

Nemko Korea CO., Ltd.

67-1 & 300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA

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FCC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Samsung Electronics Co., Ltd.
416, Maetan-3Dong, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, Korea.
(Post code : 443-742)
Attn. : Mr. Dongwook. Shin

Dates of Issue : February 23, 2012**Test Report No. : NK-11-R-284****Test Site : Nemko Korea Co., Ltd.****FCC ID****A3LRPMR500****Brand Name****SAMSUNG****Contact Person**

Samsung Electronics Co., Ltd.
416, Maetan-3Dong, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, Korea, 443-742.
Mr. Dongwook. Shin
Telephone No. : +82-31-200-5698

Applied Standard: FCC 47 CFR Part 15C
Classification: Digital Transmission System (DTS)
EUT Type: Zigbee 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. 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 : Minchul. Shin
Engineer


Reviewed By : Hyunho. Kim
Manager & Chief Engineer

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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.

Responsible Party :	Samsung Electronics Co., Ltd.
Contact Person :	Mr. Dongwook. Shin
Manufacturer :	Samsung Electronics Co., Ltd. 416 Maetan-3Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 KOREA

- FCC ID: A3LRPMR500
- Model: RP-MR500
- Brand Name: SAMSUNG
- EUT Type: Zigbee Module
- Classification: Digital Transmission System (DTS)
- Applied Standard: FCC 47 CFR Part 15 subpart C
- Test Procedure(s): ANSI C63.4-2003 and FCC procedure dated March 23, 2005 entitled "Measurements of Digital Transmission Systems Operating Under Section 15.247"
- Dates of Test: October 19, 2011 ~ December 30, 2011
- 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) was used in determining radiated and conducted emissions emanating from **Samsung Electronics Co., Ltd.**

FCC ID : A3LRPMR500

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

The site address is 67-1 & 300-2, Osan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, KOREA.

The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilo-meters (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (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.
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Tel)+82-31-330-1700
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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-1
	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

During the test, the EUT was connected to laptop PC and then a test program was executed to operate EUT continuously.

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.

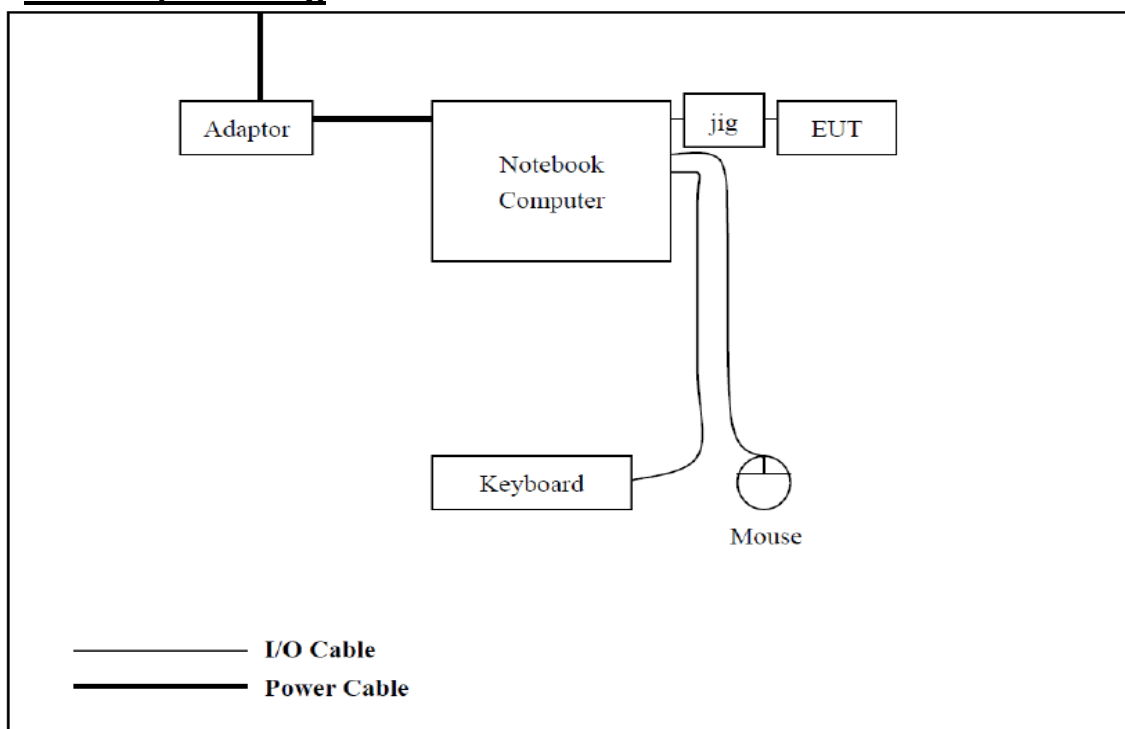
The EUT is programmed with the following setting during the testing:

Test frequency	2425 MHz	2450 MHz	2475 MHz
Programed Level	6 dBm	6 dBm	6 dBm

3.2 Support Equipment

Zigbee Module (EUT)	Samsung Electronics Co., Ltd. Model : RP-MR500	S/N: N/A
Keyboard	Sejin Electronics Co., Ltd. Model : SKR-3033S	FCC DOC S/N: 0FBB007934
Mouse	SUZHOU LOGITECH ELECTRONICS CO., LTD. Model : M-UR69	FCC DOC S/N: N/A
Laptop PC	HP Model: G62	FCC DOC S/N: 00196-128-293-875
AC Adaptor	Delta Electronics (Jiang Su), Ltd Model : PPP009D 1.2 m unshielded a.c. cable 1.8 m unshielded d.c. cable	FCC DOC S/N: N/A

3.3 Setup Drawing



3.4 EUT Information

The EUT is the **Samsung Zigbee Module FCC ID: A3LRPMR500**.

Specifications:

EUT Type	Zigbee Module
Model Name	RP-MR500
Brand Name	SAMSUNG
Frequency of Operation	2425 MHz ~ 2475 MHz
Peak Power Output (Conducted)	5.29 dBm
TX Antenna Gain	3.0 dBi
Modulations	O-QPSK
Voltage	1.9 V dc ~ 3.6 Vdc
Dimension(W x H x D)	24 mm x 41 mm x 4 mm
Weight	4 g
Remarks	-

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

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

5. RECOMMENDATION/CONCLUSION

The data collected shows that the **Samsung Zigbee Module FCC ID: A3LRPMR500** 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 Zigbee Module FCC ID: A3LRPMR500** 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 Rohde & Schwarz (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 ms 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.

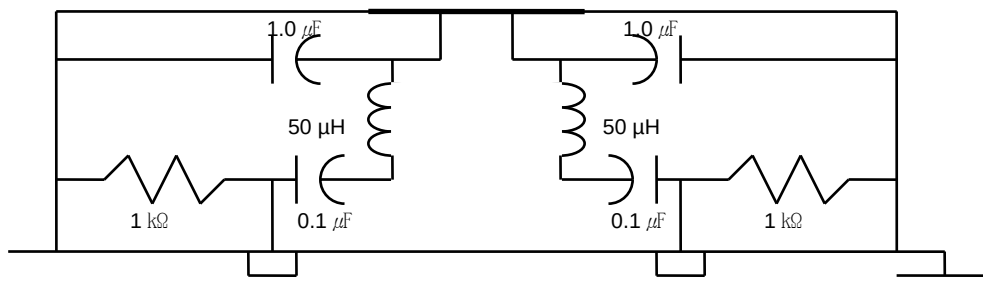


Fig. 2. LISN Schematic Diagram

7.2 Radiated Emissions

Preliminary measurements were made indoors at 3 meter using broad band antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found. The spectrum was scanned from 9 kHz to 30 MHz using Loop Antenne(Rohde&Schwarz, HFH2-Z2) and 30 to 1000 MHz using Bi-conical log Antenna(ARA, LPB-2520/A). Above 1 GHz, Horn antenna (Scwarzbeck BBHA 9120D: up to 18 GHz, Q-par Angus QSH20S20 : 18 to 26.5 GHz, QSH22K20: up to 40 GHz) was used. Final Measurements were made outdoors at 3 or 10 m test range using Loop Antenne(Rohde&Schwarz, HFH2-Z2) and Logbicon Super Antenna (Schwarzbeck, VULB9168) or Horn antenna.(Scwarzbeck BBHA 9120D: up to 18 GHz , Q-par Angus QSH20S20 : 18 to 26.5 GHz, QSH22K20: up to 40 GHz).

The test equipment was placed on a wooden table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was reexamined and investigated using EMI test receiver (ESCS30) & (FSP40). The detector function was set to CISPR peak mode or quasi-peak mode or average mode and the band-width of the receiver was set to 120 kHz or 1 MHz depending on the frequency or type of signal. The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non- metallic 1.0 x 1.5 meter table. The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; whichever determined the worst case emission.

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

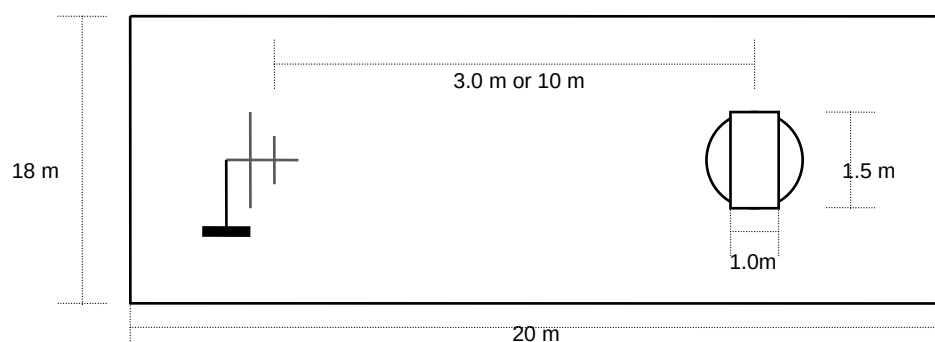
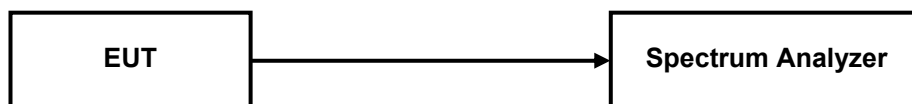


Fig. 3. Dimensions of Outdoor Test Site

7.3 6 dB Bandwidth

Test Setup



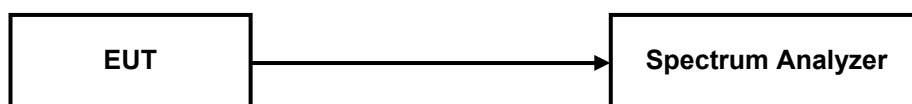
Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the spectrum analyzer. The RBW of spectrum analyzer is set to 100 kHz and VBW is set to 300 kHz. The sweep time is coupled.

The spectrum analyzer is set for peak detected and Max hold scan mode.

7.4 Peak Output Power

Test Setup

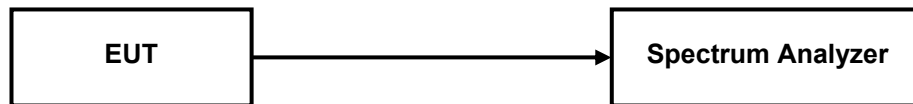


Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the spectrum analyzer. The RBW of spectrum analyzer is set to 3 MHz and VBW is set to the 3 MHz. The sweep time is coupled.

7.5 Peak Power Spectral Density

Test Setup



Test Procedure

The transmitter is connected to the Spectrum analyzer.

The maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer.

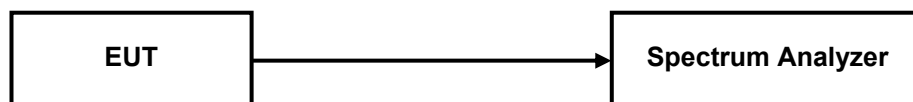
The RBW of spectrum analyzer is set to 3 kHz and VBW is set to 3 kHz.

The sweep time is set to Span/3 kHz and video averaging is turned off.

The PPSD is the highest level found across the emission in any 3 kHz band.

7.6 Conducted Spurious Emissions

Test Setup



Test Procedure

The transmitter is connected to the spectrum analyzer.

The RBW of spectrum analyzer is set to 100 kHz and VBW is set to the 300 kHz.

Measurements are made over the 30 MHz to 26.5 GHz range with the transmitter set to the Lowest, middle and highest channels.

8. TEST DATA

8.1 Conducted Emissions

FCC §15.207

Frequency (MHz)	Level(dBμV)		*)Factor (dB)	**) Line	Limit(dBμV)		Margin(dB)	
	Q-Peak	Average			Q-Peak	Average	Q-Peak	Average
0.15	55.3	45.0	0.2	L	66.0	56.0	10.7	11.0
0.53	36.9	35.6	0.2	L	56.0	46.0	19.1	10.4
0.61	33.3	32.1	0.1	L	56.0	46.0	22.7	13.9
2.07	32.2	31.6	0.2	N	56.0	46.0	23.8	14.4
2.15	30.4	29.2	0.2	N	56.0	46.0	25.6	16.8
12.16	37.0	30.1	1.0	L	60.0	50.0	23.0	19.9

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 were 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

Conducted Emission at the Mains port (Line)

NEMKO KOREA (NK-11-R-307)

23 Dec 2011 14:23

Conducted Emissions

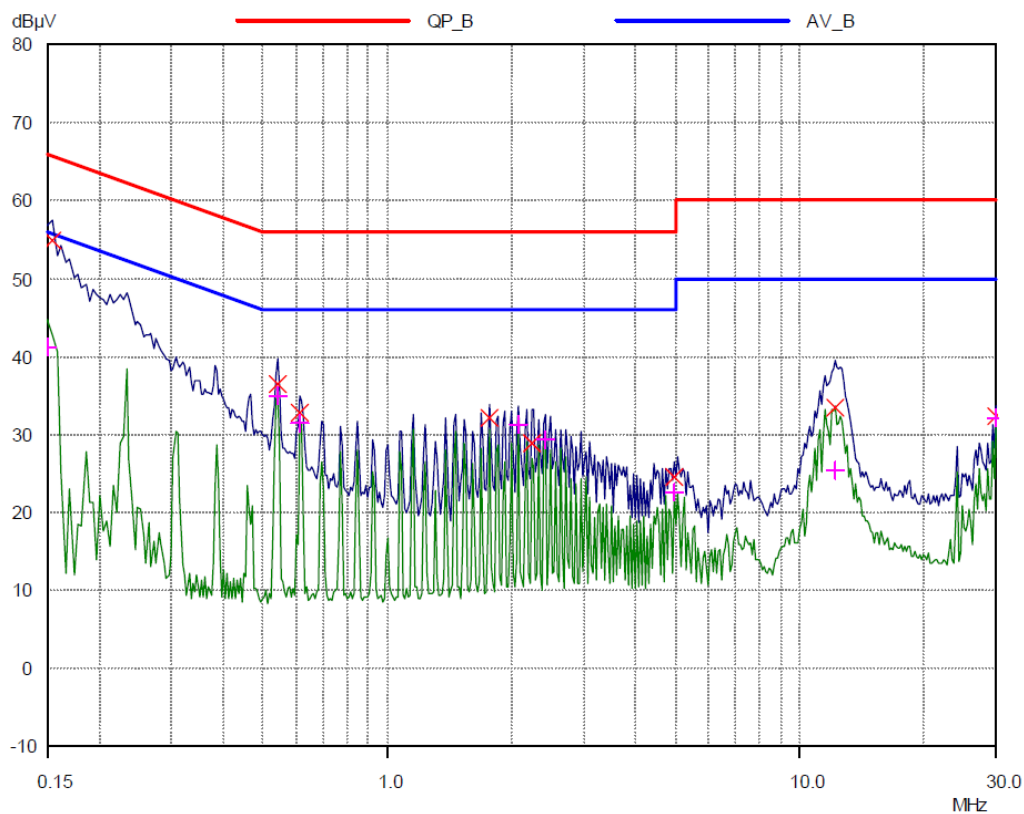
EUT: Zigbee Module
Manuf: Samsung Electronics Co., Ltd
Op Cond: a.c. 120 V / 60 Hz
Operator: Minchul, Shin
Test Spec: FCC PART 15.207
Comment: MODEL :RP-MR500
LINE : Line- PE
Result File: 915_1.dat :

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-11-R-307)

23 Dec 2011 14:17

Conducted Emissions

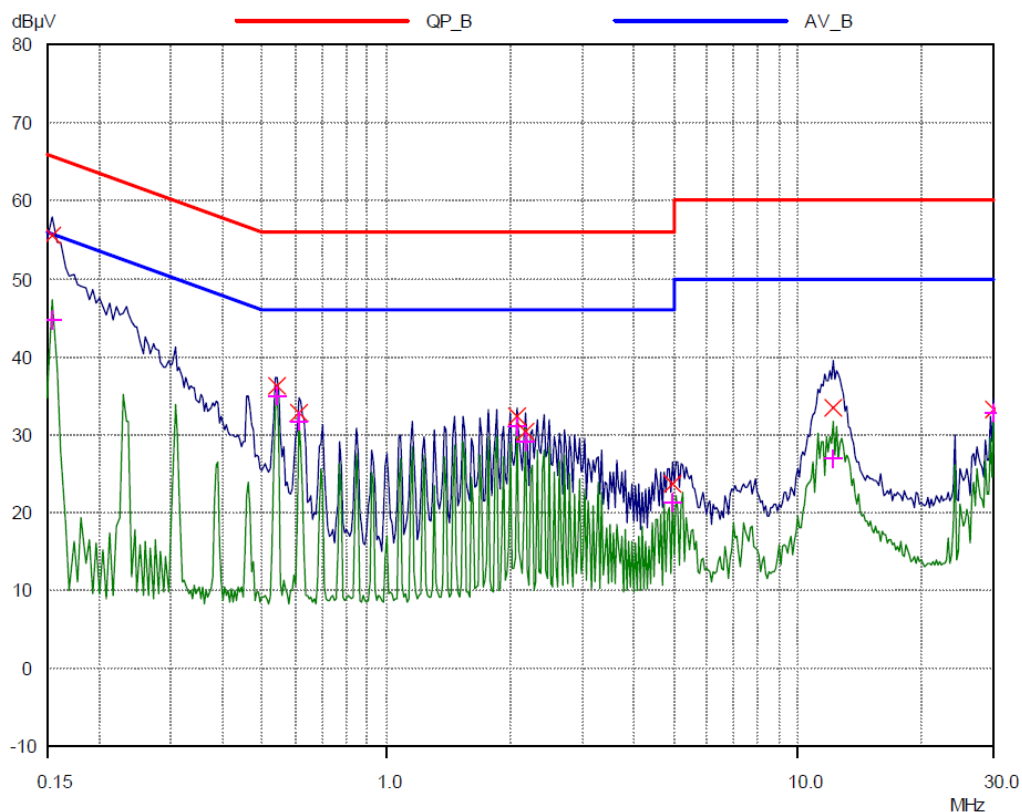
EUT: Zigbee Module
 Manuf: Samsung Electronics Co., Ltd
 Op Cond: a.c. 120 V / 60 Hz
 Operator: Minchul, Shin
 Test Spec: FCC PART 15.207
 Comment: MODEL : RP-MR500
 LINE : Neutra I- PE
 Result File: 915_n.dat

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



TEST DATA

8.2 Radiated Emissions

FCC §15.209

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)
36.97	49.5	V	300	54	-23.5	26.0	40.0	14.0
99.59	45.0	V	200	40	-19.1	25.9	43.5	17.6
143.58	50.5	H	400	17	-18.6	31.9	43.5	11.6
191.47	50.7	H	400	345	-16.7	34.0	43.5	9.5
224.04	42.3	V	100	131	-15.4	26.9	46.0	19.1
232.25	50.0	V	100	117	-15.4	34.6	46.0	11.4

Radiated Measurements at 3 meters

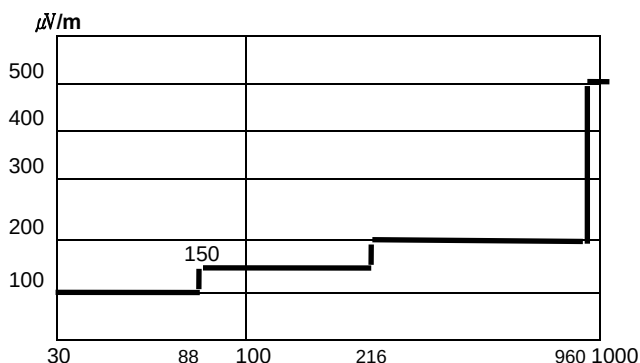


Fig. 4. Limits at 3 meters

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.

MHz

NOTES:

1. *Pol. H = Horizontal V = Vertical

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

3. Measurements using CISPR quasi-peak mode below 1 GHz.

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 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)

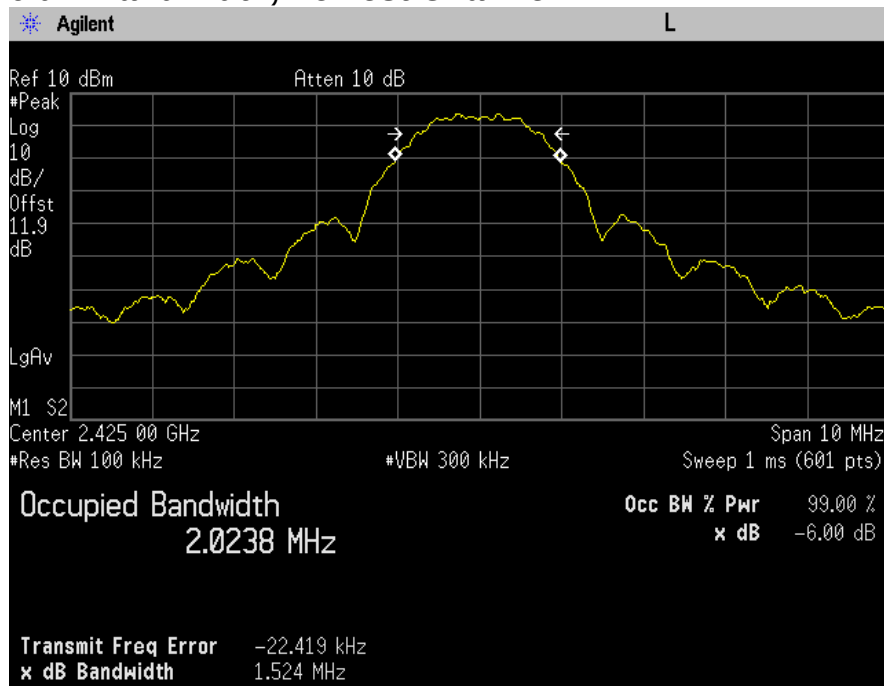
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

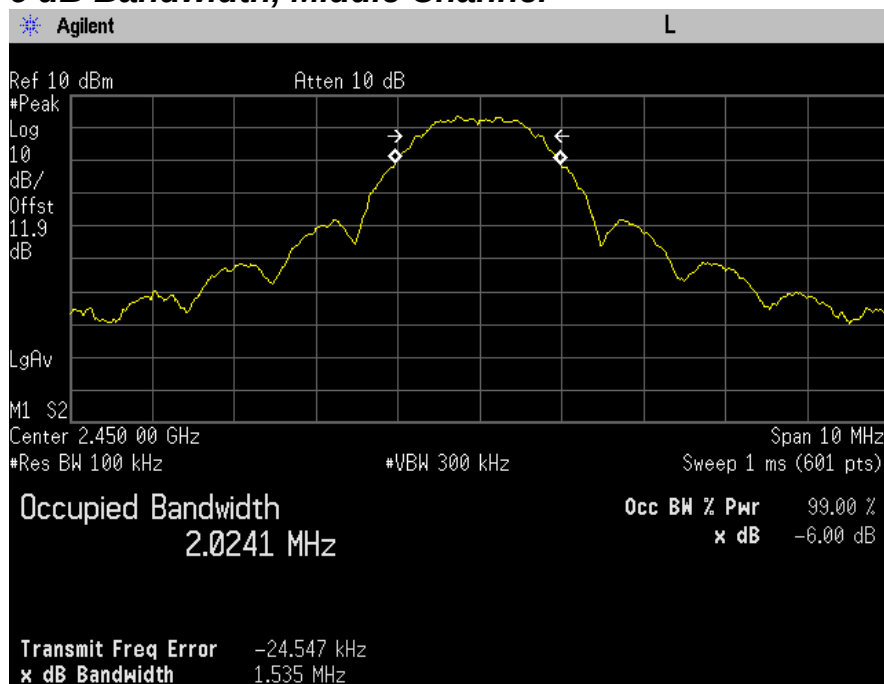
Channel	Frequency(MHz)	Result(MHz)	Limit(MHz)
Low	2425	1.524	0.5
Middle	2450	1.535	0.5
High	2475	1.511	0.5

PLOTS OF EMISSIONS

6 dB Bandwidth, Lowest Channel

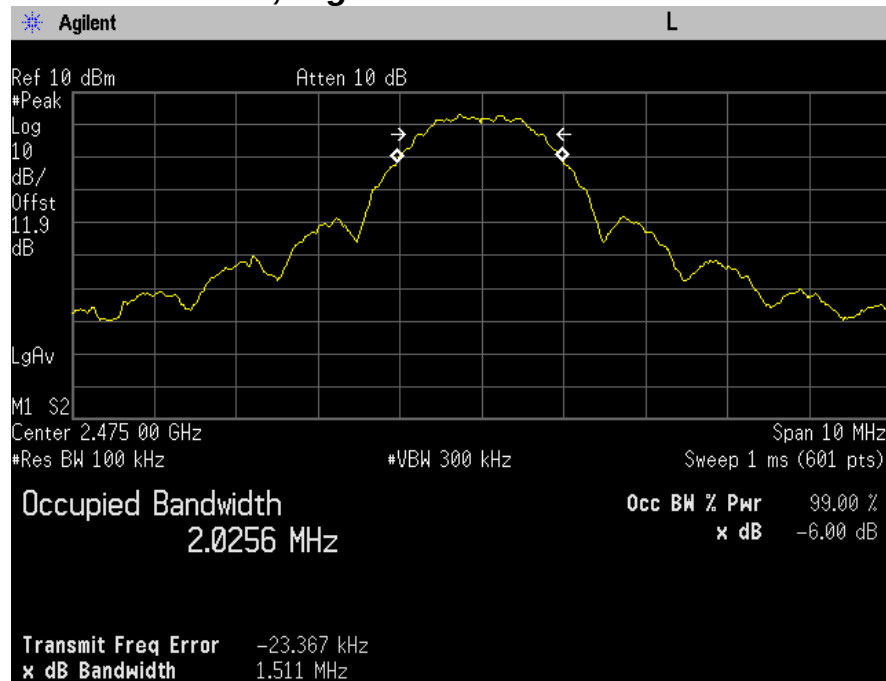


6 dB Bandwidth, Middle Channel



PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel



TEST DATA

8.4 Peak Power Output

FCC §15.247(b)(3)

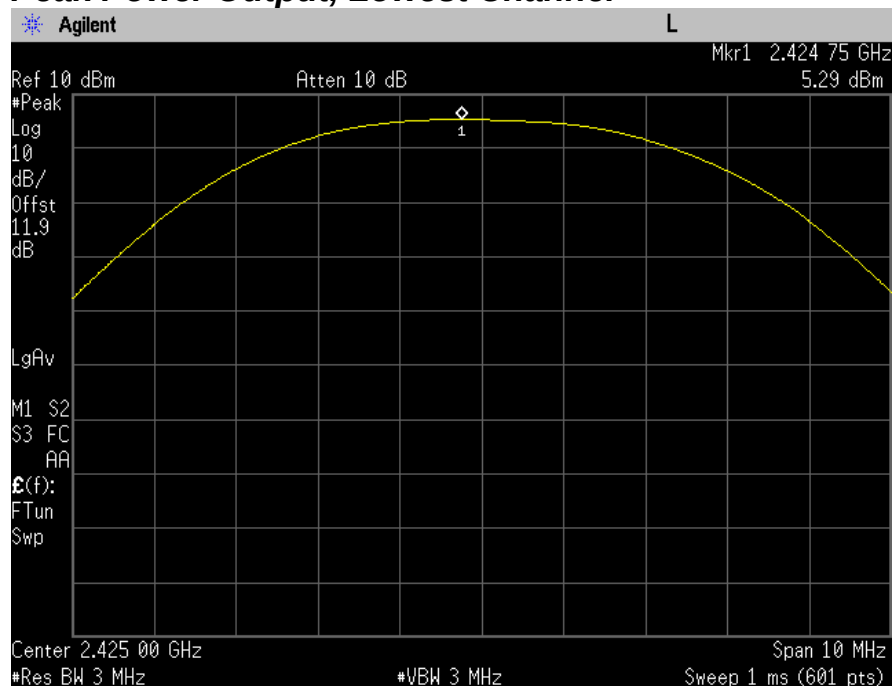
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

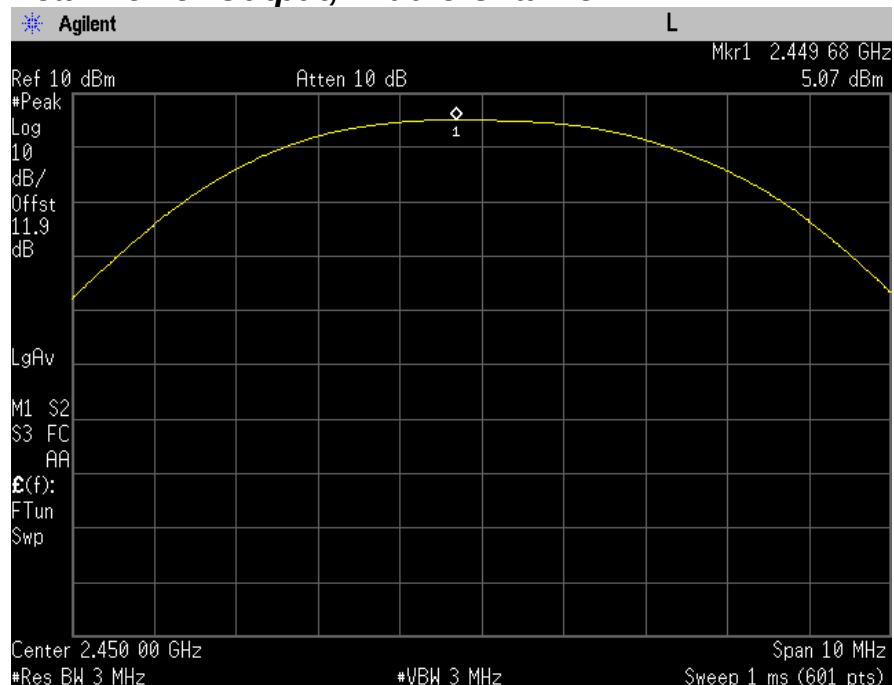
Channel	Frequency(MHz)	Peak Power(dBm)	Limit(dBm)
Low	2425	5.29	30
Middle	2450	5.07	30
High	2475	4.75	30

PLOTS OF EMISSIONS

Peak Power Output, Lowest Channel

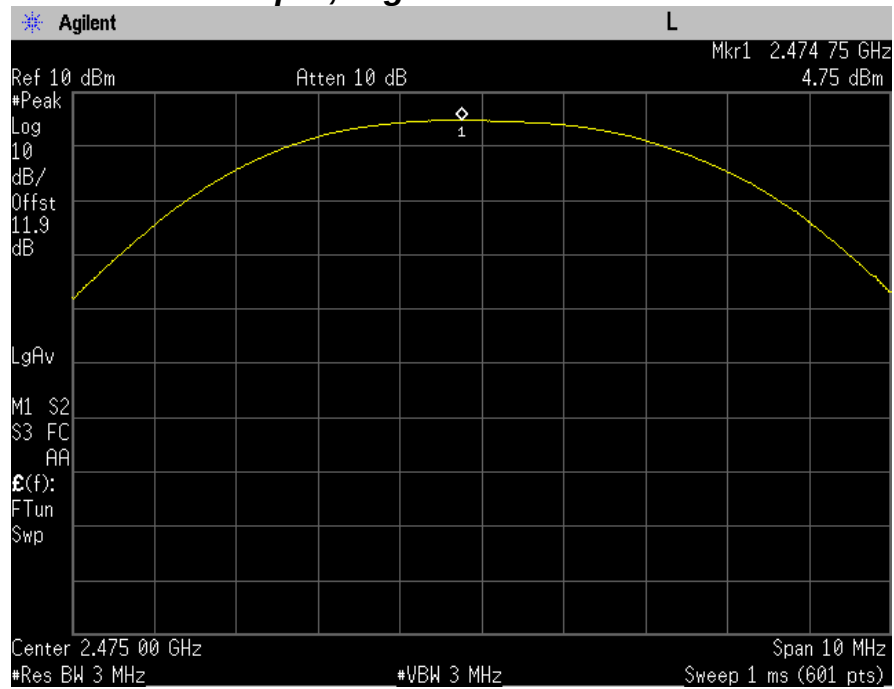


Peak Power Output, Middle Channel



PLOTS OF EMISSIONS

Peak Power Output, Highest Channel



TEST DATA

8.5 Peak Power Spectral Density

FCC §15.247(e)

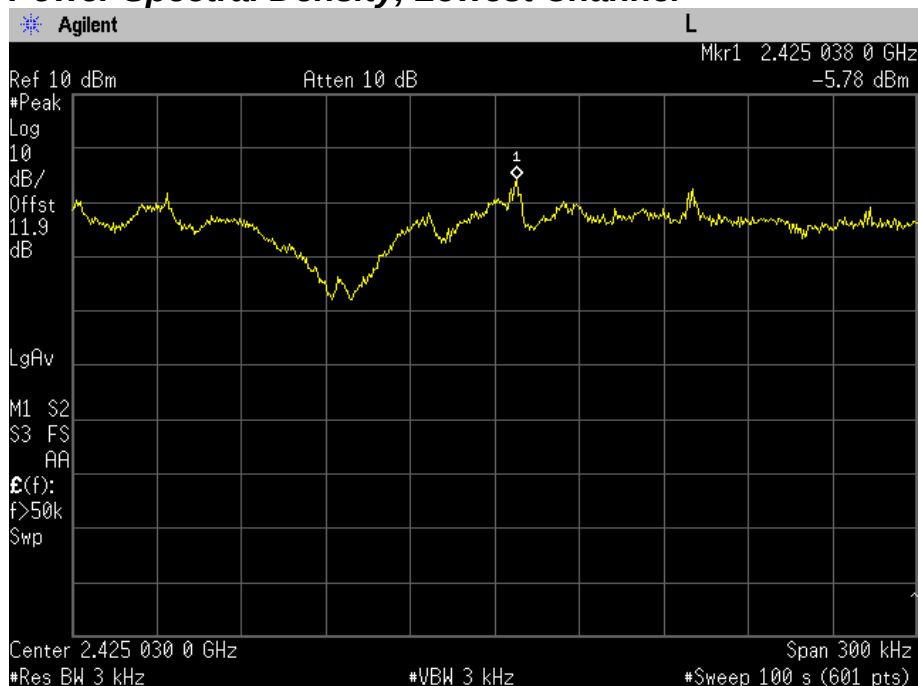
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

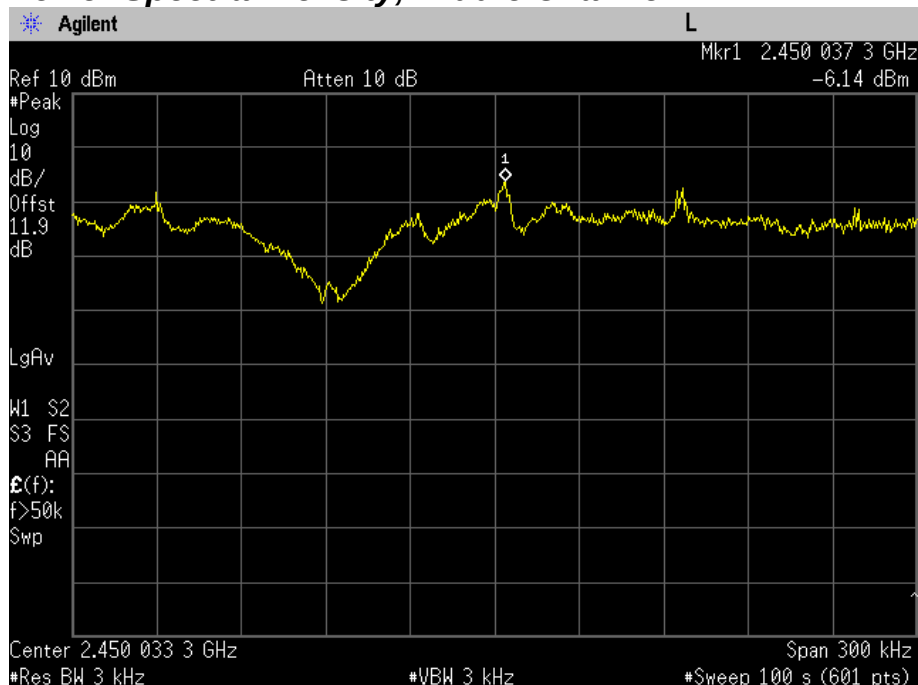
Channel	Frequency(MHz)	PPSD(dBm)	Limit(dBm)
Low	2425	-5.78	8
Middle	2450	-6.14	8
High	2475	-6.61	8

PLOTS OF EMISSIONS

Power Spectral Density, Lowest Channel

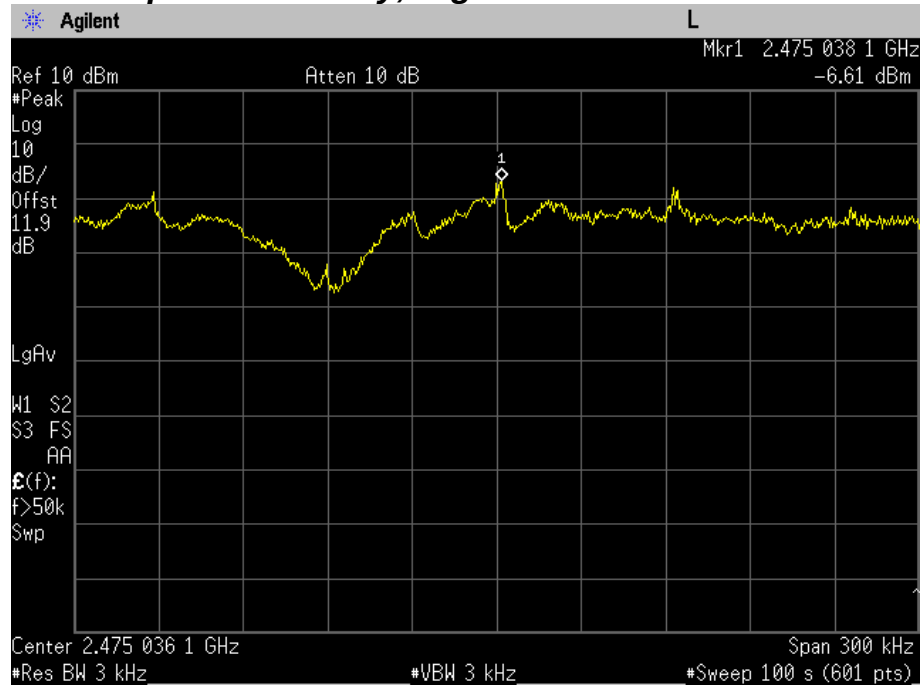


Power Spectral Density, Middle Channel



PLOTS OF EMISSIONS

Power Spectral Density, Highest Channel



TEST DATA

8.6 Conducted Spurious Emissions

FCC §15.247(d)

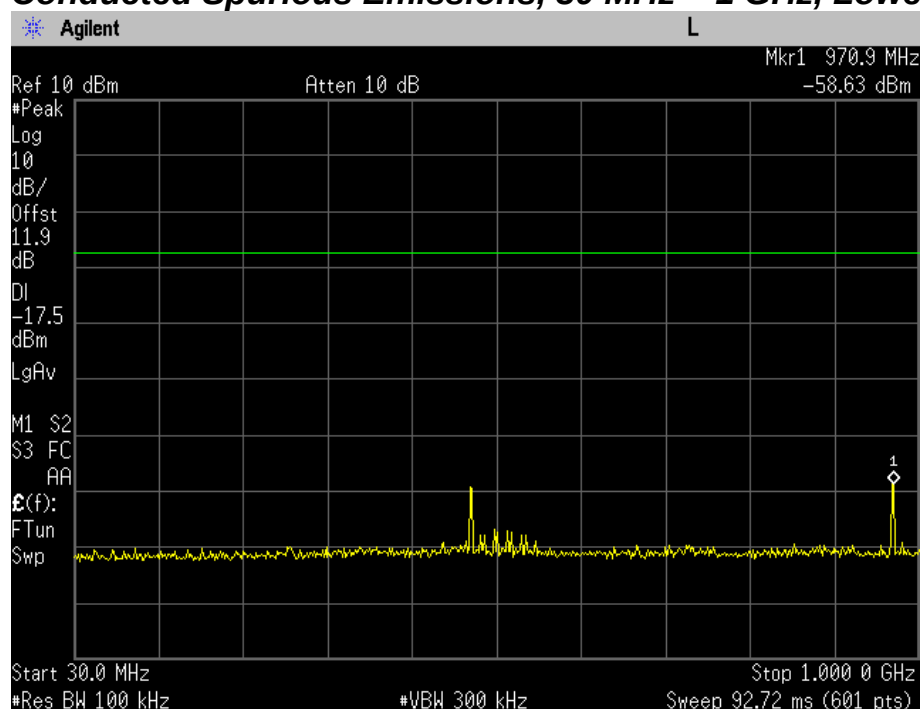
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

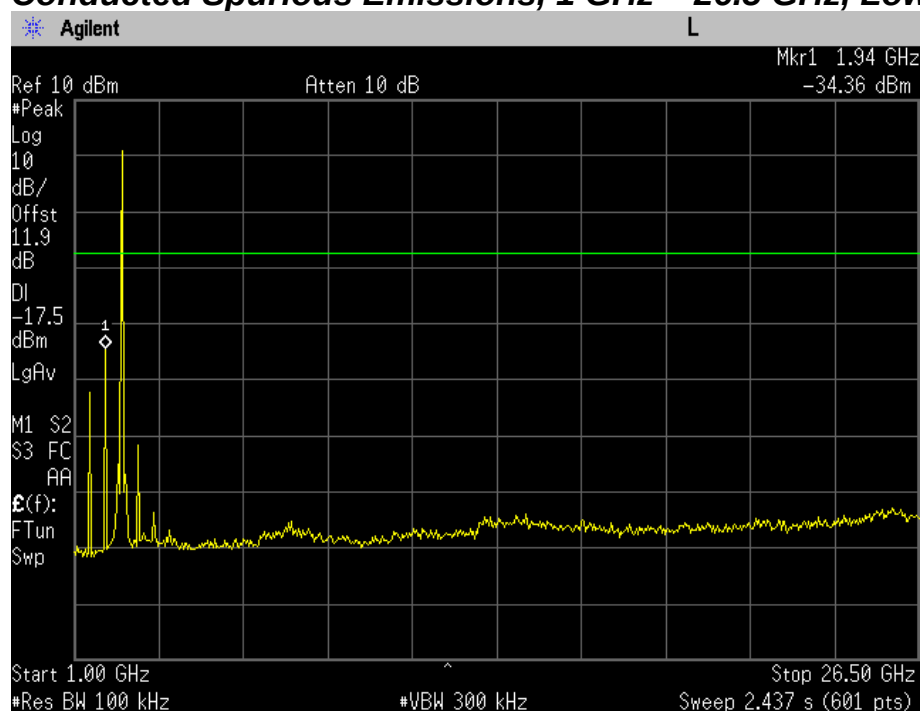
Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)
Low	2425	More than 30 dBc	20
Middle	2450	More than 30 dBc	20
High	2475	More than 30 dBc	20

PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 1 GHz, Lowest Channel

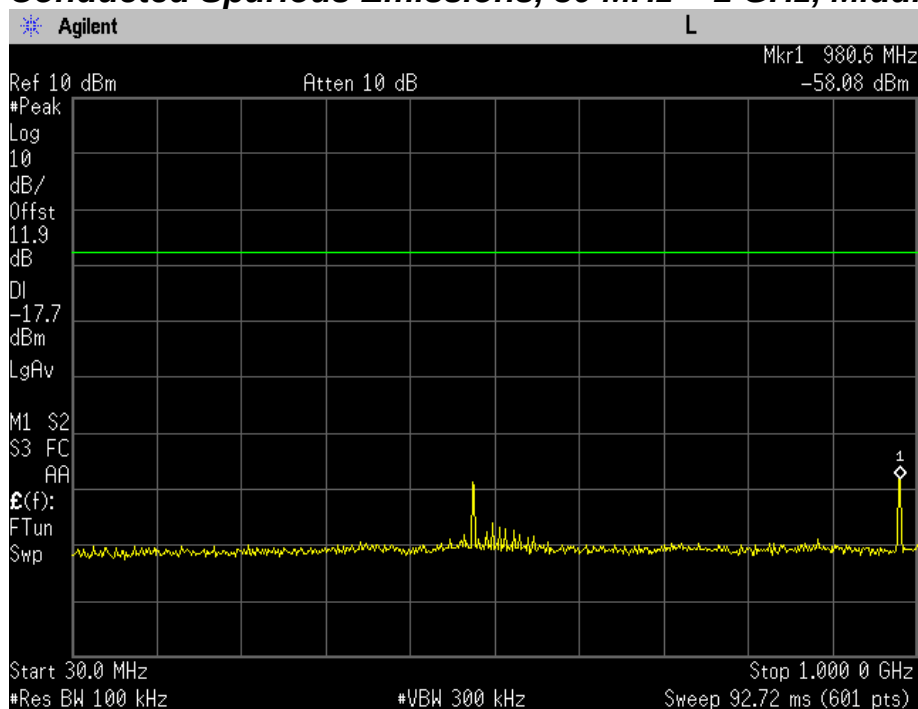


Conducted Spurious Emissions, 1 GHz ~ 26.5 GHz, Lowest Channel

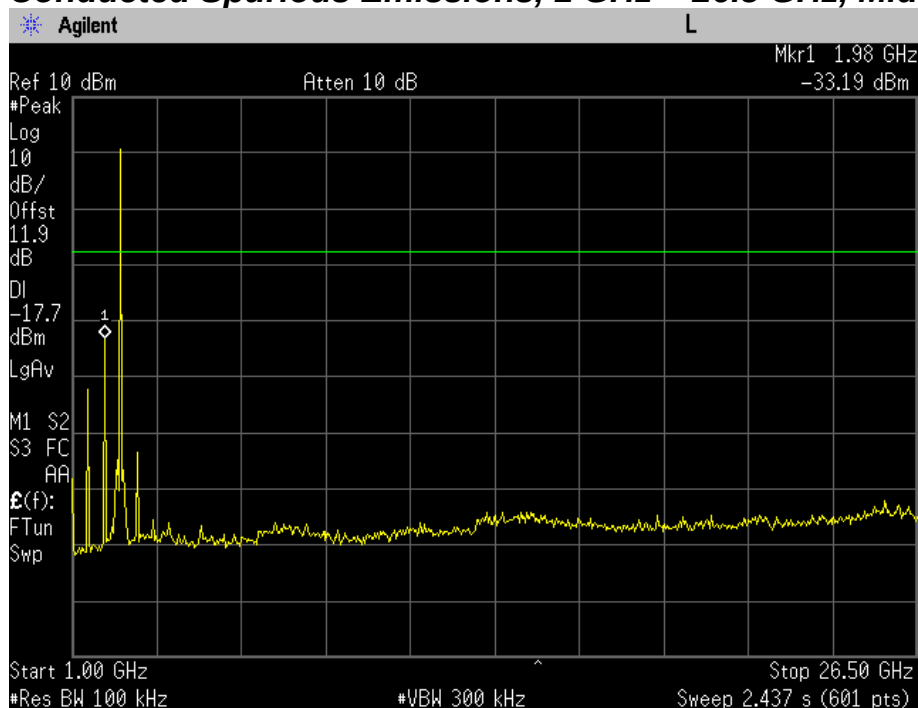


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 1 GHz, Middle Channel

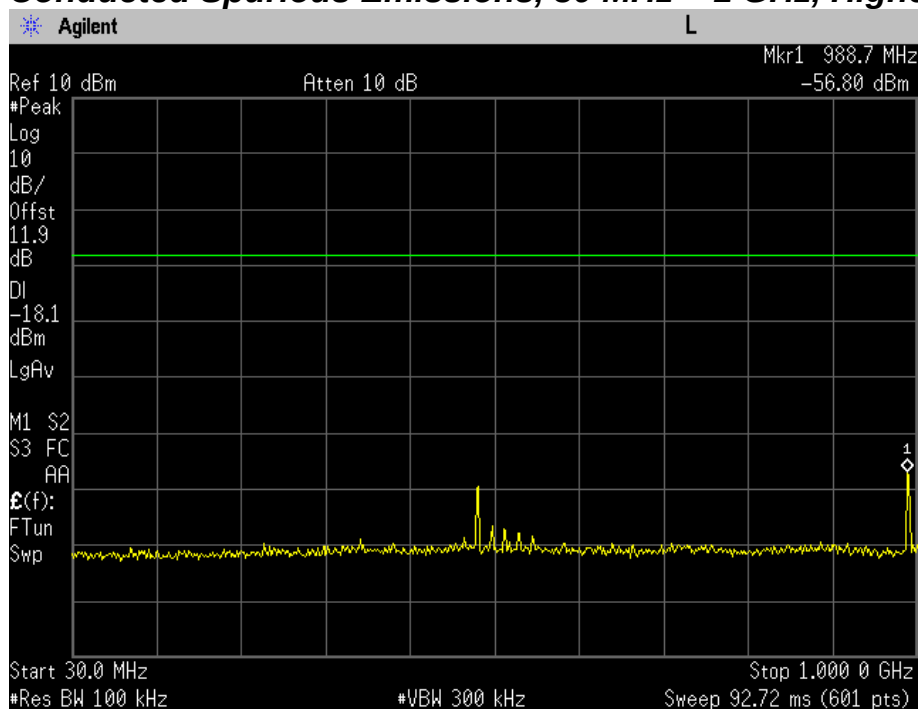


Conducted Spurious Emissions, 1 GHz ~ 26.5 GHz, Middle Channel

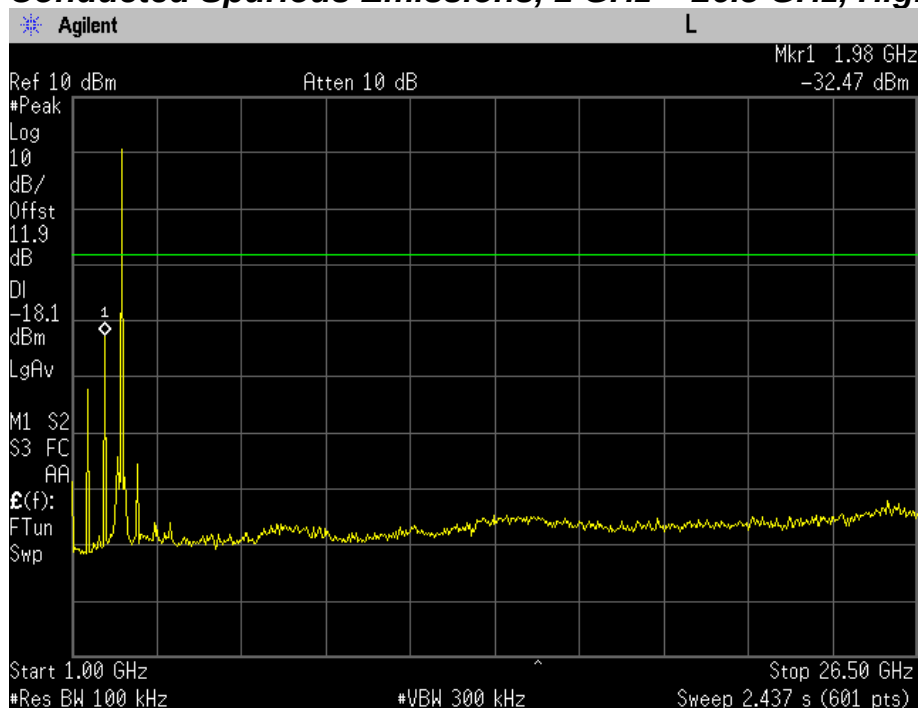


PLOT OF TEST DATA

Conducted Spurious Emissions, 30 MHz ~ 1 GHz, Highest Channel

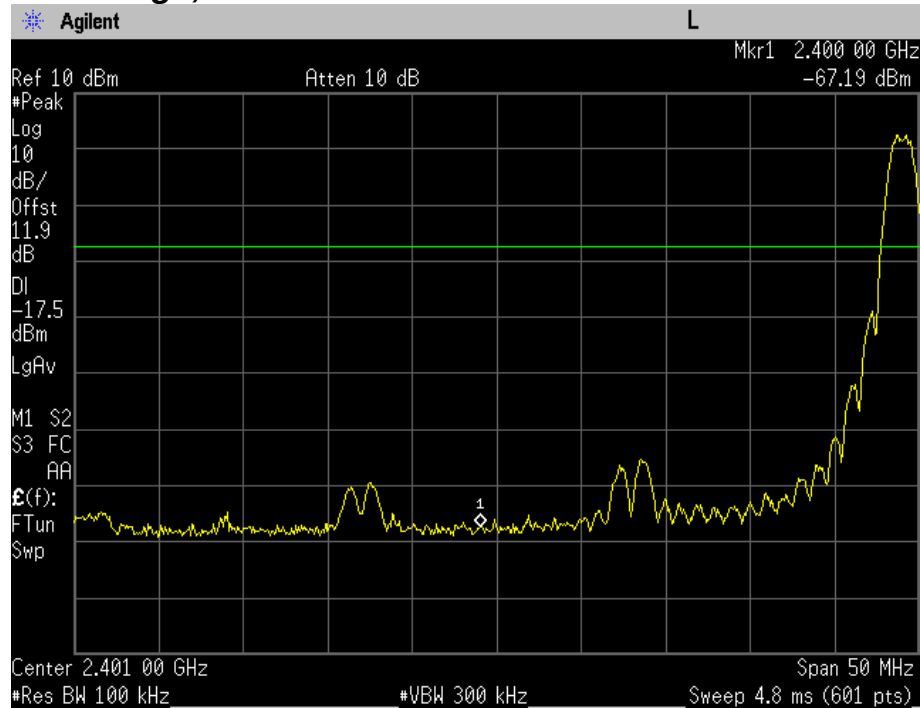


Conducted Spurious Emissions, 1 GHz ~ 26.5 GHz, Highest Channel

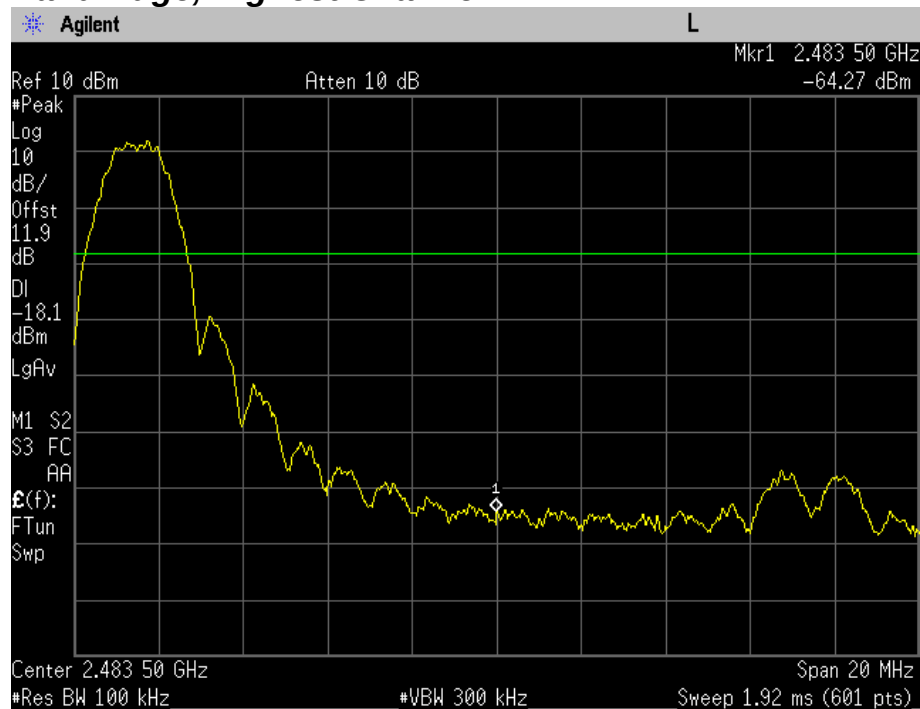


PLOT OF TEST DATA

Band Edge, Lowest Channel



Band Edge, Highest Channel



TEST DATA

8.7 Radiated Spurious Emissions

FCC §15.247(d)

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

Result:

Lowest Channel

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Detector	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1080.00	46.2	V	Peak	-5.8	40.4	74.0	33.6
1080.00	39.1	V	Average	-5.8	33.3	54.0	20.7
1140.00	47.2	V	Peak	-5.6	41.6	74.0	32.4
1140.00	37.7	V	Average	-5.6	32.1	54.0	21.9
1500.00	45.5	V	Peak	-4.6	40.9	74.0	33.1
1500.00	36.7	V	Average	-4.6	32.1	54.0	21.9
2329.00	46.1	V	Peak	-3.6	42.5	74.0	31.5
2329.00	36.9	V	Average	-3.6	33.3	54.0	20.7
3879.75	50.8	V	Peak	-2.1	48.7	74.0	25.3
3879.75	42.7	V	Average	-2.1	40.6	54.0	13.4
4850.00	49.3	V	Peak	6.3	55.6	74.0	18.4
4850.00	42.2	V	Average	6.3	48.5	54.0	5.5

TEST DATA

Middle Channel

Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Detector	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1080.00	47.6	V	Peak	-5.8	41.8	74.0	32.2
1080.00	38.9	V	Average	-5.8	33.1	54.0	20.9
1140.00	51.6	V	Peak	-5.6	46.0	74.0	28.0
1140.00	37.6	V	Average	-5.6	32.0	54.0	22.0
1380.00	44.1	V	Peak	-4.9	39.2	74.0	34.8
1380.00	36.6	V	Average	-4.9	31.7	54.0	22.3
2354.00	44.2	V	Peak	-1.9	42.3	74.0	31.7
2354.00	36.5	V	Average	-1.9	34.6	54.0	19.4
3919.88	41.9	V	Peak	6.5	48.4	74.0	25.6
3919.88	33.7	V	Average	6.5	40.2	54.0	13.8
4900.00	46.4	V	Peak	9.6	56.0	74.0	18.0
4900.00	39.1	V	Average	9.6	48.7	54.0	5.3

Highest Channel

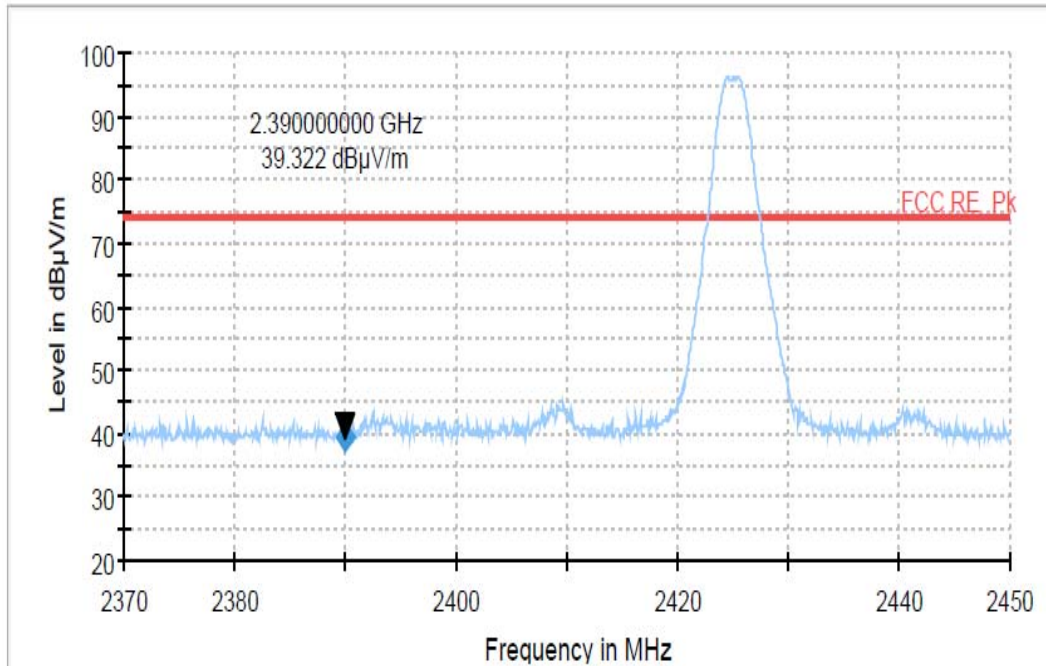
Frequency (MHz)	Reading (dBμV/m)	Pol* (H/V)	Detector	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1080.00	47.4	V	Peak	-5.8	41.6	74.0	32.4
1080.00	38.8	V	Average	-5.8	33.0	54.0	21.0
1140.00	46.8	V	Peak	-5.6	41.2	74.0	32.8
1140.00	37.4	V	Average	-5.6	31.8	54.0	22.2
1500.00	45.5	V	Peak	-4.6	40.9	74.0	33.1
1500.00	36.3	V	Average	-4.6	31.7	54.0	22.3
2379.00	44.4	V	Peak	-1.9	42.5	74.0	31.5
2379.00	36.9	V	Average	-1.9	35.0	54.0	19.0
3960.00	40.8	V	Peak	6.6	47.4	74.0	26.6
3960.00	32.6	V	Average	6.6	39.2	54.0	14.8
4950.00	44.1	V	Peak	9.6	53.7	74.0	20.3
4950.00	36.2	V	Average	9.6	45.8	54.0	8.2

Note:

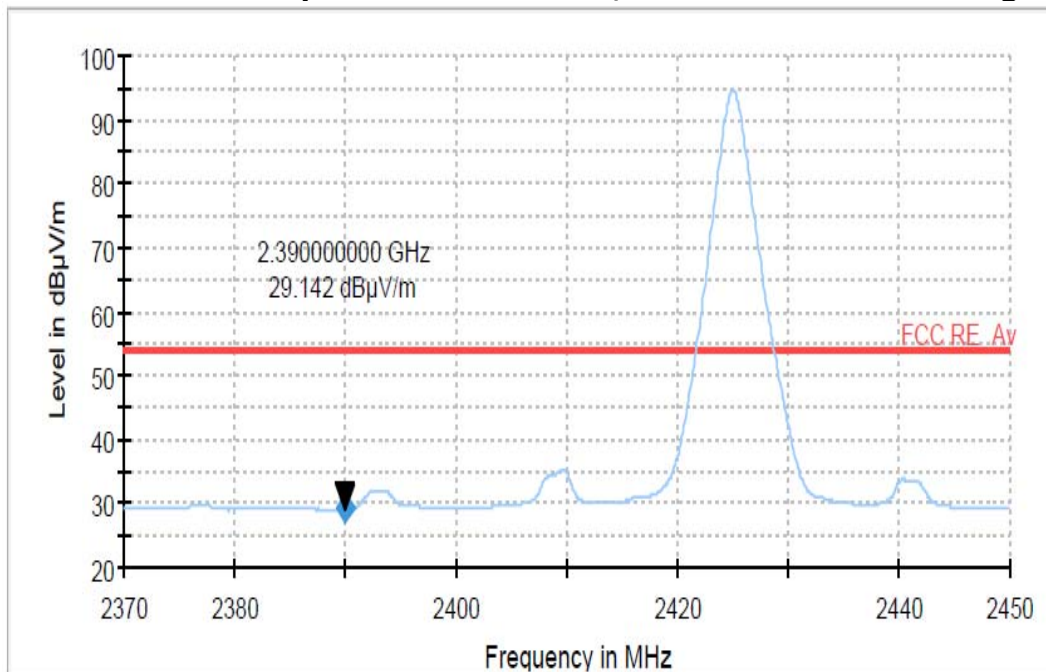
- 1. *Pol. H = Horizontal V = Vertical**
- 2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.**
- 3. Other spurious are 20 dB below than Fundamental.**
- 4. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization.
The worst date was recorded.**
- 5. 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.**
- 6. The spectrum is measured from 9 kHz to 10th harmonic and the worst-case emissions are reported. No significant emissions were found beyond the 4th harmonic for this device.**

PLOT OF TEST DATA

Restricted Band Spurious Emissions, Lowest channel Peak

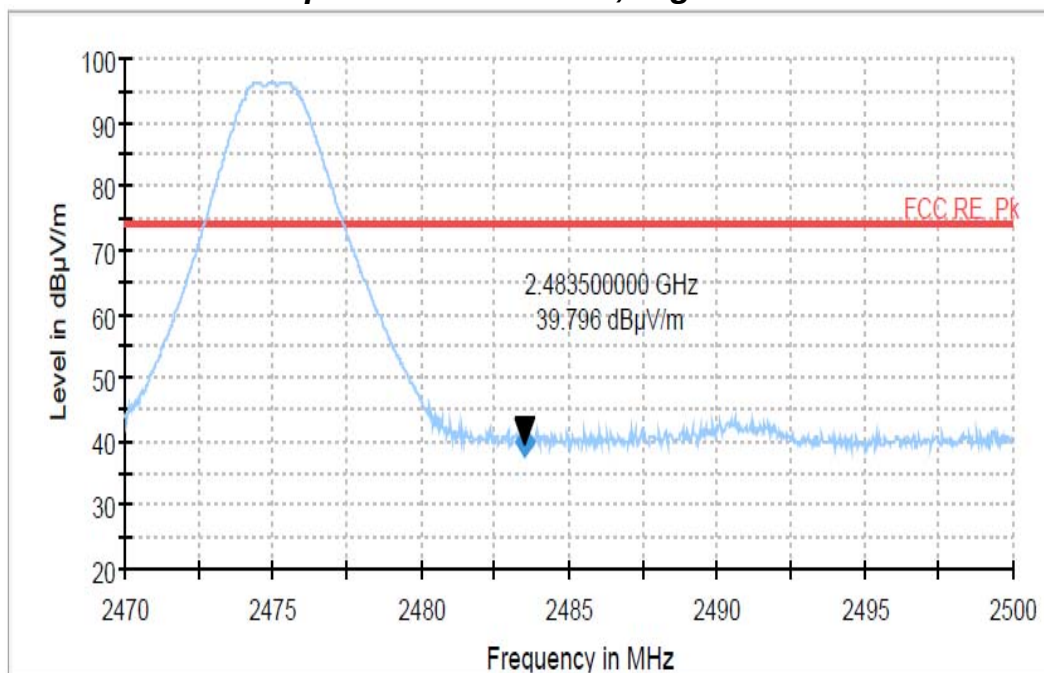


Restricted Band Spurious Emissions, Lowest channel Average

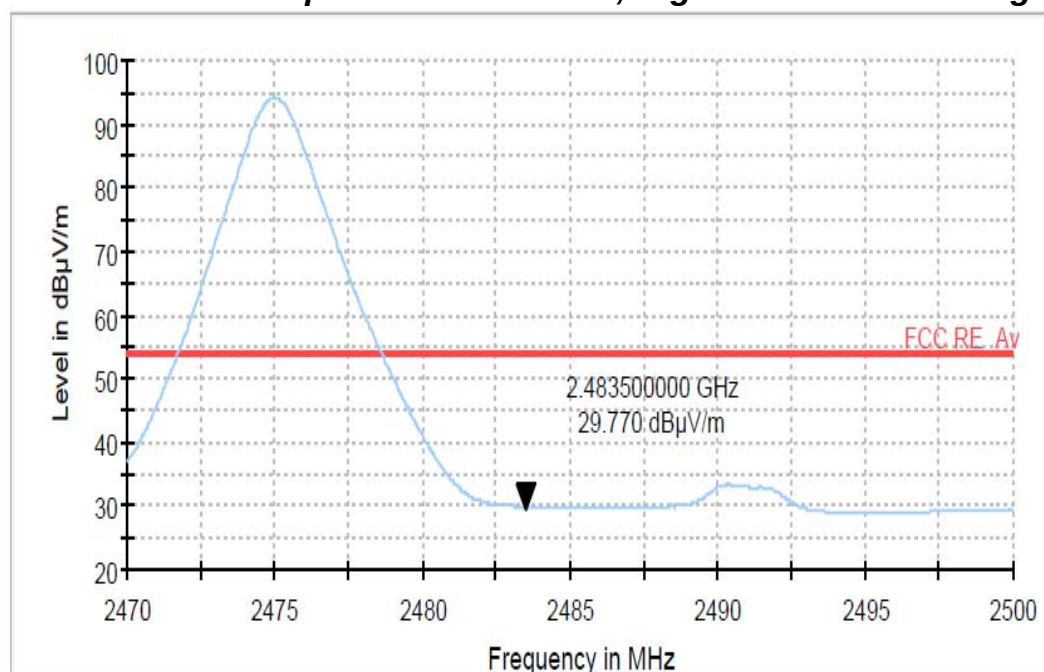


PLOT OF TEST DATA

Restricted Band Spurious Emissions, Highest channel Peak



Restricted Band Spurious Emissions, Highest channel Average



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

9. ACCURACY OF MEASUREMENT

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

1. Conducted Uncertainty Calculation

Source of Uncertainty	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	DbaI	± 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)			
Expended Uncertainty U	Normal ($k = 2$)			± 5.26 (< 200 MHz) ± 5.48 ($\geq$ 200 MHz)			

10. TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESCS 30	833364/020	Jan. 12 2012	1 year
2	*Test Receiver	R & S	ESCS 30	100302	Oct. 12 2011	1 year
3	*Amplifier	R & S	SCU01	10029	Apr. 06 2011	1 year
4	*Amplifier	Sonoma Instrument	310N	291916	Jul. 19 2011	1 year
5	*Amplifier	R & S	SCU-26	10011	Jun. 01 2011	1 year
6	*Pre Amplifier	HP	8449B	3008A00107	Jan. 13 2012	1 year
7	*Pre Amplifier	HP	8447F	2805A03351	Oct. 06 2011	1 year
8	*Spectrum Analyzer	Agilent	E4440A	MY44303257	Jul. 19 2011	1 year
9	*Spectrum Analyzer	Agilent	E4440A	MY44022567	Apr. 05 2011	1 year
10	*Spectrum Analyzer	R & S	FSP40	100361	Jul. 19 2011	1 year
11	*Loop Antenna	R & S	HFH2-Z2	100279	Aug. 31 2011	2 year
12	*Wideband Power Sensor	R & S	NRP-Z81	100634	May. 03 2011	1 year
13	Biconical Log Antenna	ARA	LPB-2520/A	1180	Apr. 14 2010	2 year
14	*Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-508	Dec. 24 2010	2 year
15	*Horn Antenna	Q-par Angus	QSH20S20	8179	Apr. 12 2010	2 year
16	*Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-257	Apr. 14 2010	2 year
17	Logbicon Antenna	SCHWARZBECK	VULB9166	1067	Jul. 14 2010	2 year
18	*LISN	R & S	ESH3-Z5	833874/006	Oct. 12 2011	1 year
19	LISN	R & S	ESH2-Z5	100227	Apr. 06 2011	1 year
20	*Position Controller	DAEIL EMC	N/A	N/A	N/A	N/A
21	*Turn Table	DAEIL EMC	N/A	N/A	N/A	N/A
22	*Antenna Mast	DAEIL EMC	N/A	N/A	N/A	N/A
23	*Anechoic Chamber	EM Eng.	N/A	N/A	N/A	N/A
24	*Shielded Room	EM Eng.	N/A	N/A	N/A	N/A
25	*Position Controller	Seo-Young EMC	N/A	N/A	N/A	N/A
26	*Turn Table	Seo-Young EMC	N/A	N/A	N/A	N/A
27	*Antenna Mast	Seo-Young EMC	N/A	N/A	N/A	N/A
28	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
29	*Shielded Room	Seo-Young EMC	N/A	N/A	N/A	N/A

*) Test equipment used during the test