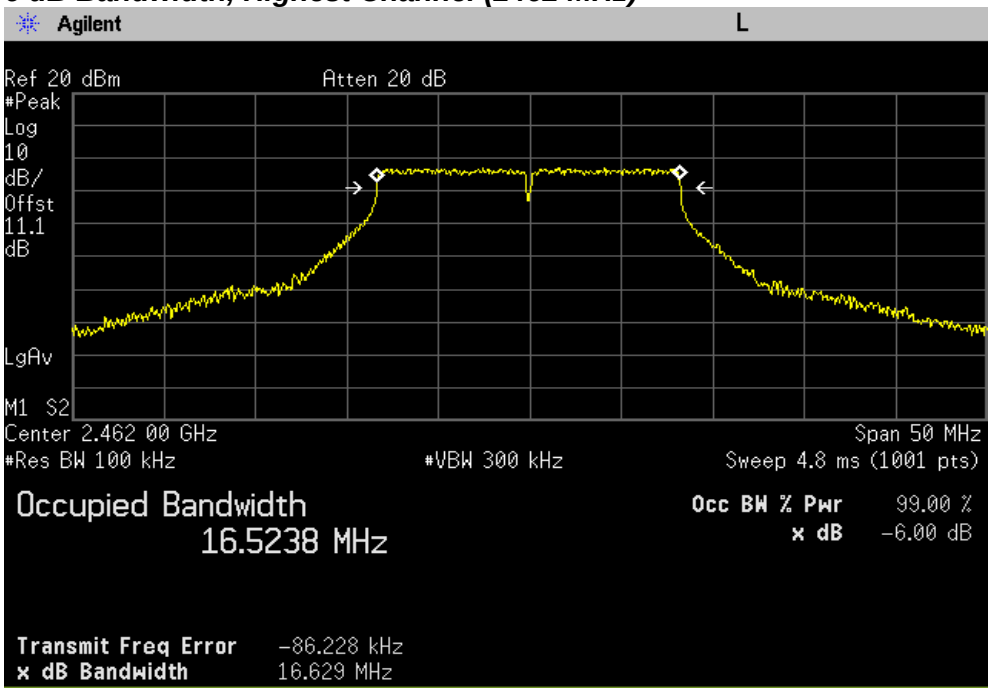


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2462 MHz)

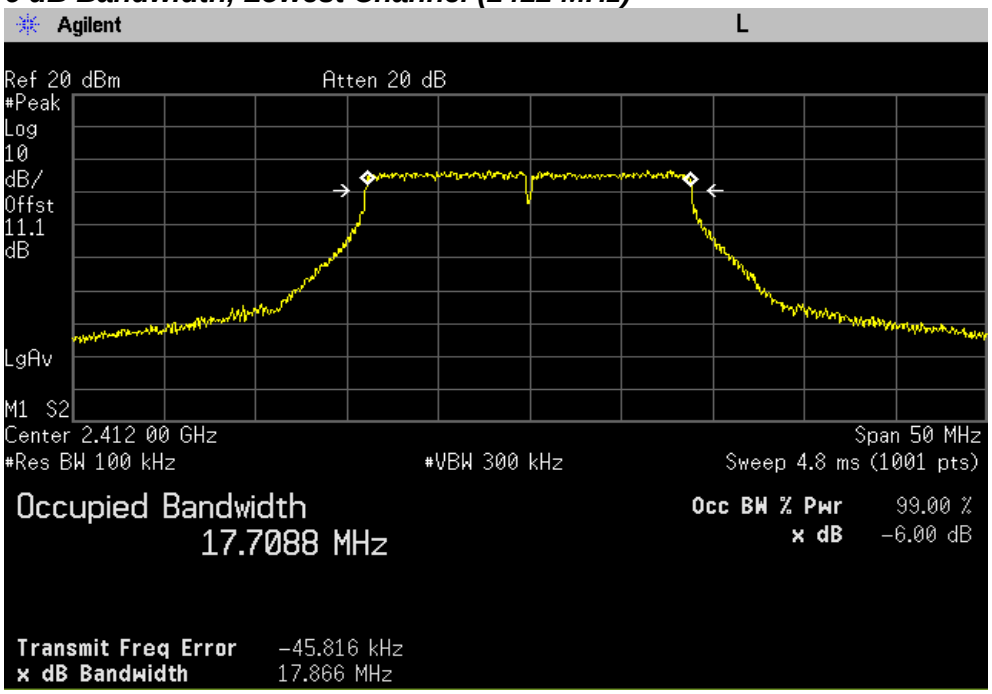


PLOTS OF EMISSIONS

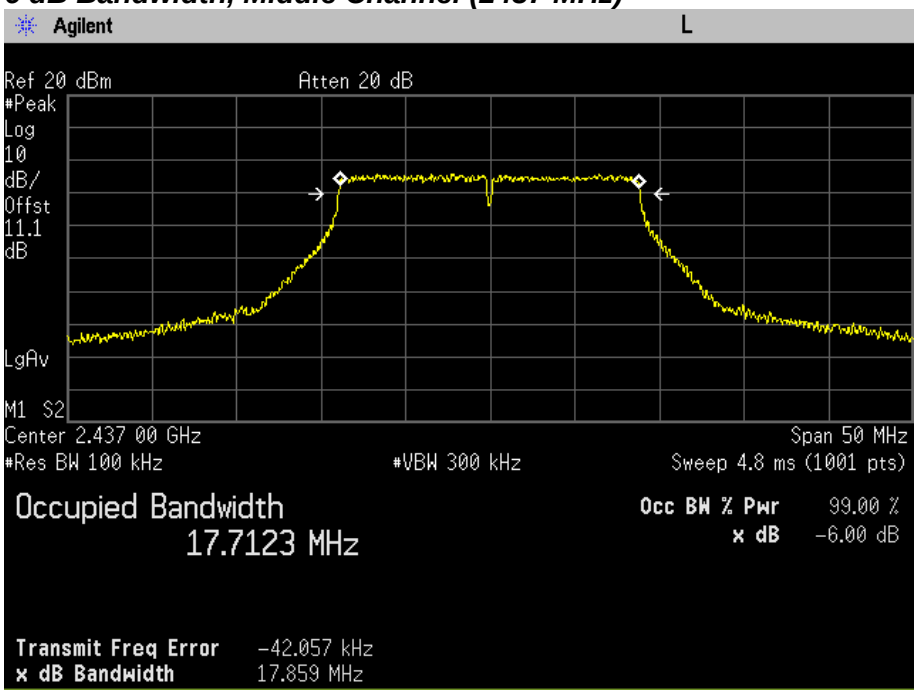
802.11n(HT20) mode

Chain 0

6 dB Bandwidth, Lowest Channel (2412 MHz)

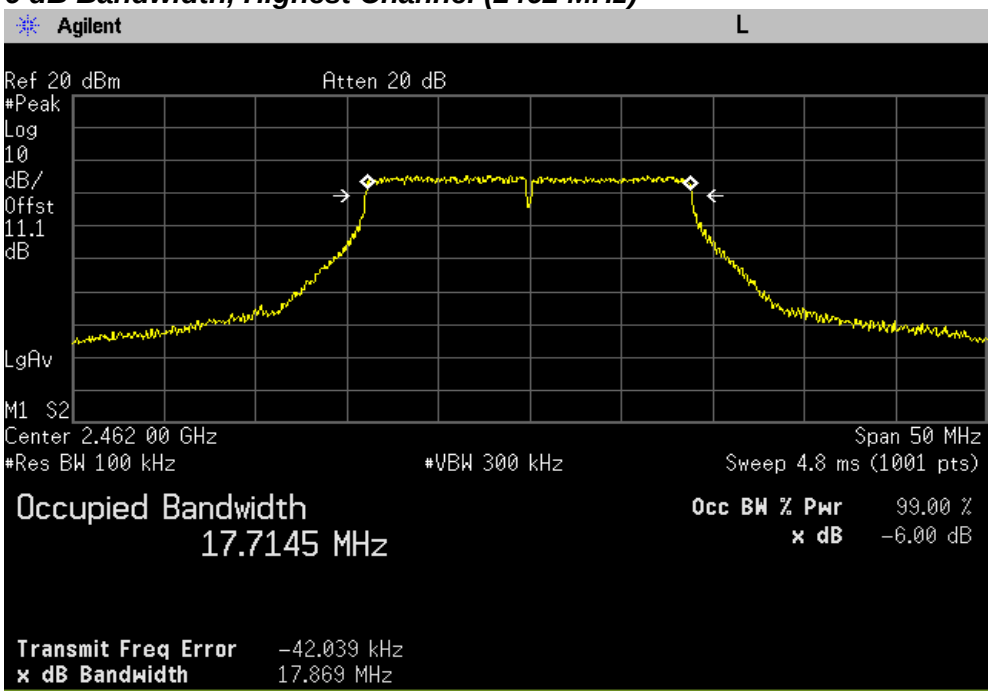


6 dB Bandwidth, Middle Channel (2437 MHz)



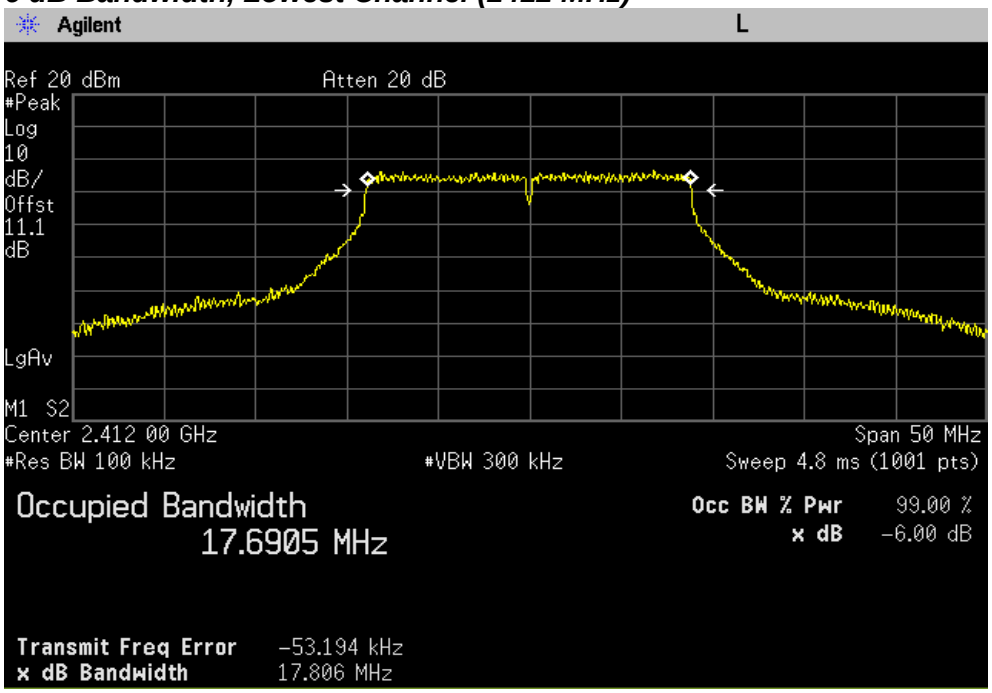
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2462 MHz)



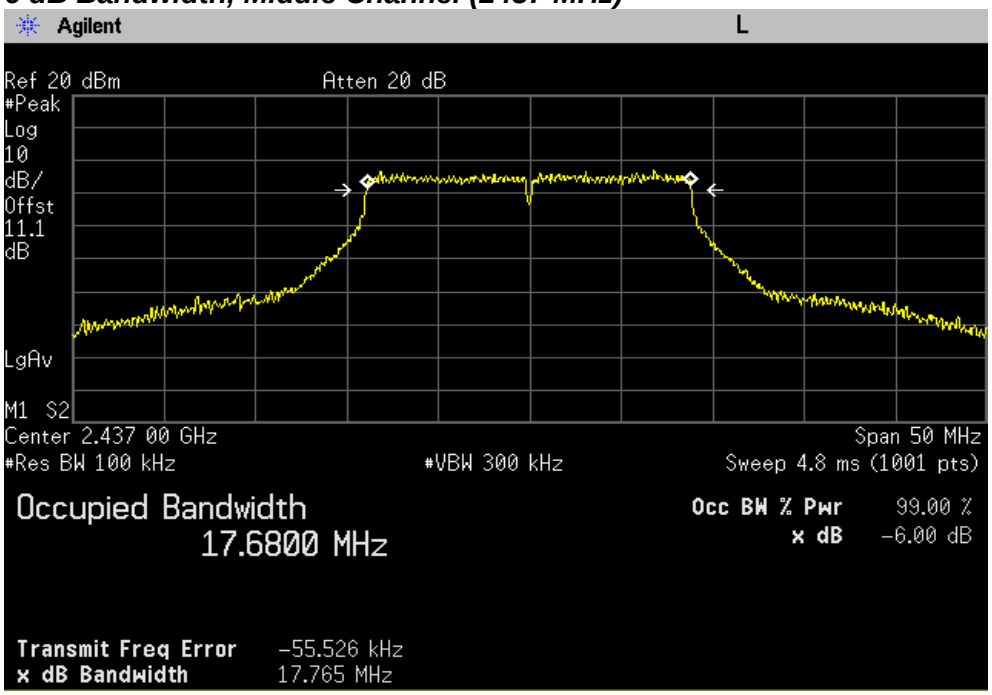
Chain 1

6 dB Bandwidth, Lowest Channel (2412 MHz)

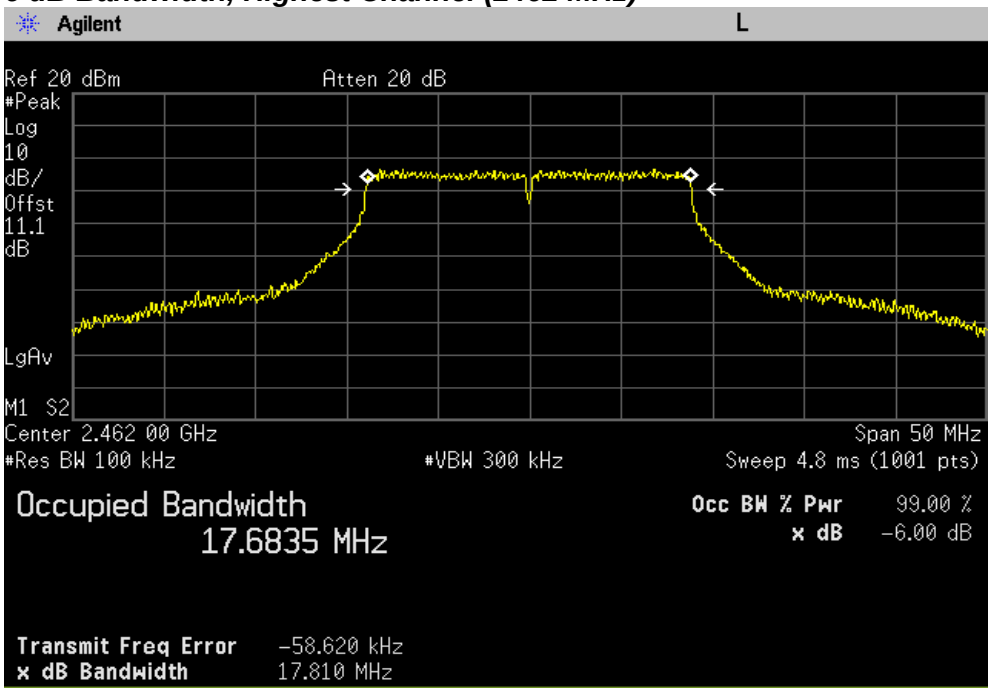


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2462 MHz)

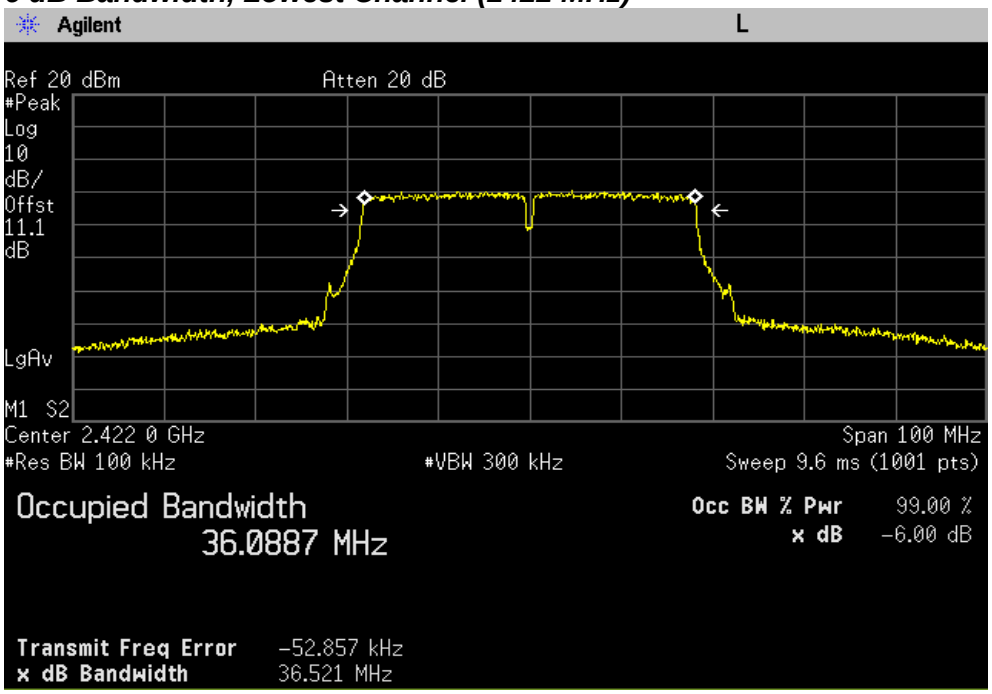


PLOTS OF EMISSIONS

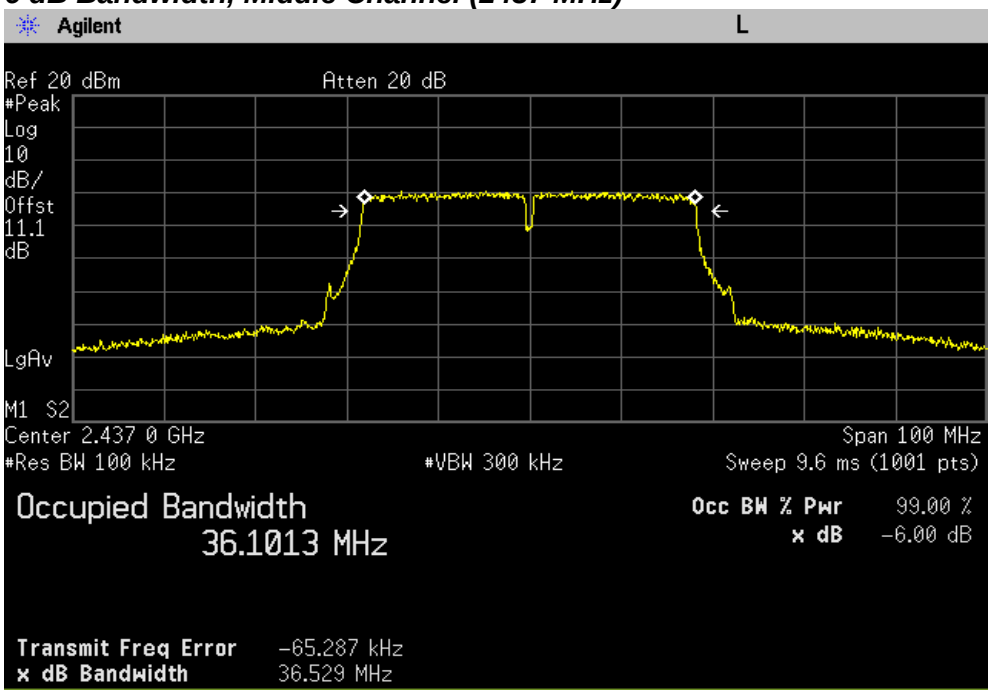
802.11n(HT40) mode

Chain 0

6 dB Bandwidth, Lowest Channel (2422 MHz)

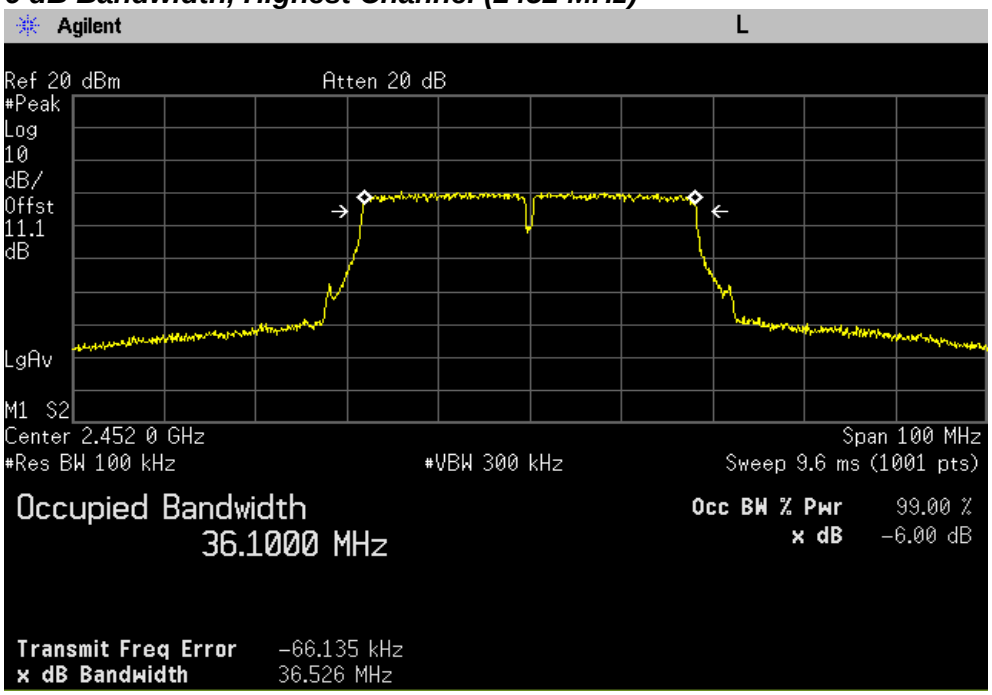


6 dB Bandwidth, Middle Channel (2437 MHz)



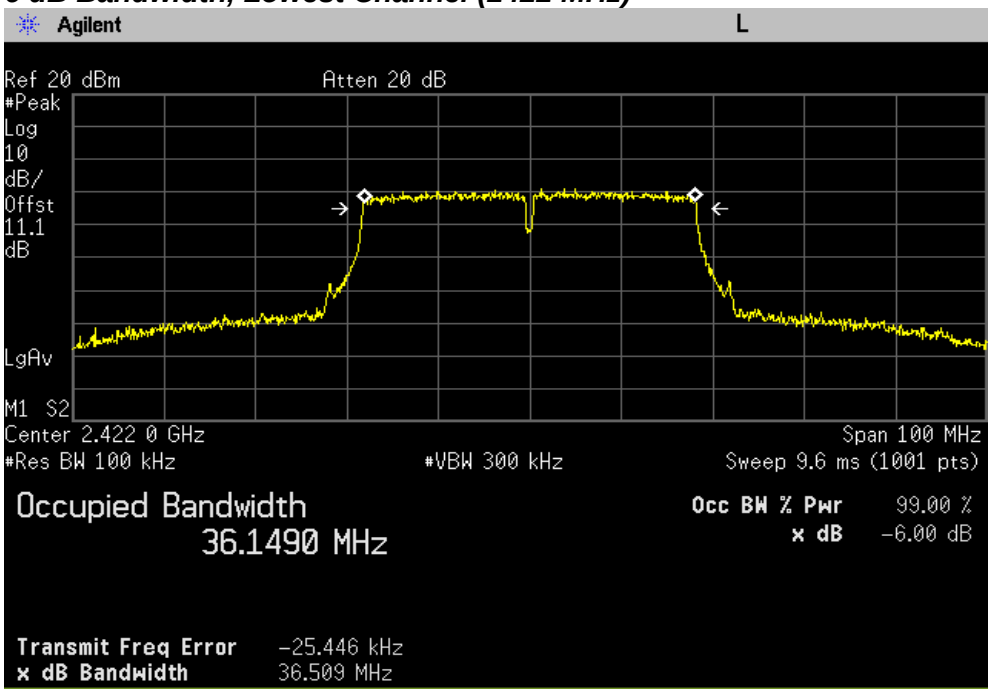
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2452 MHz)



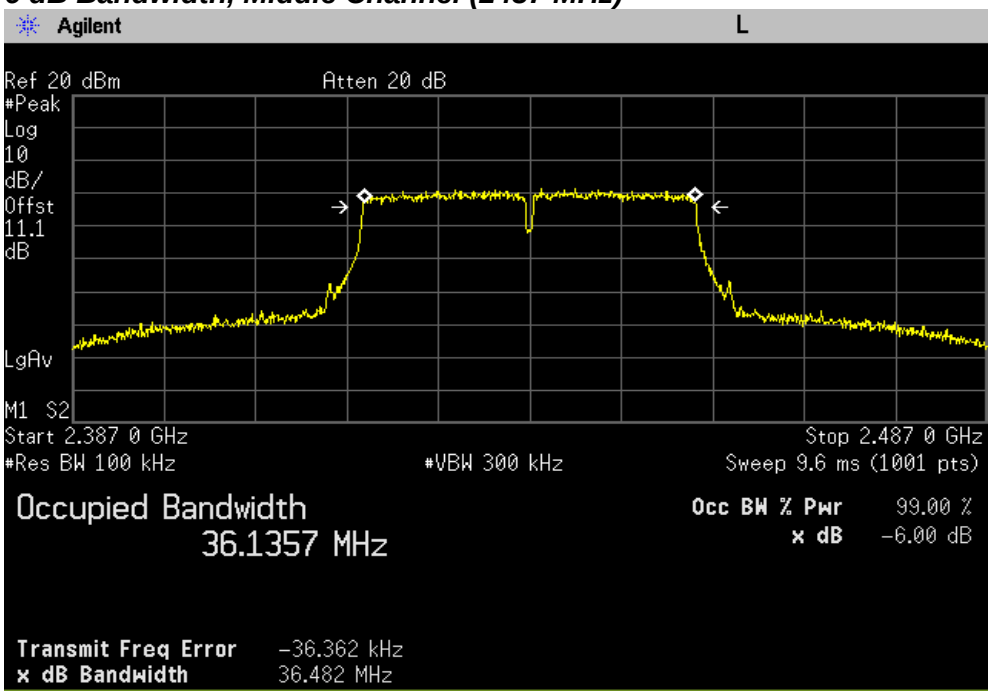
Chain 1

6 dB Bandwidth, Lowest Channel (2422 MHz)

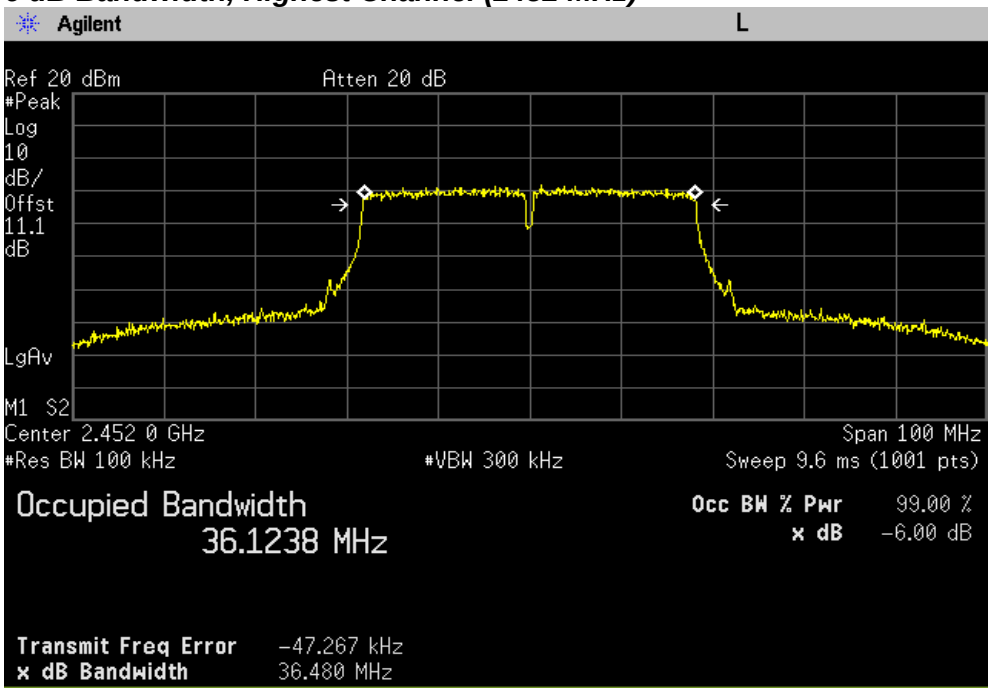


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2437 MHz)



6 dB Bandwidth, Highest Channel (2452 MHz)



8.4 Maximum conducted (average) Output Power

FCC §15.247(b)(3) / IC RSS-247 Issue 1, 5.4(4)

Test Mode : Lowest channel, Middle channel and Highest

802.11b mode

Chain 0

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	14.61	30.00	15.39
Middle	2437	14.50	30.00	15.50
High	2462	14.10	30.00	15.90

Chain 1

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	13.90	30.00	16.10
Middle	2437	14.05	30.00	15.95
High	2462	14.04	30.00	15.96

802.11g mode

Chain 0

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.63	30.00	18.37
Middle	2437	11.71	30.00	18.29
High	2462	11.64	30.00	18.36

Chain 1

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	11.60	30.00	18.40
Middle	2437	11.83	30.00	18.17
High	2462	11.90	30.00	18.10

802.11n(HT20) mode

Chain 0 + Chain 1

Channel	Frequency (MHz)	Result(dBm)		*Total Power (dBm)	**Limit (dBm)
		Chain 0	Chain 1		
Low	2412	11.20	10.72	13.98	30.0
Middle	2437	11.00	10.79	13.91	30.0
High	2462	10.86	11.01	13.95	30.0

802.11n(HT40) mode

Chain 0 + Chain 1

Channel	Frequency (MHz)	Result(dBm)		*Total Power (dBm)	Limit (dBm)
		Chain 0	Chain 1		
Low	2412	9.32	8.29	11.85	30.0
Middle	2437	8.71	8.57	11.65	30.0
High	2462	8.40	8.34	11.38	30.0

Note(s):

The following equation was used for Power Meter offset:

Power Meter offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

Directional gain = Gant + 10log(Nant/Nss) dBi = 3.29 + 10log(2/2) = 3.29 dBi < 6 dBi

**Total power = 10 log [10^(Chain 0 Power/10) + 10^(Chain 1 Power/10)]*

8.5 Power Spectral Density (average)

FCC §15.247(e) / IC RSS-247 Issue 1, 5.2(2)

Test Mode : Lowest channel, Middle channel and Highest channel

802.11b mode

Chain 0

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-3.74	8	11.74
Middle	2438	-3.93	8	11.93
High	2464	-4.26	8	12.26

Chain 1

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.44	8	12.44
Middle	2438	-4.29	8	12.29
High	2464	-4.07	8	12.07

802.11g mode

Chain 0

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.26	8	17.26
Middle	2438	-9.30	8	17.30
High	2464	-4.26	8	12.26

Chain 1

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-9.49	8	17.49
Middle	2438	-9.80	8	17.80
High	2464	-9.39	8	17.39

802.11n(HT20) mode

Chain 0 + Chain 1

Channel	Frequency (MHz)	Result(dBm)		*Total Power Spectral Density (dBm)	Limit (dBm)
		Chain 0	Chain 1		
Low	2412	-10.71	-11.51	-8.08	8.0
Middle	2437	-10.68	-10.97	-7.81	8.0
High	2462	-10.94	-11.47	-8.19	8.0

802.11n(HT40) mode

Chain 0 + Chain 1

Channel	Frequency (MHz)	Result(dBm)		*Total Power Spectral Density (dBm)	Limit (dBm)
		Chain 0	Chain 1		
Low	2412	-15.84	-16.43	-13.11	8.0
Middle	2437	-15.70	-15.94	-12.81	8.0
High	2462	-16.01	-15.72	-12.85	8.0

Note(s):

The following equation was used for spectrum offset for Power Spectral Density:

Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

Directional gain = Gant + 10log(Nant/Nss) dBi = 3.29 + 10log(2/2) = 3.29 dBi < 6 dBi

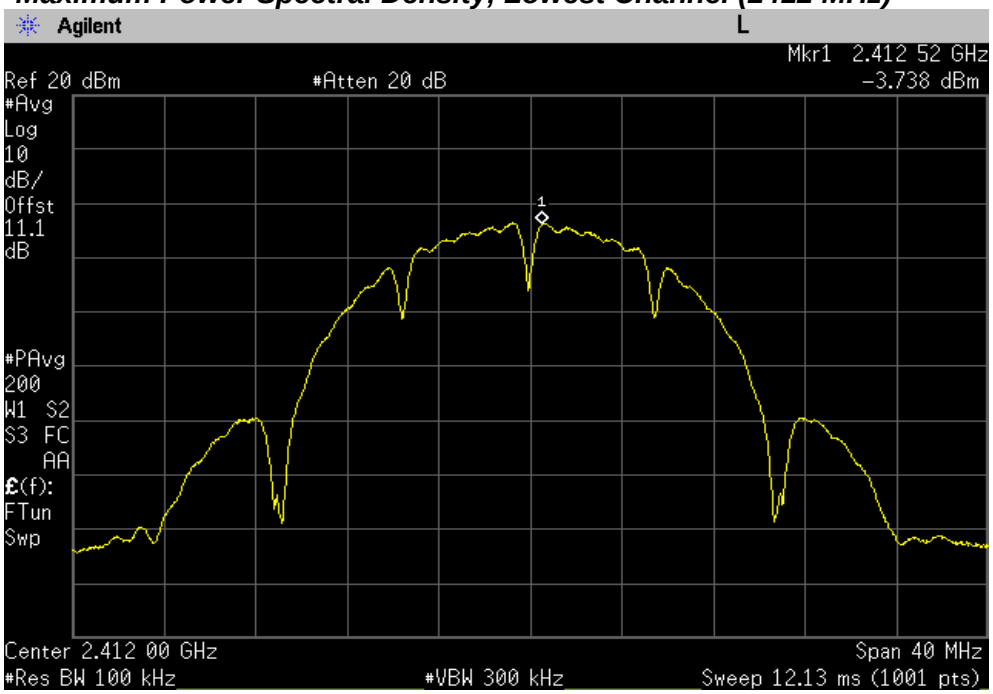
**Total power Spectral Dansity = 10 log [10^(Chain 0 Power density/10) + 10^(Chain 1 Power density/10)]*

PLOT OF TEST DATA

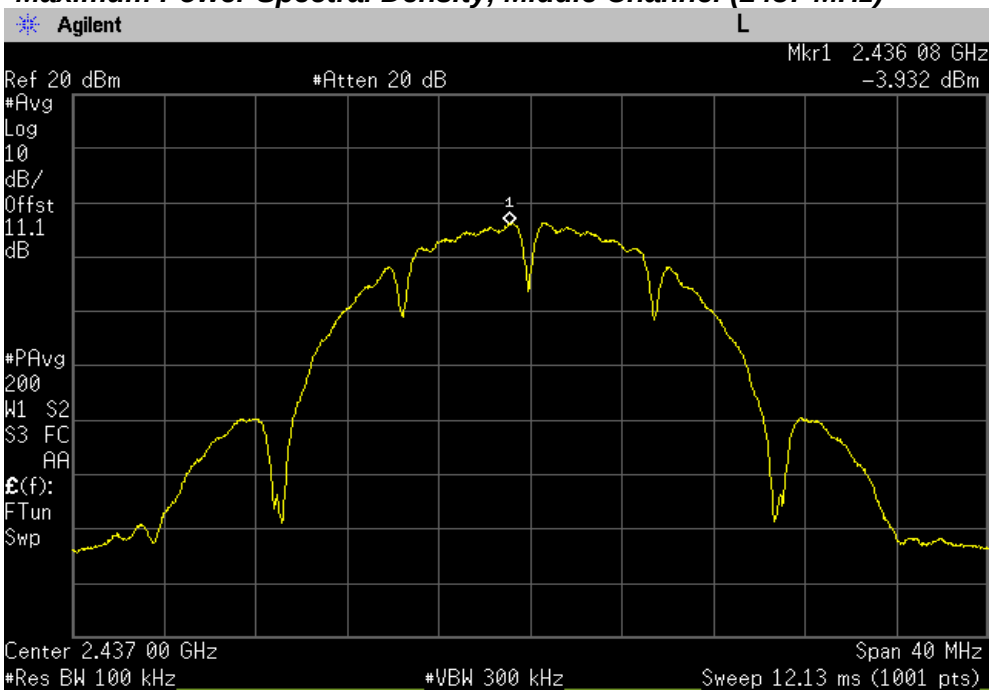
802.11b mode

Chain 0

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

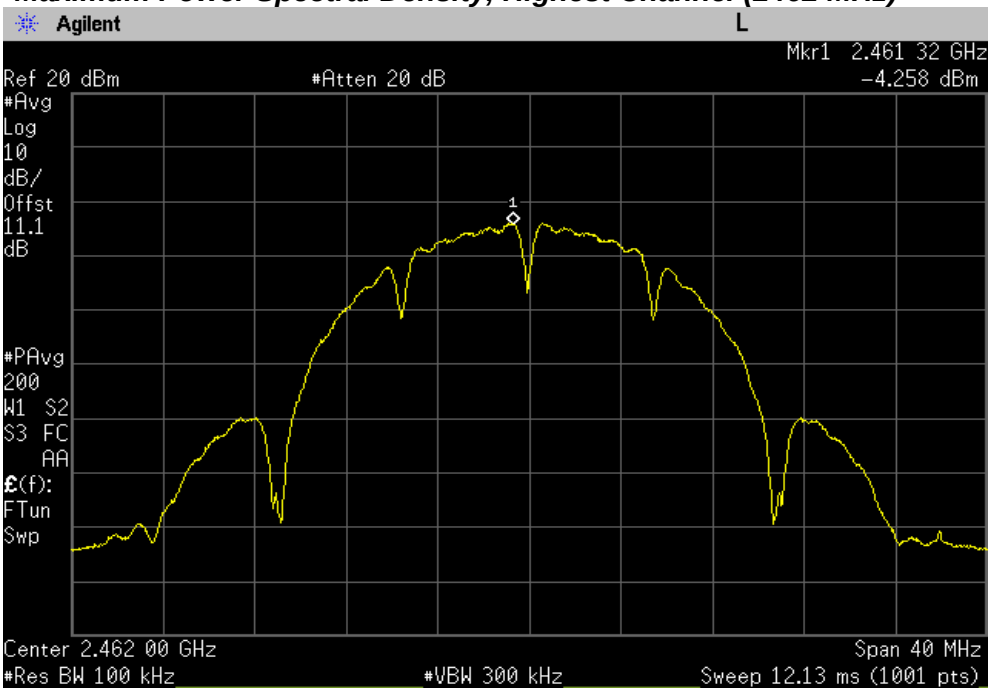


Maximum Power Spectral Density, Middle Channel (2437 MHz)



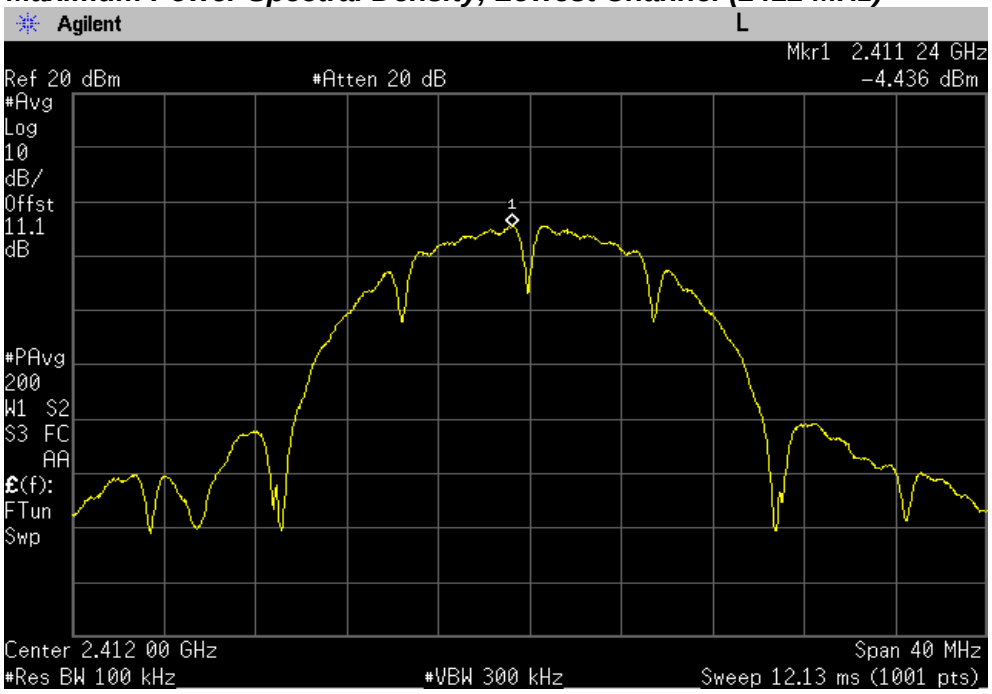
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2462 MHz)



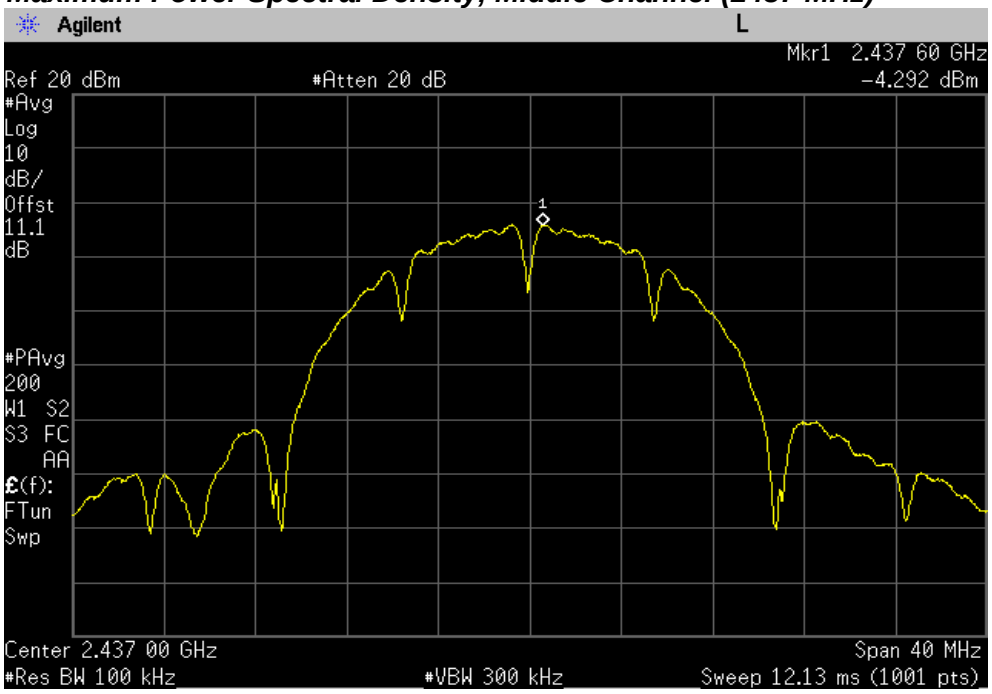
Chain 1

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

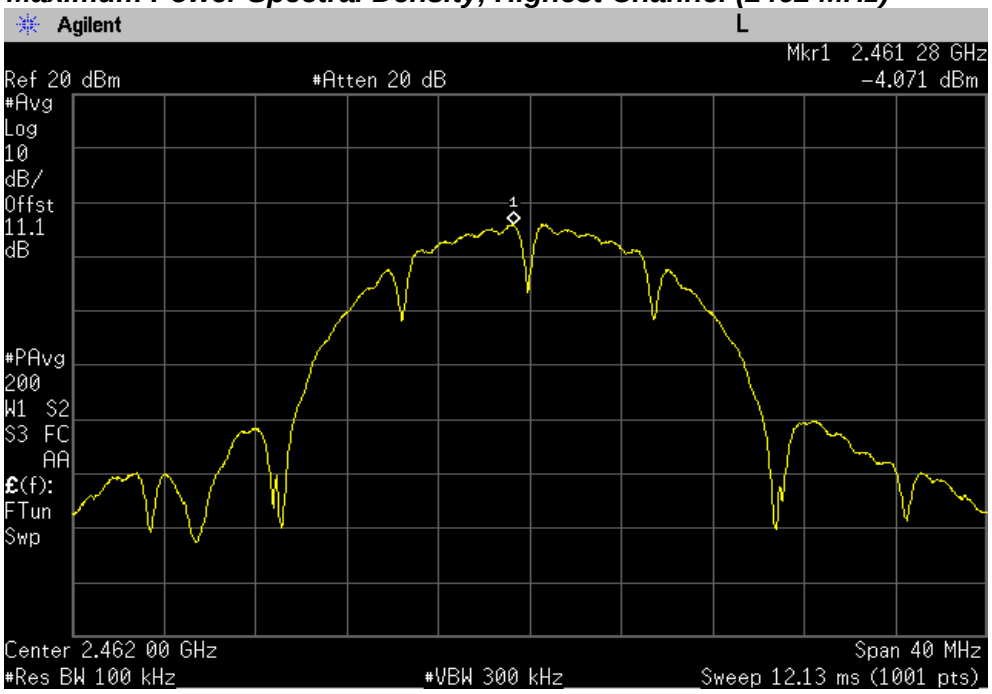


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2462 MHz)

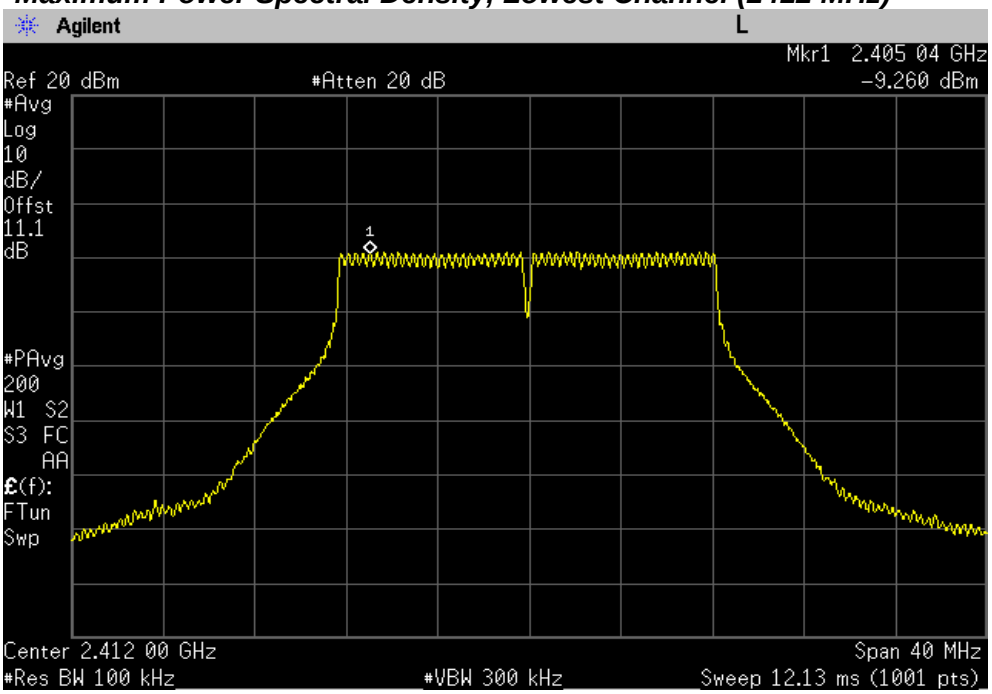


PLOT OF TEST DATA

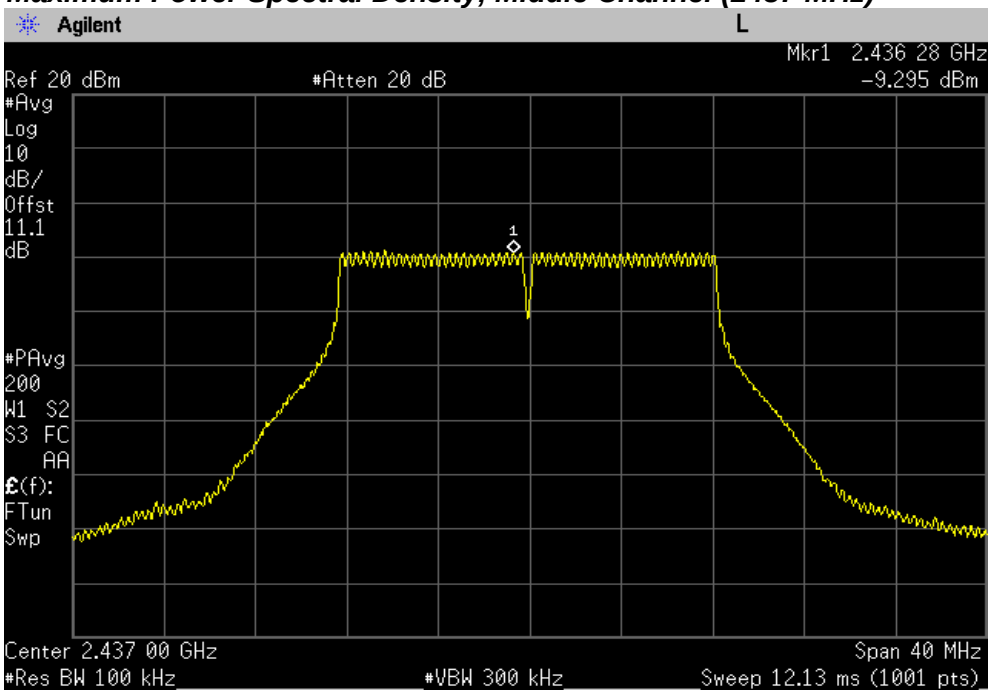
802.11g mode

Chain 0

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

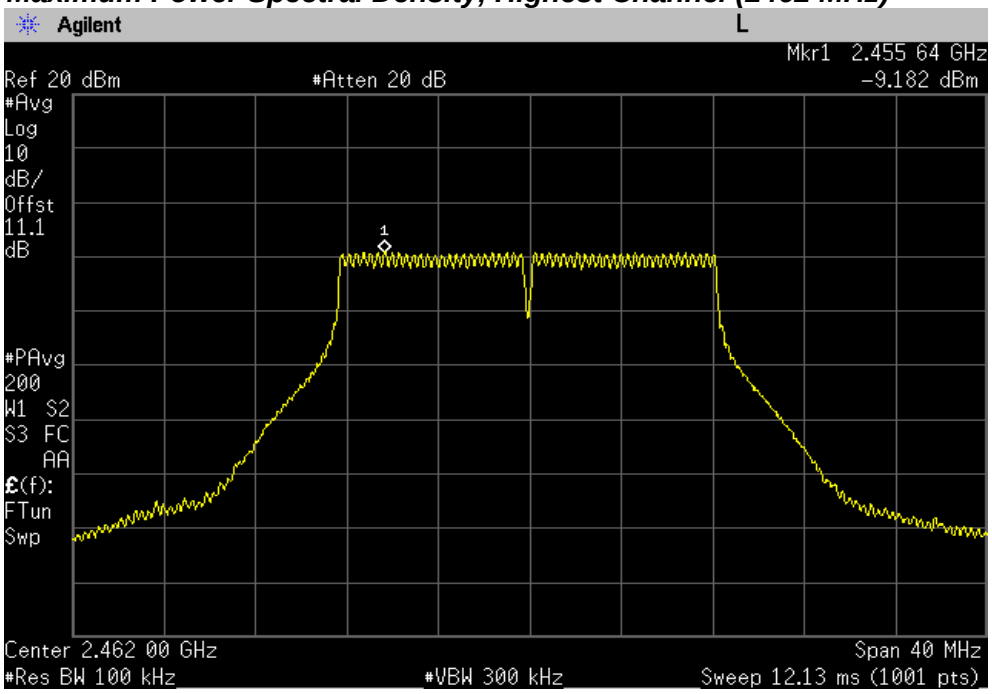


Maximum Power Spectral Density, Middle Channel (2437 MHz)



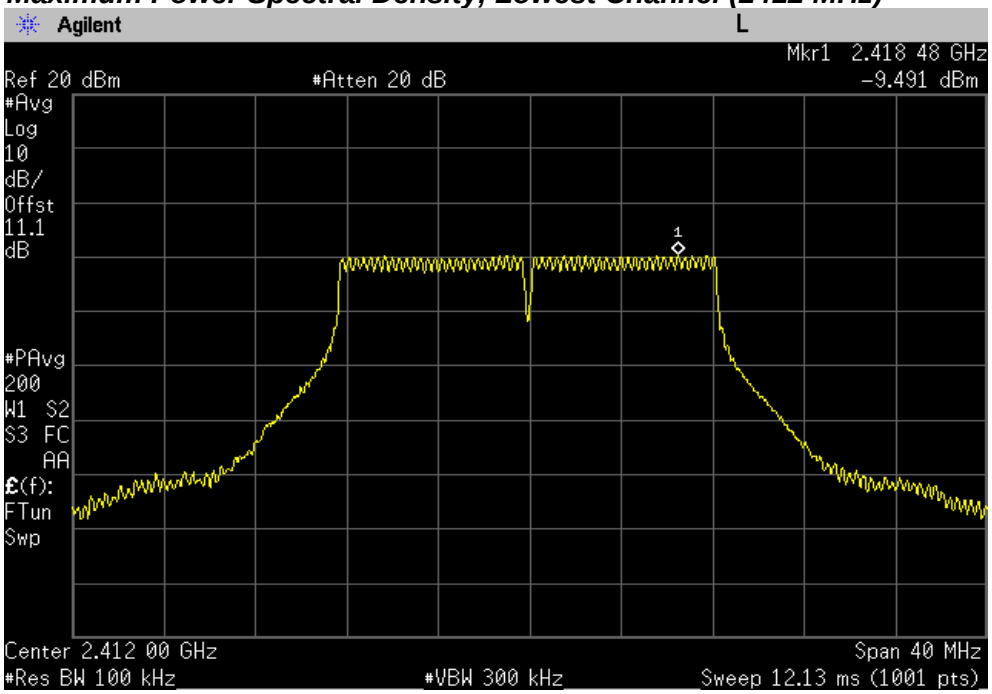
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2462 MHz)



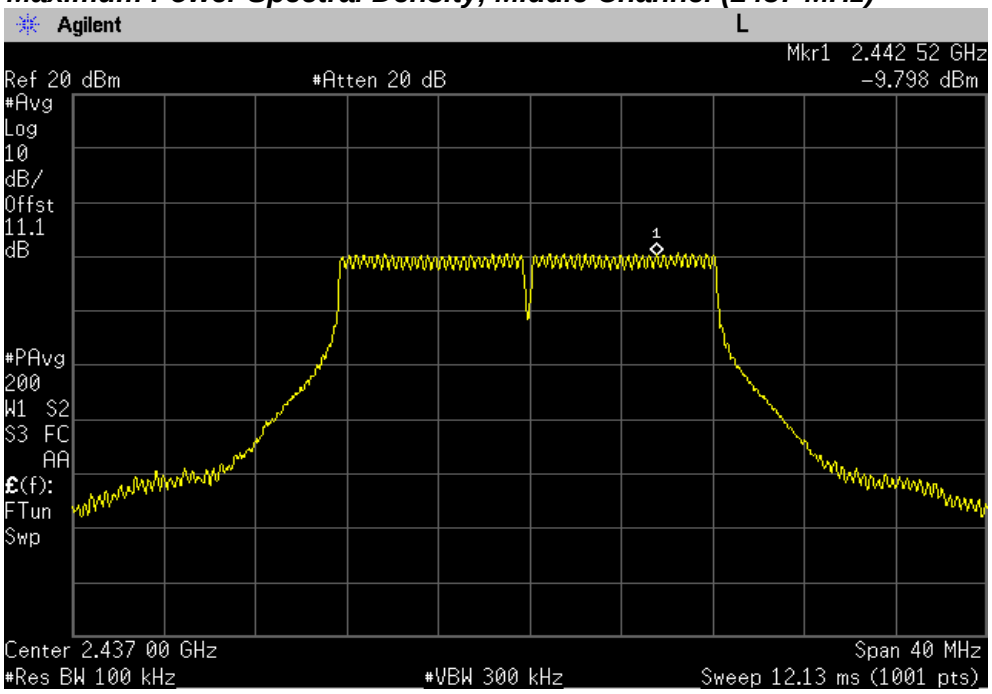
Chain 1

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

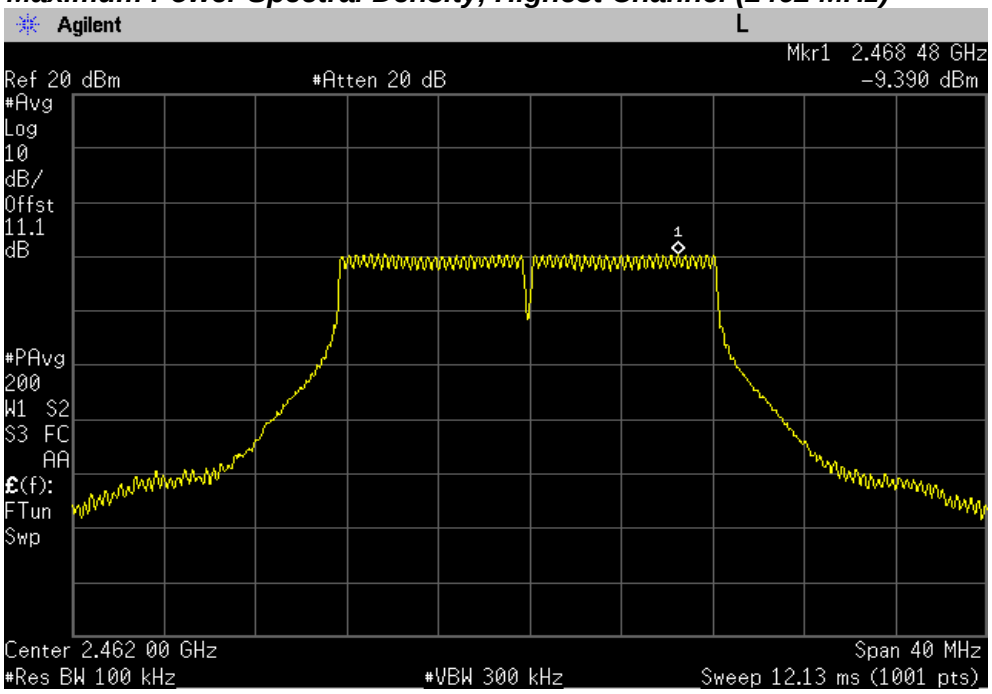


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2462 MHz)

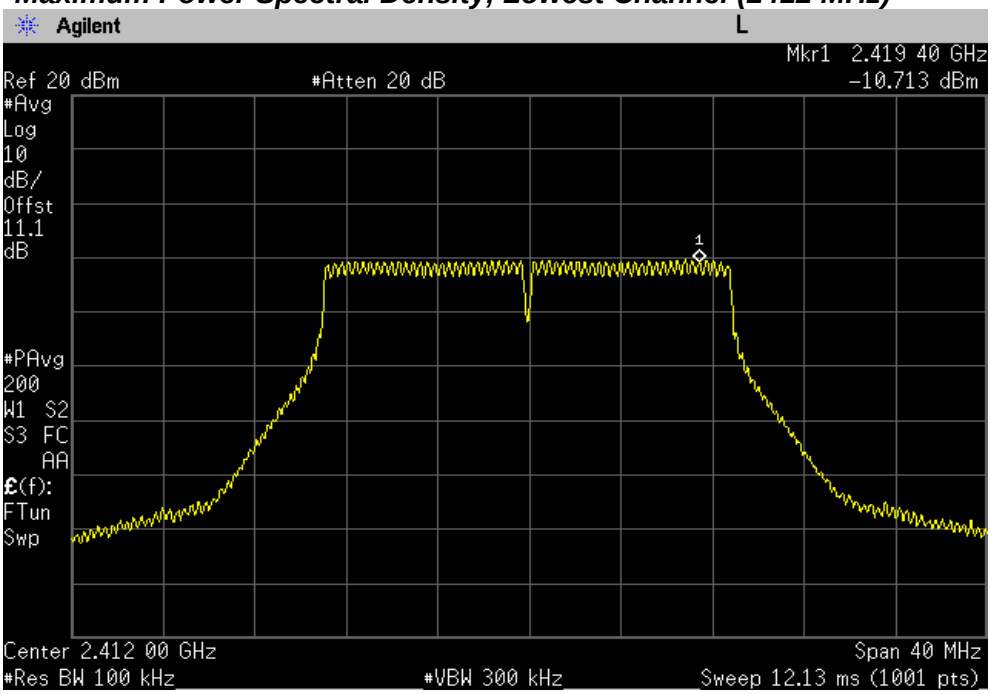


PLOT OF TEST DATA

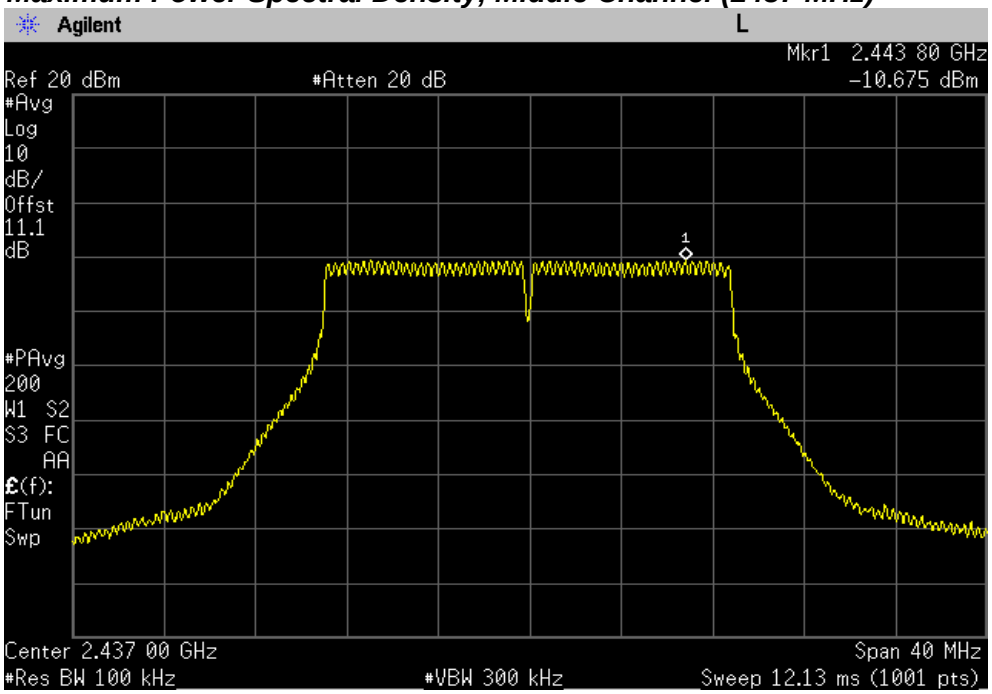
802.11n(HT20) mode

Chain 0

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

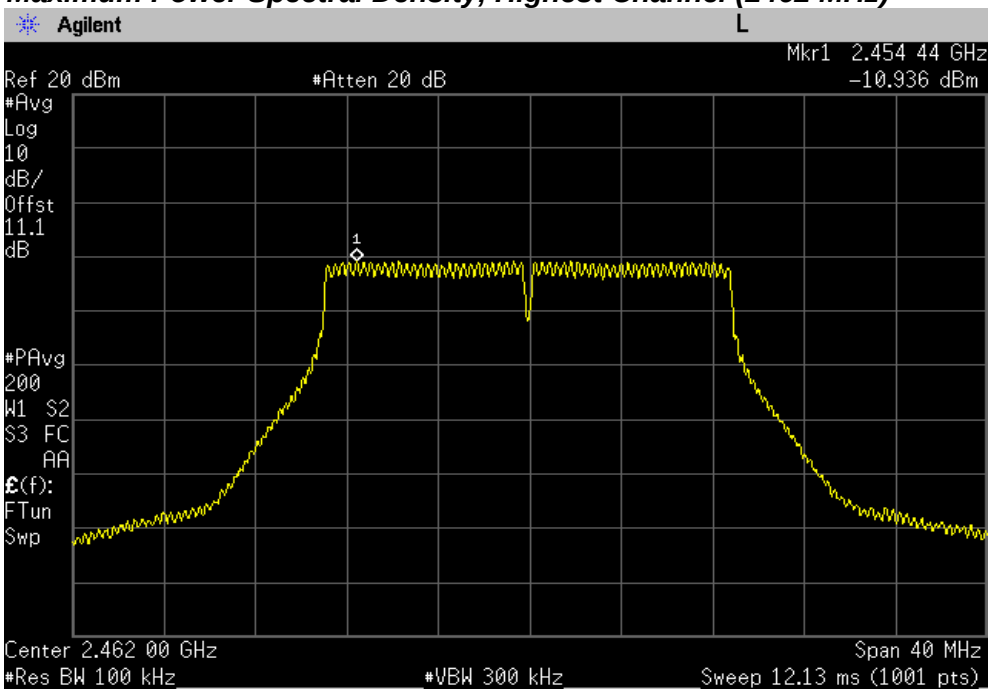


Maximum Power Spectral Density, Middle Channel (2437 MHz)



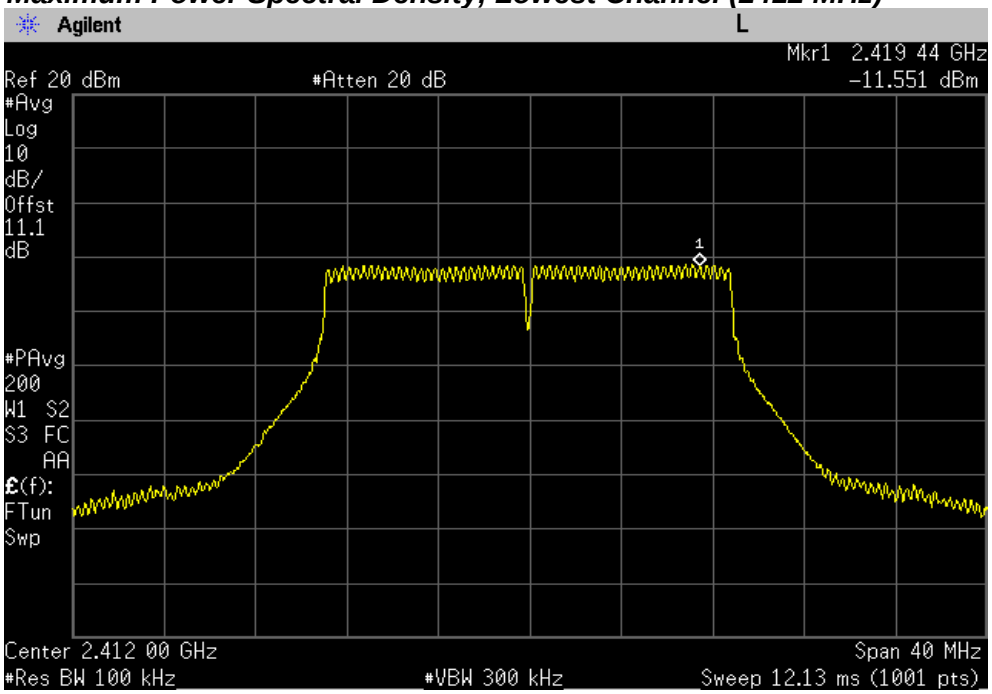
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2462 MHz)



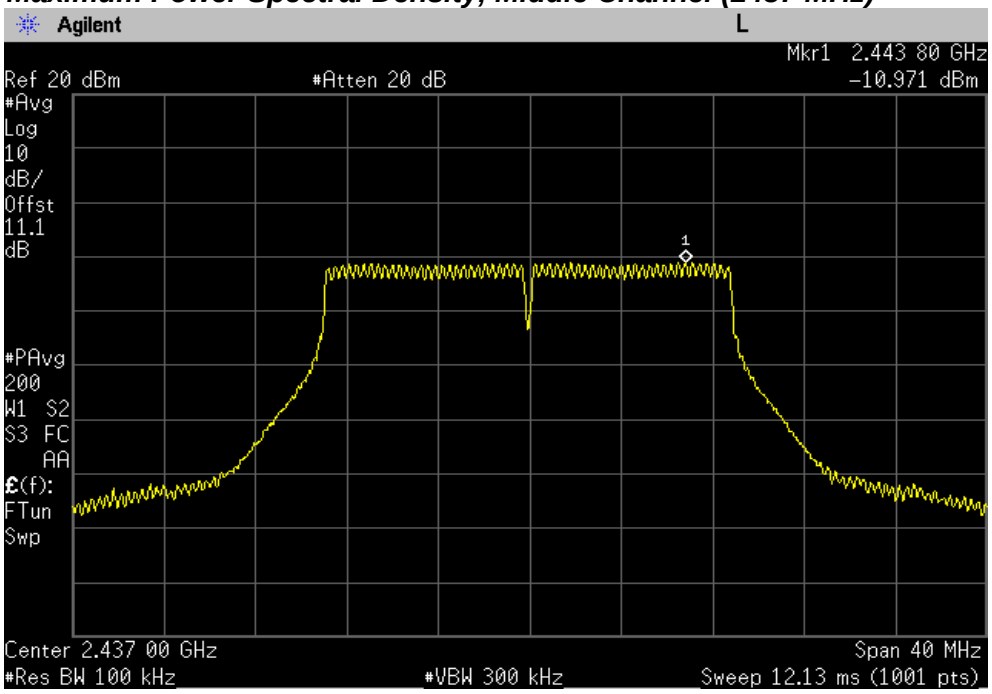
Chain 1

Maximum Power Spectral Density, Lowest Channel (2412 MHz)

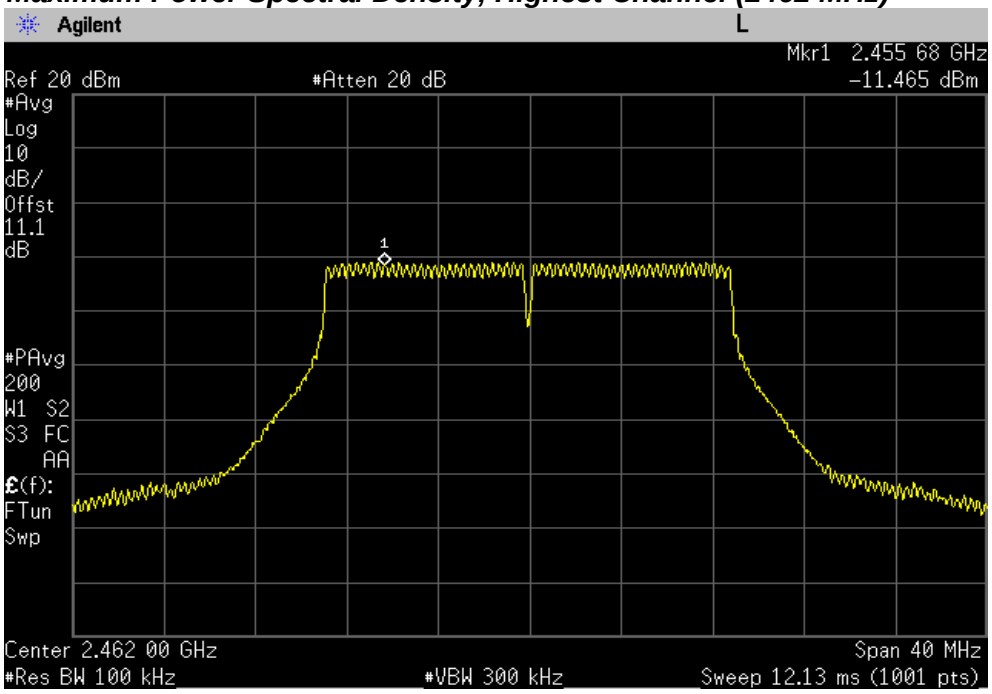


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2462 MHz)

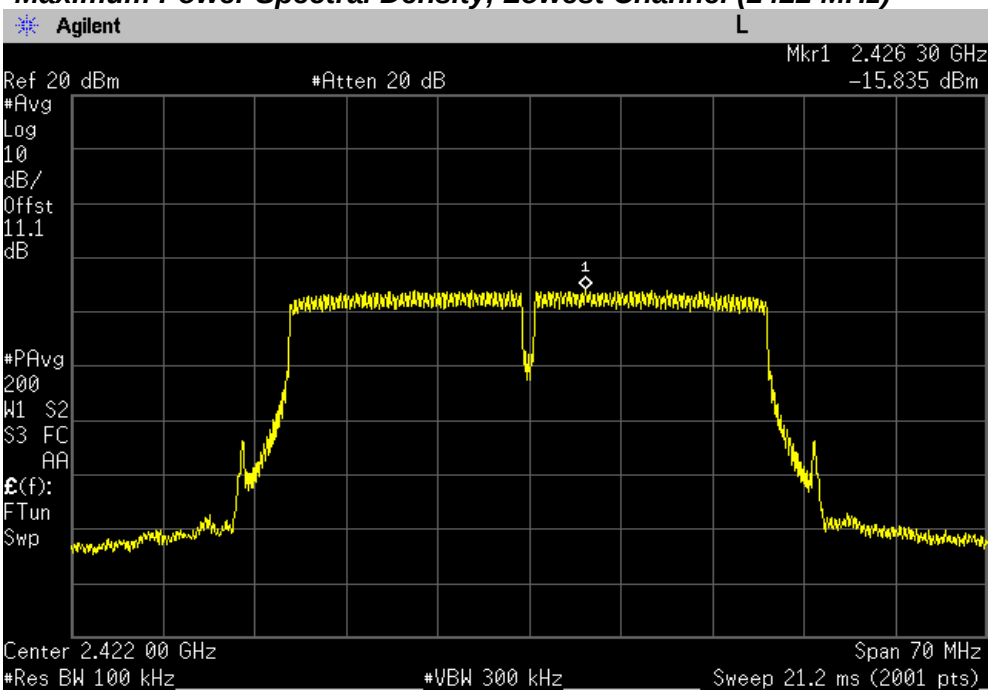


PLOT OF TEST DATA

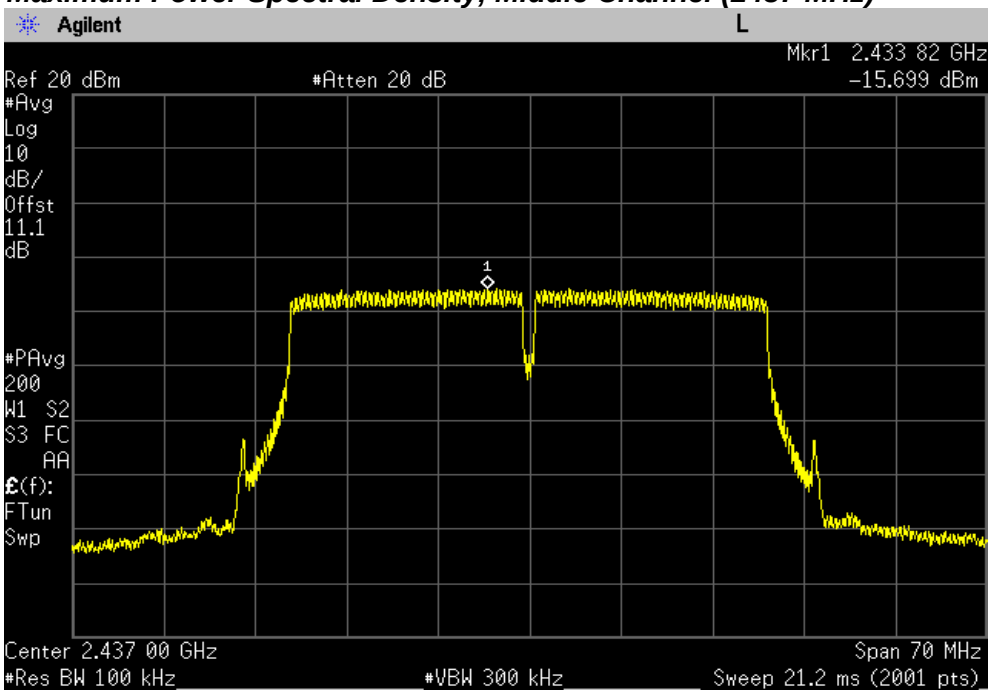
802.11n(HT40) mode

Chain 0

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

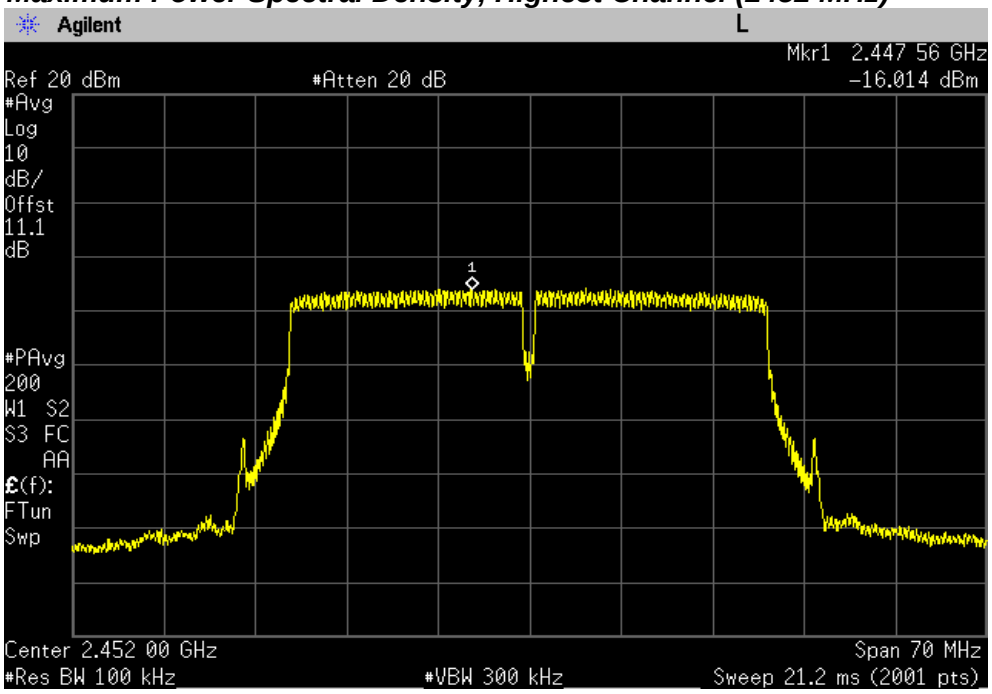


Maximum Power Spectral Density, Middle Channel (2437 MHz)



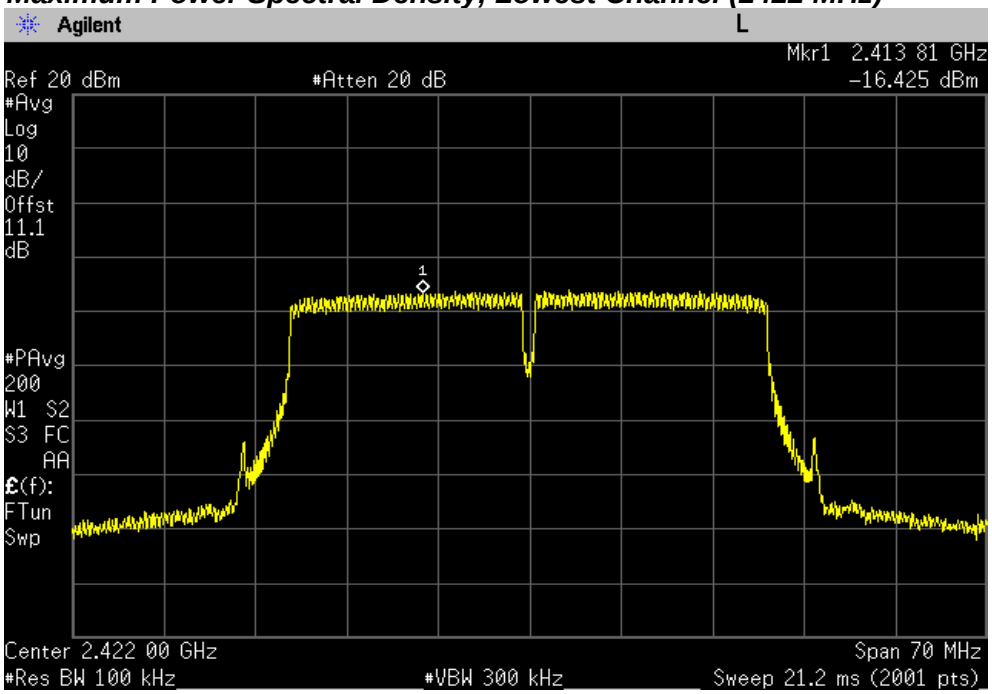
PLOT OF TEST DATA

Maximum Power Spectral Density, Highest Channel (2452 MHz)



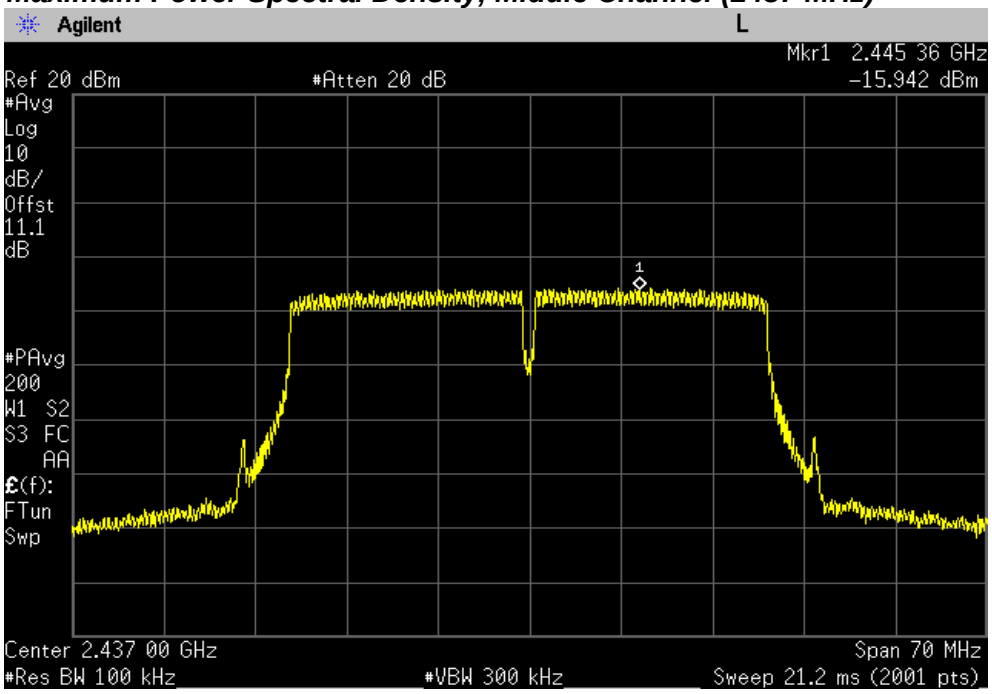
Chain 1

Maximum Power Spectral Density, Lowest Channel (2422 MHz)

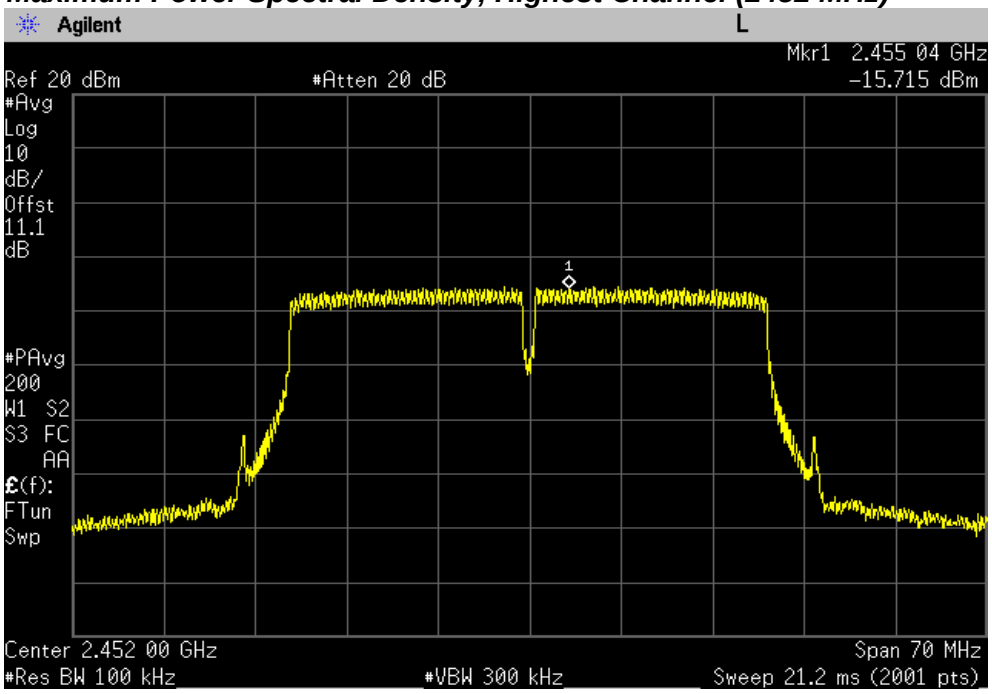


PLOT OF TEST DATA

Maximum Power Spectral Density, Middle Channel (2437 MHz)



Maximum Power Spectral Density, Highest Channel (2452 MHz)



8.6 Conducted Spurious Emissions

FCC §15.247(d) / IC RSS-247 Issue 1, 5.5

Test Mode: Lowest channel, Middle channel and Highest channel

802.11b mode

Chain 0 and Chain 1

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	4.45	4.33	More than 30 dBc	30
Middle	2437	4.12	3.86	More than 30 dBc	30
High	2462	4.01	4.02	More than 30 dBc	30

802.11g mode

Chain 0 and Chain 1

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	-2.95	-3.01	More than 30 dBc	30
Middle	2437	-3.04	-3.05	More than 30 dBc	30
High	2462	-3.49	-2.93	More than 30 dBc	30

802.11n(HT20) mode

Chain 0 and Chain 1

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	-3.68	-3.71	More than 30 dBc	30
Middle	2437	-4.16	-3.28	More than 30 dBc	30
High	2462	-4.50	-3.40	More than 30 dBc	30

802.11n(HT40) mode

Chain 0 and Chain 1

Channel	Frequency (MHz)	Reference Level (dBm)		Conducted Spurious Emissions (dBc)	Limit (dBc)
		Chain 0	Chain 1		
Low	2412	-9.20	-8.59	More than 30 dBc	30
Middle	2437	-9.13	-8.31	More than 30 dBc	30
High	2462	-8.06	-7.97	More than 30 dBc	30

Note(s):

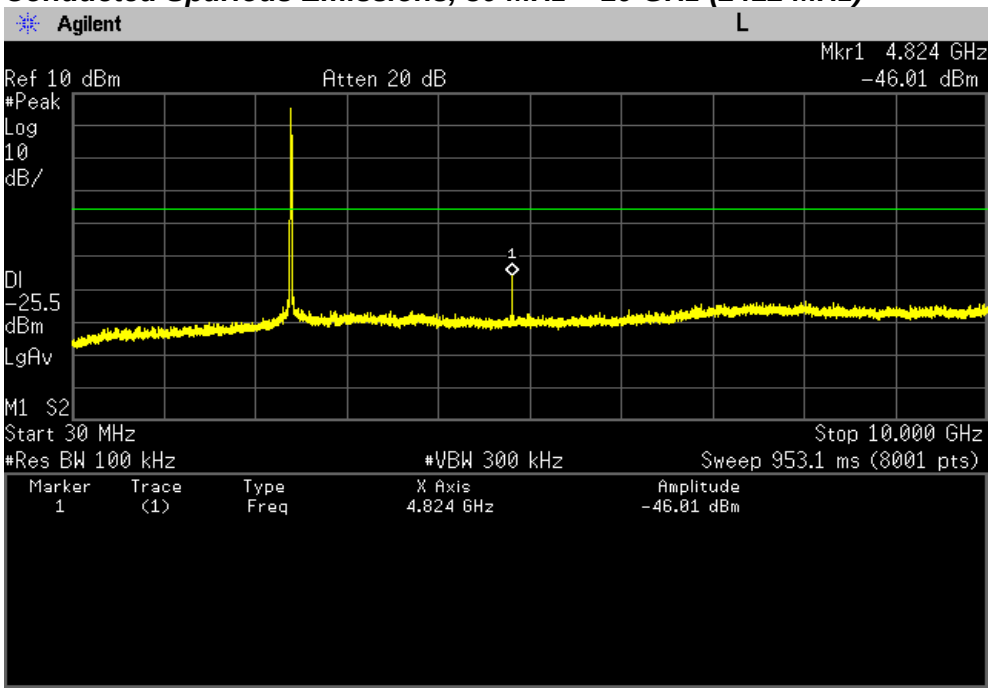
1. *The cable and attenuator loss from 30 MHz to 25 GHz was reflected in spectrum analyzer with correction factor for the spurious emissions test.*
2. *The display line shown in the following plots indicates the limit at 30 dB below the fundamental emission level measured in a 100 kHz bandwidth.*
3. *During the test, the sweep point was set 8001 for the conducted spurious emissions test and 2001 for the Band Edge test.*

PLOT OF TEST DATA

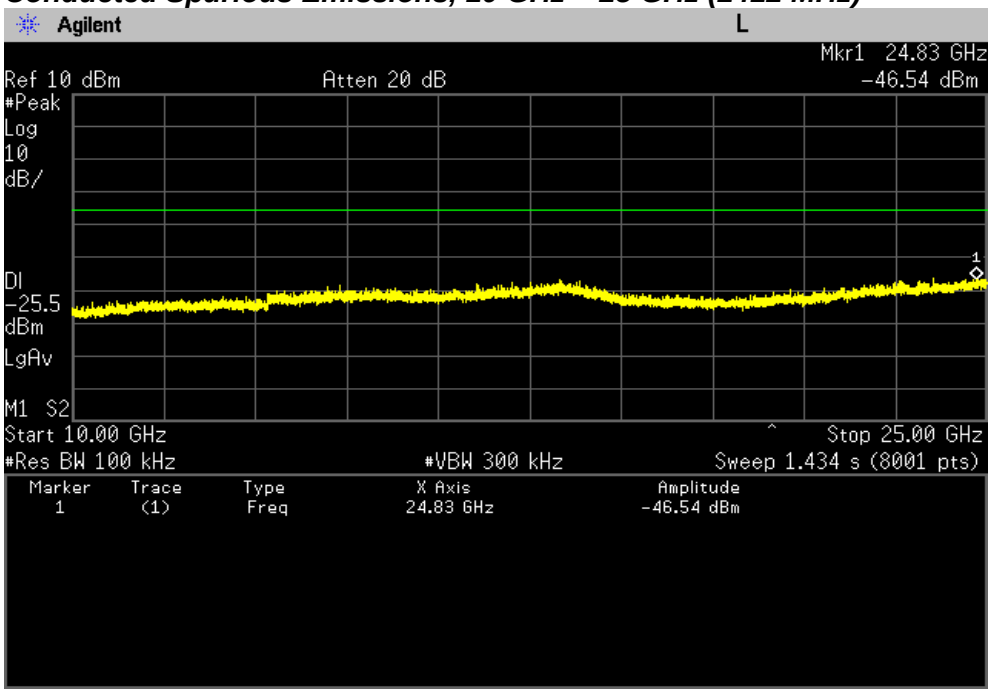
802.11b mode

Chain 0

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

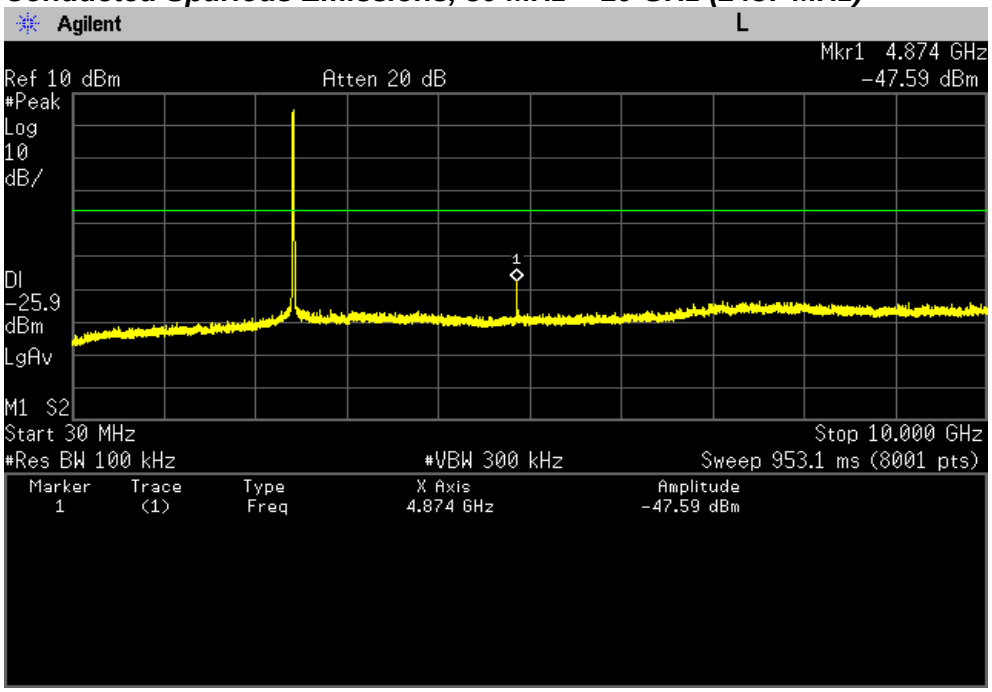


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

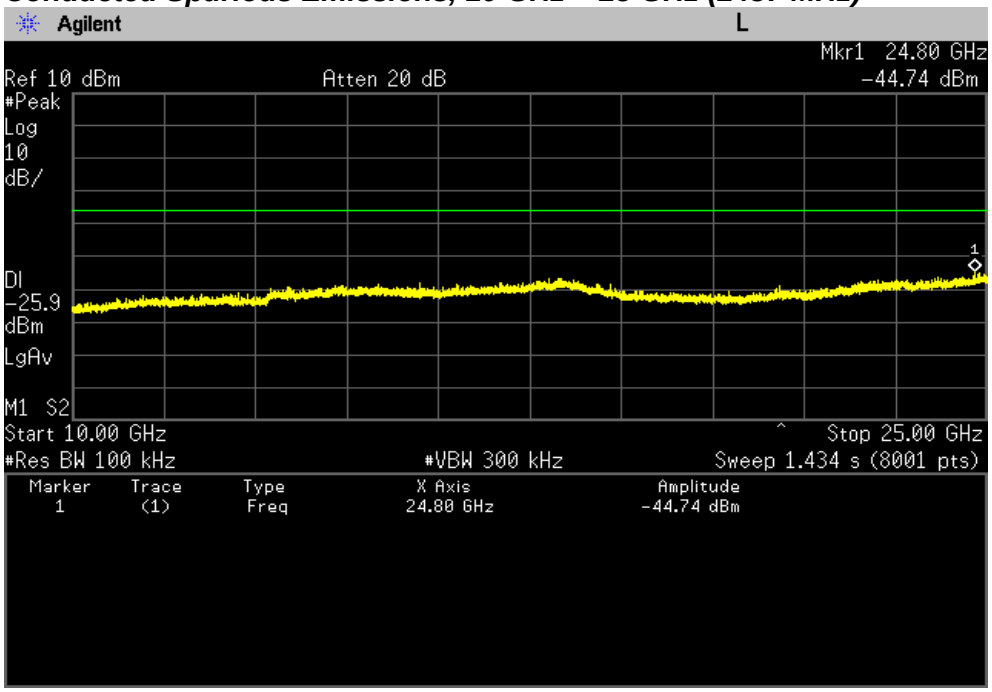


PLOT OF TEST DATA

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

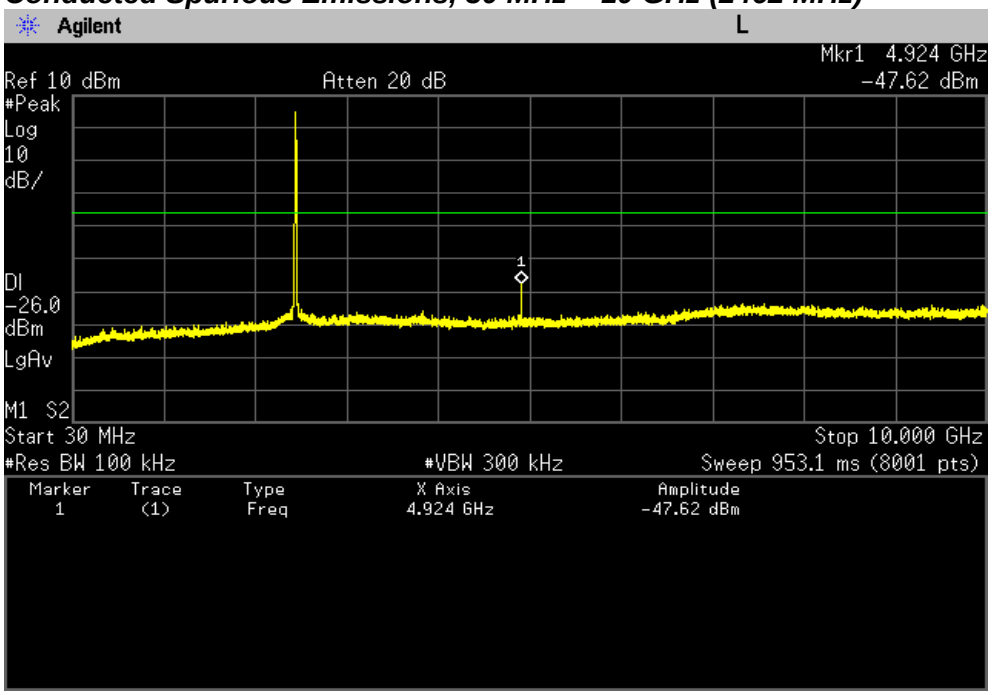


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

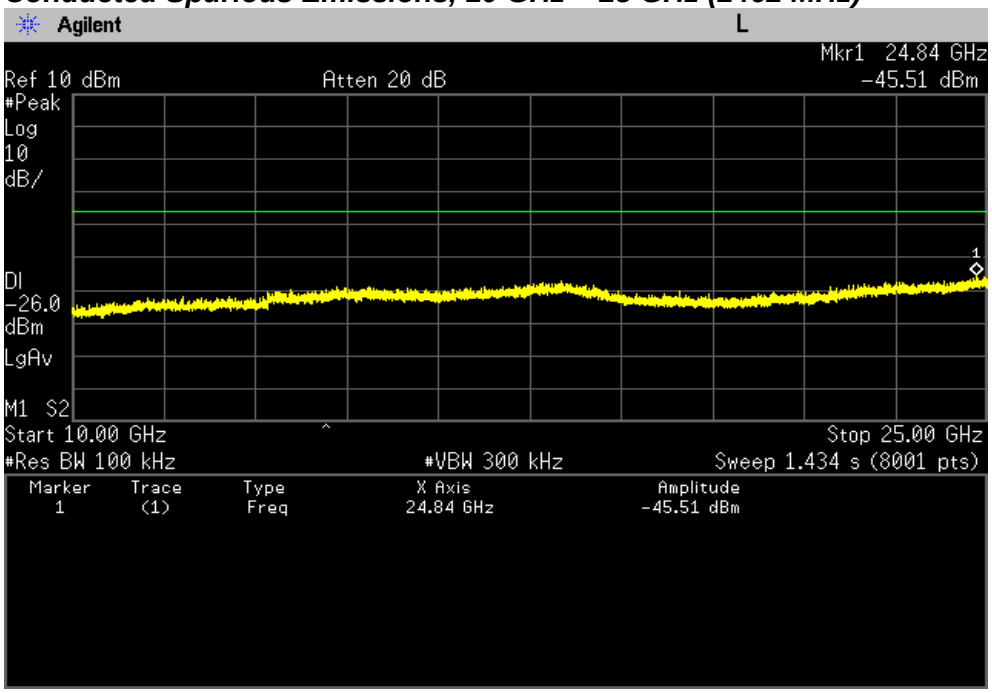


PLOT OF TEST DATA

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



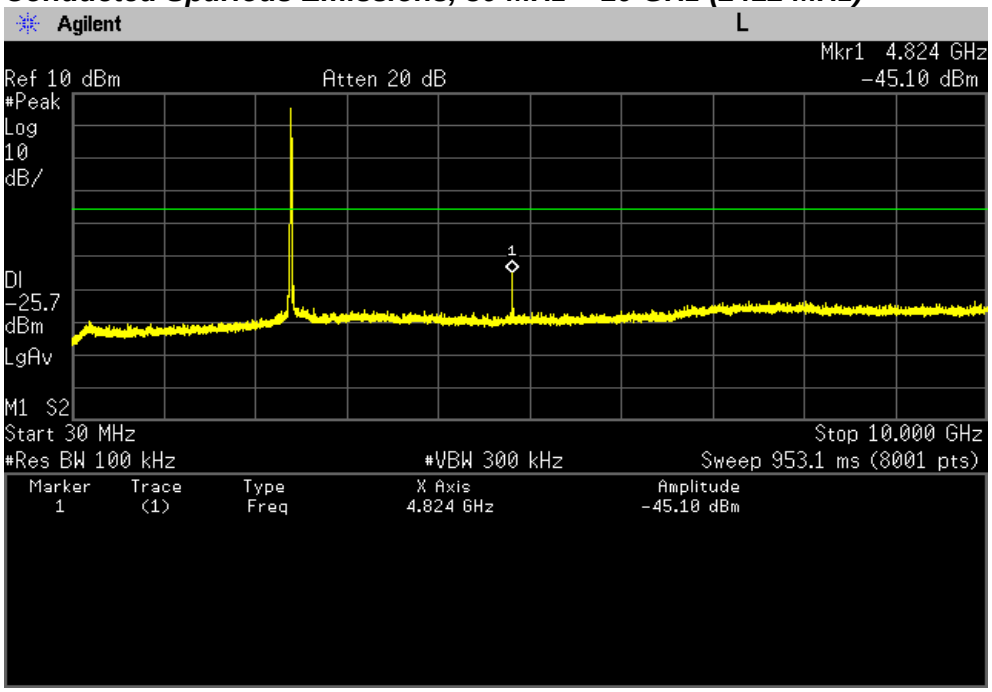
Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2462 MHz)



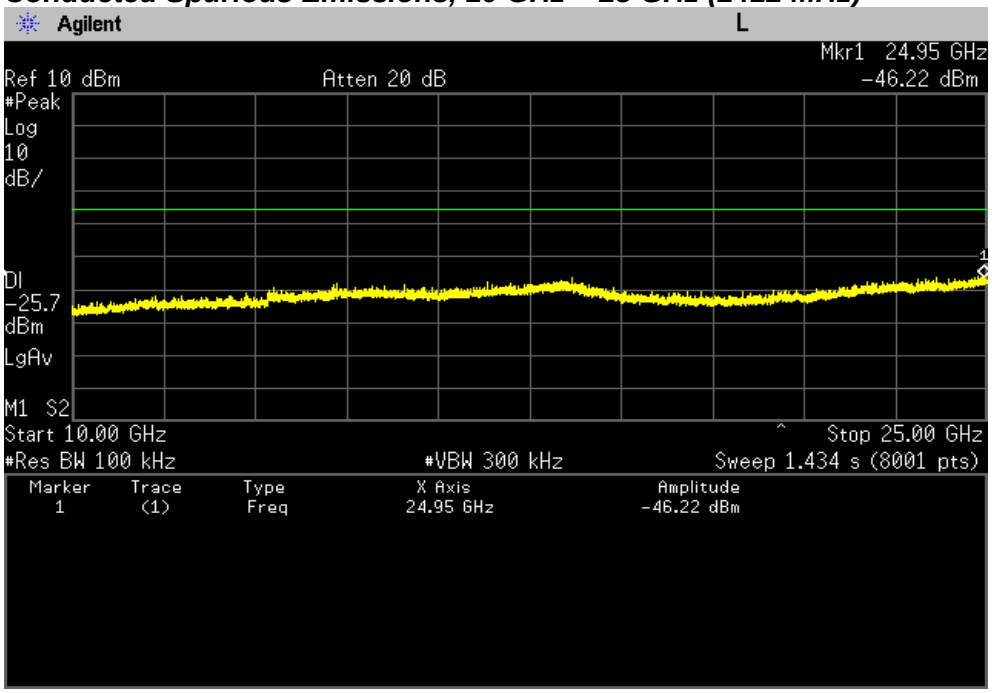
PLOT OF TEST DATA

Chain 1

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

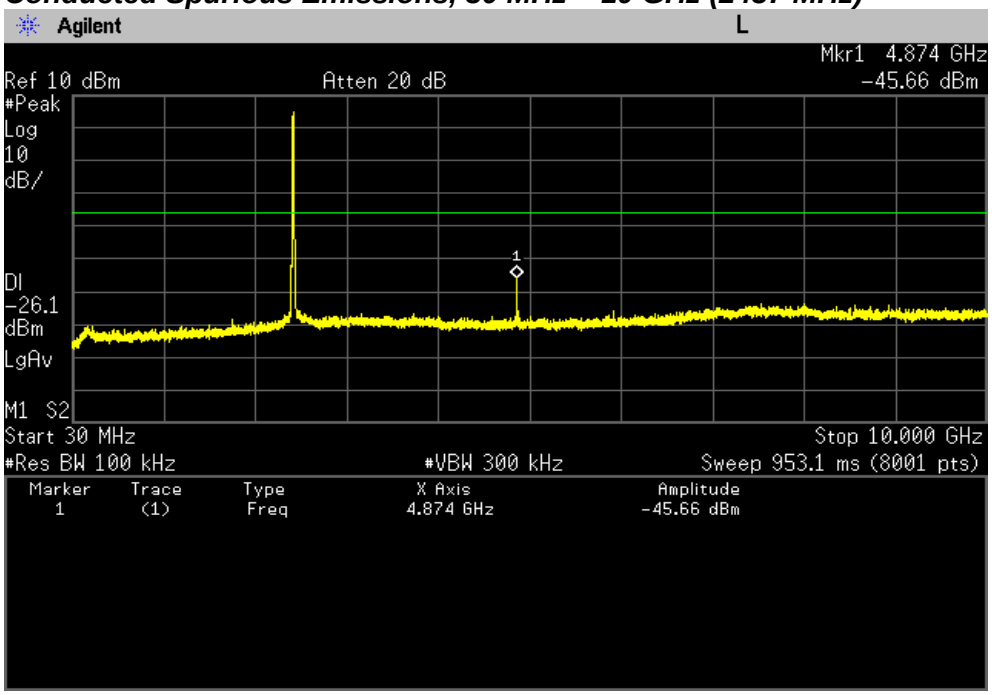


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

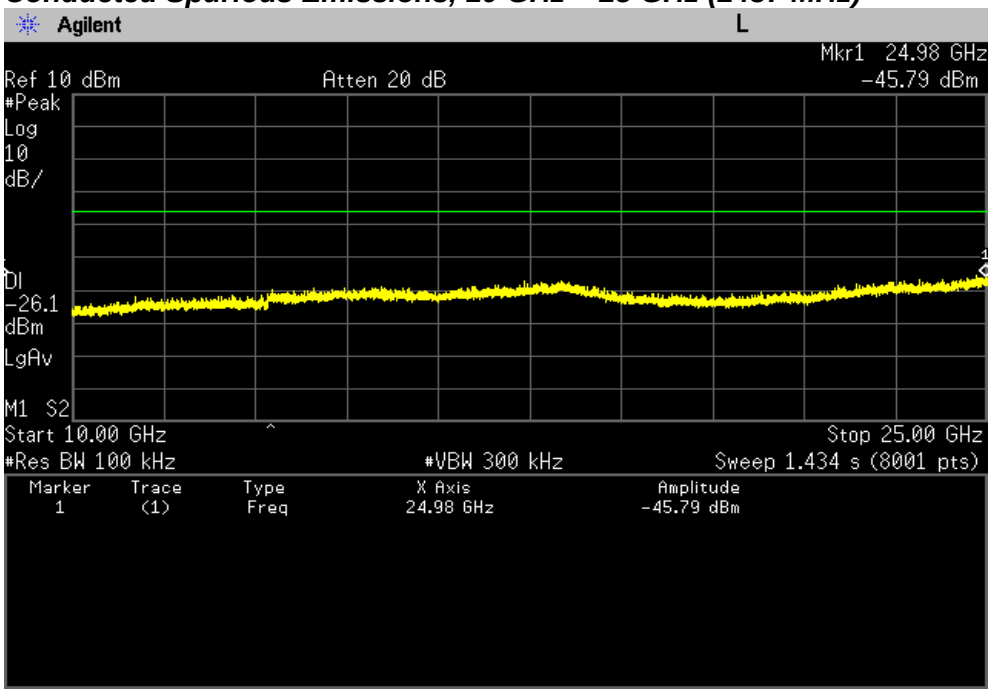


PLOT OF TEST DATA

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

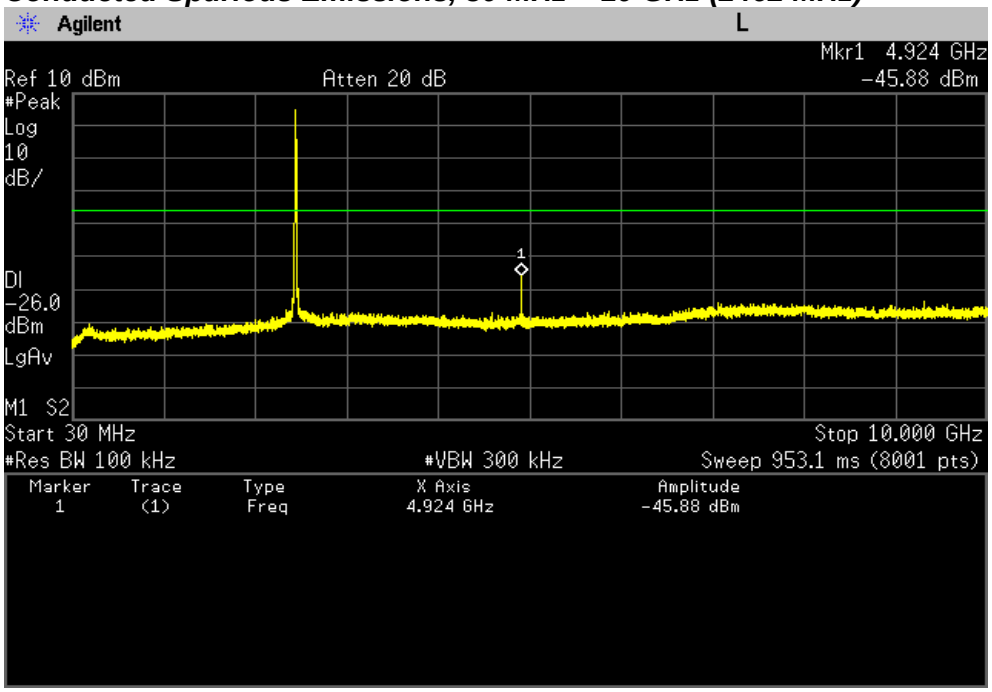


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

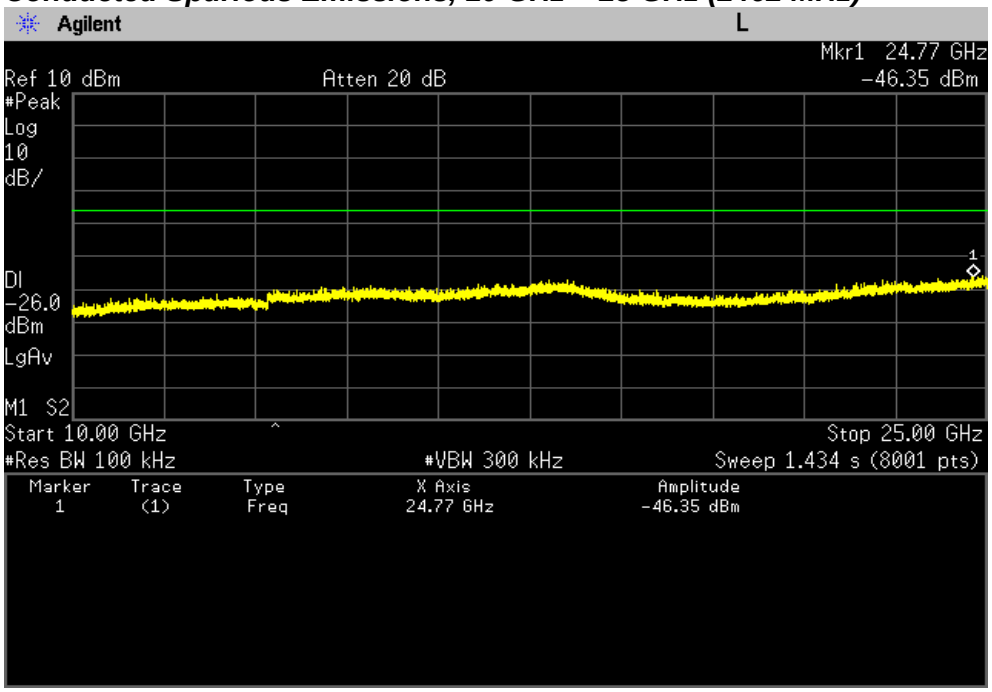


PLOT OF TEST DATA

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



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

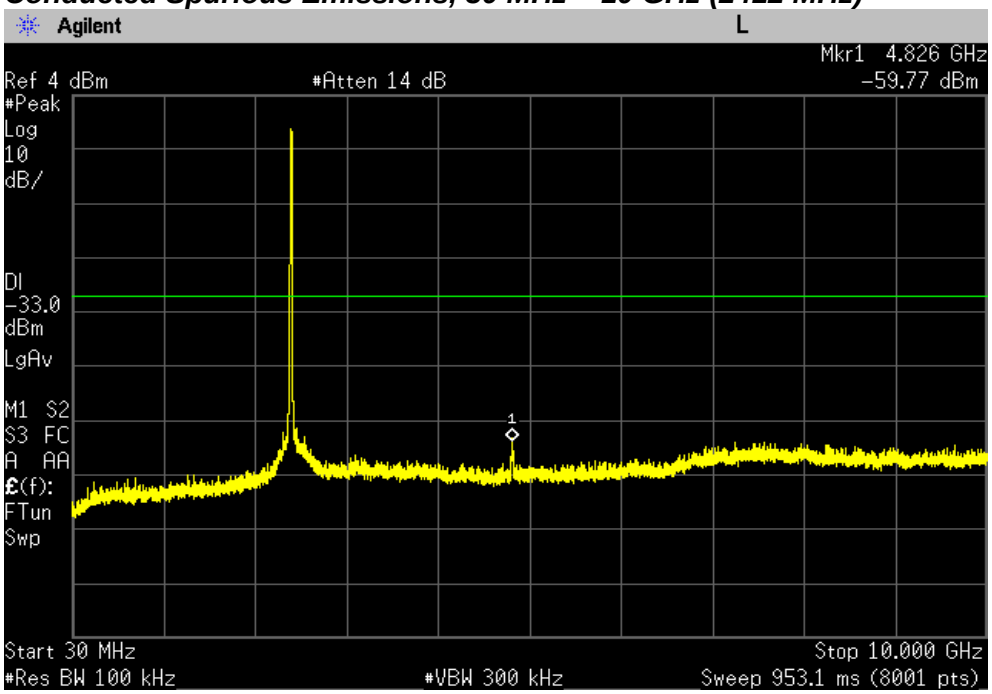


PLOT OF TEST DATA

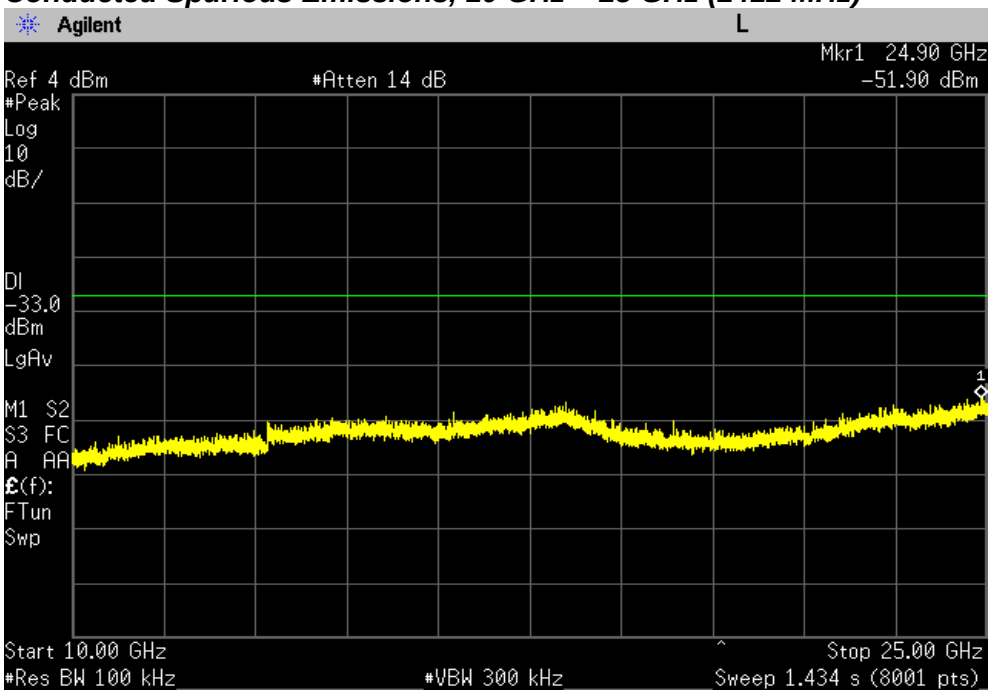
802.11g mode

Chain 0

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

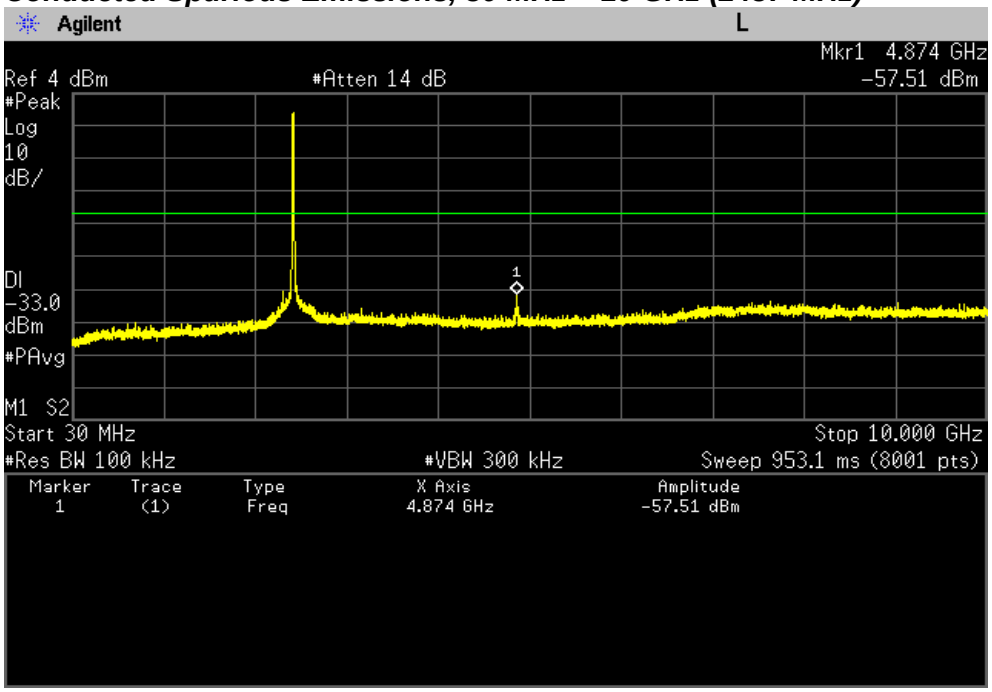


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

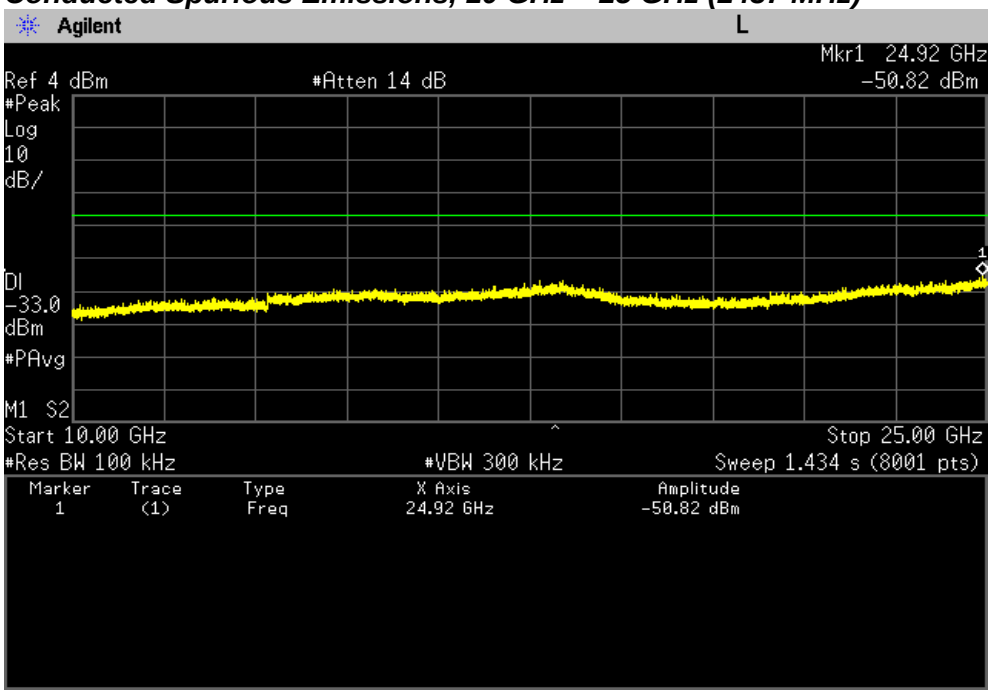


PLOT OF TEST DATA

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

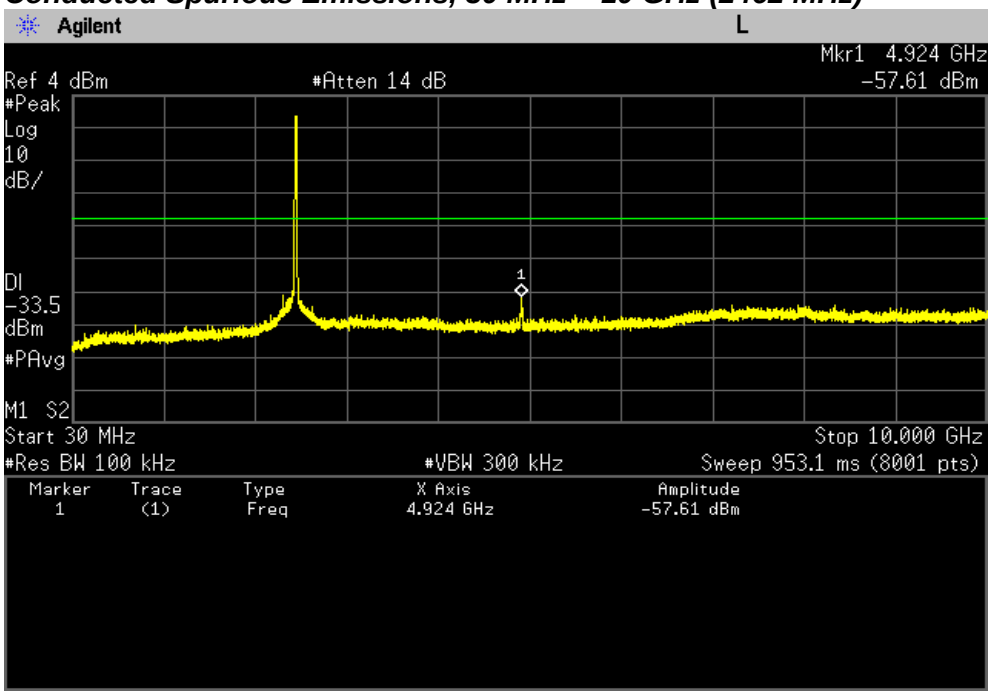


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

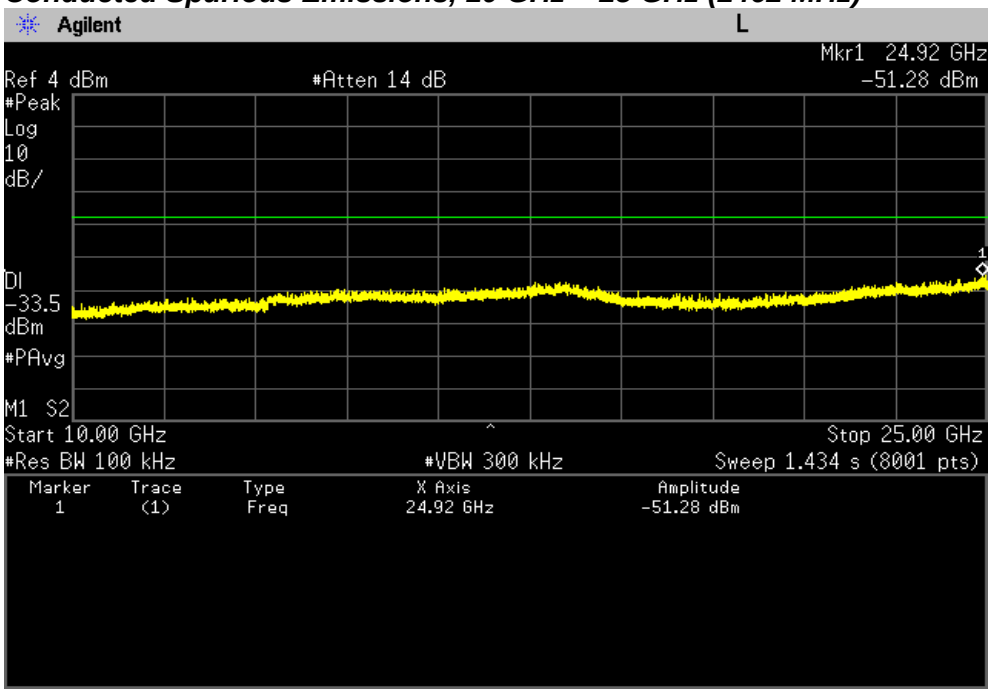


PLOT OF TEST DATA

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



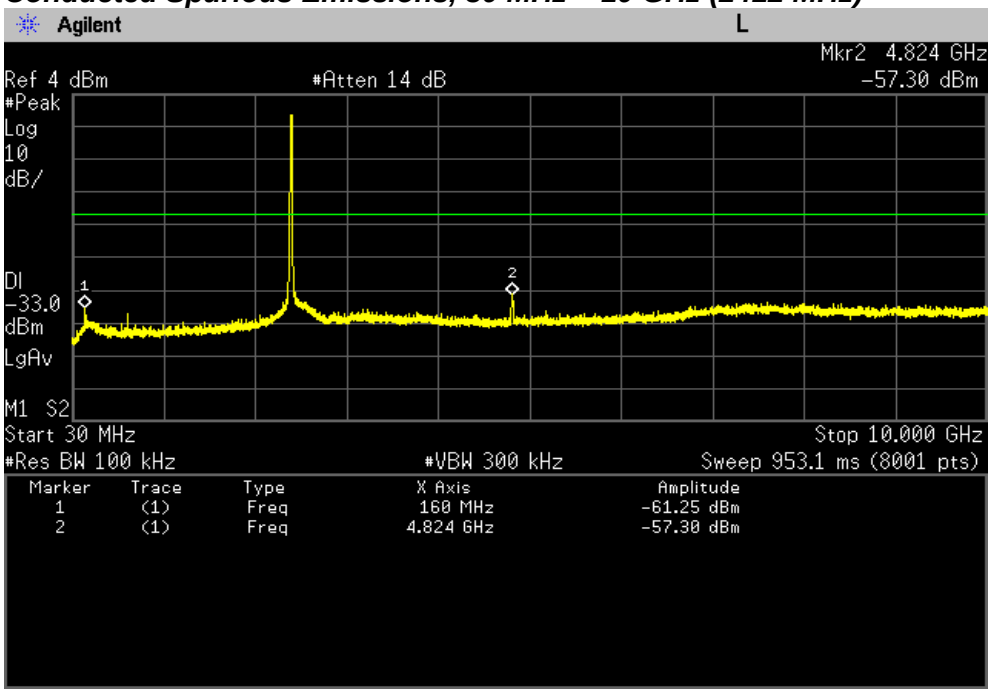
Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2462 MHz)



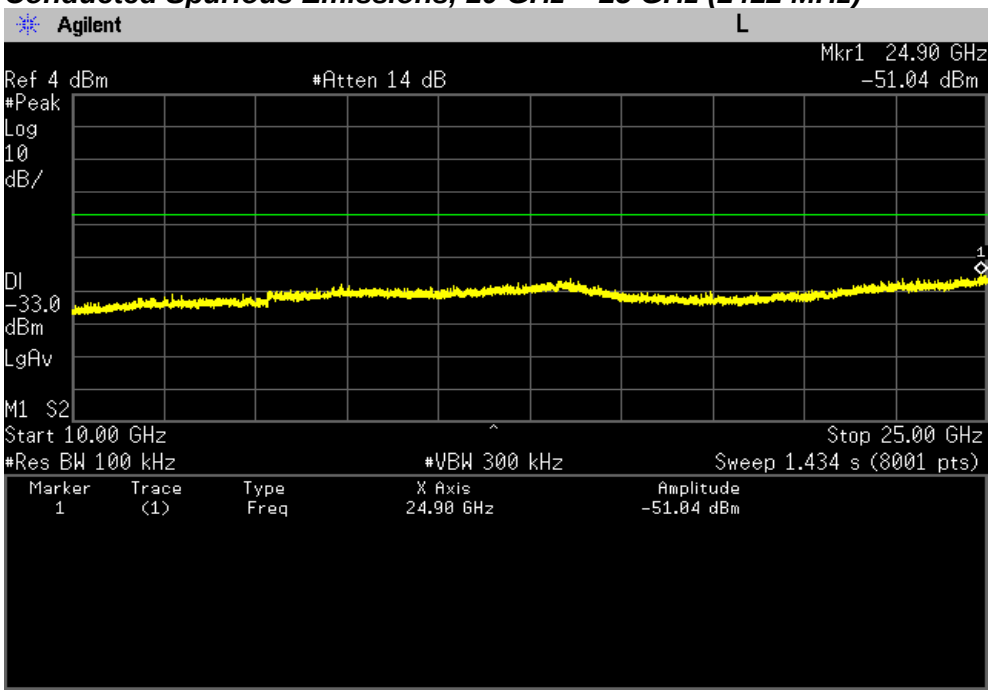
PLOT OF TEST DATA

Chain 1

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

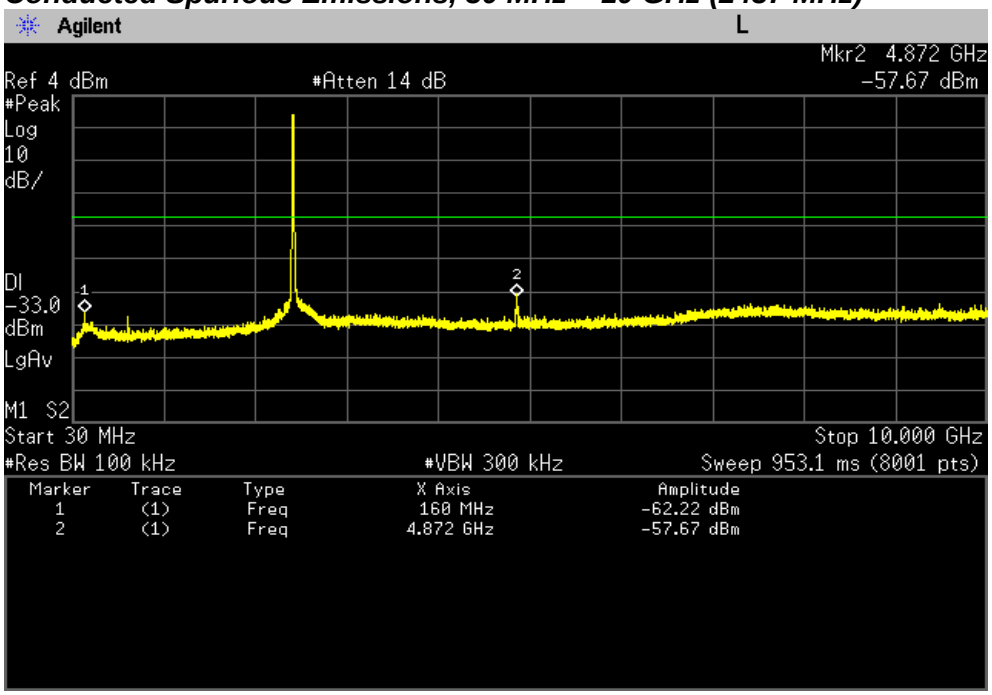


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

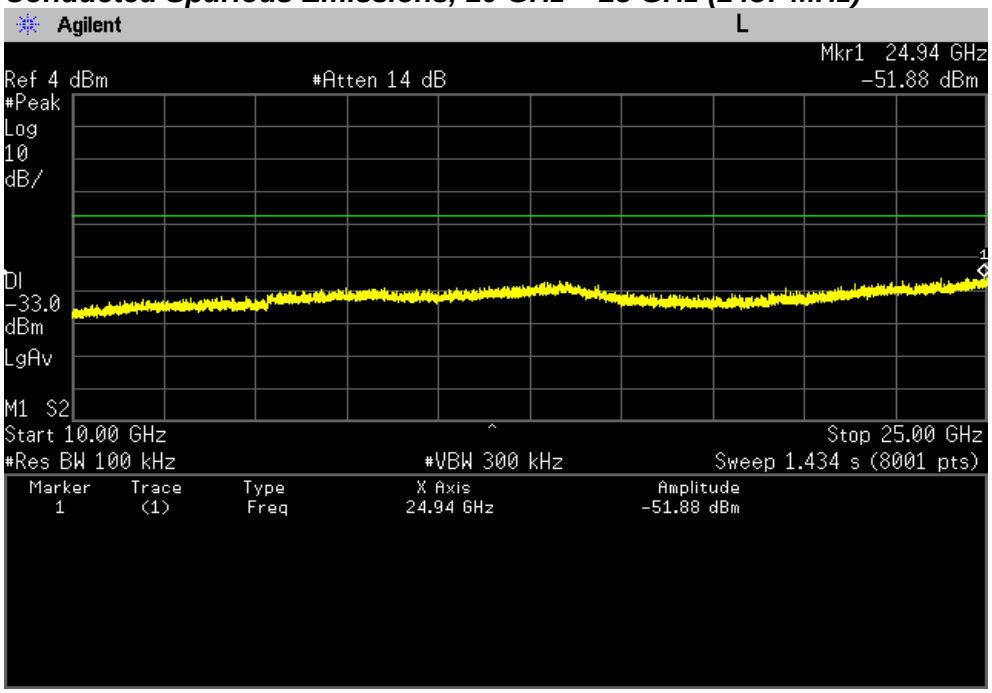


PLOT OF TEST DATA

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

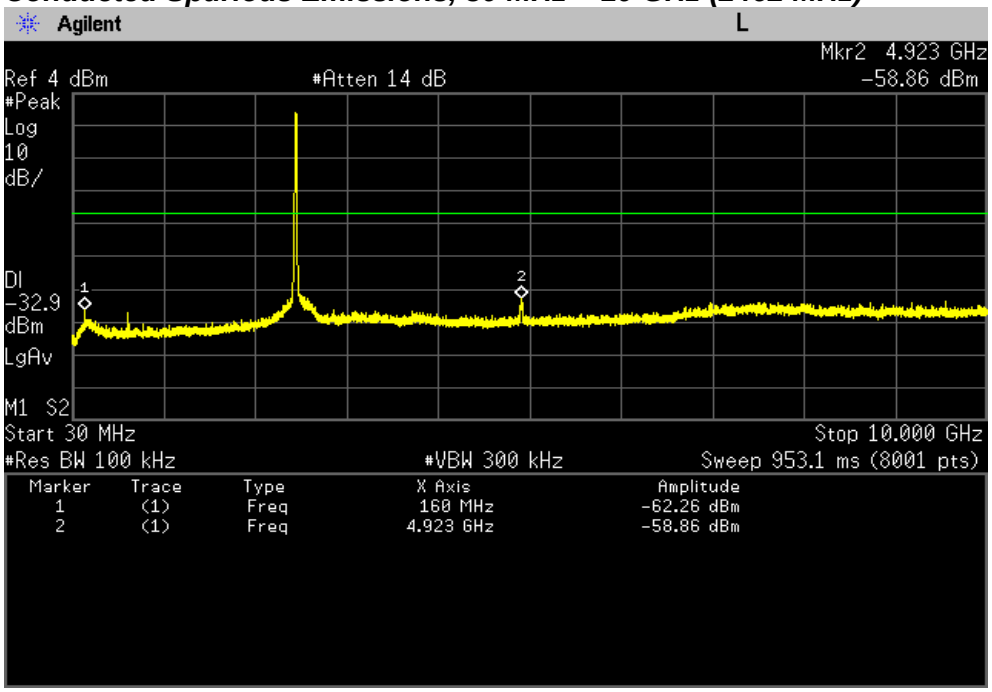


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

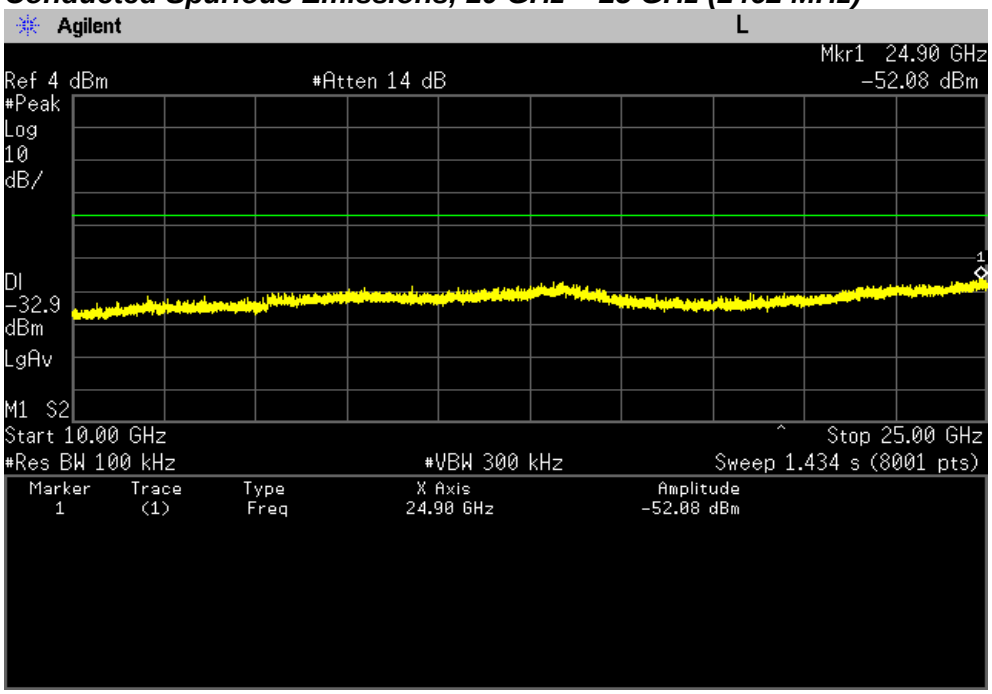


PLOT OF TEST DATA

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



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

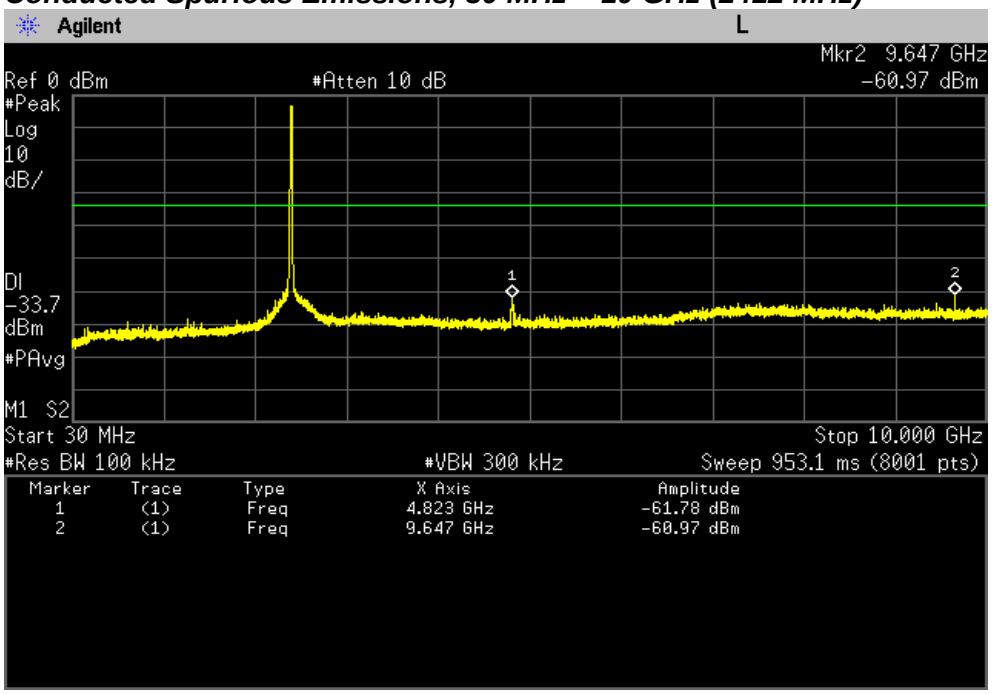


PLOT OF TEST DATA

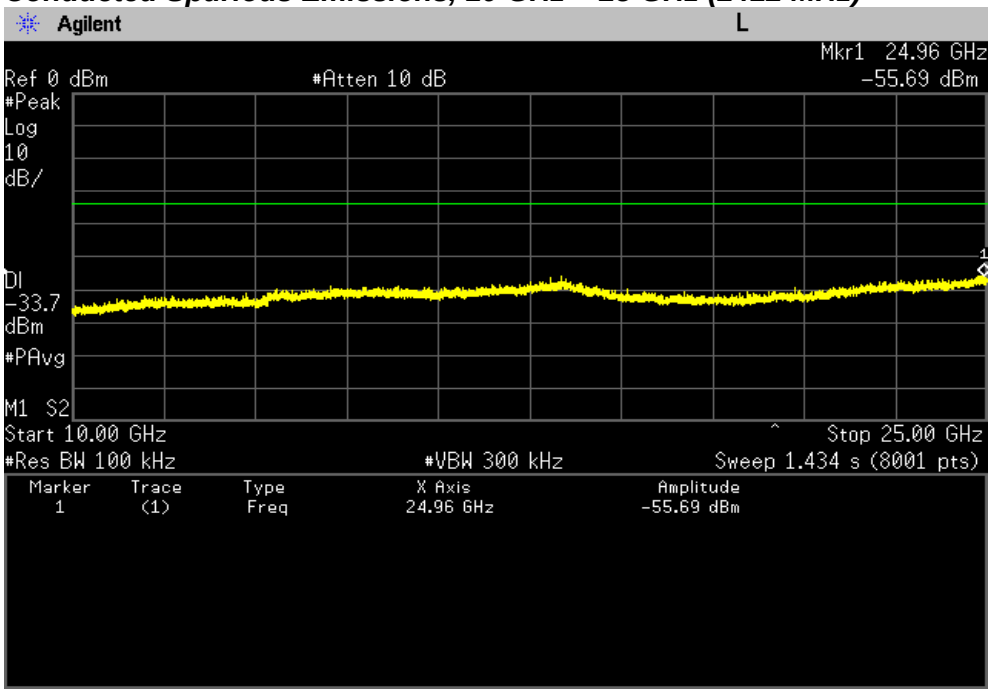
802.11n(HT20) mode

Chain 0

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

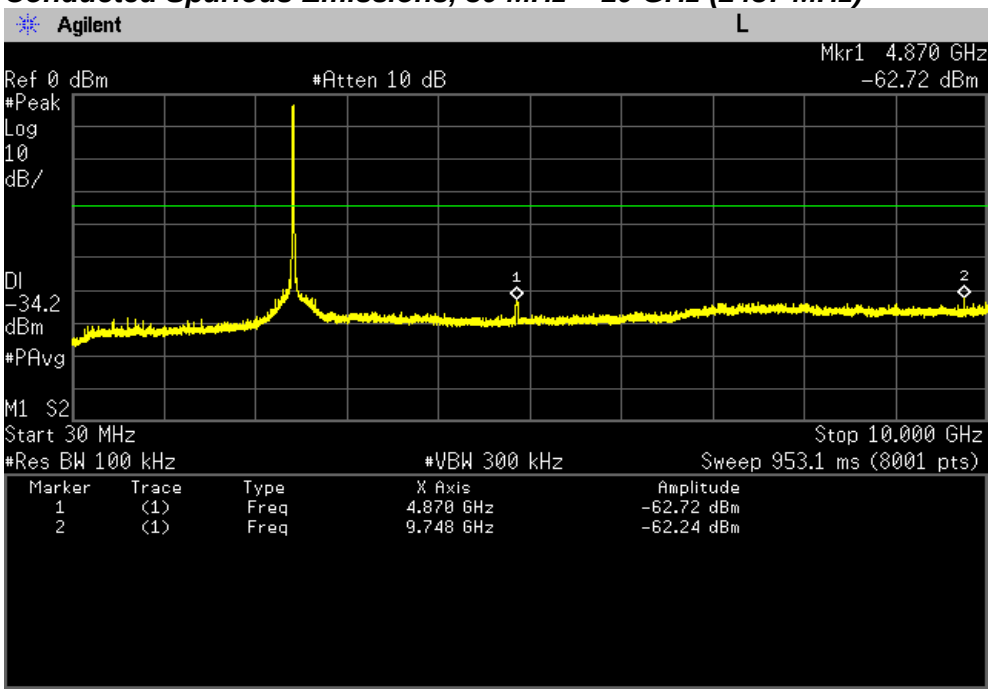


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

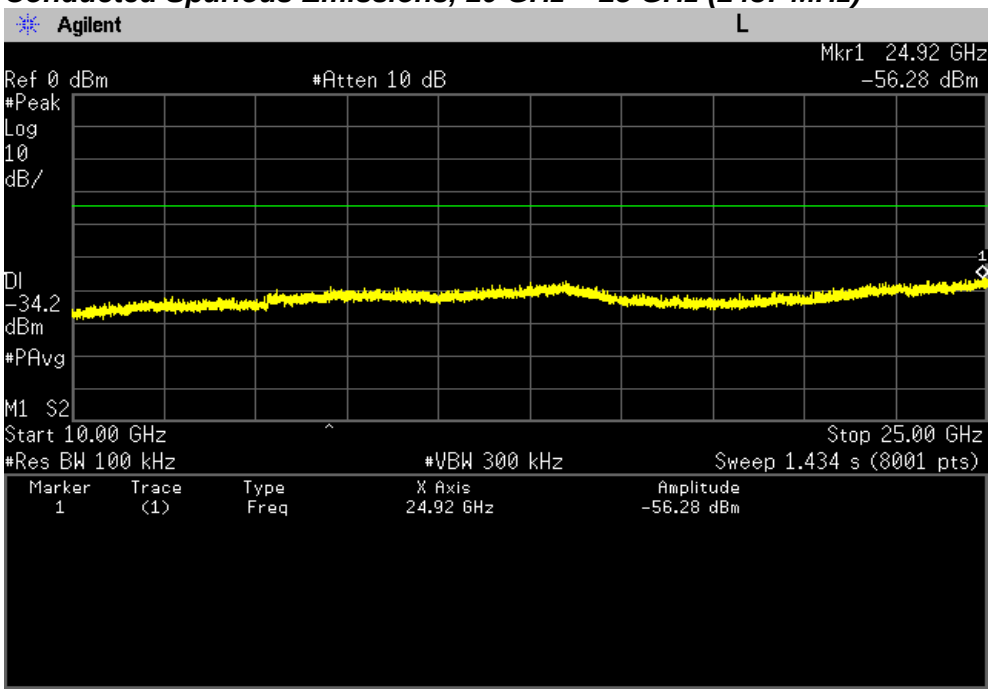


PLOT OF TEST DATA

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

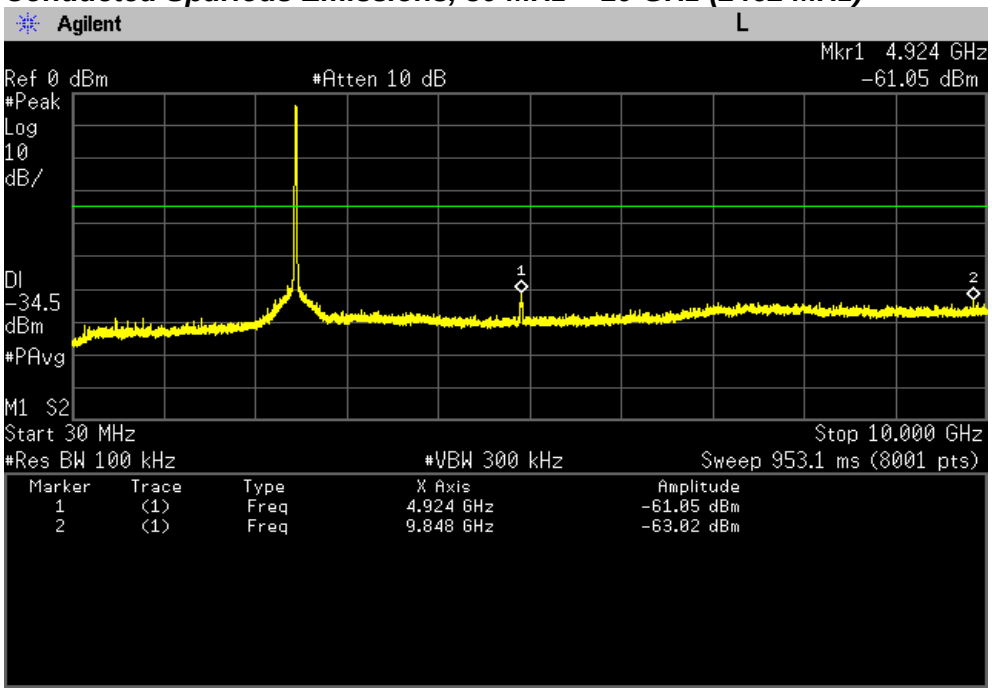


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

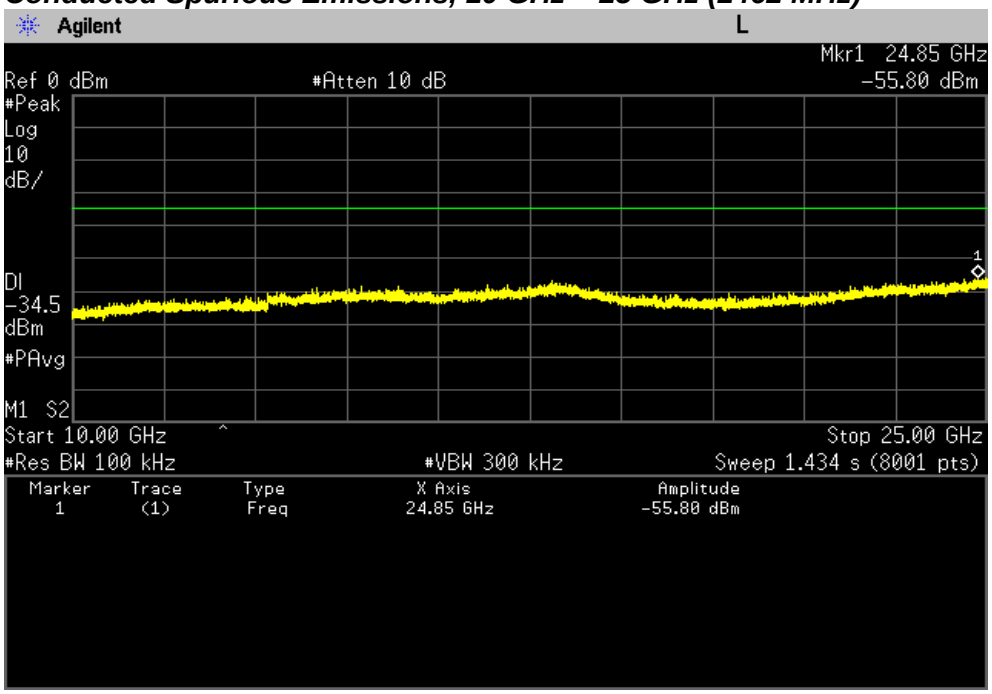


PLOT OF TEST DATA

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



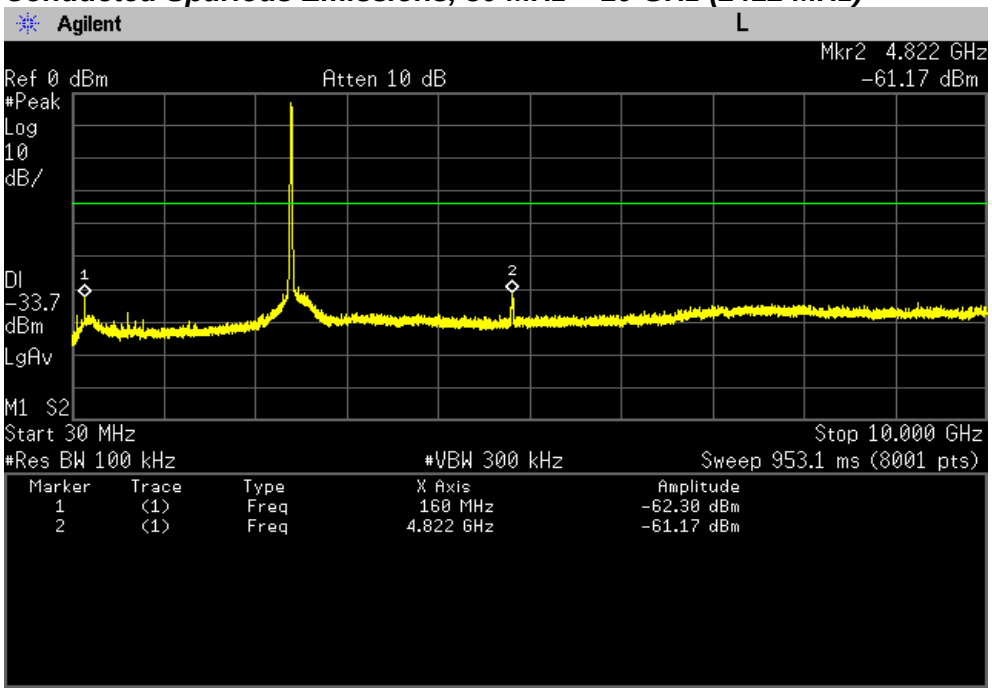
Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2462 MHz)



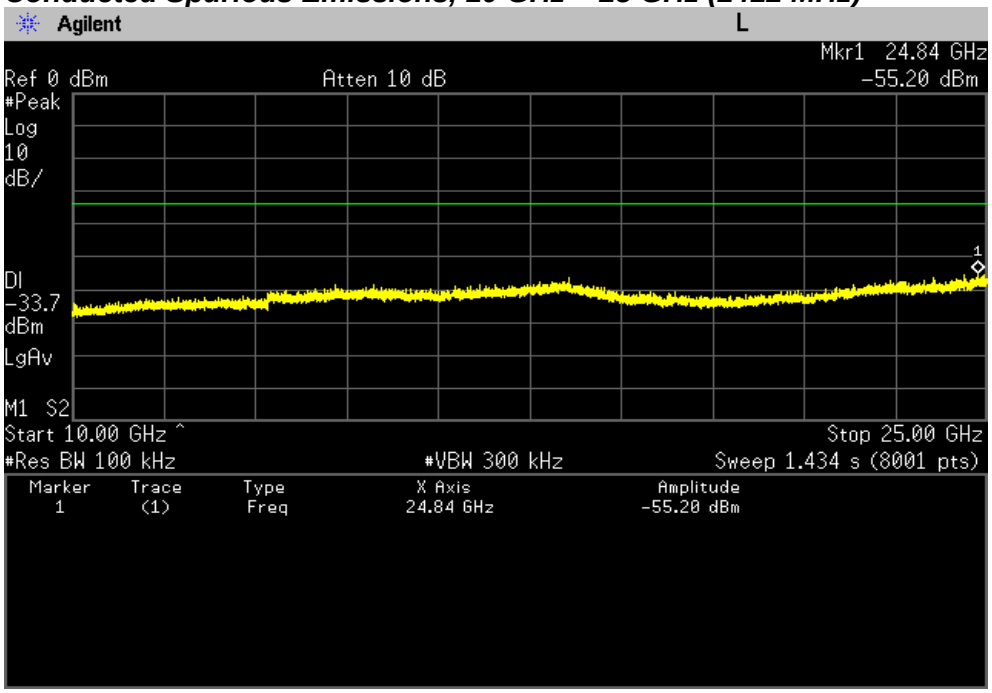
PLOT OF TEST DATA

Chain 1

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

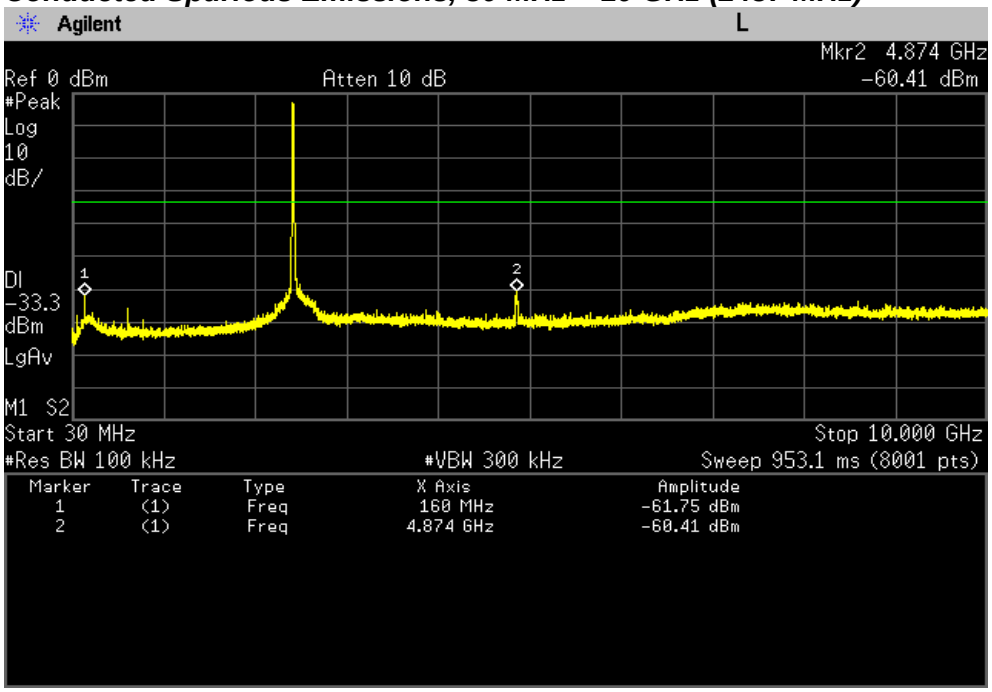


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

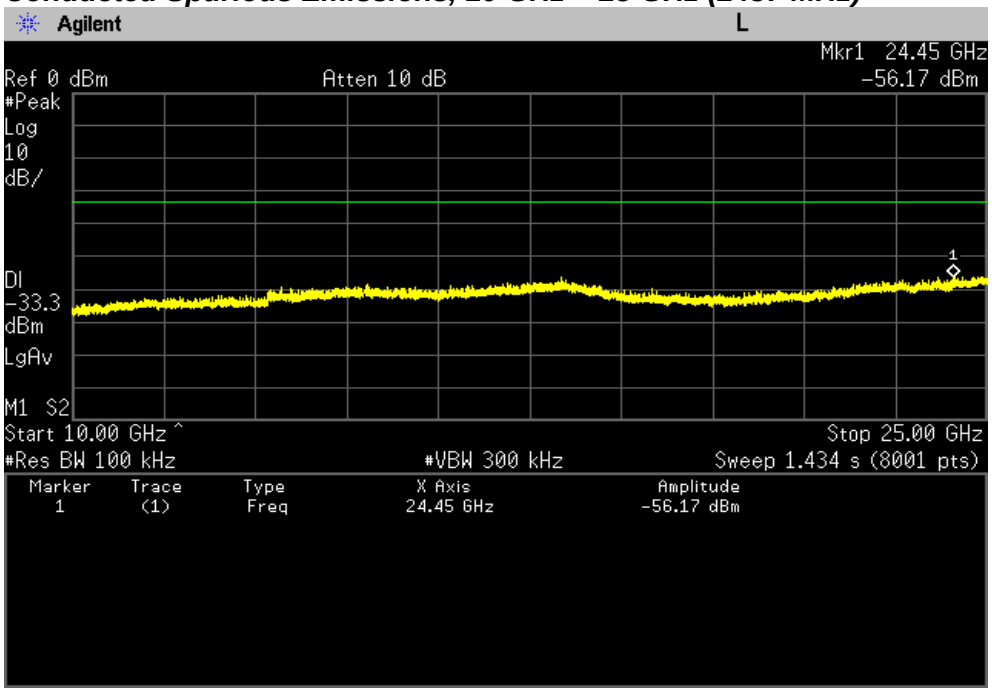


PLOT OF TEST DATA

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

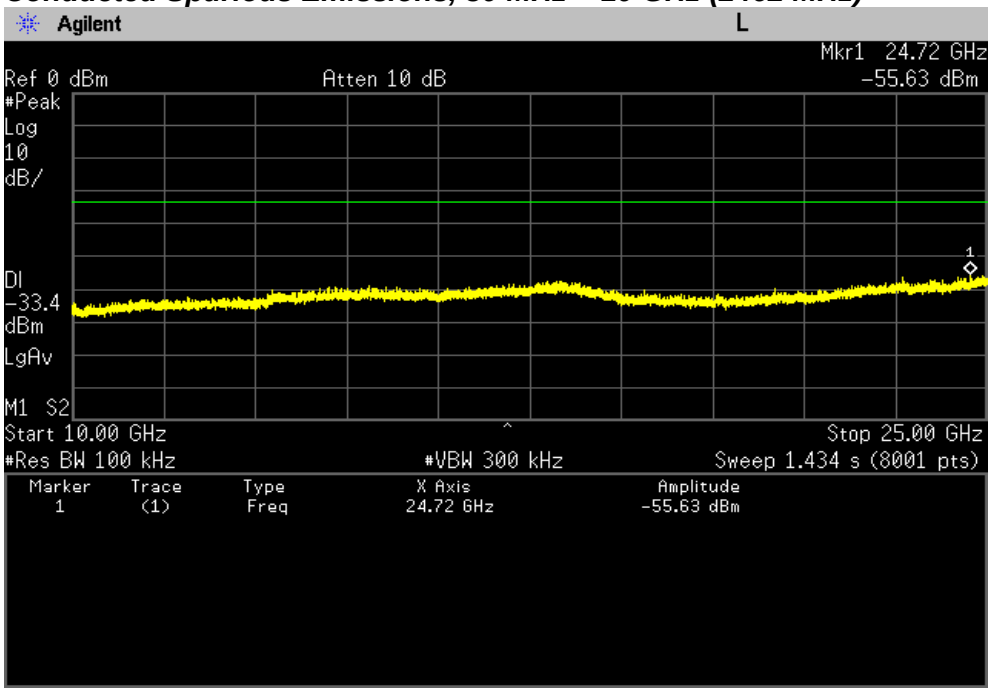


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

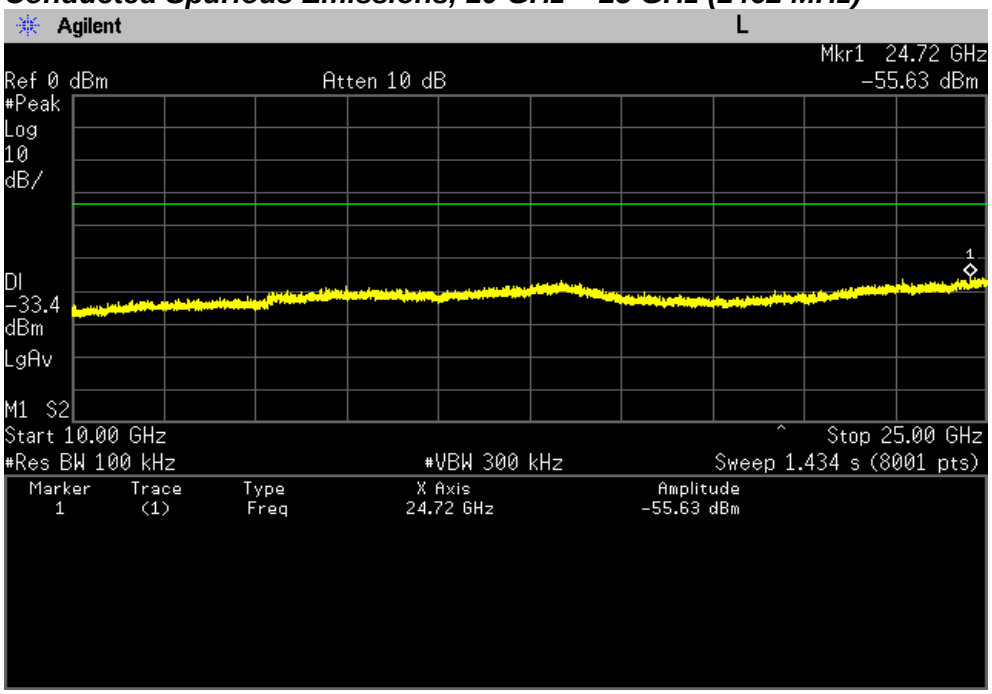


PLOT OF TEST DATA

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



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

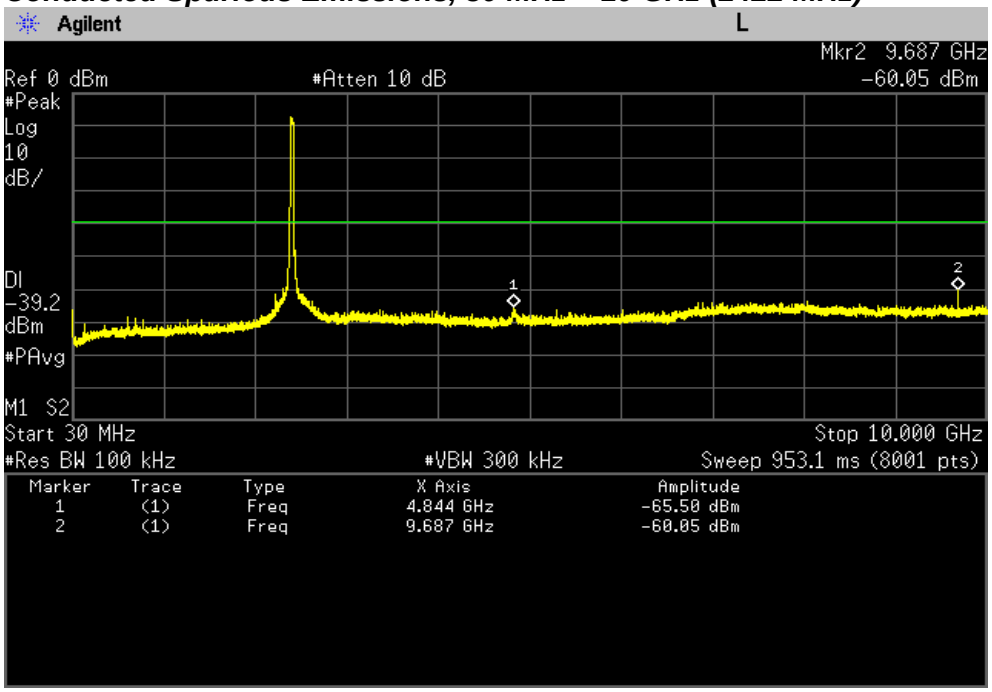


PLOT OF TEST DATA

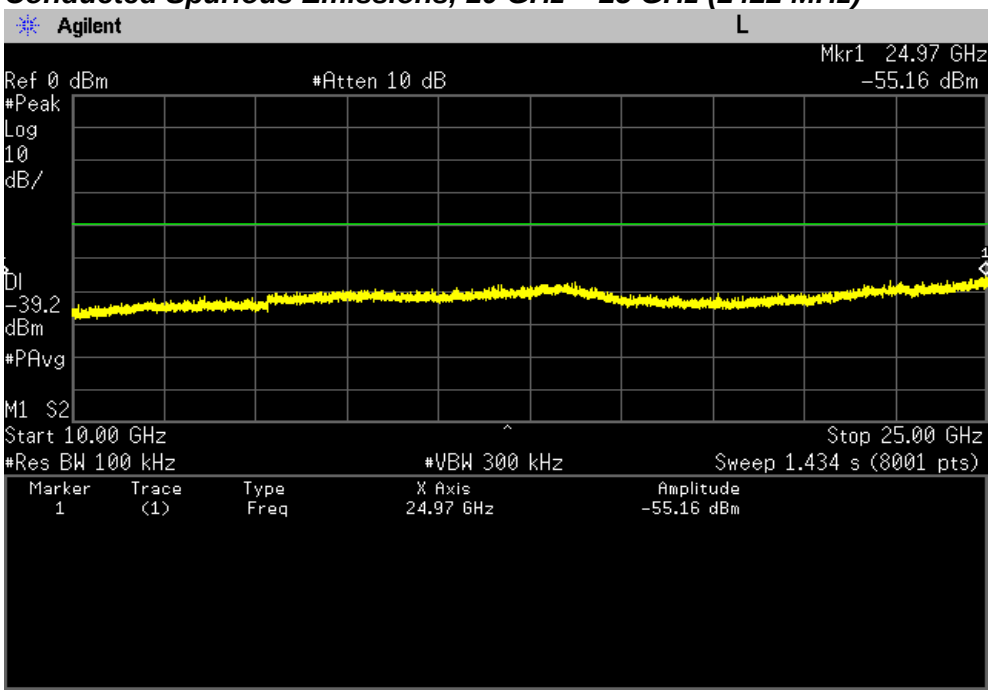
802.11n(HT40) mode

Chain 0

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2422 MHz)

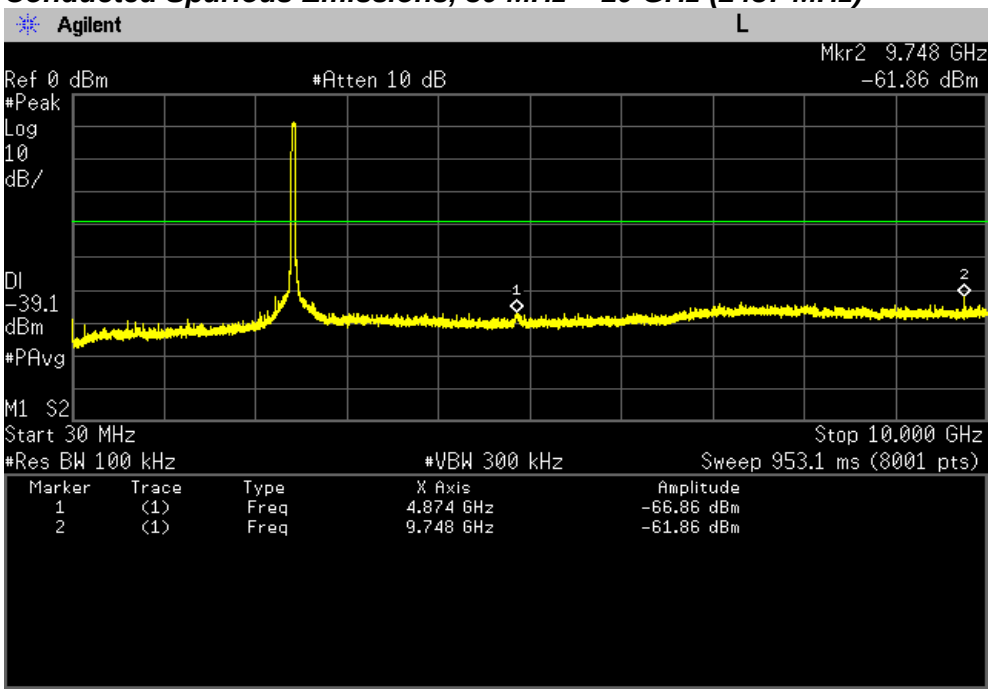


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2422 MHz)

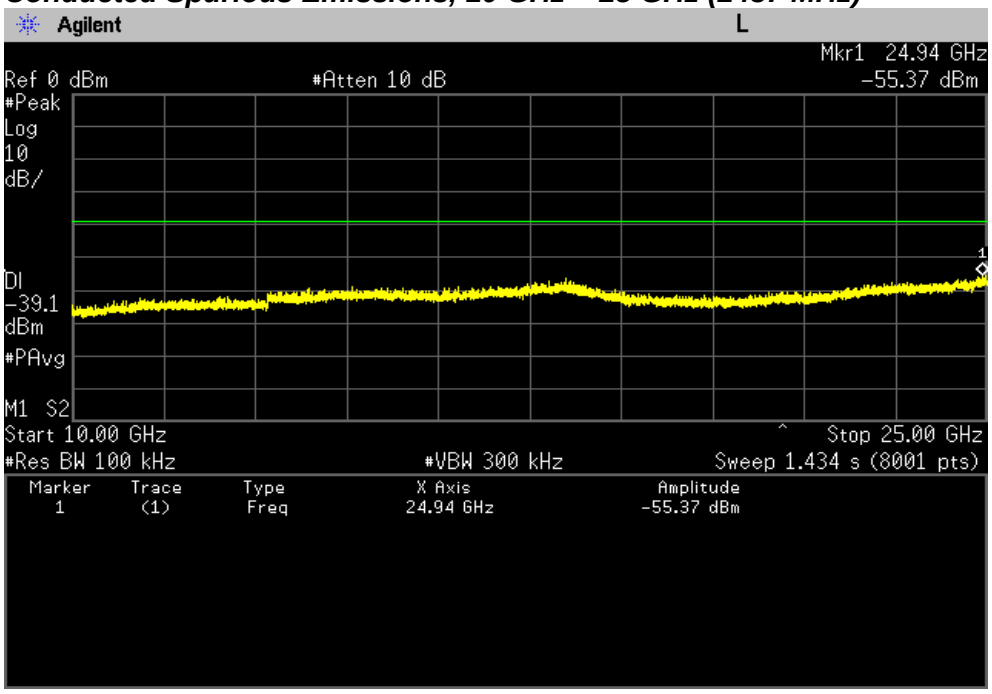


PLOT OF TEST DATA

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

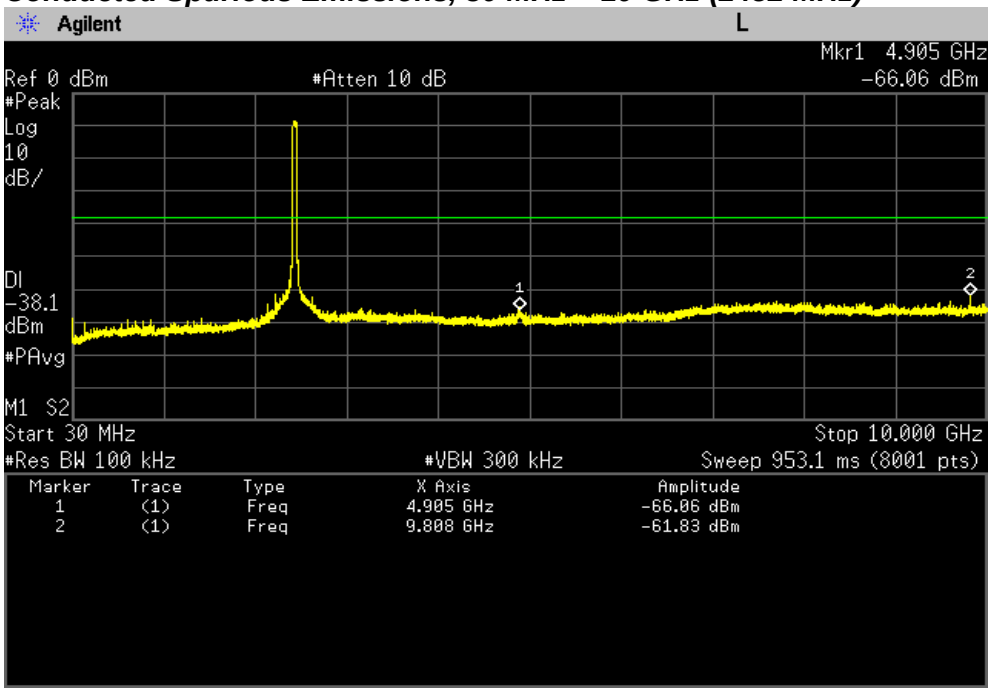


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

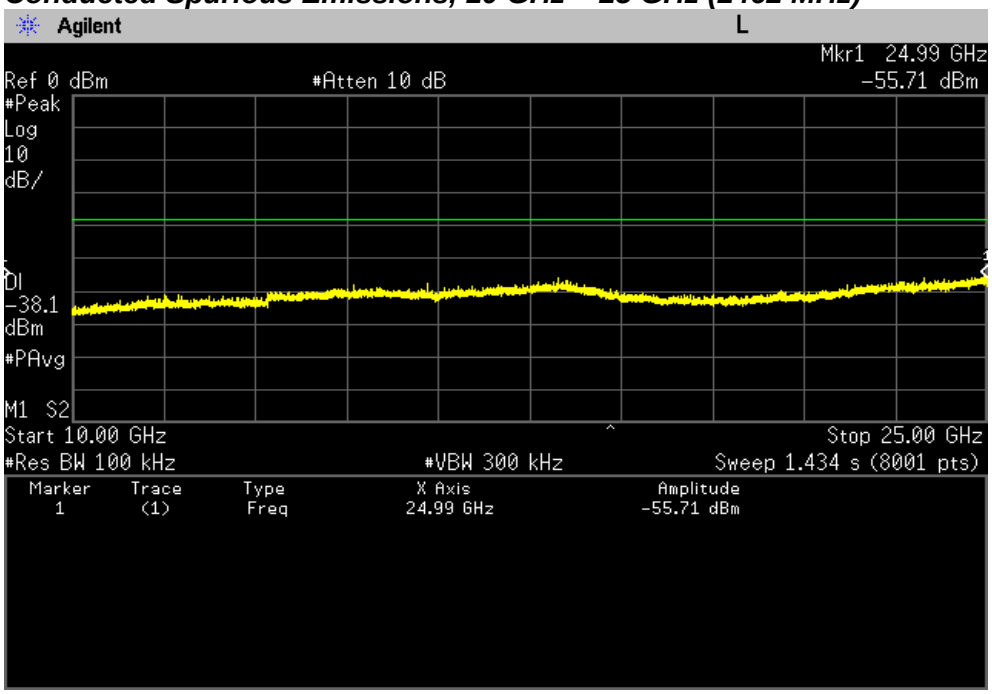


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2452 MHz)



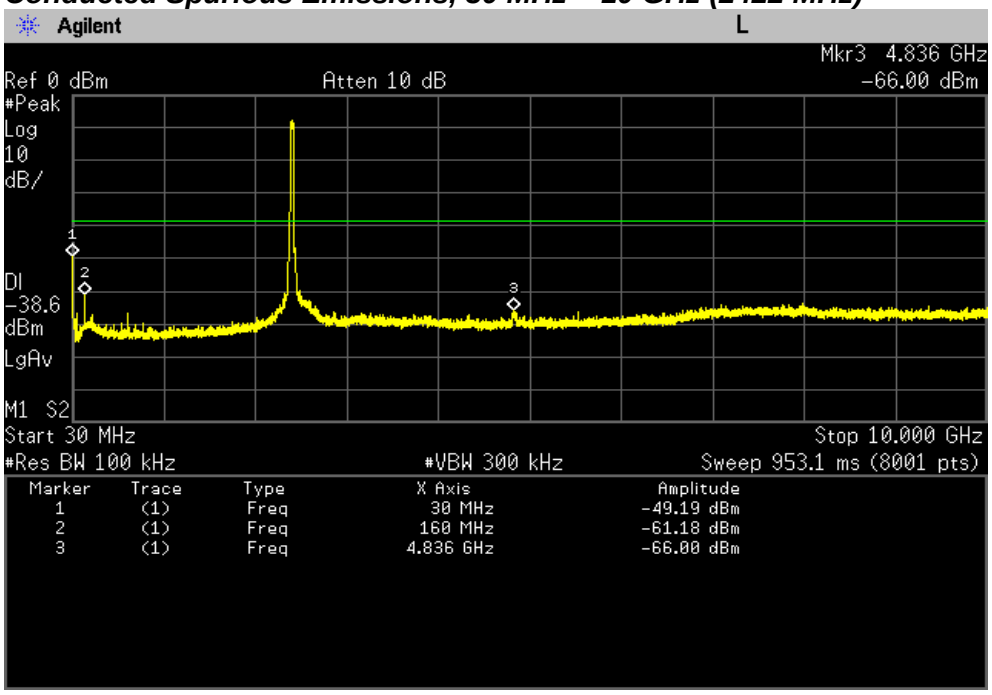
Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2462 MHz)



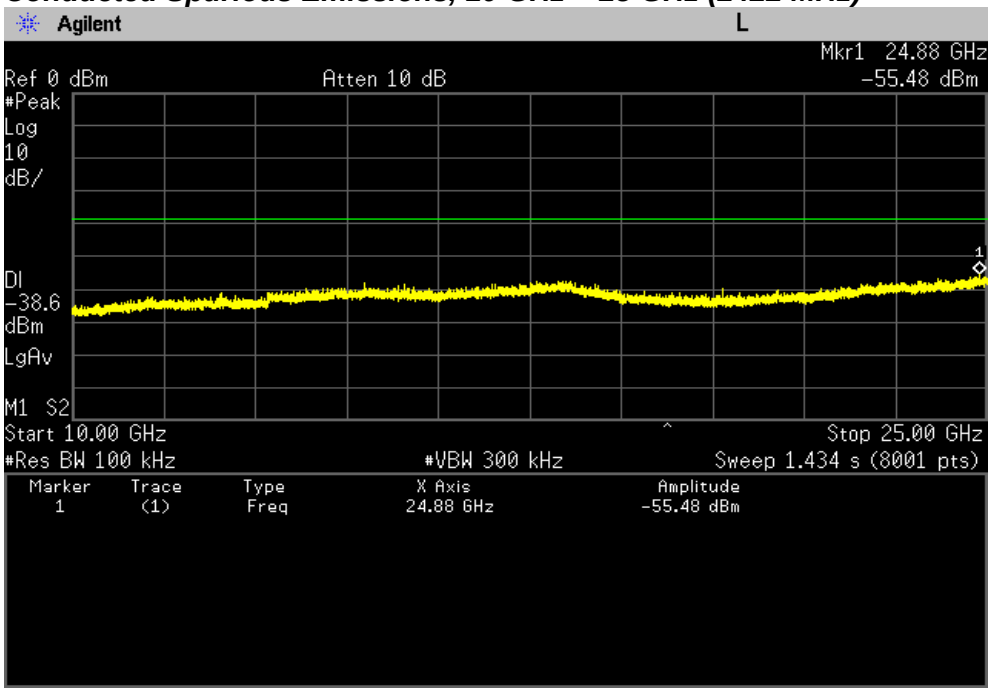
PLOT OF TEST DATA

Chain 1

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2422 MHz)

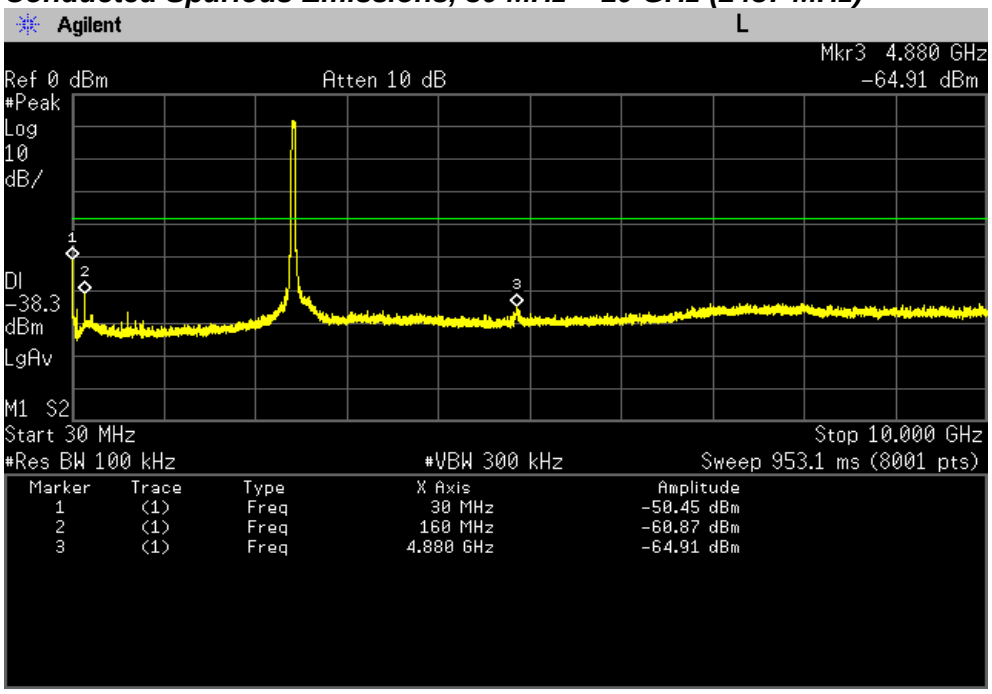


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2422 MHz)

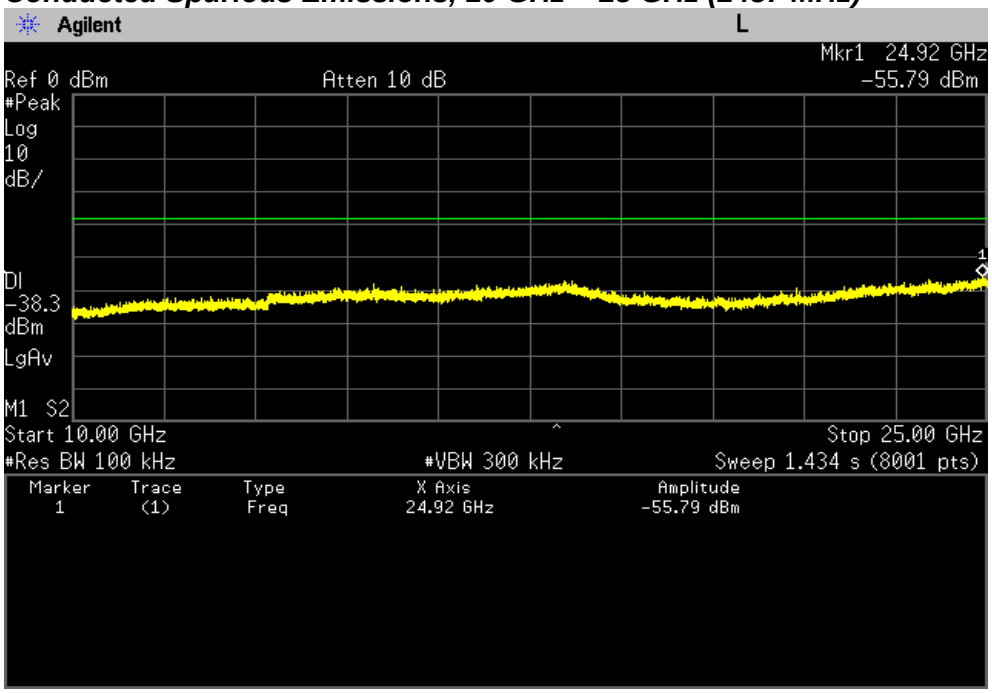


PLOT OF TEST DATA

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

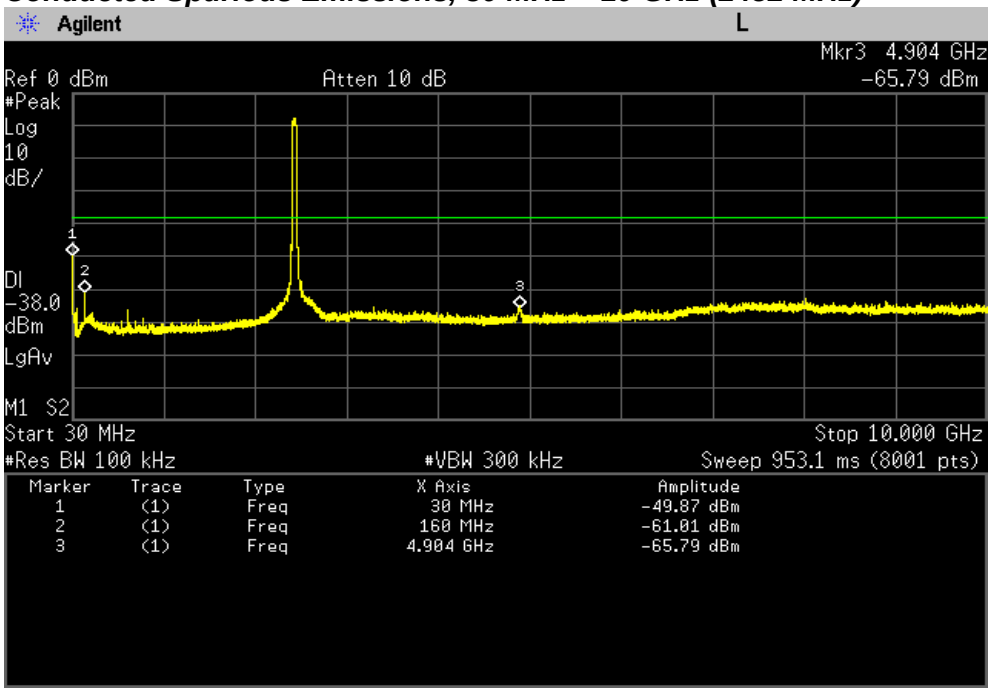


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2437 MHz)

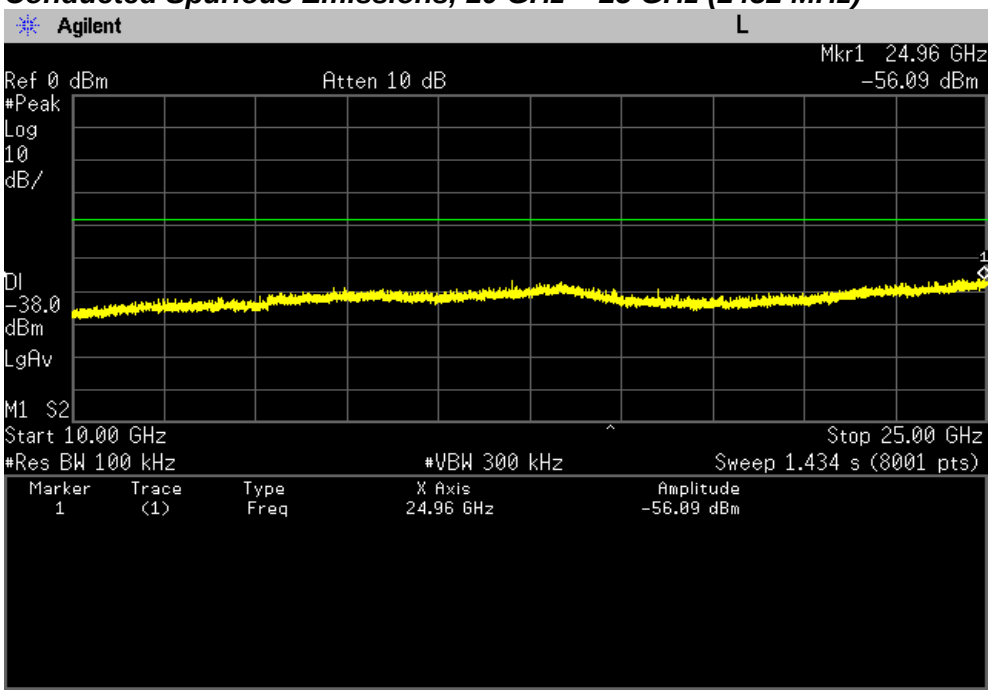


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2452 MHz)



Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2452 MHz)

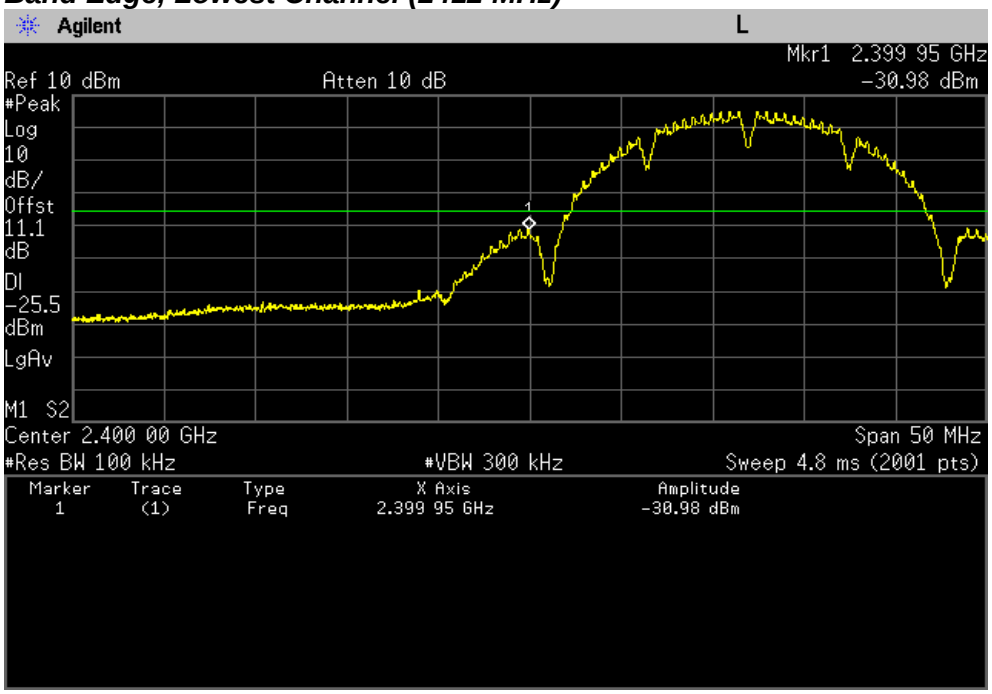


PLOT OF TEST DATA

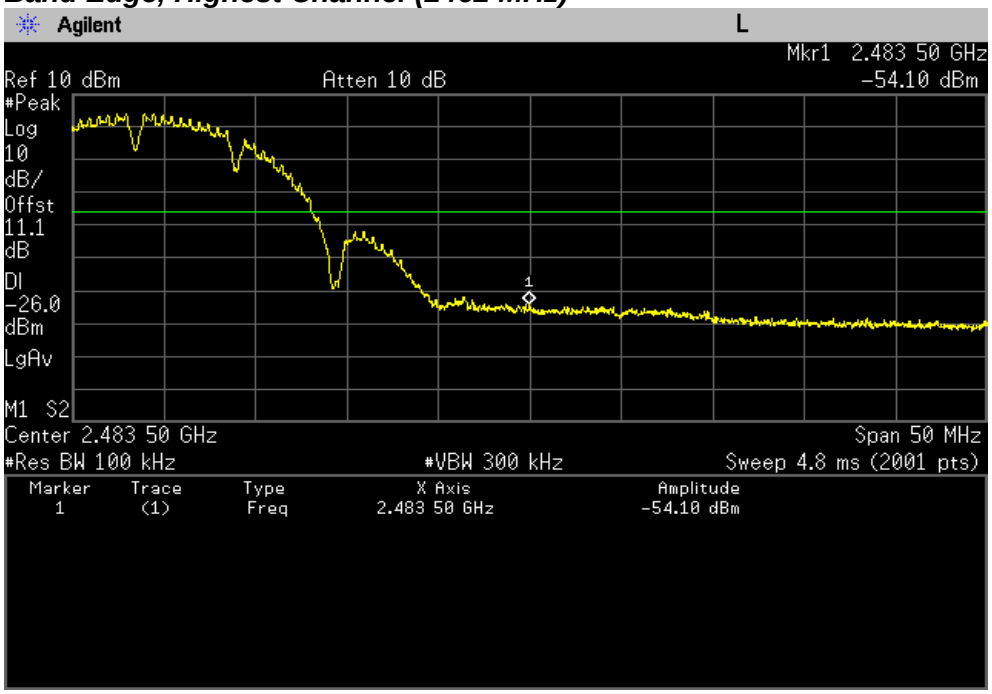
802.11b mode

Chain 0

Band Edge, Lowest Channel (2412 MHz)



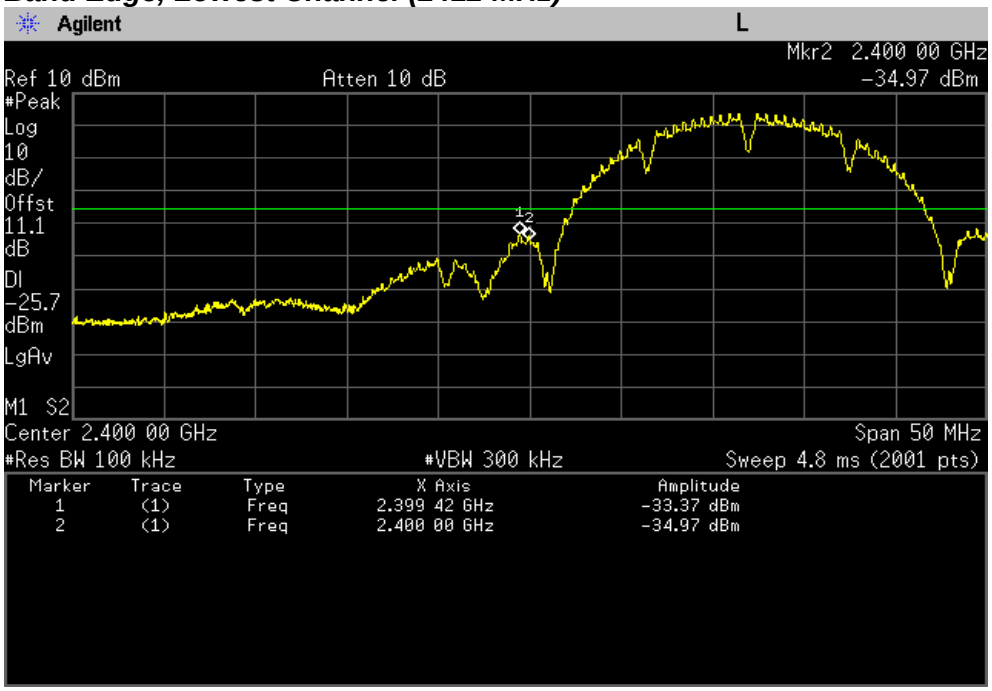
Band Edge, Highest Channel (2462 MHz)



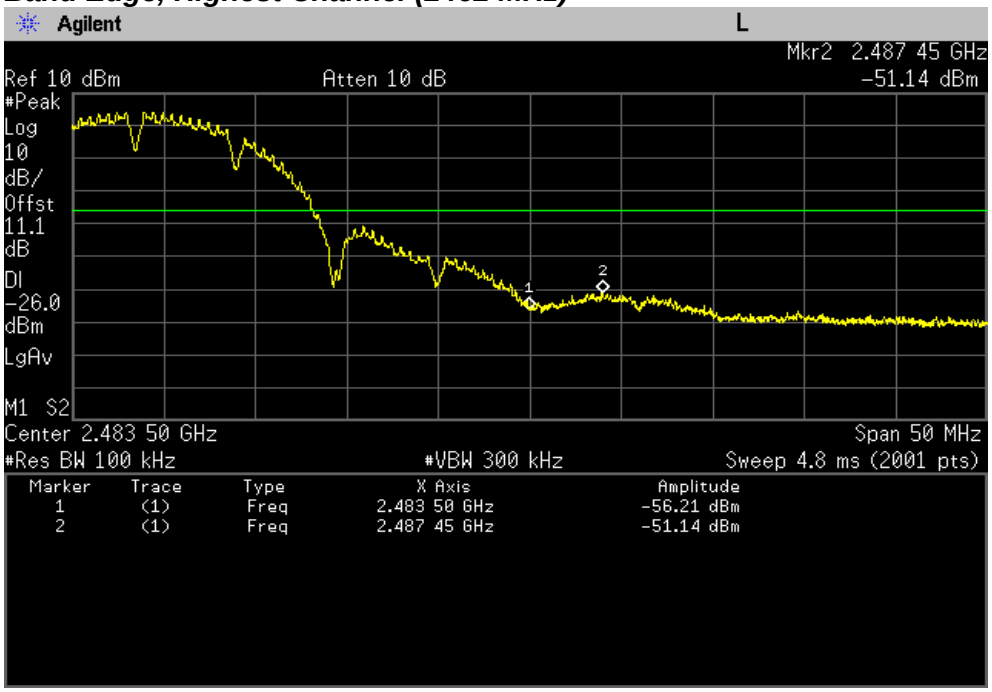
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel (2462 MHz)

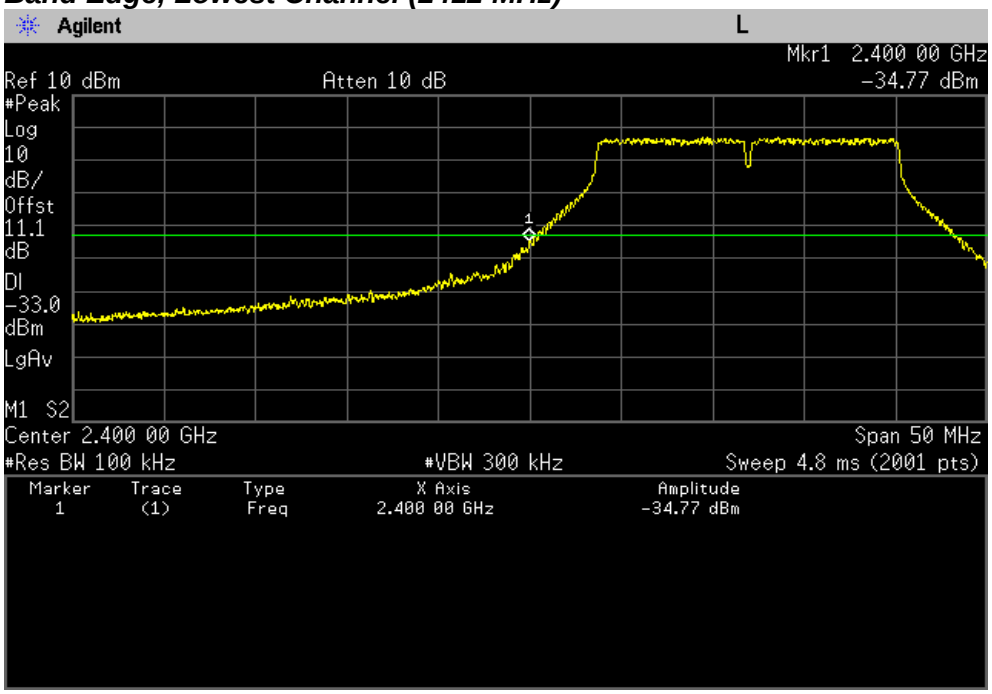


PLOT OF TEST DATA

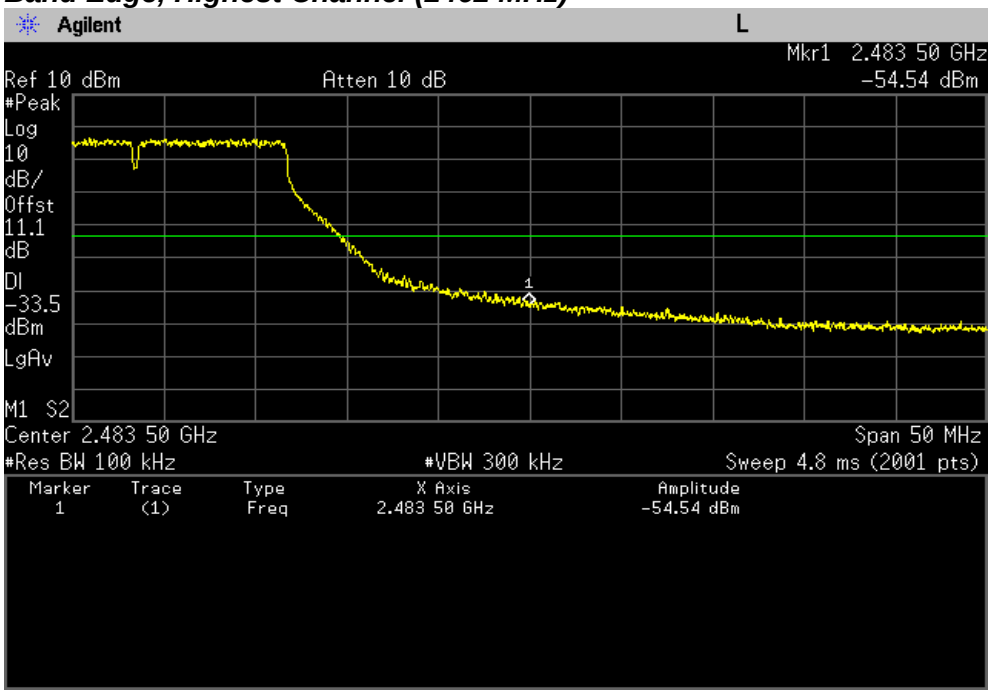
802.11g mode

Chain 0

Band Edge, Lowest Channel (2412 MHz)



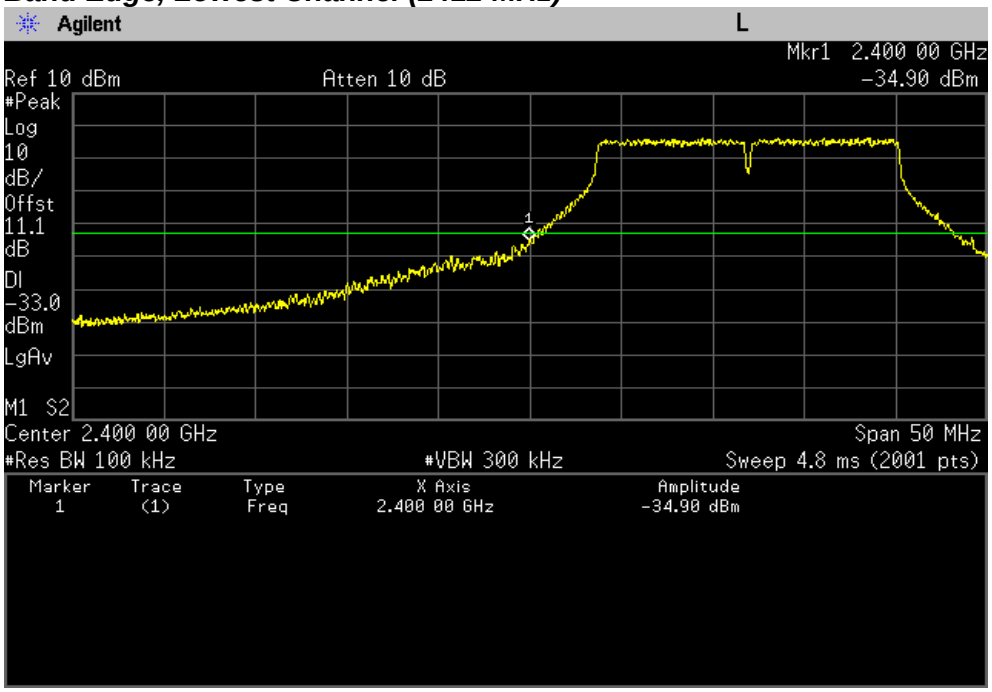
Band Edge, Highest Channel (2462 MHz)



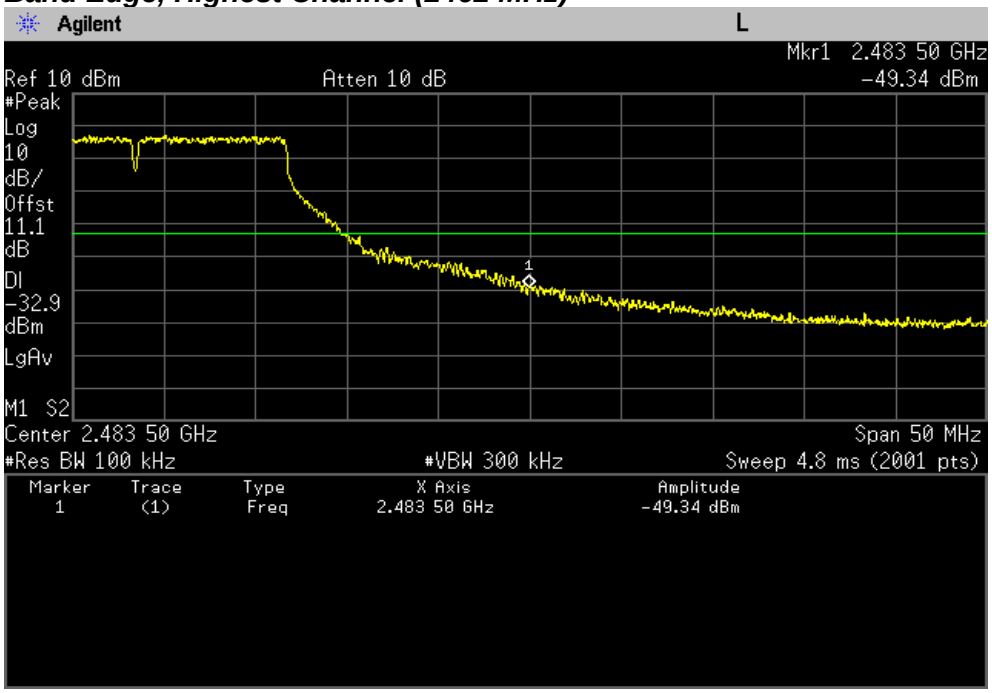
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel (2462 MHz)

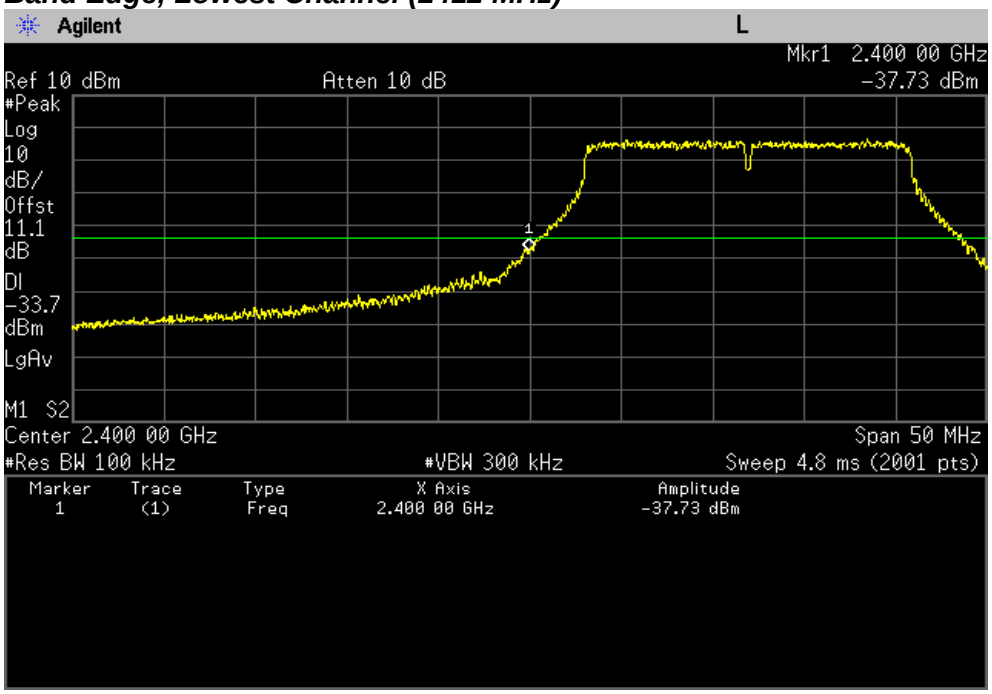


PLOT OF TEST DATA

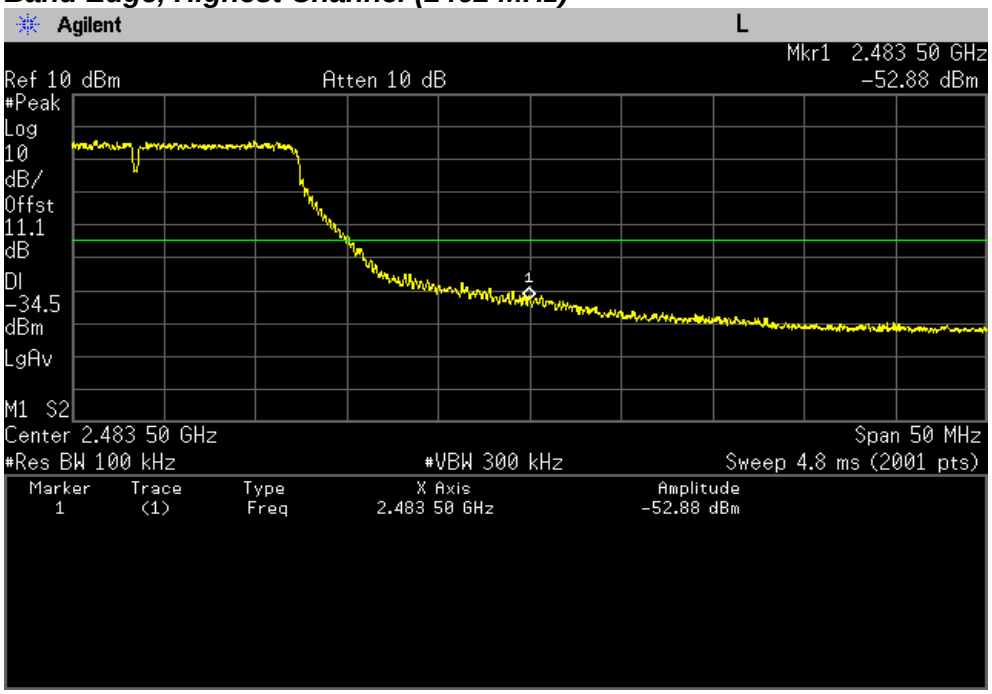
802.11n(HT20) mode

Chain 0

Band Edge, Lowest Channel (2412 MHz)



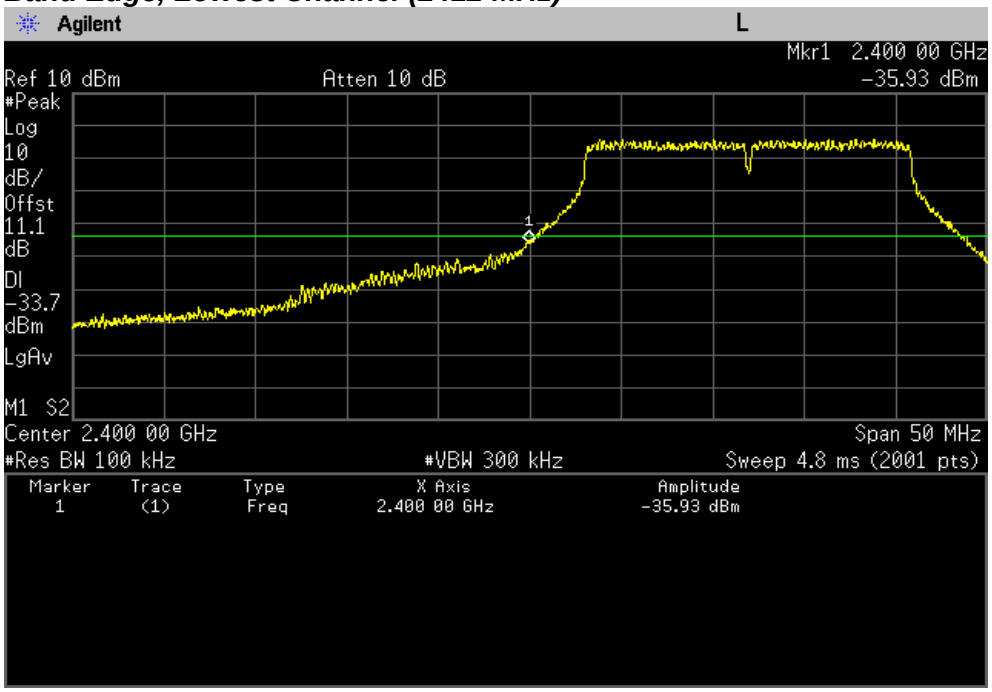
Band Edge, Highest Channel (2462 MHz)



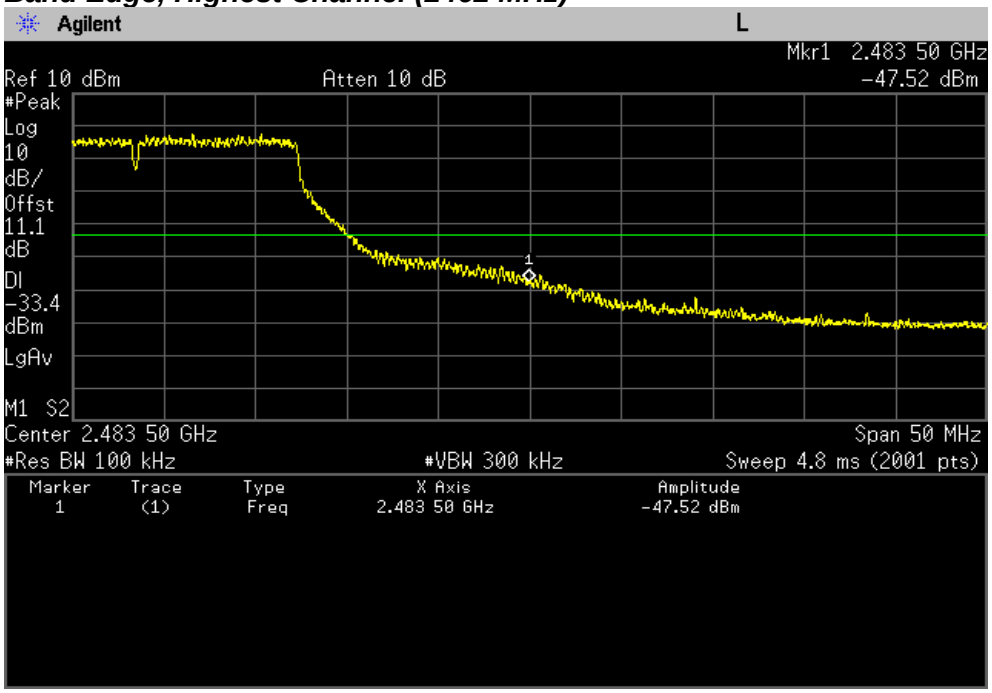
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel (2462 MHz)

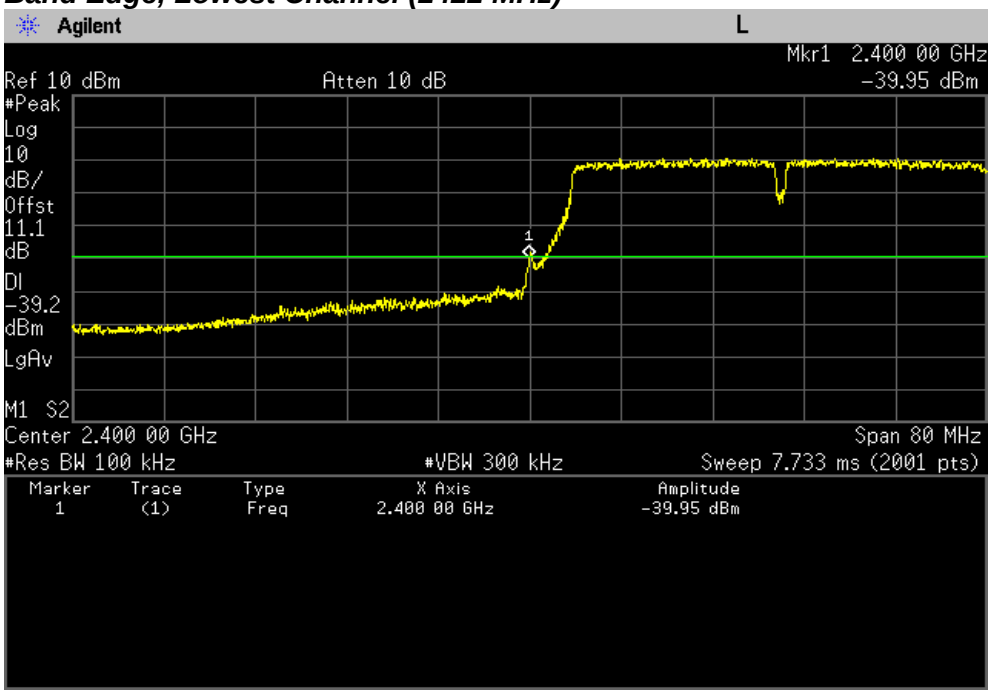


PLOT OF TEST DATA

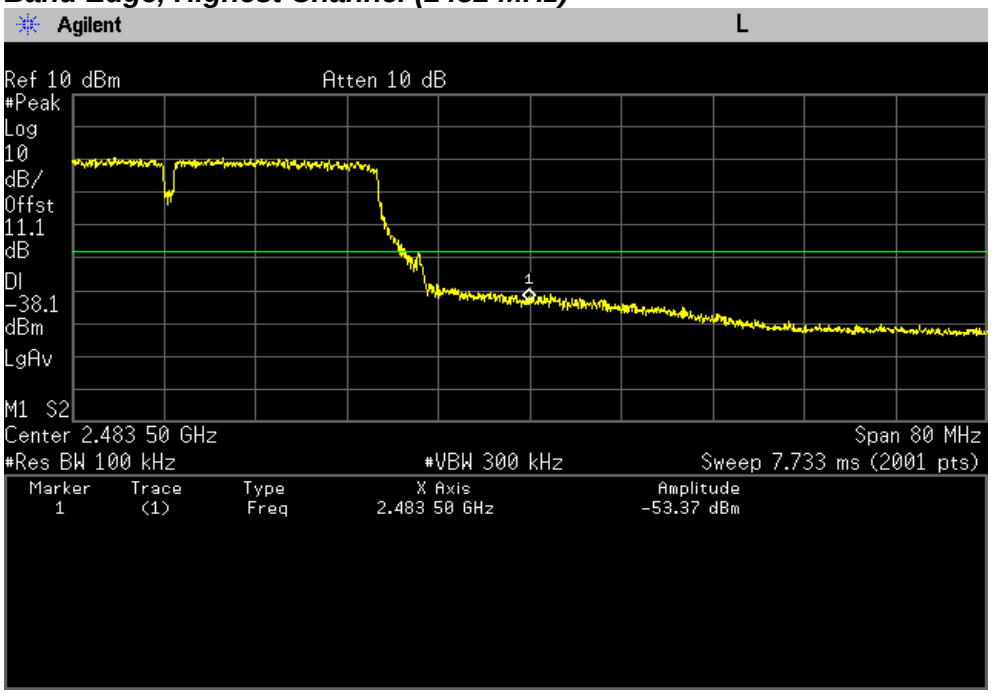
802.11n(HT40) mode

Chain 0

Band Edge, Lowest Channel (2422 MHz)



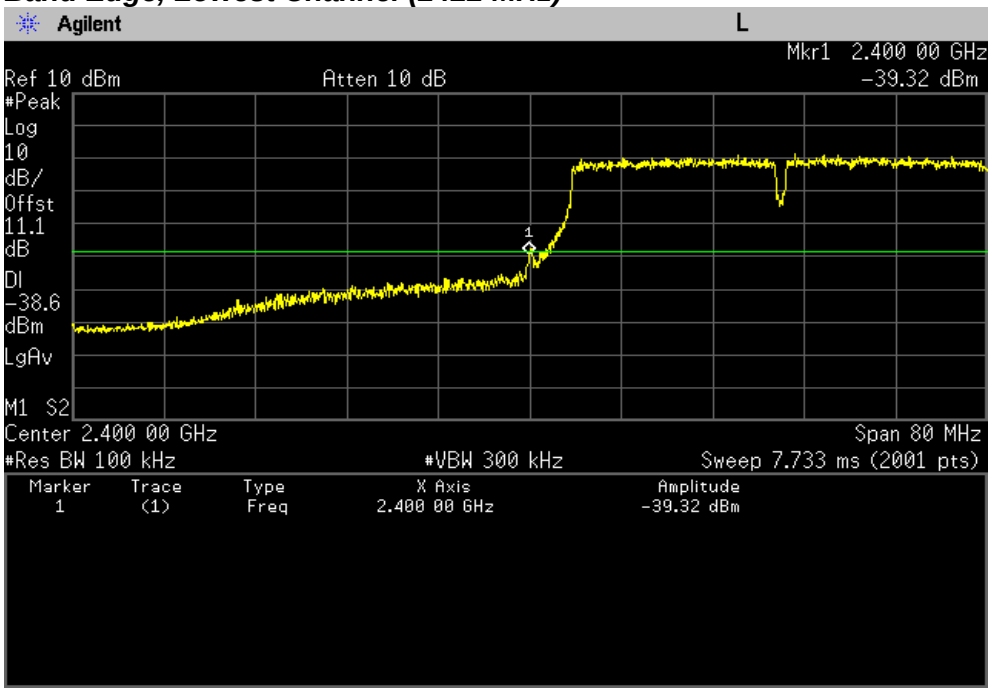
Band Edge, Highest Channel (2452 MHz)



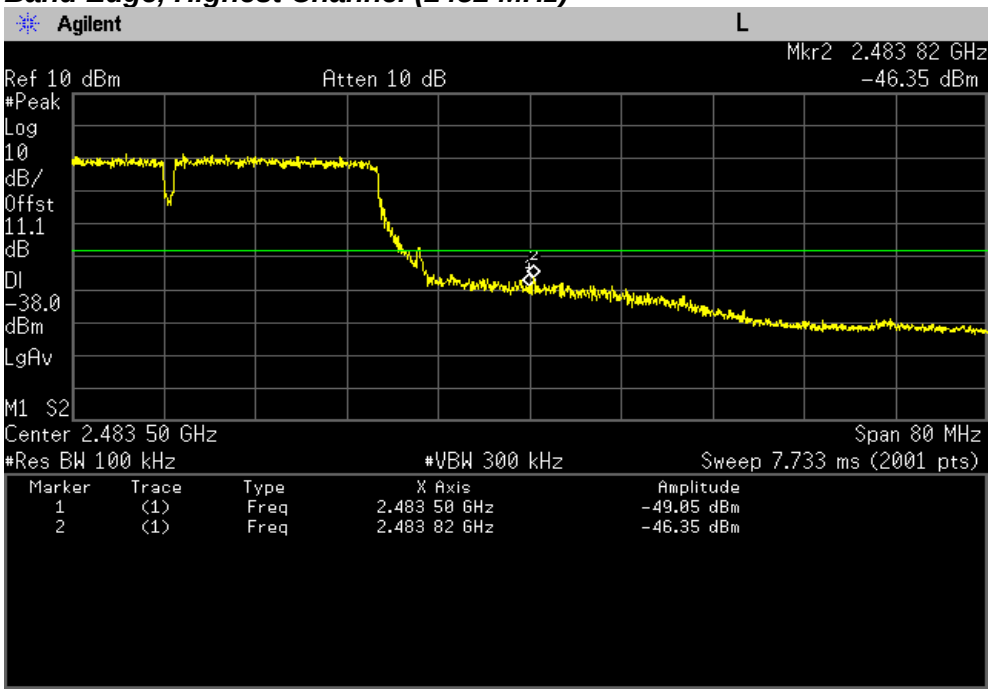
PLOT OF TEST DATA

Chain 1

Band Edge, Lowest Channel (2422 MHz)



Band Edge, Highest Channel (2452 MHz)



8.7 Radiated Spurious Emissions

FCC §15.247(d) / IC RSS-247 Issue 1, 5.5

Test Mode : Lowest channel, Middle channel and Highest channel

802.11b mode

Chain 0

Lowest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
3737.50	41.20	H	peak	6.30	47.50	74.0	26.50
3737.50	30.50	H	average	6.30	36.80	54.0	17.20
4823.75	40.10	H	peak	9.70	49.80	74.0	24.20
4823.75	32.50	H	average	9.70	42.20	54.0	11.80

Middle Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4245.00	40.40	V	peak	7.50	47.90	74.0	26.10
4245.00	30.40	V	average	7.50	37.90	54.0	16.10
4873.75	39.30	H	peak	9.80	49.10	74.0	24.90
4873.75	32.10	H	average	9.80	41.90	54.0	12.10

Highest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4358.13	40.90	H	peak	8.00	48.90	74.0	25.10
4358.13	29.70	H	average	8.00	37.70	54.0	16.30
4923.75	38.70	H	peak	10.10	48.80	74.0	25.20
4923.75	32.00	H	average	10.10	42.10	54.0	11.90

Chain 1

Lowest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4197.50	41.40	H	peak	7.30	48.70	74.0	25.30
4197.50	30.70	H	average	7.30	38.00	54.0	16.00
4823.75	39.00	H	peak	9.70	48.70	74.0	25.30
4823.75	30.70	H	average	9.70	40.40	54.0	13.60

Middle Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4060.63	40.20	H	peak	6.70	46.90	74.0	27.10
4060.63	30.80	H	average	6.70	37.50	54.0	16.50
4874.38	38.80	H	peak	9.80	48.60	74.0	25.40
4874.38	29.90	H	average	9.80	39.70	54.0	14.30

Highest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4357.50	41.50	H	peak	8.00	49.50	74.0	24.50
4357.50	29.40	H	average	8.00	37.40	54.0	16.60
4923.75	37.50	H	peak	10.10	47.60	74.0	26.40
4923.75	30.00	H	average	10.10	40.10	54.0	13.90

802.11g mode

Chain 0

Lowest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4339.38	40.50	H	peak	7.90	48.40	74.0	25.60
4339.38	30.90	H	average	7.90	38.80	54.0	15.20
4824.38	39.40	V	peak	9.70	49.10	74.0	24.90
4824.38	29.10	V	average	9.70	38.80	54.0	15.20

Middle Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4285.63	40.30	H	peak	7.80	48.10	74.0	25.90
4285.63	30.10	H	average	7.80	37.90	54.0	16.10
4874.38	38.80	H	peak	9.80	48.60	74.0	25.40
4874.38	28.70	H	average	9.80	38.50	54.0	15.50

Highest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4278.75	38.90	H	peak	7.80	46.70	74.0	27.30
4278.75	30.80	H	average	7.80	38.60	54.0	15.40
4924.38	38.10	H	peak	10.10	48.20	74.0	25.80
4924.38	28.90	H	average	10.10	39.00	54.0	15.00

Chain 1

Lowest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
3685.00	41.70	H	peak	6.10	47.80	74.0	26.20
3685.00	30.00	H	average	6.10	36.10	54.0	17.90
4824.38	37.60	H	peak	9.70	47.30	74.0	26.70
4824.38	29.00	H	average	9.70	38.70	54.0	15.30

Middle Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4047.50	39.70	V	peak	6.70	46.40	74.0	27.60
4047.50	30.80	V	average	6.70	37.50	54.0	16.50
4873.75	38.30	H	peak	9.80	48.10	74.0	25.90
4873.75	29.00	H	average	9.80	38.80	54.0	15.20

Highest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4293.13	40.00	V	peak	7.90	47.90	74.0	26.10
4293.13	30.40	V	average	7.90	38.30	54.0	15.70
4923.13	39.20	V	peak	10.10	49.30	74.0	24.70
4923.13	28.80	V	average	10.10	38.90	54.0	15.10

802.11n(HT20) mode

Chain 0 + Chain 1

Lowest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1200.00	47.60	V	peak	-4.60	43.00	74.0	31.00
1200.00	41.00	V	average	-4.60	36.40	54.0	17.60
1500.00	44.80	H	peak	-3.50	41.30	74.0	32.70
1500.00	36.70	H	average	-3.50	33.20	54.0	20.80
4823.75	38.80	H	peak	9.70	48.50	74.0	25.50
4823.75	29.30	H	average	9.70	39.00	54.0	15.00

Middle Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1202.00	48.50	V	peak	-4.60	43.90	74.0	30.10
1202.00	41.60	V	average	-4.60	37.00	54.0	17.00
1677.25	45.50	H	peak	-2.70	42.80	74.0	31.20
1677.25	35.00	H	average	-2.70	32.30	54.0	21.70
4874.38	39.10	H	peak	9.80	48.90	74.0	25.10
4874.38	29.40	H	average	9.80	39.20	54.0	14.80

Highest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1499.75	45.20	V	peak	-3.50	41.70	74.0	32.30
1499.75	35.70	V	average	-3.50	32.20	54.0	21.80
1680.00	46.10	H	peak	-2.70	43.40	74.0	30.60
1680.00	34.80	H	average	-2.70	32.10	54.0	21.90
4924.38	38.60	H	peak	10.10	48.70	74.0	25.30
4924.38	29.20	H	average	10.10	39.30	54.0	14.70

802.11n(HT40) mode

Chain 0 + Chain 1

Lowest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1349.50	47.60	V	peak	-3.90	43.70	74.0	30.30
1349.50	35.50	V	average	-3.90	31.60	54.0	22.40
1597.00	53.10	H	peak	-3.00	50.10	74.0	23.90
1597.00	34.60	H	average	-3.00	31.60	54.0	22.40
4843.75	38.50	H	peak	9.70	48.20	74.0	25.80
4843.75	29.30	H	average	9.70	39.00	54.0	15.00

Middle Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1604.00	48.50	V	peak	-2.90	45.60	74.0	28.40
1604.00	33.30	V	average	-2.90	30.40	54.0	23.60
1682.50	46.60	H	peak	-2.60	44.00	74.0	30.00
1677.25	34.90	H	average	-2.60	32.30	54.0	21.70
4874.38	38.90	H	peak	9.80	48.70	74.0	25.30
4874.38	29.30	H	average	9.80	39.10	54.0	14.90

Highest Channel

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1199.75	47.00	V	peak	-4.60	42.40	74.0	31.60
1199.75	38.90	V	average	-4.60	34.30	54.0	19.70
1680.00	47.40	H	peak	-2.70	44.70	74.0	29.30
1680.00	35.40	H	average	-2.70	32.70	54.0	21.30
4904.38	37.60	H	peak	10.00	47.60	74.0	26.40
4904.38	29.30	H	average	10.00	39.30	54.0	14.70

Note(s):

*1. *Pol. H = Horizontal V = Vertical*

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

3. Other spurious are the under 30 dB below Fundamental.

4. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

5. For peak measurements, the resolution bandwidth was set to 1 MHz and the video bandwidth was set to 3 MHz.

6. For average measurements, "12.2.5.1 Average Power Measurement Procedures" at "558074 D01 DTS Meas Guidance v03r02" was used.

7. The spectrum was measured from 9 kHz to 10th harmonic and the worst-case emissions were reported. No significant emissions were found beyond the Second harmonic for this device.

8.8 Radiated Band Edge

FCC §15.247(d), IC RSS-247 Issue 1, 5.5

Test Mode : Set to Lowest channel and Highest channel

802.11b mode

Chain 0

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2390.00	41.60	H	peak	-0.30	41.30	74.0	32.70
2390.00	31.85	H	average	-0.30	31.55	54.0	22.45
2483.50	47.20	H	peak	0.10	47.30	74.0	26.70
2483.50	31.93	H	average	0.10	32.03	54.0	21.97

Chain 1

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2385.90	48.90	H	peak	-0.30	48.60	74.0	25.40
2385.90	37.21	H	average	-0.30	36.91	54.0	17.09
2390.00	44.80	H	peak	-0.30	44.50	74.0	29.50
2390.00	33.72	H	average	-0.30	33.42	54.0	20.58
2483.50	43.70	H	peak	0.10	43.80	74.0	30.20
2483.50	32.20	H	peak	0.10	32.30	54.0	21.70
2487.98	45.00	H	peak	0.10	45.10	74.0	28.90
2487.98	33.18	H	average	0.10	33.28	54.0	20.72

802.11g mode

Chain 0

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2390.00	48.00	H	peak	-0.30	47.70	74.0	26.30
2390.00	33.89	H	average	-0.30	33.59	54.0	20.41
2483.50	46.60	H	peak	0.10	46.70	74.0	27.30
2483.50	34.11	H	average	0.10	34.21	54.0	19.79

Chain 1

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2390.00	48.60	H	peak	-0.30	48.30	74.0	25.70
2390.00	38.44	H	average	-0.30	38.14	54.0	15.86
2483.50	54.50	H	peak	0.10	54.60	74.0	19.40
2483.50	40.36	H	average	0.10	40.46	54.0	13.54

802.11n(HT20) mode

Chain 0 + Chain 1

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2390.00	46.30	H	peak	-0.30	46.00	74.0	28.00
2390.00	35.56	H	average	-0.30	35.26	54.0	18.74
2483.50	41.20	H	peak	0.10	41.30	74.0	32.70
2483.50	31.24	H	average	0.10	31.34	54.0	22.66

802.11n(HT40) mode

Chain 0 + Chain 1

Frequency (GHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2390.00	47.20	H	peak	-0.30	46.90	74.0	27.10
2390.00	34.36	H	average	-0.30	34.06	54.0	19.94
2483.50	47.50	H	peak	0.10	47.60	74.0	26.40
2483.50	30.94	H	average	0.10	31.04	54.0	22.96

Note(s):

*1. *Pol. H = Horizontal V = Vertical*

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

3. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

4. For peak measurements, the resolution bandwidth was set to 1 MHz and the video bandwidth was set to 3 MHz.

5. For average measurements, "12.2.5.1 Average Power Measurement Procedures" at "558074 D01 DTS Meas Guidance v03r02" was used.

9. TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESU 40	100202	Apr. 03 2014	1 year
2	*Test Receiver	R & S	ESCS30	100302	Oct. 06 2014	1 year
3	*Attenuator	AGILENT	8491B	57773	Oct. 07 2014	1 year
4	*Attenuator	FAIRVIEW	SA3N5W-06	N/A	Apr. 03 2014	1 year
5	*Attenuator	FAIRVIEW	SA3N5W-10	N/A	Apr. 02 2014	1 year
5	*Amplifier	R & S	SCU 01	10030	Apr. 03 2014	1 year
6	*Amplifier	R & S	SCU18	10065	Apr. 03 2014	1 year
7	*Amplifier	R & S	SCU26	10011	Jul. 08 2014	1 year
8	Amplifier	R & S	SCU40	10008	Jul. 08 2014	1 year
9	*Pre Amplifier	HP	8449B	3008A00107	Jan. 09 2014	1 year
10	*Spectrum Analyzer	Agilent	E4440A	MY44303257	Jul. 16 2014	1 year
11	Spectrum Analyzer	Agilent	E4440A	MY44022567	Apr. 02 2014	1 year
11	*Spectrum Analyzer	R&S	FSP40	100361	Jul. 16 2014	1 year
12	*DC Power Supply	HP	6574A	US36340190	Jul. 16 2014	1 year
13	*Loop Antenna	R & S	HFH2-Z2	100279	Feb. 13 2014	2 year
14	Wideband Power Sensor	R & S	NRP-Z81	100634	Jul. 17 2014	1 year
15	*Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-508	Feb. 28 2013	2 year
16	*Horn Antenna	Q-par Angus	QSH20S20	8179	Mar. 20 2013	2 year
17	Horn Antenna	Q-par Angus	QSH22K20	8180	Mar. 20 2013	2 year
18	*Trilog-Broadband Antenna	SCHWARZBECK	VULB 9163	9163-423	Jun. 21 2013	2 year
19	*LISN	R & S	ESH3-Z5	833874/006	Oct. 06 2014	1 year
21	*Controller	INNCO	CO2000-G	CO2000/562/23890210/L	N/A	N/A
22	*Turn Table	INNCO	DT3000-3T	N/A	N/A	N/A
23	*Antenna Mast	INNCO	MA4000-EP	N/A	N/A	N/A
24	*Open Switch And Control Unit	R & S	OSP-120	100015	N/A	N/A
25	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
26	*Position Controller	INNCO	CO2000	12480406/L	N/A	N/A
27	*Turn Table	INNCO	DS1200S	N/A	N/A	N/A
28	*Antenna Mast	INNCO	MA4000	N/A	N/A	N/A
29	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
30	Shielded Room	Seo-Young EMC	N/A	N/A	N/A	N/A
31	*Open Switch And Control Unit	R & S	OSP-120	100081	N/A	N/A

Note(s)

*1. * Test equipment used during the test*

10. 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			

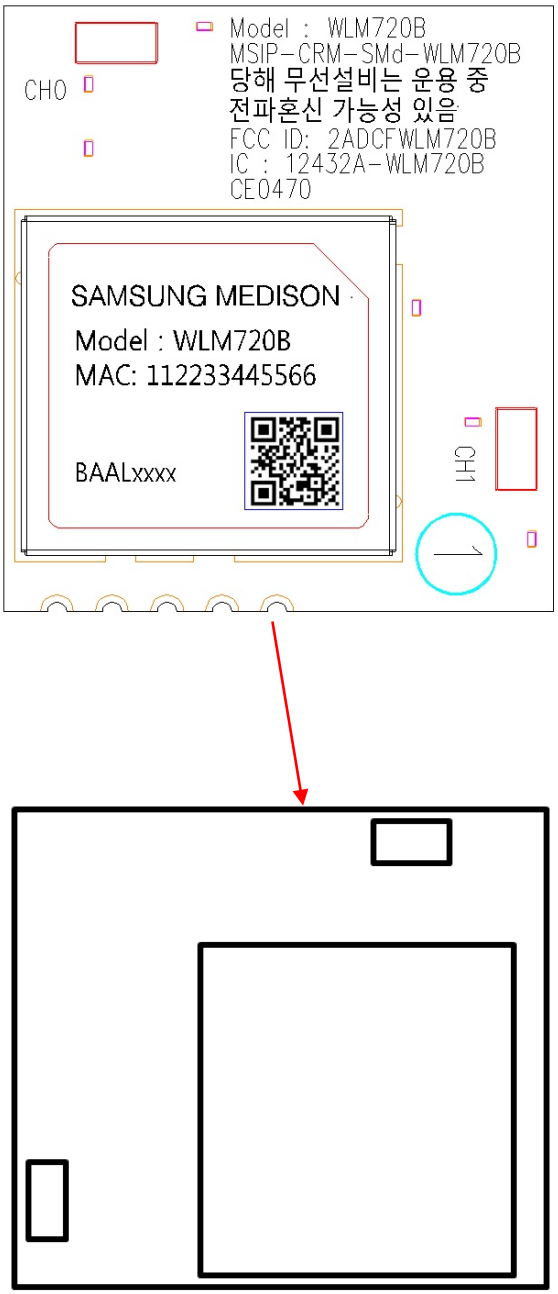
2. Radiation Uncertainty Calculation

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)			

APPENDIX A – LABELLING REQUIREMENTS

Labelling Requirements

The sample label shown shall be *permanently affixed* at a conspicuous location on the device and be readily visible to the user at the time of purchase.



※ See other informations in the manual

APPENDIX B – PHOTOGRAPHS OF TEST SET-UP

The **Conducted Test Picture** and **Radiated Test Picture** and show the worst-case configuration and cable placement.

- **Conducted Test Picture(Front)**

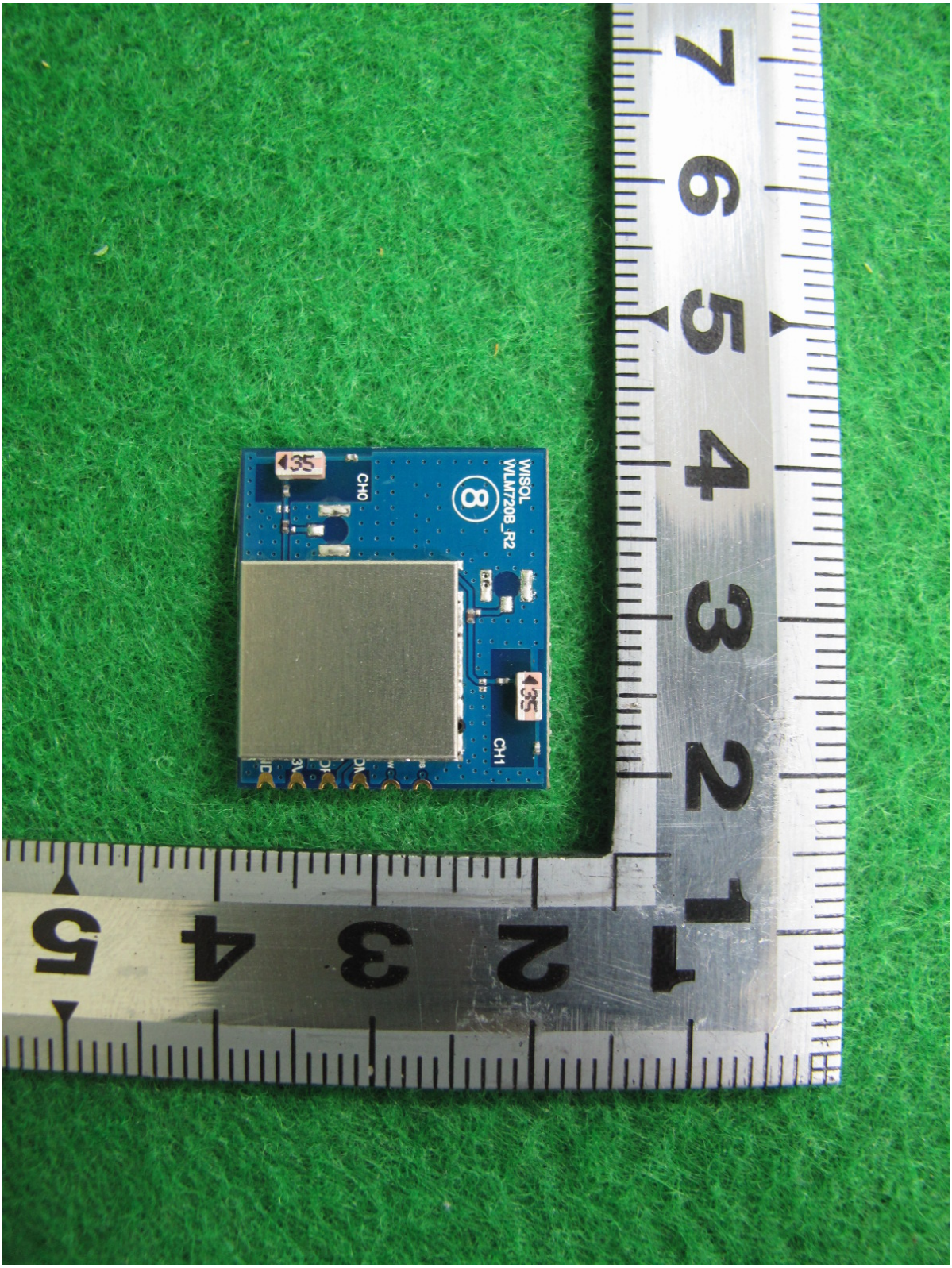
- **Conducted Test Picture(Side)**

- **Radiated Test Picture (Front)**

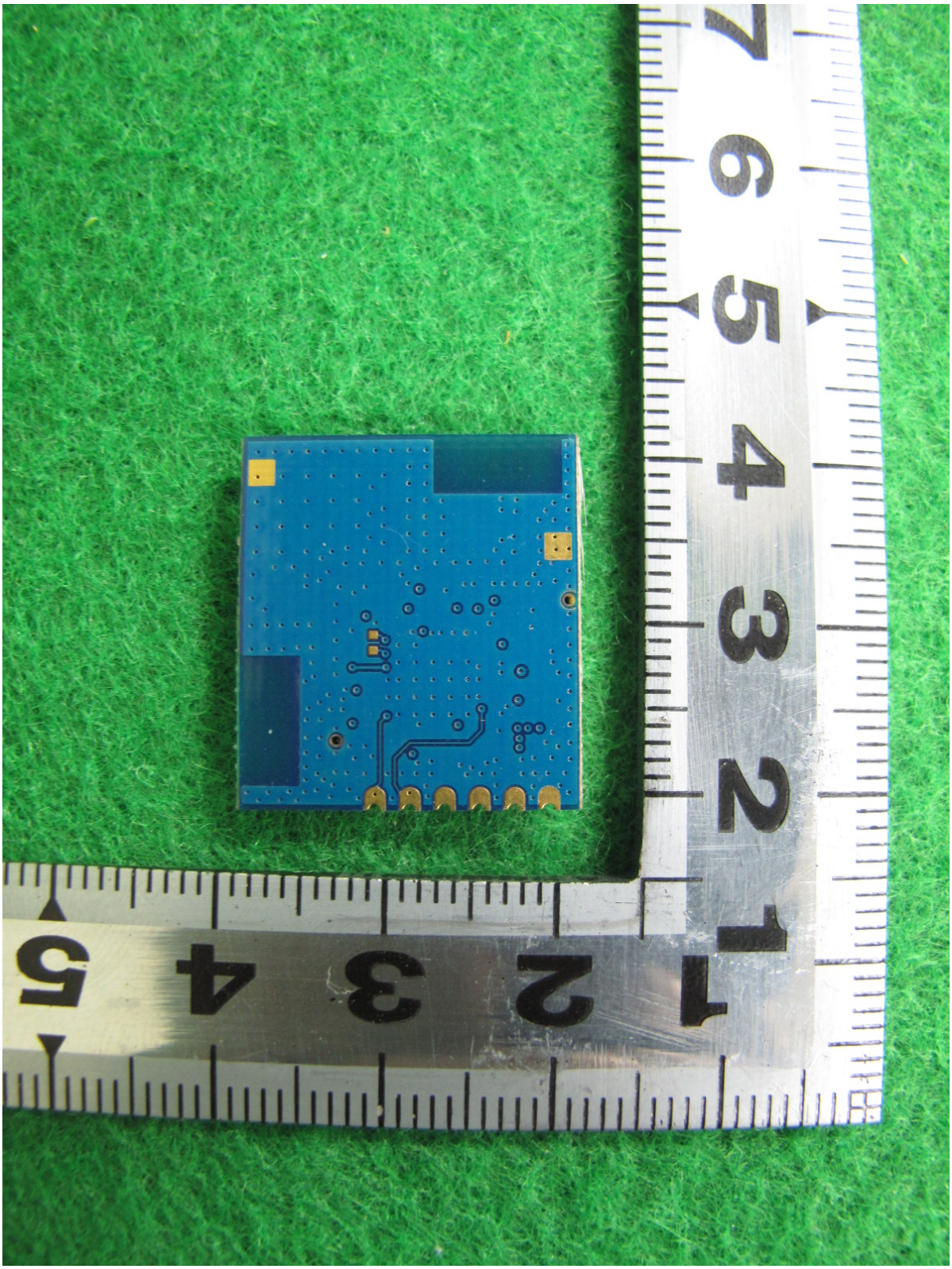
- **Radiated Test Picture (Rear)**

APPENDIX C – EUT PHOTOGRAPHS

Front View of EUT



Rear View of EUT



EUT without Shielding can