



Report No.SH16030055W35

# FCC RF TEST REPORT

Issued to

**TRIMBLE EUROPE B.V.**

For

**Rugged Smart Phone**

Model Name : MobileMapper50\_WiFi  
Trade Name : Spectra Precision  
Brand Name : Spectra Precision  
Standard : 47 CFR Part 15,Subpart C  
ANSI C63.10-2013  
RSS 247 Issue 1  
RSS GEN Issue 4  
FCC ID : NZI-10900310  
IC ID : 9288A-10900310  
Test date : Apr.8,2016 to Apr.9,2016  
Issue date : Jul.12,2016

by

**Shanghai Skylabs Co., Ltd.**

Tested by

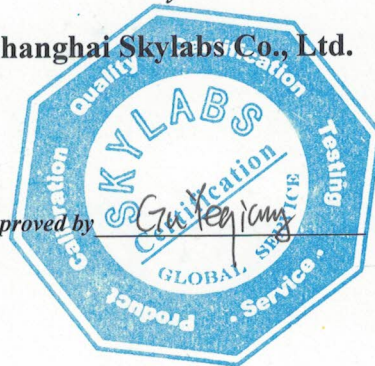
Wu Hongfei

Approved by

Guo Yanyang

Review by

Leonard Bao



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### Change History

Issue	Date	Reason for change
1.0	Apr.10,2016	First edition
2.0	Jul.12,2016	Second edition



## 1. General Information

### 1.1 Applicant

**TRIMBLE EUROPE B.V.**

European Regional Fulfilment Centre  
Meerheide, 45  
5521DZ Eersel  
THE NETHERLANDS

### 1.2 Manufacturer

**TRIMBLE EUROPE B.V.**

European Regional Fulfilment Centre  
Meerheide, 45  
5521DZ Eersel  
THE NETHERLANDS

### 1.3 Description of EUT

EUT Name.....: Rugged Smart Phone  
Model Name.....: MobileMapper50\_WiFi  
Brand Name.....: Spectra Precision  
Trade Name.....: Spectra Precision  
Hardware Version.....: MM50.WiFi\_V1.0  
Software Version.....: MM50.WiFi.16.22.11  
Modulation Type.....: DSSS (802.11b), OFDM (802.11g/n)  
Frequency Range.....: 2.412GHz - 2.462GHz (at interval of 5 MHz)  
Channel Number.....: 11  
Antenna Type.....: ABS Frame and FPC antenna  
Antenna Gain.....: 0.44 dBi

**NOTE 1:**

*The EUT contains WIFI Module operating at 2.4GHz ISM band; it supports 802.11b, 802.11g, 802.11n(20MHz) and they are all tested in this report. The frequencies allocated is  $F$  (MHz)  $=2412+5*(n-1)$  ( $1 \leq n \leq 11$ ). The lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz).*

**NOTE 2:**

*For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacture.*



## 2. Facilities and Accreditations

### 2.1 Test Facility

Shanghai Skylabs Co., Ltd. Skylabs Laboratory is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6644. A 9\*6\*6(m) full/semi-anechoic chamber was used for the radiated emissions test.

### 2.2 Environmental Conditions

Ambient temperature: 15~35°C

Relative humidity: 30~60%

Atmosphere pressure: 86-106kPa

### 2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:  $\pm 1.76$ dB

Uncertainty of Radiated Emission:  $\pm 3.16$ dB



## 2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Service Simulator	Agilent	N4010A	MY47230669	2015.9.22	1year
Spectrum Analyzer	R&S	FSU26	200880	2016.2.25	1year
Power Splitter	Weinschel	1506A	NW521	(n.a.)	(n.a.)
Power Splitter	Mini-Circuits	ZFRSC-183-S+	76500F1016	(n.a.)	(n.a.)
Attenuator 1	Resnet	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)
Power supplier	NF	ES2000S	9087735	2015.9.25	1year
Full/Semi-Anechoic Chamber	CHENGYU	9.2×6.25×6.15m	SAR	2015.9.14	3year
EMI Test Receiver	R&S	ESCI7	100787	2016.2.55	1year
Antenna	R&S	HL562	100385	2015.6.17	1year
Antenna	R&S	HF906	100565	2015.6.17	1year
LISN	TESEQ	NNB 51	33285	2016.2.25	1year
Personal Computer	HP	(n.a.)	(n.a.)	(n.a.)	(n.a.)
Test Antenna-Horn	Schwarzbeck	BBHA9170	BBHA91970171	2015.9.22	1year
Test Antenna-Log	Schwarzbeck	VULB 9163	9163-561	2015.9.25	1year
Test Antenna-Loop	Rohde&Schwarz	HFH2-Z2	860004/001	2015.9.22	1year
Test Antenna-Horn	Schwarzbeck	BBHA 9120D	9120D-1033	2015.7.25	1year
EPM Series Power Meter	Agilent	E4418B	GB43318055	2015.5.24	1year
Power Sensor	Agilent	8482A	MY41091706	2015.5.24	1year
Temporary Antenna Connector	Farpu	SMA-K	(n.a.)	(n.a.)	(n.a.)
RF Cable	(n.a.)	(n.a.)	(n.a.)	(n.a.)	(n.a.)
Power Supplier	NF	ES2000S	9087735	2015.09.25	1year

**NOTE:**

*Equipments listed above have been calibrated and are in the period of validation.*



### 3. Test Standards and Results

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

FCC Part 15 Subpart C §15.247

ANSI C63.10-2013

June 2015 KDB558074

INDUSTRY CANADA RSS 247 Issue 1

INDUSTRY CANADA RSS GEN Issue 4

**NOTE:**

*(1) All test items were verified and recorded according to the standards and without any deviation during the test.*

*(2) This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart C (WIFI, 2.4GHz ISM band radiators), recorded in a separate test report.*

Test items and the results are as bellow:

No.	FCC Rules	IC Rules	Description	Result
1	15.203	RSS-GEN 8.3	Antenna Requirement	Pass
2	15.247(b)	RSS-247 5.4(4)	Peak Output power	Pass
3	15.247(b)	RSS-247 5.4(4)	Average Power	Pass
4	15.247(a)	RSS-247 5.4(4)	6dB & 20dB Bandwidth	Pass
5	15.247(d)	RSS-247 5.2(1)	Conducted Spurious Emission	Pass
6	15.247(d)	RSS-247 5.5 RSS-GEN 8.10	Band Edge	Pass
7	15.207	RSS-GEN 8.8	Conducted Emission	Pass
8	15.247(d) 15.209	RSS-247 5.5 RSS-GEN 8.9	Radiated Emission	Pass
9	15.247(e)	RSS-247 5.2(2)	Power Spectral Density (PSD)	Pass



## 4. 47 CFR Part 15C

### 4.1 Antenna requirement

#### 4.1.1 Applicable standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by 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.

#### 4.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.





## 5. Test Result

### 5.1 Peak Output Power

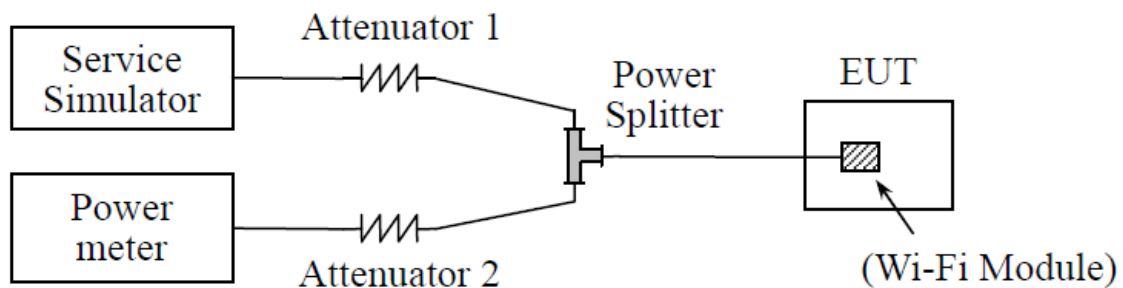
#### 5.1.1 Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

#### 5.1.2 Test Description

The measured output power was calculated by the reading of the spectrum analyzer and calibration.

##### A. Test Setup:



The EUT (Equipment under the test) is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in power meter.



### 5.1.3 Test Result

The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.(Duty cycle > 98%)

#### A. Test Verdict:

Mode	Channel	Frequency (MHz)	Measured Output Peak Power		Limit		Verdict
			dBm	W	dBm	W	
802.11b	1	2412	19.10	0.08128	30	1	Pass
	6	2437	19.07	0.08072			Pass
	11	2462	19.47	0.08851			Pass
802.11g	1	2412	20.26	0.10617			Pass
	6	2437	20.60	0.11482			Pass
	11	2462	20.45	0.11092			Pass
802.11n (20MHz)	1	2412	19.64	0.09204			Pass
	6	2437	18.92	0.07798			Pass
	11	2462	19.34	0.08590			Pass



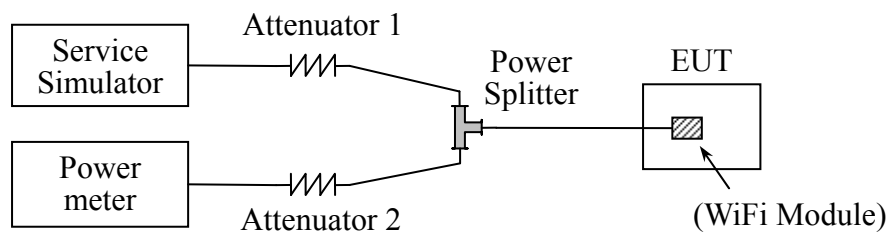
## 5.2 Average Power

### 5.2.1 Requirement

None; for reporting purposes only.

### 5.2.2 Test Description

The transmitter output was split to 2 ways, the one was connected to Service Simulator as monitor, the other one was connected to Power Meter. (Duty cycle > 98%)



### 5.2.3 Results

Mode	Channel	Frequency (MHz)	Measured Output Average Power	
			dBm	W
802.11b	1	2412	15.46	0.03516
	6	2437	15.37	0.03443
	11	2462	15.57	0.03606
802.11g	1	2412	13.51	0.02244
	6	2437	13.74	0.02366
	11	2462	13.59	0.02286
802.11n (20MHz)	1	2412	13.30	0.02138
	6	2437	13.13	0.02056
	11	2462	13.26	0.02118

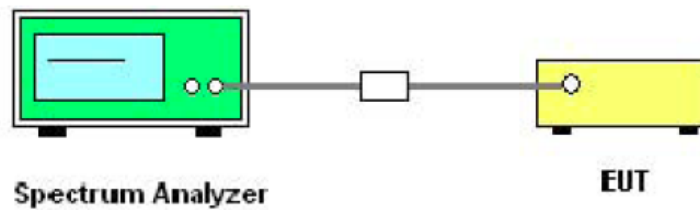


## 5.3 6dB & 20dB Bandwidth

### 5.3.1 Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.3.2 Test Description



### 5.3.3 Test Result

The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

#### A. Test Verdict:

##### 802.11b Test mode

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Refer to plot	20dB Bandwidth (MHz)	Refer to plot	Limit (KHz)	Result
1	2412	7.307	Plot A1	14.038	Plot A2	$\geq 500$	Pass
6	2437	7.548	Plot B1	14.134	Plot B2	$\geq 500$	Pass
11	2462	7.596	Plot C1	13.750	Plot C2	$\geq 500$	Pass

##### 802.11g Test mode

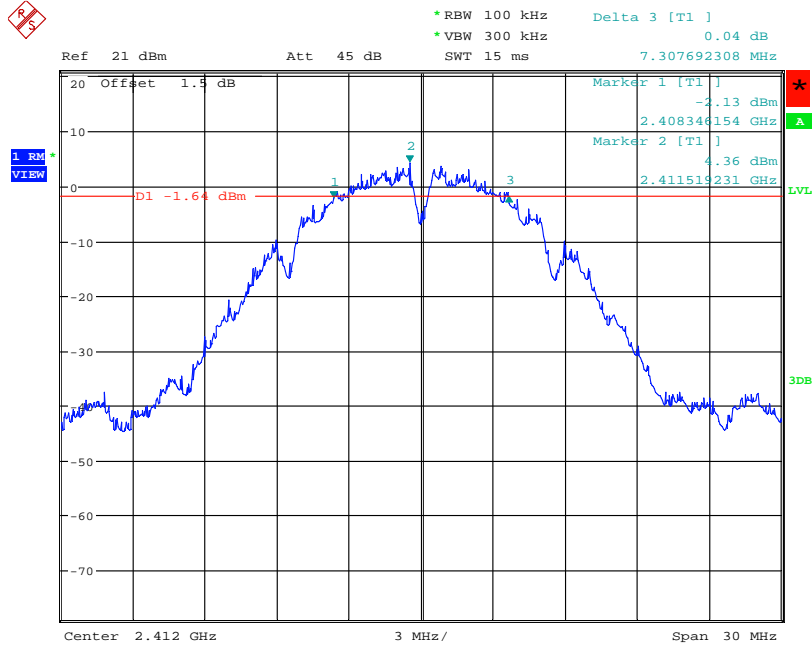
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Refer to plot	20dB Bandwidth (MHz)	Refer to plot	Limit (KHz)	Result
1	2412	16.586	Plot D1	18.750	Plot D2	$\geq 500$	Pass
6	2437	16.538	Plot E1	17.884	Plot E2	$\geq 500$	Pass
11	2462	16.490	Plot F1	17.826	Plot F2	$\geq 500$	Pass

##### 802.11n (20MHz) Test mode

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Refer to plot	20dB Bandwidth (MHz)	Refer to plot	Limit (KHz)	Result
1	2412	17.788	Plot G1	19.663	Plot G2	$\geq 500$	Pass
6	2437	17.788	Plot H1	18.653	Plot H2	$\geq 500$	Pass
11	2462	17.708	Plot I1	18.717	Plot I2	$\geq 500$	Pass

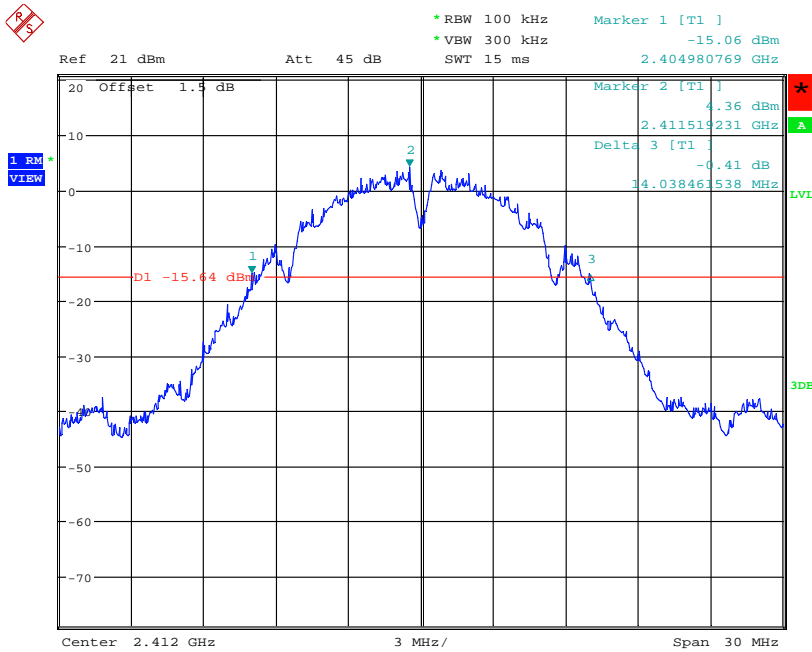


### B. Test Plots:



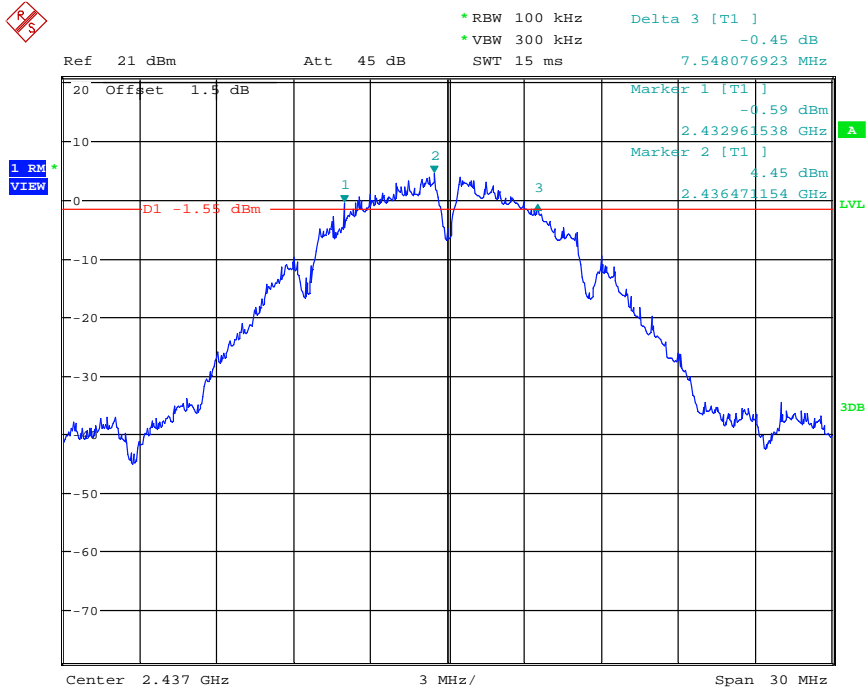
Date: 8.APR.2016 18:24:47

Plot A1



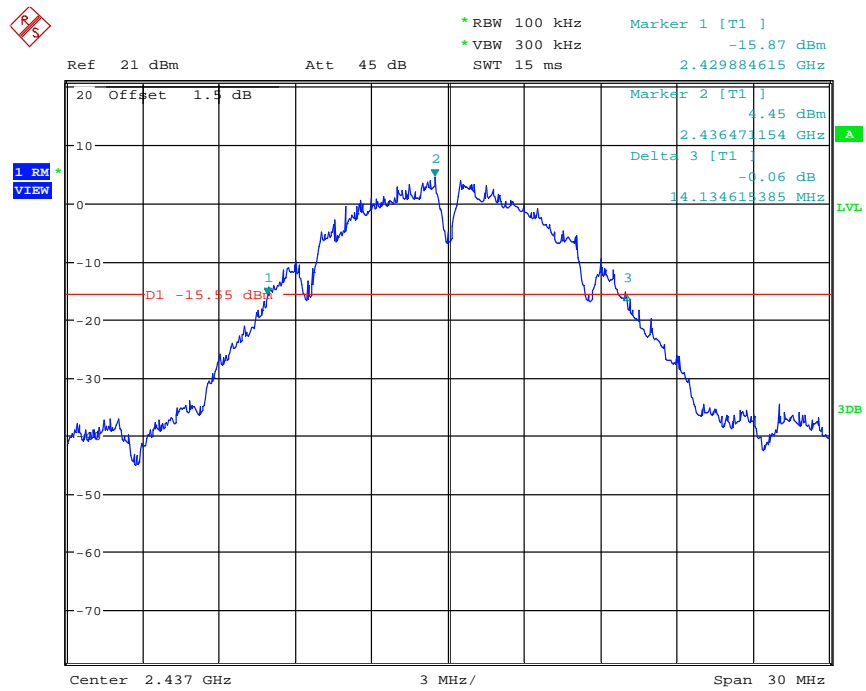
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Plot A2



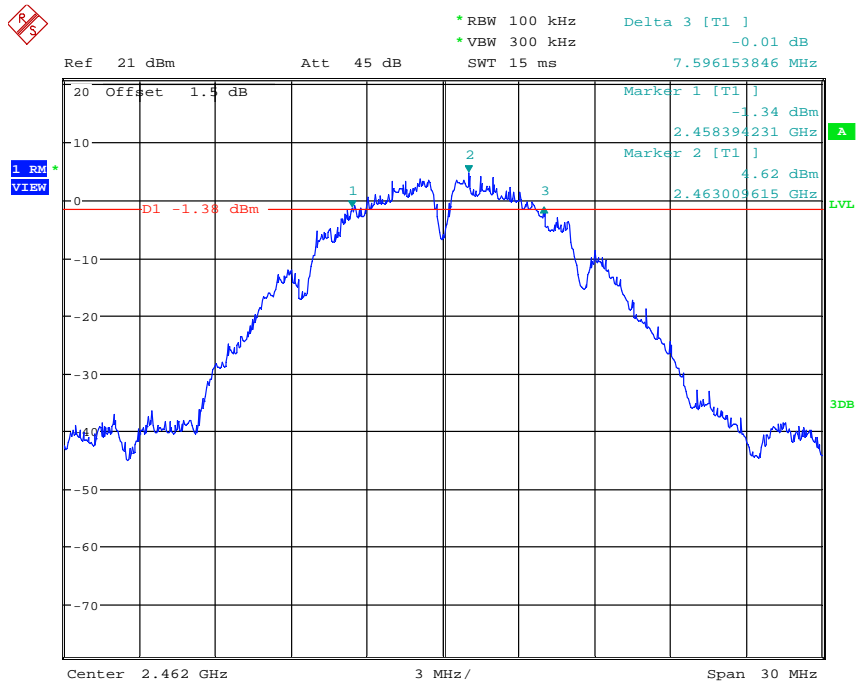
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Plot B1



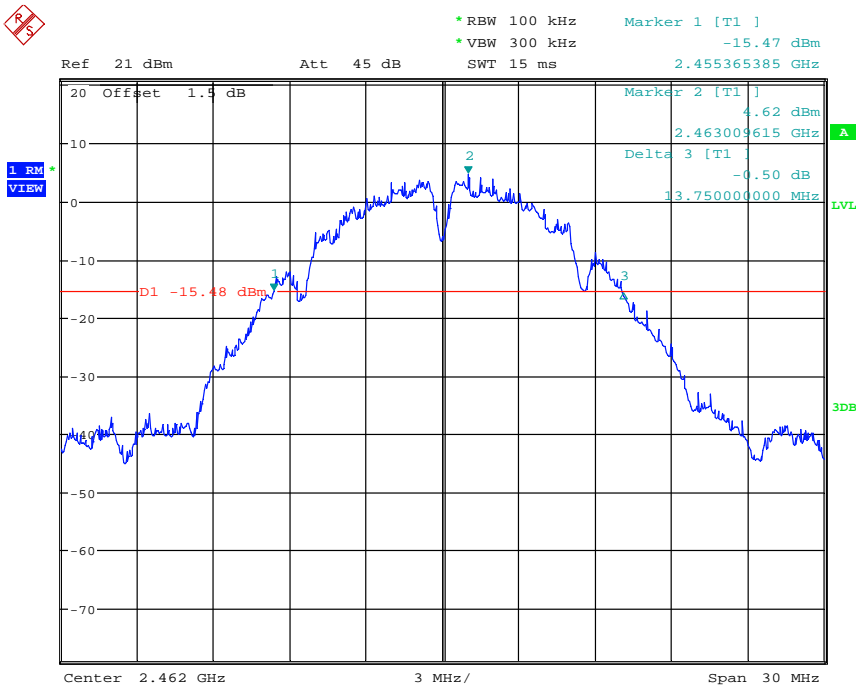
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Plot B2



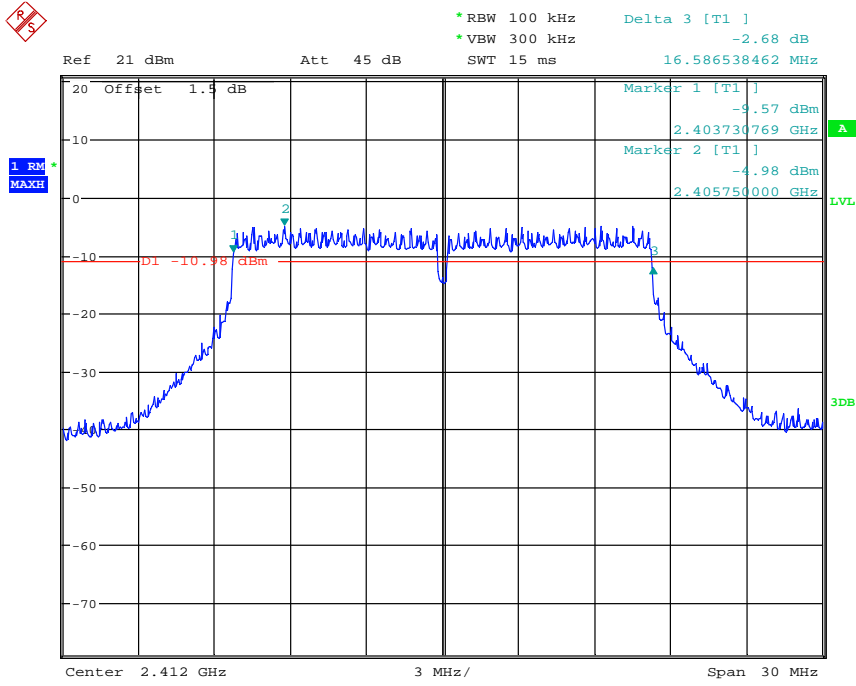
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Plot C1



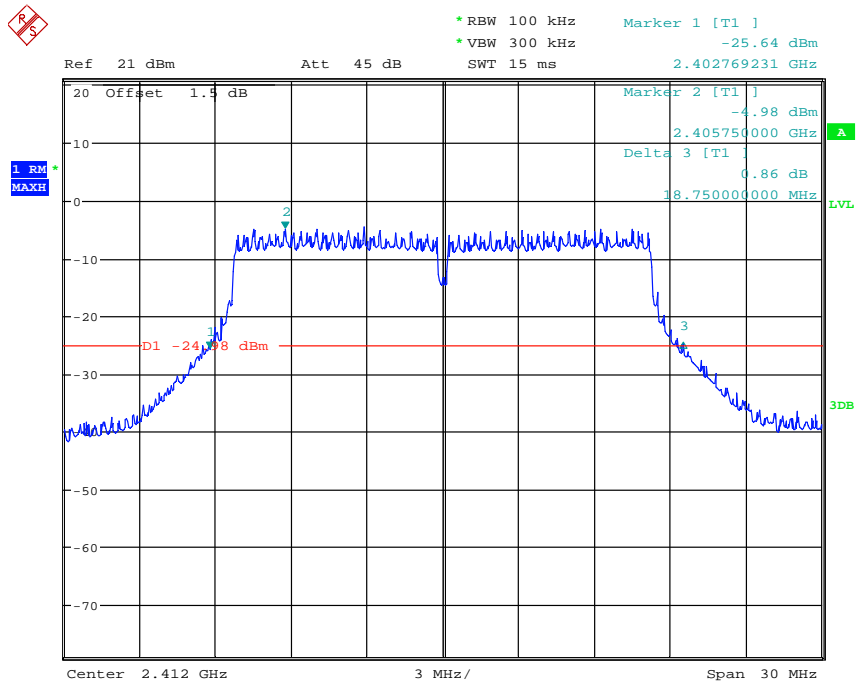
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Plot C2



Date: 8.APR.2016 18:05:03

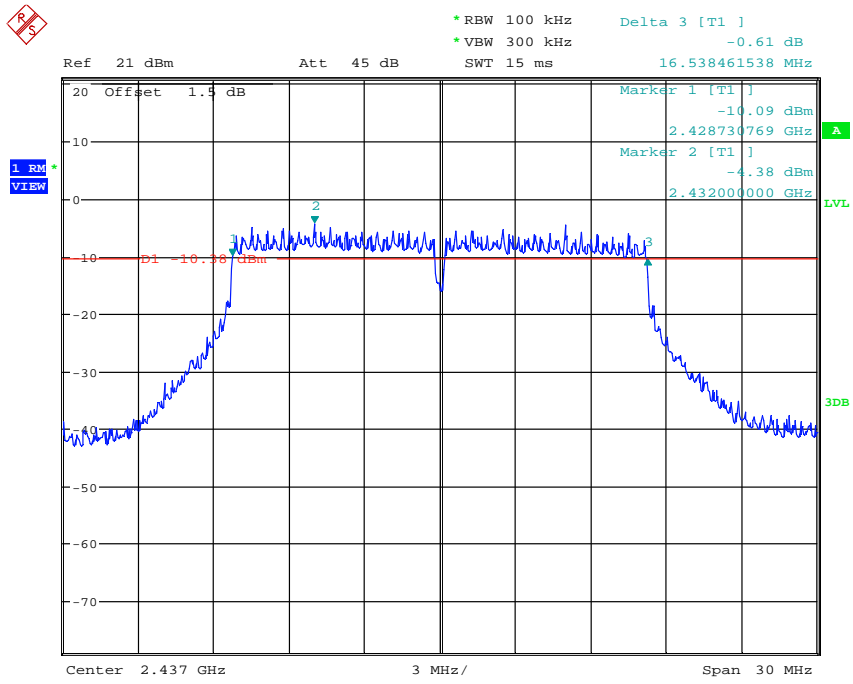
Plot D1



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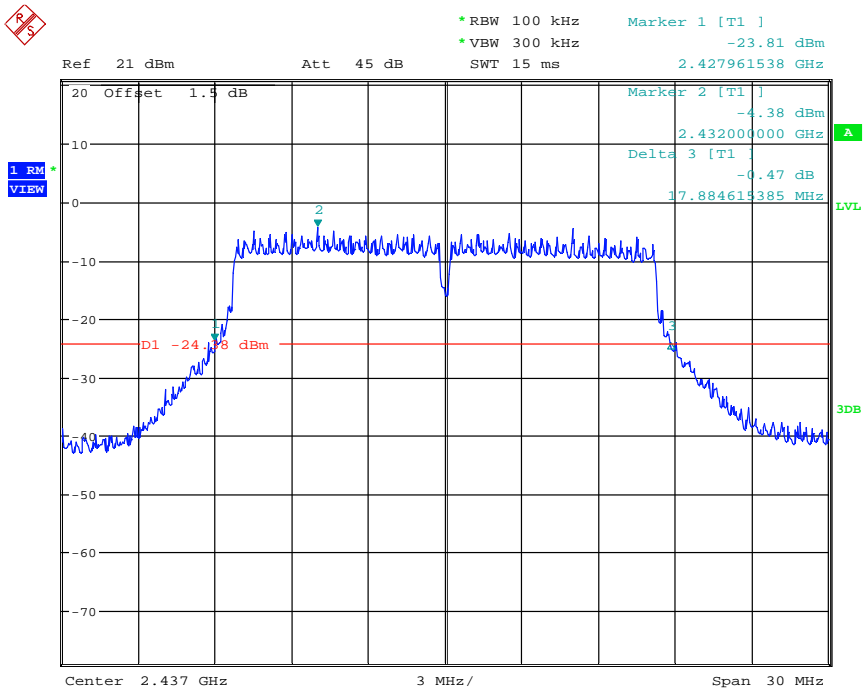
Plot D2





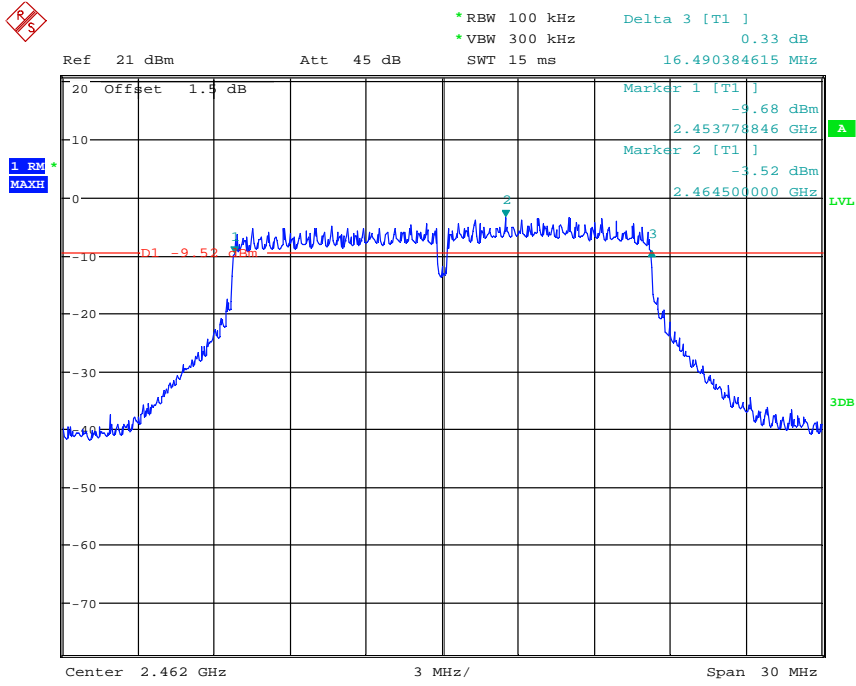
Date: 8.APR.2016 18:10:09

Plot E1



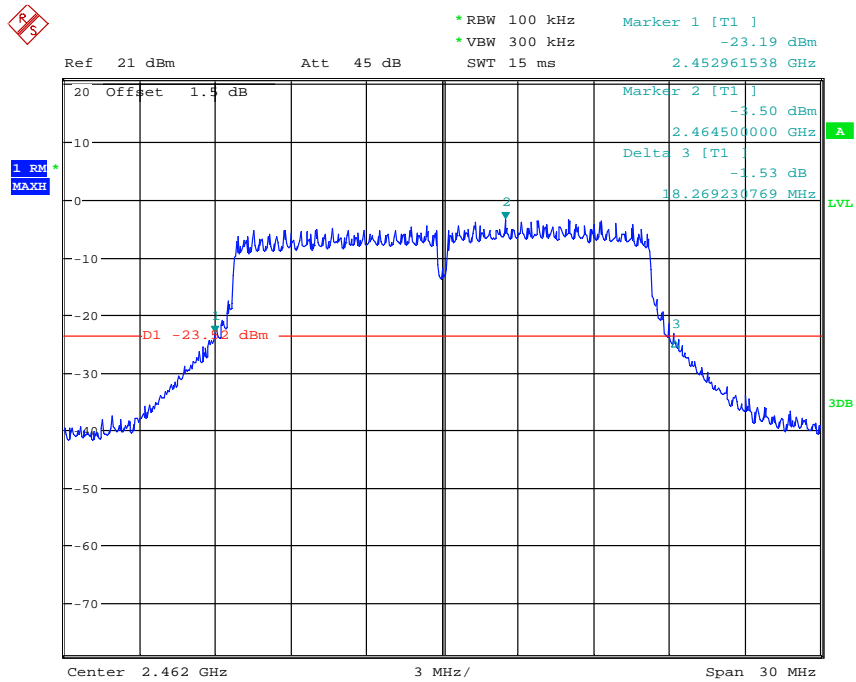
Date: 8.APR.2016 18:11:50

Plot E2



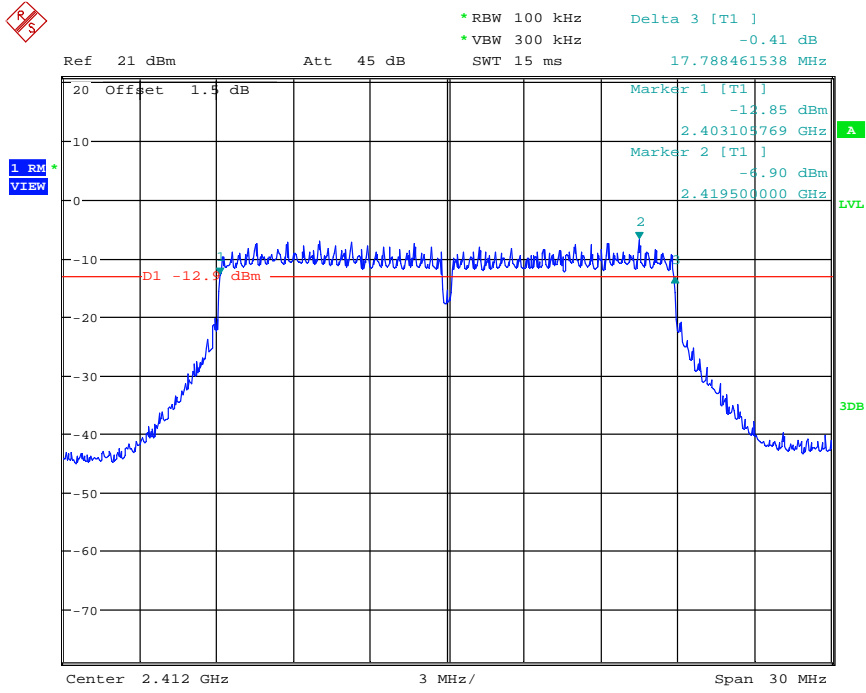
Date: 8.APR.2016 18:15:52

Plot F1



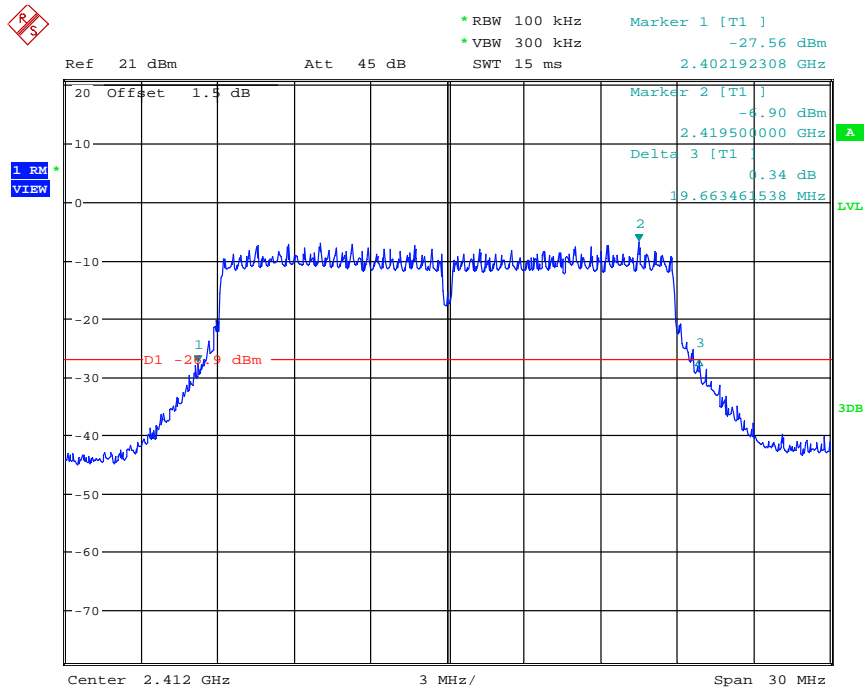
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Plot F2



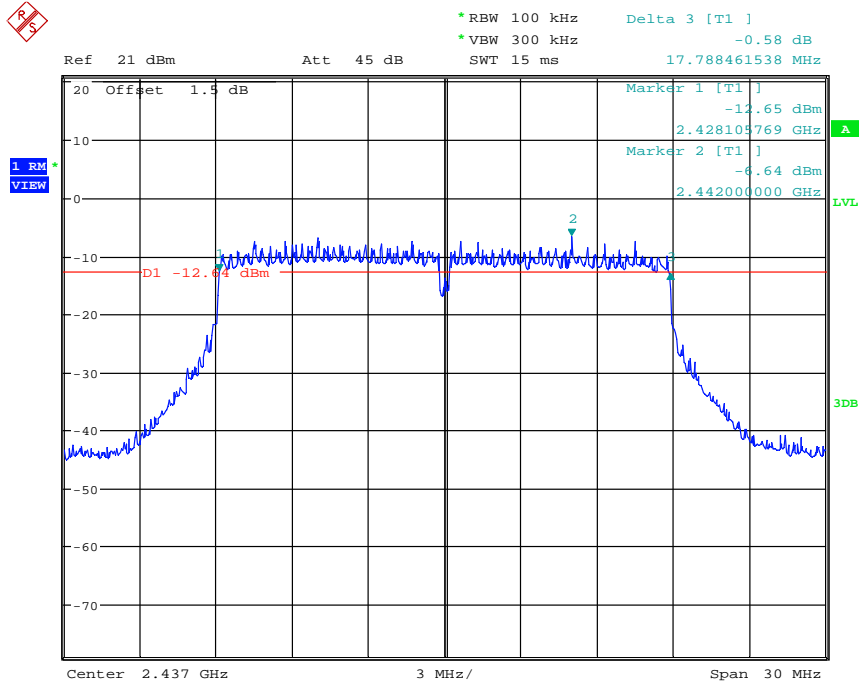
Date: 8.APR.2016 18:02:06

Plot G1



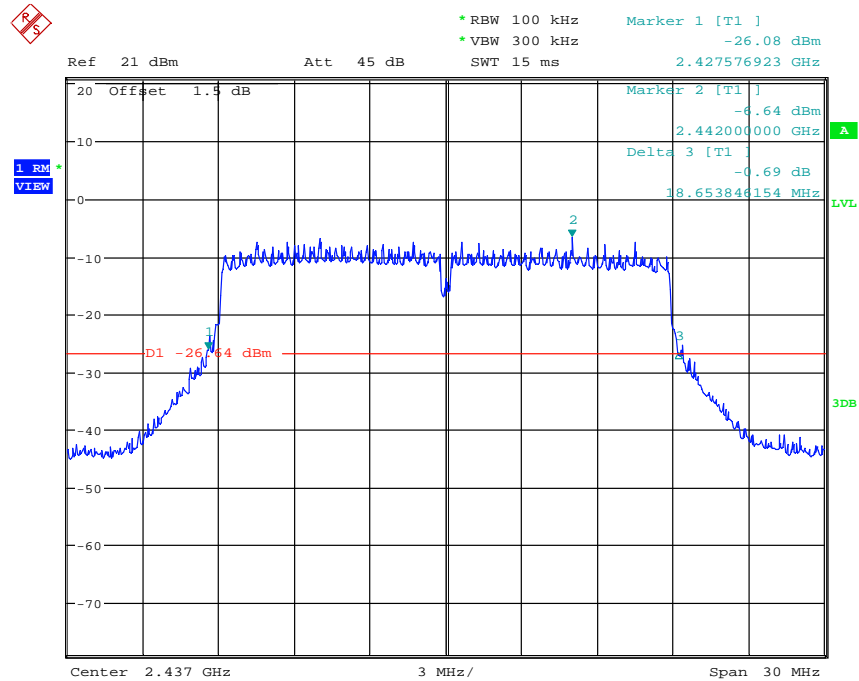
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Plot G2



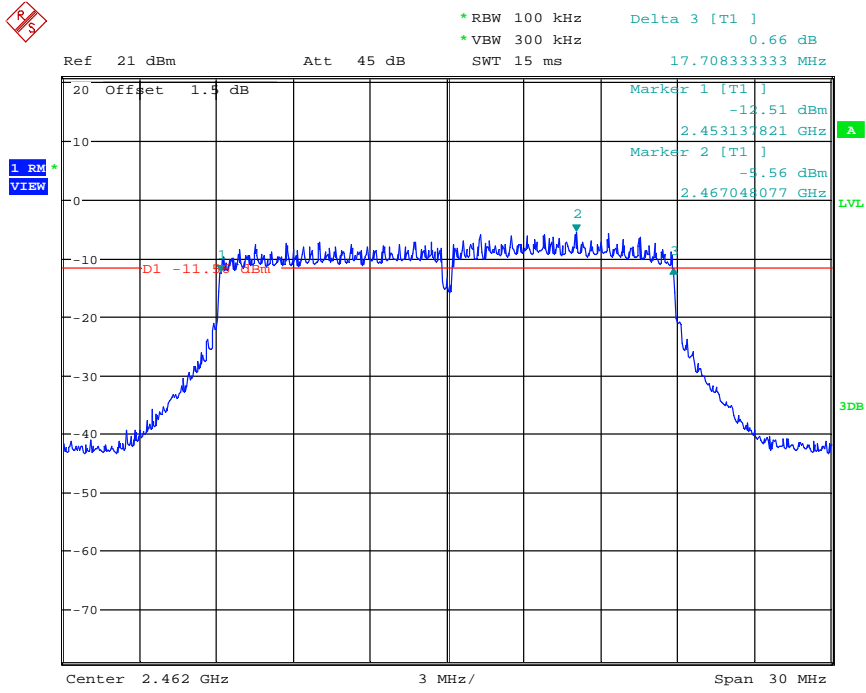
Date: 8.APR.2016 17:59:56

Plot H1



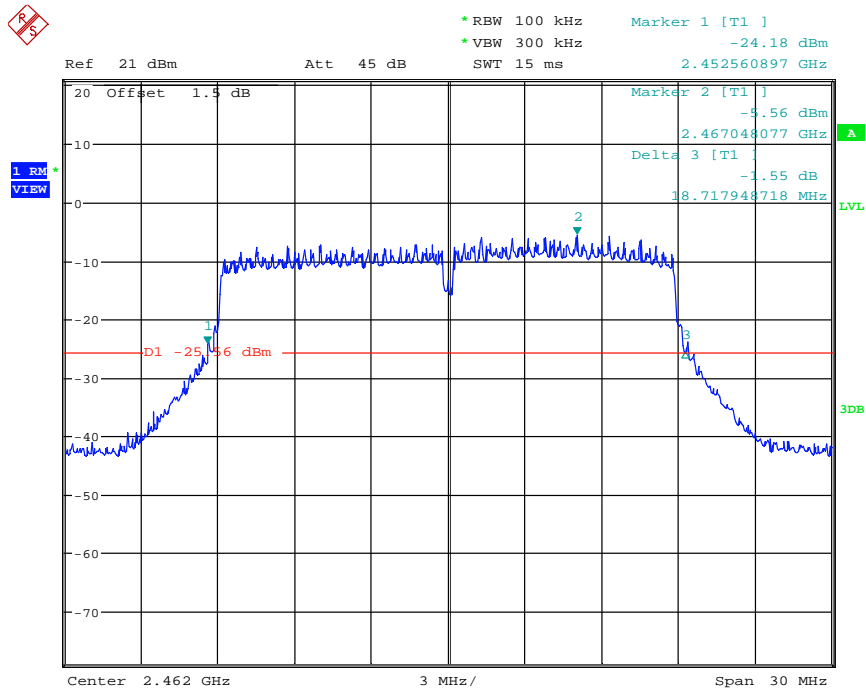
Date: 8.APR.2016 18:00:42

Plot H2



Date: 8.APR.2016 17:57:08

Plot I1



Date: 8.APR.2016 17:58:07

Plot I2

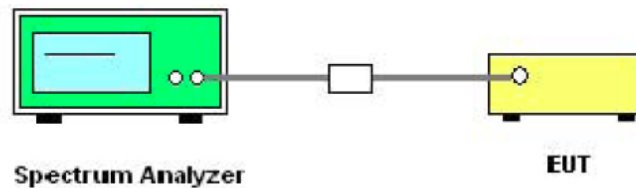


## 5.4 Conducted Spurious Emissions

### 5.4.1 Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### 5.4.2 Test Description



### 5.4.3 Test Result

The Wifi Module operates at hopping-off test mode. The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions.

#### A. Test Verdict:

##### 802.11b Test mode

Channel	Frequency (MHz)	Measured max out of band emission(dBm)	Refer to plot	Limit(dBm)		Result
				Carrier level	Calculated 20dBc limit	
1	2412	-41.51	Plot A	4.40	-15.60	Pass
6	2437	-42.01	Plot B	3.31	-16.69	Pass
11	2462	-41.38	Plot C	3.99	-16.01	Pass

##### 802.11g Test mode

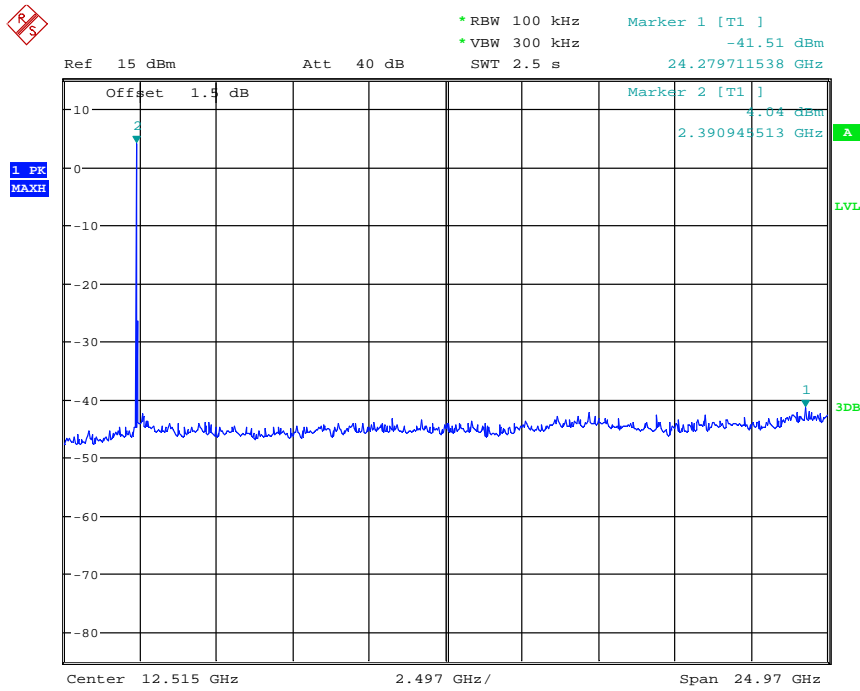
Channel	Frequency (MHz)	Measured max out of band emission(dBm)	Refer to plot	Limit(dBm)		Result
				Carrier level	Calculated 20dBc limit	
1	2412	-41.98	Plot D	-3.80	-23.80	Pass
6	2437	-42.13	Plot E	-4.12	-24.12	Pass
11	2462	-41.62	Plot F	-2.90	-22.90	Pass



802.11n (20MHz) Test mode

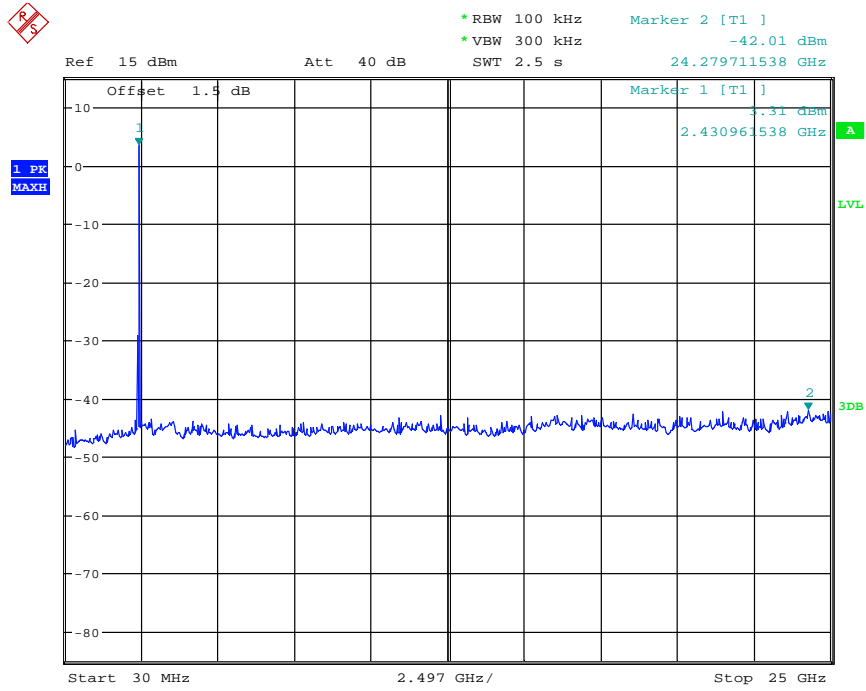
Channel	Frequency (MHz)	Measured max out of band emission(dBm)	Refer to plot	Limit(dBm)		Result
				Carrier level	Calculated 20dBc limit	
1	2412	-41.75	Plot G	-4.86	-24.86	Pass
6	2437	-41.90	Plot H	-3.99	-23.99	Pass
11	2462	-41.44	Plot I	-3.40	-23.40	Pass

**B. Test Plot:**



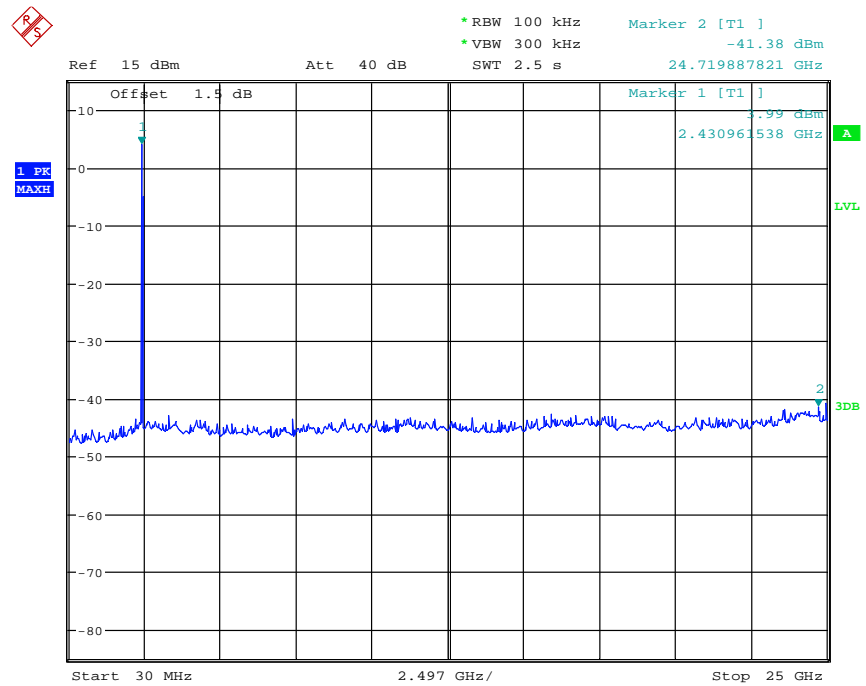
Date: 8.APR.2016 19:44:28

Plot A



Date: 8.APR.2016 19:43:26

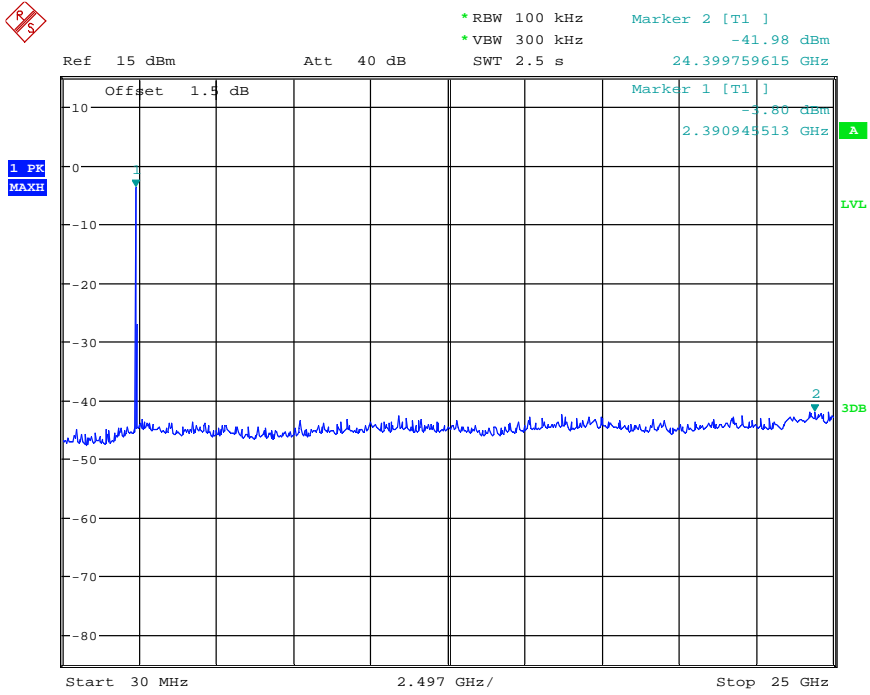
Plot B



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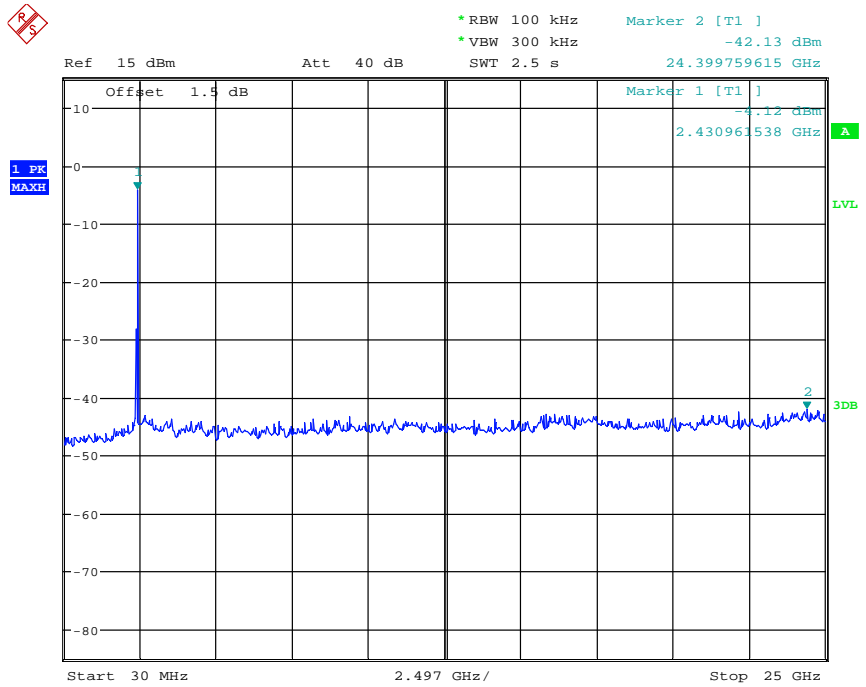
Plot C





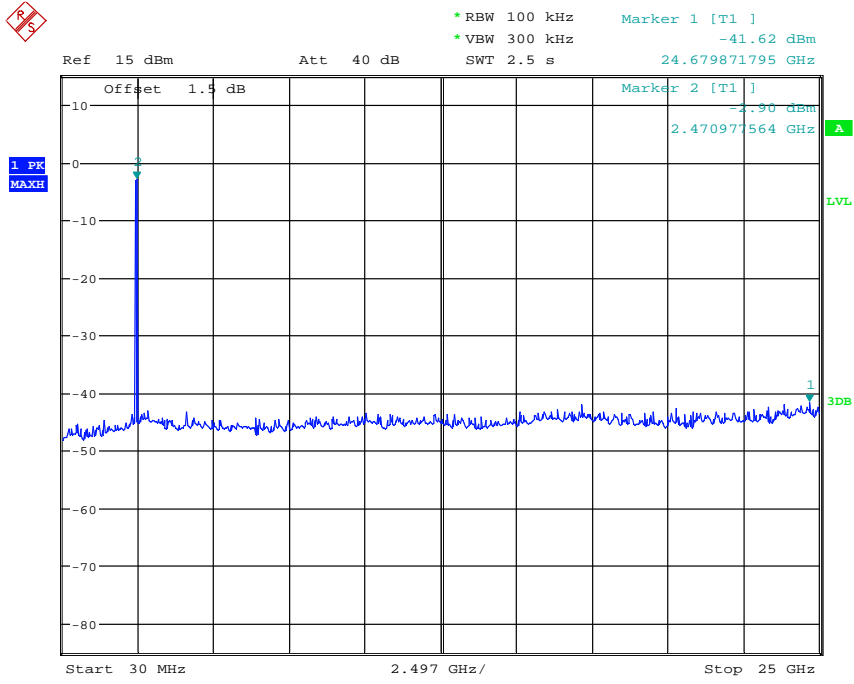
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Plot D



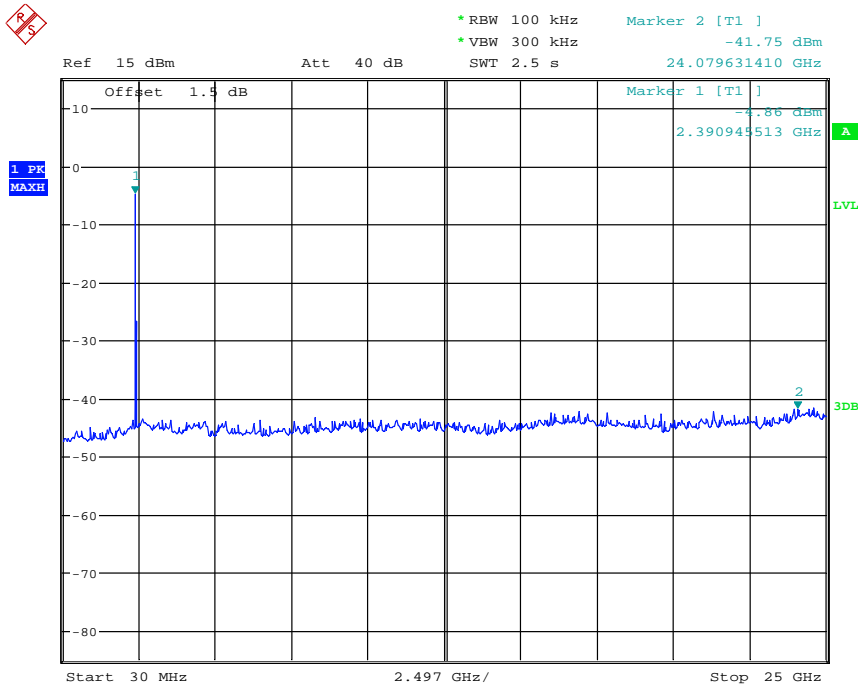
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Plot E



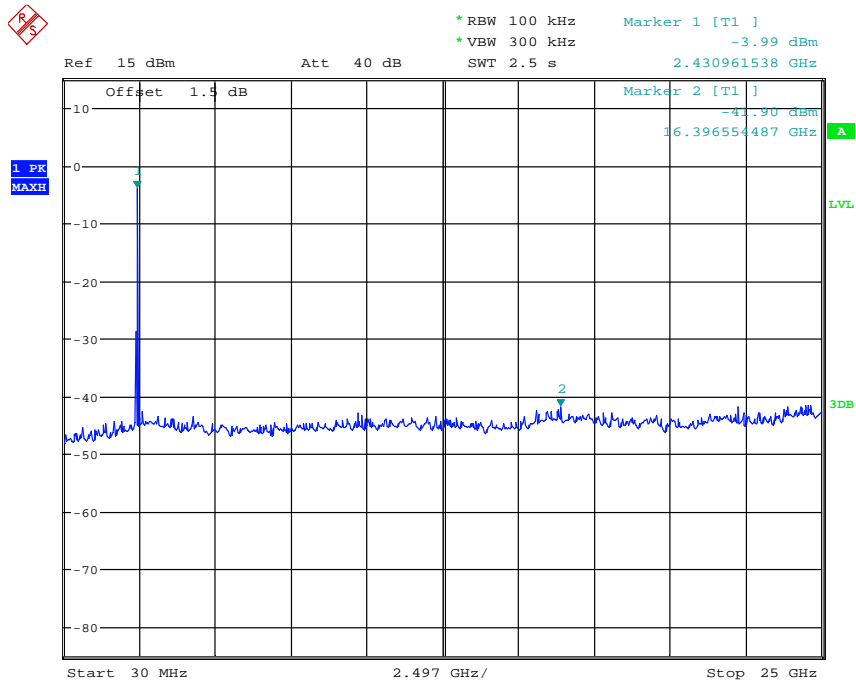
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Plot F



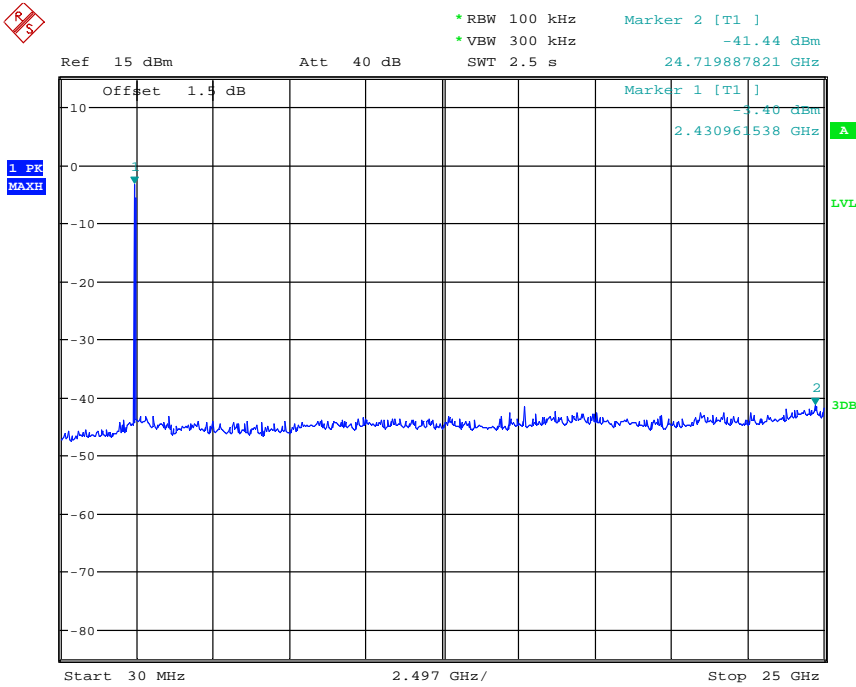
Date: 8.APR.2016 19:39:37

Plot G



Date: 8.APR.2016 19:38:43

Plot H



Date: 8.APR.2016 19:37:45

Plot I

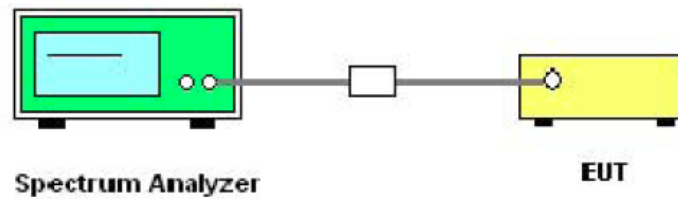


## 5.5 Power Spectral Density (PSD)

### 5.5.1 Requirement

According to FCC section 15.247(e), the same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used

### 5.5.2 Test Description



### 5.5.3 Test Result

#### A. Test Verdict

##### 802.11b Test mode

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to plot	Limit (dBm/3kHz)	Result
1	2412	-9.29	Plot A	8	Pass
6	2437	-8.82	Plot B	8	Pass
11	2462	-7.40	Plot C	8	Pass

##### 802.11g Test mode

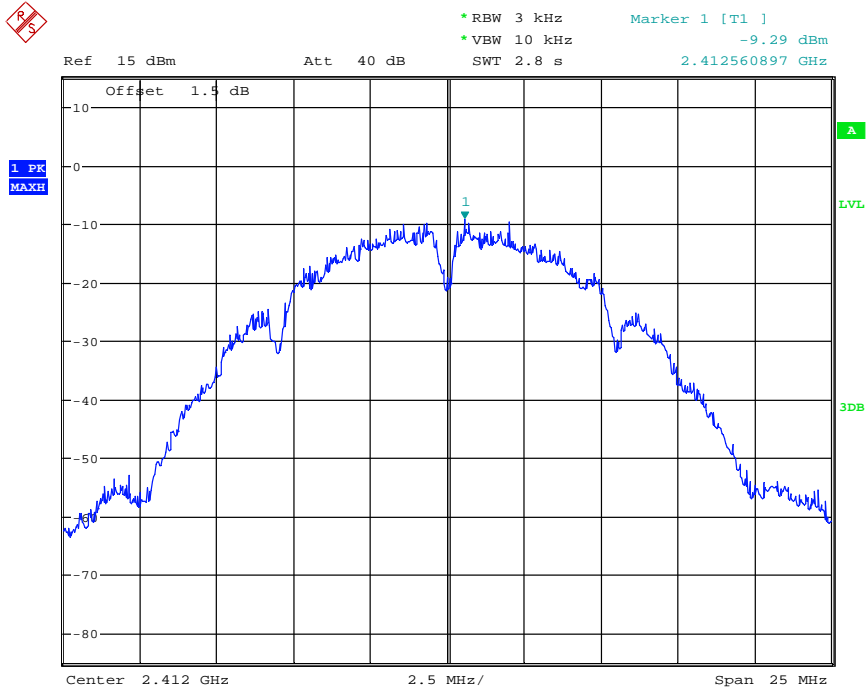
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to plot	Limit (dBm/3kHz)	Result
1	2412	-14.74	Plot D	8	Pass
6	2437	-13.47	Plot E	8	Pass
11	2462	-13.88	Plot F	8	Pass

##### 802.11n (20MHz) Test mode

Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Refer to plot	Limit (dBm/3kHz)	Result
1	2412	-16.99	Plot G	8	Pass
6	2437	-15.60	Plot H	8	Pass
11	2462	-15.00	Plot I	8	Pass

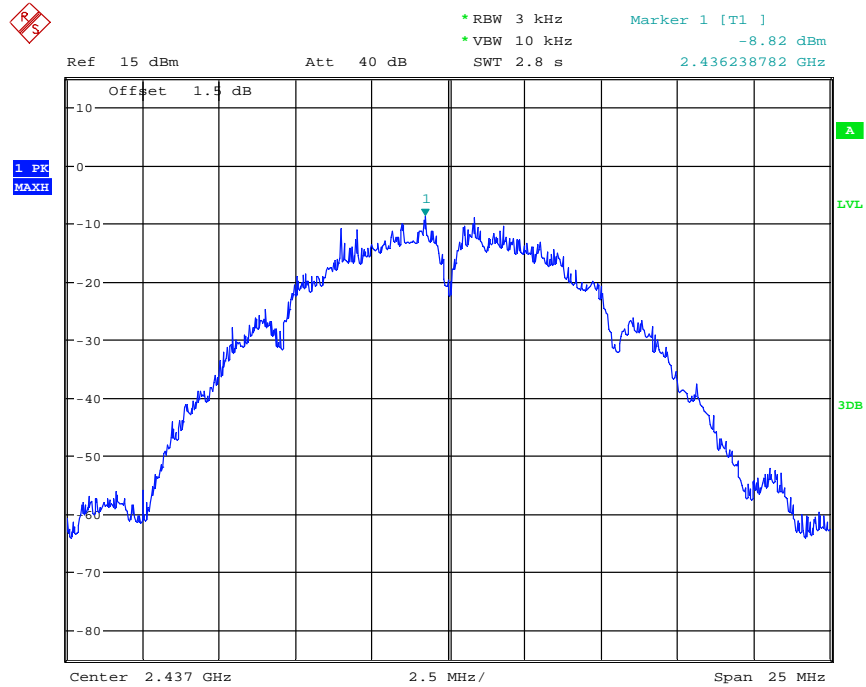


### B. Test Plot



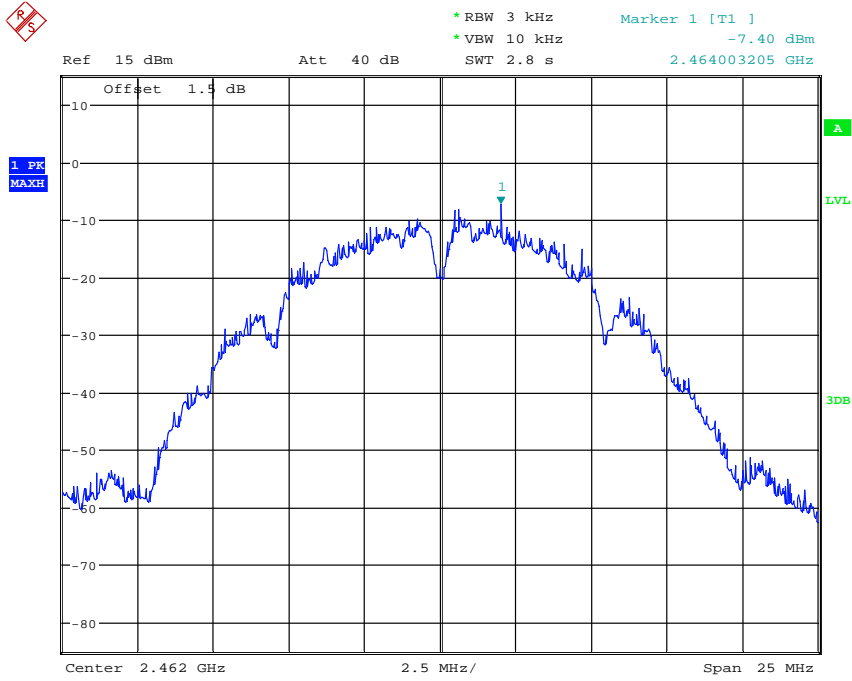
Date: 8.APR.2016 19:46:01

Plot A



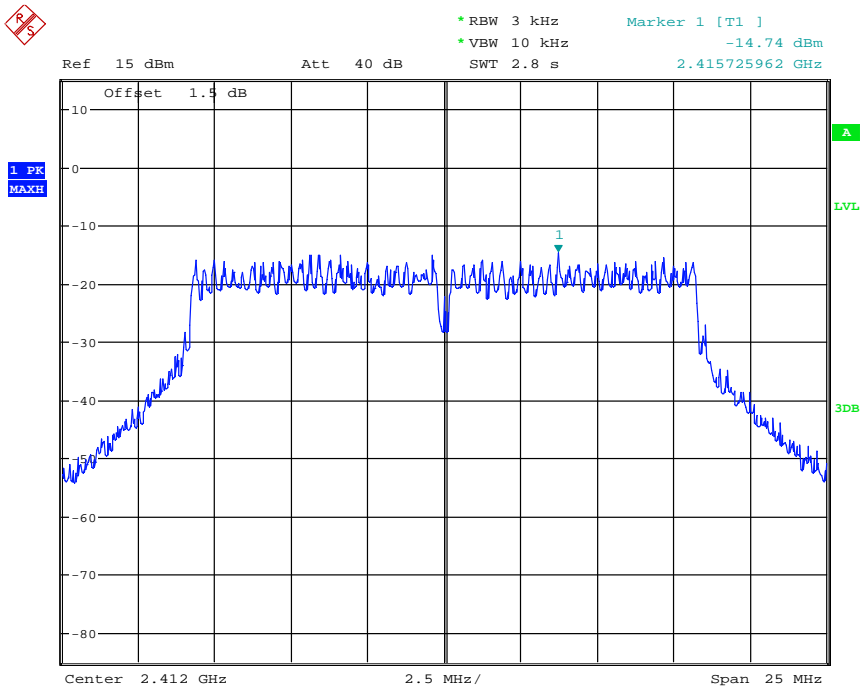
Date: 8.APR.2016 19:46:38

Plot B



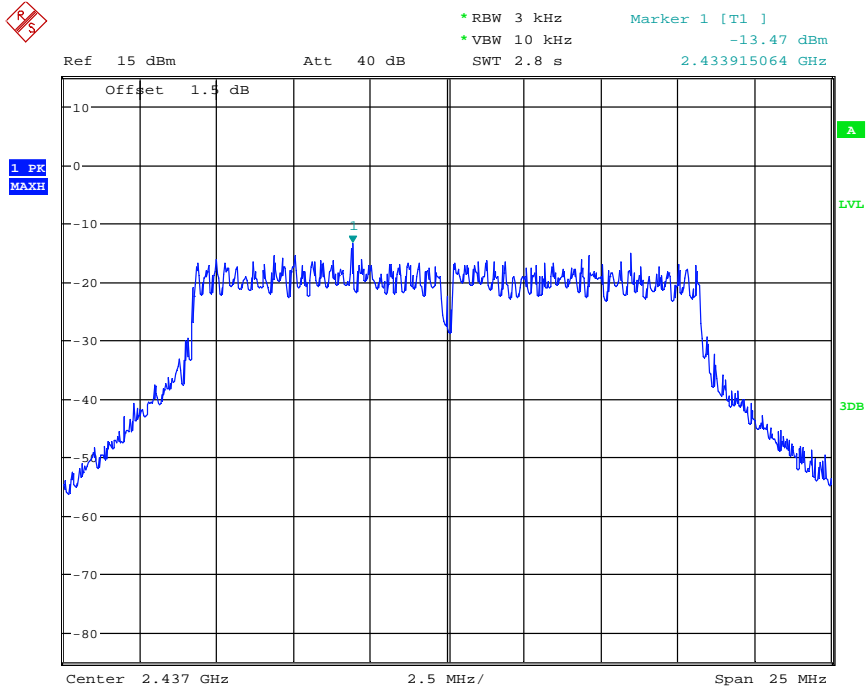
Date: 8.APR.2016 19:47:05

Plot C



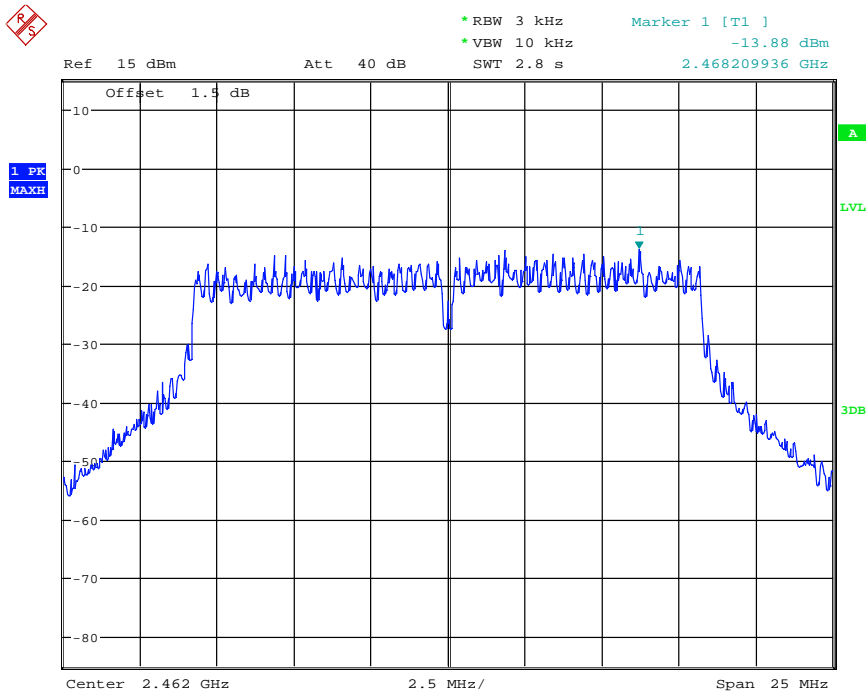
Date: 8.APR.2016 19:49:12

Plot D



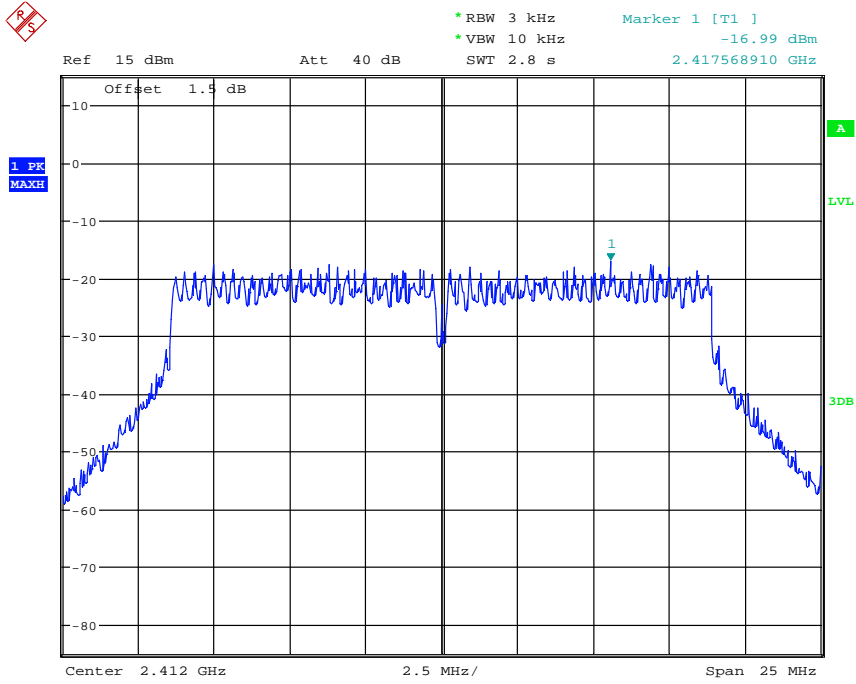
Date: 8.APR.2016 19:48:17

Plot E



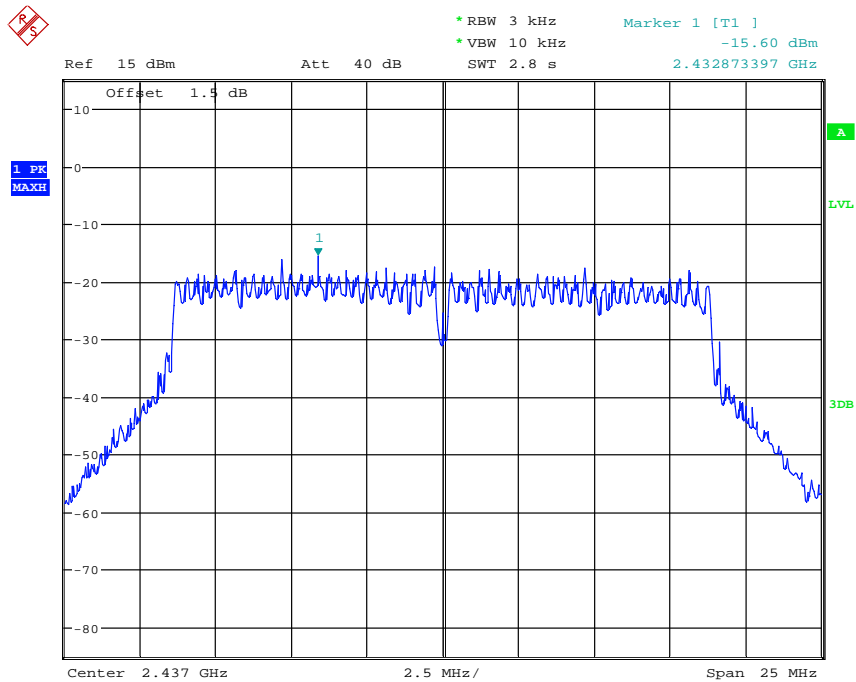
Date: 8.APR.2016 19:47:35

Plot F



Date: 8.APR.2016 19:49:42

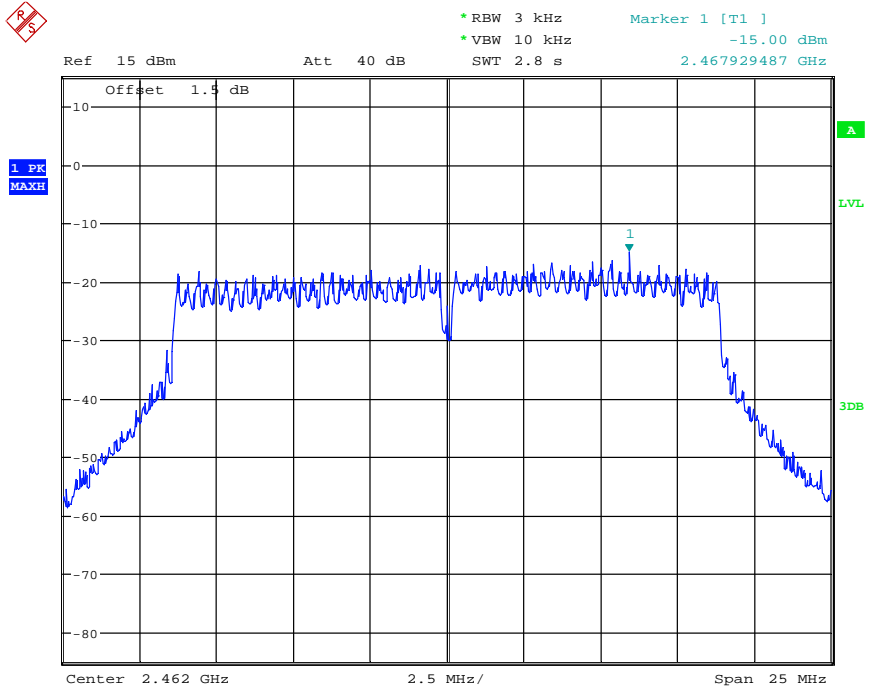
Plot G



Date: 8.APR.2016 19:50:24

Plot H





Date: 8.APR.2016 19:50:54

Plot I

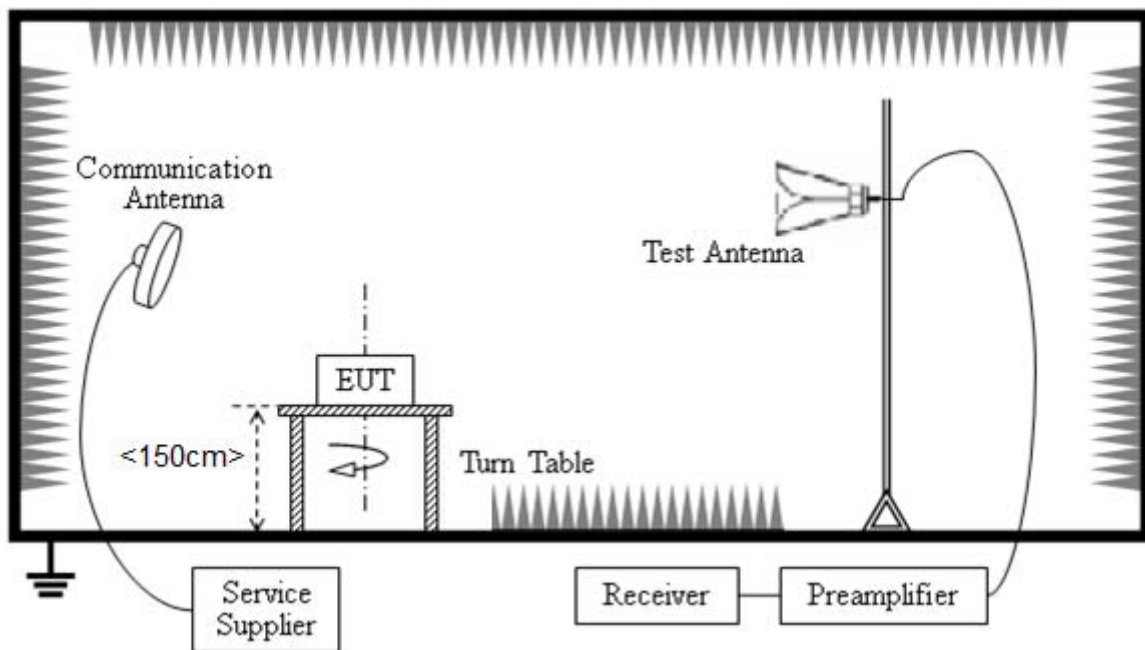


## 5.6 Band Edge

### 5.6.1 Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, , In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

### 5.6.2 Test Description



The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

### 5.6.3 Test Result

The lowest and highest channels are tested to verify the Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dBV/m]} = UR + AT + A\text{Factor [dB]}; AT = LCable \text{ loss [dB]} - G\text{preamp [dB]}$$

AT: Total correction Factor except Antenna

UR: Receiver Reading

Gpreamp: Preamplifier Gain

AFactor: Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

The lowest and highest channels are tested to verify the Restricted Frequency Bands

**A. Test Verdict**

## 802.11b Test mode

Ch	Frequency (MHz)	Detector PK/AV	Receiver Reading UR (dBuV/m)	AT (dB)	Afactor (dB@3m)	Max. Emission (dBuV/m)	Limit (dBuV/m)	Result
1	2367.53	PK	42.52	-32.2	32.56	42.88	74	Pass
1	2366.23	AV	38.14	-32.2	32.56	38.50	54	Pass
11	2489.22	PK	41.99	-30.7	32.50	43.79	74	Pass
11	2487.08	AV	37.39	-30.7	32.50	39.19	54	Pass

## 802.11g Test mode

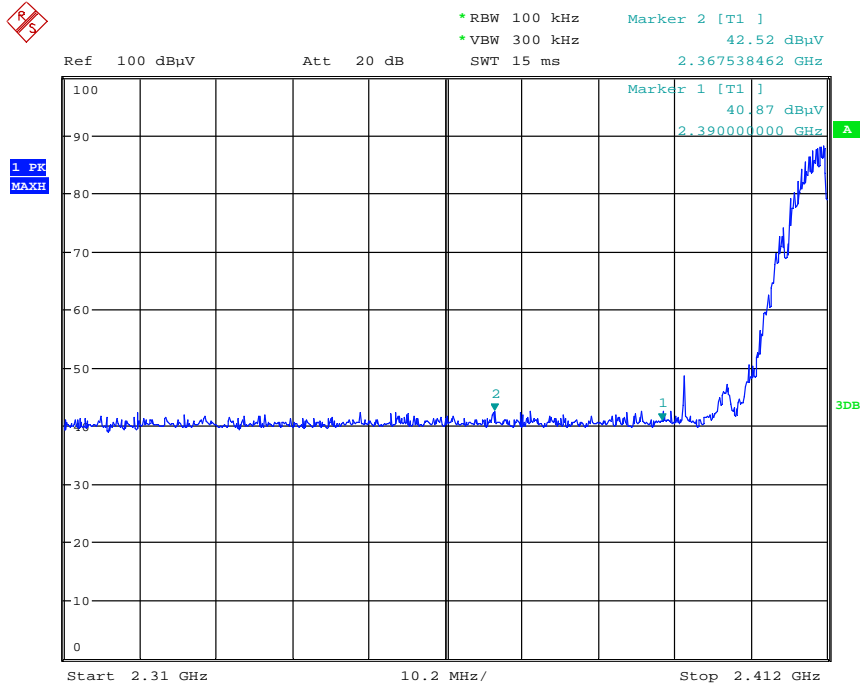
Ch	Frequency (MHz)	Detector PK/AV	Receiver Reading UR (dBuV/m)	AT (dB)	Afactor (dB@3m)	Max. Emission (dBuV/m)	Limit (dBuV/m)	Result
1	2372.93	PK	42.38	-32.2	32.56	42.74	74	Pass
1	2325.85	AV	38.25	-32.2	32.56	38.61	54	Pass
11	2483.92	PK	42.94	-30.7	32.50	44.74	74	Pass
11	3484.53	AV	37.51	-30.7	32.50	39.31	54	Pass

## 802.11n (20MHz) Test mode

Ch	Frequency (MHz)	Detector PK/AV	Receiver Reading UR (dBuV/m)	AT (dB)	Afactor (dB@3m)	Max. Emission (dBuV/m)	Limit (dBuV/m)	Result
1	2366.39	PK	41.84	-32.2	32.56	42.20	74	Pass
1	2375.87	AV	38.13	-32.2	32.56	38.49	54	Pass
11	2486.23	PK	42.09	-30.7	32.50	43.89	74	Pass
11	2489.52	AV	38.04	-30.7	32.50	39.84	54	Pass

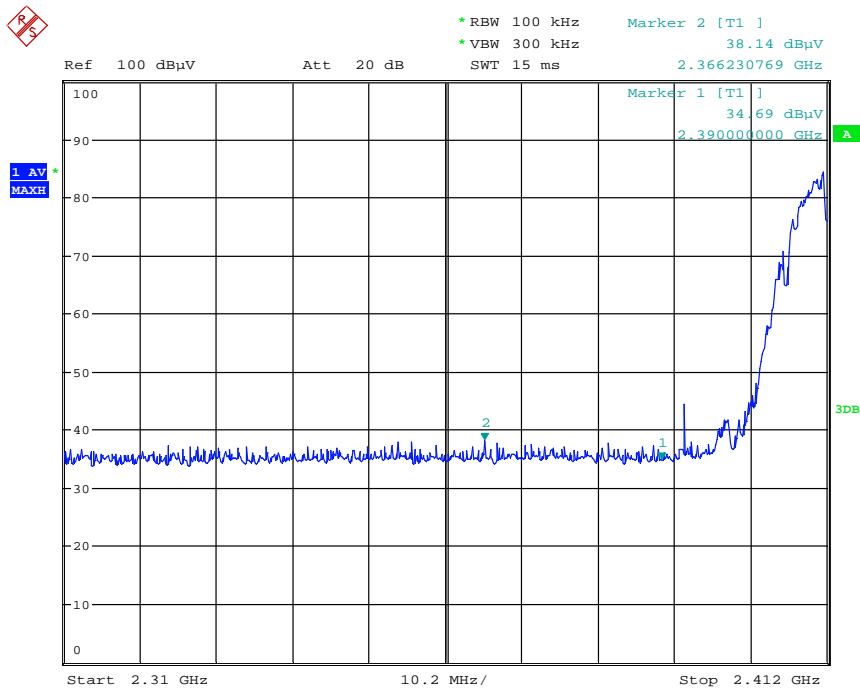


### B. Test Plot



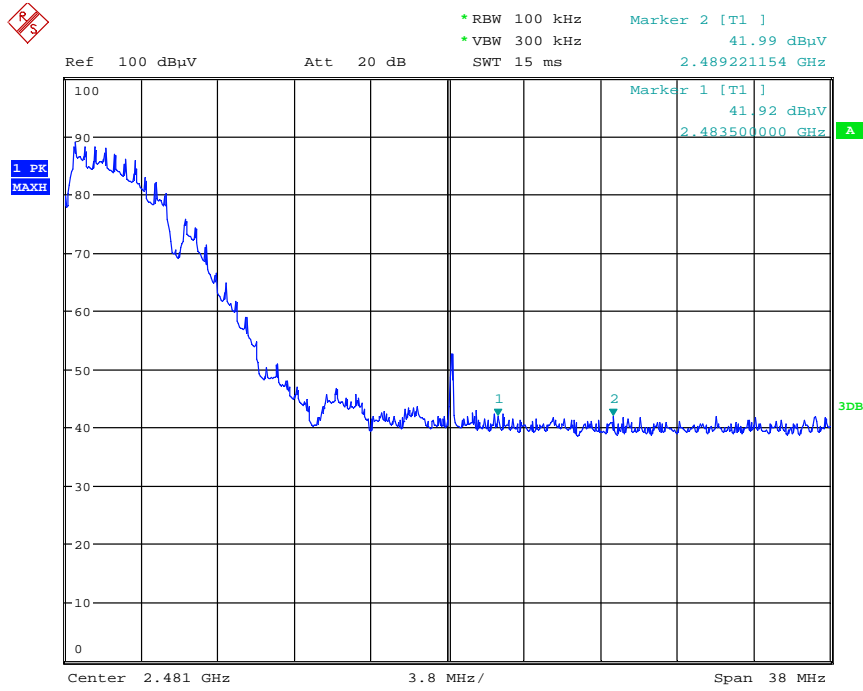
Date: 8.APR.2016 19:56:17

(802.11b Channel = 1 PK)



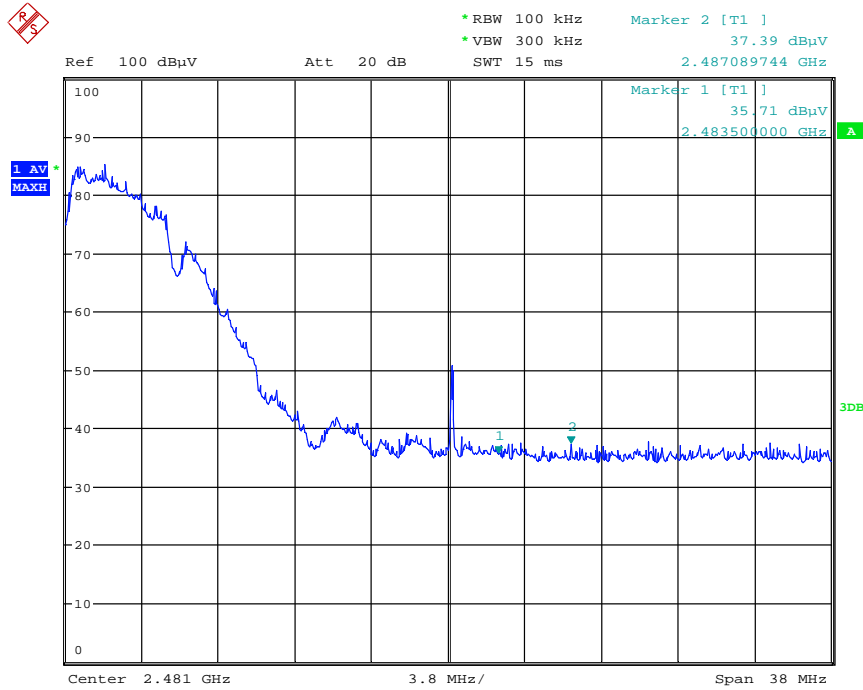
Date: 8.APR.2016 19:57:06

(802.11b Channel = 1 AV)



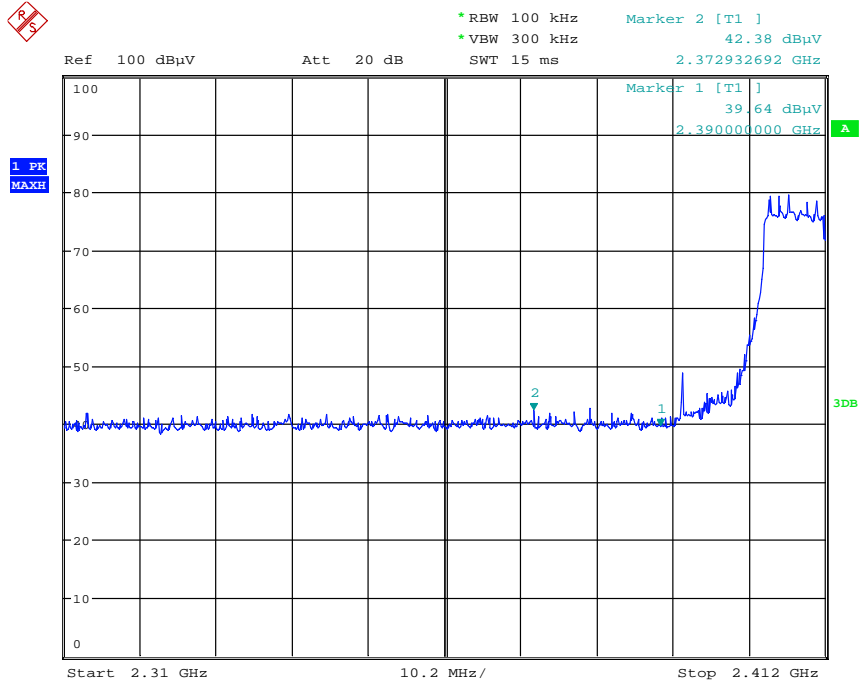
Date: 8.APR.2016 20:07:04

(802.11b Channel = 11 PK)



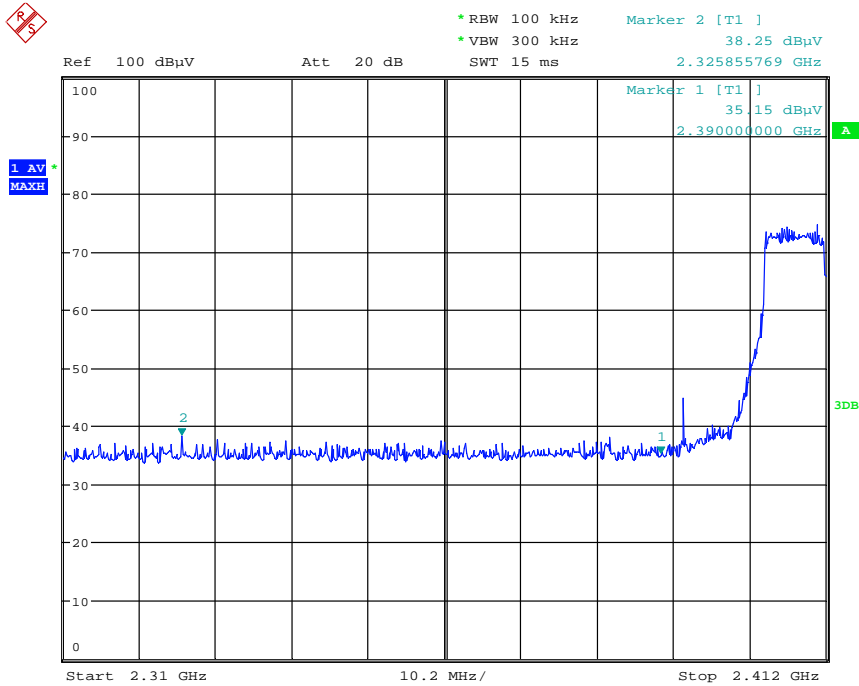
Date: 8.APR.2016 20:06:30

(802.11b Channel = 11 AV)



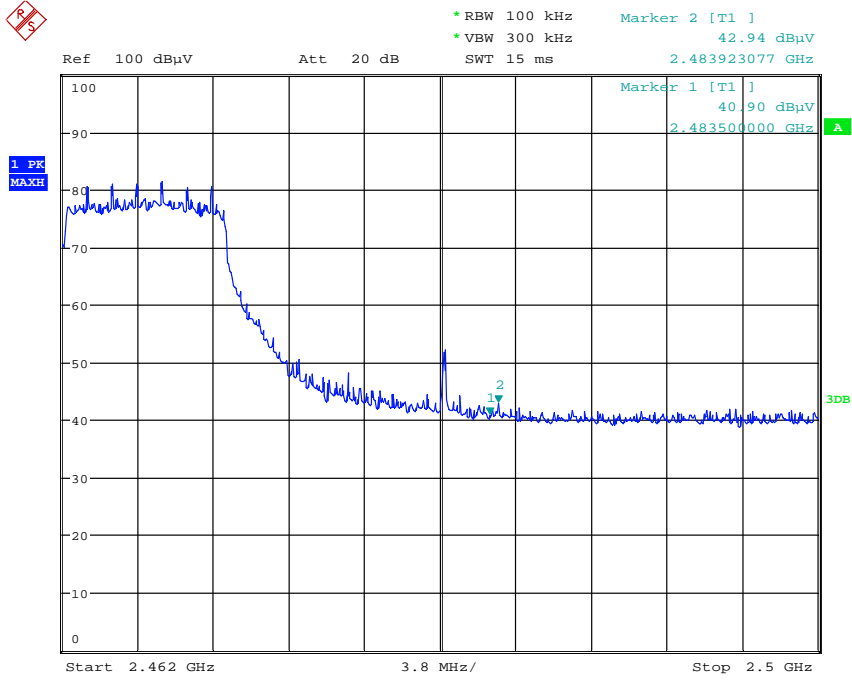
Date: 8.APR.2016 19:59:09

(802.11g Channel = 1 PK)



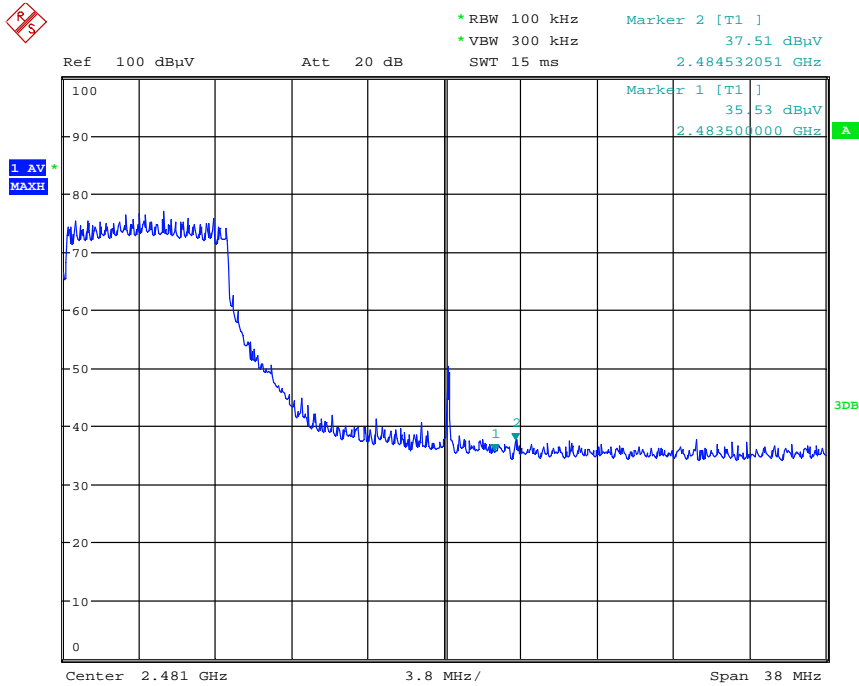
Date: 8.APR.2016 19:58:28

(802.11g Channel = 1 AV)



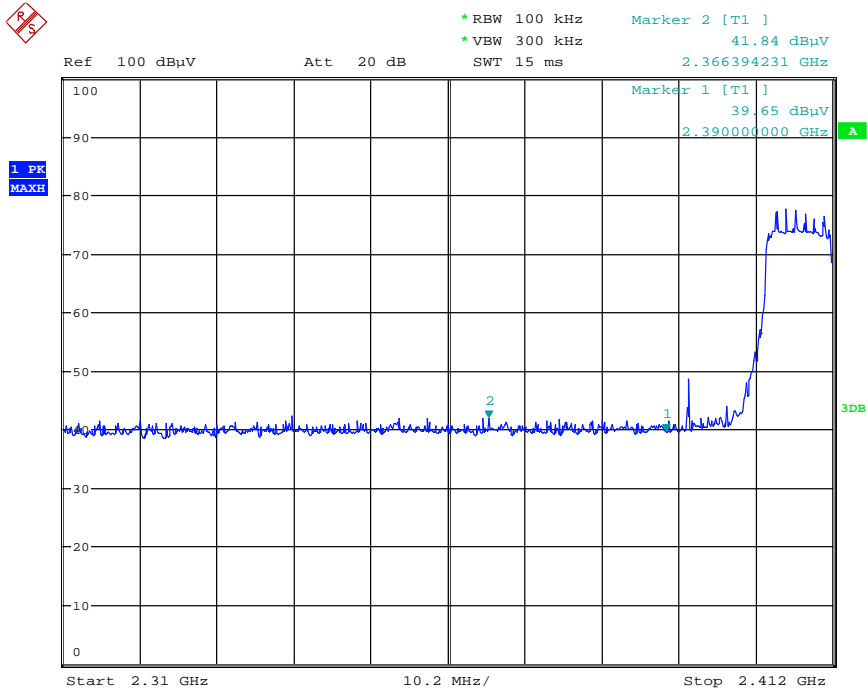
Date: 8.APR.2016 20:04:30

(802.11g Channel = 11 PK)



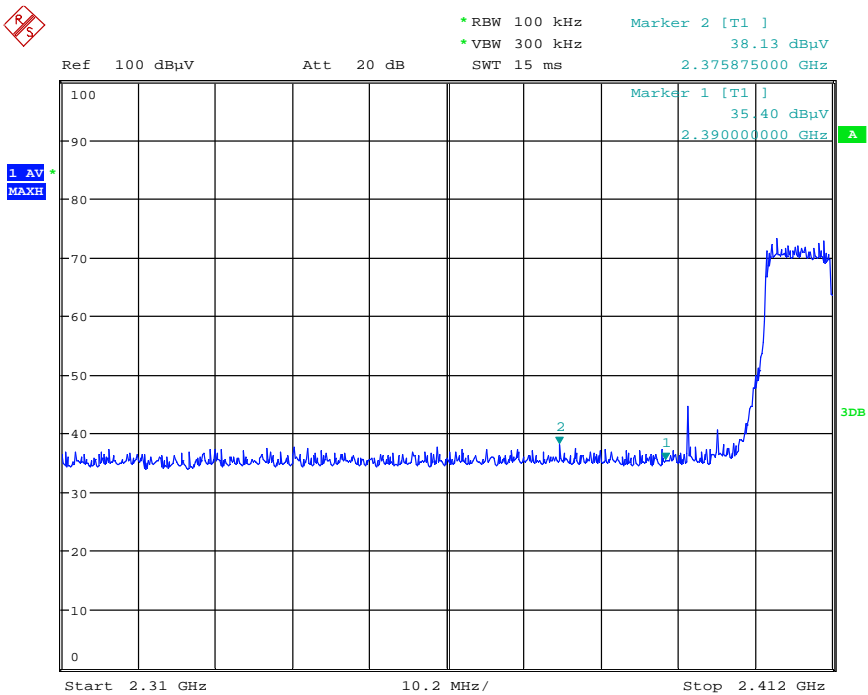
Date: 8.APR.2016 20:05:08

(802.11g Channel = 11 AV)



Date: 8.APR.2016 19:59:54

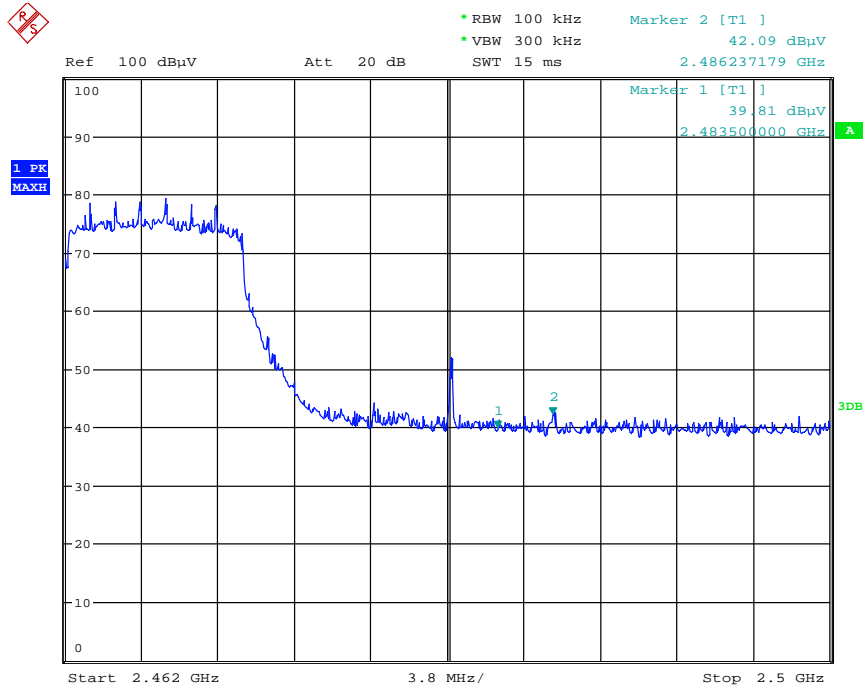
(802.11n-20MHz Channel = 1 PK)



Date: 8.APR.2016 20:00:42

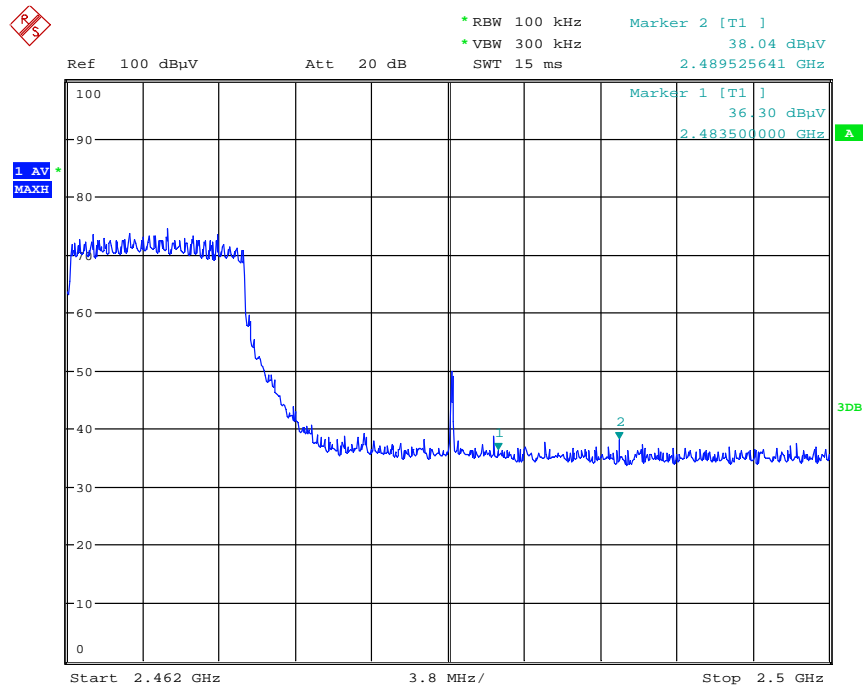
(802.11n-20MHz Channel = 1 AV)





Date: 8.APR.2016 20:03:51

(802.11n-20MHz Channel = 11 PK)



Date: 8.APR.2016 20:03:15

(802.11n-20MHz Channel = 11 AV)



## 5.7 Conducted Emission

### 5.7.1 Requirement

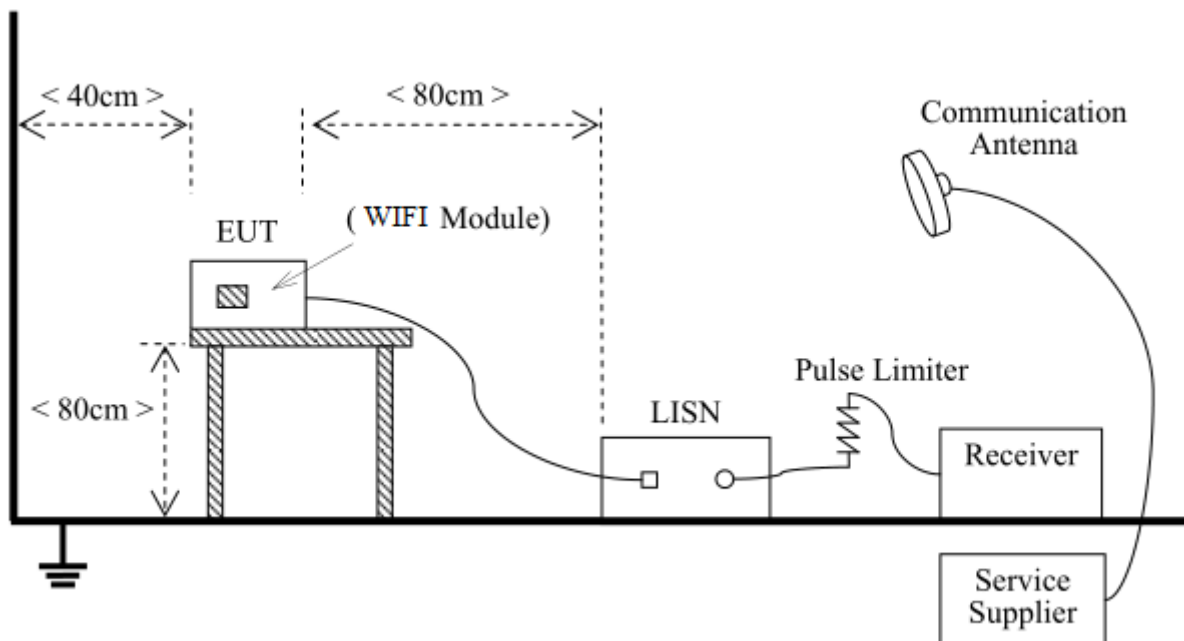
According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network(LISN).

Frequency range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- The lower limit shall apply at the band edges.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

### 5.7.2 Test Description



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. Power supplier is setting to 120V/60Hz. The set-up and test methods were according to ANSI C63.10:2013

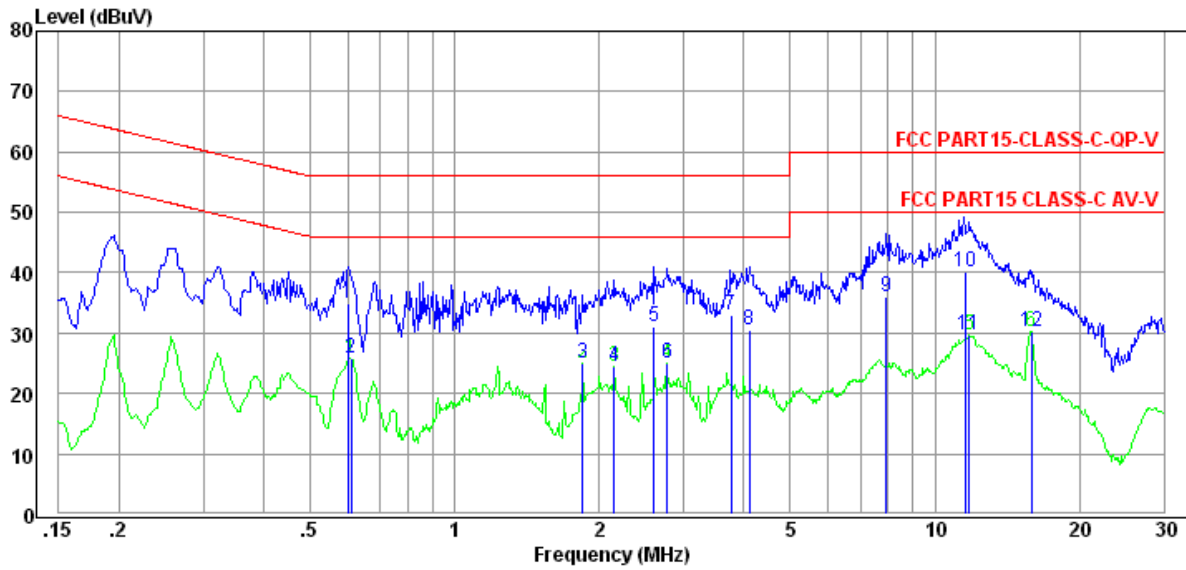


### 5.7.3 Test result

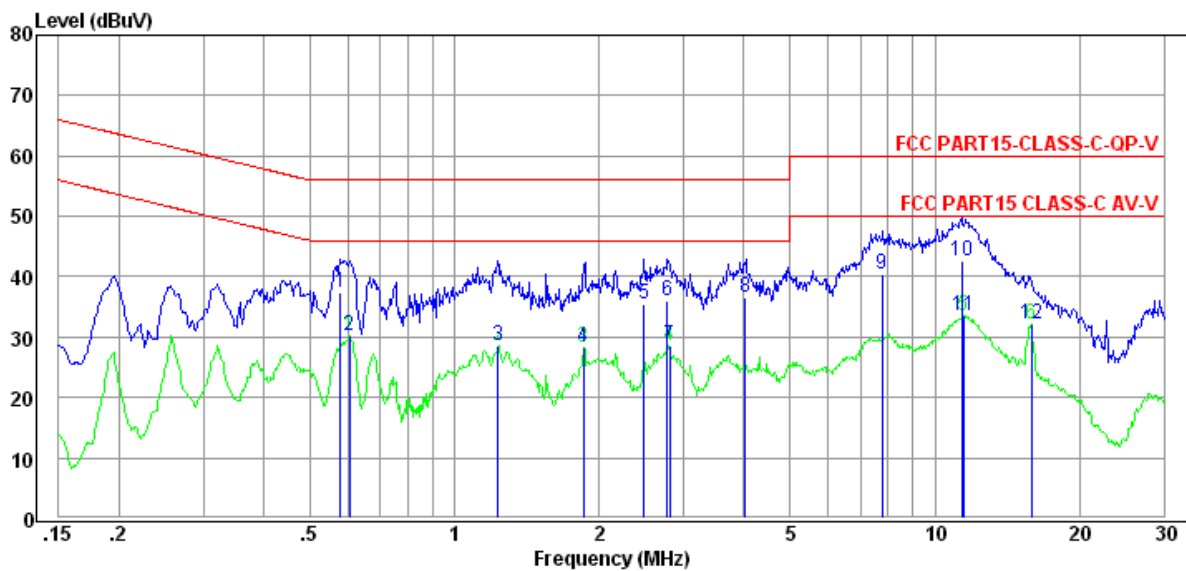
Test Verdict Recorded for Suspicious Points:

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Phase line	Detector
0.60	34.84	56.00	21.16	L	QP
0.61	25.83	56.00	30.17	L	Average
1.85	24.93	56.00	31.07	L	Average
2.15	24.47	56.00	31.53	L	Average
2.61	31.06	56.00	24.94	L	QP
2.77	25.10	56.00	30.90	L	Average
3.76	32.89	56.00	23.11	L	QP
4.12	30.46	56.00	25.54	L	QP
7.92	36.03	60.00	23.97	L	QP
11.54	40.23	60.00	19.77	L	QP
0.58	37.34	56.00	18.66	N	QP
0.61	30.12	46.00	15.88	N	Average
1.23	28.53	46.00	17.47	N	Average
1.86	28.24	46.00	17.76	N	Average
2.49	35.50	56.00	20.50	N	QP
2.78	36.05	56.00	19.95	N	QP
2.81	28.65	46.00	17.35	N	Average
4.04	36.56	56.00	19.44	N	QP
7.77	40.28	60.00	19.72	N	QP
11.42	42.55	60.00	17.45	N	QP
11.45	33.54	50.00	16.46	N	Average
15.92	32.28	50.00	17.72	N	Average

### 5.7.4 Test Plot



L Line



N Line



## 5.8 Radiated Emission

### 5.8.1 Requirement

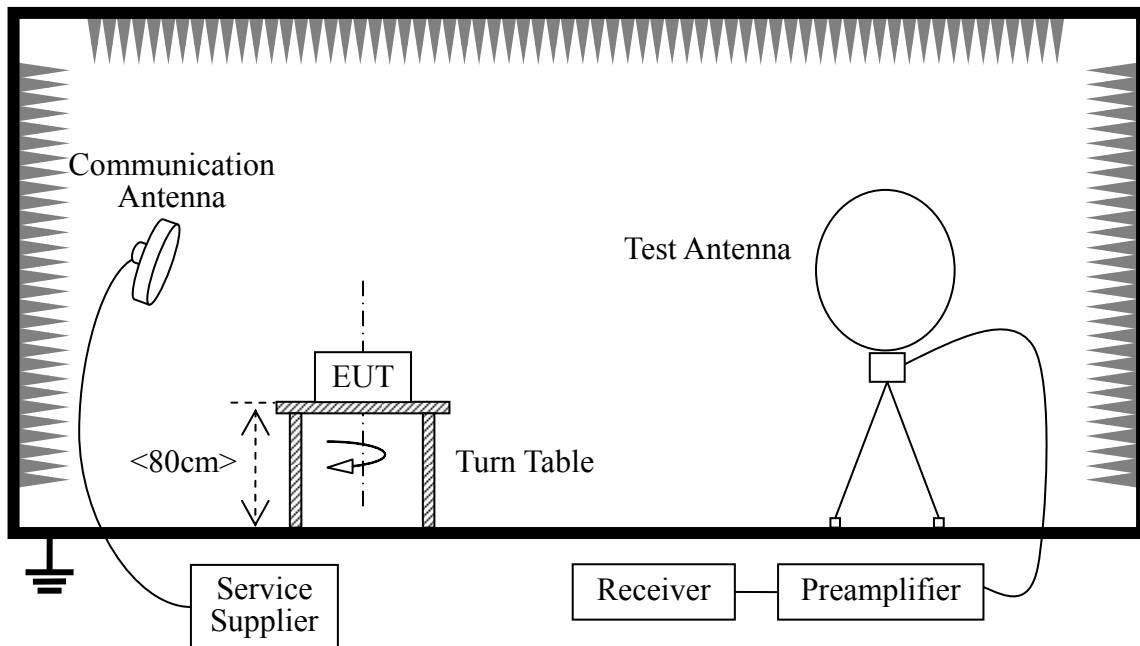
According to FCC section 15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

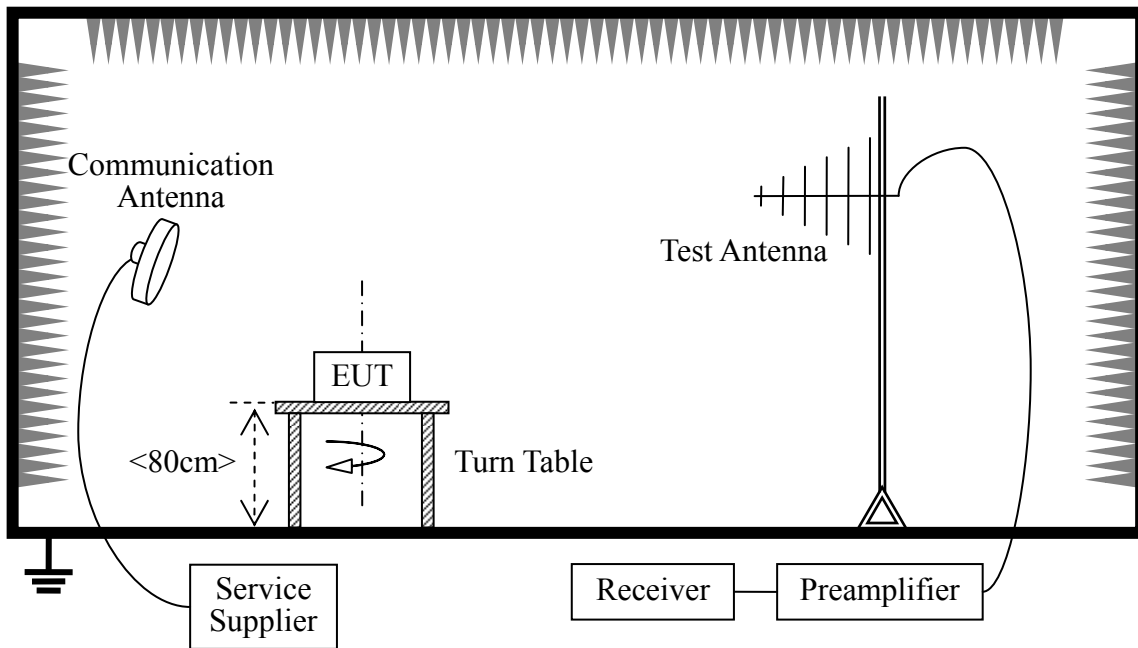
Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ )	Measurement Distance (m)	Limit( $\text{dB}\mu\text{V}/\text{m}$ )	Detector
0.009-0.490	2400/F(kHz)	300	/	/
0.490-1.705	24000/F(kHz)	30	/	/
1.705-30	30	30	/	/
30 - 88	100	3	40	QP
88 - 216	150	3	43.5	QP
216 - 960	200	3	46	QP
960 - 1000	500	3	54	QP
Above 1000	500	3	54	AV

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

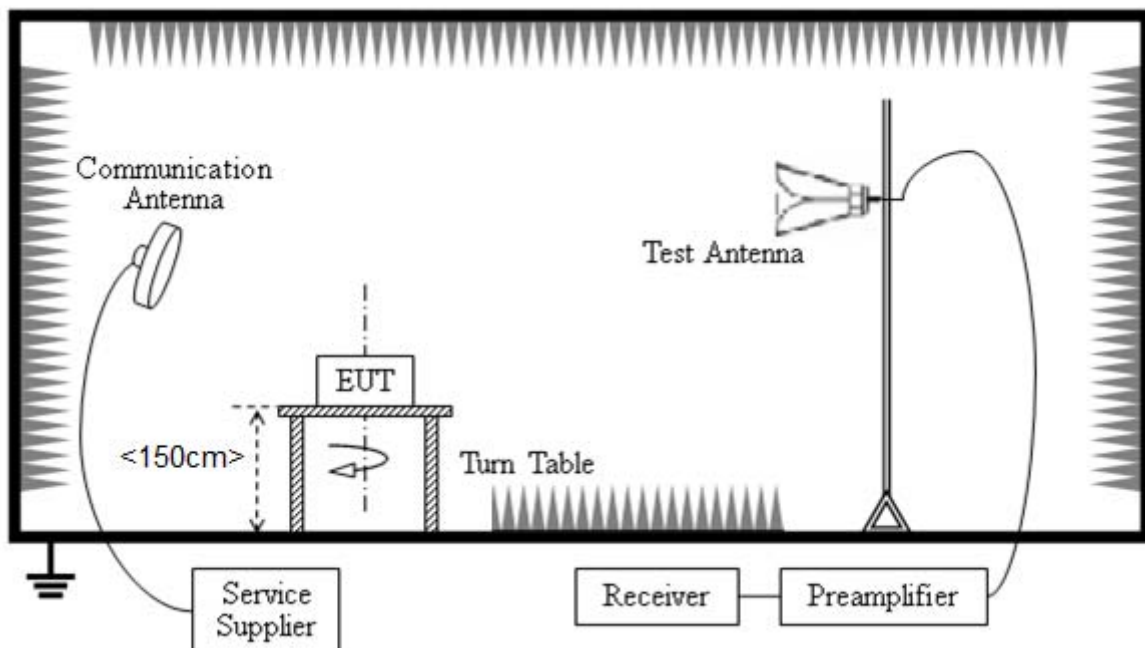
### 5.8.2 Test setup



Radiated Emissions Below 30MHz



Radiated Emissions 30-1000MHz



Radiated Emissions above 1000MHz

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10-2013. Below 1GHz, the EUT was set-up on insulator 80cm above the Ground Plane. Above 1GHz, the EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10

The Wifi Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the Wifi Module is activated and controlled by the Wifi Service Supplier (SS) via a Common Antenna, and is set to



operate under transmitting at maximum power.

For the Test Antenna: In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength, the azimuth range of turntable was 0o to 360o, the receive antenna has two polarizations horizontal and vertical. When doing measurements above 1GHz, the EUT was placed within the 3dB beam width range of the horn antenna, and the EUT was tested in 3 orthogonal positions as recommended in ANSI C63.10 for Radiated Emissions and the worst-case data was presented.

### 5.8.3 Test Result

#### A. Test Result for 9kHz~30MHz

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
--	--	20	--	See Note

Note:

- The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.*
- Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);*
- Limit line = specific limits (dBuV) + distance extrapolation factor.*

#### B. Test Result for above 30MHz ~ 10th Harmonic

Frequency (MHz)	Level (dBuV)	Limit Line (dBuV)	Margin (dB)	Antenna Polarization	Result
53.88	21.99	40.00	18.01	Horizontal	PASS
100.23	19.78	43.50	23.72	Horizontal	PASS
318.82	22.47	46.00	23.53	Horizontal	PASS
3142.24	34.69	54.00	19.31	Horizontal	PASS
3698.71	45.34	54.00	8.66	Horizontal	PASS
4594.17	37.84	54.00	16.16	Horizontal	PASS
4874.00	37.85	54.00	16.15	Horizontal	PASS
53.88	21.99	40.00	18.01	Vertical	PASS
100.23	19.78	43.50	23.72	Vertical	PASS
318.82	22.47	46.00	23.53	Vertical	PASS
3698.71	48.88	54.00	5.12	Vertical	PASS
4284.09	35.82	54.00	18.18	Vertical	PASS
4400.79	37.24	54.00	16.76	Vertical	PASS
4882.74	45.01	54.00	8.99	Vertical	PASS

Note:

*The worst case (802.11g Channel 6:2437MHz) is recorded in the report.*



## Annex A Photos of the EUT

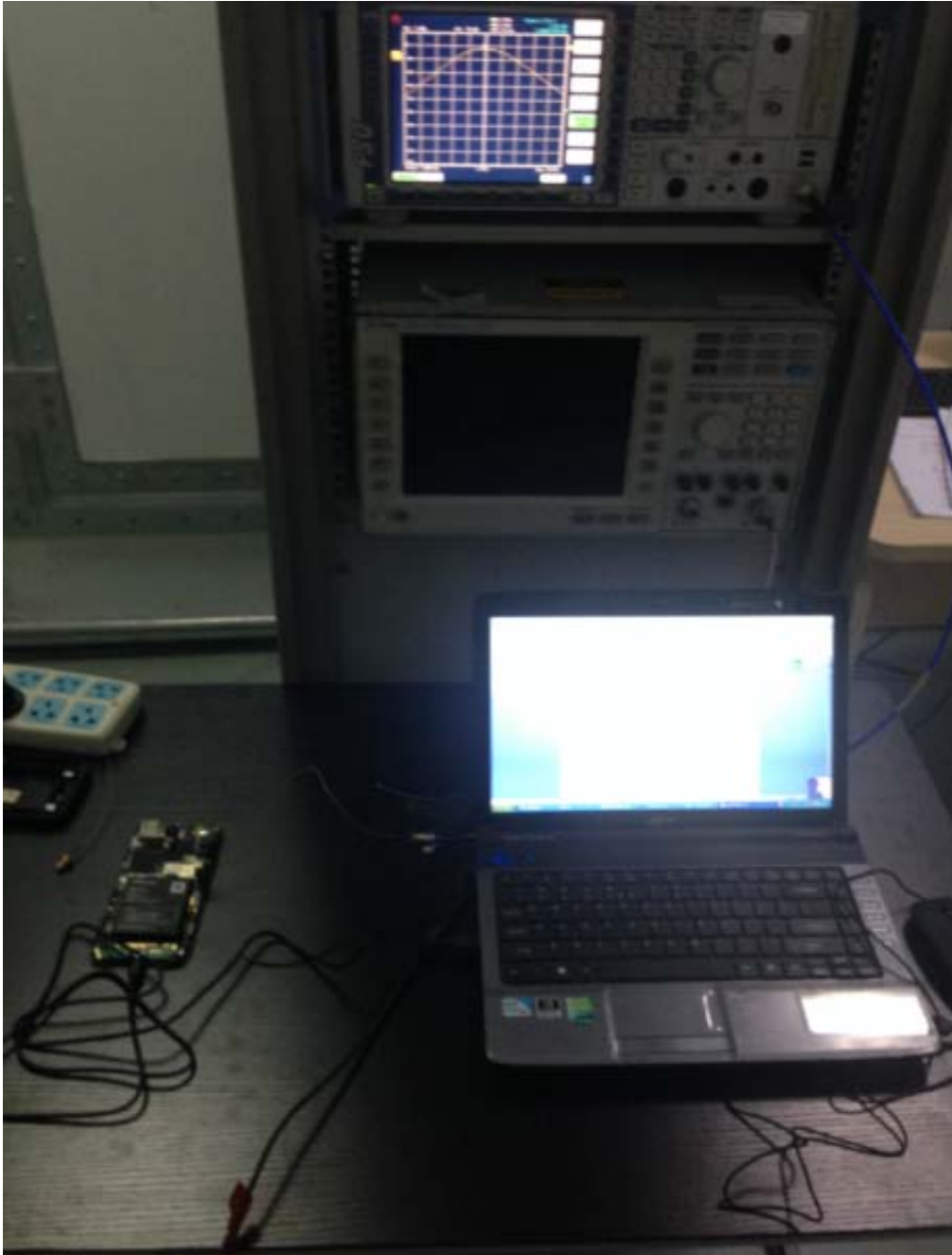






## Annex B Photos of Setup

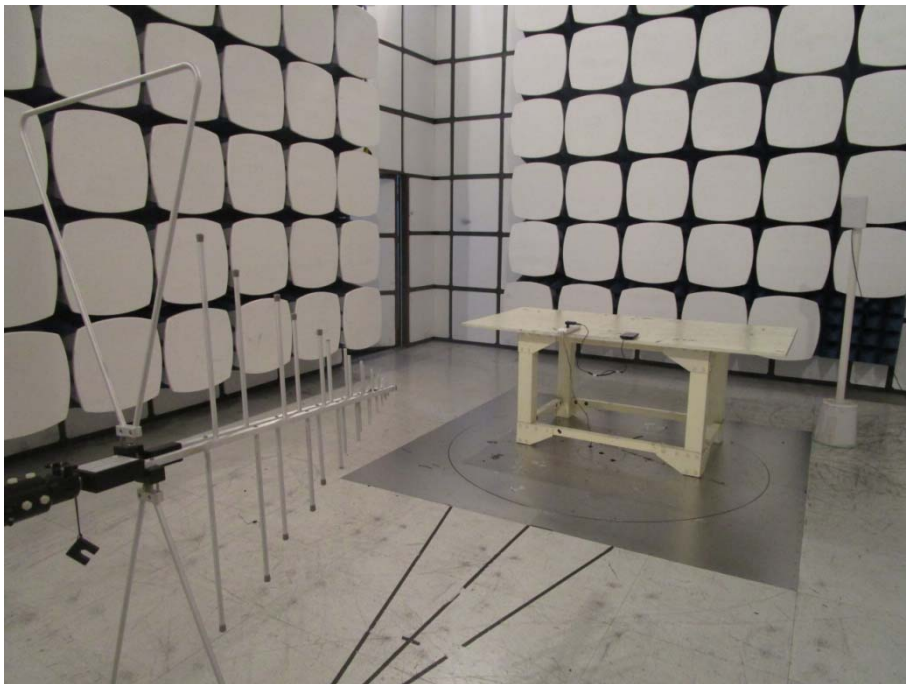
### 1. RF

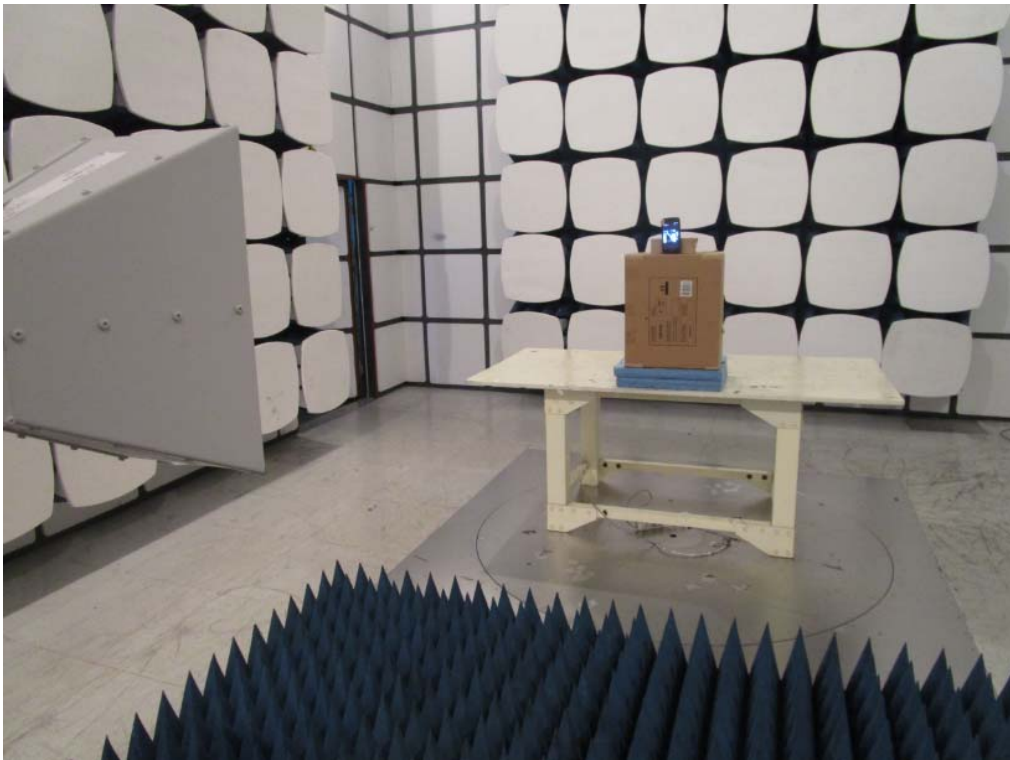


### 2. Conducted Emission



### 3. Radiated Emission





**\*\* END OF REPORT \*\***