

Nemko Korea Co., Ltd.

155 & 159, Osan-Ro, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-852 KOREA, REPUBLIC OF

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FCC and IC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, Korea.
(Post code : 443-742)
Attn. : Mr. Jaywoo. Lee

Dates of Issue : December 6, 2012**Test Report No. : NK-12-R-170-1****Test Site : Nemko Korea Co., Ltd.****FCC ID**
IC**A3LWISP50S**
649E-WISP50S**Brand Name****SAMSUNG****Contact Person**

Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, Korea, 443-742.
Mr. Jaywoo. Lee
Telephone No. : +82-31-277-2569

Applied Standard: FCC 47 CFR Part 15 Subpart and IC RSS-210
Classification: Digital modulation Transmitter
EUT Type: Audio transceiver 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 C63.4-2003, ANSI C63.10. 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.

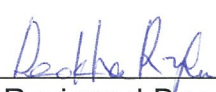

Tested By : Jin-ha Ko
Engineer*Dec - 6, 2012*
Reviewed By : Deokha Ryu
Technical Manager*Dec 6, 2012*

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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 and IC RSS-210.

Responsible Party :	Samsung Electronics Co., Ltd.
Contact Person :	Mr. Jaywoo. Lee
Manufacturer :	Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 443-742

- FCC ID: A3LWISP50S
- IC : 649E-WISP50S
- Model: WISP50S
- Brand Name: SAMSUNG
- EUT Type: Audio transceiver module
- Classification: Digital modulation Transmitter
- Applied Standard: FCC 47 CFR Part 15 subpart C and IC RSS-210
- Test Procedure(s): ANSI C63.4-2003, ANSI C63.10 and FCC guidance of 558074 D01 DTS Meas. Guidance v02 dated October 4, 2012 entitled "Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) Operating Under §15.247"
- Dates of Test: October 10, 2012 ~ December 5, 2012
- 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) was used in determining radiated and conducted emissions emanating from **Samsung Electronics Co., Ltd.**

FCC ID : A3LWISP50S and IC : 649E-WISP50S

These measurement tests were conducted at **Nemko Korea Co., Ltd. EMC Laboratory**.

The site address 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 km (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 km (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.
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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
	FCC part 15/18 Filing site	Registration No. 97992
	CAB Accreditation for DOC	Designation No. KR0026
	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. 155
	Canada IC Registered site	Site No. 2040E
	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
	EMC CBTL	-
	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

The EUT was controlled and monitored by testing Jig which manufacturer supported. The EUT have two antennas which are not working simultaneously. All tests were performed at two antenna paths then the worst case was recorded.

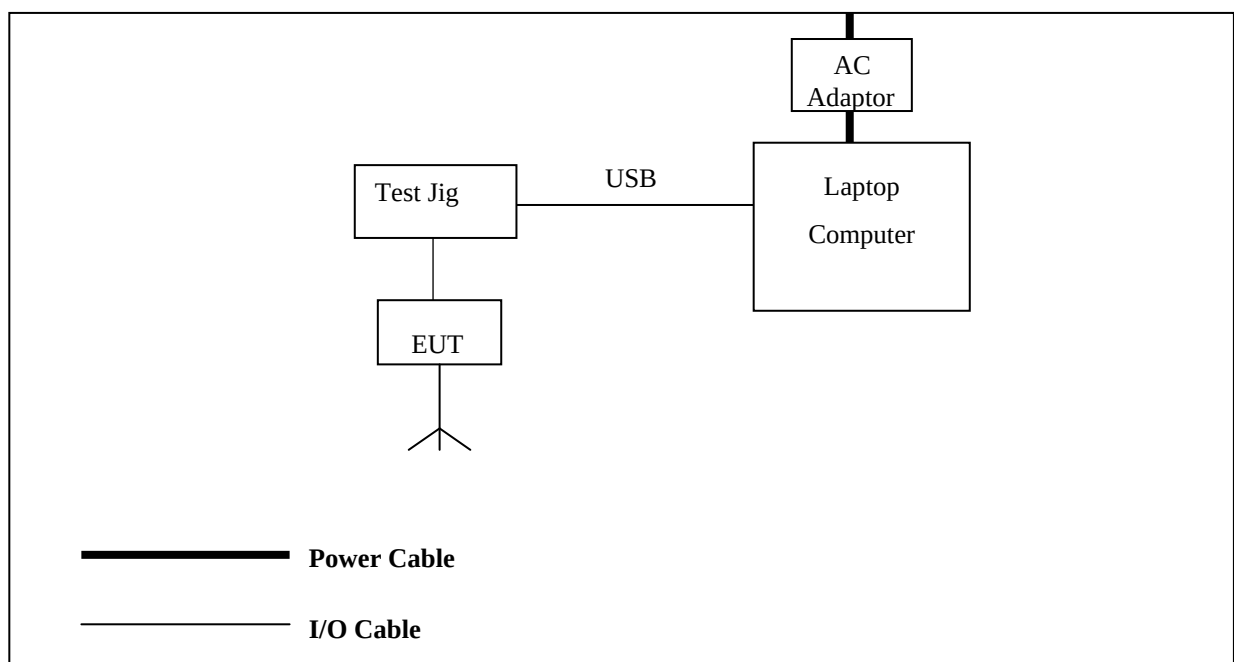
The EUT was programmed with the following power setting that used during the testing:

Frequency	2412 MHz ~ 2464 MHz	5736 MHz ~ 5814 MHz
Power setting Level	480	238

3.2 Support Equipment

EUT	Samsung Electronics Co., Ltd. FCC ID: A3LWISP50S	S/N: N/A
Laptop Computer	HP Model : HSTNN-Q61C 1.2 m shielded USB cable	FCC DOC S/N : CNF0489WDT
AC/DC Adapter	DELTA ELECTRONICS(JIANG SU), LTD Model : PPP009D 1.2 m unshielded power cable	FCC DOC S/N :WBGSV0ACXZH162

3.3 Setup Drawing



3.4 EUT Information

The EUT is the **Samsung Audio transceiver module FCC ID: A3LWISP50S, IC: 649E-WISP50S.**

Specifications:

Category	Audio transceiver module
Model Name	WISP50S
Brand Name	SAMSUNG
Frequency of Operation	2412 MHz ~ 2464 MHz 5736 MHz ~ 5814 MHz
Power Output (Conducted)	2 GHz: 16.59 dBm 5 GHz: 9.11 dBm
Channels	2 GHz: 3 ch 5 GHz: 3 ch
Antenna Gain (peak)	2 GHz : 0.9 dBi 5 GHz : 6.0 dBi
Modulations	QPSK
Temperature Range	-10 °C ~ +50 °C
Voltage	5.0 Vdc
Dimensions (D x W x H)	26 mm x 60.2 mm X 3.2 mm
Weight	5 g
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 7.2.4	Complies	
Radiated Emission	15.209	RSS-210 A8.5	Complies	
6 dB Bandwidth	15.247(a)(2)	RSS-210 A8.2	Complies	
Peak Power Output	15.247(b)(3)	RSS-210 A8.4	Complies	
Power Spectral Density	15.247(e)	RSS-210 A8.2	Complies	
Conducted Spurious Emission	15.247(d)	RSS-210 A8.5	Complies	
Radiated Spurious Emission	15.247(d)	RSS-210 A8.5	Complies	
Maximum Permissible Exposure	1.1307(b)	RSS-102	Complies	

5. RECOMMENDATION/CONCLUSION

The data collected shows that the **Samsung Audio transceiver module FCC ID: A3LWISP50S, IC : 649E-WISP50S** 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 **Samsung Audio transceiver module FCC ID: A3LWISP50S, IC: 649E-WISP50S** 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 μ H 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 (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 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.

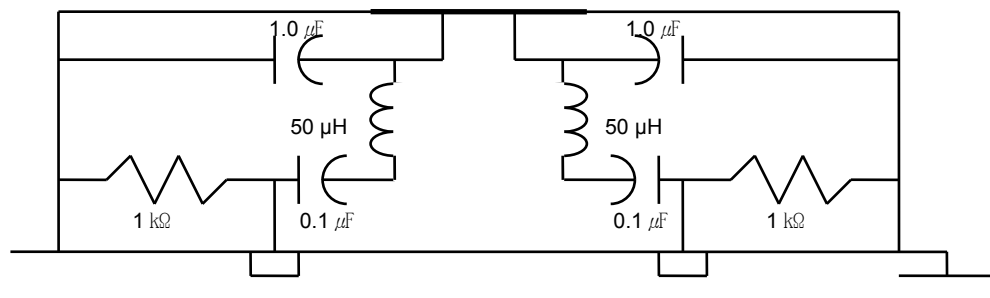


Fig. 2. LISN Schematic Diagram

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 Bi-conical log Antenna(ARA, LPB-2520/A). 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.

The test equipment was placed on turntable with 0.8 m above ground. Sufficient time for the EUT, 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 receiver (ESCS30 & FSP40) bandwidth was set to 120 kHz for measurements below 1 GHz, and 1 MHz for measurements above 1 GHz. A peak detector is used to detect an emission; a quasi-peak detector may be used to record a final measurement below 1 GHz and an average detector may be used above 1 GHz.

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)

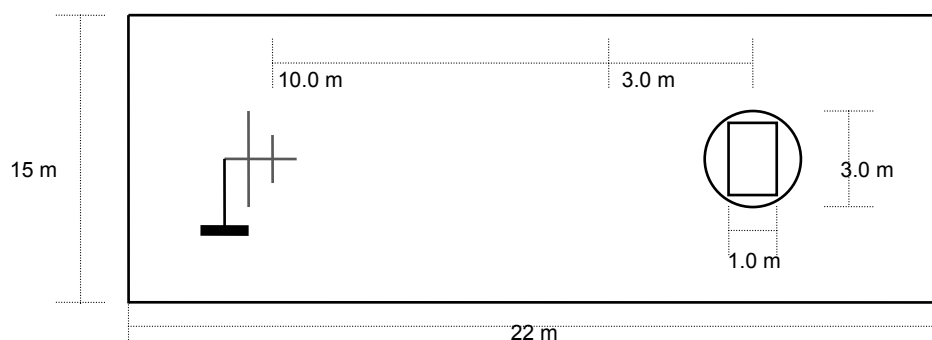
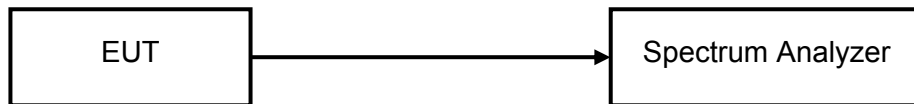


Fig. 3. Dimensions of semi anechoic chamber

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 = approximately 1-5 % of the emission bandwidth

VBW $\geq$ 3 x RBW

Detector = Peak

Trace mode = max hold

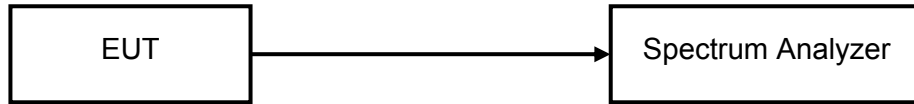
Sweep = auto couple

Allow the trace to stabilize.

The bandwidth measurement function on the spectrum analyzer is used to measure the 6 dB bandwidth.

7.4 Maximum Peak Output Power

Test Setup



Test Procedure

EUTs Maximum Peak 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.

The spectrum analyzer setting is as follows.

RBW = 1 MHz

VBW = 3 MHz

Span = fully encompass the DTS bandwidth

Detector = peak

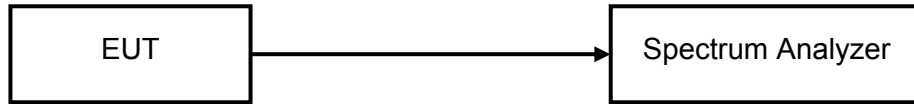
Sweep time = auto couple

Allow the trace to stabilize.

The band power measurement function on the spectrum analyzer is used to measure the Maximum peak conducted output power.

7.5 Peak Power Spectral Density

Test Setup



Test Procedure

EUTs Peak 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 = 1.5 times the DTS channel bandwidth

RBW $\geq$ 3 kHz

VBW $\geq$ 3 x RBW

Detector = peak

Sweep time = auto couple

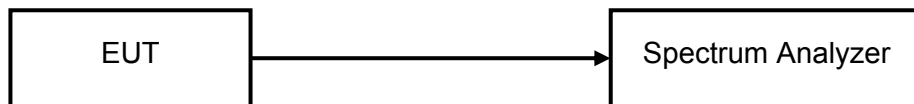
Trace mode = max hold

Allow the trace to stabilize.

The peak search function on the spectrum analyzer is used to determine the maximum amplitude level within the fundamental DTS bandwidth.

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

RBW = 100 kHz

VBW $\geq$ 300 kHz

Span = 1.5 times the DTS channel bandwidth

Detector = peak

Sweep time = auto couple

Trace mode = max hold

Allow the trace to stabilize.

The peak search function on the spectrum analyzer is used to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

2) Unwanted Emissions

RBW = 100 kHz

VBW $\geq$ 300 kHz

Span = encompass the spectrum to be examined

Detector = peak

Sweep time = auto couple

Allow the trace to stabilize.

The amplitude of all unwanted emissions outside of the authorized frequency band is confirmed that it is attenuated by at least the minimum requirements specified.

8. TEST DATA

8.1 Conducted Emissions

FCC §15.207, RSS-Gen

2.4 GHz mode

Frequency (MHz)	Level(dBμV)		*)Factor (dB)	**) Line	Limit(dBμV)		Margin(dB)	
	Q-Peak	Average			Q-Peak	Average	Q-Peak	Average
0.15	55.2	44.3	0.2	N	66.0	56.0	10.8	11.7
0.23	48.7	42.8	0.2	N	62.4	52.4	13.7	9.6
0.31	42.6	38.2	0.2	L	60.0	50.0	17.4	11.8
0.39	37.1	34.2	0.2	L	58.1	48.1	21.0	13.9
0.62	37.1	35.8	0.1	L	56.0	46.0	18.9	10.2
27.64	39.5	39.1	1.7	L	60.0	50.0	20.5	10.9

Line Conducted Emissions Tabulated Data

5.8 GHz mode

Frequency (MHz)	Level(dBμV)		*)Factor (dB)	**) Line	Limit(dBμV)		Margin(dB)	
	Q-Peak	Average			Q-Peak	Average	Q-Peak	Average
0.15	53.3	44.2	0.2	N	66.0	56.0	12.7	11.8
0.23	46.9	41.6	0.2	L	62.4	52.4	15.5	10.8
0.31	43.3	39.8	0.2	L	60.0	50.0	16.7	10.2
0.39	36.9	34.4	0.2	L	58.1	48.1	21.2	13.7
0.55	38.7	36.2	0.2	N	56.0	46.0	17.3	9.8
27.64	39.4	39.3	1.7	L	60.0	50.0	20.6	10.7

Line Conducted Emissions Tabulated Data

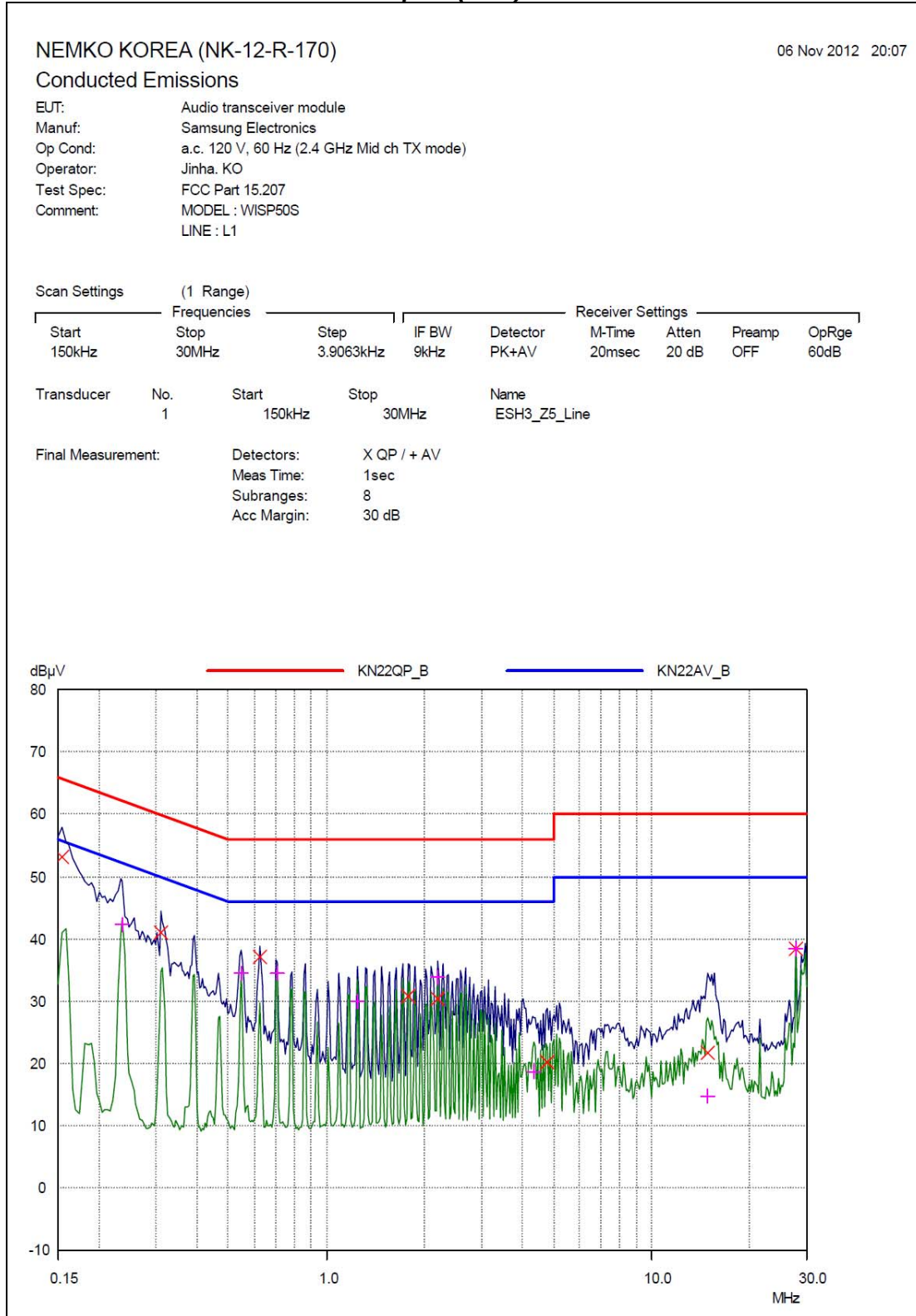
Notes:

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).

PLOTS OF EMISSIONS

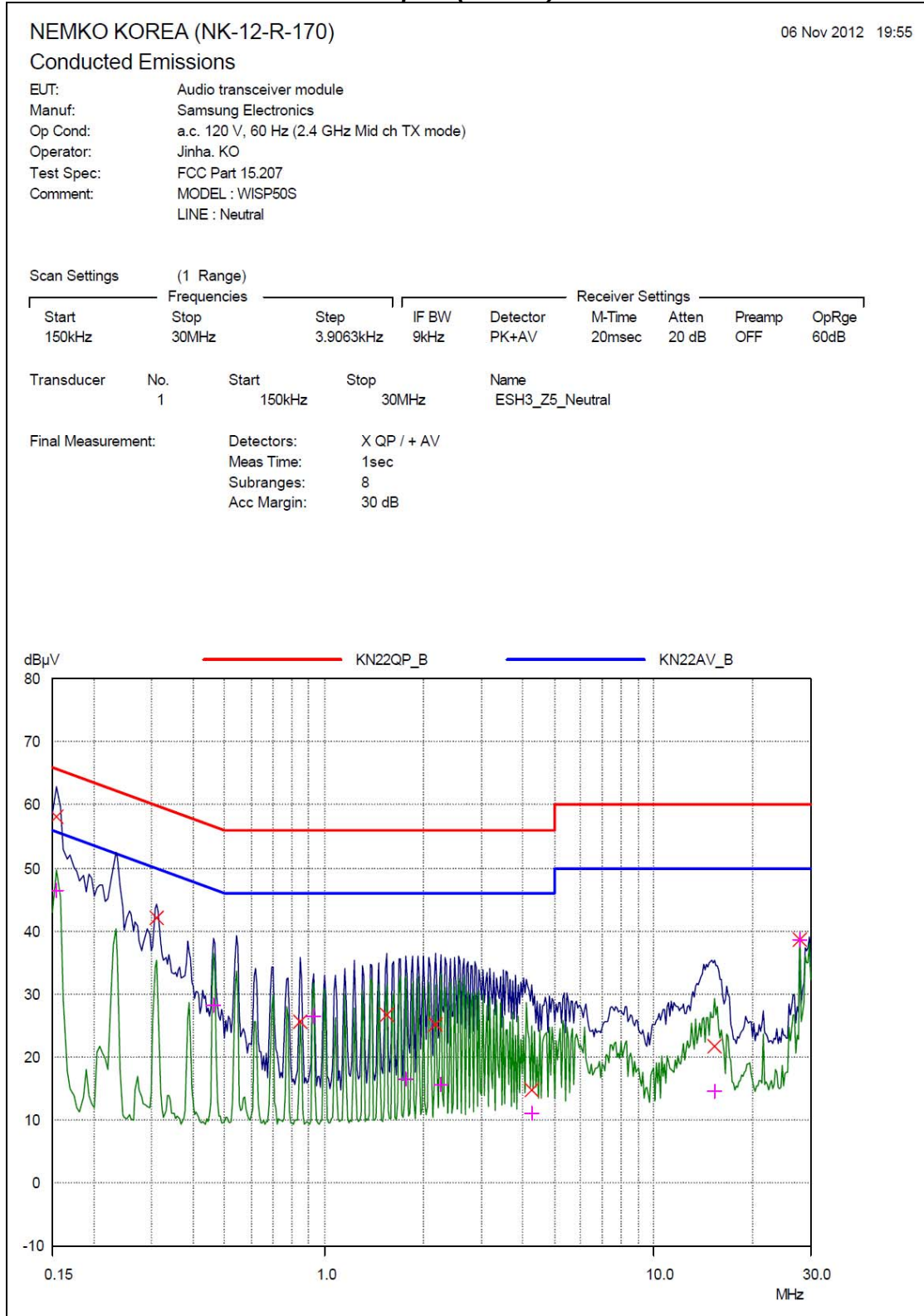
2.4 GHz mode

Conducted Emission at the Mains port (Line)



PLOTS OF EMISSIONS

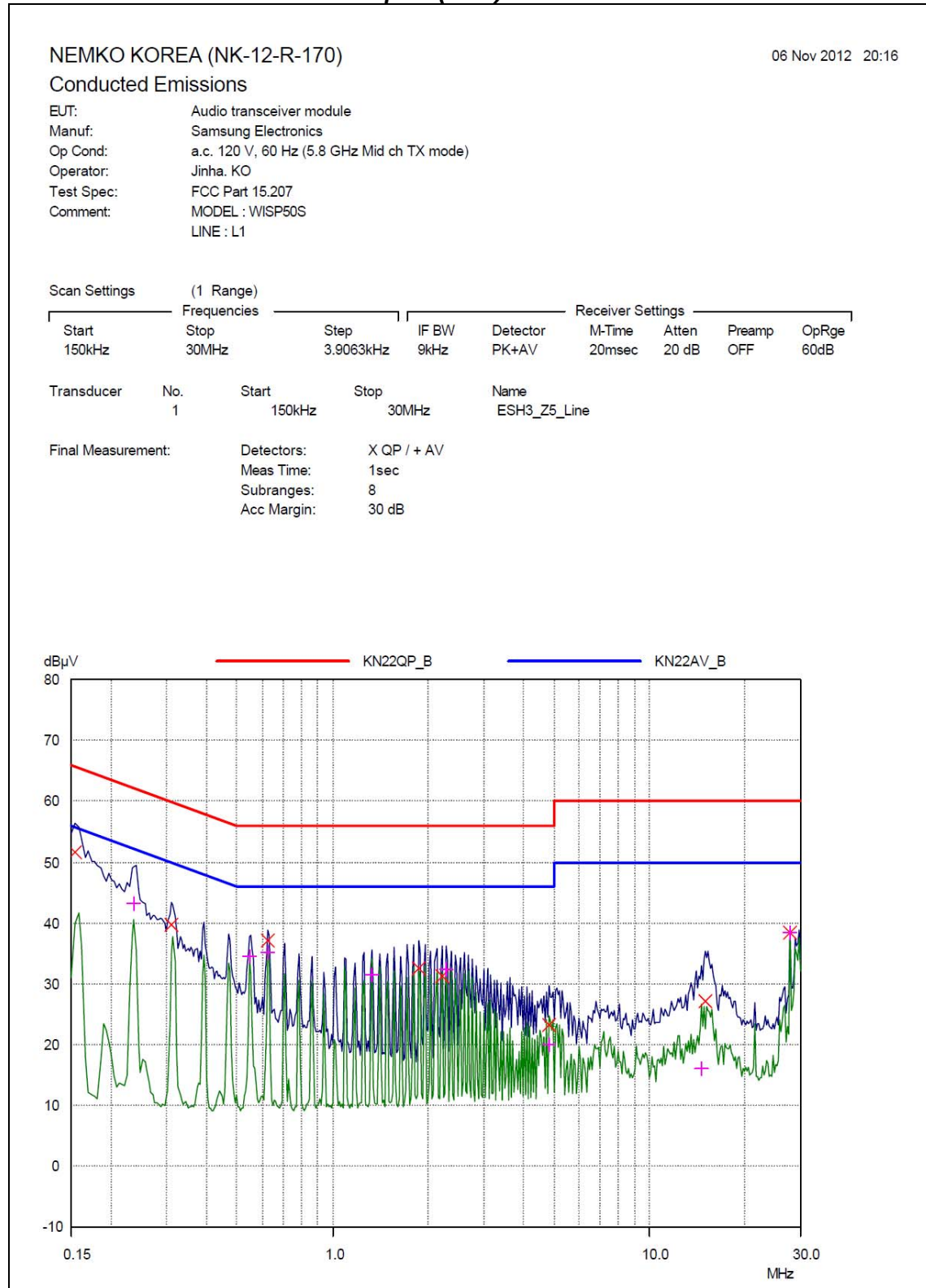
Conducted Emission at the Mains port (Neutral)



PLOTS OF EMISSIONS

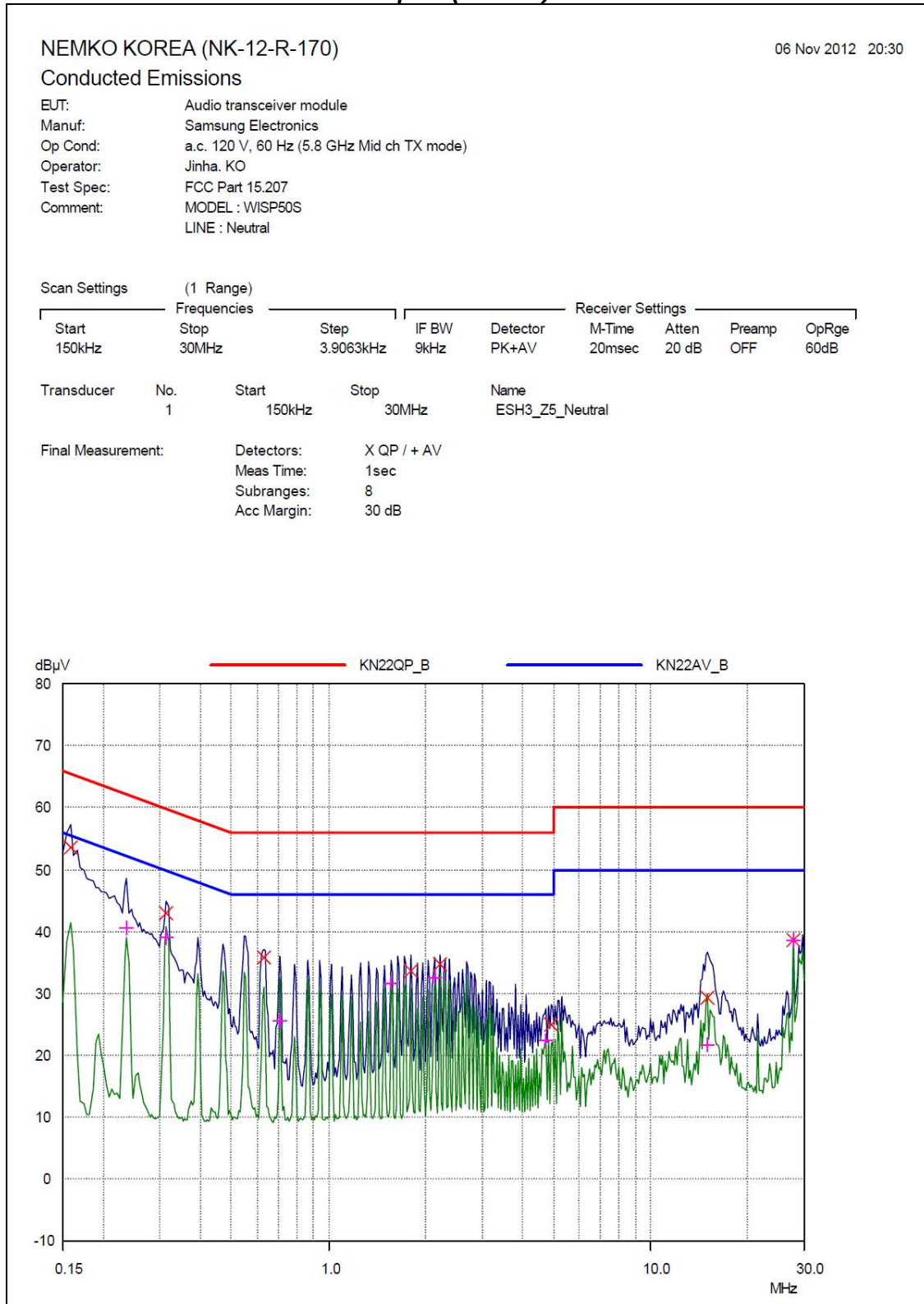
5.8 GHz mode

Conducted Emission at the Mains port (Line)



PLOTS OF EMISSIONS

Conducted Emission at the Mains port (Neutral)



TEST DATA

8.2 Radiated Emissions

FCC §15.209, RSS-210 A8.5

2.4 GHz mode

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Antenna Height (cm)	Turntable Angles (°)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
36.89	55.5	V	100	222	-21.8	33.7	40.0	6.3
184.33	58.4	H	385	40	-24.8	33.6	43.5	9.9
233.46	60.4	H	385	73	-21.8	38.6	46.0	7.4
258.05	62.6	H	385	69	-20.8	41.8	46.0	4.2
264.01	60.4	H	315	86	-20.6	39.8	46.0	6.2
276.87	60.1	H	385	237	-20.3	39.8	46.0	6.2

Radiated Measurements at 3meters

5.8 GHz mode

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Antenna Height (cm)	Turntable Angles (°)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
36.84	54.8	V	115	195	-21.8	33.0	40.0	7.0
184.33	58.5	H	385	45	-24.8	33.7	43.5	9.8
208.92	54.4	V	100	71	-23.2	31.2	43.5	12.3
233.46	60.3	H	385	72	-21.8	38.5	46.0	7.5
258.05	62.5	H	301	82	-20.8	41.7	46.0	4.3
264.01	60.8	H	315	75	-20.6	40.2	46.0	5.8

Radiated Measurements at 3meters

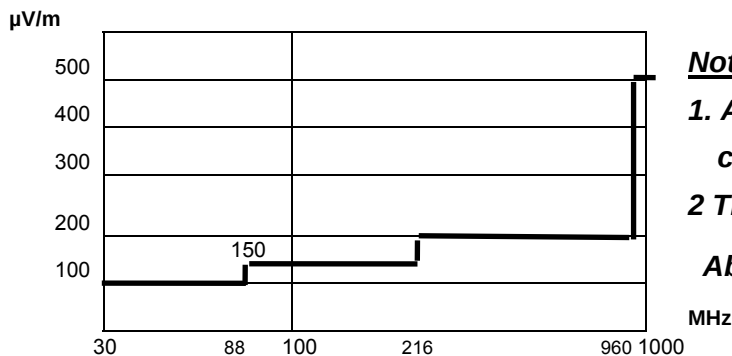


Fig. 4. Limits at 3 meters

Notes:

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

2 The radiated limits are shown on Figure 4.

Above 1 GHz the limit is 500 μV/m.

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 radiated emissions testing were made by rotating through three orthogonal axes.
The worst date was recorded.*
5. *The limit is on the FCC Part section 15.209(a).*

TEST DATA

8.3 6 dB Modulated Bandwidth

FCC §15.247(a)(2), RSS-210 A8.2

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

2.4 GHz band

Ant A

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	10203	500	9703
Middle	2438	10255	500	9755
High	2464	10263	500	9763

Ant B

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	2412	10264	500	9764
Middle	2438	10257	500	9757
High	2464	10264	500	9764

5.8 GHz band

Ant A

Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	5736	10247	500	9747
Middle	5762	10257	500	9757
High	5814	10268	500	9768

Ant B

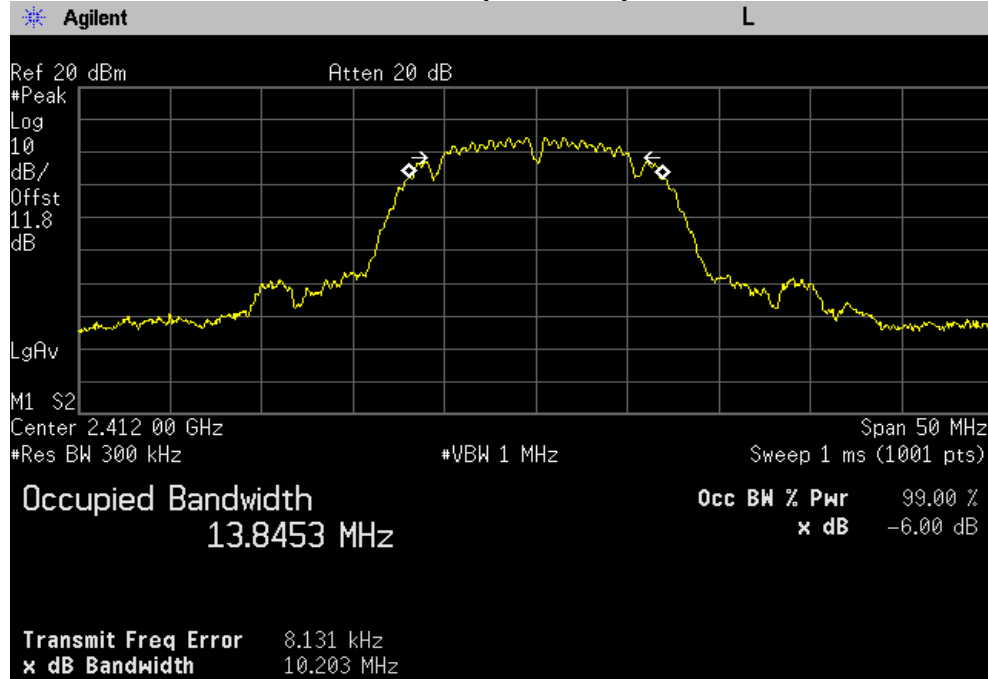
Channel	Frequency(MHz)	Result(kHz)	Limit(kHz)	Margin(kHz)
Low	5736	10251	500	9751
Middle	5762	10256	500	9756
High	5814	10266	500	9766

PLOTS OF EMISSIONS

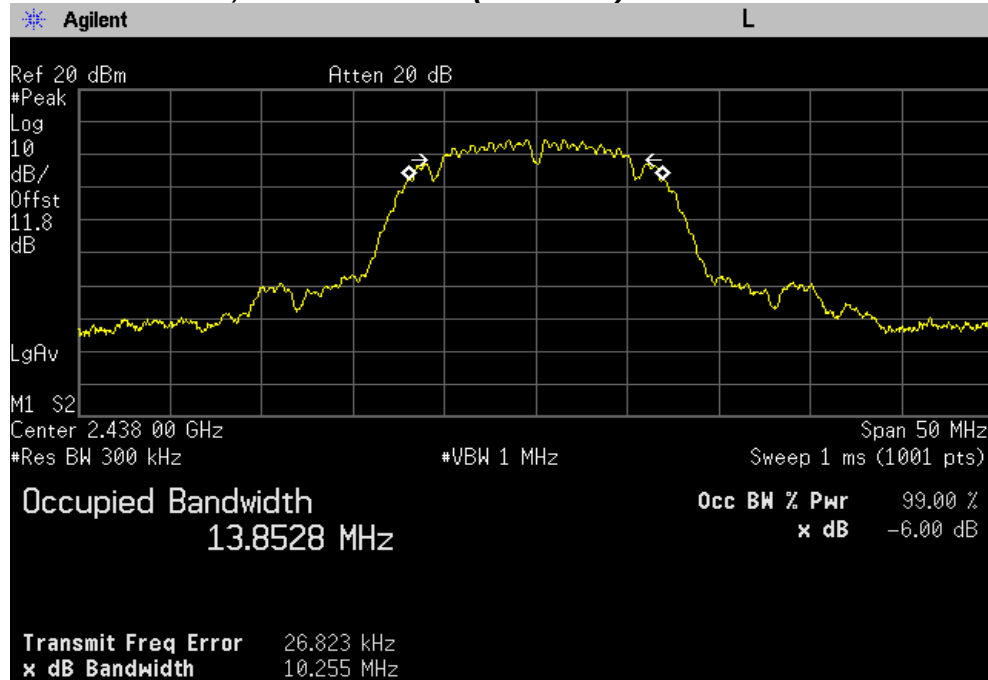
2.4 GHz band

Ant A

6 dB Bandwidth, Lowest Channel (2412 MHz)

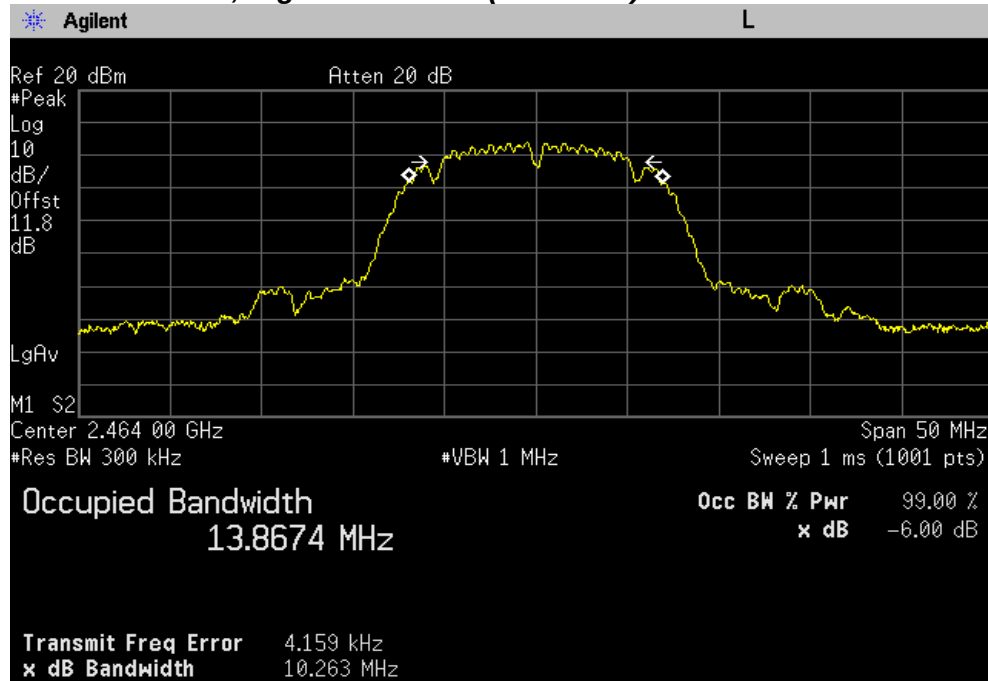


6 dB Bandwidth, Middle Channel (2438 MHz)



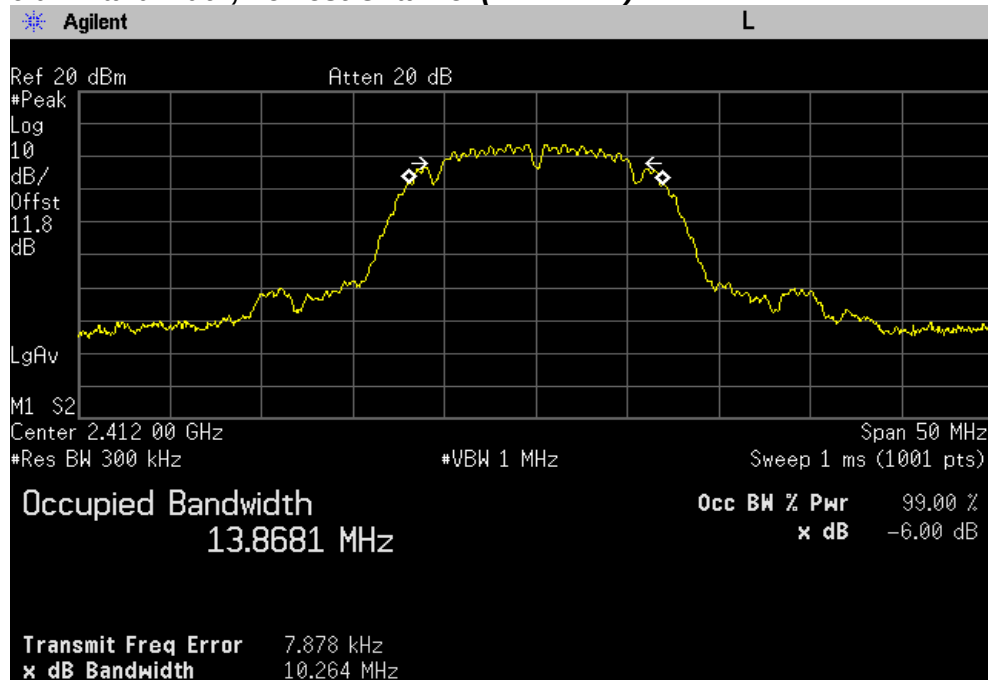
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (2464 MHz)



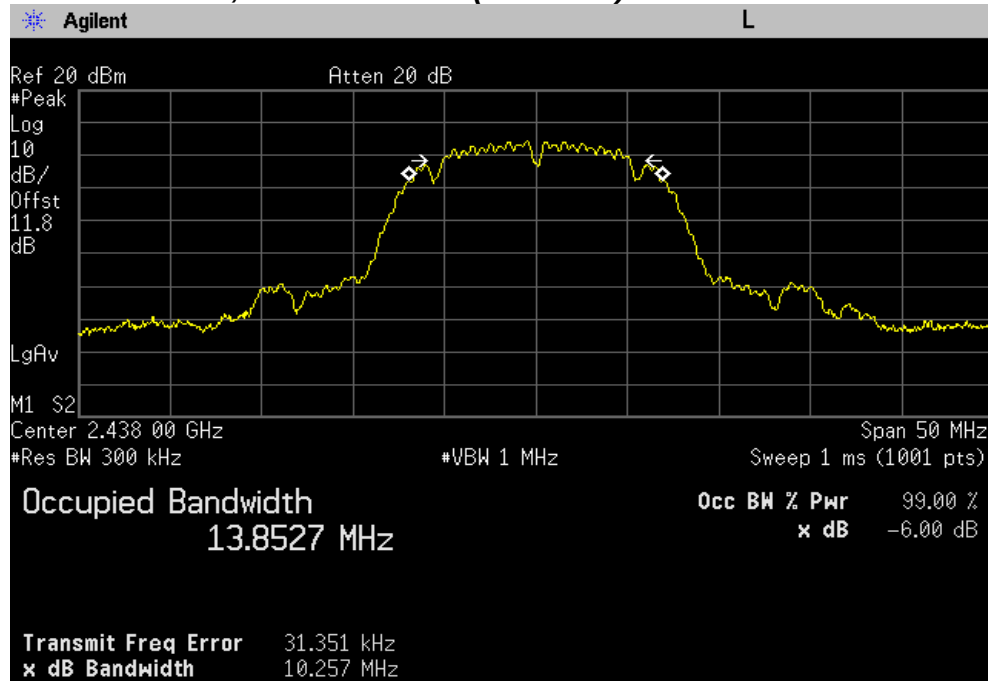
Ant B

6 dB Bandwidth, Lowest Channel (2412 MHz)

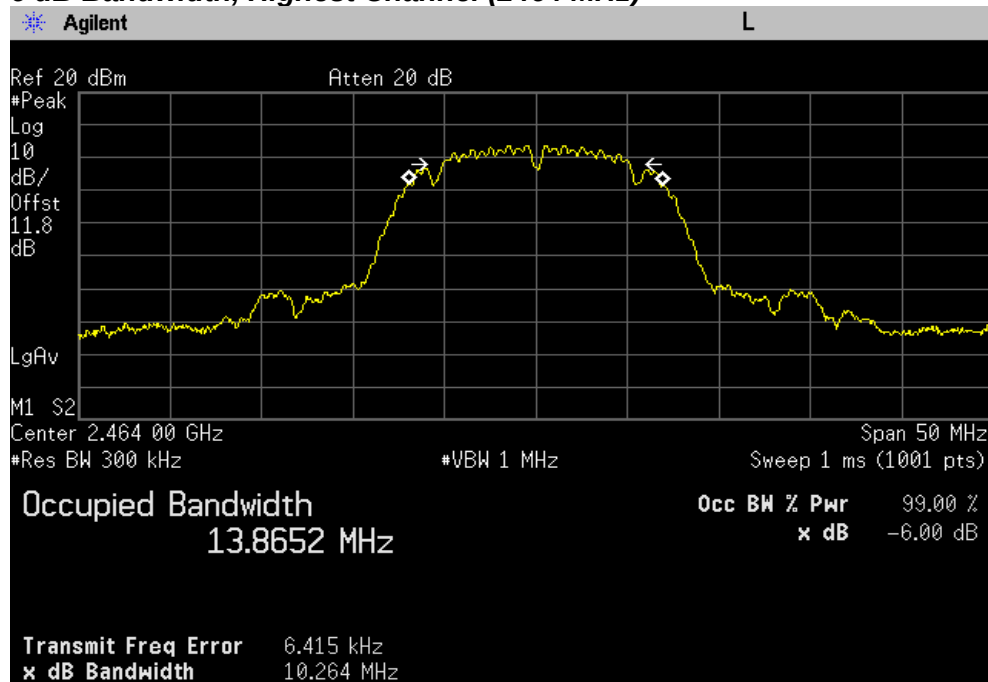


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (2438 MHz)



6 dB Bandwidth, Highest Channel (2464 MHz)

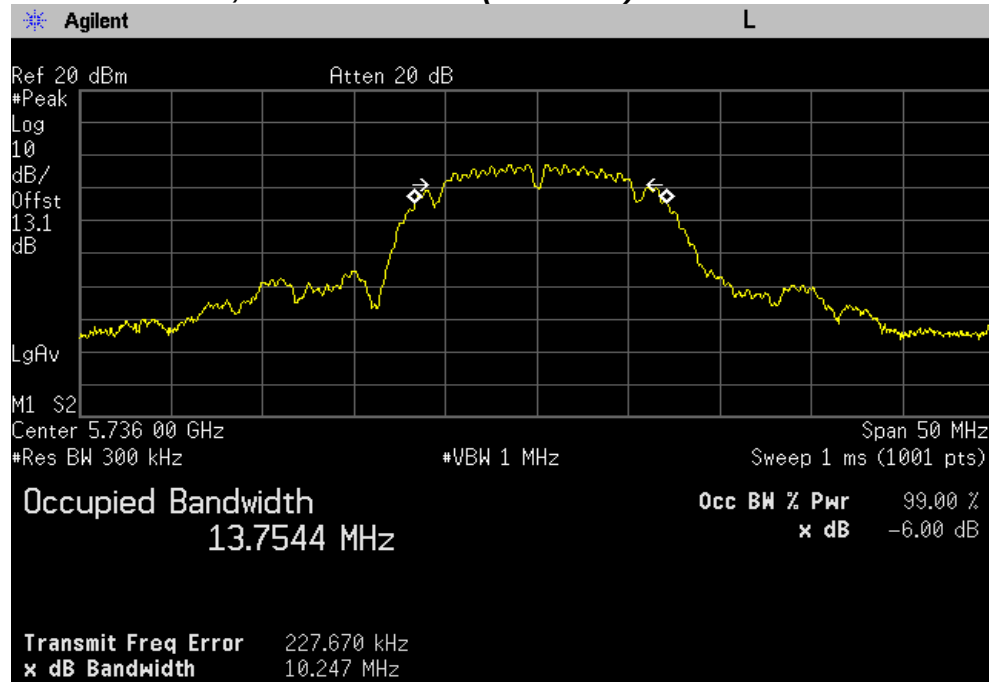


PLOTS OF EMISSIONS

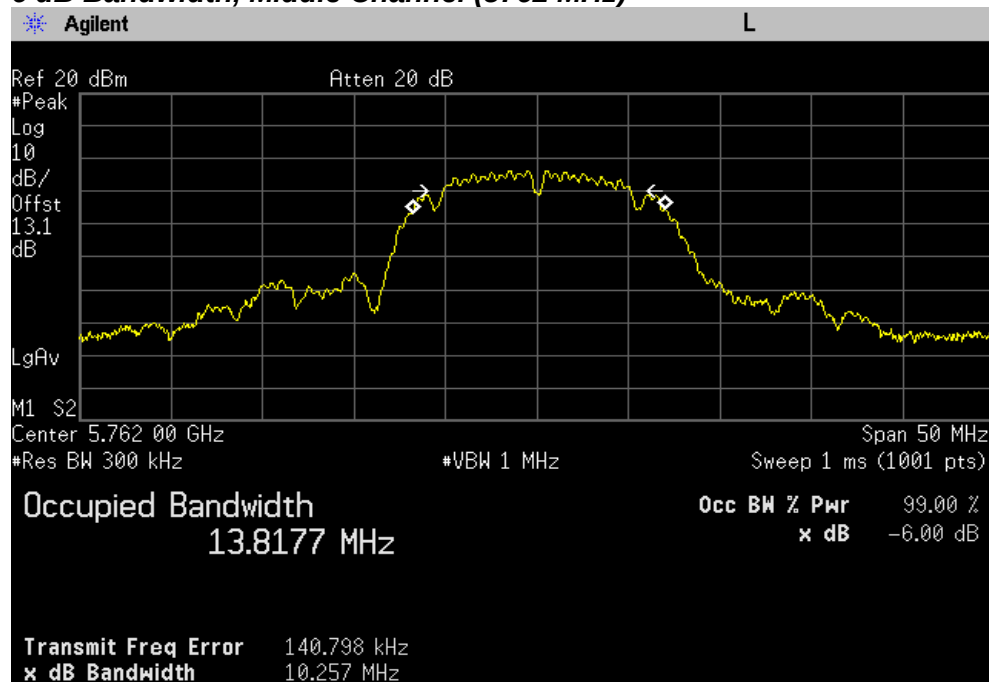
5.8 GHz band

Ant A

6 dB Bandwidth, Lowest Channel (5736 MHz)

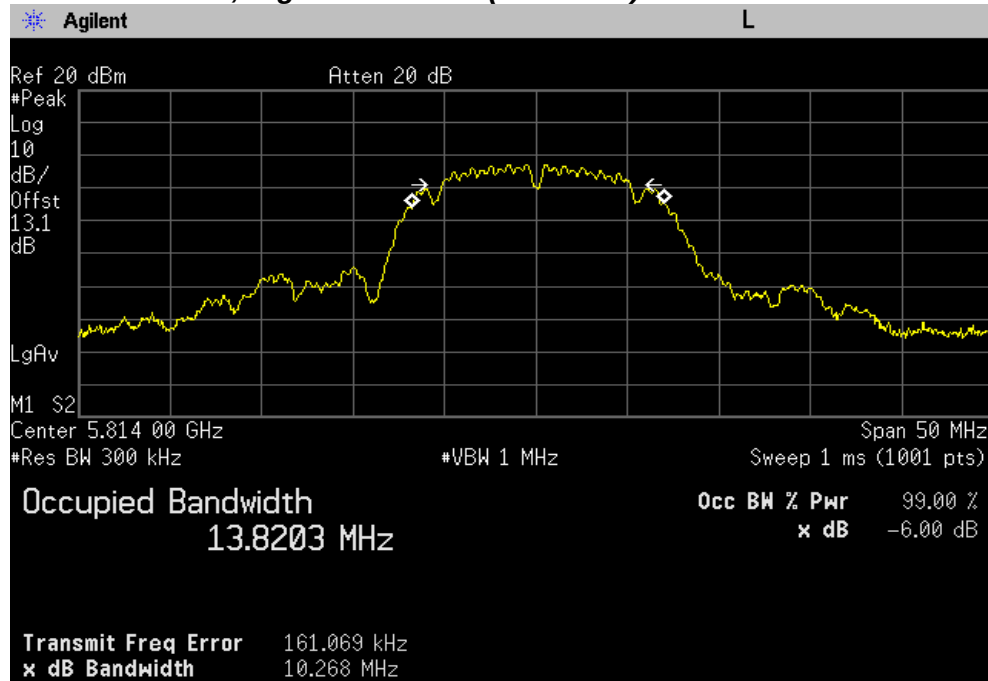


6 dB Bandwidth, Middle Channel (5762 MHz)



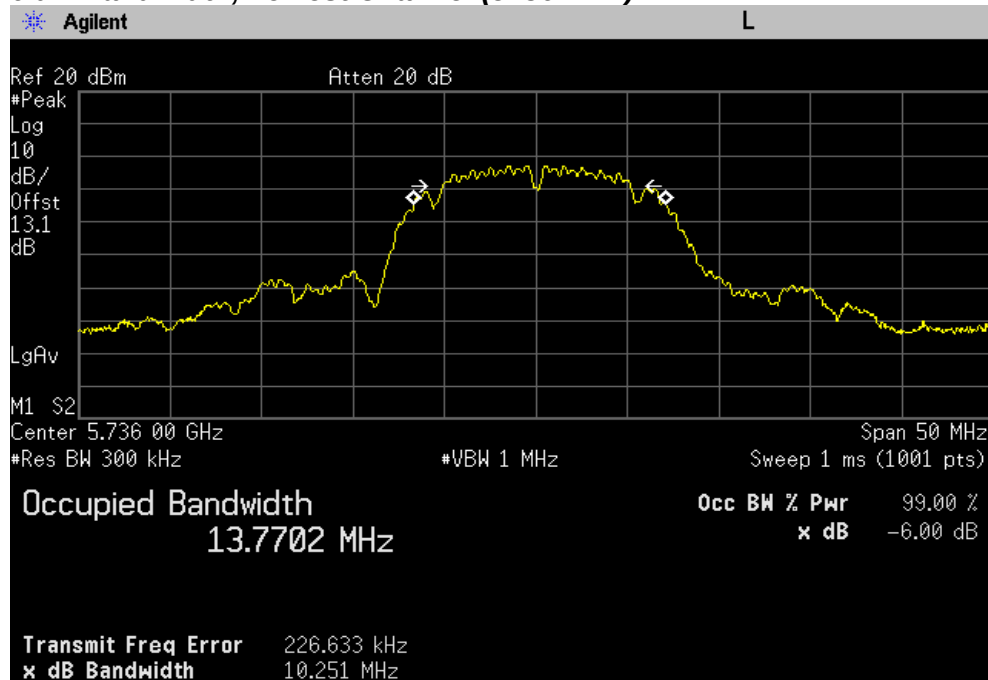
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (5814 MHz)



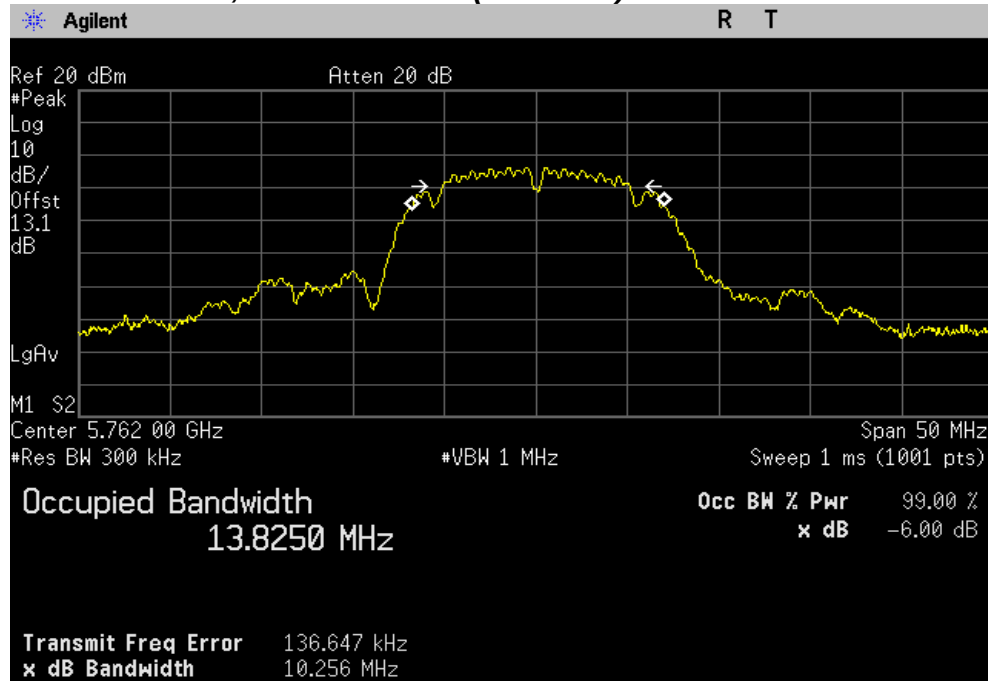
Ant B

6 dB Bandwidth, Lowest Channel (5736 MHz)

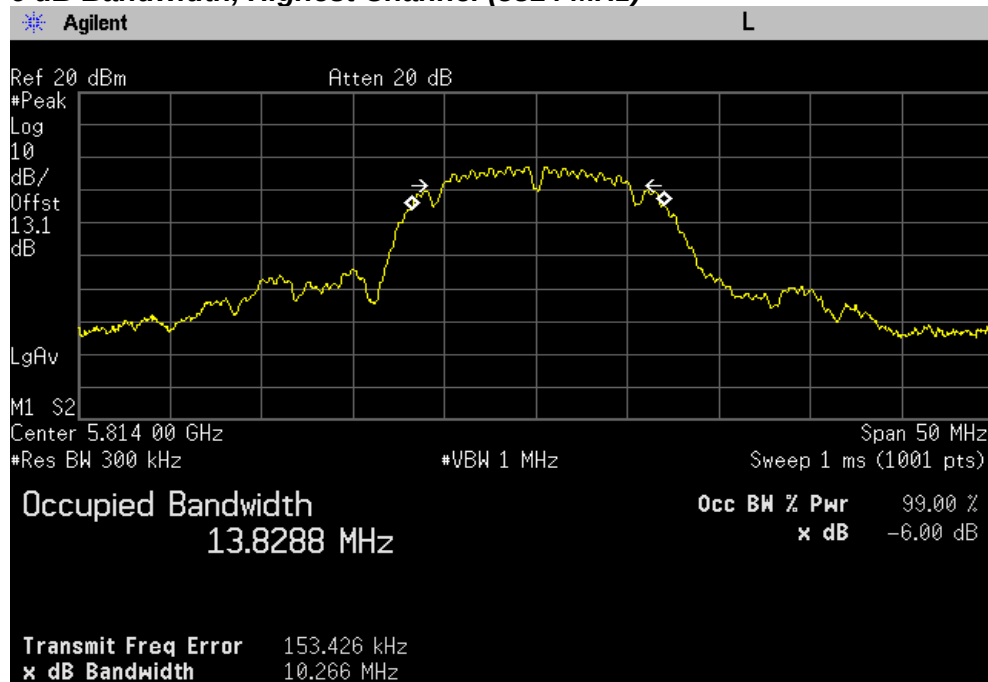


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (5762 MHz)



6 dB Bandwidth, Highest Channel (5814 MHz)



TEST DATA

8.4 Maximum Peak Power Output

FCC §15.247(b)(3), RSS-210 A8.4

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

2.4 GHz band

Ant A

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	16.30	30.00	13.70
Middle	2438	16.59	30.00	13.41
High	2464	15.81	30.00	14.19

Ant B

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	15.66	30.00	14.34
Middle	2438	16.19	30.00	13.81
High	2464	15.65	30.00	14.35

5.8 GHz band

Ant A

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5736	9.05	30.00	20.95
Middle	5762	8.08	30.00	21.92
High	5814	8.95	30.00	21.05

Ant B

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5736	9.11	30.00	20.89
Middle	5762	8.23	30.00	21.77
High	5814	9.09	30.00	20.91

Note:

The following equation was used for spectrum offset:

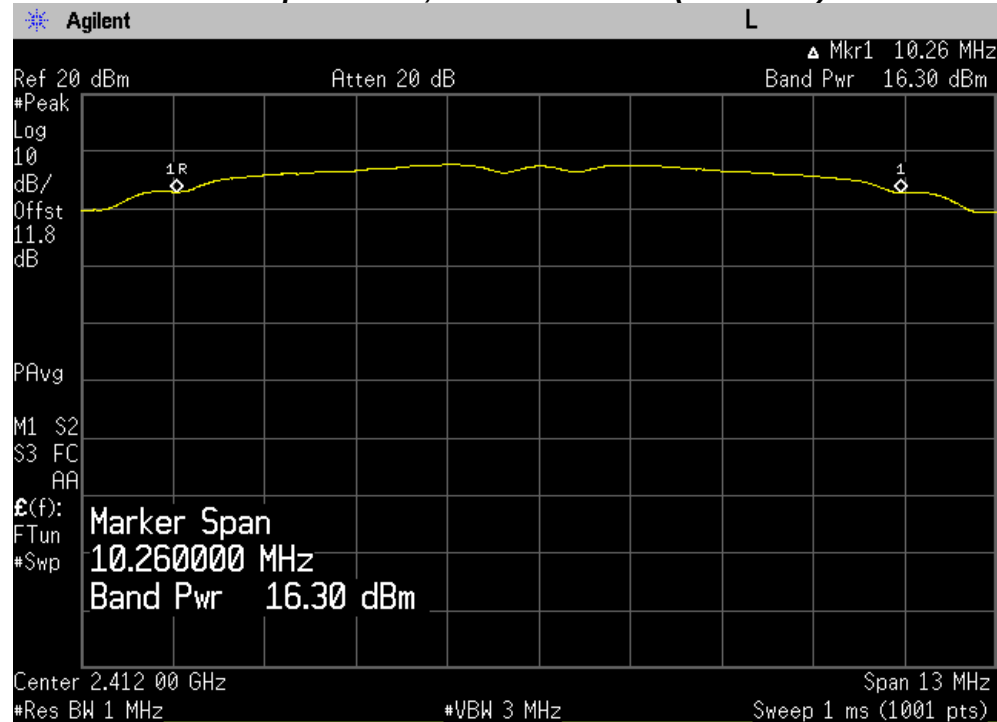
$$\text{Spectrum offset (dB)} = \text{Attenuator (dB)} + \text{Cable Loss (dB)} + \text{SMA Type Connector Loss (dB)}$$

PLOT OF TEST DATA

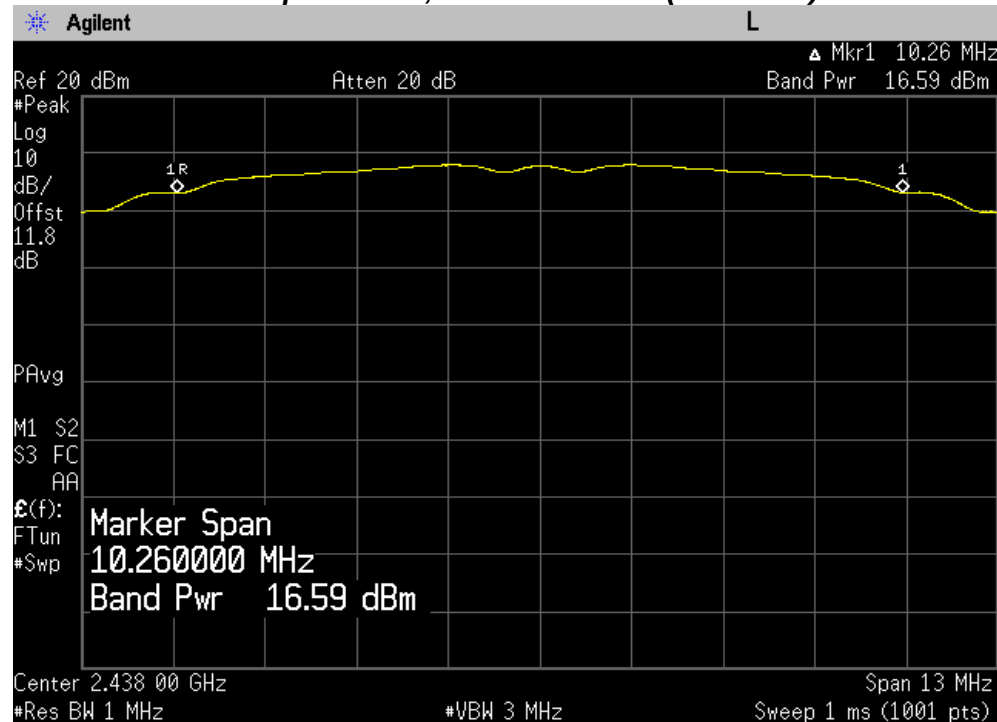
2.4 GHz band

Ant A

Maximum Peak Output Power, Lowest Channel (2412 MHz)

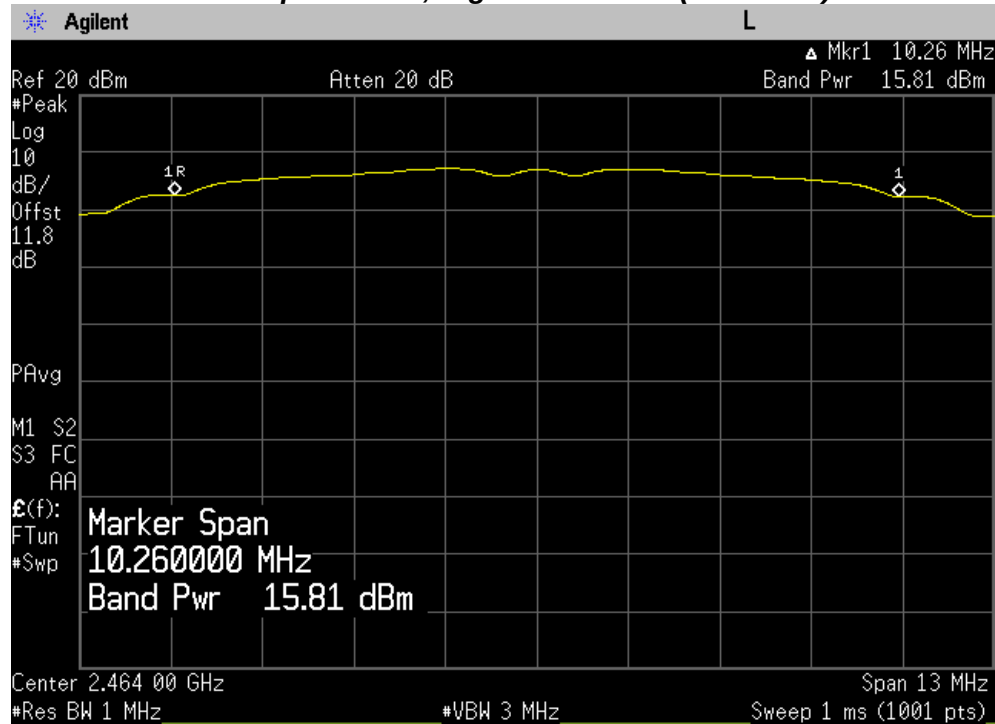


Maximum Peak Output Power, Middle Channel (2438 MHz)



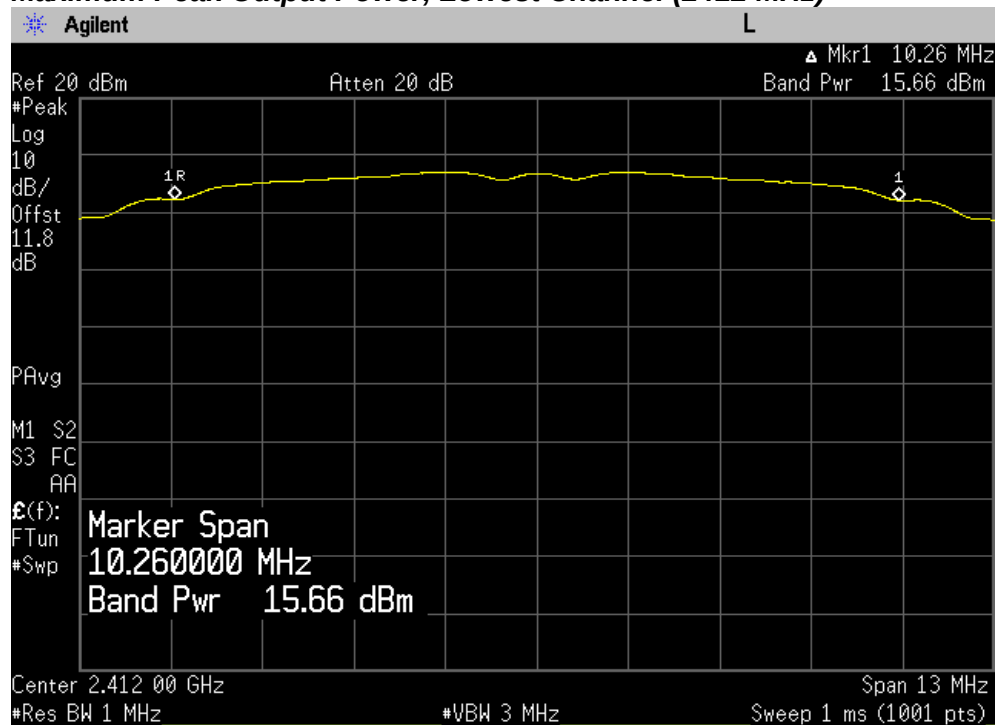
PLOT OF TEST DATA

Maximum Peak Output Power, Highest Channel (2464 MHz)



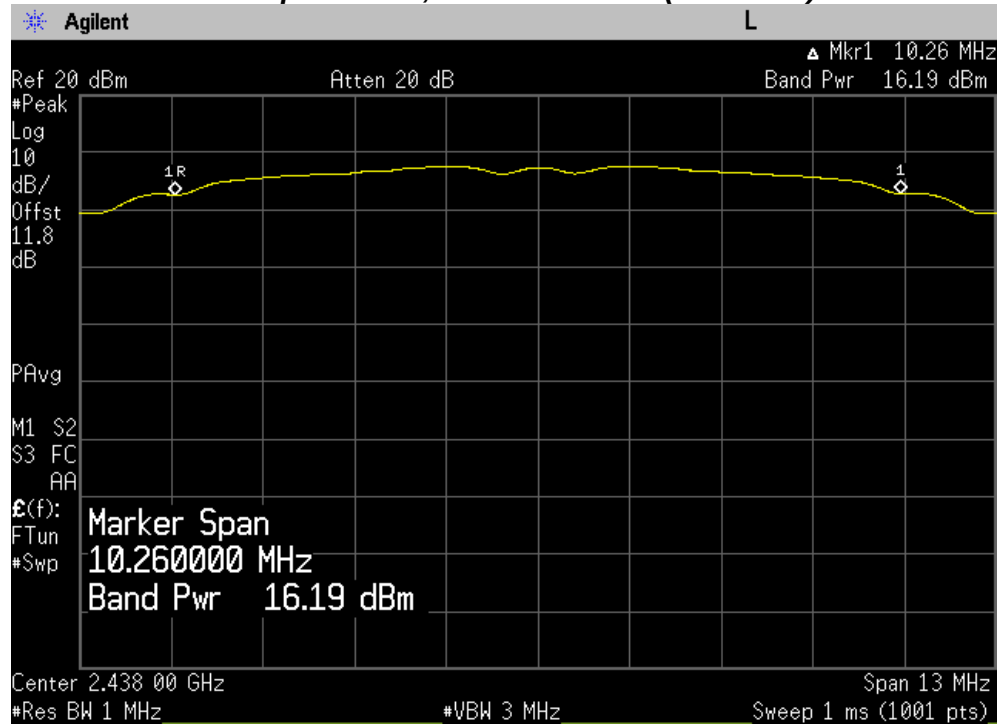
Ant B

Maximum Peak Output Power, Lowest Channel (2412 MHz)

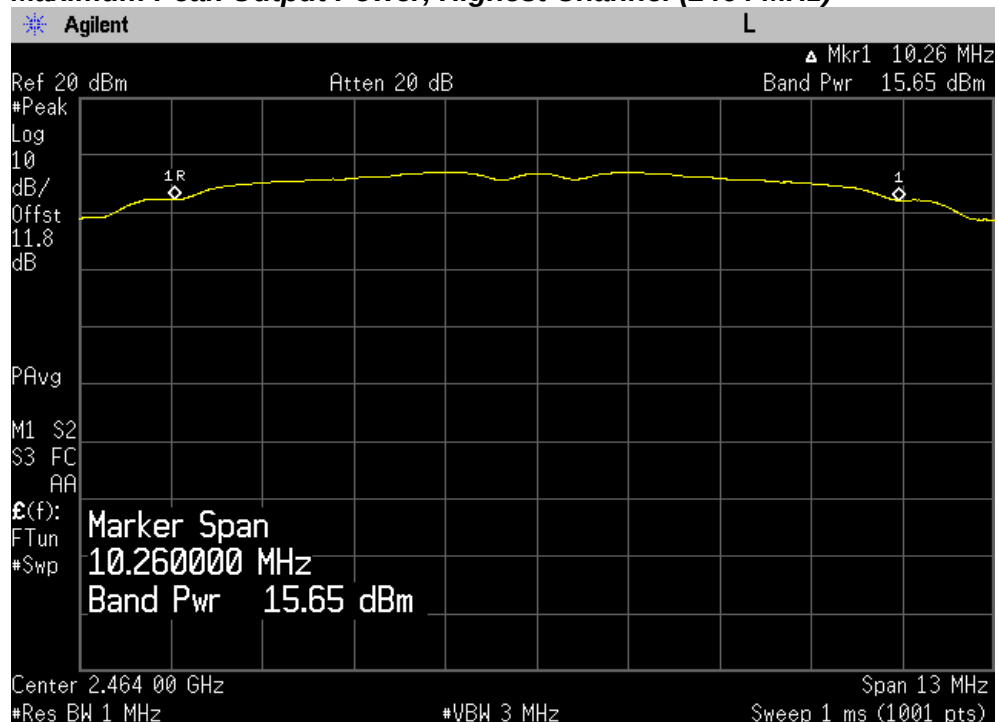


PLOT OF TEST DATA

Maximum Peak Output Power, Middle Channel (2438 MHz)



Maximum Peak Output Power, Highest Channel (2464 MHz)

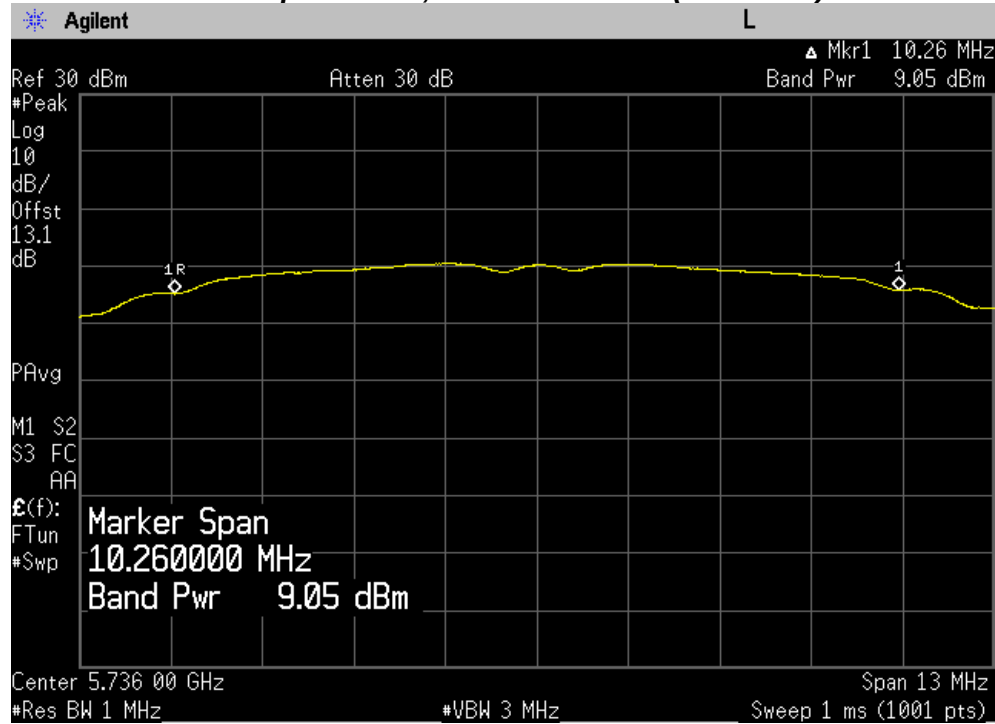


PLOT OF TEST DATA

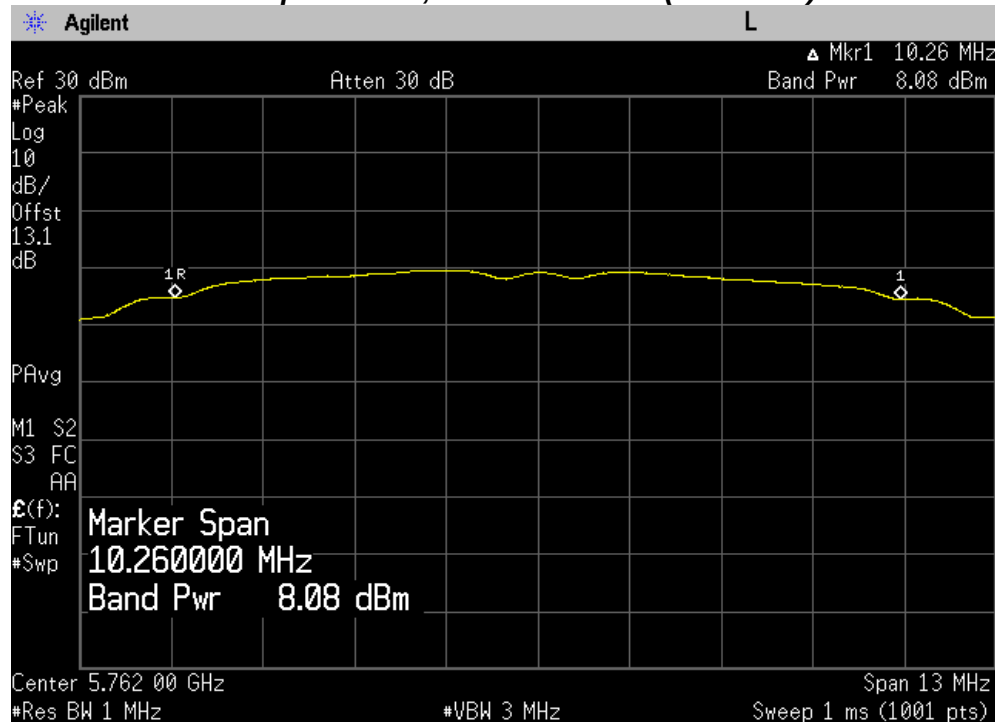
5.8 GHz band

Ant A

Maximum Peak Output Power, Lowest Channel (5736 MHz)

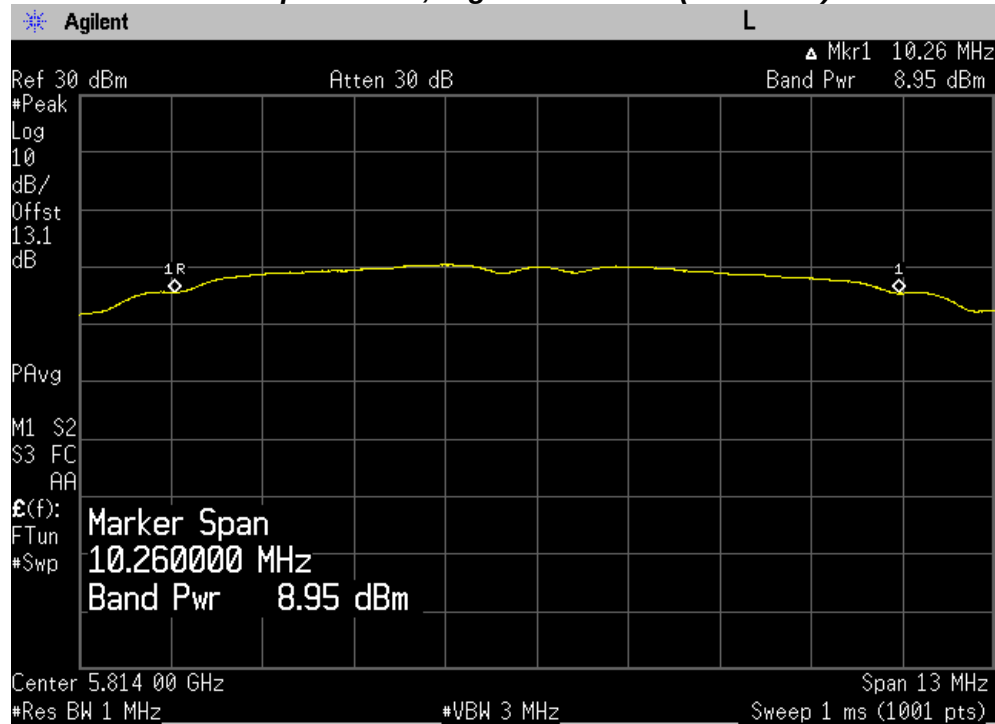


Maximum Peak Output Power, Middle Channel (5762 MHz)



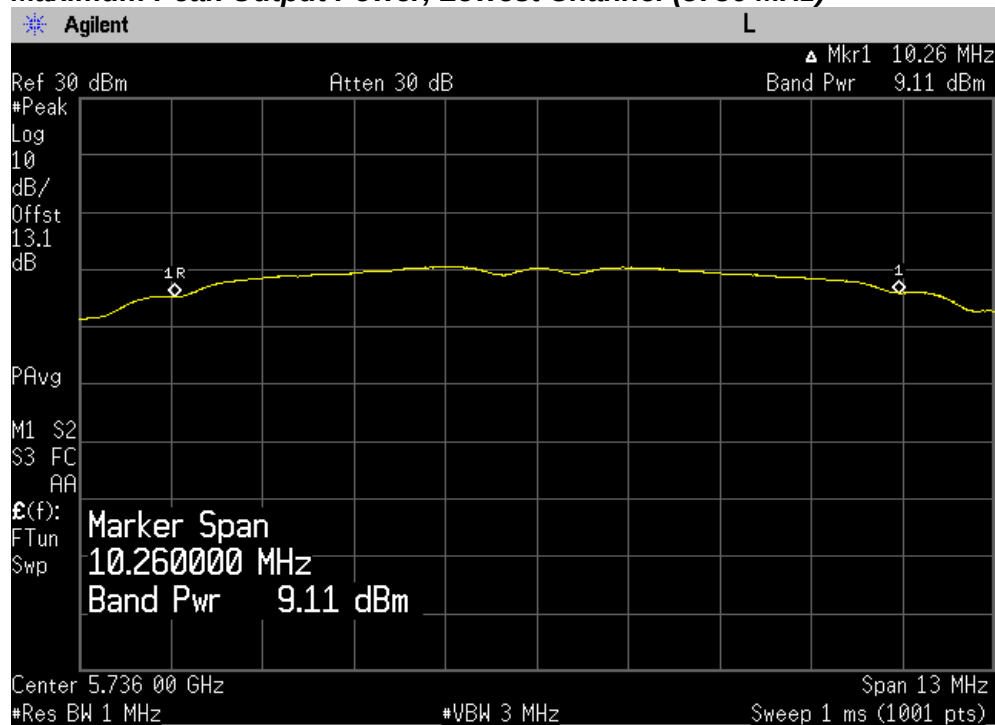
PLOT OF TEST DATA

Maximum Peak Output Power, Highest Channel (5814 MHz)



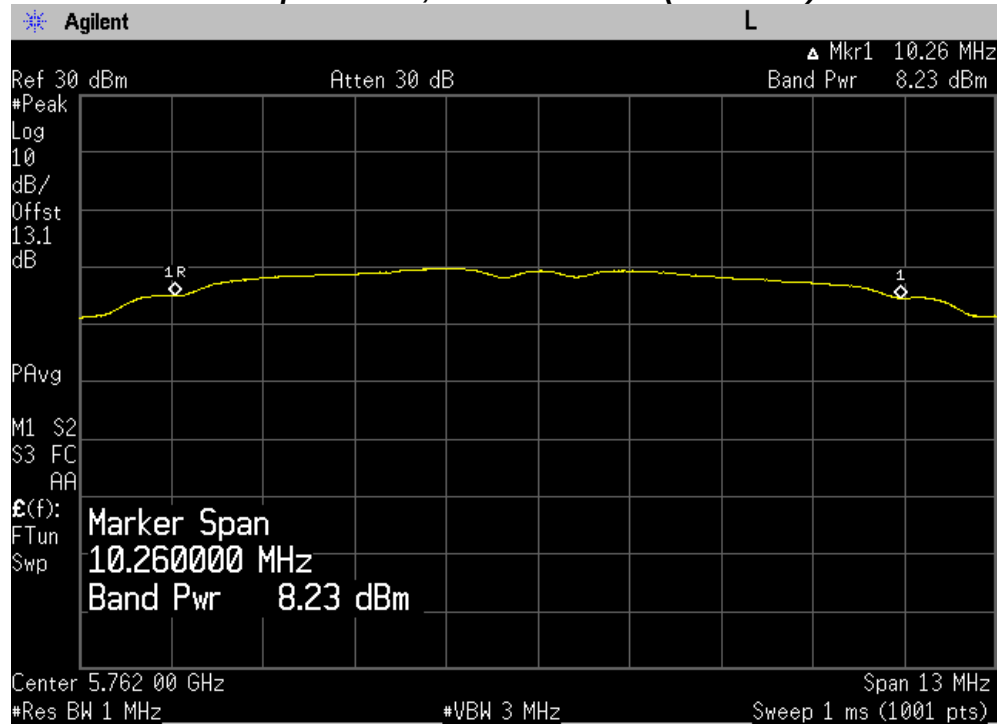
Ant B

Maximum Peak Output Power, Lowest Channel (5736 MHz)

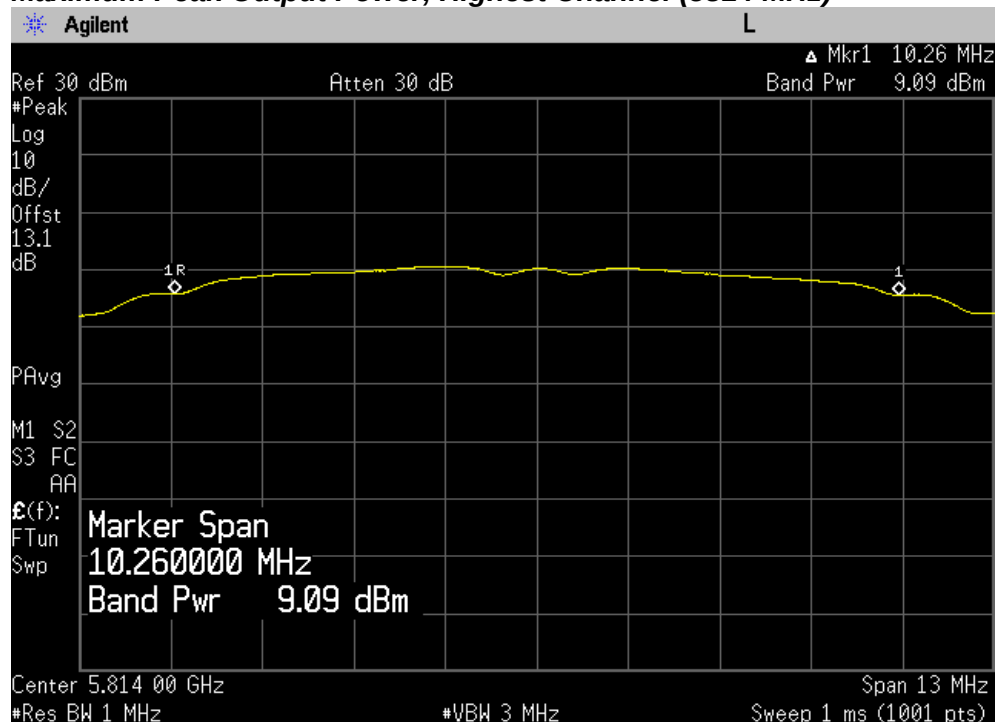


PLOT OF TEST DATA

Maximum Peak Output Power, Middle Channel (5762 MHz)



Maximum Peak Output Power, Highest Channel (5814 MHz)



TEST DATA

8.5 Power Spectral Density

FCC §15.247(e), RSS-210 A8.2

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

2.4 GHz band

Ant A

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-1.05	8	9.05
Middle	2438	-1.08	8	9.08
High	2464	-1.74	8	9.74

Ant B

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-1.49	8	9.49
Middle	2438	-0.99	8	8.99
High	2464	-1.59	8	9.59

5.8 GHz band

Ant A

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	5736	-8.44	8	16.44
Middle	5762	-9.43	8	17.43
High	5814	-8.52	8	16.52

Ant B

Channel	Frequency (MHz)	Measured Power Spectral Density (dBm)	Limit (dBm)	Margin (dB)
Low	5736	-8.27	8	16.27
Middle	5762	-9.31	8	17.31
High	5814	-8.38	8	16.38

Note:

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

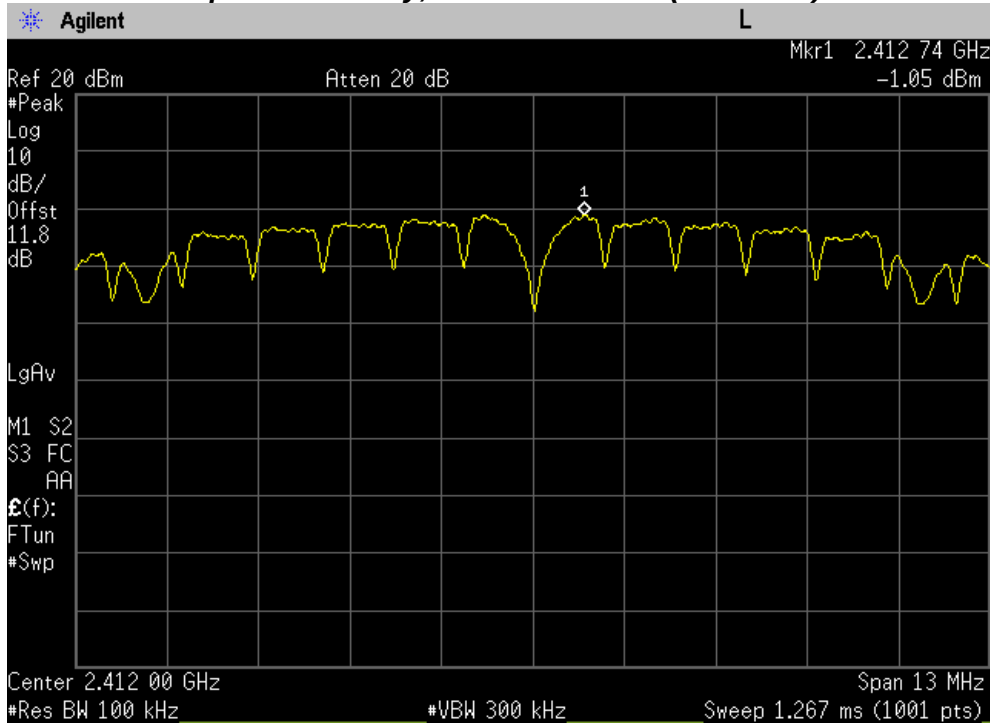
$\text{Spectrum offset (dB)} = \text{Attenuator (dB)} + \text{Cable Loss (dB)} + \text{SMA Type Connector Loss (dB)}$

PLOT OF TEST DATA

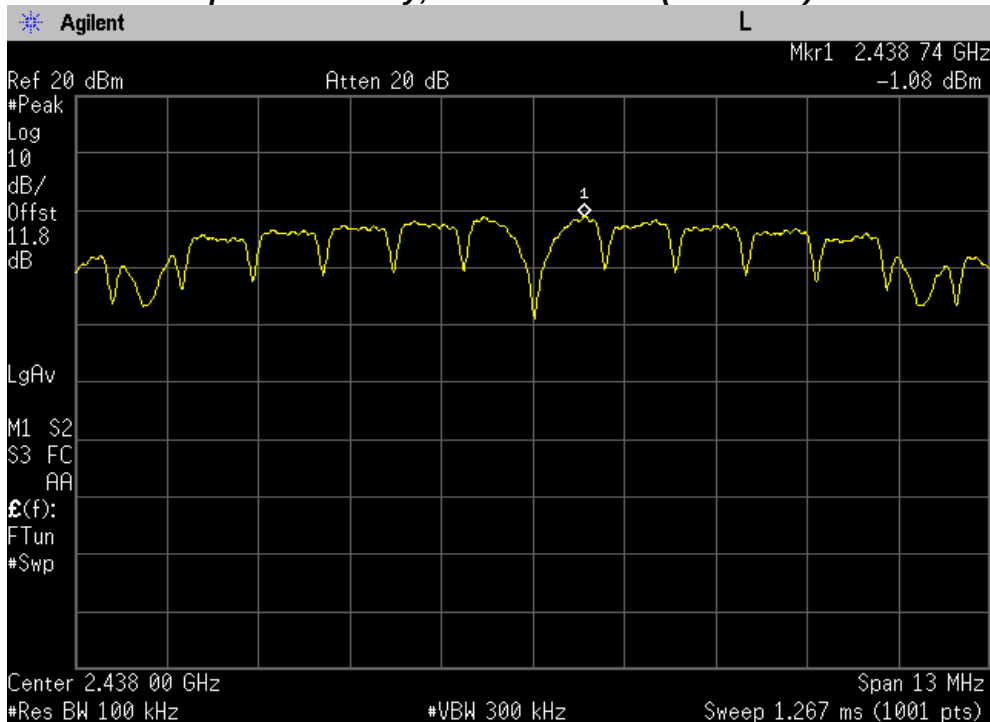
2.4 GHz band

Ant A

Peak Power Spectral Density, Lowest Channel (2412 MHz)

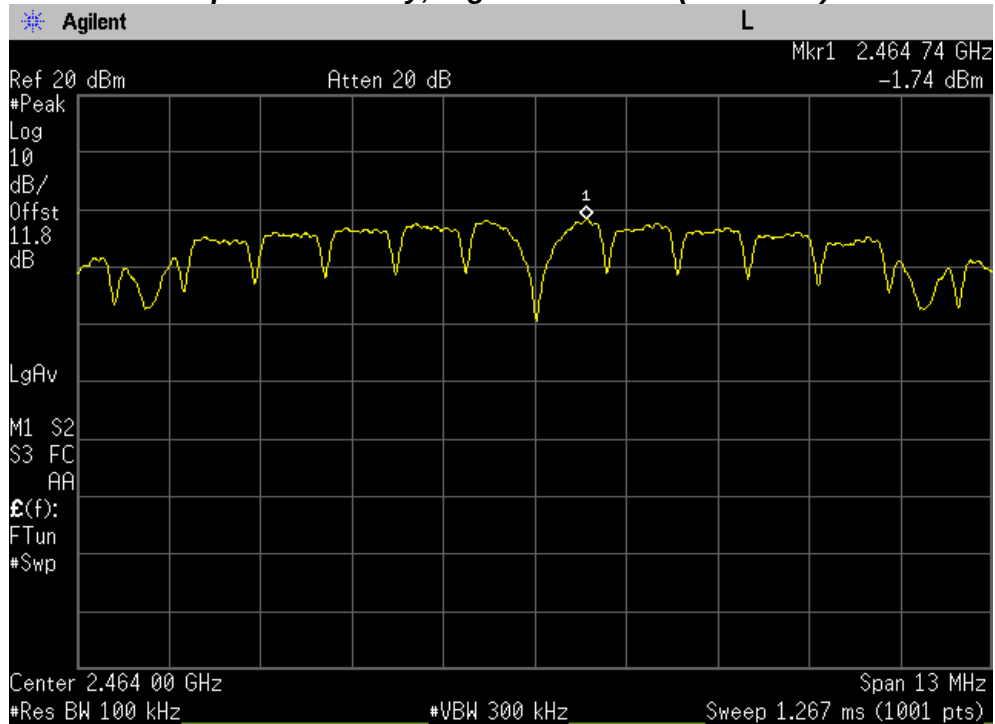


Peak Power Spectral Density, Middle Channel (2438 MHz)



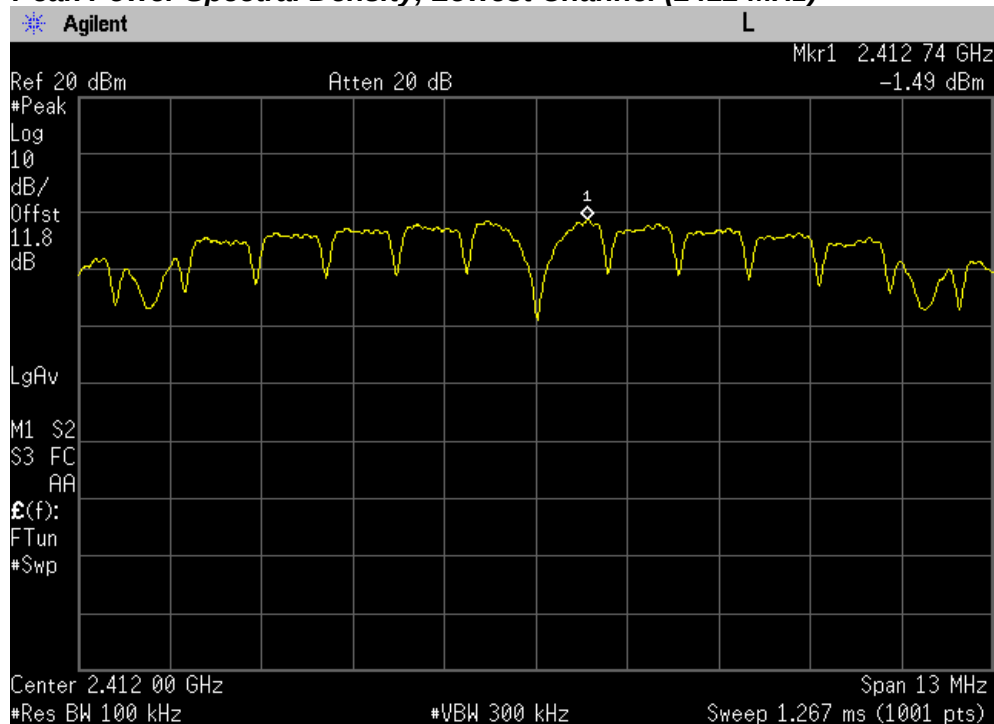
PLOT OF TEST DATA

Peak Power Spectral Density, Highest Channel (2464 MHz)



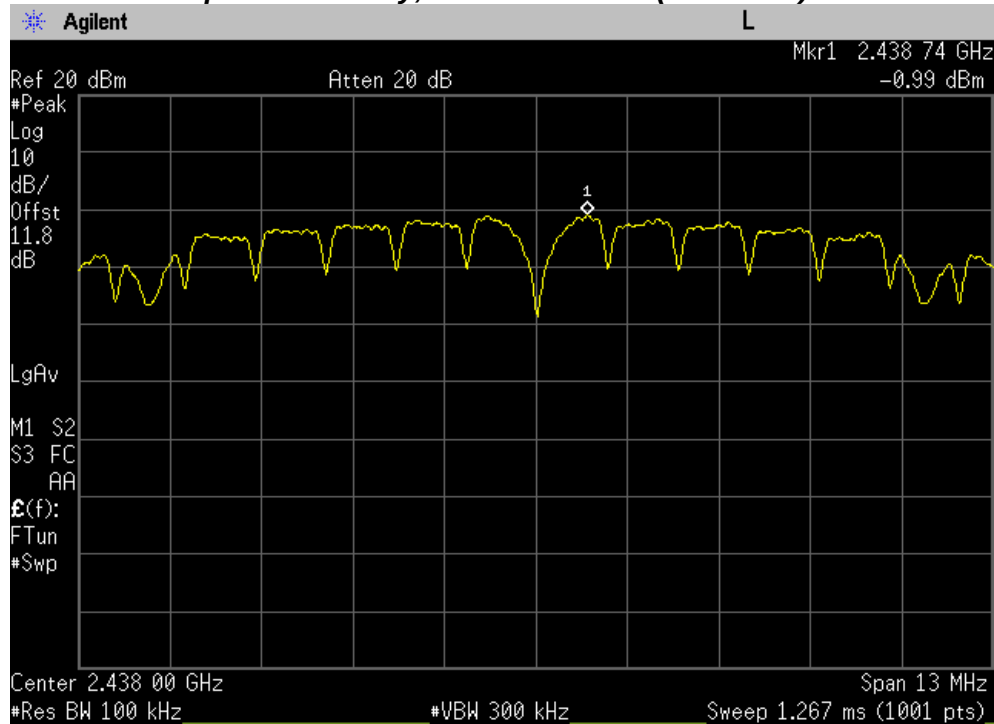
Ant B

Peak Power Spectral Density, Lowest Channel (2412 MHz)

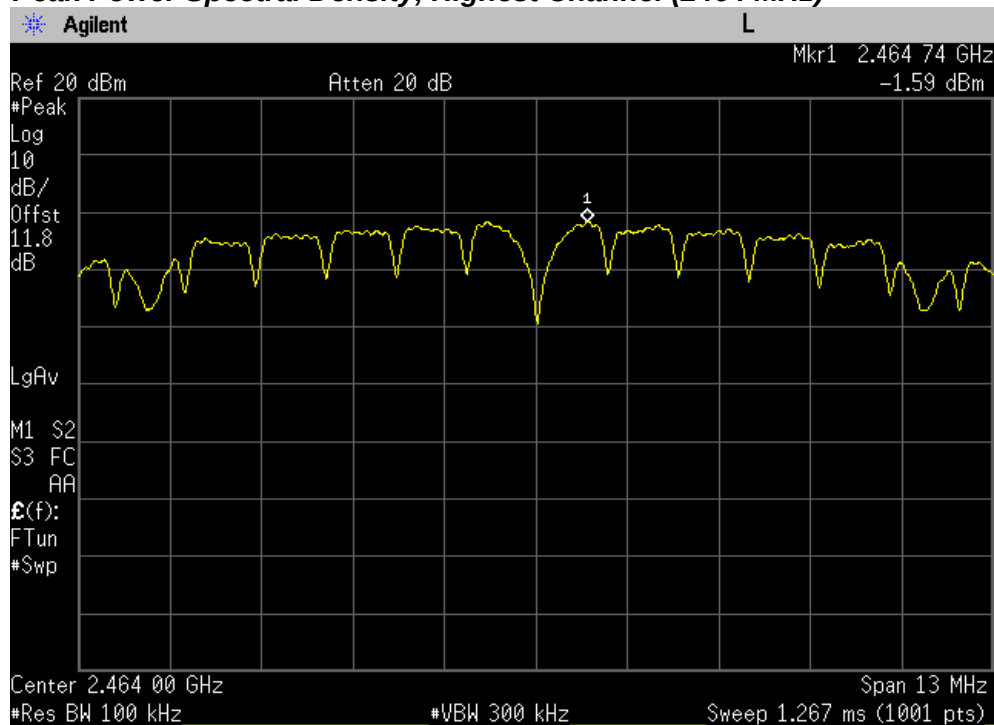


PLOT OF TEST DATA

Peak Power Spectral Density, Middle Channel (2438 MHz)



Peak Power Spectral Density, Highest Channel (2464 MHz)

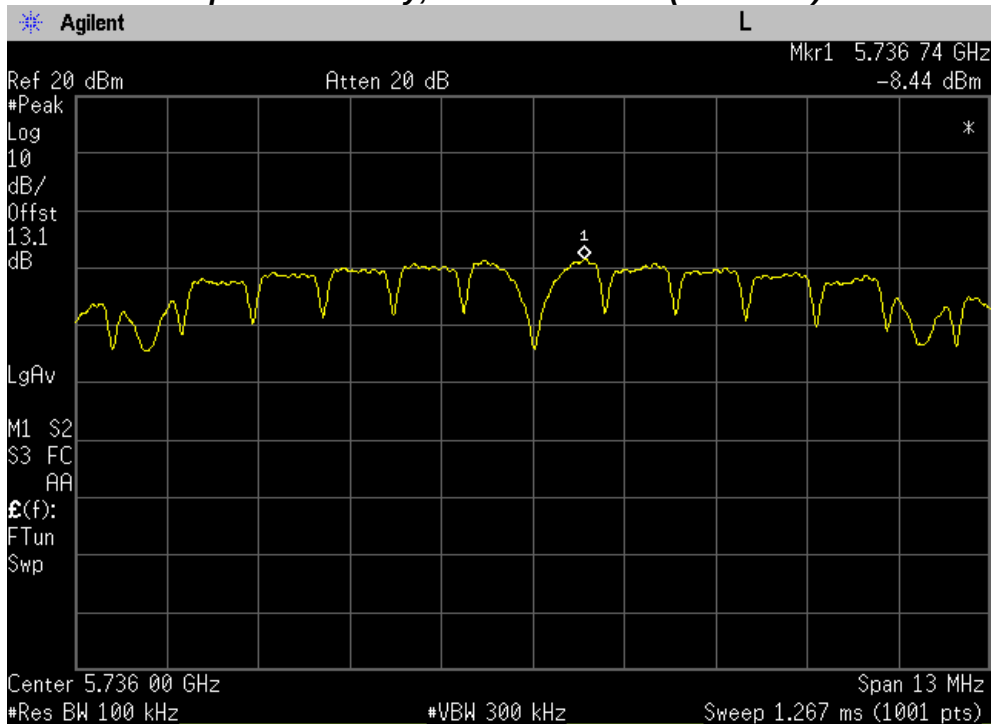


PLOT OF TEST DATA

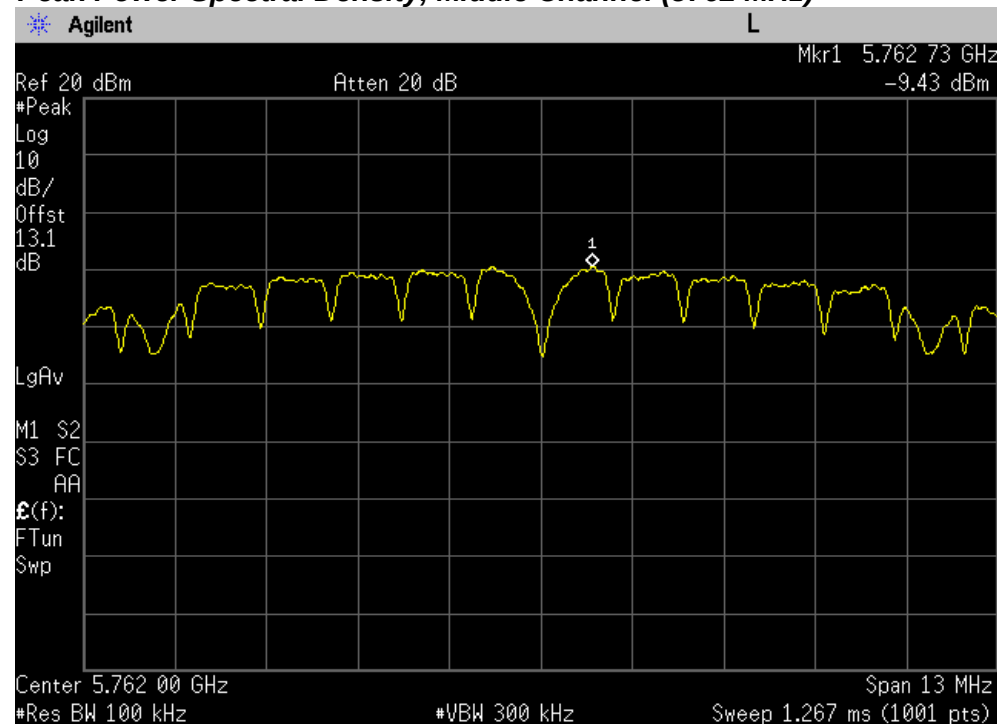
5.8 GHz band

Ant A

Peak Power Spectral Density, Lowest Channel (5736 MHz)

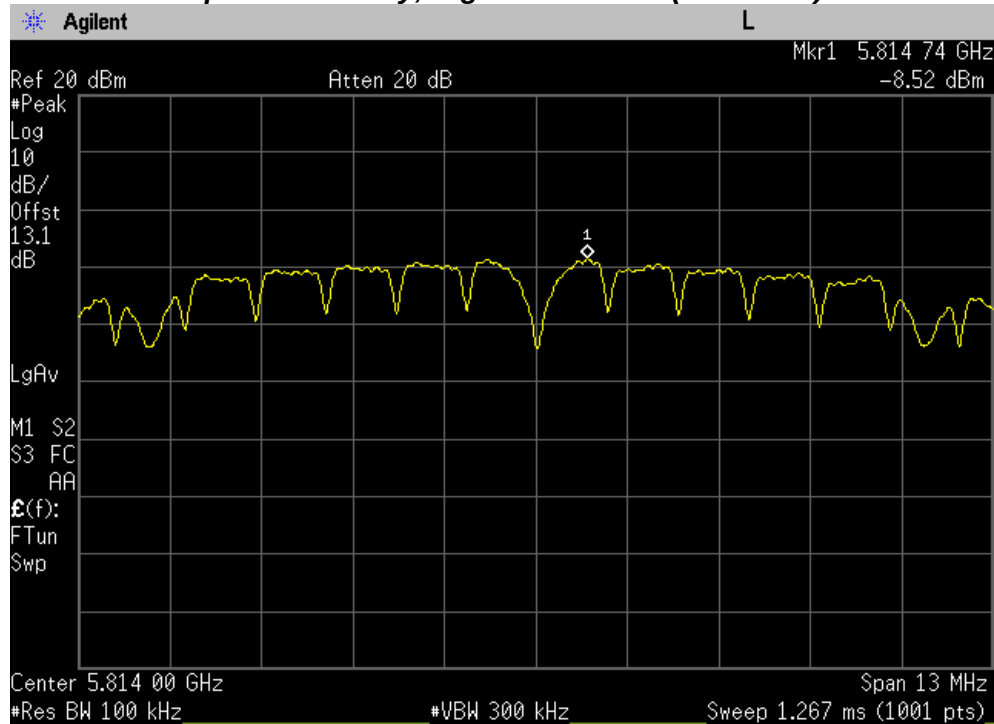


Peak Power Spectral Density, Middle Channel (5762 MHz)



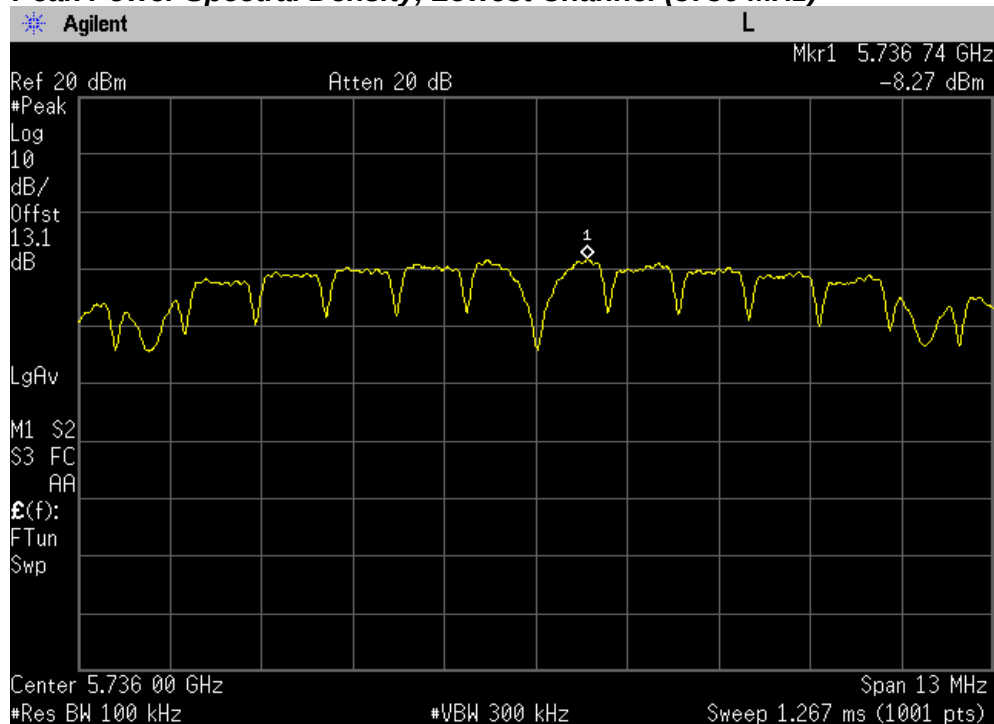
PLOT OF TEST DATA

Peak Power Spectral Density, Highest Channel (5814 MHz)



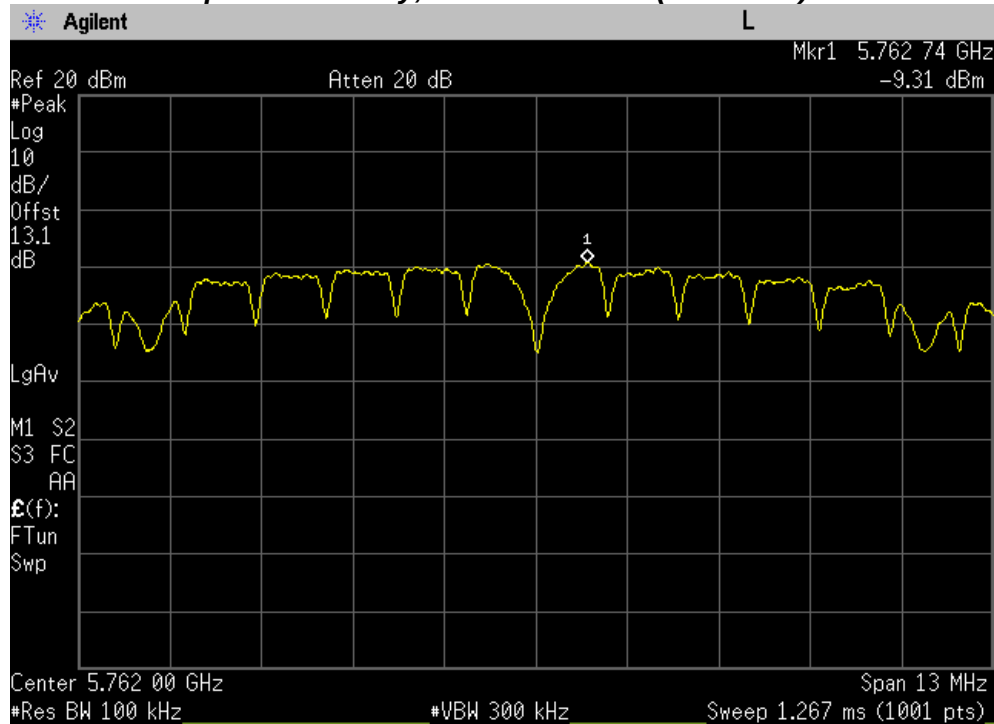
Ant B

Peak Power Spectral Density, Lowest Channel (5736 MHz)

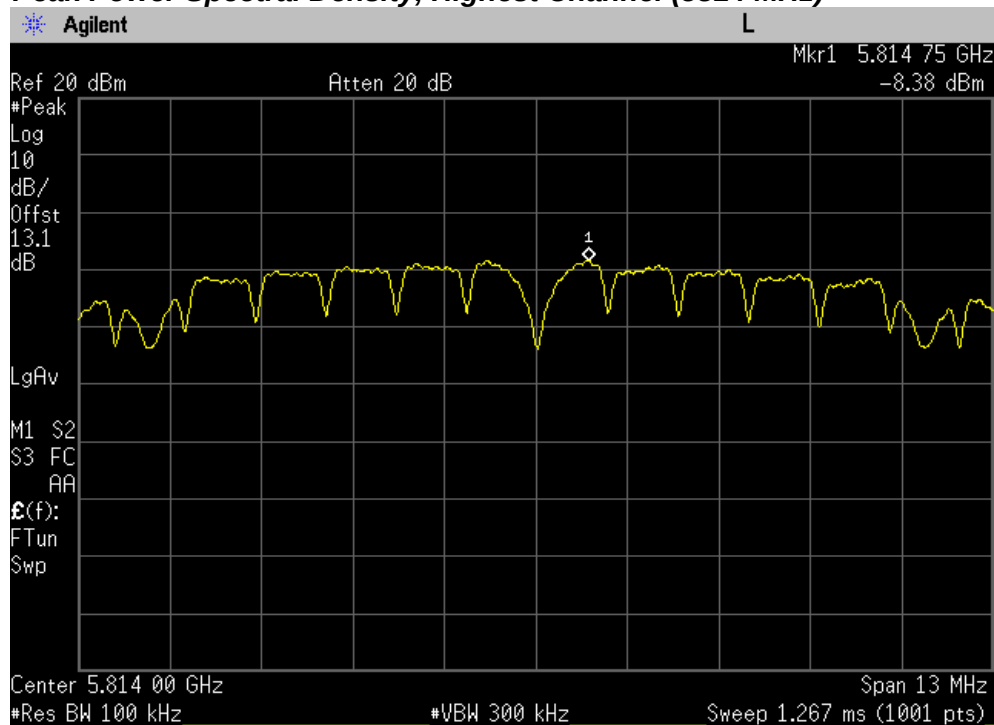


PLOT OF TEST DATA

Peak Power Spectral Density, Middle Channel (5762 MHz)



Peak Power Spectral Density, Highest Channel (5814 MHz)



TEST DATA

8.6 Conducted Spurious Emissions

FCC §15.247(d), RSS-210 A8.5

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

2.4 GHz band

Ant A

Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	2412	More than 20 dBc	20
Middle	2438	More than 20 dBc	20
High	2464	More than 20 dBc	20

Ant B

Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	2412	More than 20 dBc	20
Middle	2438	More than 20 dBc	20
High	2464	More than 20 dBc	20

Note:

The cable and attenuator loss from 30 MHz to 25 GHz was reflected in spectrum analyzer with correction factor for the spurious emissions test.

5.8 GHz band

Ant A

Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	5736	More than 20 dBc	20
Middle	5762	More than 20 dBc	20
High	5814	More than 20 dBc	20

Ant B

Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	5736	More than 20 dBc	20
Middle	5762	More than 20 dBc	20
High	5814	More than 20 dBc	20

Note:

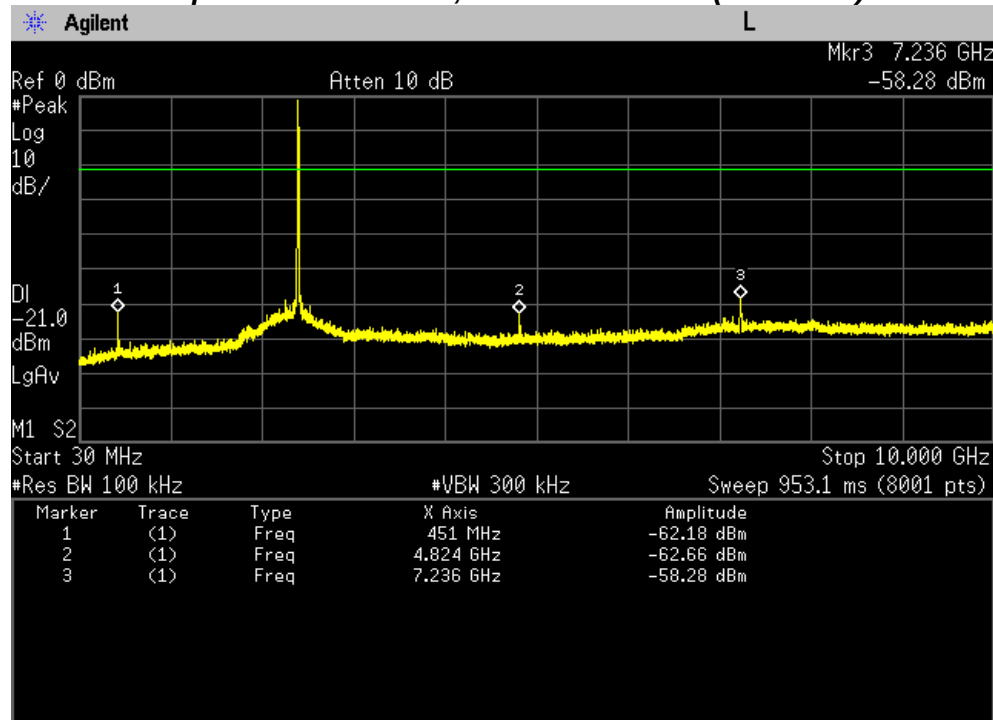
The cable and attenuator loss from 30 MHz to 40 GHz was reflected in spectrum analyzer with correction factor for the spurious emissions test.

PLOT OF TEST DATA

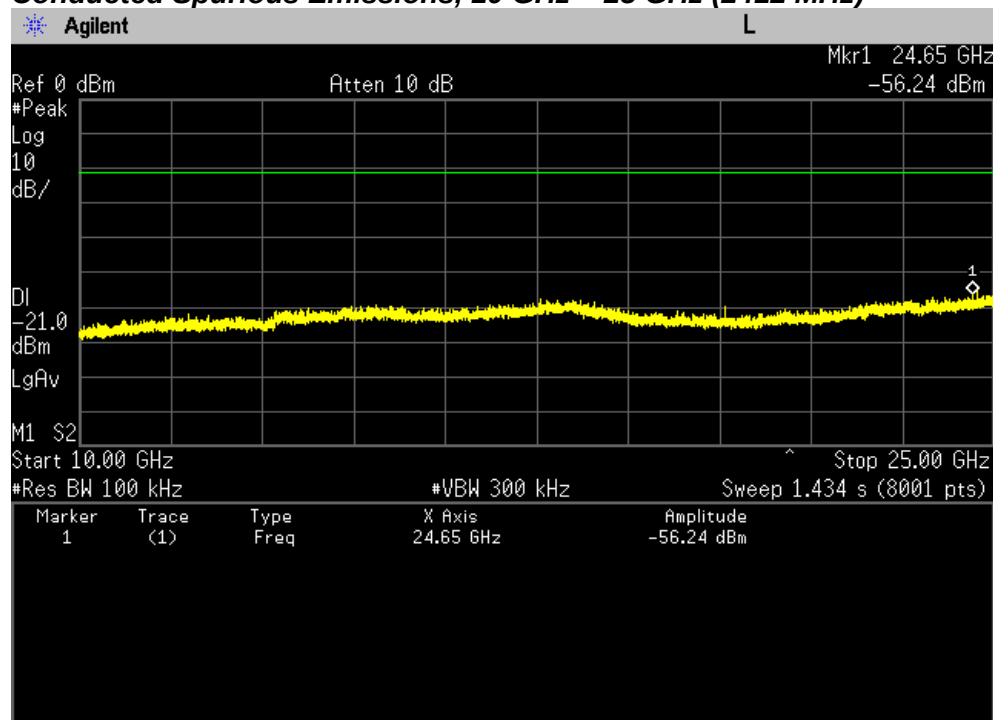
2.4 GHz mode

Ant A

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

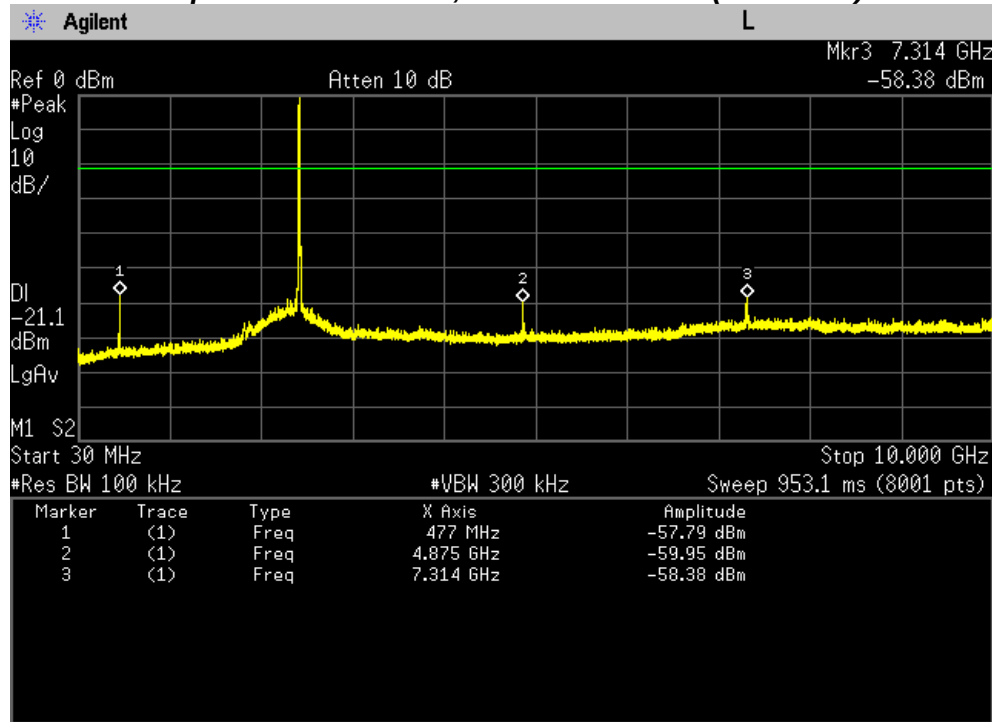


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

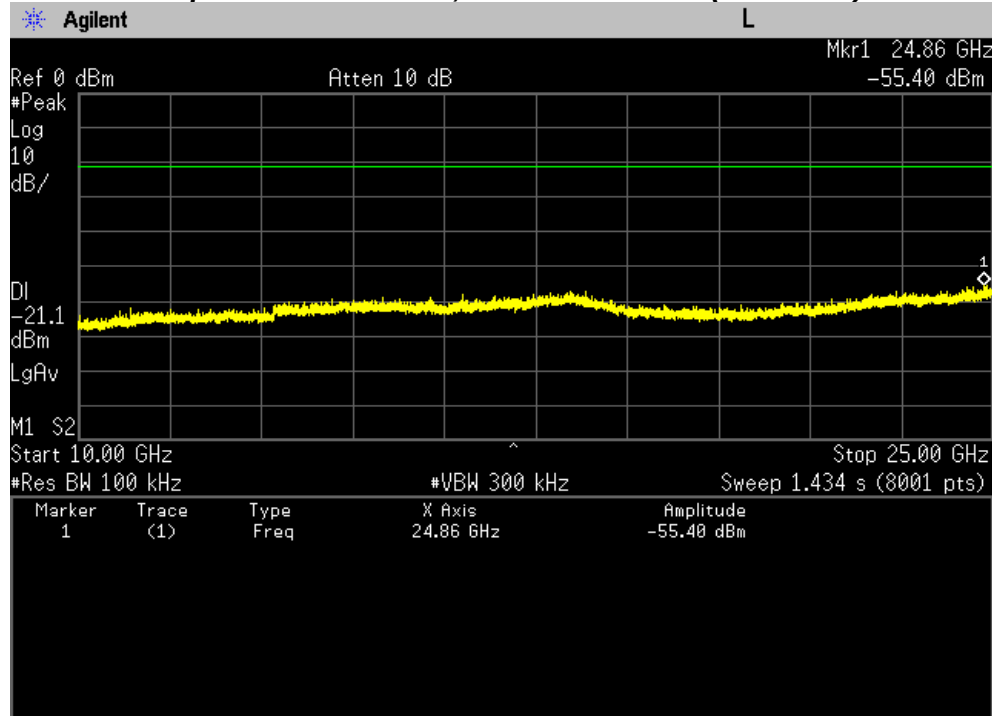


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2438 MHz)

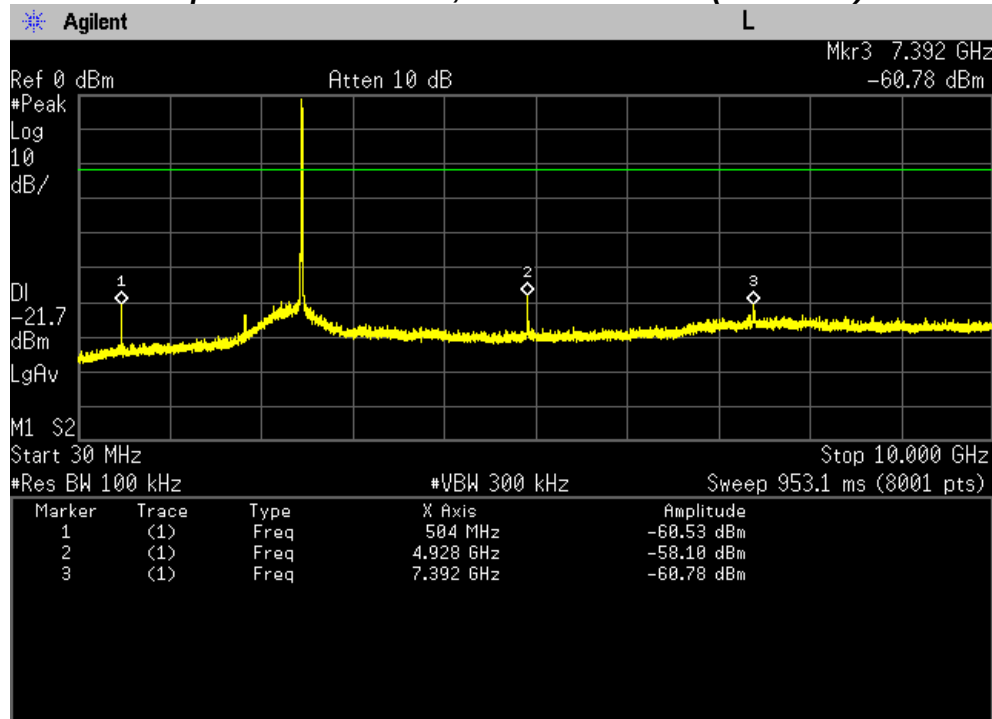


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2438 MHz)

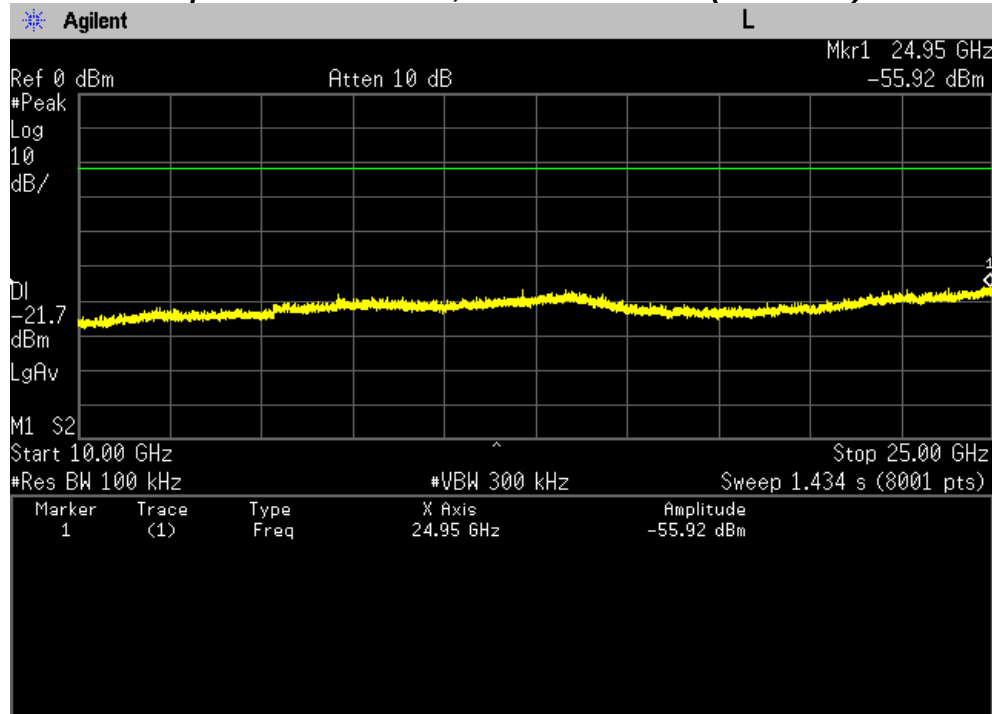


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2464 MHz)



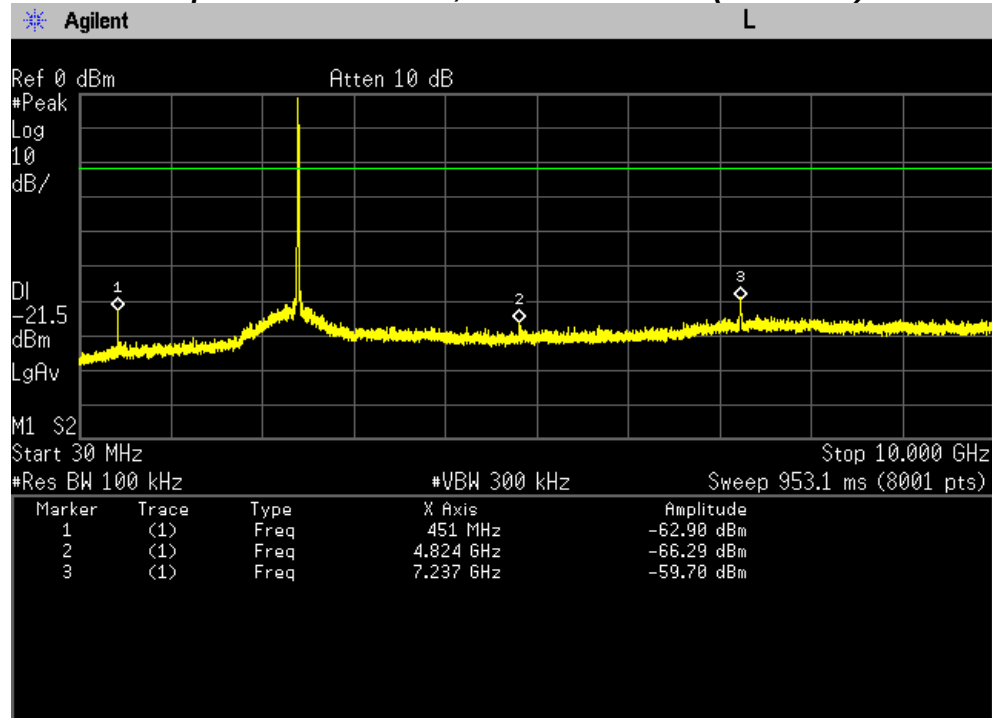
Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2464 MHz)



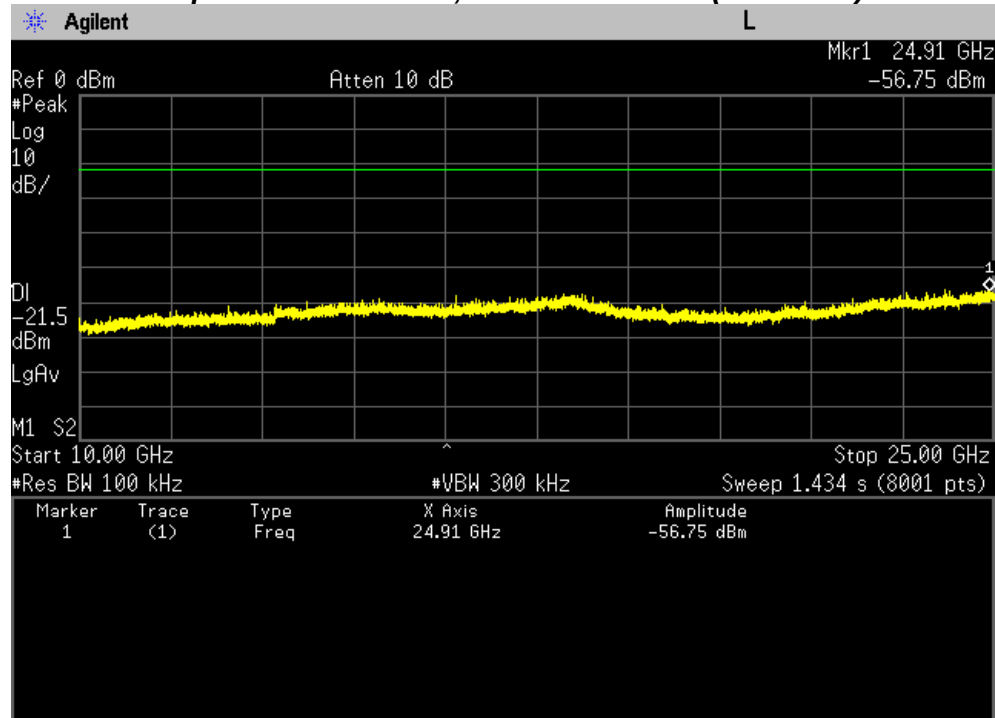
PLOT OF TEST DATA

Ant B

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

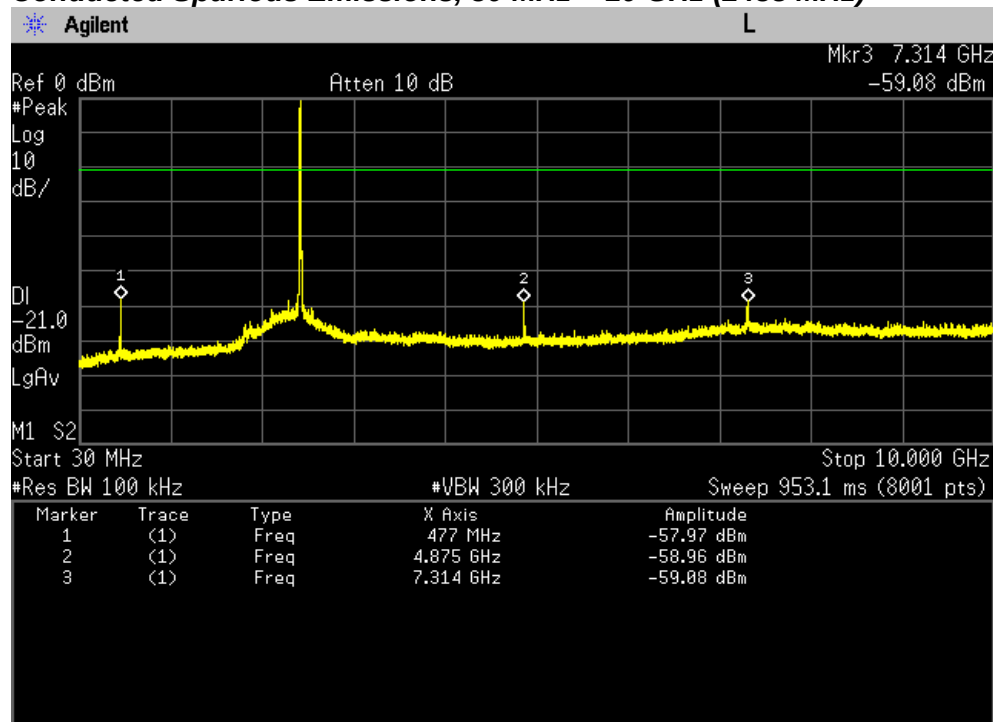


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2412 MHz)

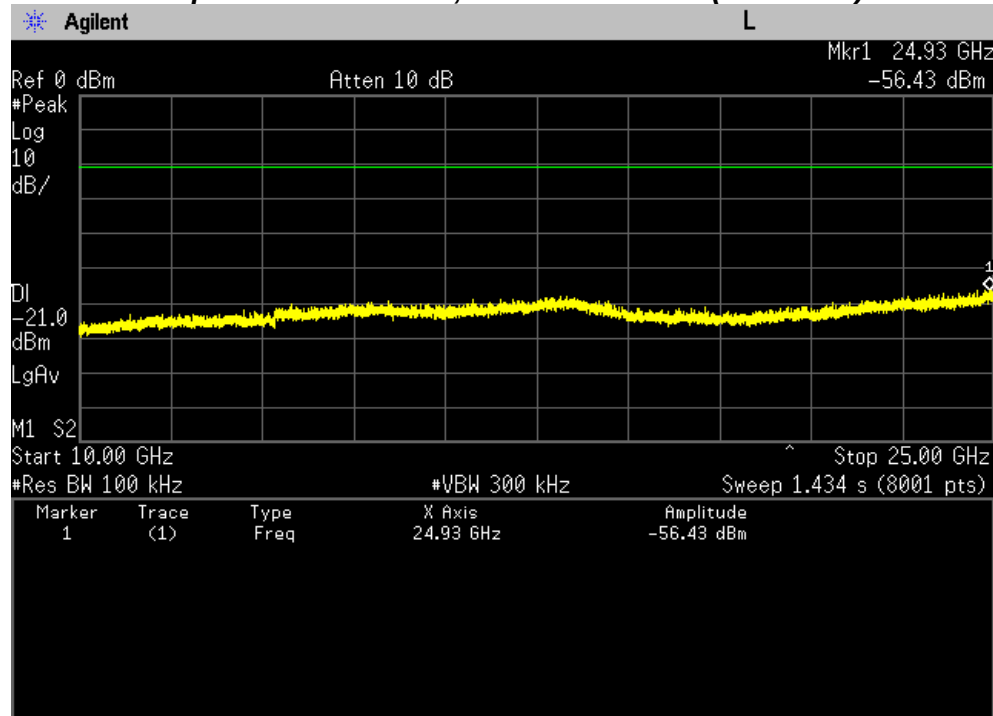


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2438 MHz)

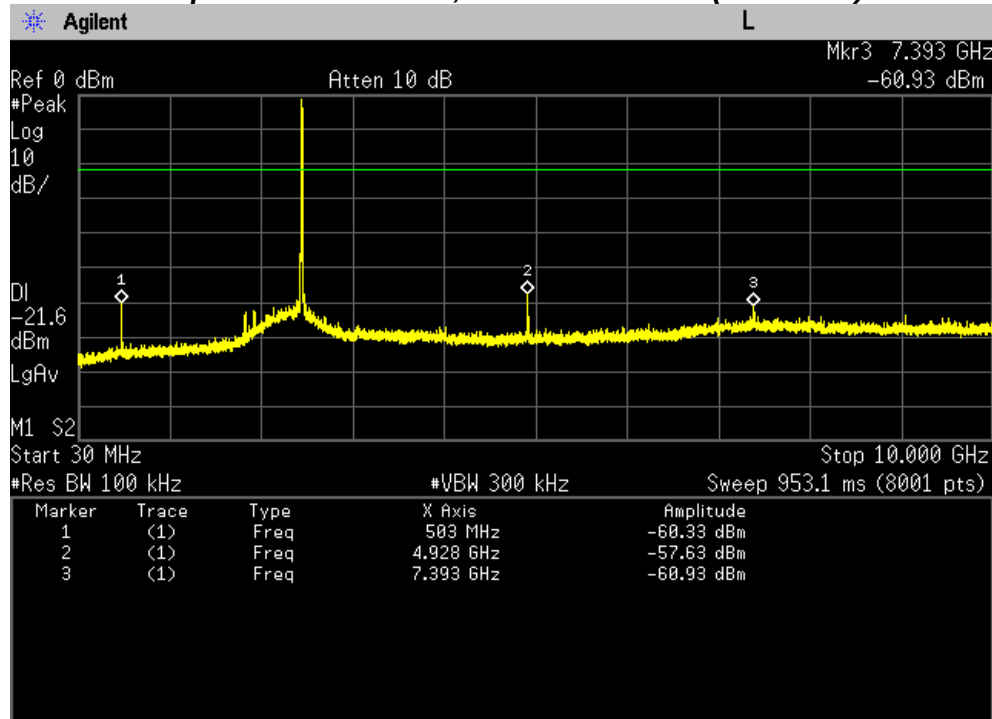


Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2438 MHz)

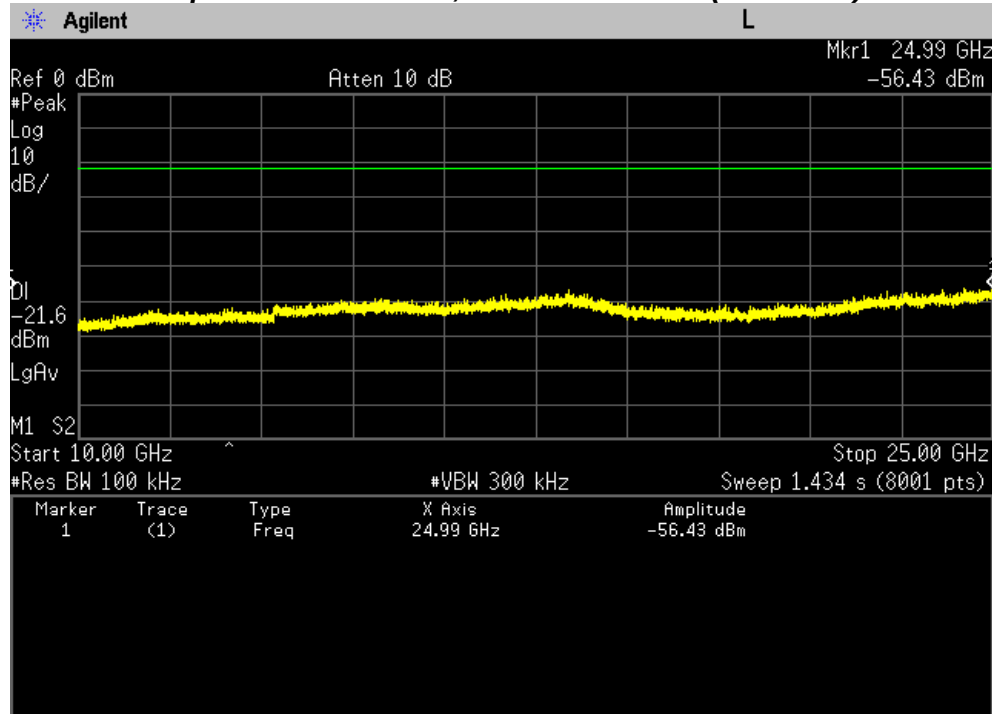


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (2464 MHz)



Conducted Spurious Emissions, 10 GHz ~ 25 GHz (2464 MHz)

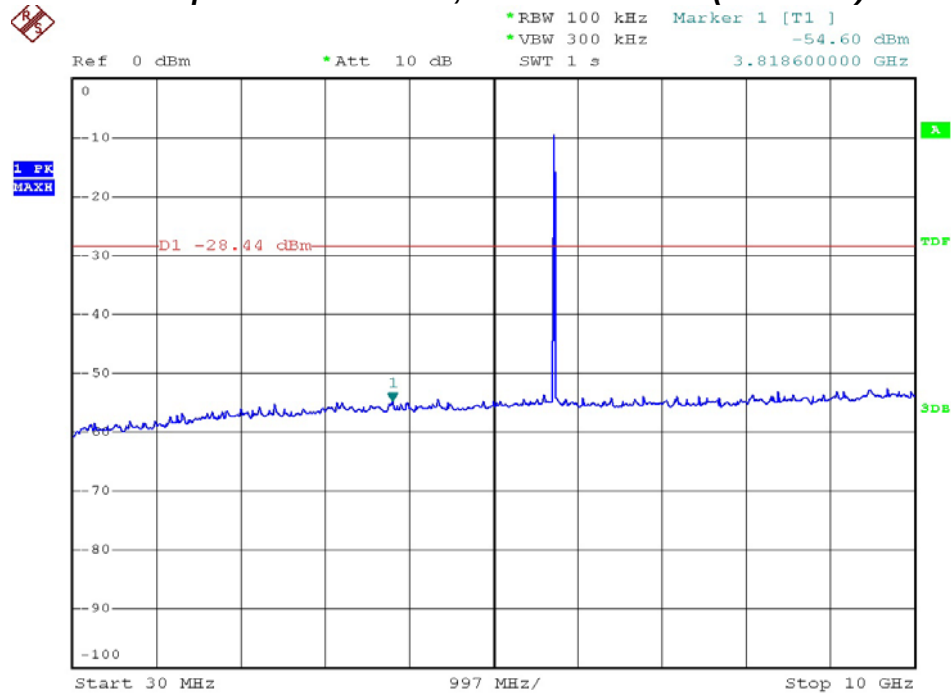


PLOT OF TEST DATA

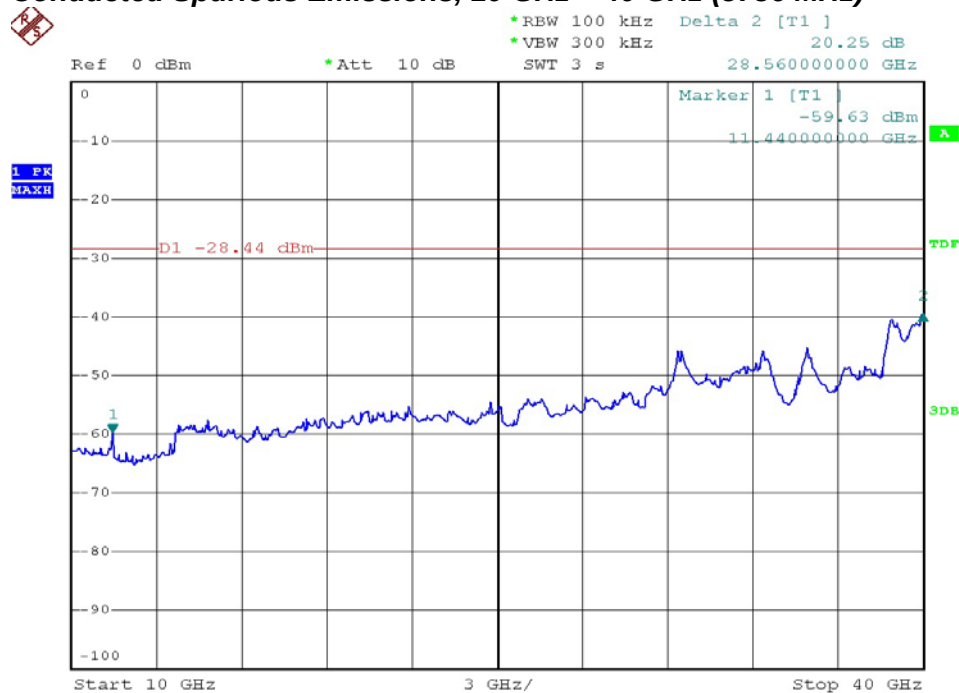
5.8 GHz mode

Ant A

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (5736 MHz)

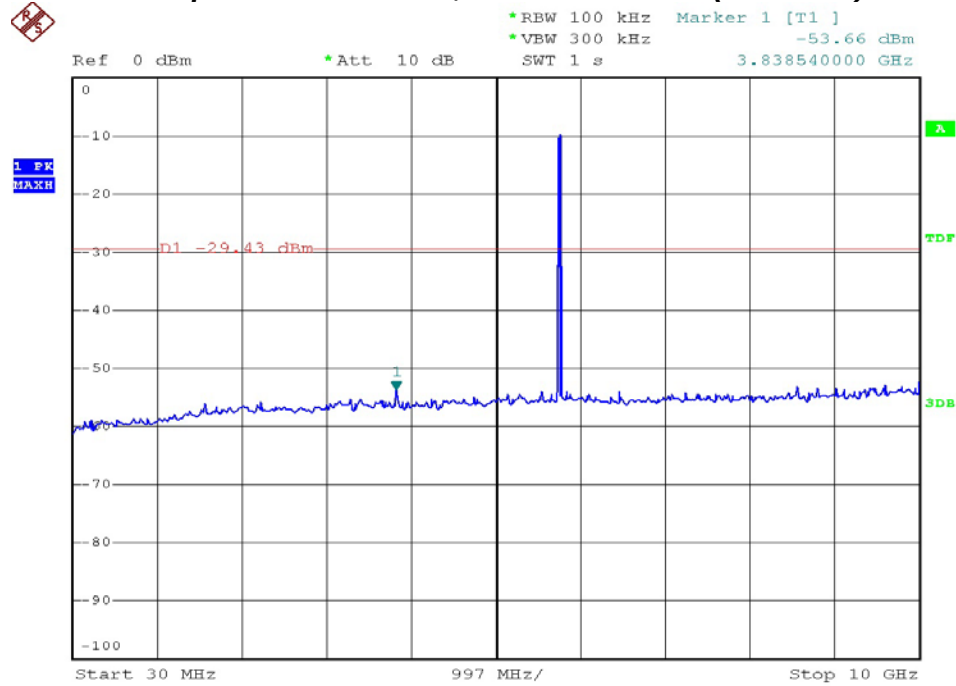


Conducted Spurious Emissions, 10 GHz ~ 40 GHz (5736 MHz)

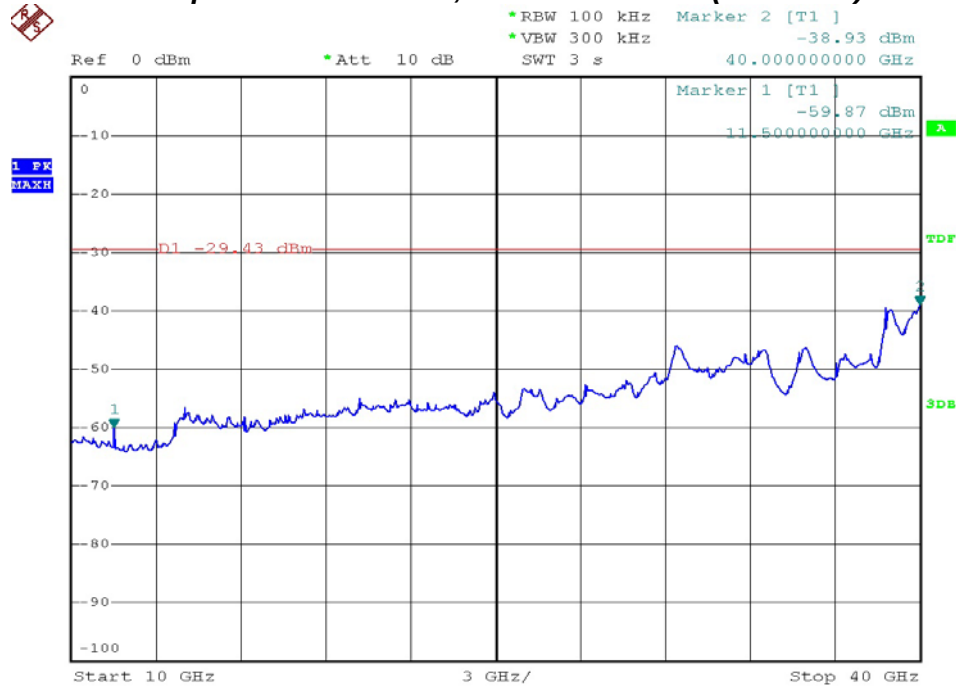


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (5762 MHz)

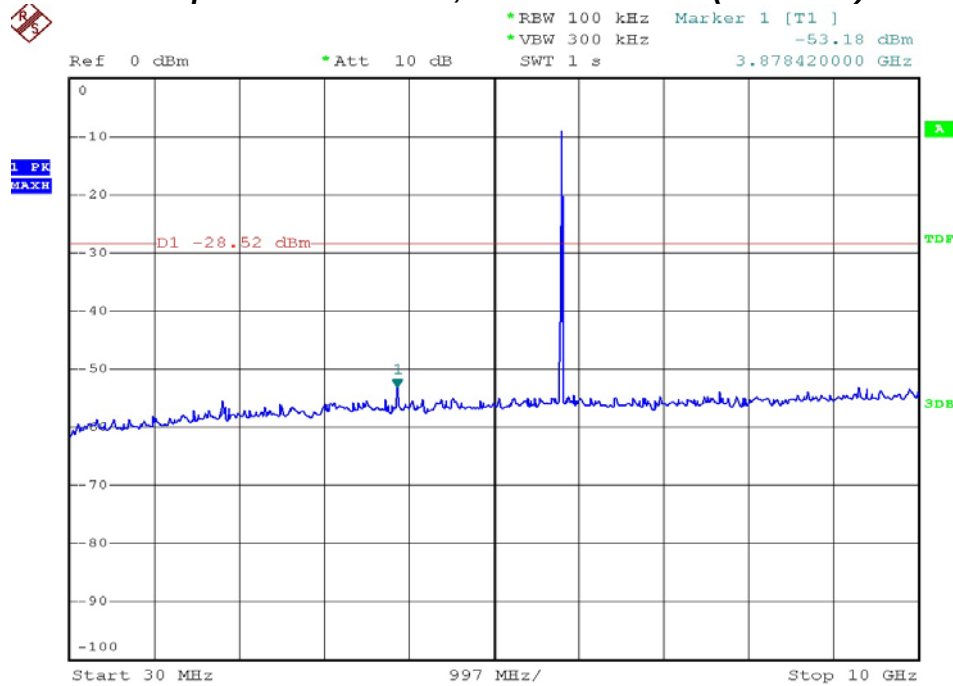


Conducted Spurious Emissions, 10 GHz ~ 40 GHz (5762 MHz)

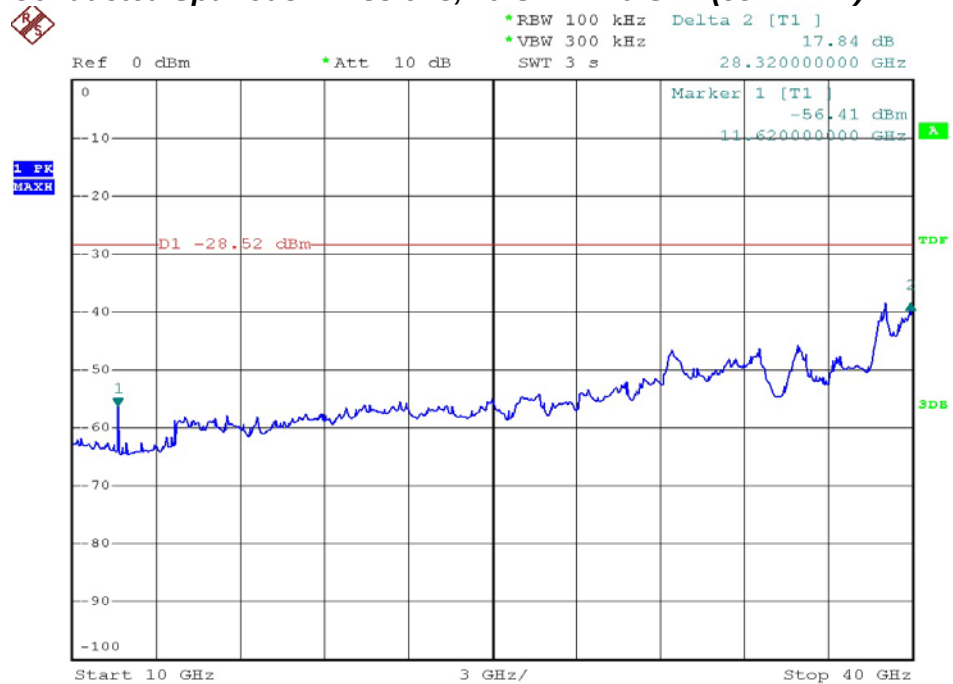


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (5814 MHz)



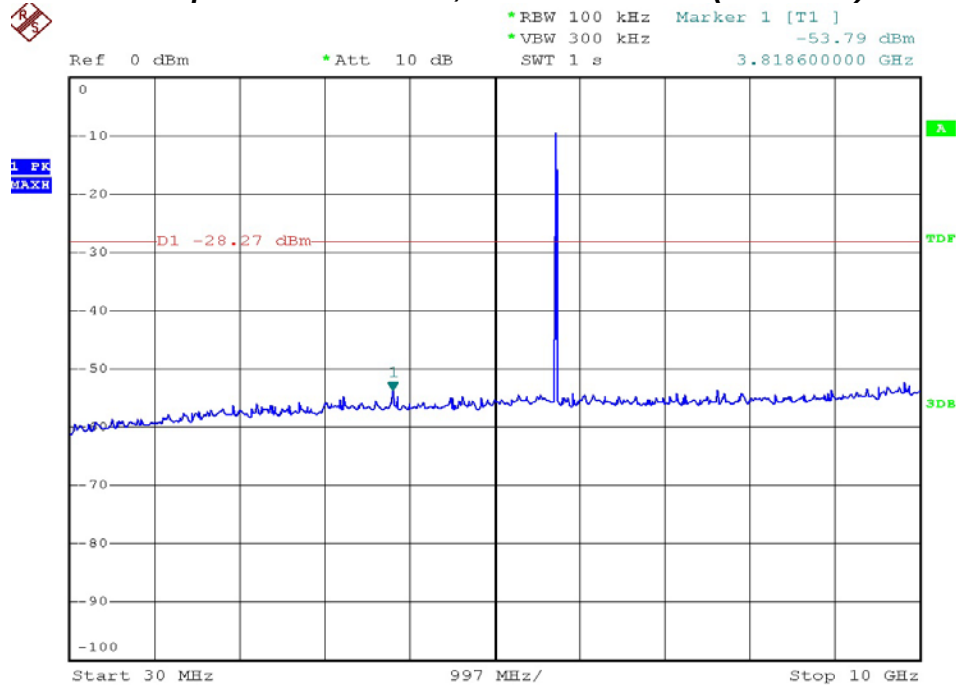
Conducted Spurious Emissions, 10 GHz ~ 40 GHz (5814 MHz)



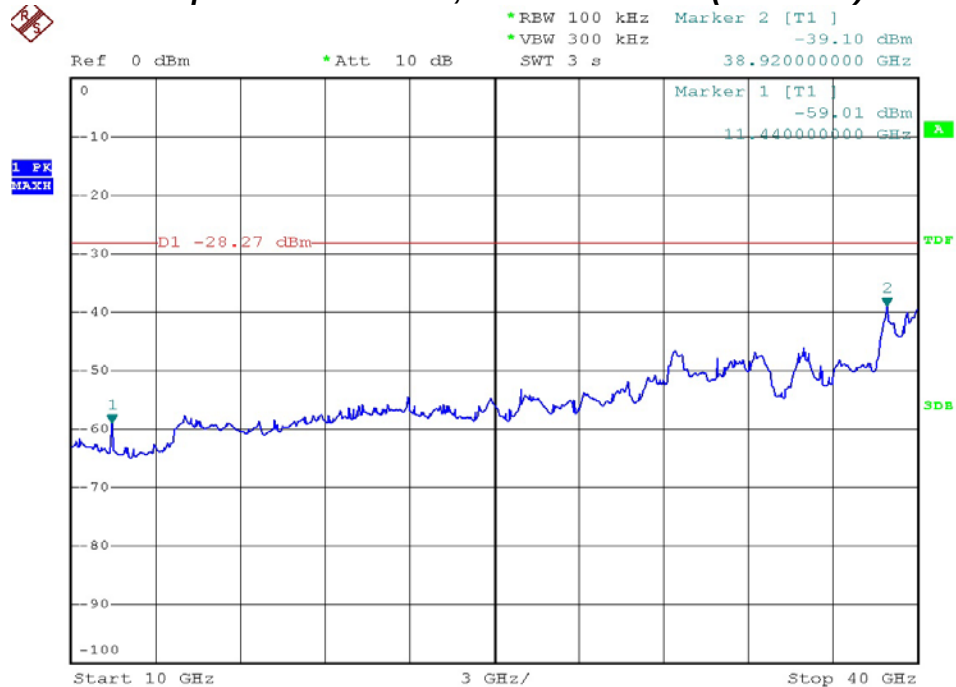
PLOT OF TEST DATA

Ant B

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (5736 MHz)

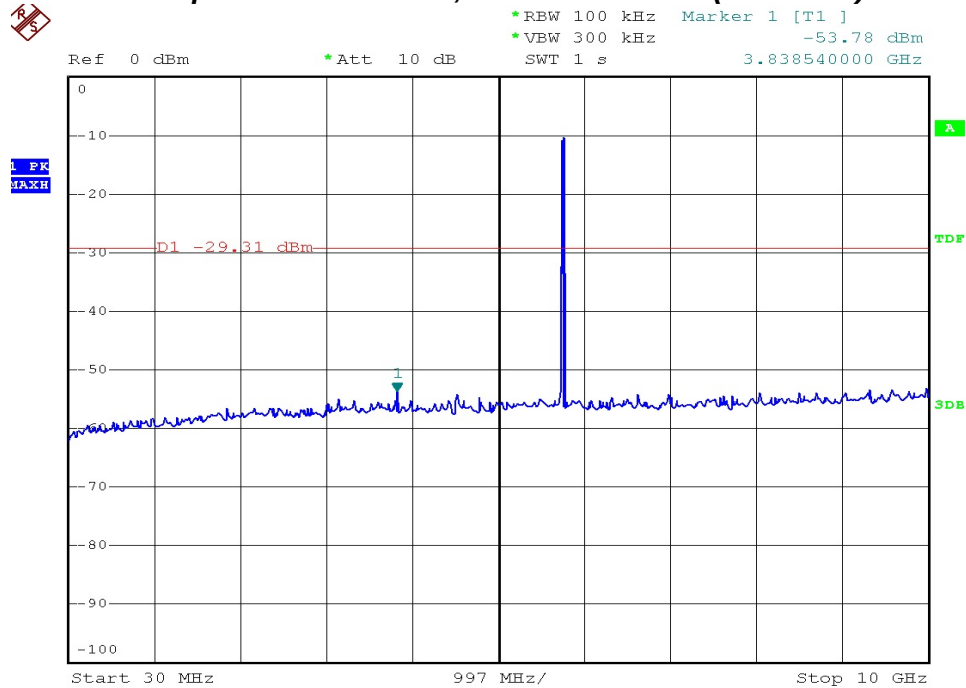


Conducted Spurious Emissions, 10 GHz ~ 40 GHz (5736 MHz)

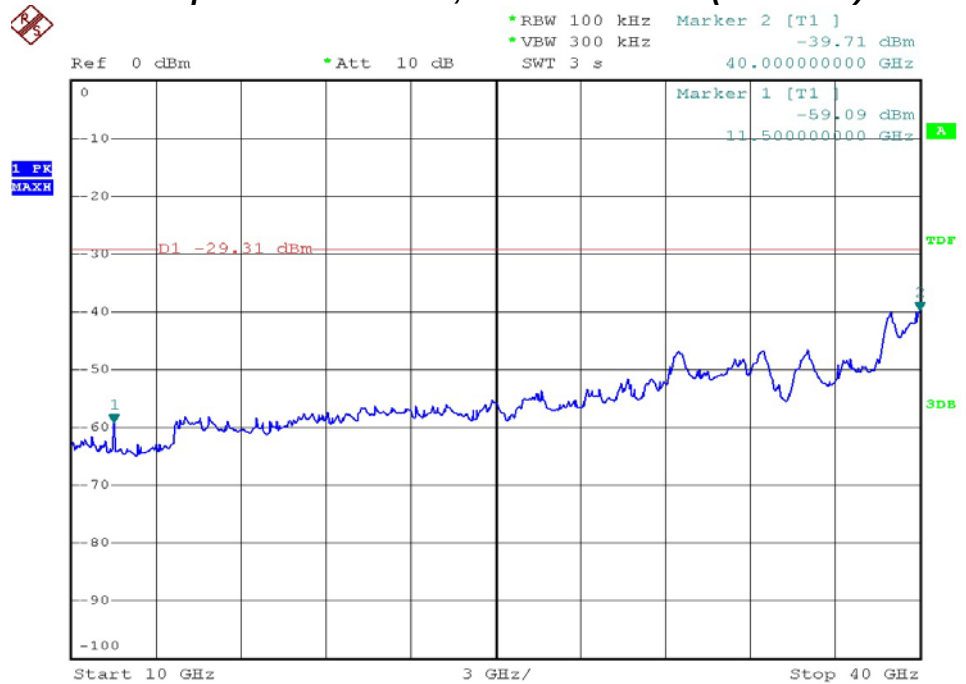


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (5762 MHz)

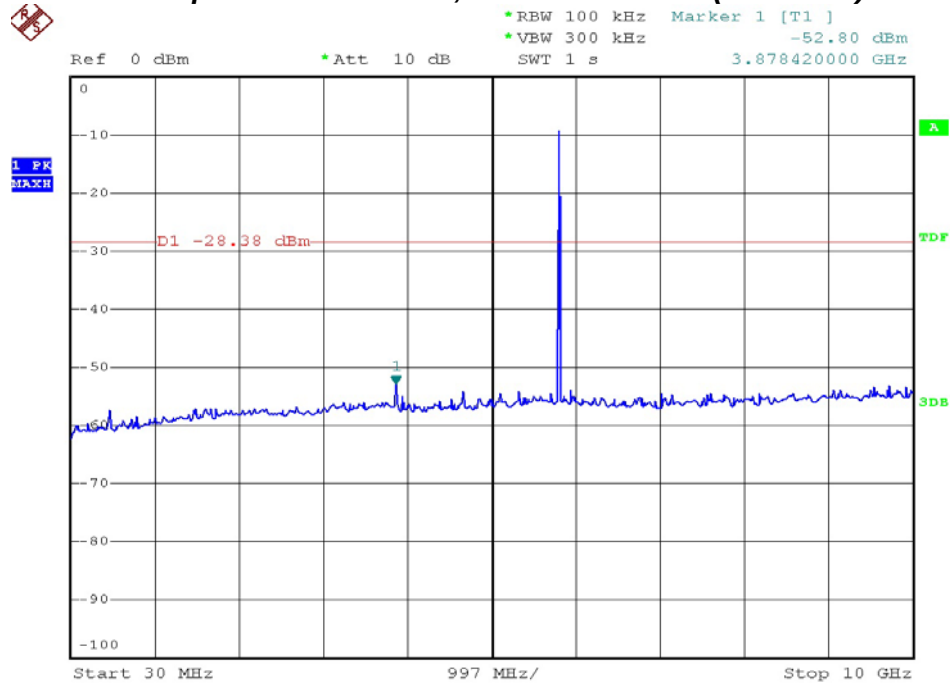


Conducted Spurious Emissions, 10 GHz ~ 40 GHz (5762 MHz)

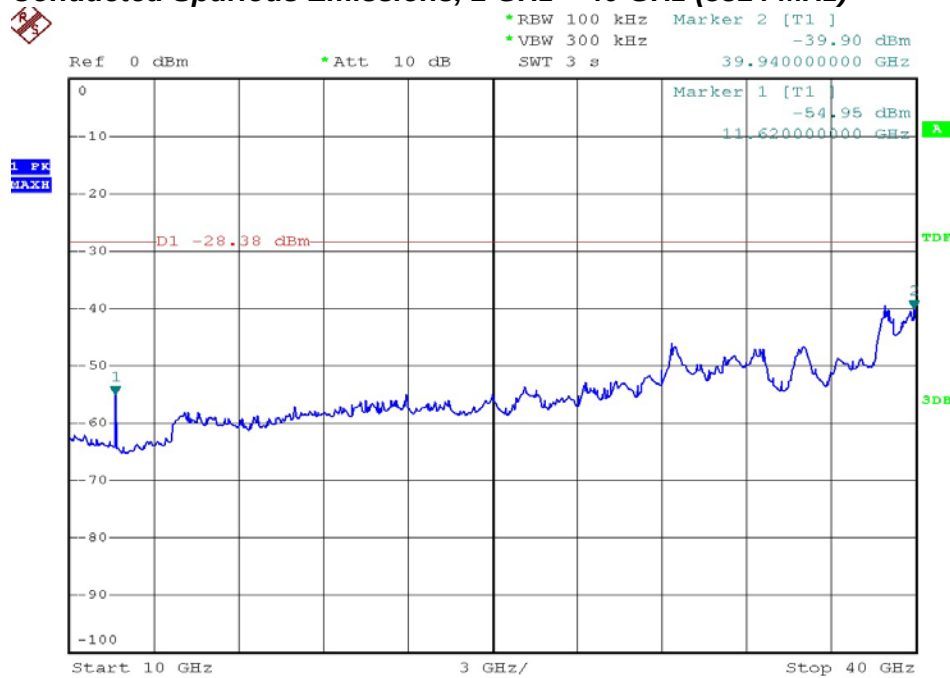


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 10 GHz (5814 MHz)



Conducted Spurious Emissions, 1 GHz ~ 40 GHz (5814 MHz)

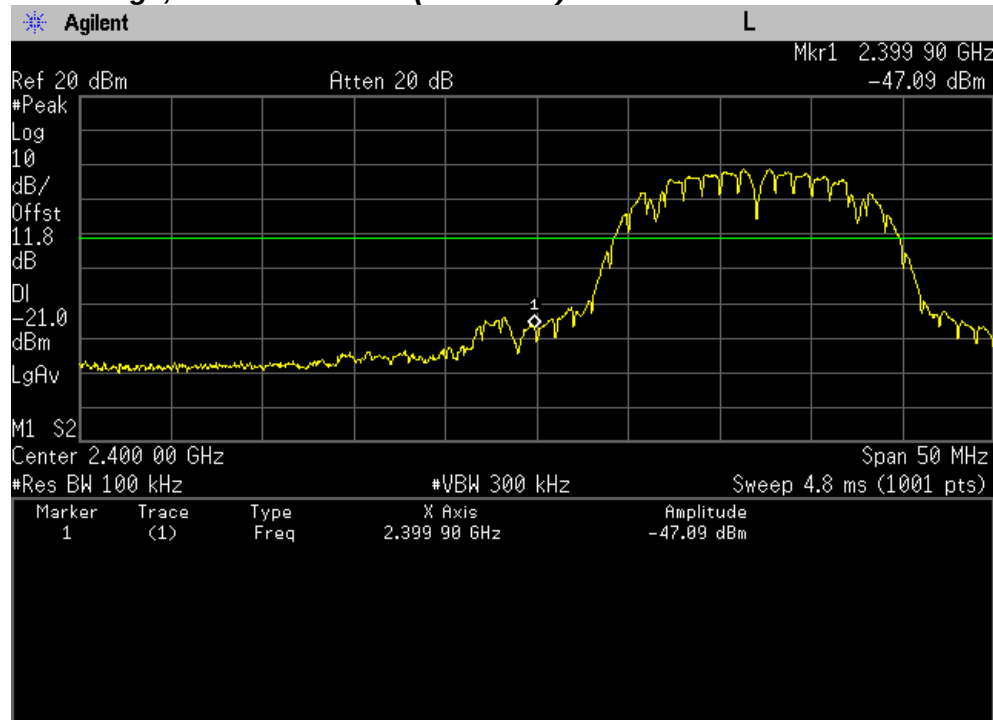


PLOT OF TEST DATA

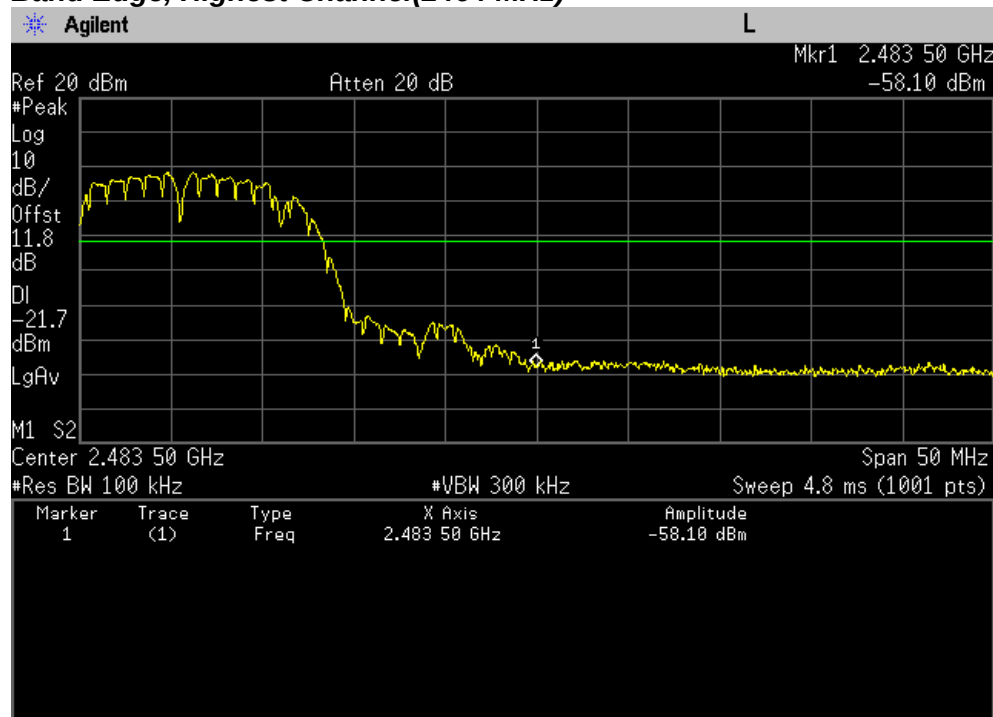
2.4 GHz band

Ant A

Band Edge, Lowest Channel (2412 MHz)



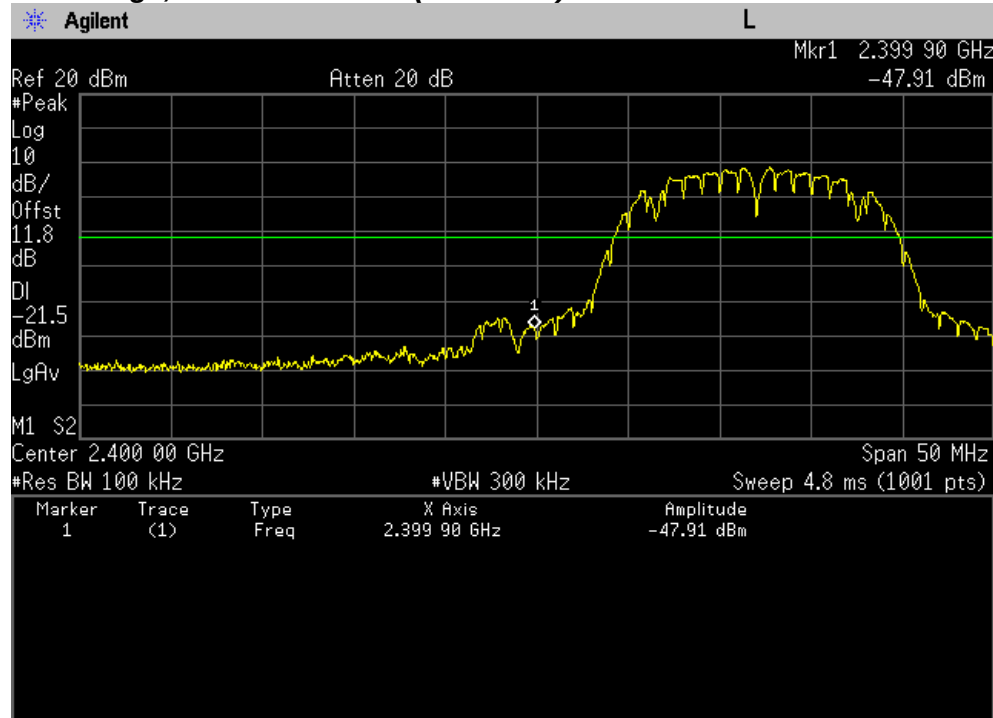
Band Edge, Highest Channel(2464 MHz)



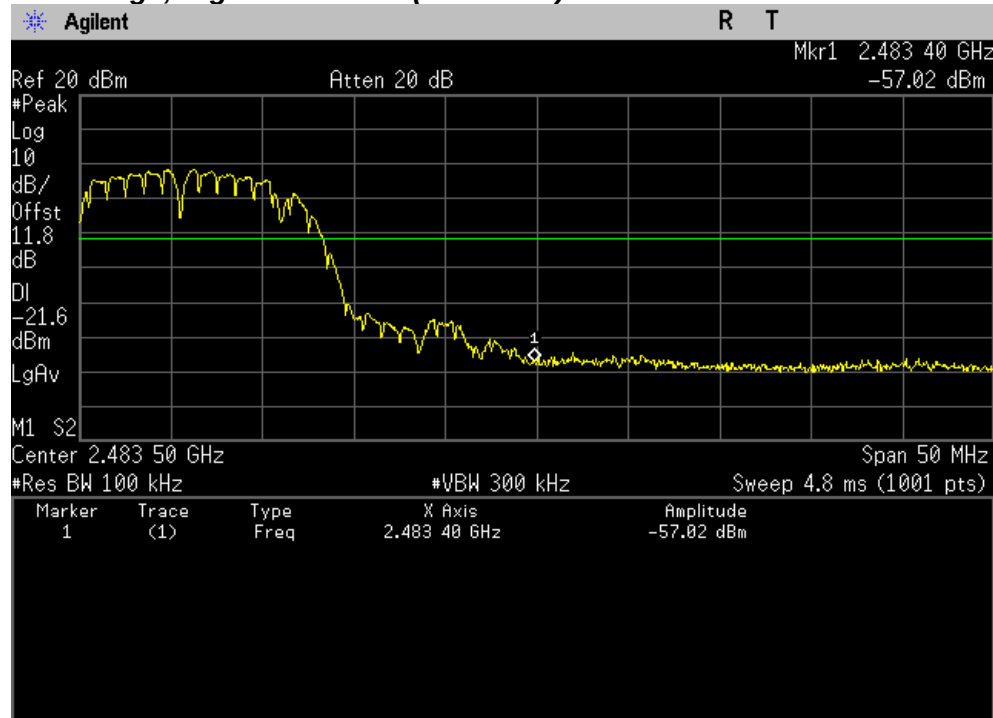
PLOT OF TEST DATA

Ant B

Band Edge, Lowest Channel (2412 MHz)



Band Edge, Highest Channel(2464 MHz)

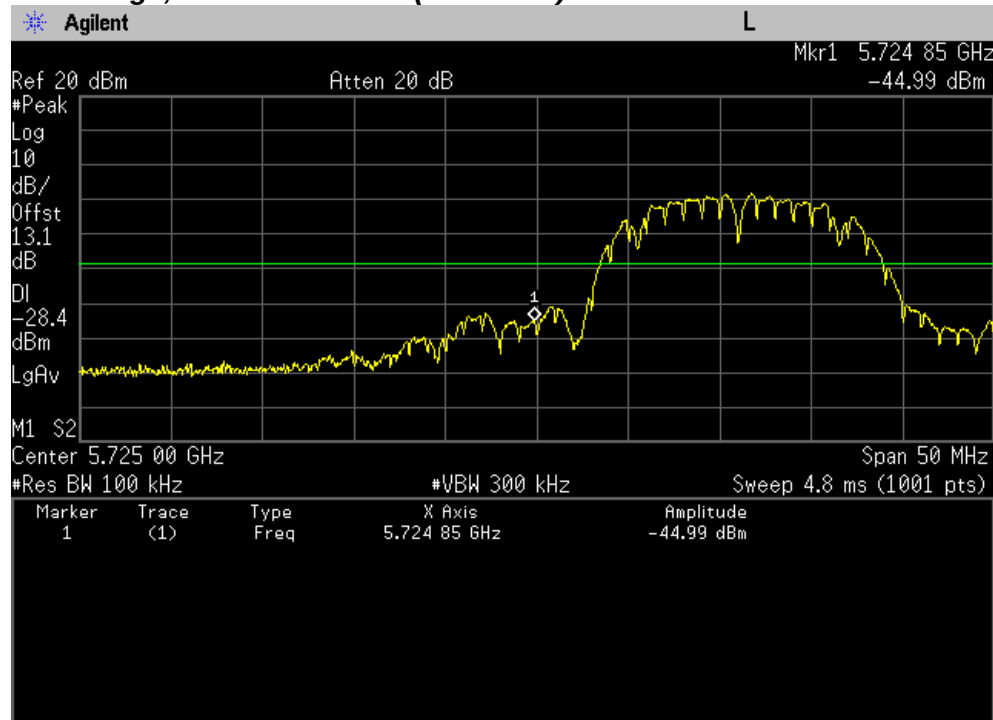


PLOT OF TEST DATA

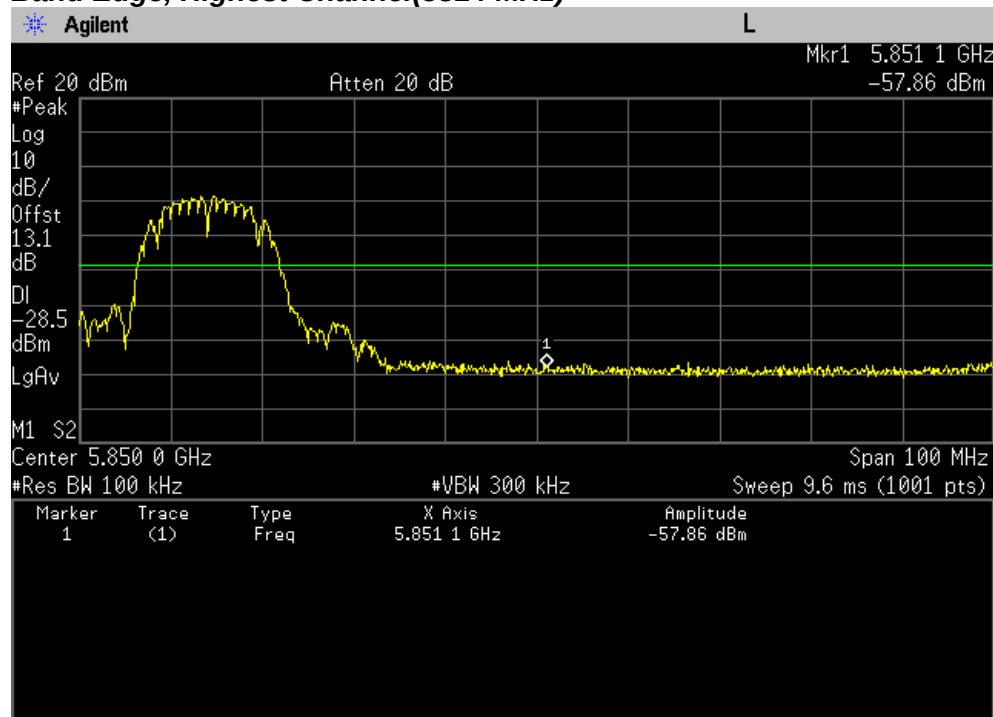
5.8 GHz band

Ant A

Band Edge, Lowest Channel (5736 MHz)



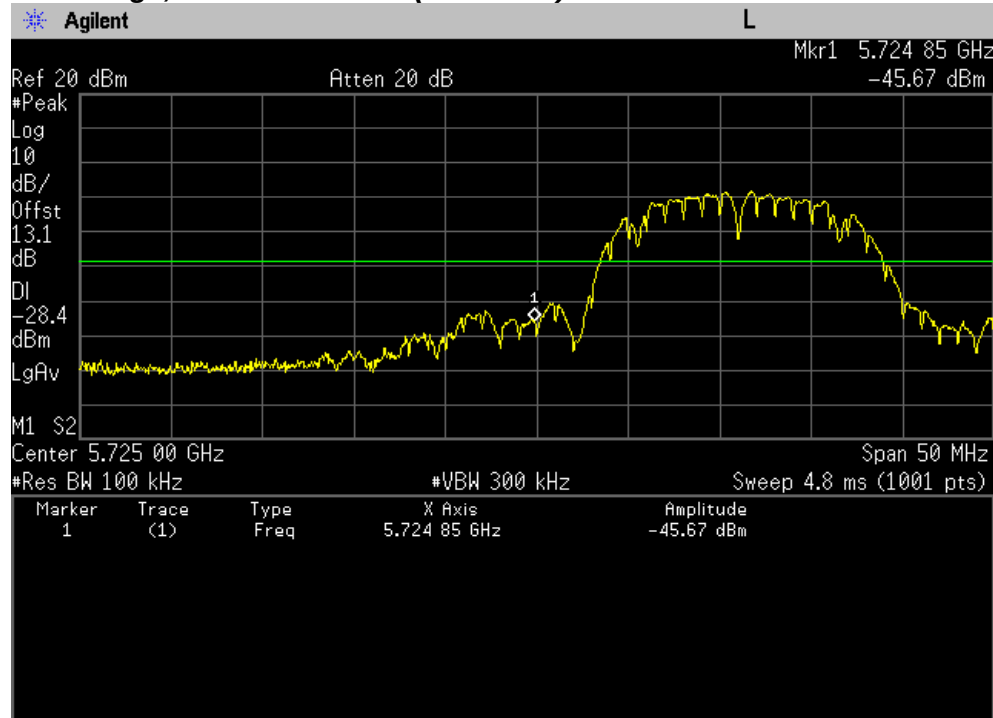
Band Edge, Highest Channel (5814 MHz)



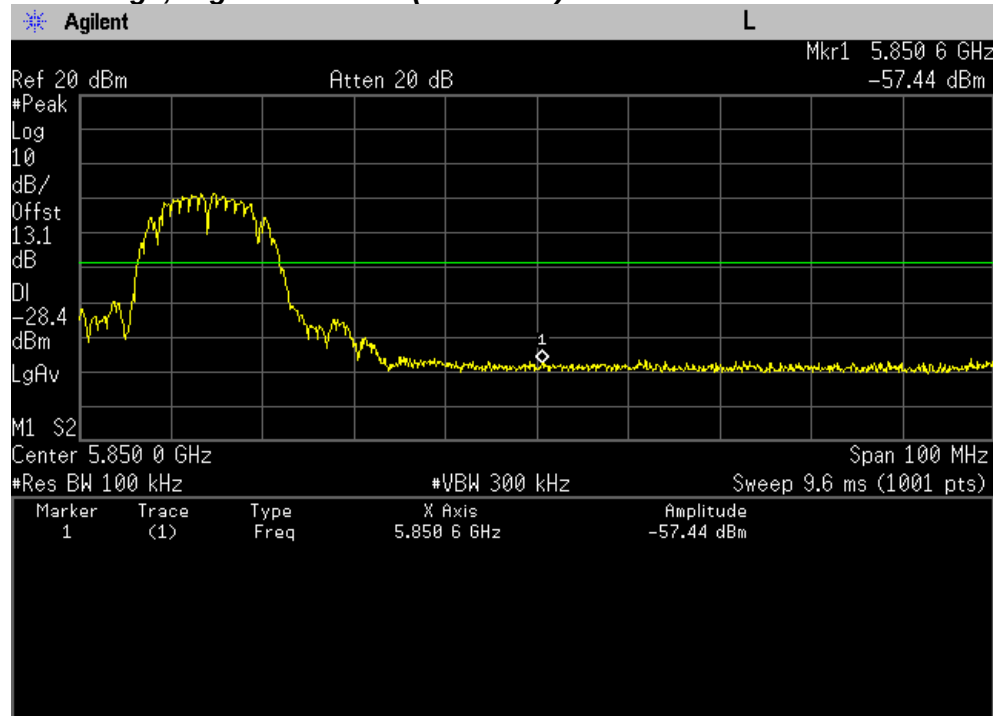
PLOT OF TEST DATA

Ant B

Band Edge, Lowest Channel (5736 MHz)



Band Edge, Highest Channel(5814 MHz)



TEST DATA

8.7 Radiated Spurious Emissions

FCC §15.247(d), RSS-210 A8.5

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

2.4 GHz mode

Ant A 2.4 GHz mode

Lowest Channel

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1155.00	46.90	V	peak	-4.40	42.50	74.0	31.50
1155.00	37.90	V	average	-4.40	33.50	54.0	20.50
1327.75	47.00	H	peak	-3.80	43.20	74.0	30.80
1327.75	38.30	H	average	-3.80	34.50	54.0	19.50
1459.00	47.10	H	peak	-3.60	43.50	74.0	30.50
1459.00	38.30	H	average	-3.60	34.70	54.0	19.30
1498.25	47.60	V	peak	-3.50	44.10	74.0	29.90
1498.25	39.50	V	average	-3.50	36.00	54.0	18.00
2246.50	48.40	V	peak	-1.30	47.10	74.0	26.90
2246.50	39.10	V	average	-1.30	37.80	54.0	16.20
4824.00	40.40	H	peak	9.00	49.40	74.0	24.60
4824.00	30.60	H	average	9.00	39.60	54.0	14.40

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1494.50	47.00	V	peak	-3.50	43.50	74.0	30.50
1494.50	38.30	V	average	-3.50	34.80	54.0	19.20
1518.50	46.10	V	peak	-3.50	42.60	74.0	31.40
1518.50	38.40	V	average	-3.50	34.90	54.0	19.10
1684.75	47.50	H	peak	-2.90	44.60	74.0	29.40
1684.75	38.10	H	average	-2.90	35.20	54.0	18.80
1700.00	45.90	H	peak	-2.90	43.00	74.0	31.00
1700.00	39.10	H	average	-2.90	36.20	54.0	17.80
2248.75	47.40	V	peak	-1.30	46.10	74.0	27.90
2248.75	38.70	V	average	-1.30	37.40	54.0	16.60
4876.13	39.00	V	peak	9.20	48.20	74.0	25.80
4876.13	31.90	V	average	9.20	41.10	54.0	12.90

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1496.75	48.40	V	peak	-3.50	44.90	74.0	29.10
1496.75	39.00	V	average	-3.50	35.50	54.0	18.50
1540.50	48.30	H	peak	-3.40	44.90	74.0	29.10
1540.50	39.70	H	average	-3.40	36.30	54.0	17.70
1674.25	48.90	V	peak	-2.90	46.00	74.0	28.00
1674.25	40.70	V	average	-2.90	37.80	54.0	16.20
1717.25	47.80	V	peak	-2.90	44.90	74.0	29.10
1717.25	38.90	V	average	-2.90	36.00	54.0	18.00
2243.25	48.60	V	peak	-1.30	47.30	74.0	26.70
2243.25	39.30	V	average	-1.30	38.00	54.0	16.00
4928.25	40.20	H	peak	9.30	49.50	74.0	24.50
4928.25	33.60	H	average	9.30	42.90	54.0	11.10

Ant B 2.4 GHz mode

Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1328.75	46.70	H	peak	-3.80	42.90	74.0	31.10
1328.75	38.30	H	average	-3.80	34.50	54.0	19.50
1497.25	48.20	V	peak	-3.50	44.70	74.0	29.30
1497.25	38.80	V	average	-3.50	35.30	54.0	18.70
1565.00	46.70	H	peak	-3.30	43.40	74.0	30.60
1565.00	37.70	H	average	-3.30	34.40	54.0	19.60
1661.25	48.30	V	peak	-2.90	45.40	74.0	28.60
1661.25	38.40	V	average	-2.90	35.50	54.0	18.50
2247.50	49.60	V	peak	-1.30	48.30	74.0	25.70
2247.50	38.80	V	average	-1.30	37.50	54.0	16.50
4824.00	40.50	H	peak	9.00	49.50	74.0	24.50
4824.00	30.00	H	average	9.00	39.00	54.0	15.00

Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1174.75	46.60	H	peak	-4.4	42.20	74.0	31.80
1174.75	38.20	H	average	-4.4	33.80	54.0	20.20
1327.50	47.40	H	peak	-3.8	43.60	74.0	30.40
1327.50	30.30	H	average	3.8	34.10	54.0	19.90
1498.25	47.80	V	peak	-3.5	44.30	74.0	29.70
1498.25	38.40	V	average	-3.5	34.90	54.0	19.10
1660.25	49.90	V	peak	-2.9	47.00	74.0	27.00
1660.25	37.90	V	average	-2.9	35.00	54.0	19.00
2243.00	47.60	V	peak	-1.3	46.30	74.0	27.70
2243.00	38.20	V	average	-1.3	36.90	54.0	17.10
4876.13	40.00	H	peak	9.2	49.20	74.0	24.80
4876.13	31.30	H	average	9.2	40.50	54.0	13.50

Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1372.00	46.30	H	peak	-3.80	42.50	74.0	31.50
1372.00	37.70	H	average	-3.80	33.90	54.0	20.10
1497.75	47.00	H	peak	-3.50	43.50	74.0	30.50
1497.75	38.80	H	average	-3.50	35.30	54.0	18.70
1664.00	50.10	V	peak	-2.90	47.20	74.0	26.80
1664.00	39.20	V	average	-2.90	36.30	54.0	17.70
1677.75	47.20	V	peak	-2.90	44.30	74.0	29.70
1677.75	38.40	V	average	-2.90	35.50	54.0	18.50
2246.00	48.30	V	peak	-1.30	47.00	74.0	27.00
2246.00	38.80	V	average	-1.30	37.50	54.0	16.50
4928.25	39.30	V	peak	9.30	48.60	74.0	25.40
4928.25	30.40	V	average	9.30	39.70	54.0	14.30

5.8 GHz mode

Ant A 5.8 GHz mode

Lowest Channel

Frequency (GHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Distance (dB)***	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11.472	53.83	H	peak	2.32	-6.02	50.13	74.0	23.87
11.472	49.36	H	average	2.32	-6.02	45.66	54.0	8.34
11.472	55.33	V	peak	2.32	-6.02	51.63	74.0	22.37
11.472	51.94	V	average	2.32	-6.02	48.24	54.0	5.76

Middle Channel

Frequency (GHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Distance (dB)***	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11.524	52.38	H	peak	2.47	-6.02	48.83	74.0	25.17
11.524	48.21	H	average	2.47	-6.02	44.66	54.0	9.34
11.524	56.08	V	peak	2.47	-6.02	52.53	74.0	21.47
11.524	53.32	V	average	2.47	-6.02	49.77	54.0	4.23

Highest Channel

Frequency (GHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Distance (dB)***	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11.628	52.60	H	peak	1.89	-6.02	48.47	74.0	25.53
11.628	48.86	H	average	1.89	-6.02	44.73	54.0	9.27
11.628	57.02	V	peak	1.89	-6.02	52.89	74.0	21.11
11.628	54.83	V	average	1.89	-6.02	50.70	54.0	3.30

Ant B 5.8 GHz mode

Lowest Channel

Frequency (GHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Distance (dB)***	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11.472	50.08	H	peak	2.32	-6.02	46.38	74.0	27.62
11.472	45.76	H	average	2.32	-6.02	42.06	54.0	11.94
11.472	54.57	V	peak	2.32	-6.02	50.87	74.0	23.13
11.472	51.19	V	average	2.32	-6.02	47.49	54.0	6.51

Middle Channel

Frequency (GHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Distance (dB)***	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11.524	50.26	H	peak	2.47	-6.02	46.71	74.0	27.29
11.524	44.83	H	average	2.47	-6.02	41.28	54.0	12.72
11.524	55.21	V	peak	2.47	-6.02	51.66	74.0	22.34
11.524	52.69	V	average	2.47	-6.02	49.14	54.0	4.86

Highest Channel

Frequency (GHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Distance (dB)***	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
11.628	50.76	H	peak	1.89	-6.02	46.63	74.0	27.37
11.628	45.31	H	average	1.89	-6.02	41.18	54.0	12.82
11.628	56.18	V	peak	1.89	-6.02	52.05	74.0	21.95
11.628	53.20	V	average	1.89	-6.02	49.07	54.0	4.93

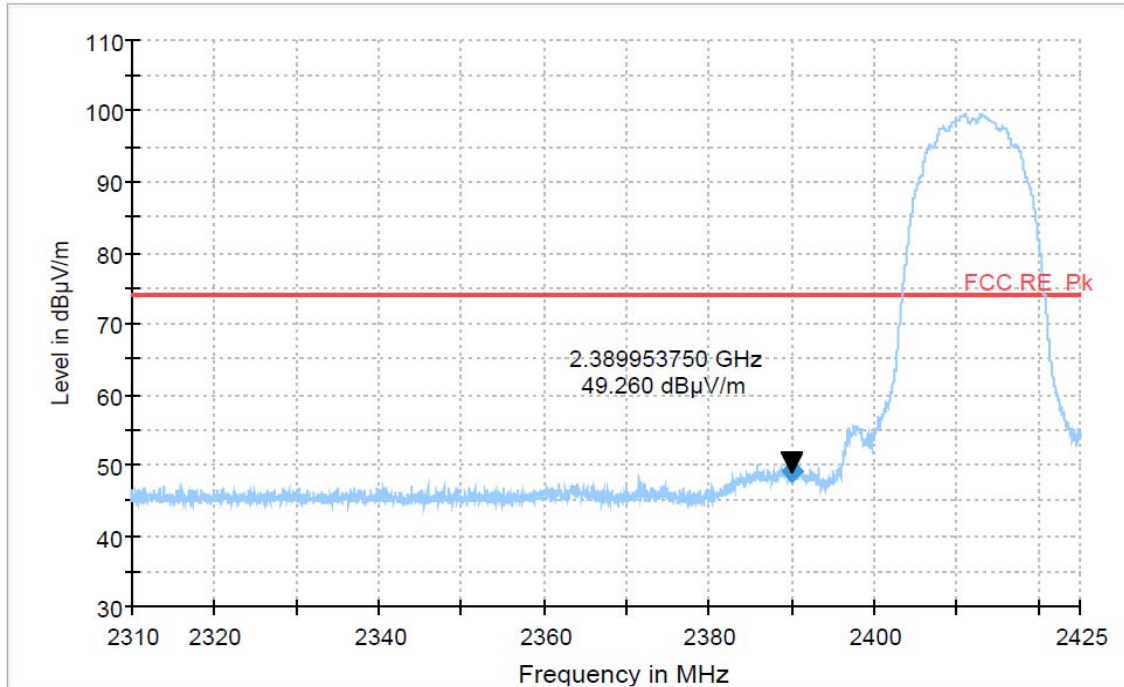
Note:

- *Pol.** H = Horizontal V = Vertical
- **AF + CL + Amp.** = Antenna Factor + Cable Loss + Amplifier.
- ***Distance factor** = $20 \log (\text{test distance} / \text{specific distance}) = 20 \log (1.5 / 3)$
- Other spurious are under 20 dB below Fundamental.
- The radiated emissions testing were made by rotating through three orthogonal axes.
The worst date was recorded.
- 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.
- 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.

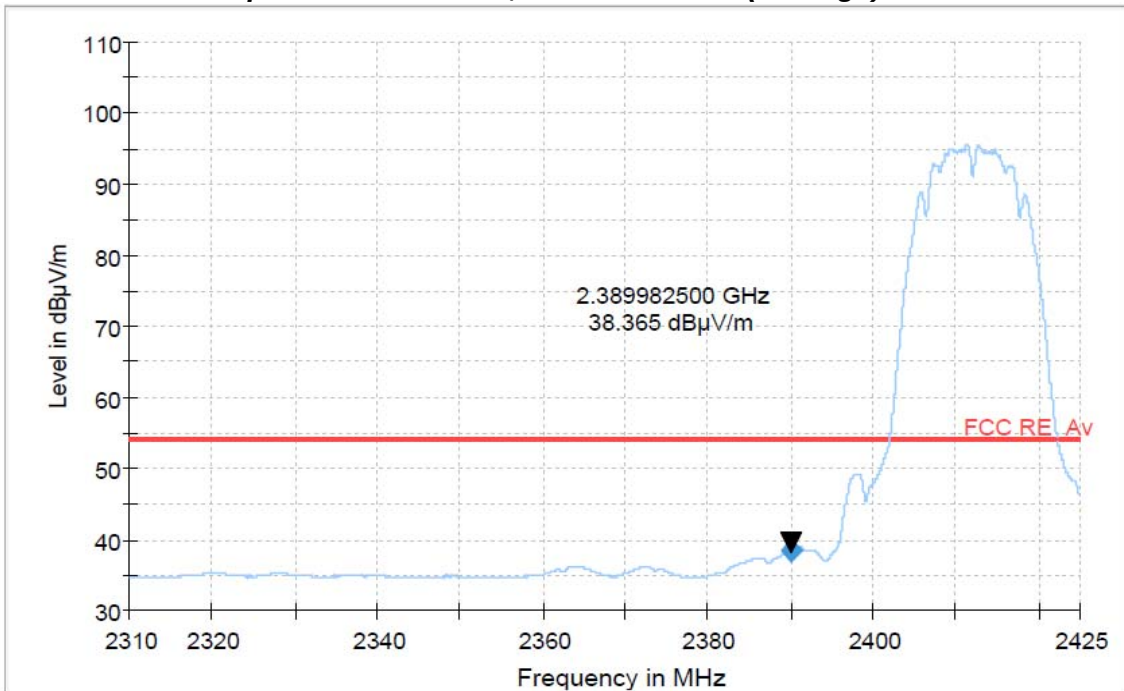
PLOT OF TEST DATA

Ant A

Restricted Band Spurious Emissions, Lowest channel(Peak)

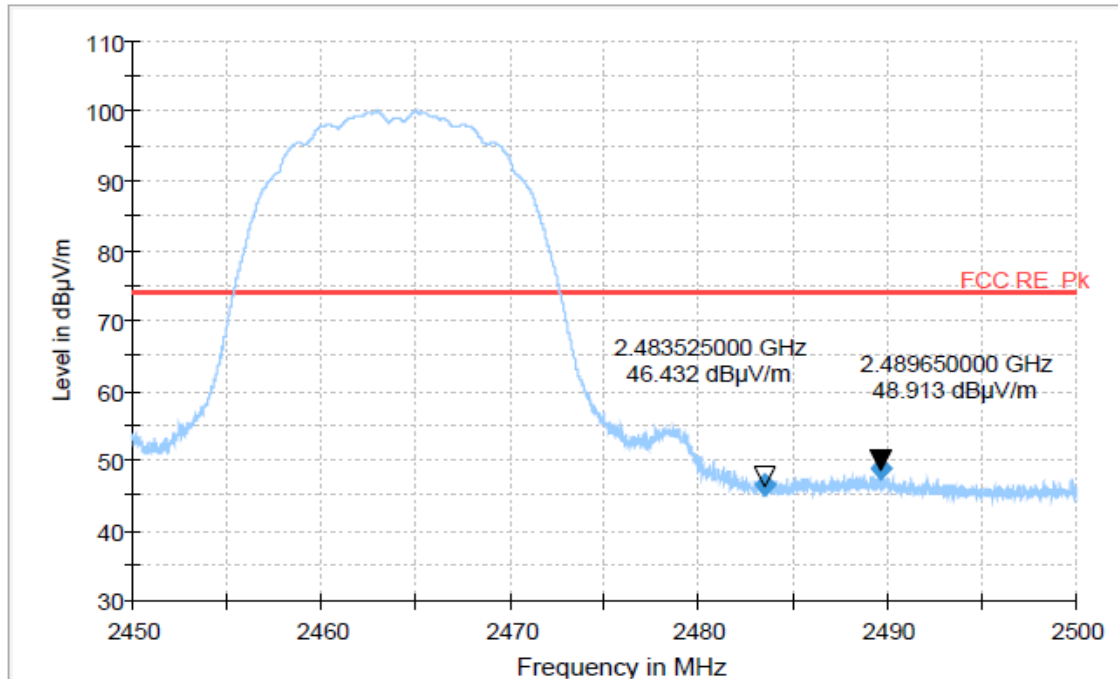


Restricted Band Spurious Emissions, Lowest channel(Average)

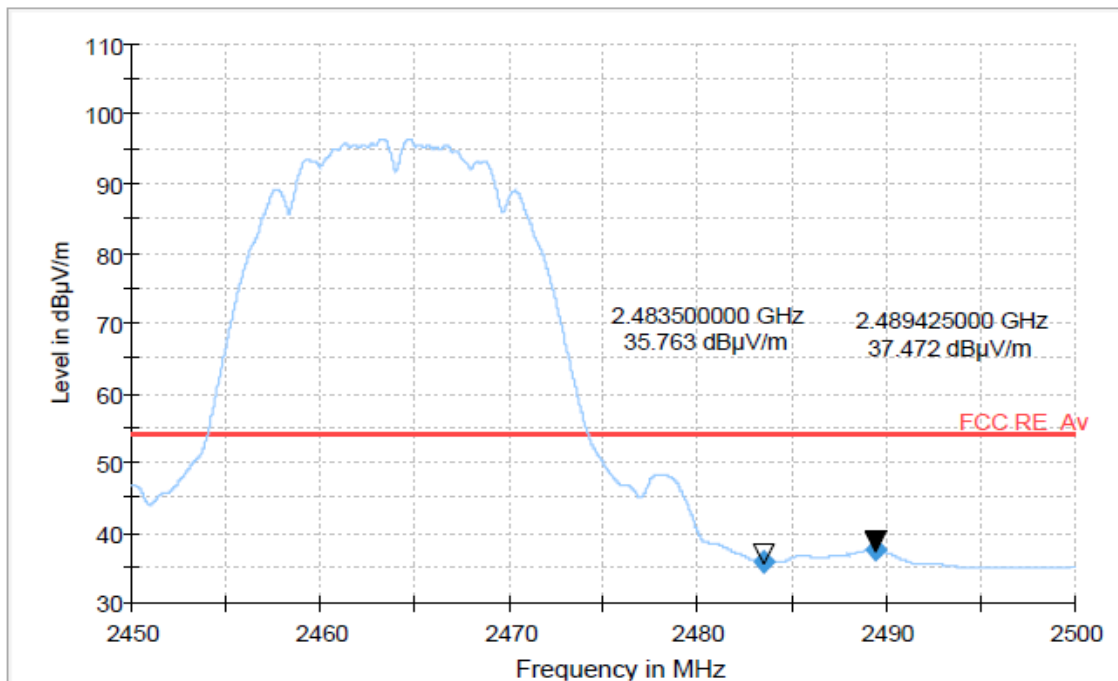


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Highest channel(Peak)



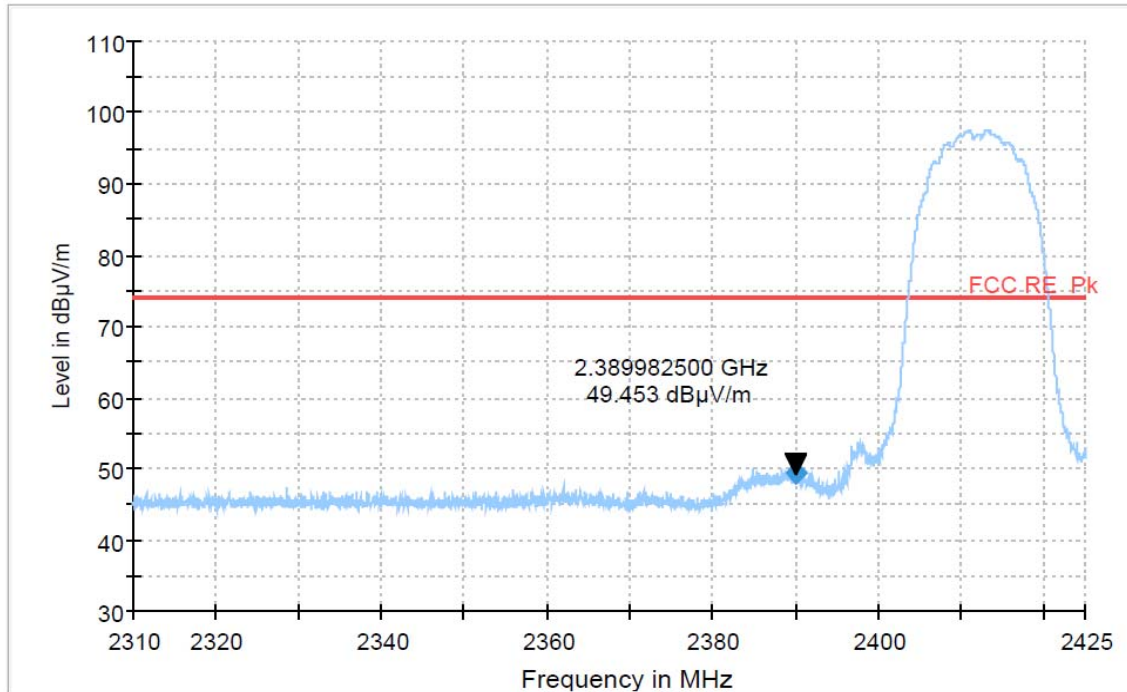
Restricted Band Spurious Emissions, Highest channel(Average)



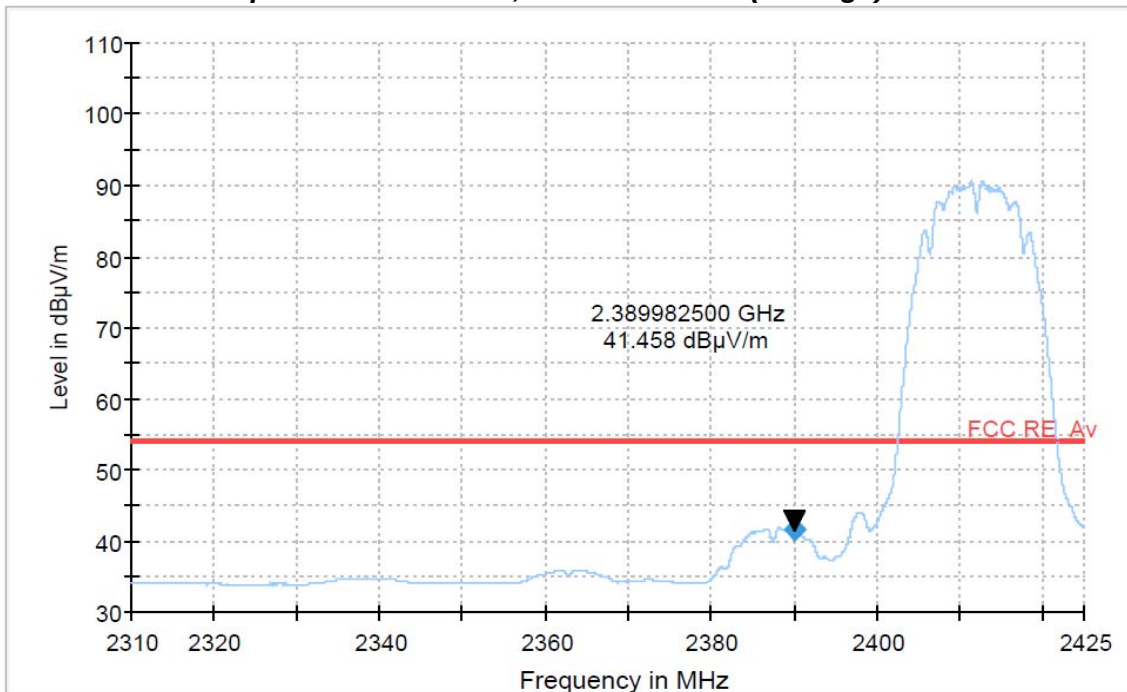
PLOT OF TEST DATA

Ant B

Restricted Band Spurious Emissions, Lowest channel(Peak)

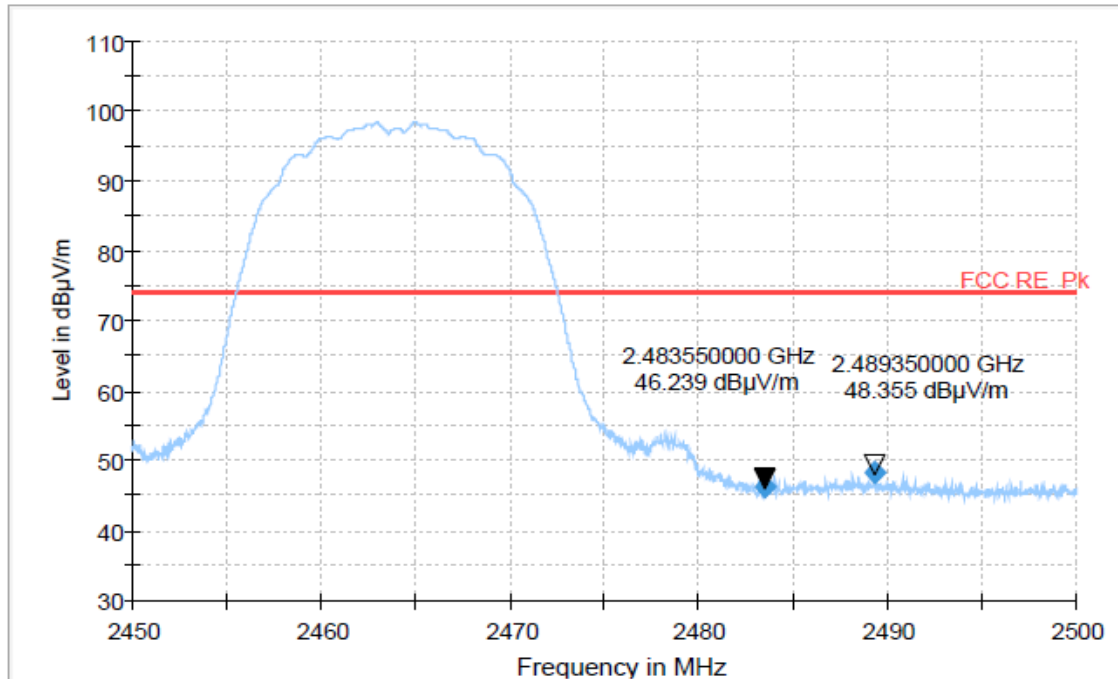


Restricted Band Spurious Emissions, Lowest channel(Average)

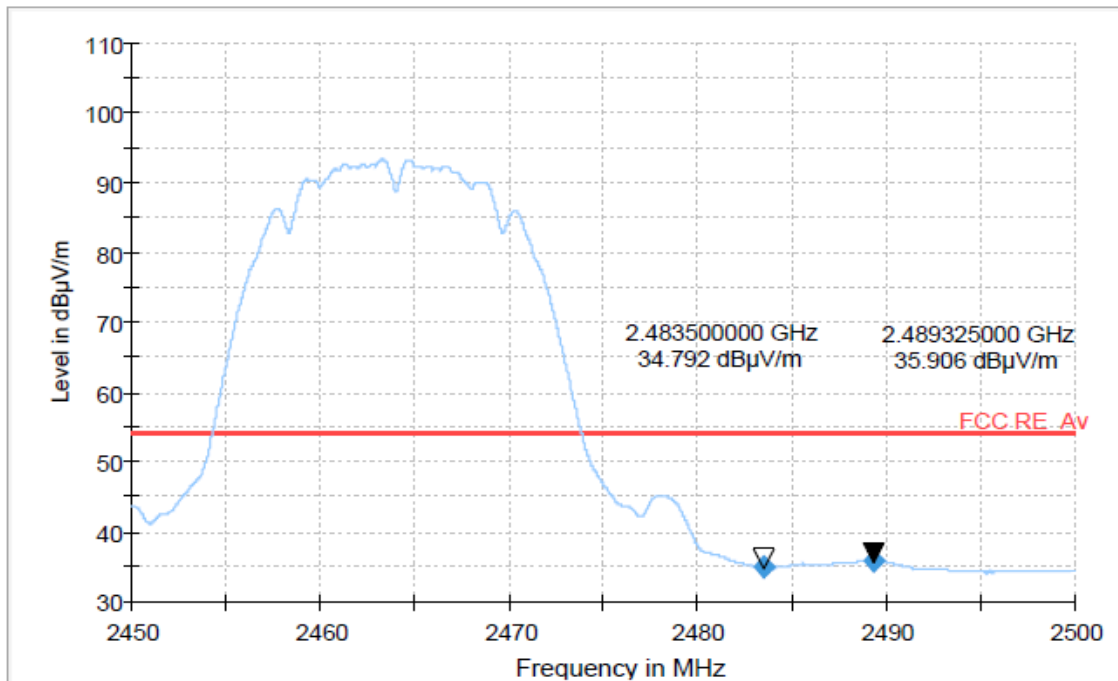


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Highest channel(Peak)



Restricted Band Spurious Emissions, Highest channel(Average)



Note: For the radiated emission field strength measurements at the band edges, the resolution bandwidth was set to 1 MHz, and then the video bandwidth was set to 1 MHz for peak measurements and 10 Hz for average measurements.

9. TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Amplifier	R & S	SCU18	10065	Apr. 05 2012	1 year
2	*Amplifier	R & S	SCU26	10011	Jun. 01 2012	1 year
3	*Amplifier	R & S	SCU40	10008	Jun. 01 2012	1 year
4	*Pre Amplifier	HP	8449B	3008A00107	Jan. 13 2012	1 year
5	*Spectrum Analyzer	Agilent	E4440A	MY44303257	Jul. 16 2012	1 year
6	*Spectrum Analyzer	R & S	FSP40	100361	Jul. 17 2012	1 year
7	*Loop Antenna	R & S	HFH2-Z2	100279	Aug. 31 2011	2 year
8	Wideband Power Sensor	R & S	NRP-Z81	100634	Apr. 05 2012	1 year
9	*Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-508	Dec. 24 2010	2 year
10	*Horn Antenna	Q-par Angus	QSH20S20	8179	Mar. 28 2011	2 year
11	*Horn Antenna	Q-par Angus	QSH22K20	8180	Mar. 28 2011	2 year
12	*LISN	R & S	ESH3-Z5	833874/006	Oct. 08 2012	1 year
13	*LISN	R & S	ESH2-Z5	100227	Apr. 04 2012	1 year
14	*Anechoic Chamber	EM Eng.	N/A	N/A	N/A	N/A
15	*Shielded Room	EM Eng.	N/A	N/A	N/A	N/A
16	*Position Controller	innco systems GmbH	CO2000	CO2000/329/124BD406/L	N/A	N/A
17	*Turn Table	innco systems GmbH	DS1200S	N/A	N/A	N/A
18	*Antenna Mast	innco systems GmbH	MA4000	N/A	N/A	N/A
19	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
20	*EMI test receiver	R & S	ESU 40	100202	Apr. 04 2012	1 year
21	*Trilog broadband test antenna	SCHWARZBECK	VULB 9163	9163-423	Jun. 09 2012	2 year
22	*Attenuator	Fairview	SA3N5W-06	N/A	Apr. 04 2012	
23	*Controller	innco systems GmbH	CO2000-G	N/A	N/A	N/A
24	*Open switch and control unit	R & S	OSP-120	100015	N/A	N/A
25	*Antenna mast	innco systems GmbH	MA4000-EP	N/A	N/A	N/A
26	*Turn table	innco systems GmbH	DT3000-3T	N/A	N/A	N/A
27	*Pre Amplifier	R & S	SCU 01	10030	Apr. 04 2012	1 year

*) 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	X_i	Uncertainty of X_i		Coverage factor k	$u(X_i)$ (dB)	C_i	$C_i u(X_i)$ (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	X_i	Uncertainty of X_i		Coverage factor k	$u(X_i)$ (dB)	C_i	$C_i u(X_i)$ (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 : + ($\geq$ 200 MHz) Ⓓ: Log Periodic Antenna-receiver Mismatch : - ($\geq$ 200 MHz)						
Combined Standard Uncertainty	Normal			± 2.63 (< 200 MHz) ± 2.74 ($\geq$ 200 MHz)			
Expanded Uncertainty U	Normal ($k = 2$)			± 5.26 (< 200 MHz) ± 5.48 ($\geq$ 200 MHz)			