

FCC TEST REPORT

FCC ID : 2AABVBARNVIEWCAM
Applicant : ASA ELECTRONICS
Address : 2602 MARINA DRIVE ELKHART, IN 46514
Manufacturer : ASA ELECTRONICS
Address : 2602 MARINA DRIVE ELKHART, IN 46514
Equipment Under Test (EUT) :
Product Name : BARNVIEW DIGITAL WIRELESS SURVEILLANCE SYSTEM
Model No. : BARNVIEWCAM
Rules : FCC CFR47 Part 15 Section 15.247:2010

Date of Test : May. 15~ June 23, 2013
Date of Issue : June. 24 2013

Test Result : **PASS**

Remark:

* The sample described above has been tested to be in compliance with the requirements of ANSI C63.4:2003. The test results have been reviewed and comply with the rules listed above and found to meet their essential requirements.

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

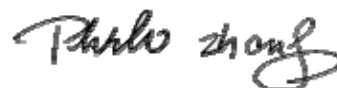
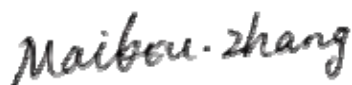
Waltek Services (Shenzhen) Co., Ltd.

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Compiled by:

Approved by:



Maikou Zhang / Project Engineer

Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.205(a) 15.209 15.247(d)	PASS
20dB Bandwidth	15.247(a)(1)	PASS
Duty Cycle	15.35	PASS
Band Edge	15.247(d)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Frequency Separated	15.247(a)(1)	PASS
Hopping Channel Number	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

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4 General Information

4.1 General Description of E.U.T.

Product Name	: BARNVIEW DIGITAL WIRELESS SURVEILLANCE SYSTEM
Model No.	: BARNVIEWCAM
Type of Modulation	: GFSK
Operation Frequency	: 2414.25MHz ~ 2461.5MHz, 15 channels
Antenna Gain	: 3dBi & 5dBi(with 3m shielding cable and 9m shielding cable , This two cables only apply to 5dBi antenna. Cable loss : 3m cable is -1.5632dB, 9m cable is -4.7267dB , the cable use connector of RP SMA with nonstandard whorl).
Oscillator	: Crystal 18MHz for RF module, 24MHz for MCU HP3129,

4.2 Details of E.U.T.

Technical Data	: Two kind of adapter could be used and the test result carried out by using two adapter were passed, and the data show in the report is the adapter 1's.
Adapter1	: Model:KSAS0060500100VUD INPUT:AC 100-240V, 50/60Hz 0.18A Output: DC5V 1000mA Manufacturer: Ktec
Adapter 2	: CSEC Adapter CS6D050100FUF INPUT:AC 100-240V, 50/60Hz 200mA Output: DC 5V 1.0A Manufacturer: Csec

4.3 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, July 12, 2012.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

4.4 Test Location

All the tests were performed at:

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd.,Songgang Street, Baoan District, Shenzhen, China

4.5 Test Mode

Test Item	Test Mode
Conducted Emissions	receiving (adapter)
Radiated Emissions	receiving (adapter)

4.6 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2414.25	2	2417.625	3	2421	4	2424.375
5	2427.75	6	2431.125	7	2434.5	8	2437.875
9	2441.25	10	2444.625	11	2448	12	2451.375
13	2454.75	14	2458.125	15	2461.5	-	-

5 Equipment Used during Test

5.1 Equipments List

Spurious Emissions and Radiated Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer	Agilent	E7405A	MY45114943	Aug. 13,2012	Aug. 13,2013
2.	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Aug. 13,2012	Aug. 13,2013
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Aug. 13,2012	Aug. 13,2013
4.	Broad-band Horn Antenna	SCHWARZBECK	VULB9163	667	Aug. 13,2012	Aug. 13,2013
5.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	399	Aug. 13,2012	Aug. 13,2013
6.	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Feb .23,2013	Feb .23,2014
7.	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-148	Aug. 13,2012	Aug. 13,2013
8.	10m Coaxial Cable with N- plug	SCHWARZBECK	AK 9515 H	-	Aug. 13,2012	Aug. 13,2013
9.	10m 50 Ohm Coaxial Cable with N-plug	SCHWARZBECK	AK 9513	-	Aug. 13,2012	Aug. 13,2013
10.	Positioning Controller	C&C LAB	CC-C-IF	-	Aug. 13,2012	Aug. 13,2013
11.	Color Monitor	SUNSPPO	SP-14C	-	Aug. 13,2012	Aug. 13,2013
Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Aug. 13,2012	Aug. 12,2013
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Aug. 13,2012	Aug. 12,2013
3.	Cable	LARGE	RF300	EW02014-3	Aug.14,2012	Aug. 13,2013
Associated Equipment						
1	VOYAGER TOUGH CAM BARNVIEW DIGITAL WIRELESS SURVEILLANCE SYSTEM	ASA ELECTRONICS	BARNVIEW MON	-	-	-

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 4.74 dB (Horn antenna 1000M~25000MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Conducted Emission Data

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	1012 mbar

EUT Operation:

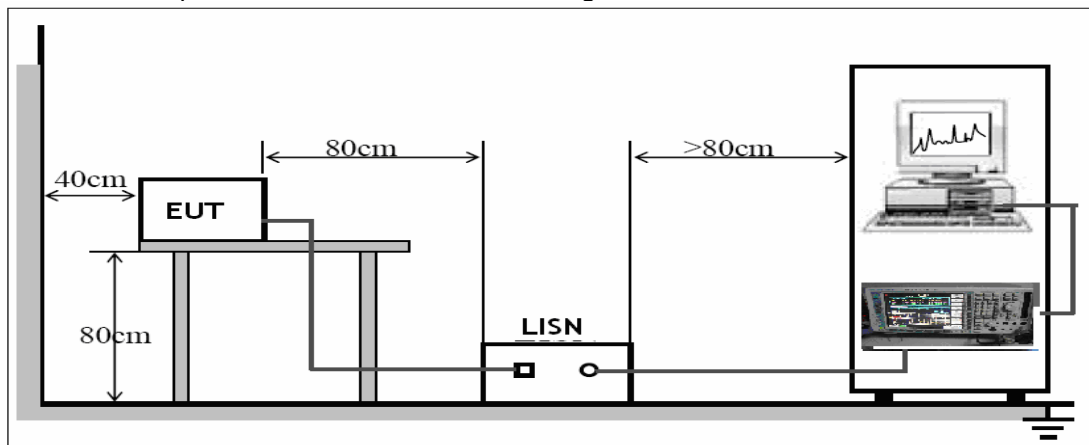
The pre-test was performed in Transmitting mode with 3dBi antenna, 5dBi antenna with 9m cabel. The test data were shown as follow.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.2 EUT Setup

The EUT was placed on the test table in shielding room.

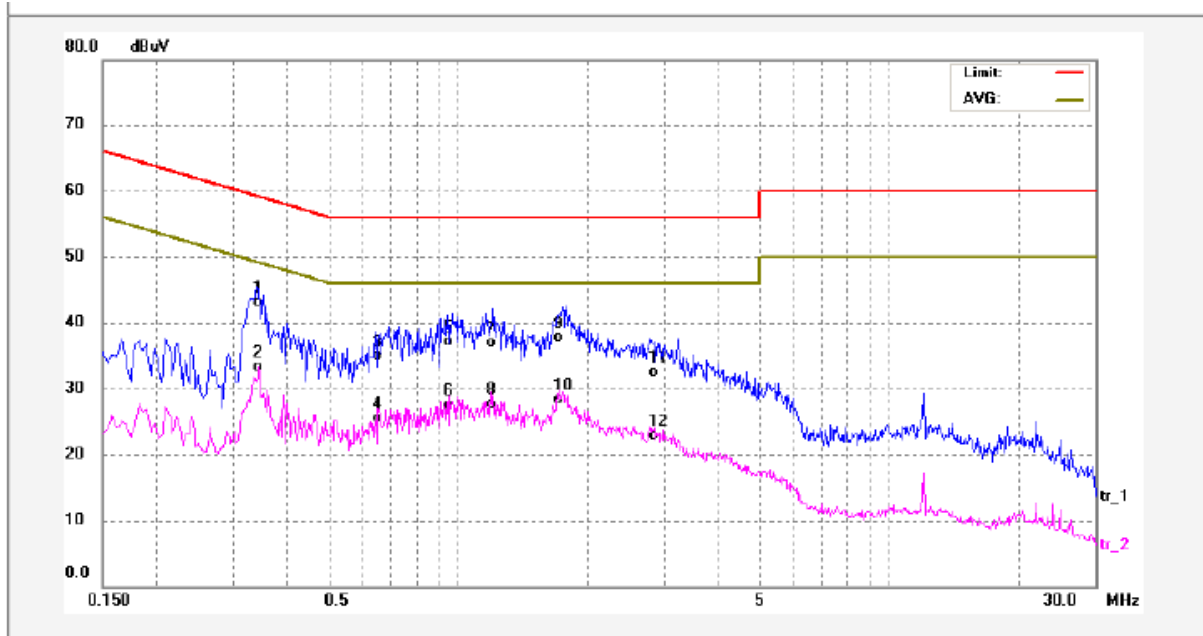


6.3 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

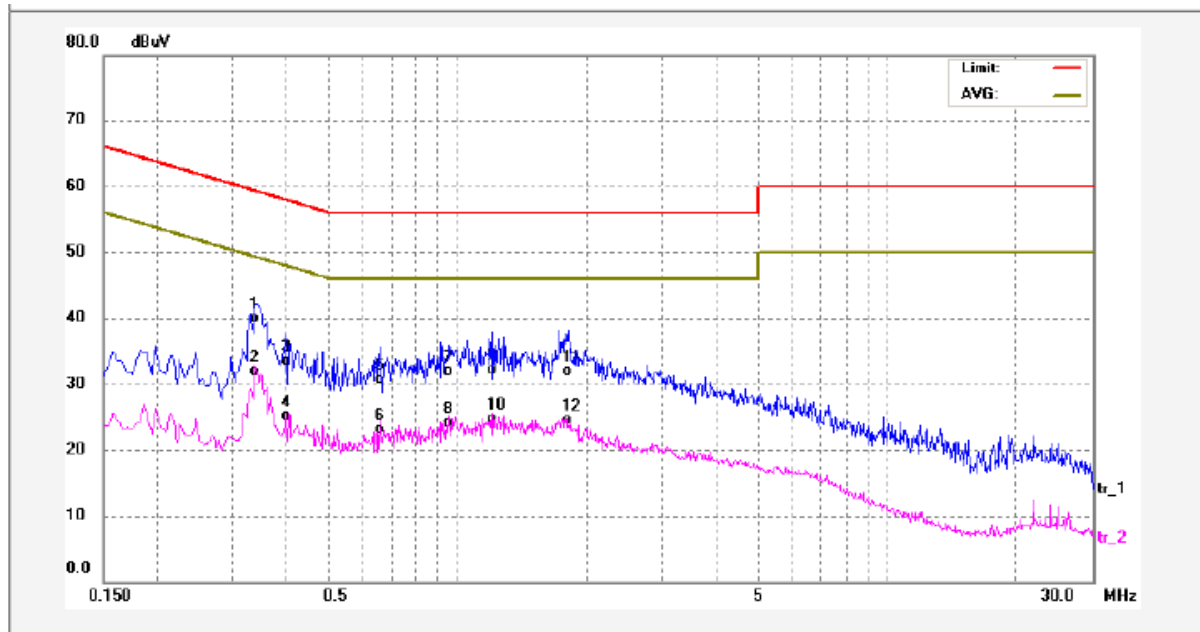
Test mode: Transmitting mode (5dBi antenna with 9m cable)

Live line:



No.	Freq. (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit dBμV	Margin (dB)	Detector	Remark
1	0.3460	30.93	11.30	42.23	59.06	-16.83	QP	
2	0.3460	21.22	11.30	32.52	49.06	-16.54	AVG	
3	0.6540	22.80	11.33	34.13	56.00	-21.87	QP	
4	0.6540	13.47	11.33	24.80	46.00	-21.20	AVG	
5	0.9540	25.09	11.20	36.29	56.00	-19.71	QP	
6	0.9540	15.44	11.20	26.64	46.00	-19.36	AVG	
7	1.1940	25.00	11.18	36.18	56.00	-19.82	QP	
8	1.1940	15.82	11.18	27.00	46.00	-19.00	AVG	
9	1.7140	25.79	11.19	36.98	56.00	-19.02	QP	
10	1.7140	16.41	11.19	27.60	46.00	-18.40	AVG	
11	2.8620	20.59	11.21	31.80	56.00	-24.20	QP	
12	2.8620	10.89	11.21	22.10	46.00	-23.90	AVG	

Neutral line:

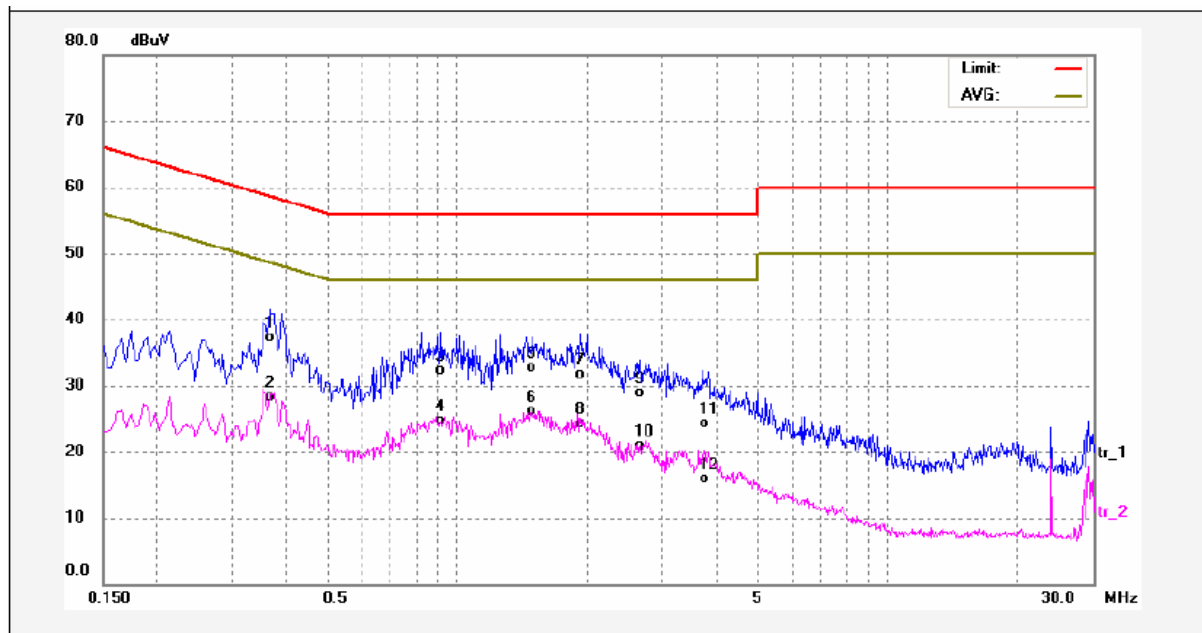


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.3379	27.73	11.30	39.03	59.25	-20.22	QP	
2	0.3379	19.79	11.30	31.09	49.25	-18.16	AVG	
3	0.3980	21.44	11.31	32.75	57.89	-25.14	QP	
4	0.3980	12.94	11.31	24.25	47.89	-23.64	AVG	
5	0.6580	18.61	11.33	29.94	56.00	-26.06	QP	
6	0.6580	11.06	11.33	22.39	46.00	-23.61	AVG	
7	0.9580	19.94	11.20	31.14	56.00	-24.86	QP	
8	0.9580	12.05	11.20	23.25	46.00	-22.75	AVG	
9	1.1980	20.08	11.18	31.26	56.00	-24.74	QP	
10	1.1980	12.72	11.18	23.90	46.00	-22.10	AVG	
11	1.7980	19.88	11.20	31.08	56.00	-24.92	QP	
12	1.7980	12.59	11.20	23.79	46.00	-22.21	AVG	

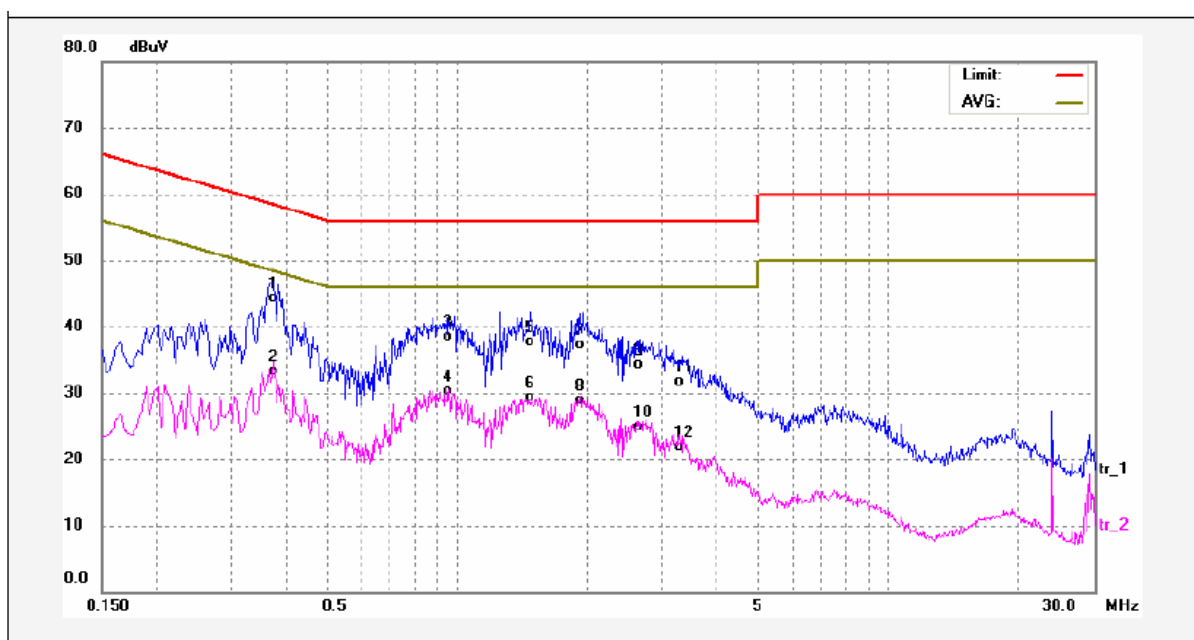
An initial pre-scan was performed on the live and neutral lines.

Test mode: Transmitting mode (5dBi antenna with 3m cable)

Live line:



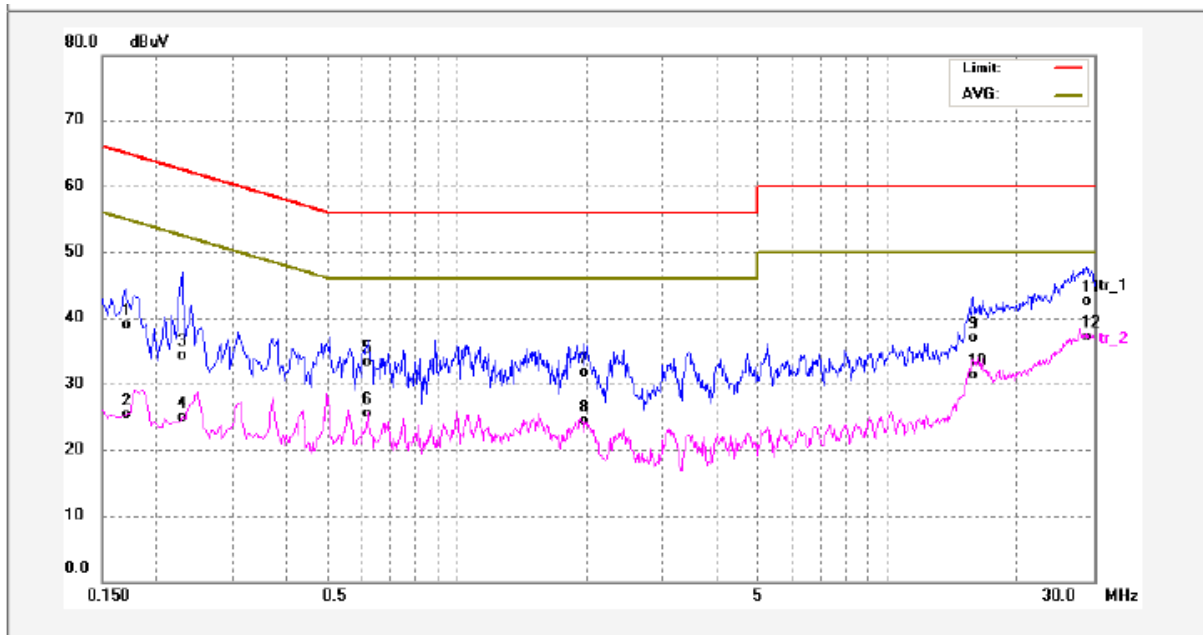
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.3660	25.20	11.31	36.51	58.59	-22.08	QP	
2	0.3660	16.28	11.31	27.59	48.59	-21.00	AVG	
3	0.9180	20.19	11.22	31.41	56.00	-24.59	QP	
4	0.9180	12.76	11.22	23.98	46.00	-22.02	AVG	
5	1.4940	20.67	11.19	31.86	56.00	-24.14	QP	
6	1.4940	14.05	11.19	25.24	46.00	-20.76	AVG	
7	1.9340	19.70	11.20	30.90	56.00	-25.10	QP	
8	1.9340	12.29	11.20	23.49	46.00	-22.51	AVG	
9	2.6580	16.98	11.21	28.19	56.00	-27.81	QP	
10	2.6580	8.82	11.21	20.03	46.00	-25.97	AVG	
11	3.7140	12.22	11.22	23.44	56.00	-32.56	QP	
12	3.7140	3.95	11.22	15.17	46.00	-30.83	AVG	

Neutral line:

No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.3740	32.12	11.31	43.43	58.41	-14.98	QP	
2	0.3740	21.21	11.31	32.52	48.41	-15.89	AVG	
3	0.9540	26.59	11.20	37.79	56.00	-18.21	QP	
4	0.9540	18.35	11.20	29.55	46.00	-16.45	AVG	
5	1.4780	25.73	11.19	36.92	56.00	-19.08	QP	
6	1.4780	17.35	11.19	28.54	46.00	-17.46	AVG	
7	1.9580	25.37	11.20	36.57	56.00	-19.43	QP	
8	1.9580	16.81	11.20	28.01	46.00	-17.99	AVG	
9	2.6619	22.38	11.21	33.59	56.00	-22.41	QP	
10	2.6619	12.87	11.21	24.08	46.00	-21.92	AVG	
11	3.3140	19.62	11.22	30.84	56.00	-25.16	QP	
12	3.3140	9.82	11.22	21.04	46.00	-24.96	AVG	

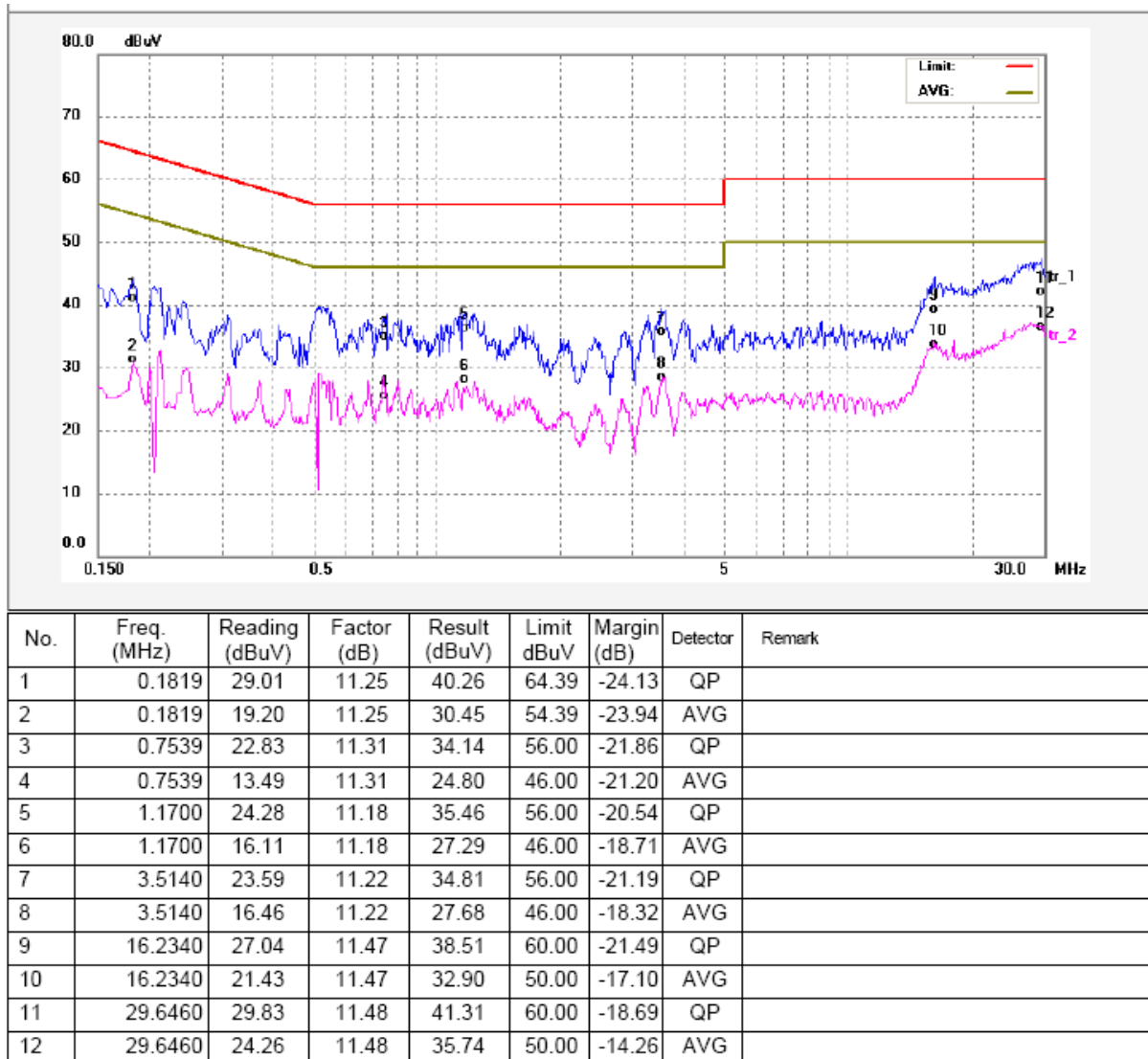
Test mode: Transmitting mode (3dBi antenna)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1700	26.82	11.22	38.04	64.96	-26.92	QP	
2	0.1700	13.34	11.22	24.56	54.96	-30.40	AVG	
3	0.2300	22.22	11.30	33.52	62.45	-28.93	QP	
4	0.2300	12.73	11.30	24.03	52.45	-28.42	AVG	
5	0.6260	21.14	11.33	32.47	56.00	-23.53	QP	
6	0.6260	13.33	11.33	24.66	46.00	-21.34	AVG	
7	1.9740	19.67	11.20	30.87	56.00	-25.13	QP	
8	1.9740	12.40	11.20	23.60	46.00	-22.40	AVG	
9	15.7260	24.64	11.46	36.10	60.00	-23.90	QP	
10	15.7260	19.01	11.46	30.47	50.00	-19.53	AVG	
11	29.0060	30.31	11.49	41.80	60.00	-18.20	QP	
12	29.0060	24.82	11.49	36.31	50.00	-13.69	AVG	

Neutral line:



7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.4:2003

Test Result: PASS

Frequency Range: 32.7688KHz to 25GHz

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation :

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

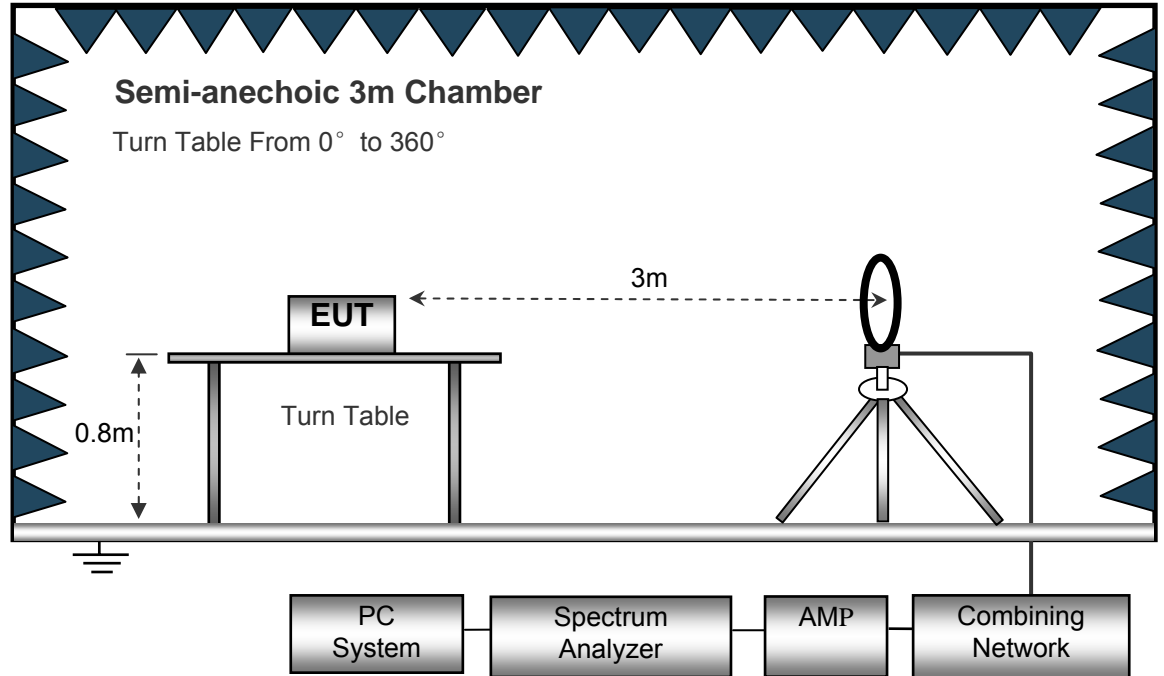
Atmospheric Pressure: 1012 mbar

Test mode: The EUT was tested in receiving mode, the test data were shown as follow.

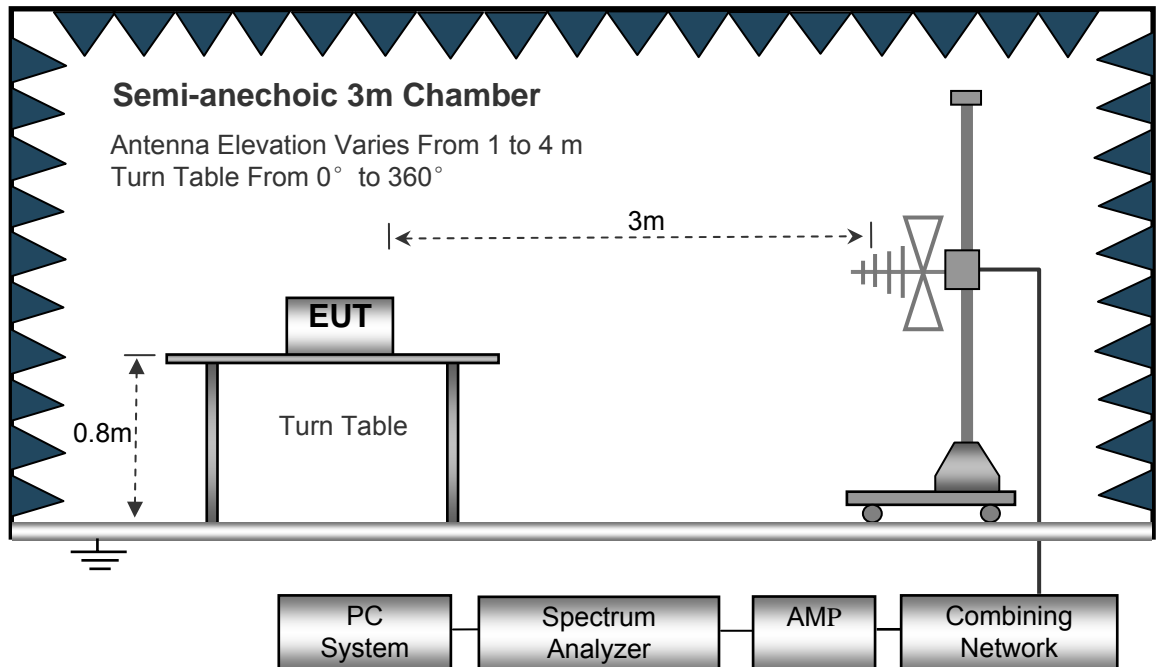
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

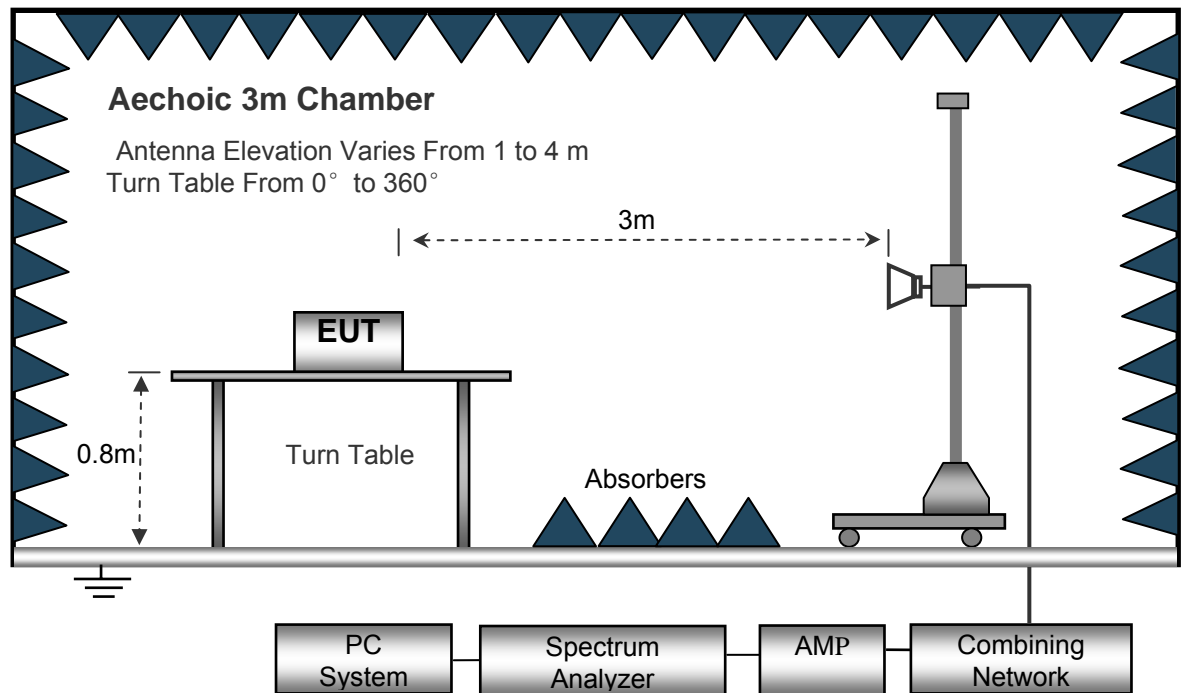
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested from 32.7688KHz to 25000MHz.

Below 30MHz

Sweep Speed	Auto
IF Bandwidth.....	10KHz
Video Bandwidth.....	10KHz
Resolution Bandwidth.....	10KHz

30MHz ~ 1GHz

Sweep Speed	Auto
IF Bandwidth.....	120 KHz
Video Bandwidth.....	100KHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth.....	100KHz

Above 1GHz

Sweep Speed	Auto
IF Bandwidth.....	120 KHz
Video Bandwidth.....	3MHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth.....	1MHz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under X-axes position(X denotes lying on the table).

7.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.6 Summary of Test Results

Test Frequency :Below 30MHz

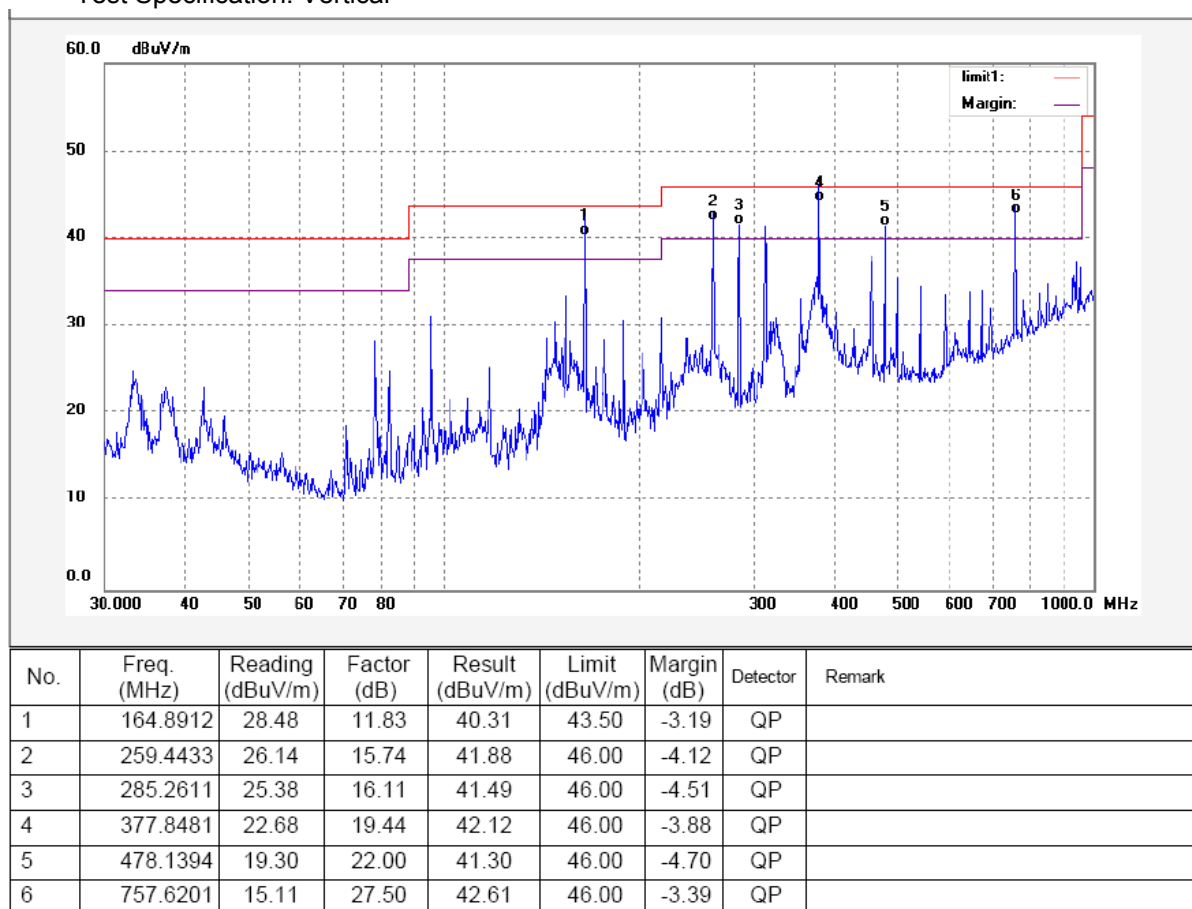
All emissions were more than 20 dB below the limit and therefore not reported.

Test Frequency Range : 30MHz ~ 1000MHz

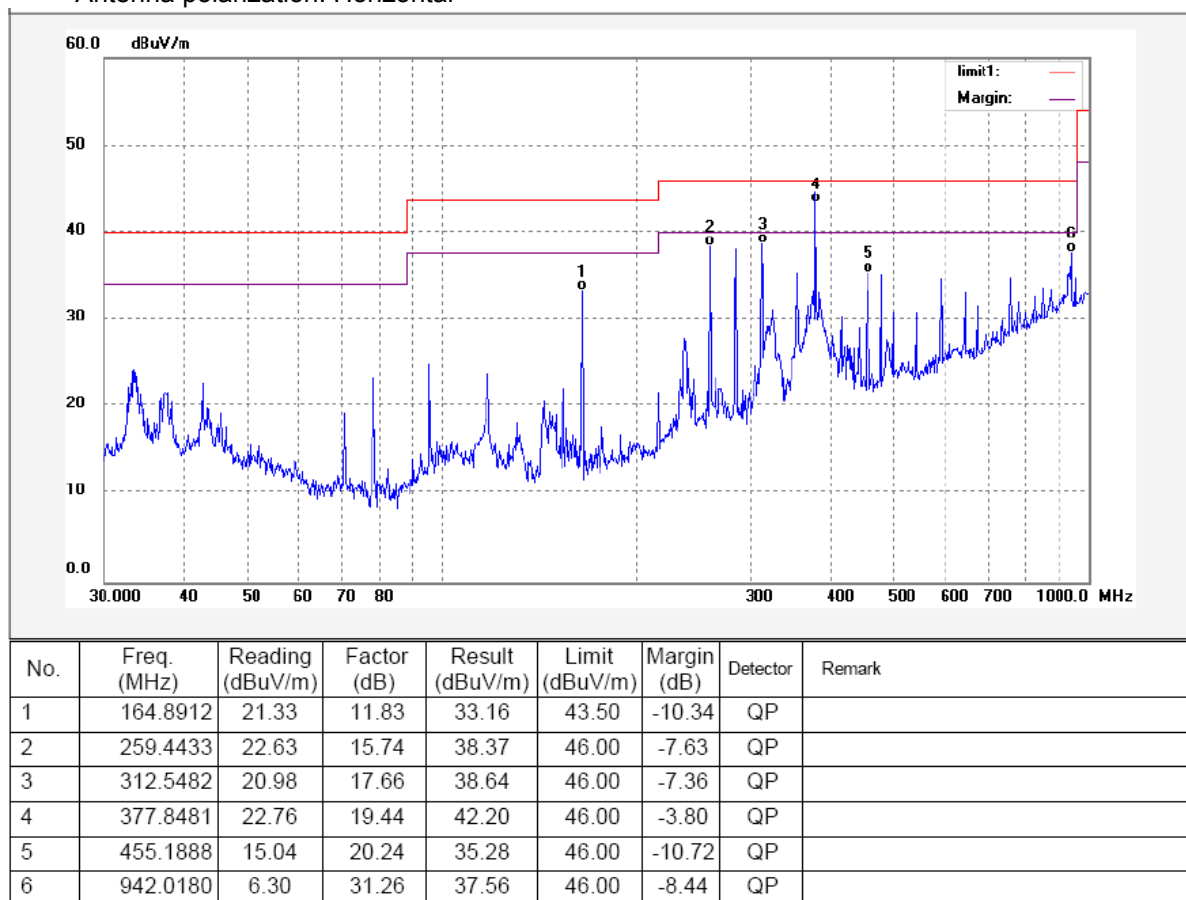
Remark: the EUT was pretested at the highest, middle and lowest channel, and the worst case was the lowest Channel, so the data show was the lowest channel only.

Test Mode: Transmitting mode(5dBi antenna with 9m cable)

Test Specification: Vertical

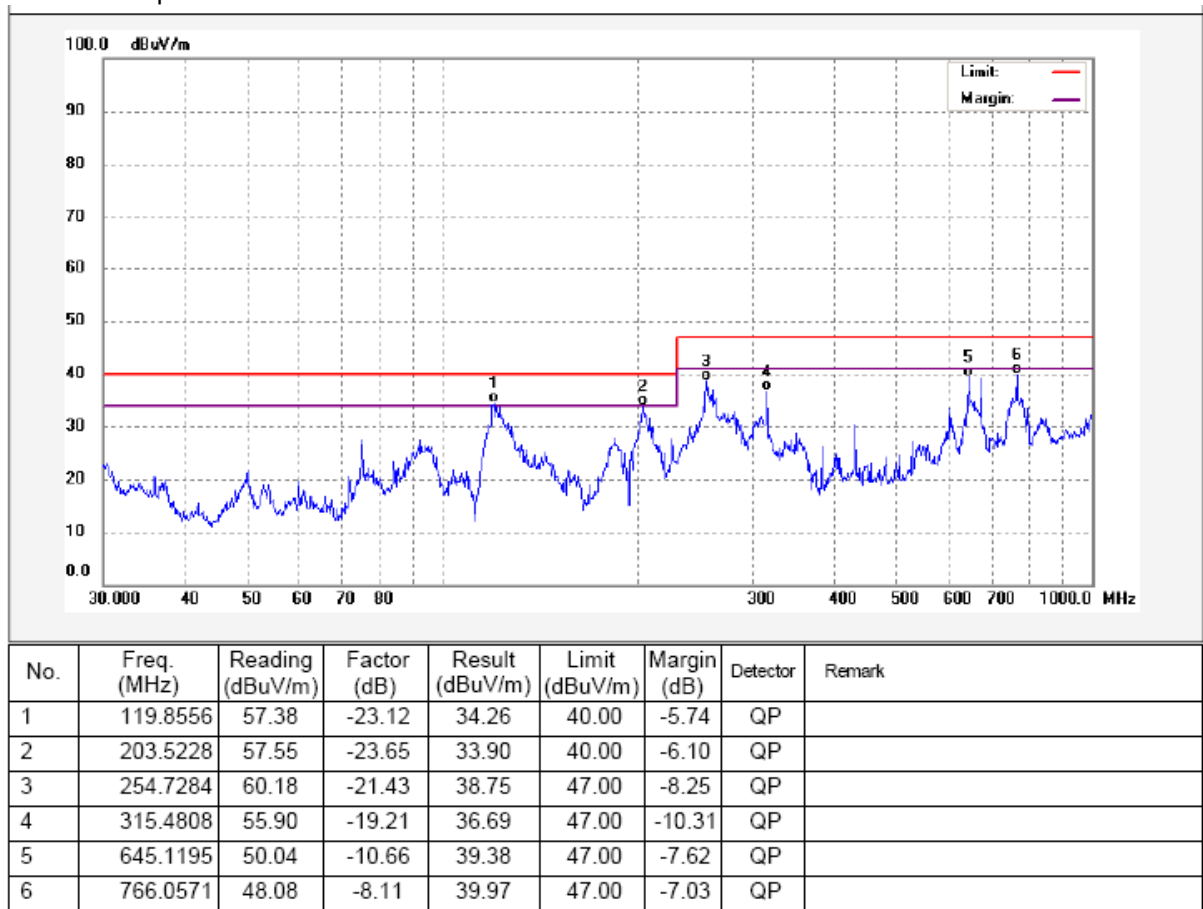


Antenna polarization: Horizontal

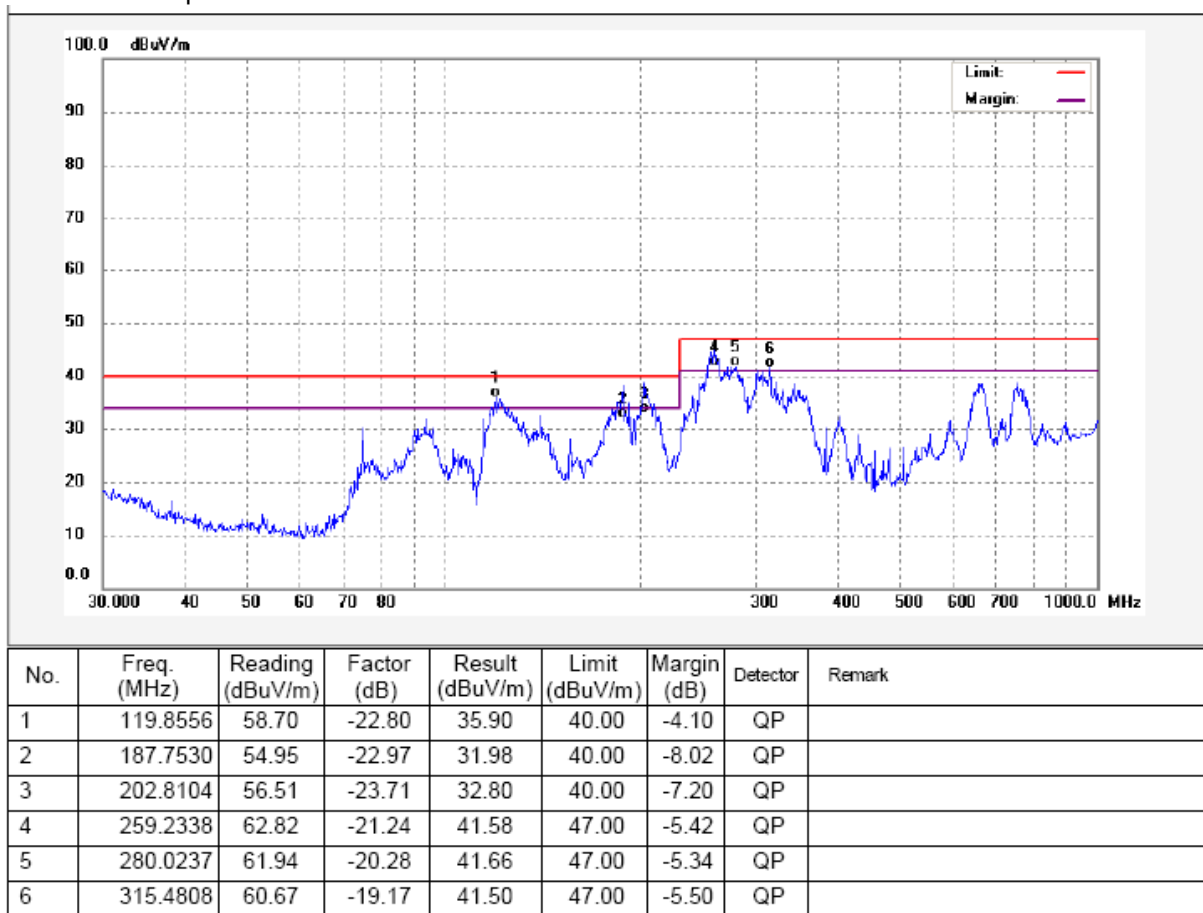


Test Mode: Transmitting mode(5dBi antenna with 3m cable)

Test Specification: Vertical

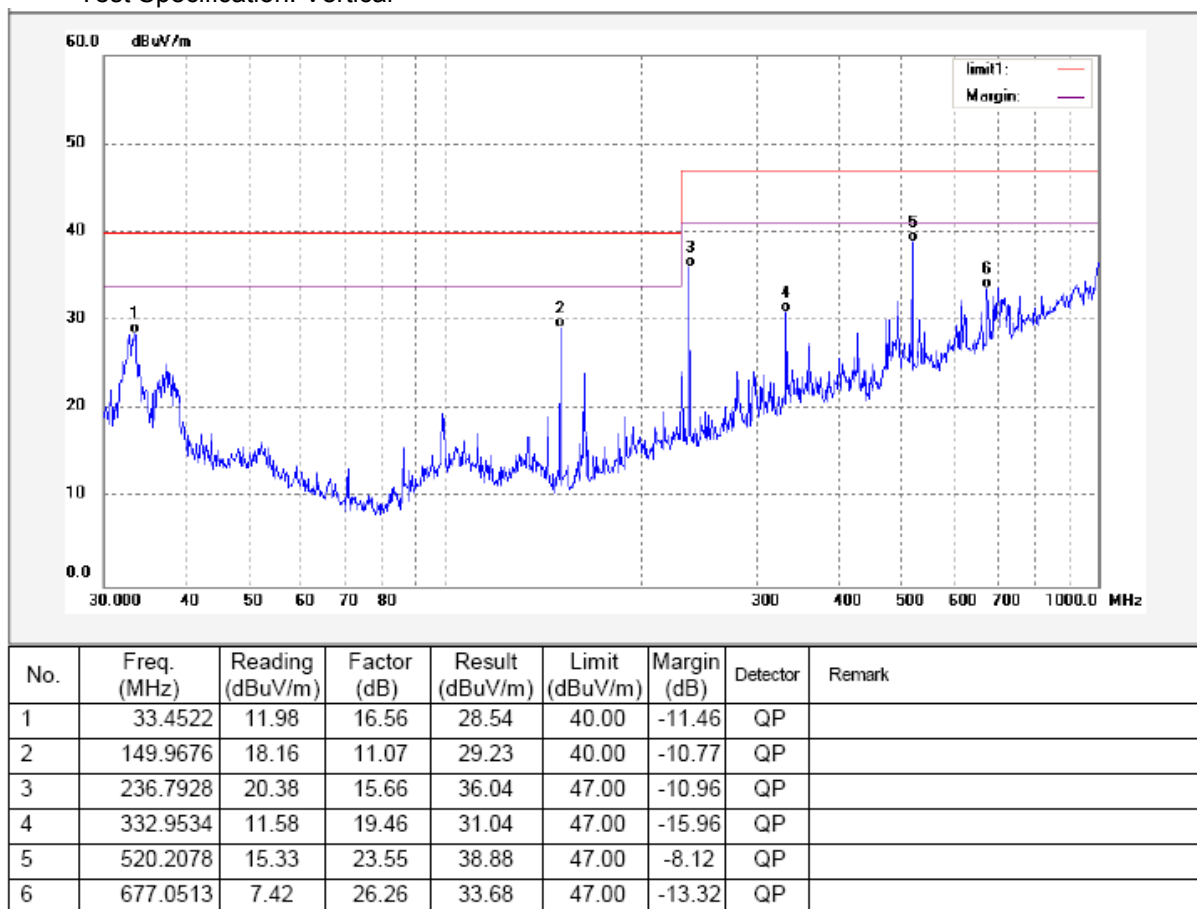


Antenna polarization: Horizontal

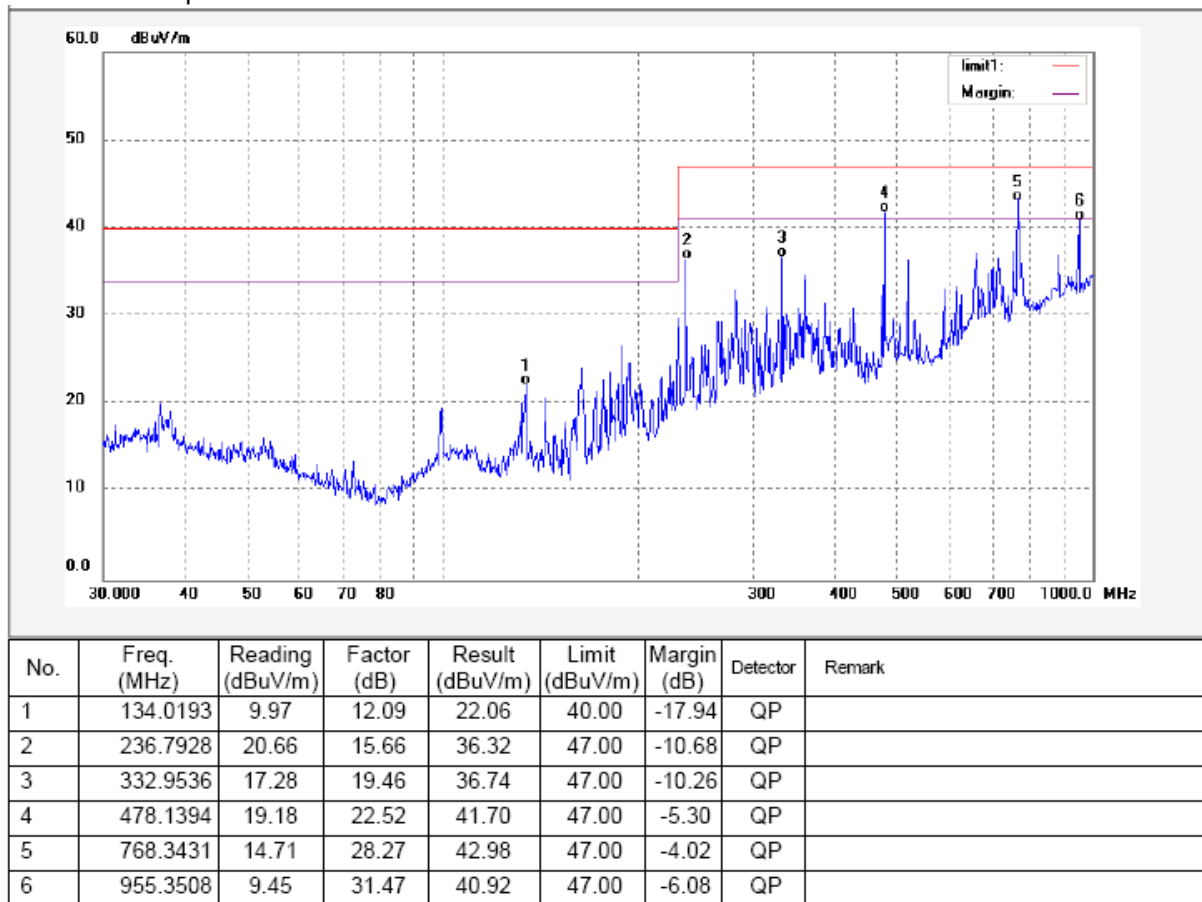


Test Mode: Transmitting mode(3dBi antenna)

Test Specification: Vertical



Antenna polarization: Horizontal



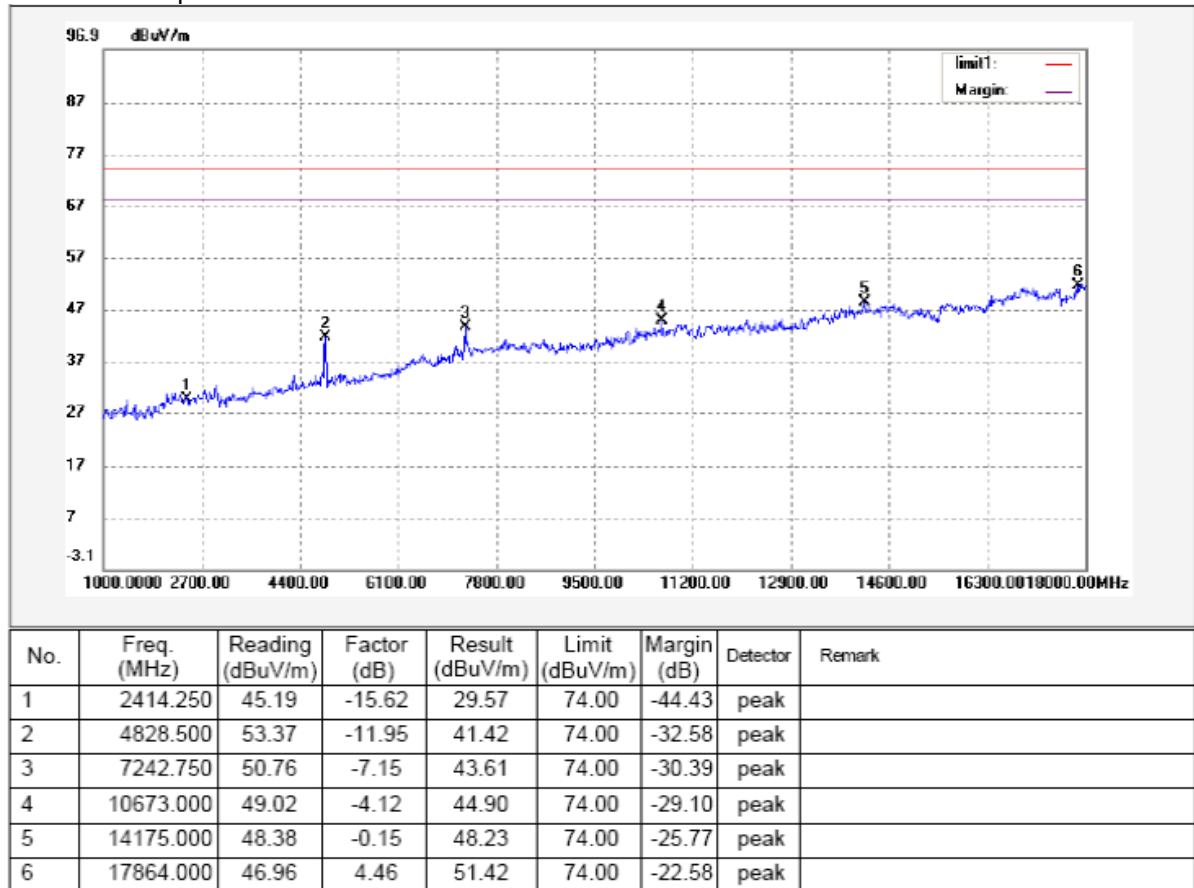
Test Frequency : 1GHz-18GHz (Remark: During testing with the 2.4GHz filter)

Test Mode: recording mode(5dBi antenna with 9m cable)

Test mode: Continuously Transmit

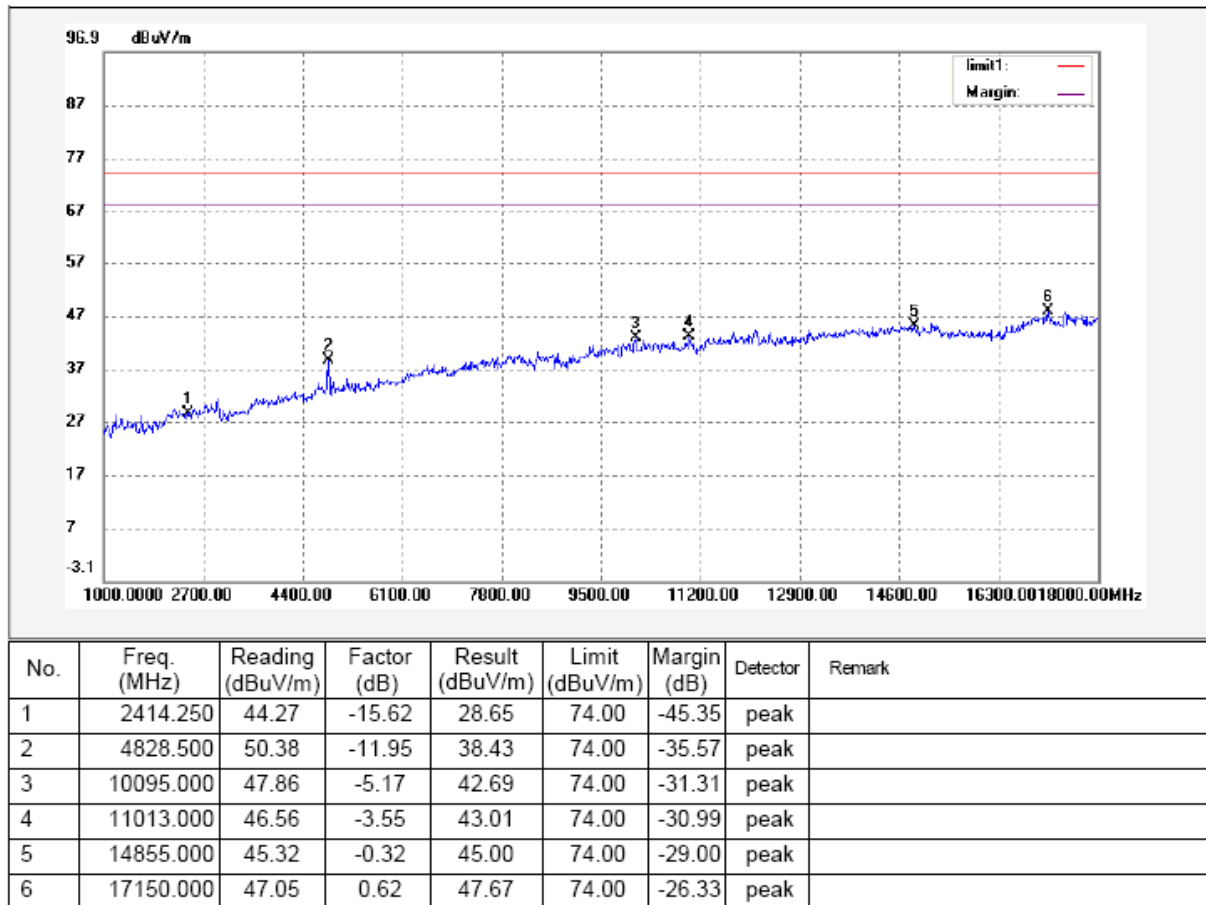
Modulation: Test Channel: 2414.25MHz

Antenna polarization: Vertical



Remark:the marker 1 is the fundamental

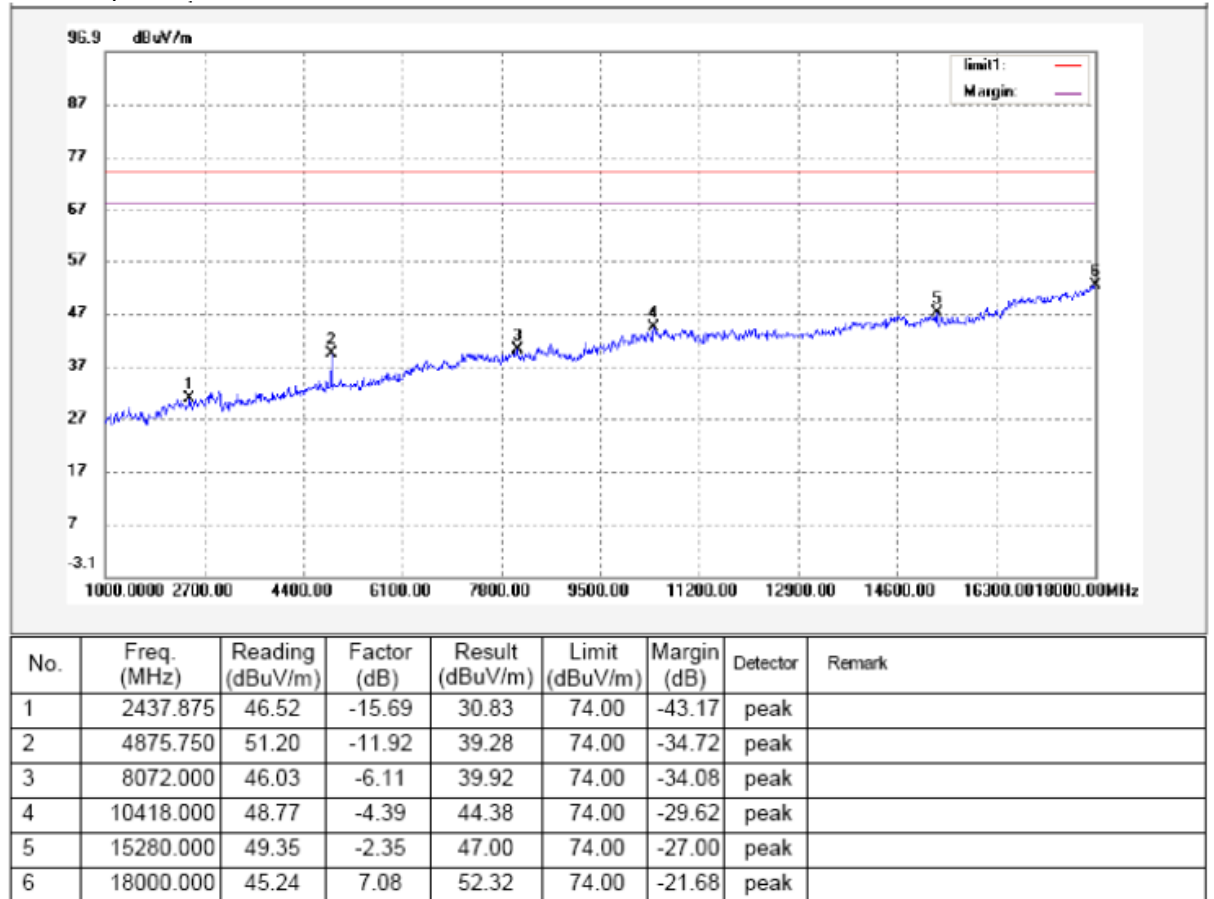
Antenna polarization: Horizontal



Remark: the marker 1 is the fundamental

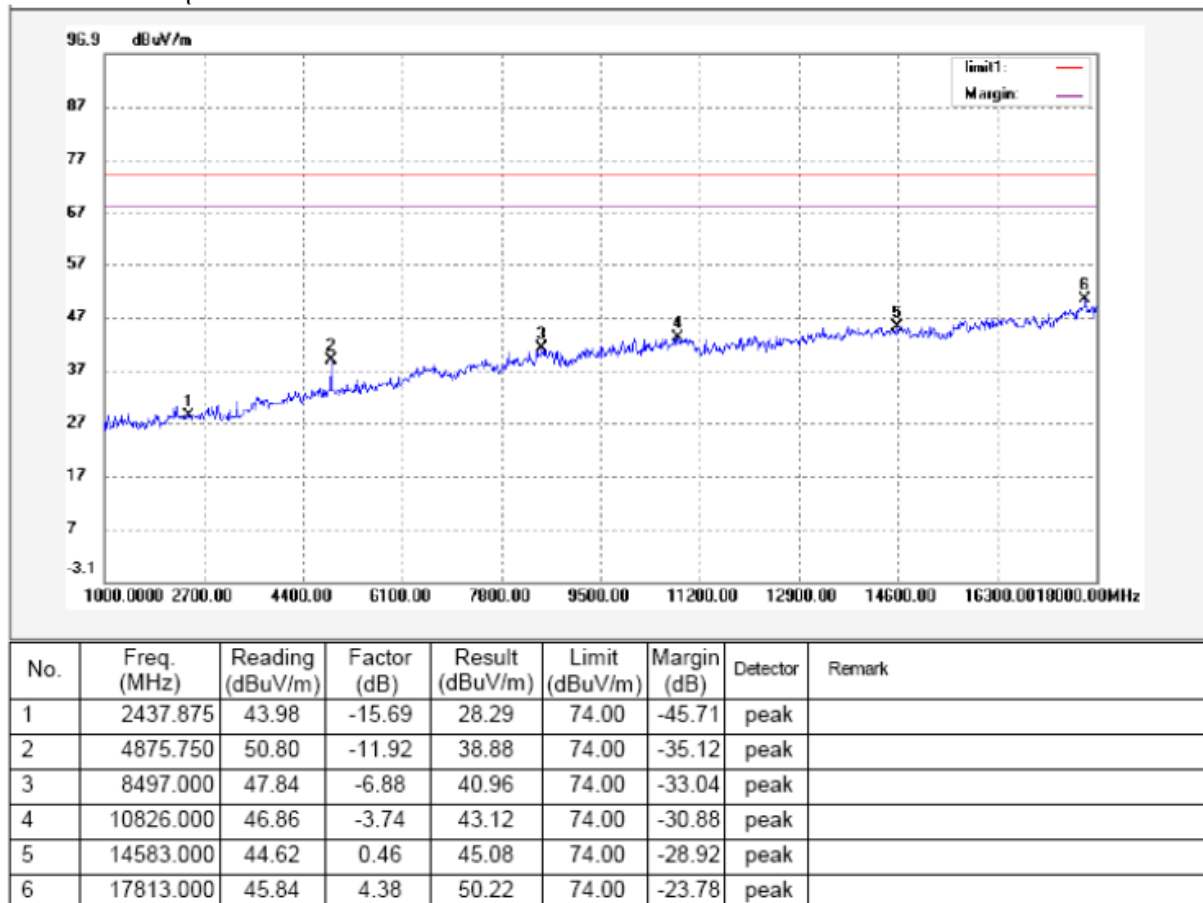
Modulation: Test Channel: 2437.875MHz

Antenna polarization: Vertical



Remark:the marker 1 is the fundamental

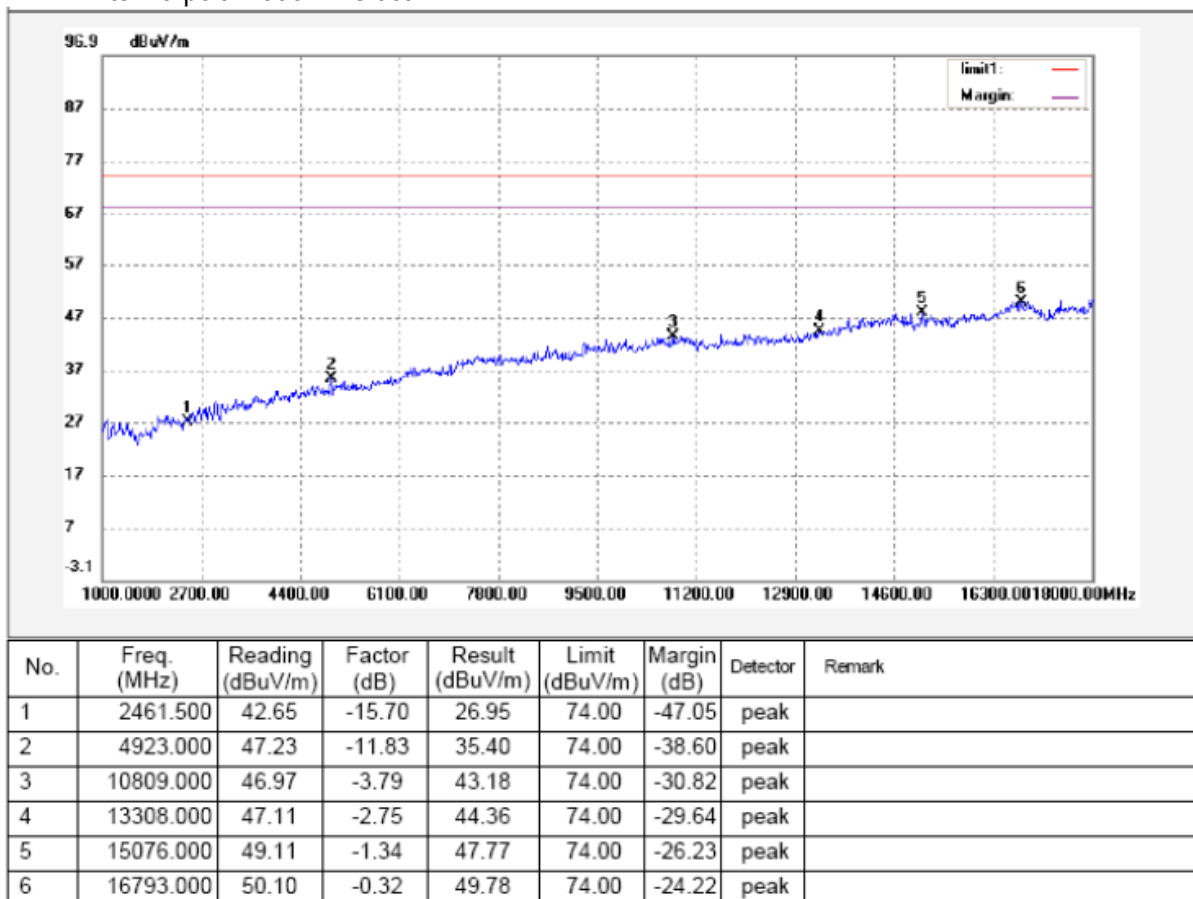
Antenna polarization: Horizontal



Remark:the marker 1 is the fundamental

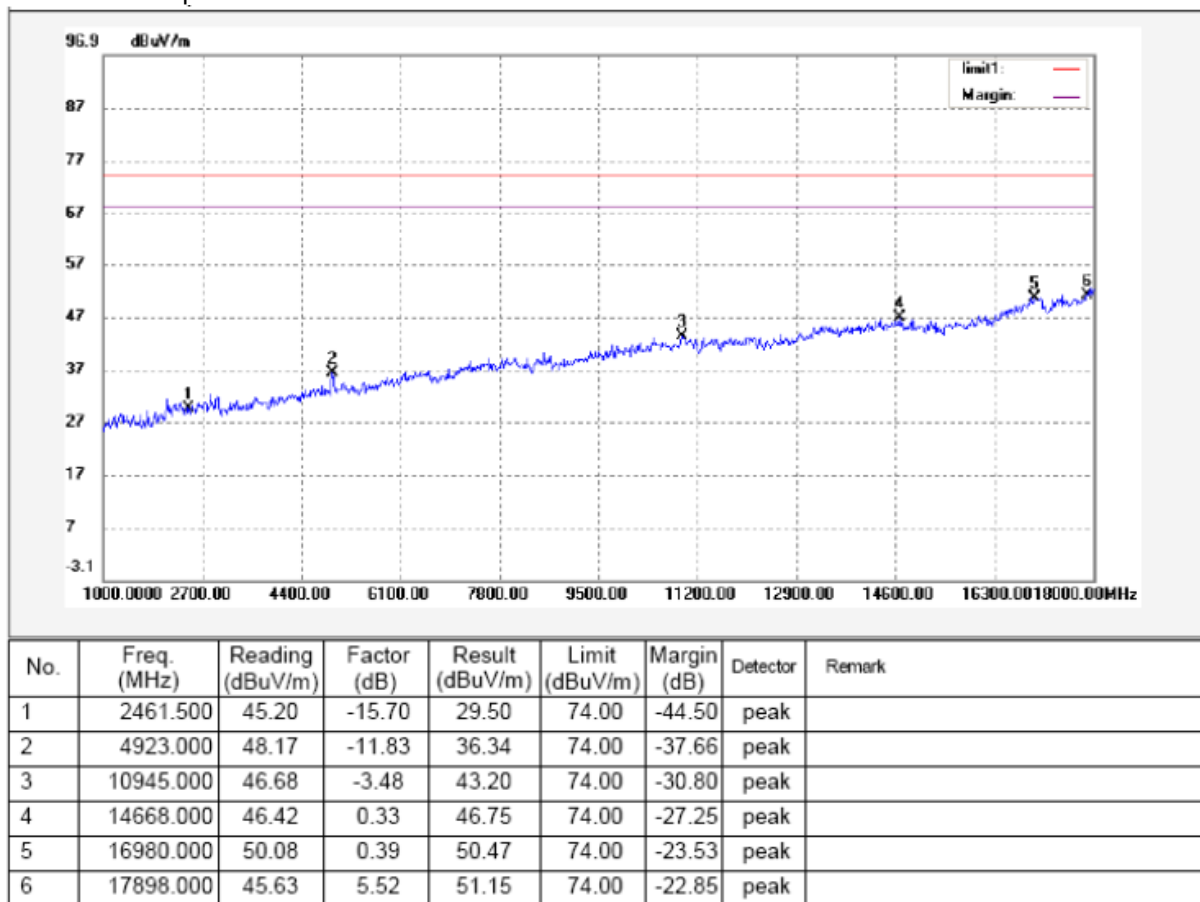
Modulation: Test Channel: 2461.5MHz

Antenna polarization: Vertical



Remark: the marker 1 is the fundamental

Antenna polarization: Horizontal



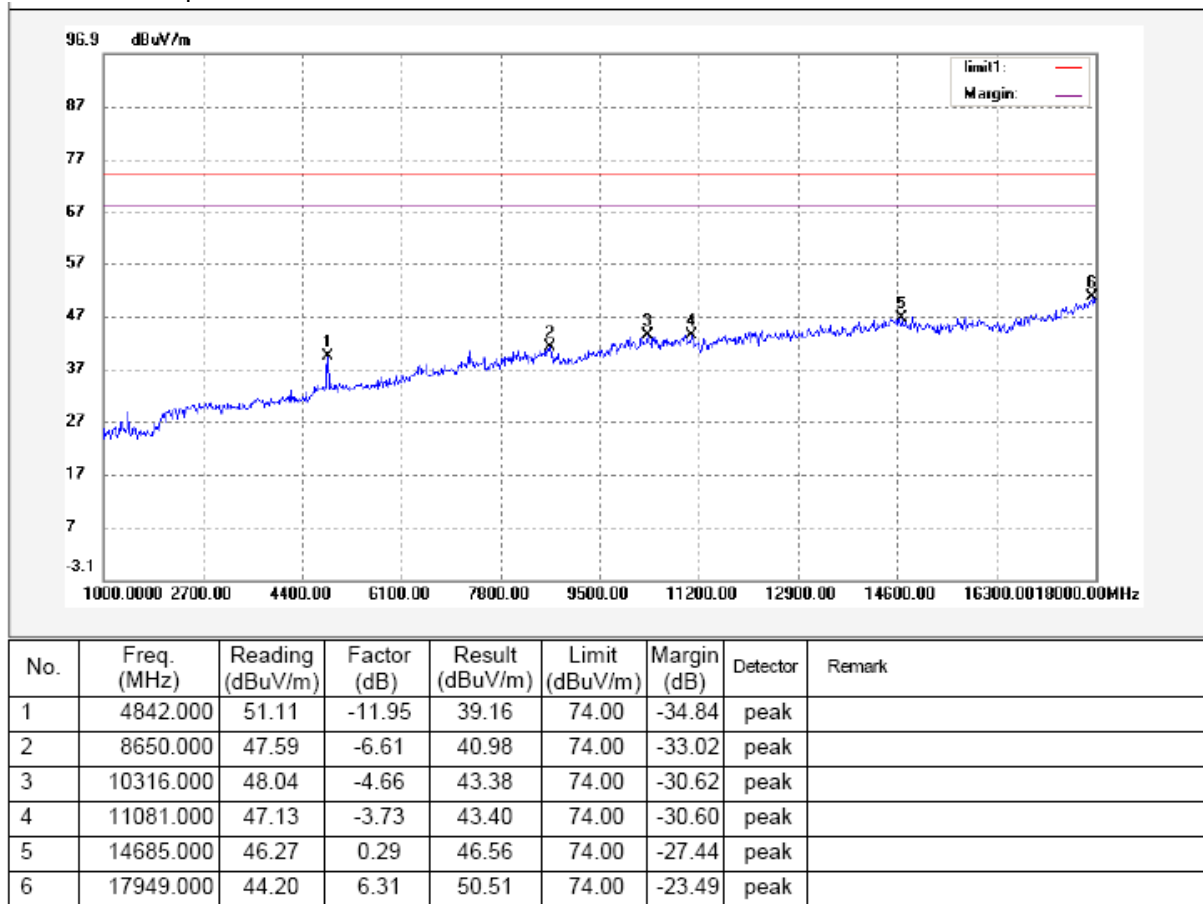
Remark: the marker 1 is the fundamental

Test Mode: recording mode(5dBi antenna with 3m cable)

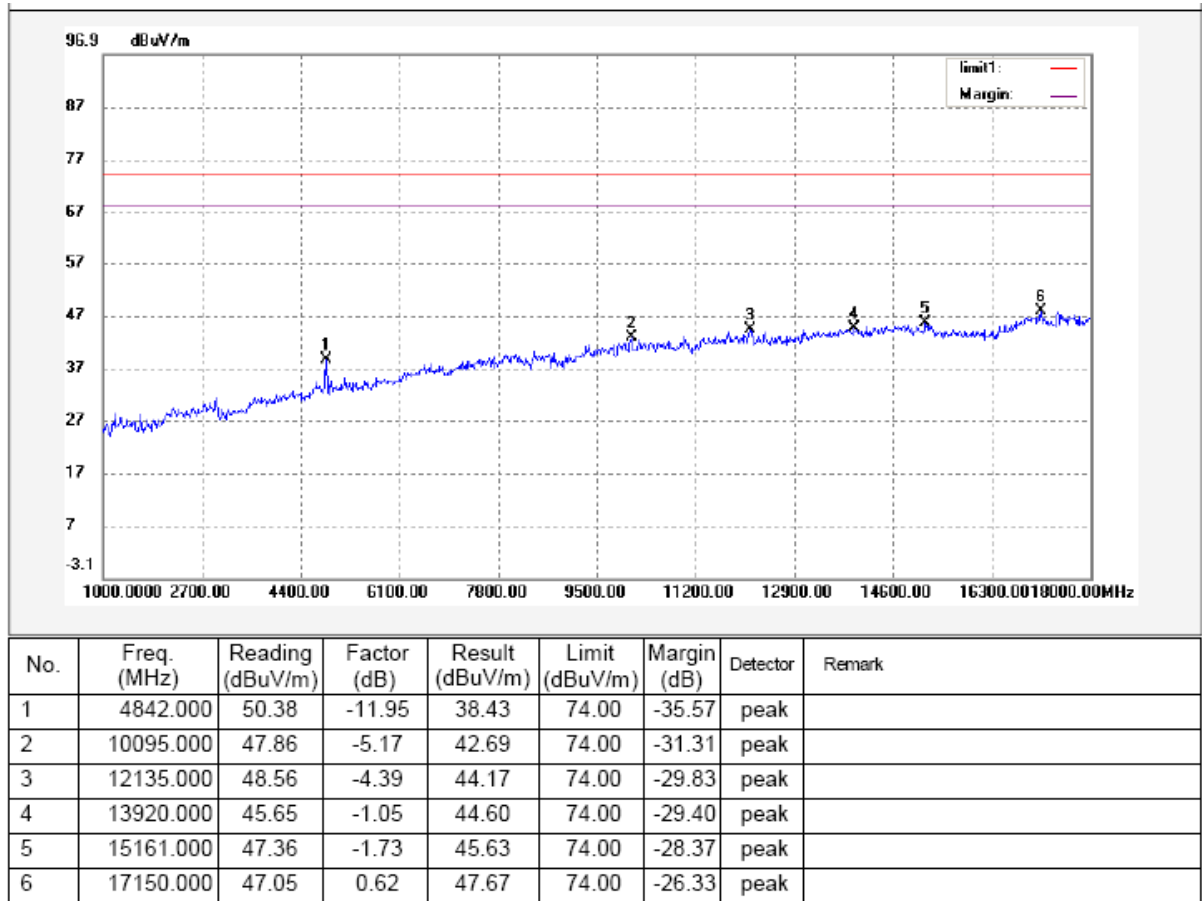
Test mode: Continuously Transmit

Modulation: Test Channel: 2414.25MHz

Antenna polarization: Vertical

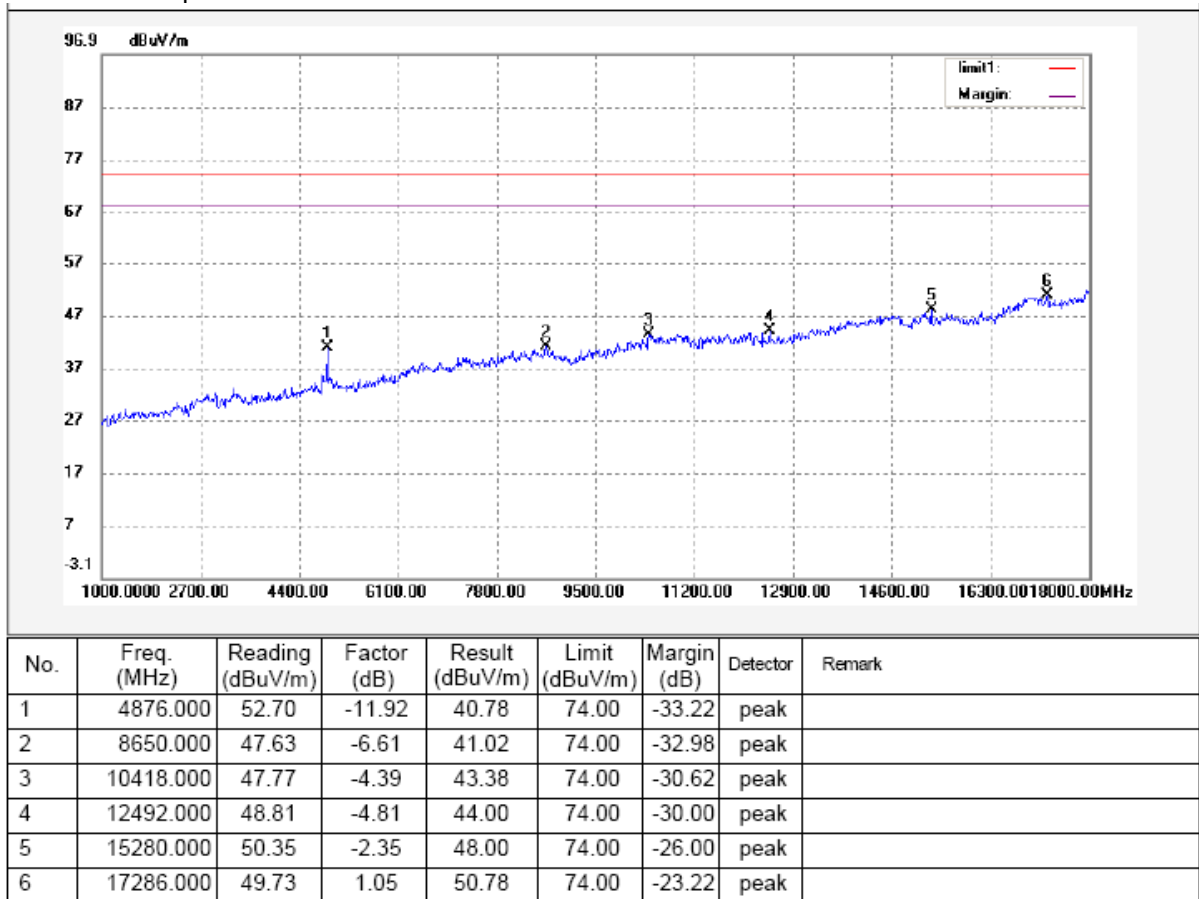


Antenna polarization: Horizontal

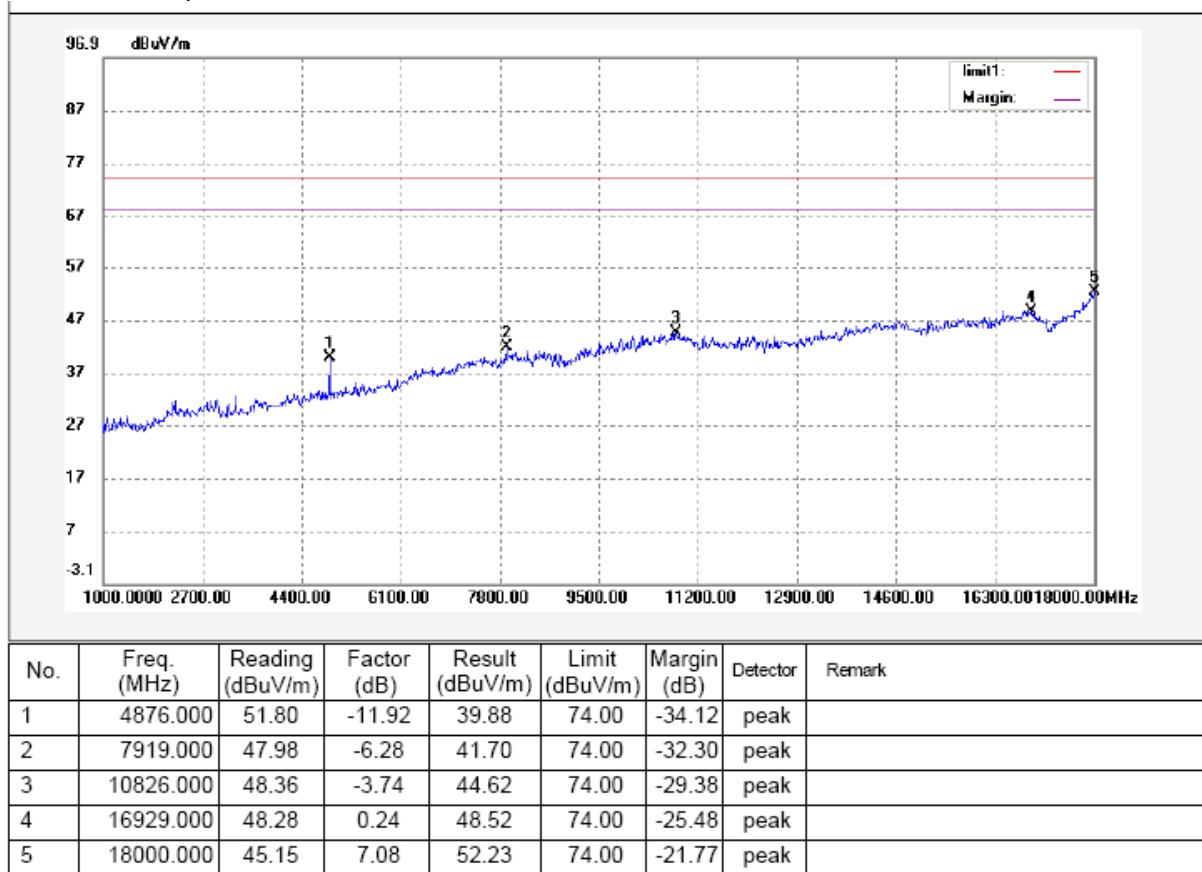


Modulation: Test Channel: 2437.875MHz

Antenna polarization: Vertical

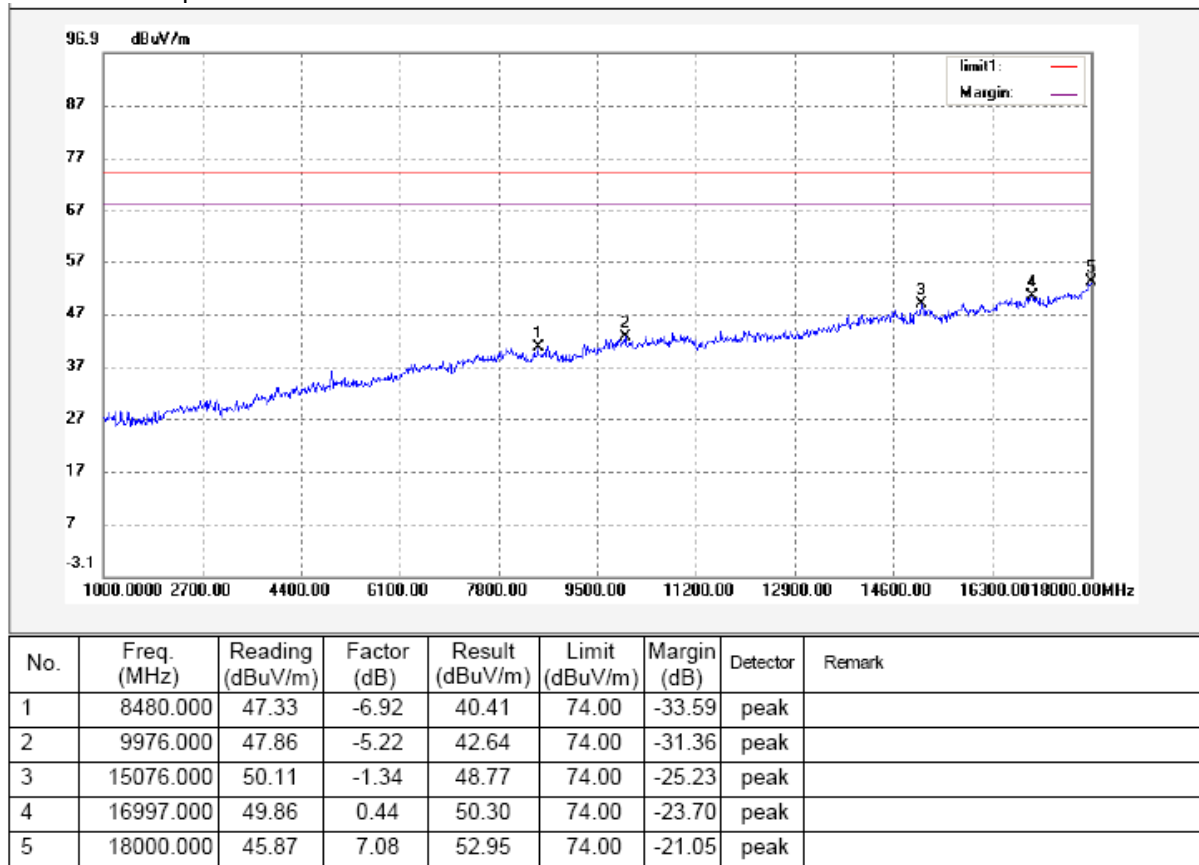


Antenna polarization: Horizontal

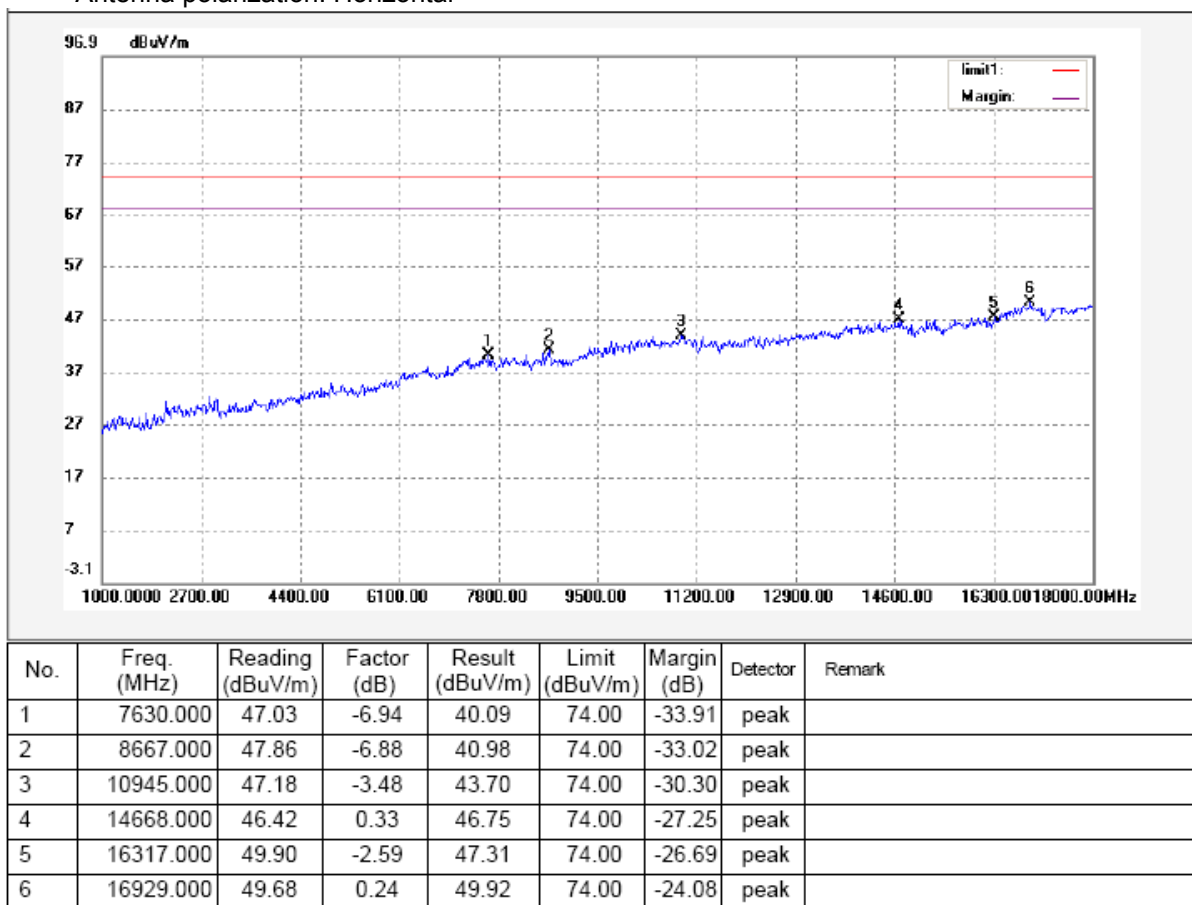


Modulation: Test Channel: 2461MHz

Antenna polarization: Vertical



Antenna polarization: Horizontal

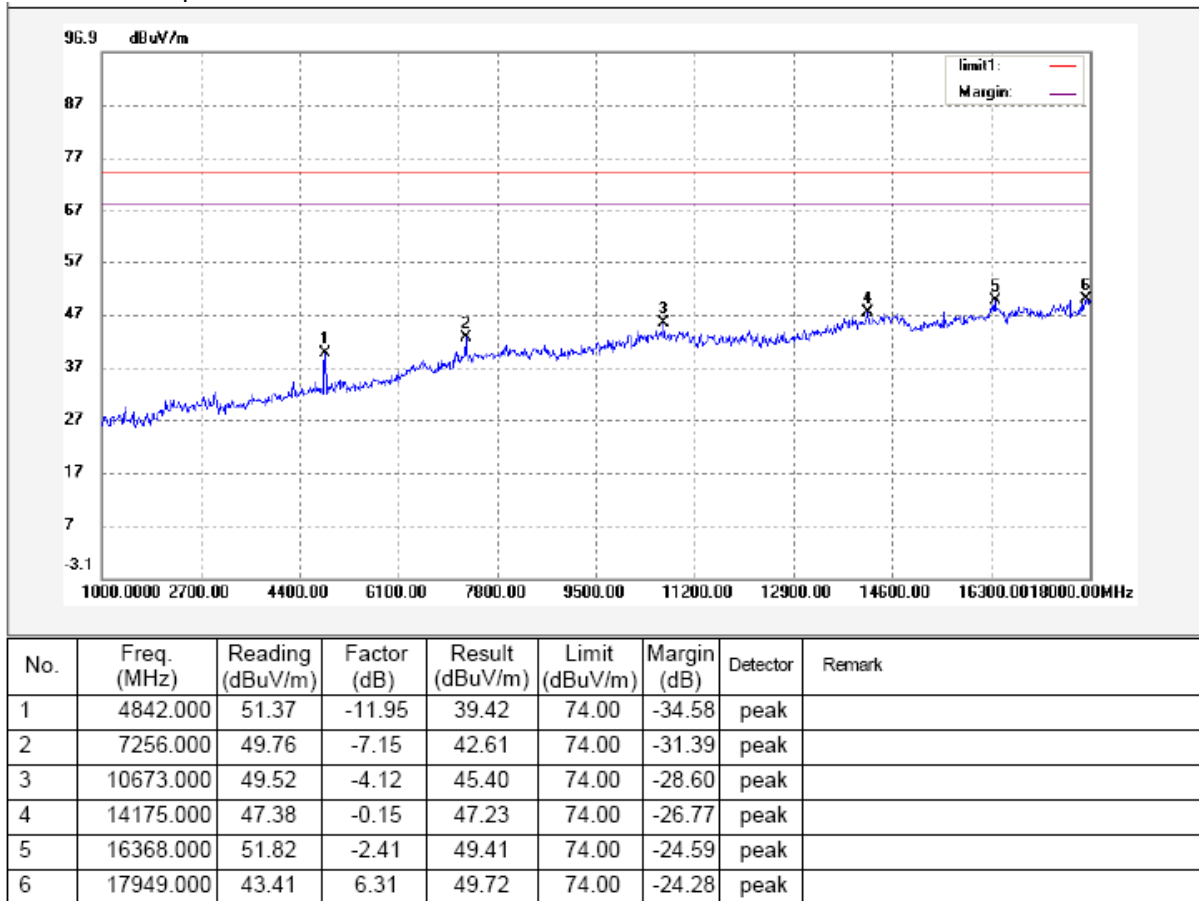


Test Mode: recording mode(3dBi antenna)

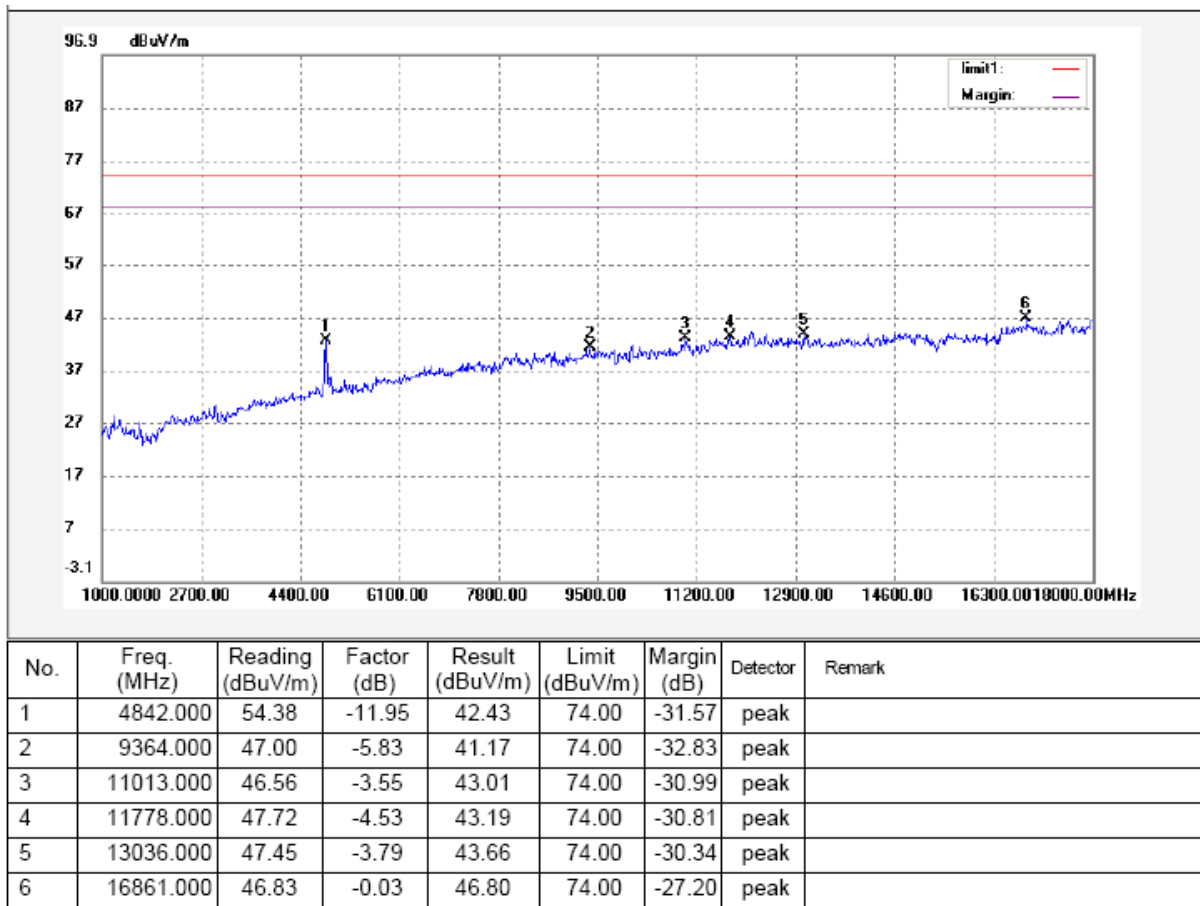
Test mode: Continuously Transmit

Modulation: Test Channel: 2414.25MHz

Antenna polarization: Vertical

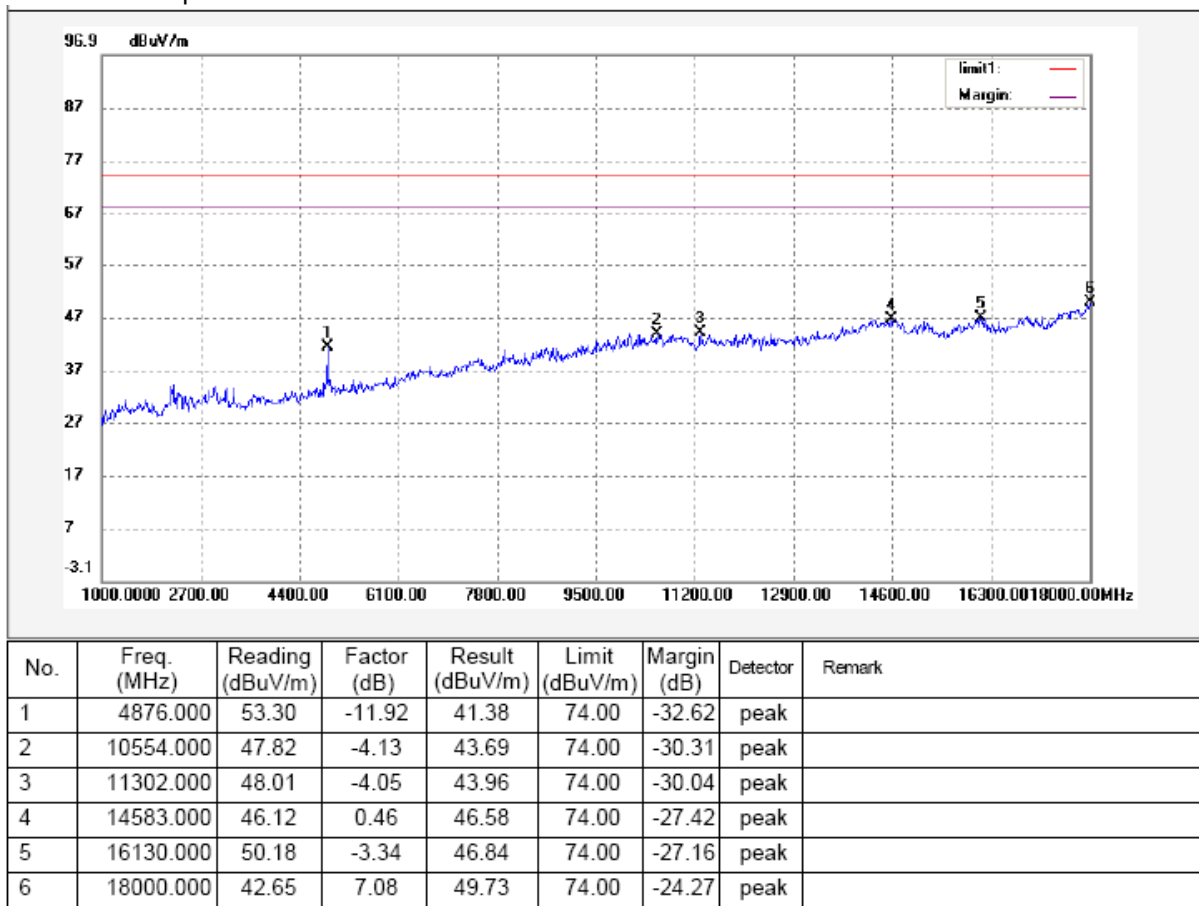


Antenna polarization: Horizontal

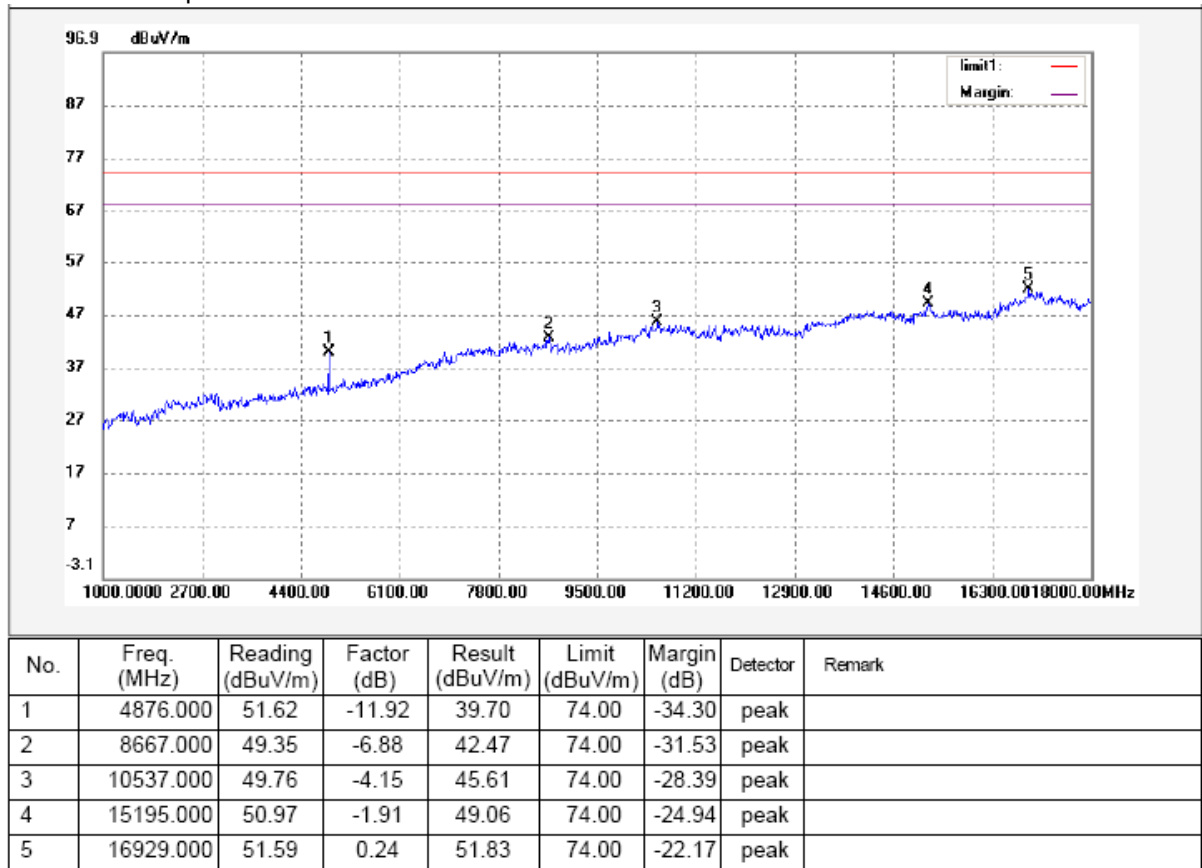


Modulation: Test Channel: 2437.875MHz

Antenna polarization: Vertical

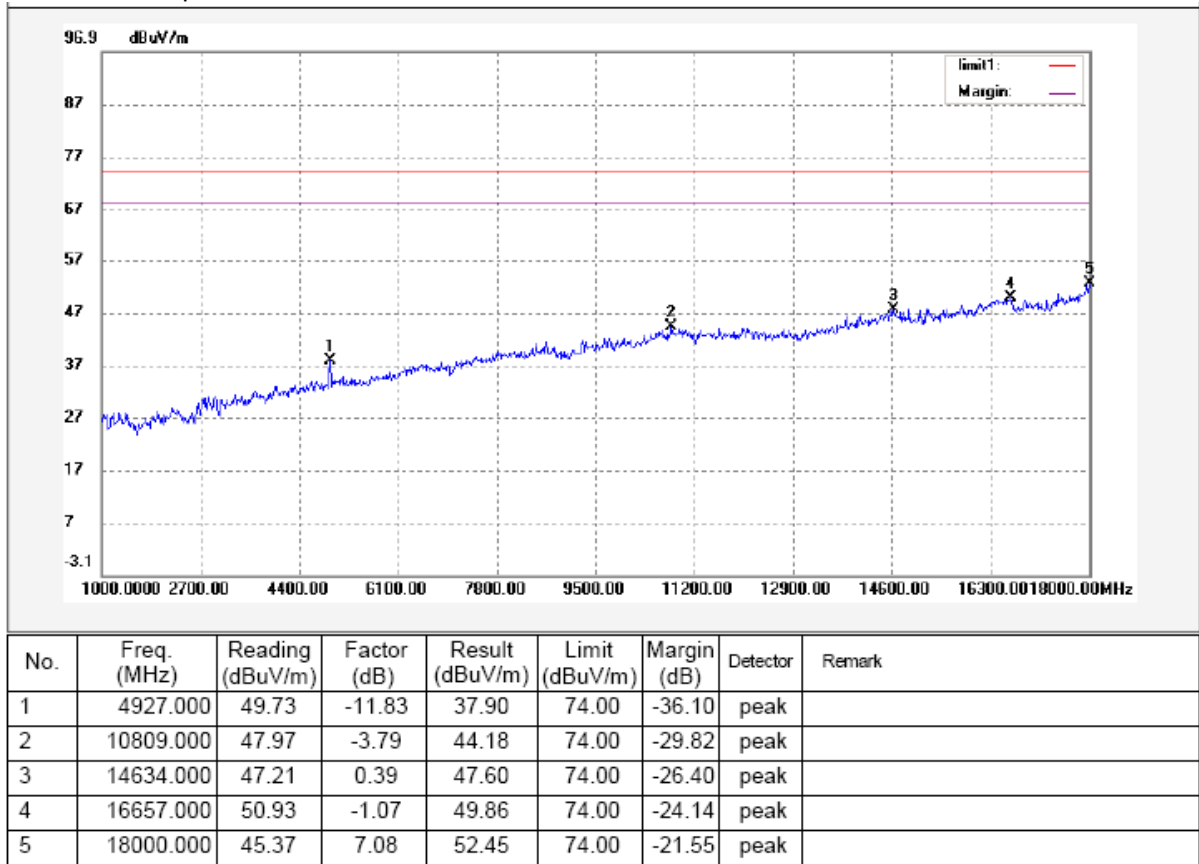


Antenna polarization: Horizontal

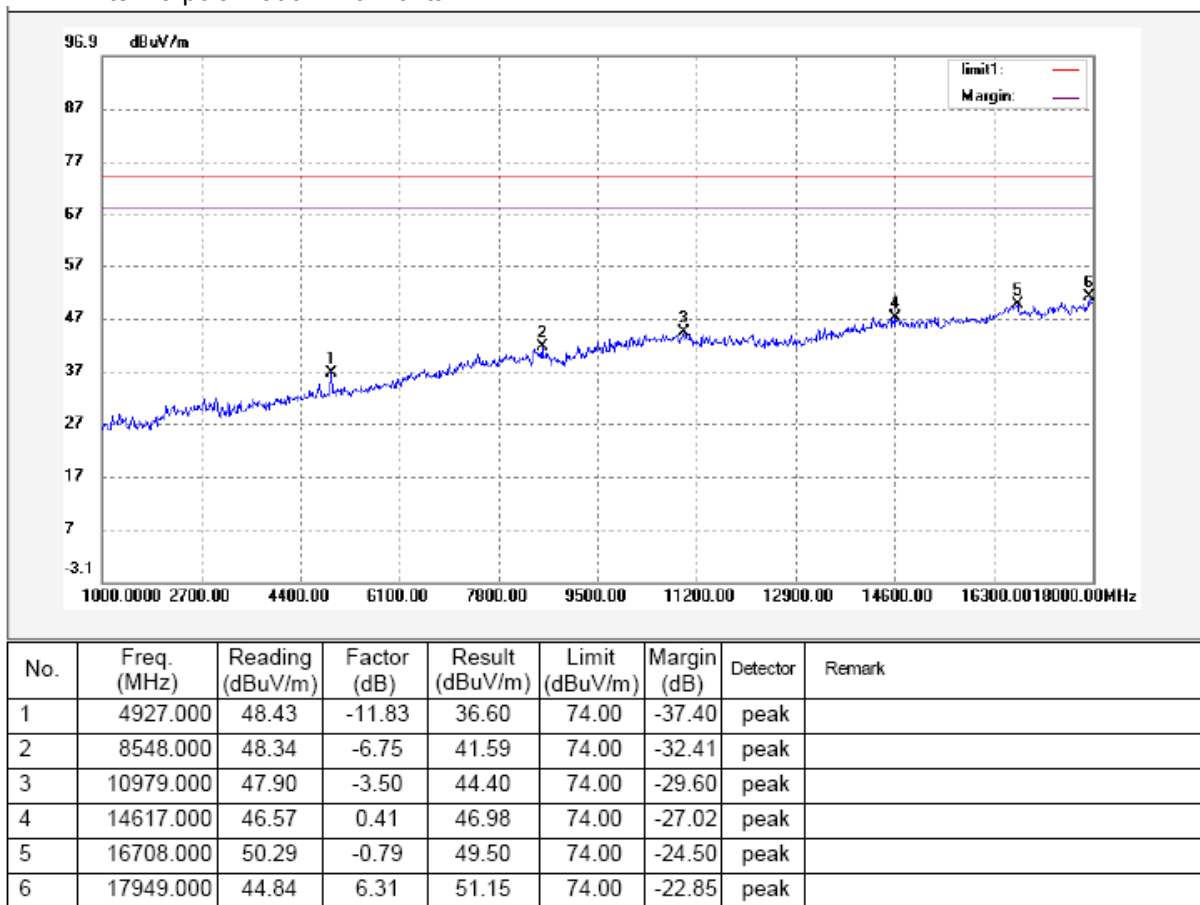


Modulation: Test Channel: 2461MHz

Antenna polarization: Vertical



Antenna polarization: Horizontal



Test Frequency: Above 18GHz(Remark: During testing with the 2.4GHz filter)

The measurements were more than 20 dB below the limit. The channels 2414.25MHz, 2437.875MHz, 2461.5MHz were tested. test Channel M MHz data was the worse, so the worst mode were shown as follow.

Test Frequency Range: 18GHz ~ 25GHz

Test Mode:Continuous Transmitting(5dBi antenna with 9m cable)

And the below is the Fundamental and Harmonic

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
Middle frequency							
19503.00	PK	Vertical	51.79	74.00	-22.21	1.5	190
21940.88	PK	Vertical	50.62	74.00	-23.38	1.7	100
19503.00	PK	Horizontal	37.91	74.00	-36.09	1.7	60
21940.87	PK	Horizontal	39.26	74.00	-34.74	1.0	150

Test Mode:Continuous Transmitting(5dBi antenna with 3m cable)

And the below is the Fundamental and Harmonic

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
Middle frequency							
19503.00	PK	Vertical	51.07	74	-22.93	1.1	143
21940.88	PK	Vertical	51.34	74	-22.66	1.3	86
19503.00	PK	Horizontal	38.89	74	-35.11	1.2	246
21940.87	PK	Horizontal	50.24	74	-23.76	1.8	154

Test Mode:Continuous Transmitting(3dBi antenna)

And the below is the Fundamental and Harmonic

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
Middle frequency							
19503.00	PK	Vertical	50.78	74	-23.22	1.3	234
21940.88	PK	Vertical	49.97	74	-24.03	1.7	218
19503.00	PK	Horizontal	38.99	74	-35.01	1.2	53
21940.87	PK	Horizontal	50.11	74	-23.89	1.2	85

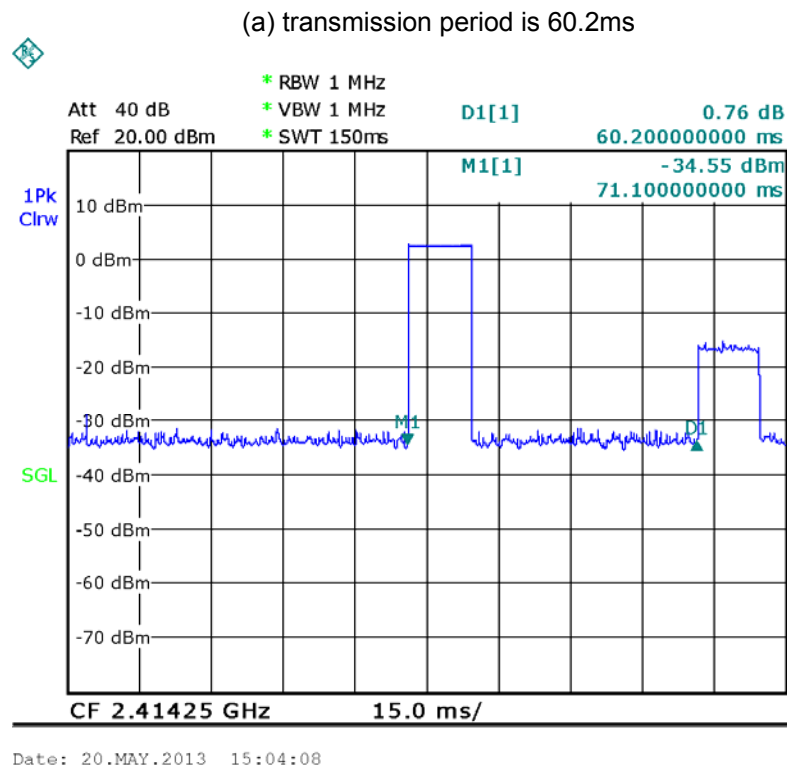
8 Duty Cycle

Test Requirement: FCC Part 15.35
 Test Method: ANSI C63.4:2003
 Test Status: TX mode.

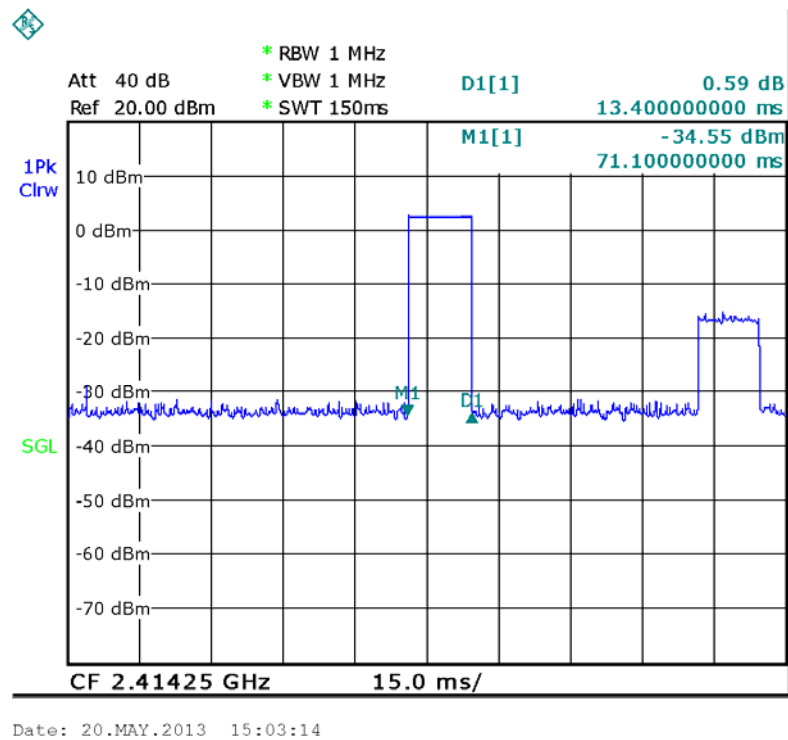
8.1 Test Procedure

1. The EUT was placed on a turntable which is 0.8m above ground plane
2. Set EUT as normal working mode
3. Set SPA center frequency = fundamental frequency, RBW = 100 kHz, VBW = 100 kHz, Span = 0 Hz, Adjacent sweep time.

8.2 Test Result



(b) Single pulse time is 13.4ms



The EUT is auto. operation for transmitter, it is declared by the manufacturer as a duty cycle ratio of less than 100%.

The EUT's work time : T_{on} = pulse time = 13.4 ms

The EUT's work period : $T = T_{ON} + T_{OFF}$ = transmission period = 60.2 ms

The EUT's duty cycle : $D = T_{on} / T = 13.4 / 60.2 * 100\% = 22.26\%$

Duty Cycle Correction Factor(dB) = $20 * \log_{10}(\text{Duty Cycle}) = 20 * \log_{10}(22.26\%)$

= -13dB

9 Band Edge Measurement

Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	DA 00-705
Measurement Distance:	3m
Limit:	40.0 dBuV/m between 30MHz & 88MHz; 43.5 dBuV/m between 88MHz & 216MHz; 46.0 dBuV/m between 216MHz & 960MHz; 54.0 dBuV/m above 960MHz. 74.0 dBuV/m for peak above 1GHz 54.0 dBuV/m for AVG above 1GHz
Detector:	For Peak value: RBW = 1 MHz for $f \geq 1$ GHz VBW \geq RBW; Sweep = auto Detector function = peak Trace = max hold For AVG value: RBW = 1 MHz for $f \geq 1$ GHz VBW = 10Hz; Sweep = auto Detector function = AVG Trace = max hold

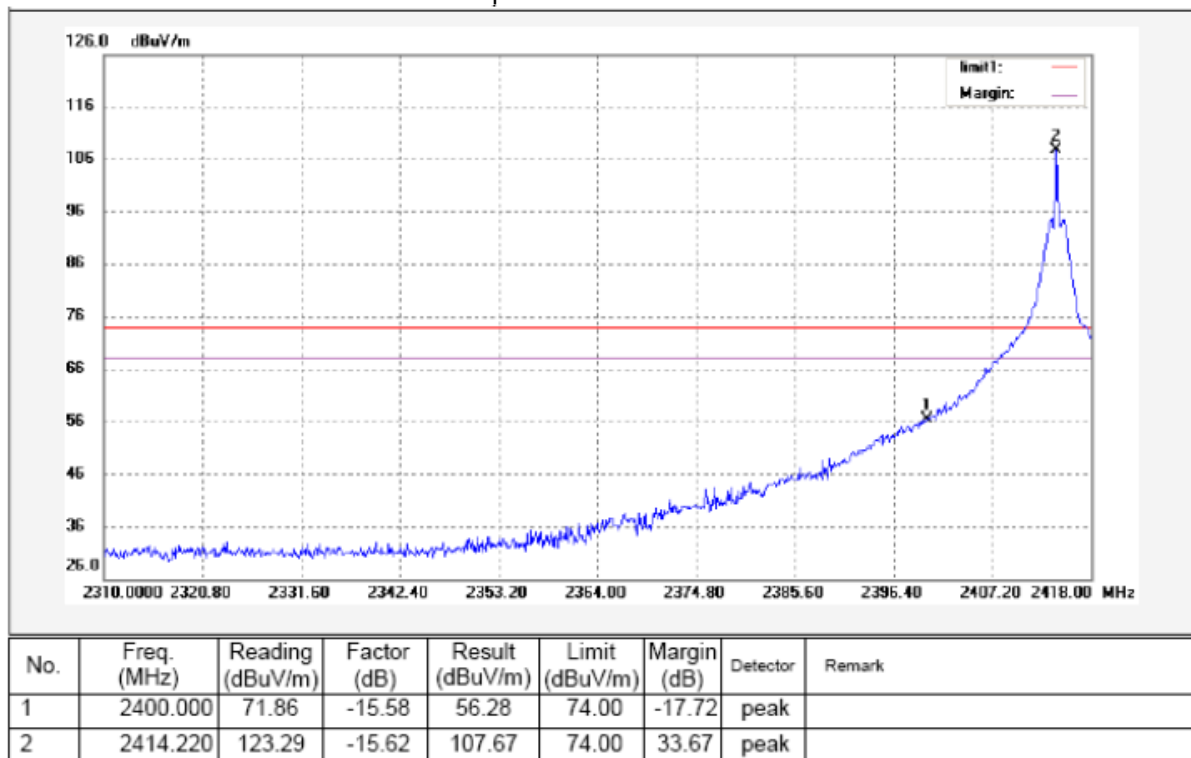
9.1 Test Result(Continuous transmitting)

5dBi antenna with 9m cable:

Low Channel – Peak

Test frequency range:from 2.310 GHz to 2.418GHz

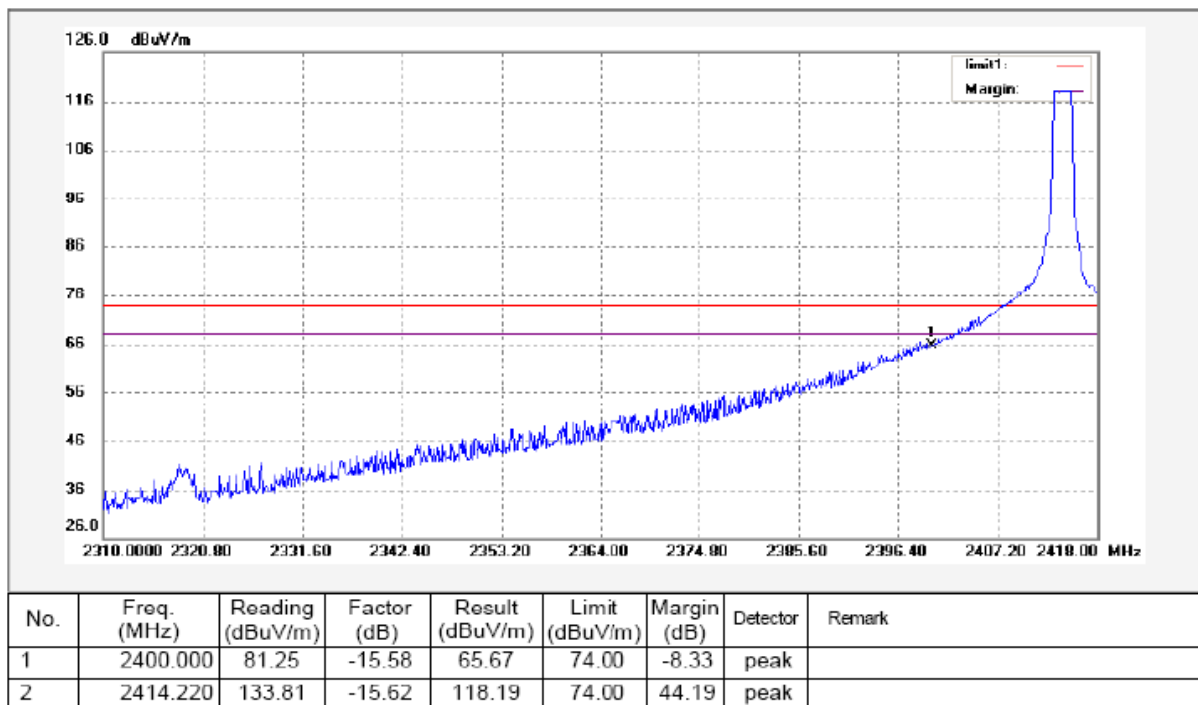
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	43.28	54.00	-10.72	AV	
2	2414.000	-13	94.67	54.00	40.67	AV	

Remark:the marker 2 is the fundamental

Antenna polarization: Vertical

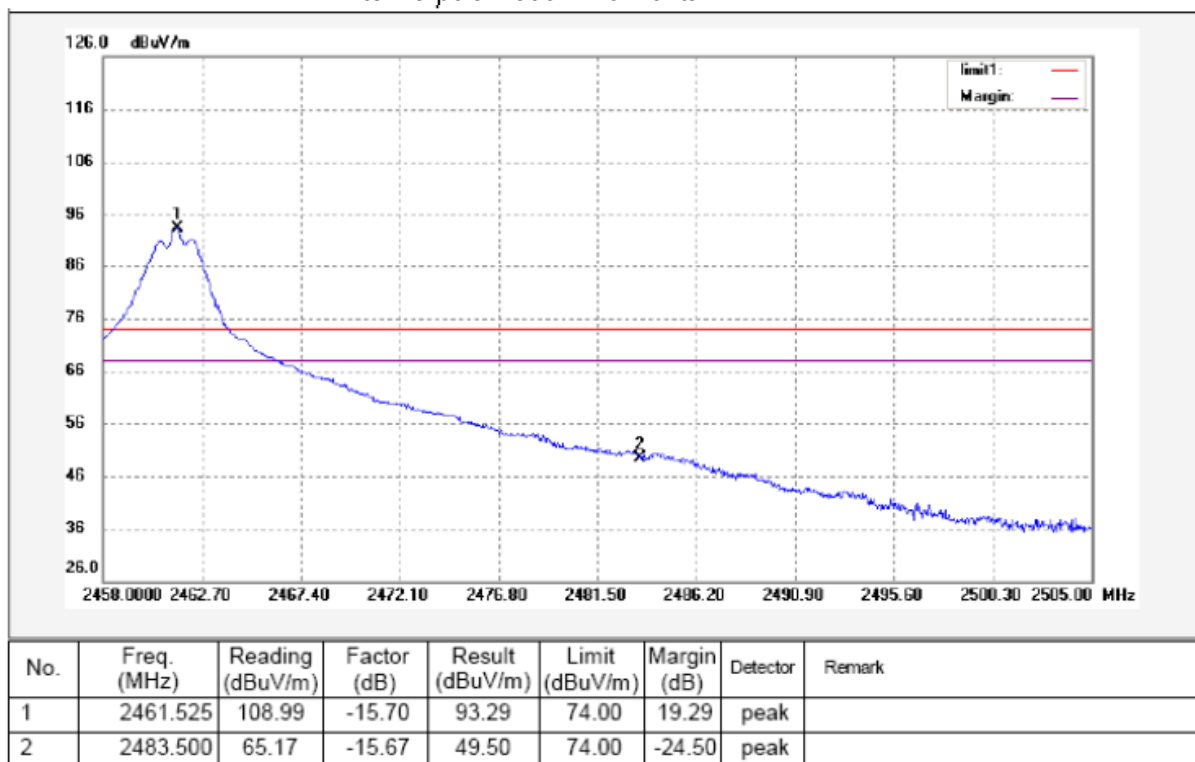


No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	52.67	54.00	-1.33	AV	
2	2414.000	-13	105.19	54.00	51.19	AV	

Remark: the marker 2 is the fundamental

Upper Channel – Peak**Test frequency range:from 2.458 GHz to 2.505 GHz**

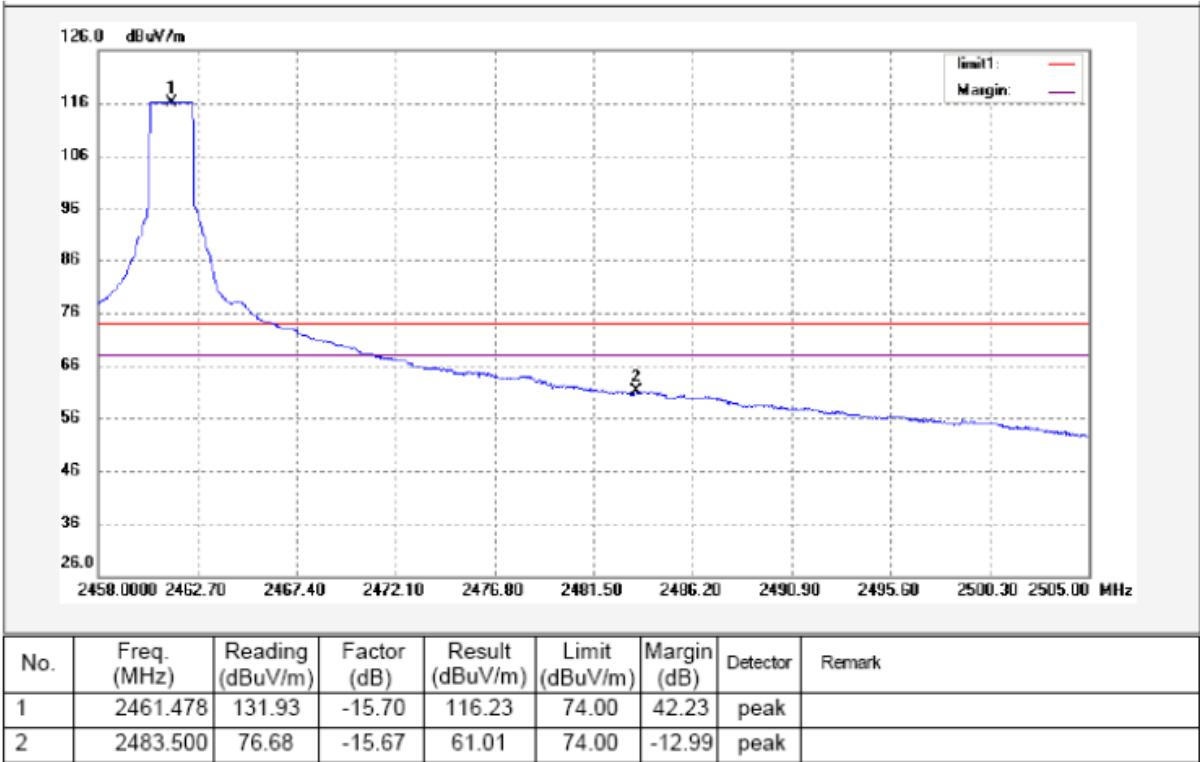
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.525	-13	80.29	54.00	26.29	AV	
2	2483.500	-13	36.5	54.00	-17.5	AV	

Remark:the marker 1 is the fundamental

Antenna polarization: Vertical



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.478	-13	103.23	54.00	49.23	AV	
2	2483.500	-13	48.01	54.00	-5.99	AV	

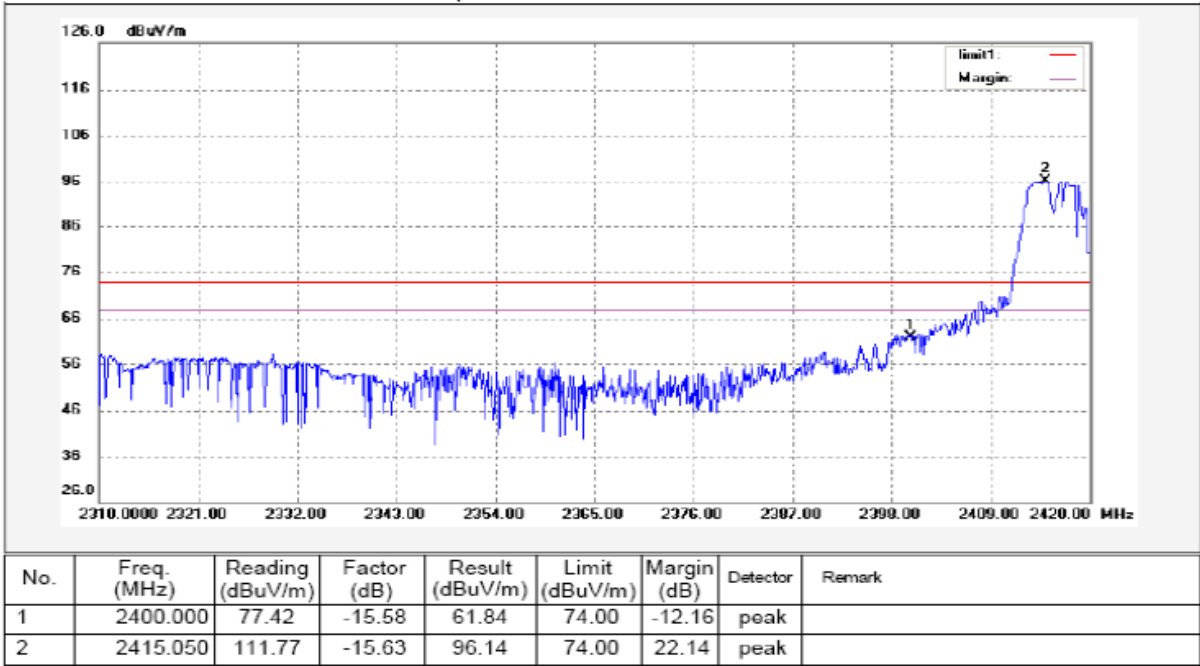
Remark:the marker 1 is the fundamental

9.2 Test Result(Hopping transmitting)

Low Channel – Peak

Test frequency range:from 2.310 GHz to 2.420GHz

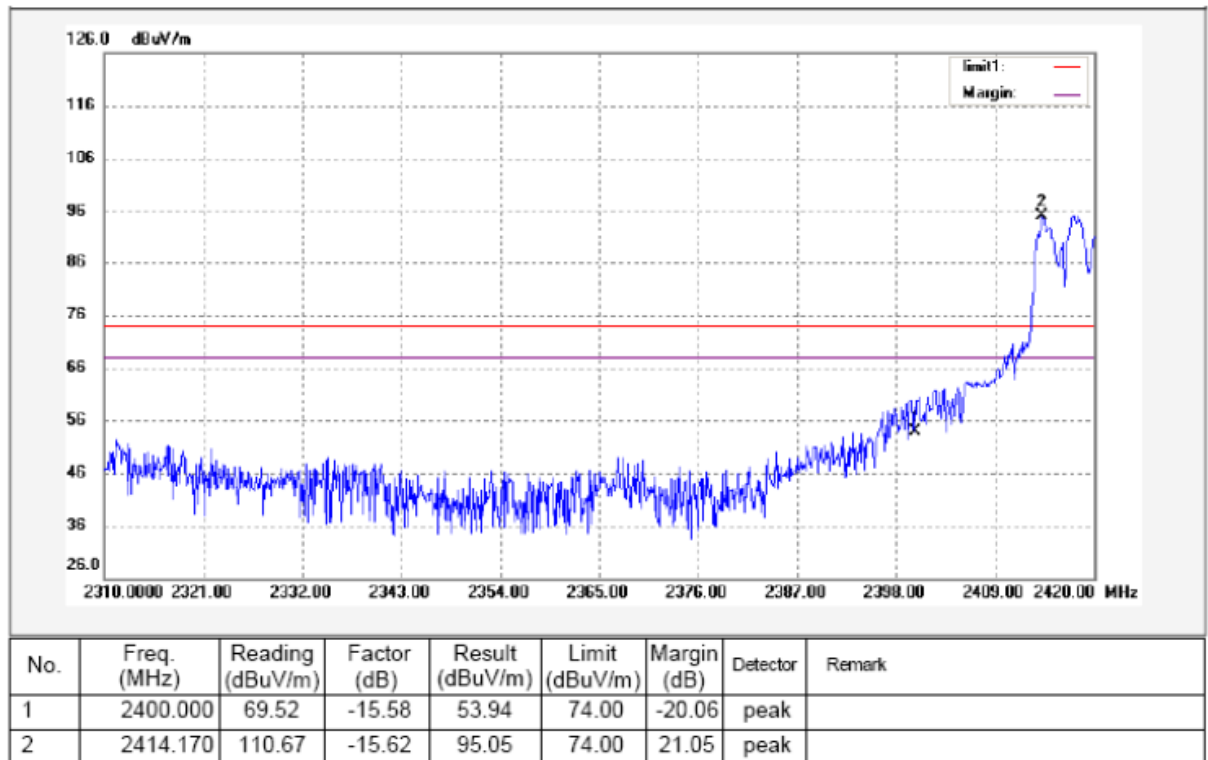
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	48.84	54.00	-5.16	AV	
2	2415.000	-13	83.14	54.00	29.14	AV	

Remark:the marker 2 is the fundamental

Antenna polarization: Vertical

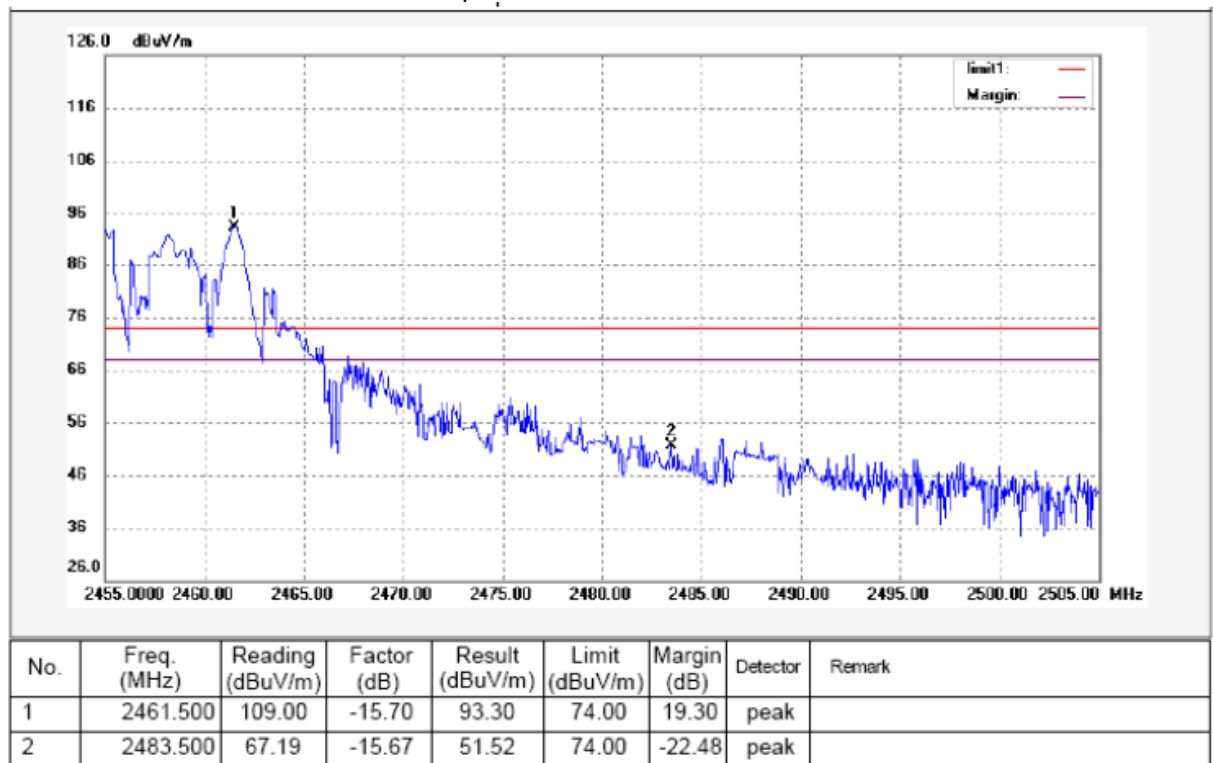


No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	40.94	54.00	-13.06	AV	
2	2414.170	-13	82.05	54.00	28.05	AV	

Remark:the marker 2 is the fundamental

Upper Channel – Peak**Test frequency range:from 2.455 GHz to 2.505 GHz**

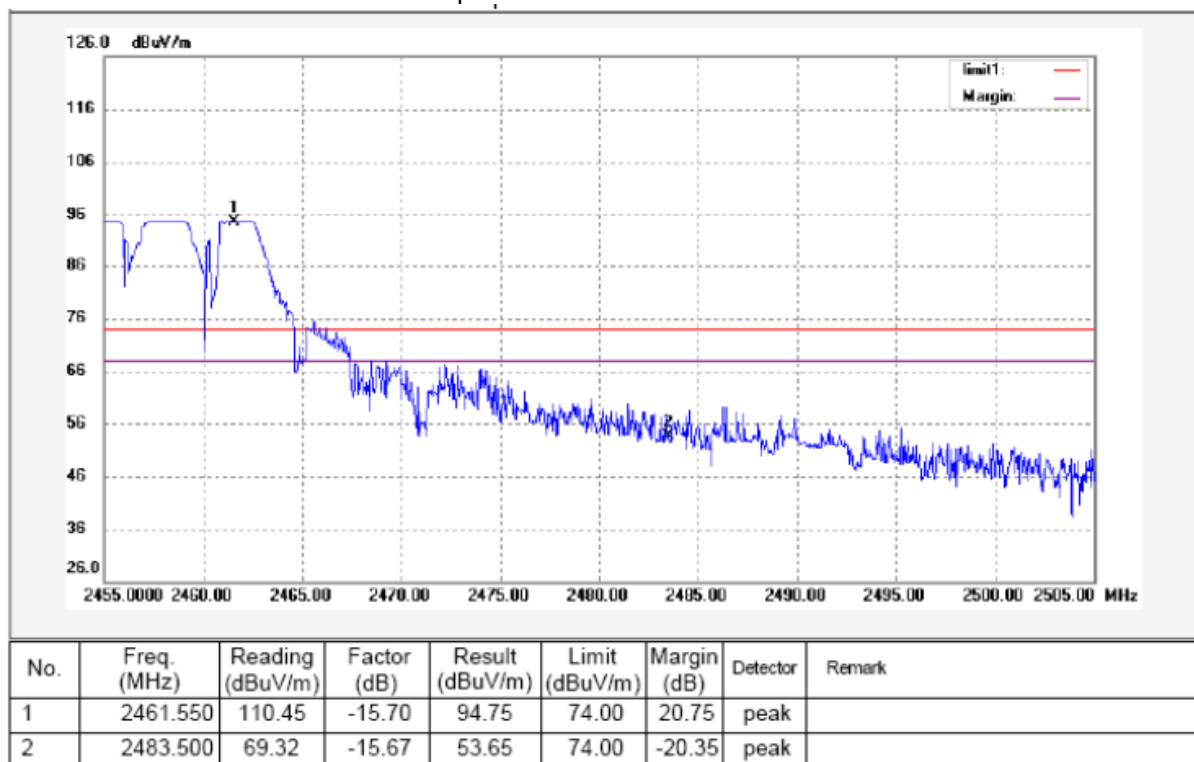
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.500	-13	80.3	54.00	26.3	AV	
2	2483.500	-13	38.52	54.00	-15.48	AV	

Remark:the marker 1 is the fundamental

Antenna polarization: Vertical



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.550	-13	81.75	54.00	27.75	AV	
2	2483.500	-13	40.65	54.00	-13.35	AV	

Remark: the marker 1 is the fundamental

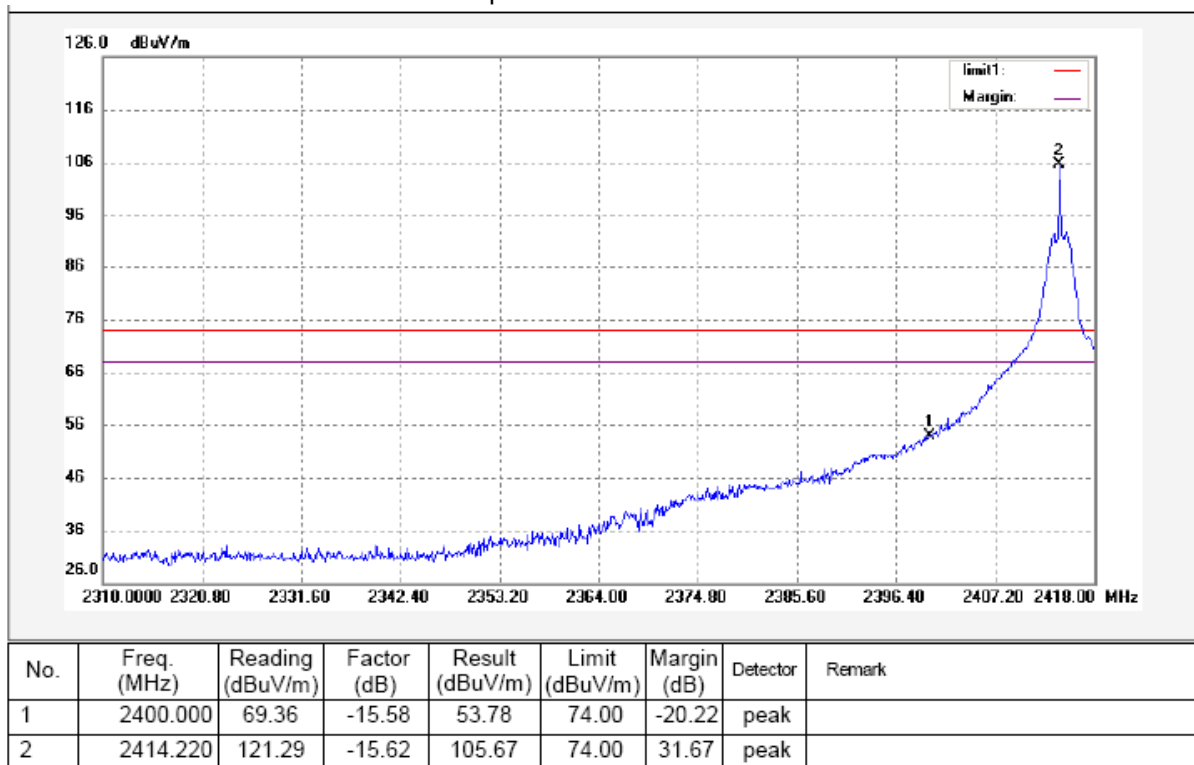
9.3 Test Result(Continuous transmitting)

5dBi antenna with 3m cable:

Low Channel – Peak

Test frequency range:from 2.310 GHz to 2.418GHz

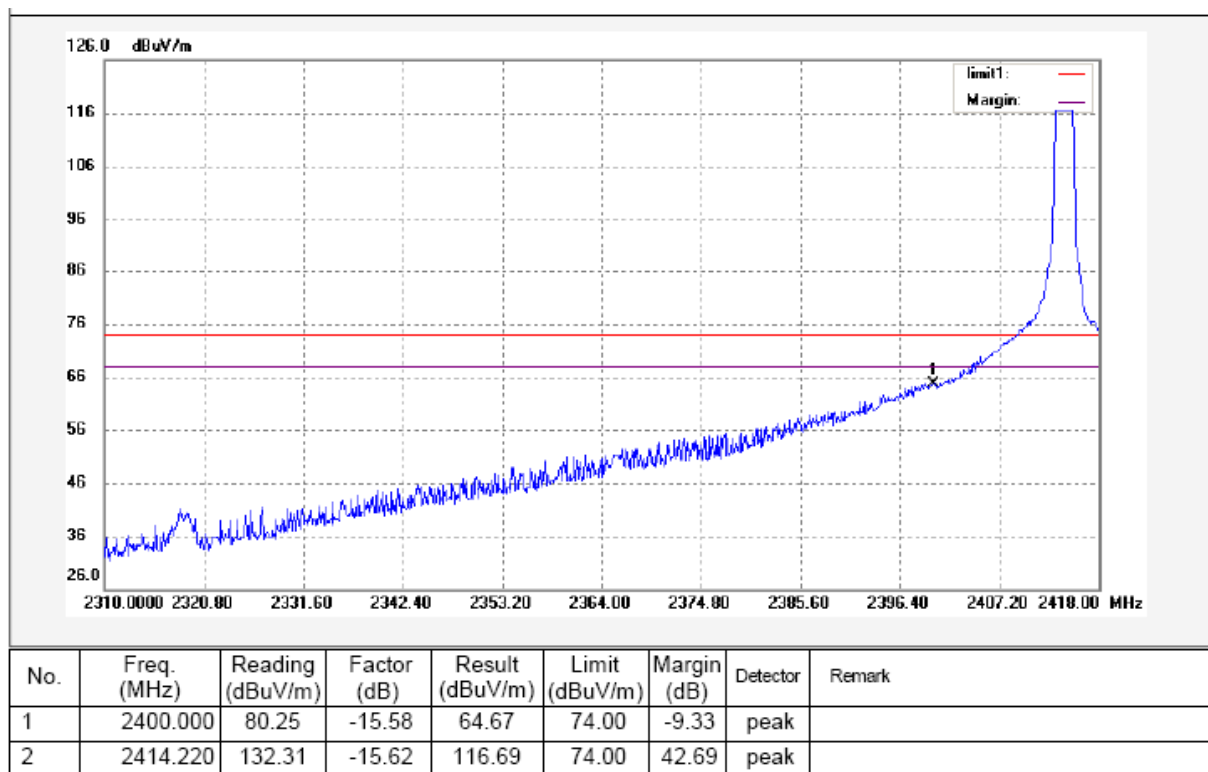
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	40.78	54.00	-13.22	AV	
2	2414.220	-13	92.67	54.00	38.67	AV	

Remark:the marker 2 is the fundamental

Antenna polarization: Vertical

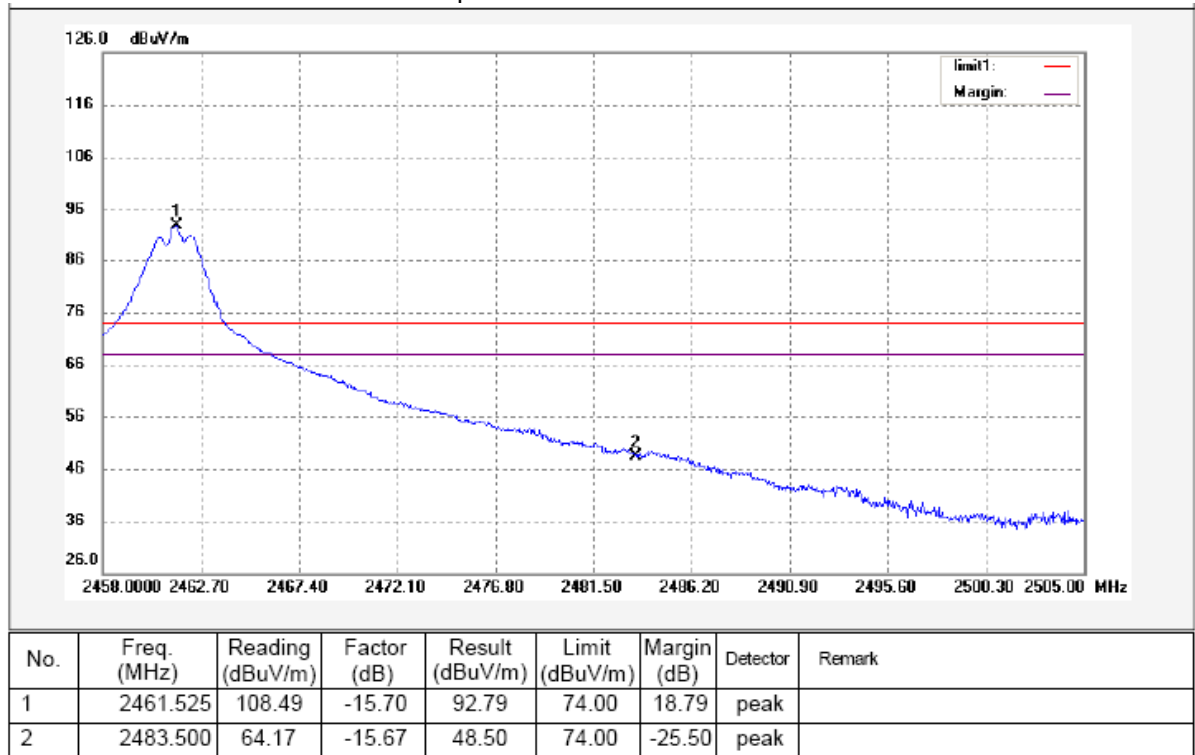


No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	51.67	54.00	-2.33	AV	
2	2414.220	-13	103.69	54.00	49.69	AV	

Remark:the marker 2 is the fundamental

Upper Channel – Peak**Test frequency range:from 2.458 GHz to 2.505 GHz**

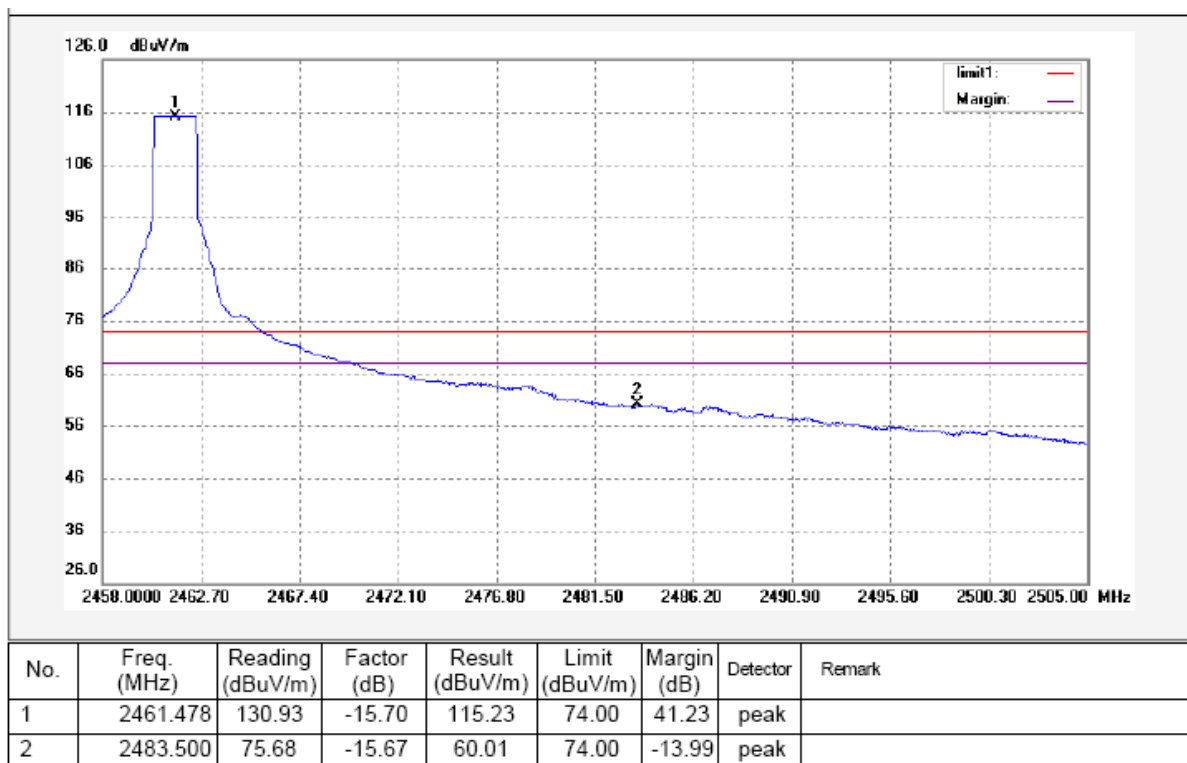
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.525	-13	79.79	54.00	25.79	AV	
2	2483.500	-13	35.5	54.00	-18.5	AV	

Remark:the marker 1 is the fundamental

Antenna polarization: Vertical



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.478	-13	102.23	54.00	48.23	AV	
2	2483.500	-13	47.01	54.00	-6.99	AV	

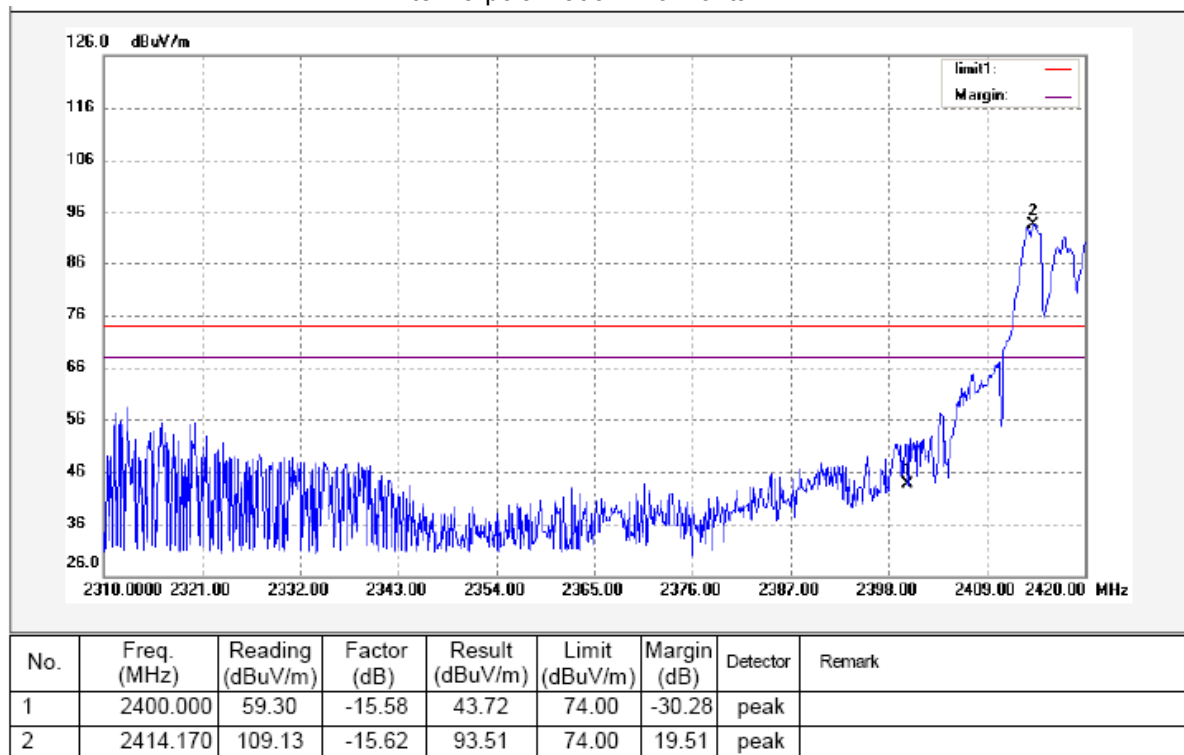
Remark: the marker 1 is the fundamental

9.4 Test Result(Hopping transmitting)

Low Channel – Peak

Test frequency range:from 2.310 GHz to 2.420GHz

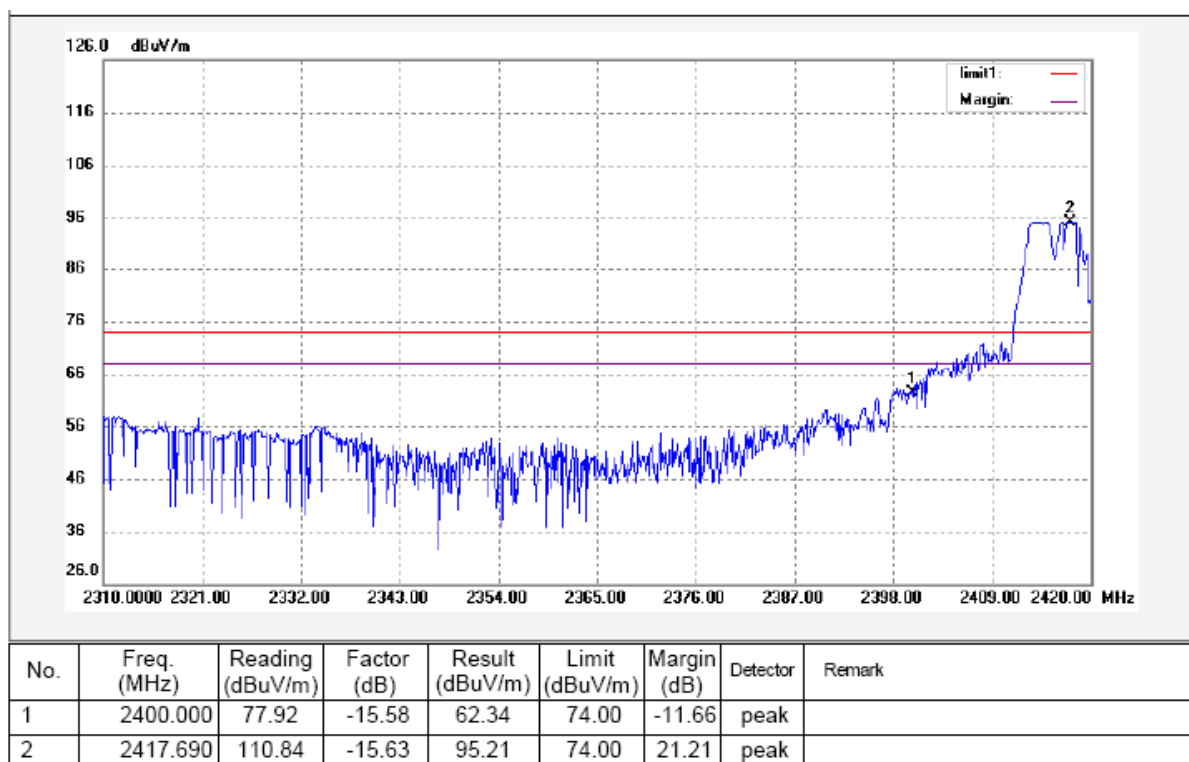
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	30.72	54.00	-23.28	AV	
2	2414.170	-13	80.51	54.00	26.51	AV	

Remark:the marker 2 is the fundamental

Antenna polarization: Vertical

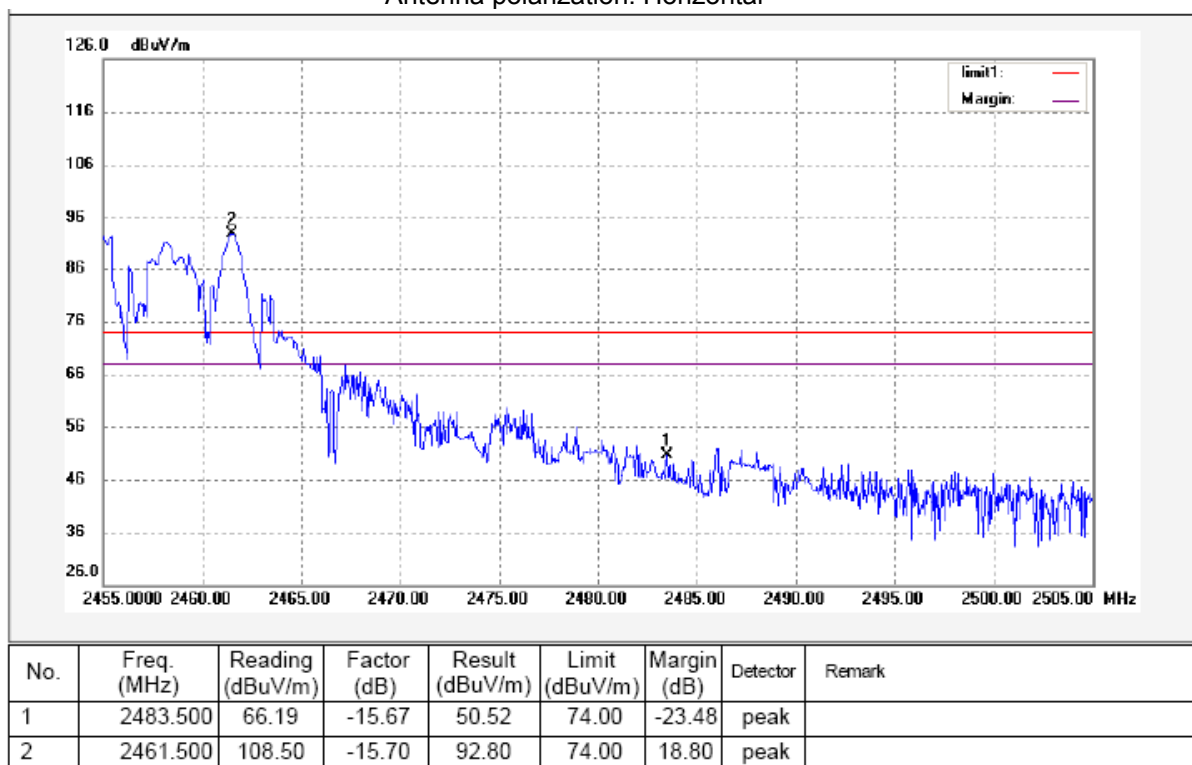


No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	49.34	54.00	-4.66	AV	
2	2417.690	-13	82.21	54.00	28.21	AV	

Remark: the marker 2 is the fundamental

Upper Channel – Peak**Test frequency range:from 2.455 GHz to 2.505 GHz**

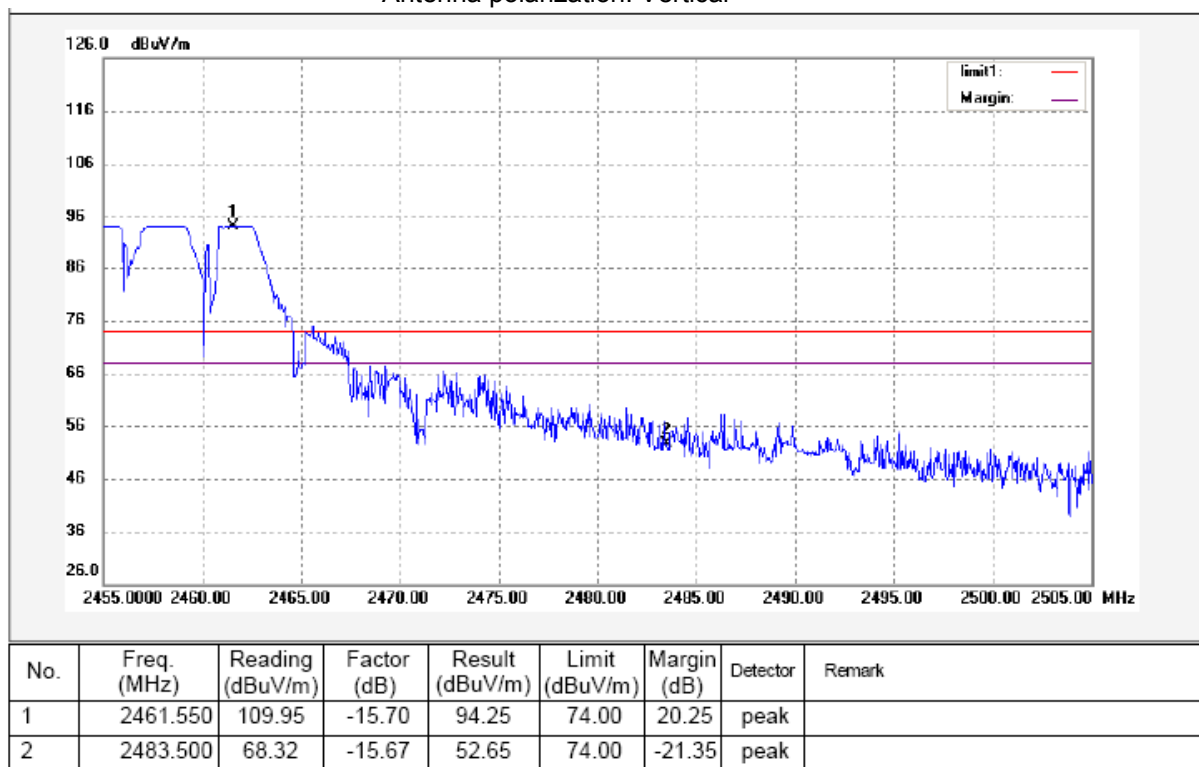
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	-13	37.52	54.00	-16.48	AV	
2	2461.500	-13	79.8	54.00	25.8	AV	

Remark:the marker 2 is the fundamental

Antenna polarization: Vertical



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.550	-13	81.25	54.00	27.25	AV	
2	2483.500	-13	39.65	54.00	-14.35	AV	

Remark:the marker 1 is the fundamental

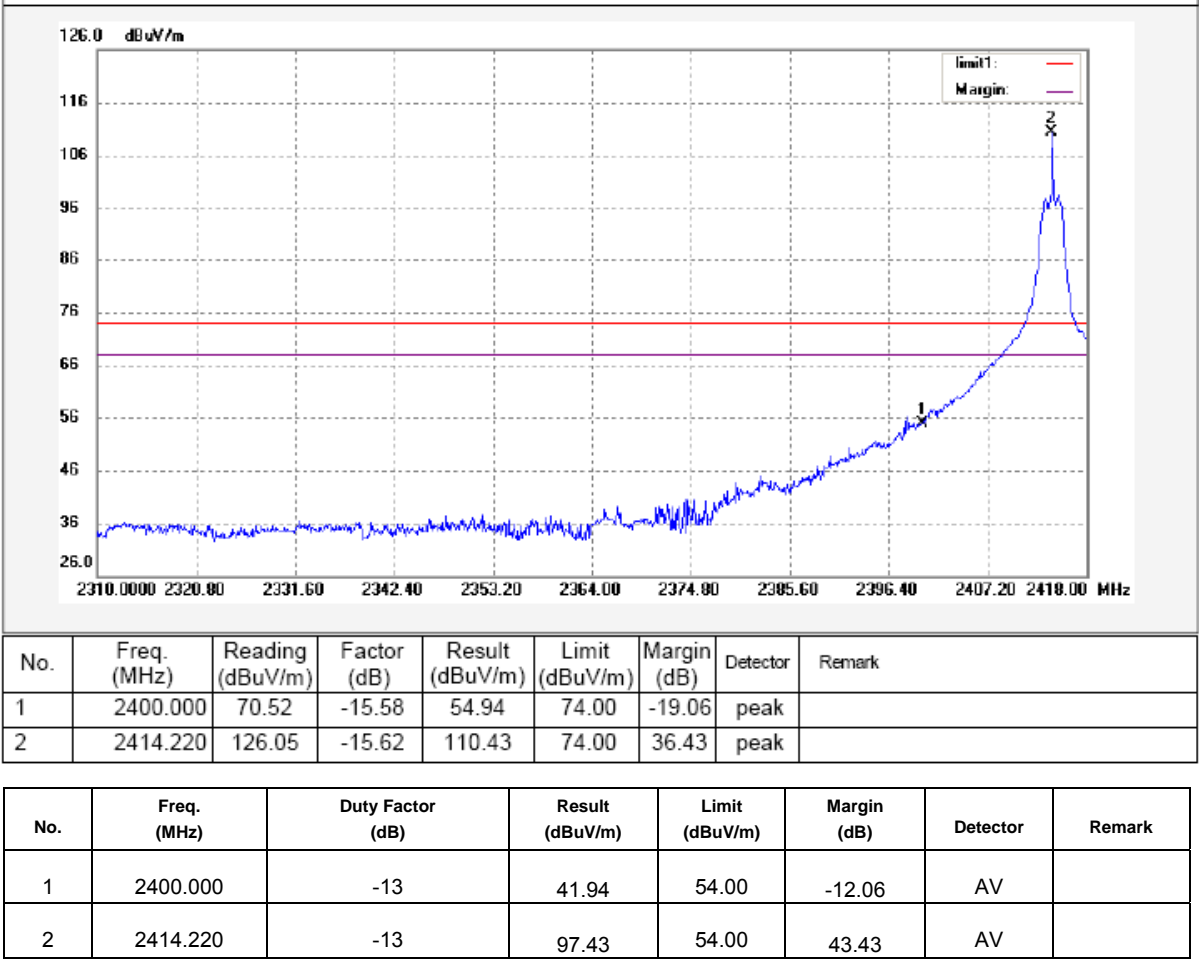
9.5 Test Result(Continuous transmitting)

3dBi antenna:

Low Channel – Peak

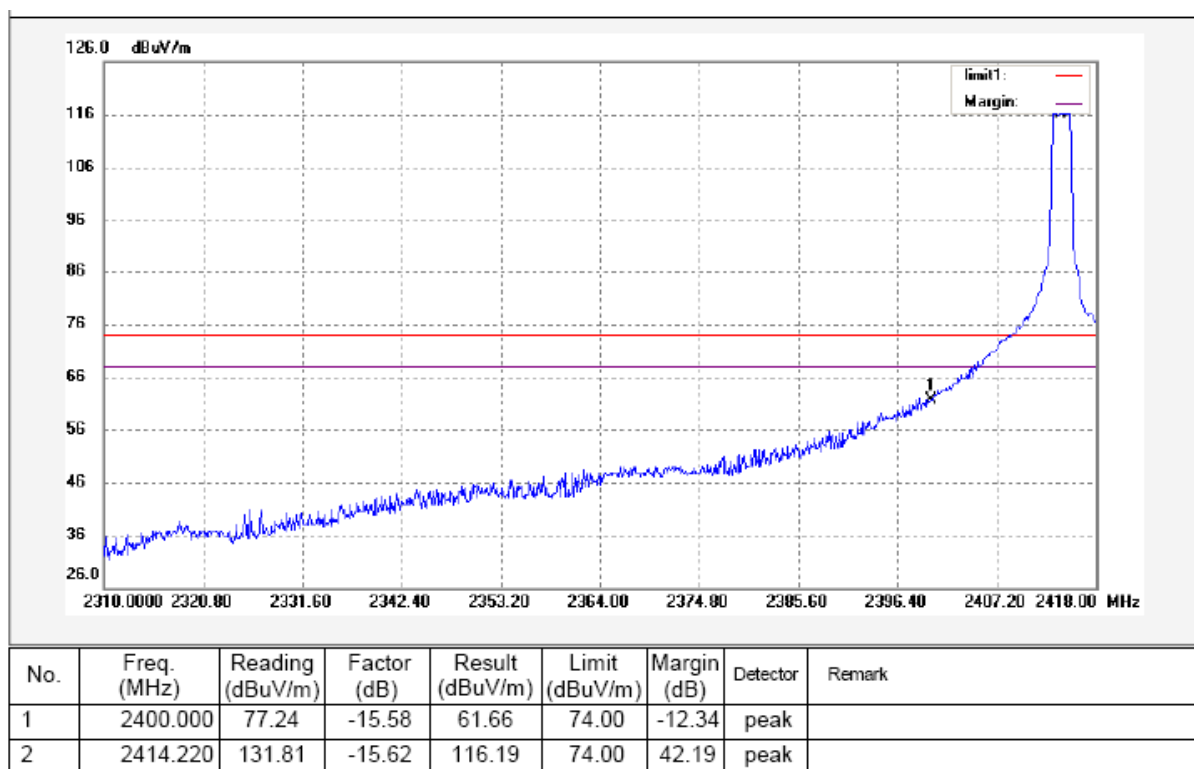
Test frequency range:from 2.310 GHz to 2.418GHz

Antenna polarization: Horizontal



Remark:the marker 2 is the fundamental

Antenna polarization: Vertical



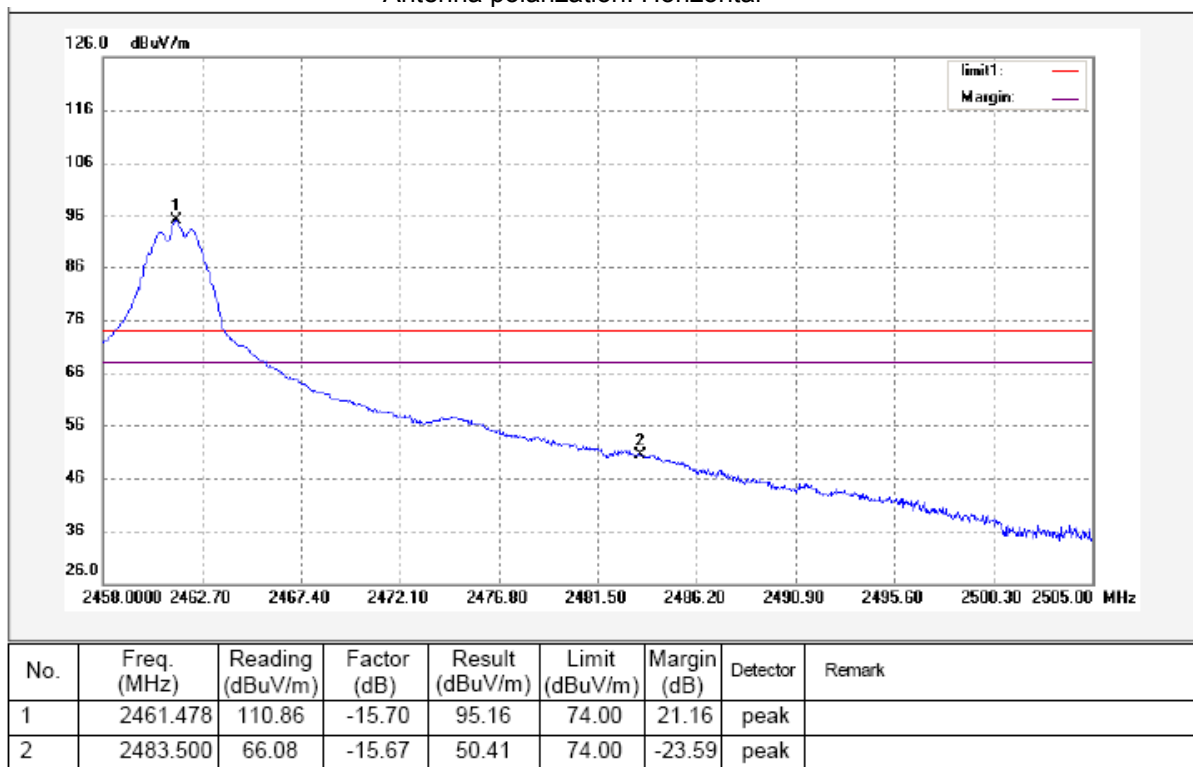
No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	48.66	54.00	-5.34	AV	
2	2414.220	-13	103.19	54.00	49.19	AV	

Remark: the marker 2 is the fundamental

Upper Channel – Peak

Test frequency range: from 2.458 GHz to 2.505 GHz

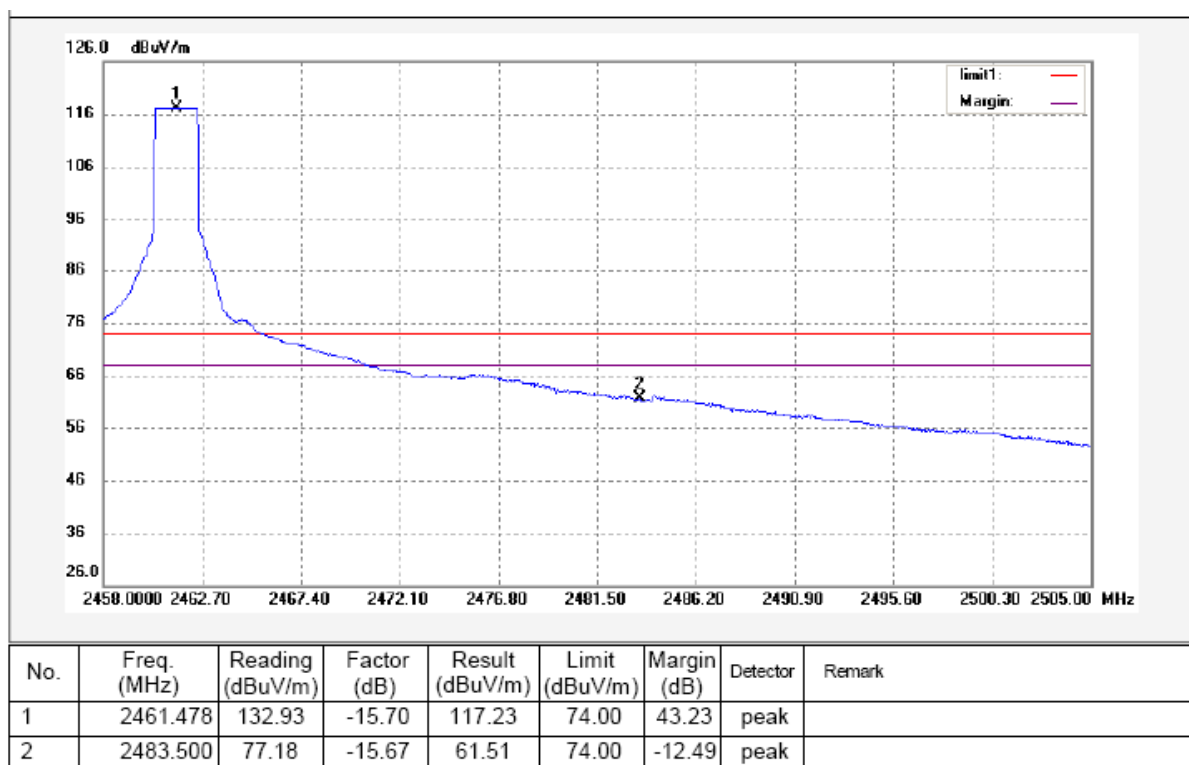
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.478	-13	82.16	54.00	28.16	AV	
2	2483.500	-13	37.41	54.00	-16.59	AV	

Remark: the marker 1 is the fundamental

Antenna polarization: Vertical



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2461.478	-13	104.23	54.00	50.23	AV	
2	2483.500	-13	48.51	54.00	-5.49	AV	

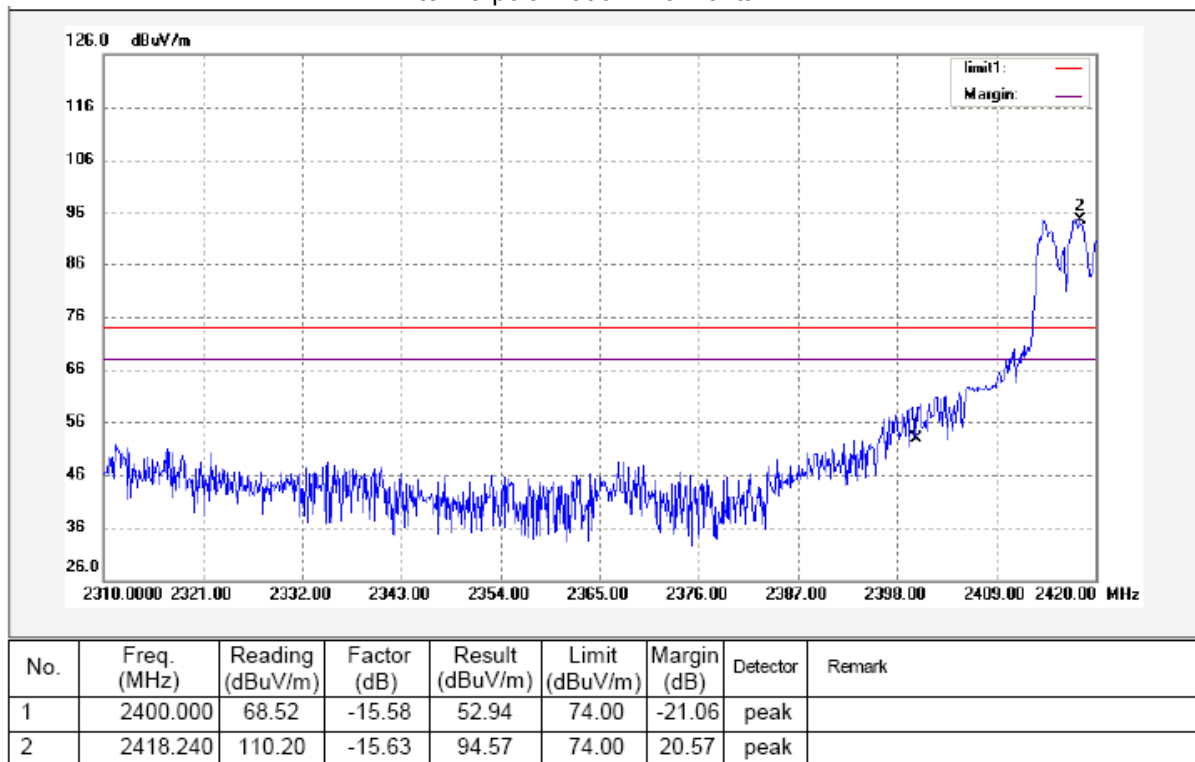
Remark: the marker 1 is the fundamental

9.6 Test Result(Hopping transmitting)

Low Channel – Peak

Test frequency range:from 2.310 GHz to 2.420GHz

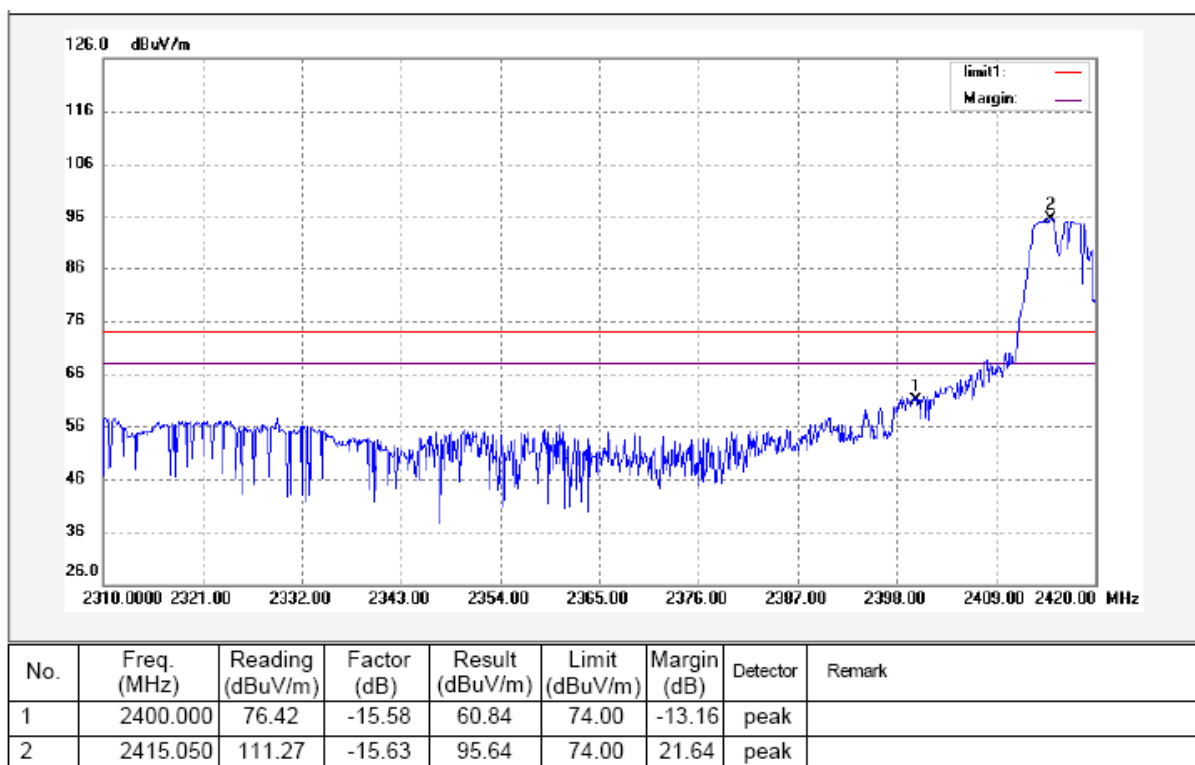
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	39.94	54.00	-14.06	AV	
2	2418.240	-13	81.57	54.00	27.57	AV	

Remark:the marker 2 is the fundamental

Antenna polarization: Vertical

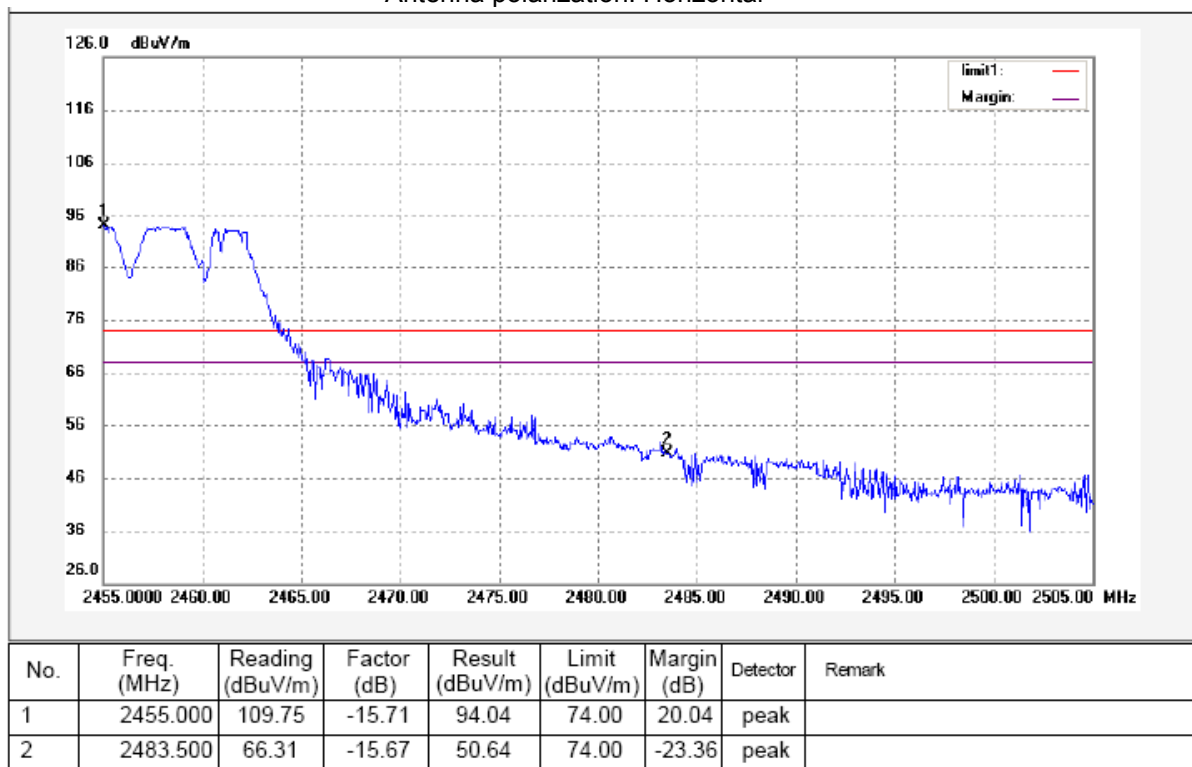


No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2400.000	-13	47.84	54.00	-6.16	AV	
2	2415.050	-13	82.64	54.00	28.64	AV	

Remark:the marker 2 is the fundamental

Upper Channel – Peak**Test frequency range:from 2.455 GHz to 2.505 GHz**

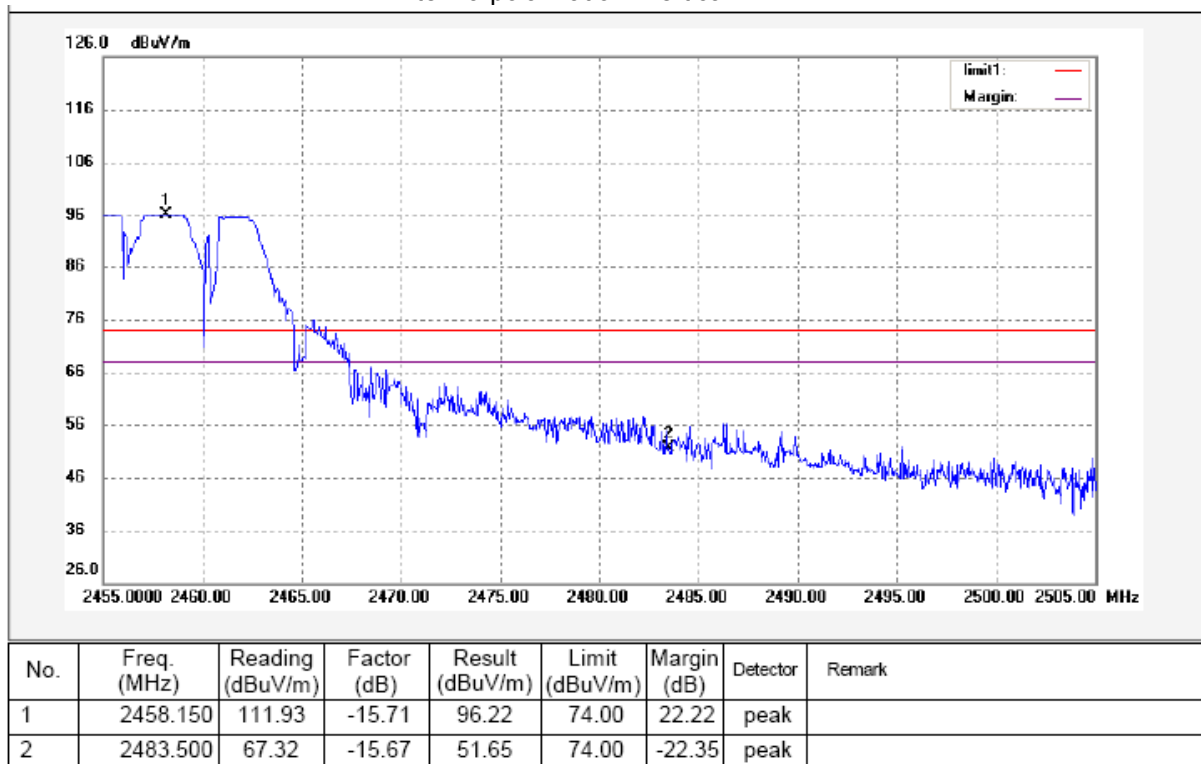
Antenna polarization: Horizontal



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2455.000	-13	81.04	54.00	27.04	AV	
2	2483.500	-13	37.64	54.00	-16.36	AV	

Remark:the marker 1 is the fundamental

Antenna polarization: Vertical



No.	Freq. (MHz)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2458.150	-13	83.22	54.00	29.22	AV	
2	2483.500	-13	38.65	54.00	-15.35	AV	

Remark: the marker 1 is the fundamental

10 20 dB Bandwidth Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Mode:	Test in fixing operating frequency at low, Middle, high channel.

10.1 Test Procedure:

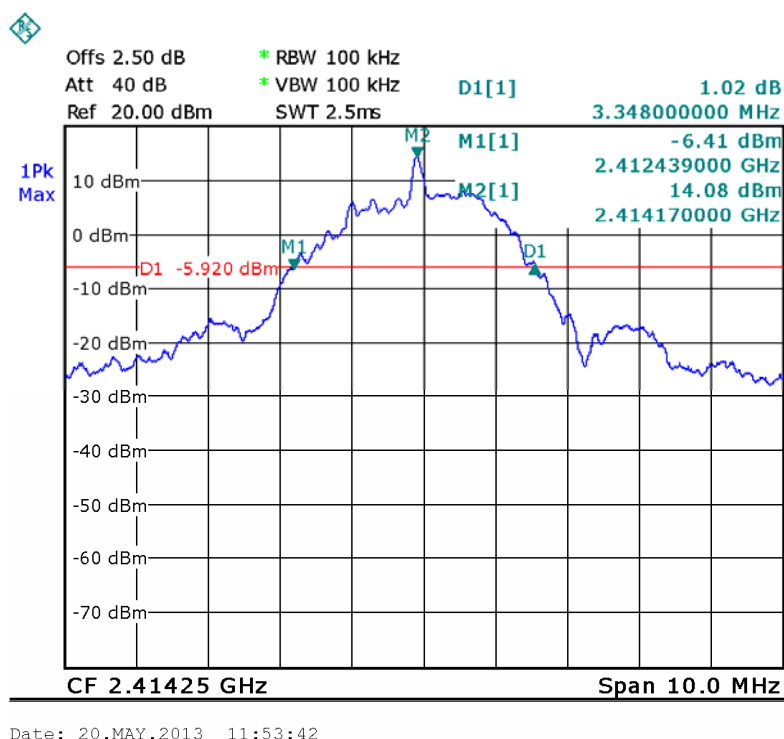
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 100kHz

10.2 Test Result:

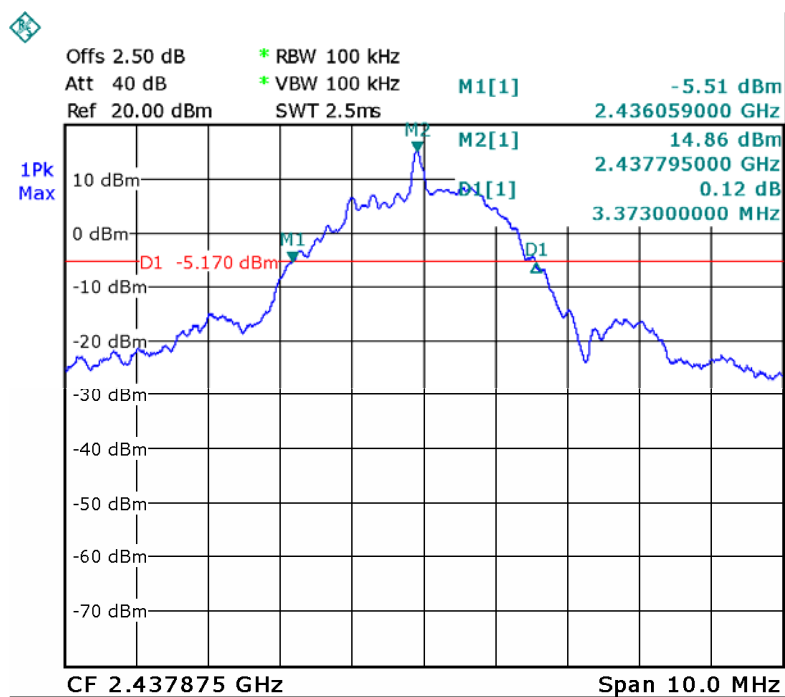
Test Channel	Bandwidth
Low	3.348MHz
Middle	3.373MHz
High	3.393MHz

Test result plot as follows:

Low Channel

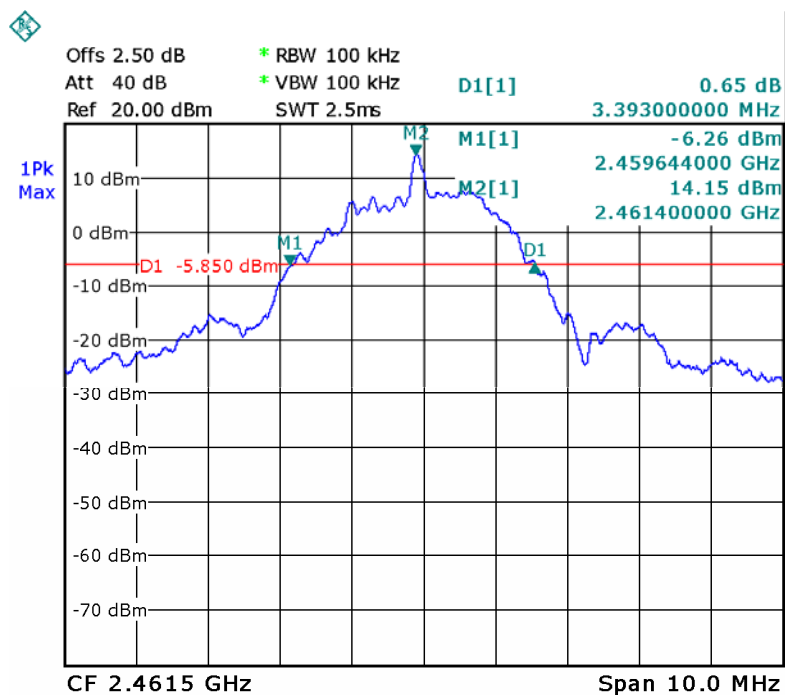


Middle Channel



Date: 20.MAY.2013 11:54:57

High Channel



Date: 20.MAY.2013 11:58:50

11 Spurious RF Conducted Emissions from out of band

Test Requirement: FCC Part 15.247(d) In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Method: DA 00-705

Test Status: TX mode

11.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set to span from the lowest frequency generated in the device up to and including the tenth harmonic of the highest fundamental frequency.
3. Set RBW = 100kHz and VBW = 300kHz. Sweep = auto.
4. mark the worst point and record.

11.2 Test Result

Test Frequency: Below 30MHz

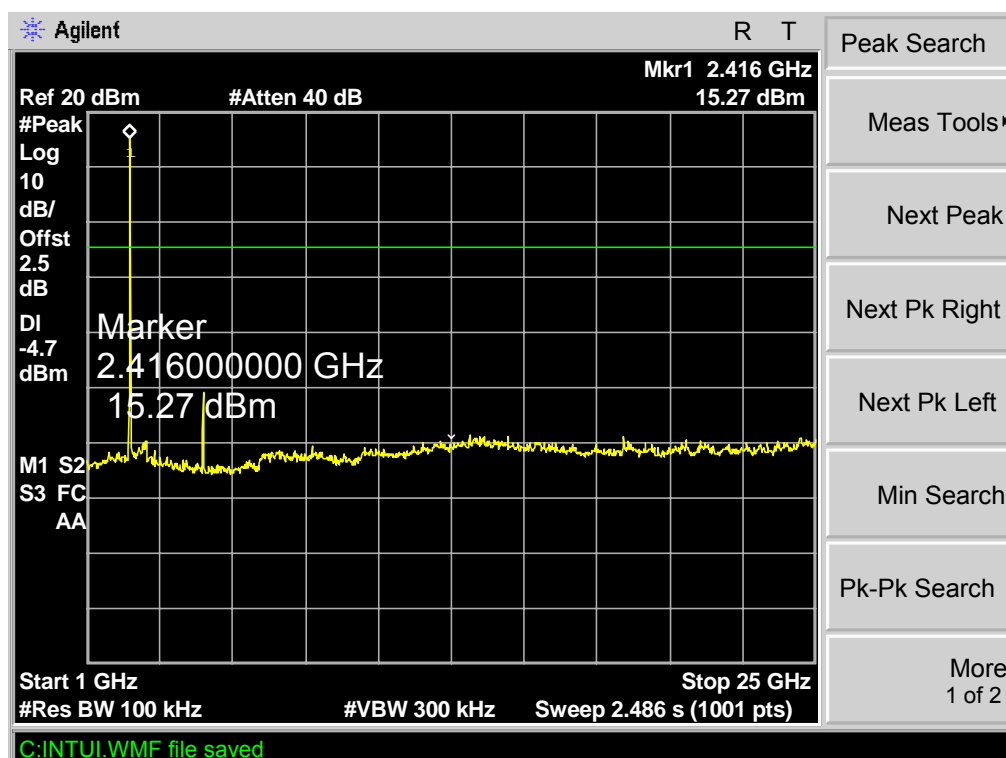
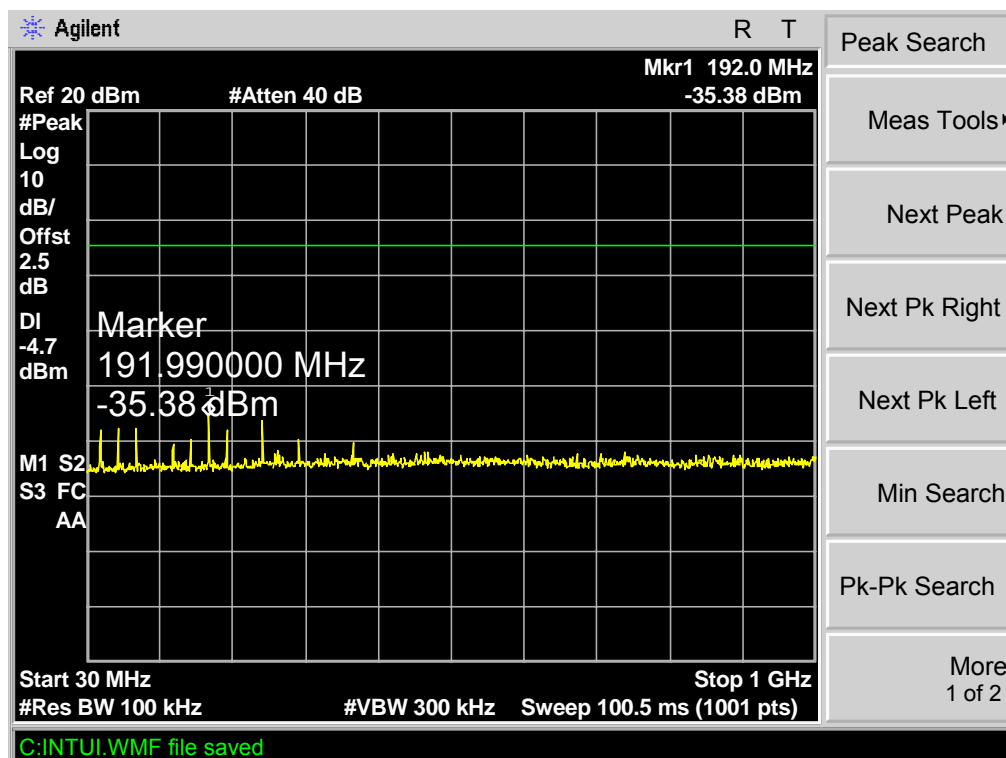
Remark: For emissions below 30MHz, no emission higher than background level, so the data does not show in the report.

Test Frequency: 30MHz ~ 25GHz

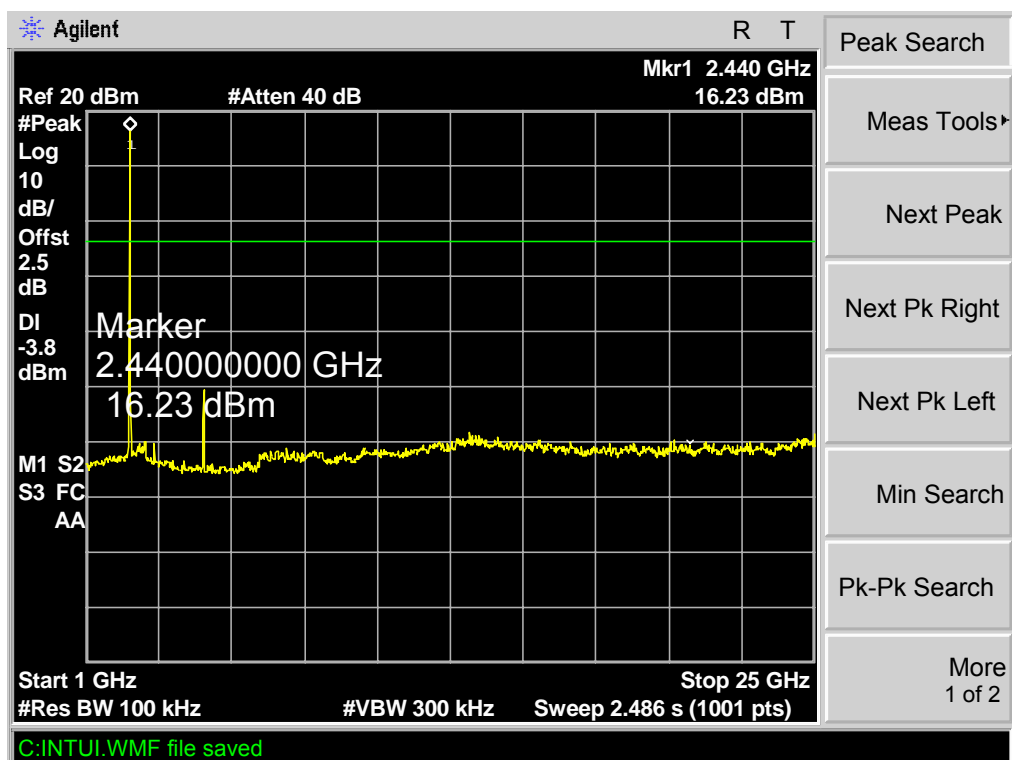
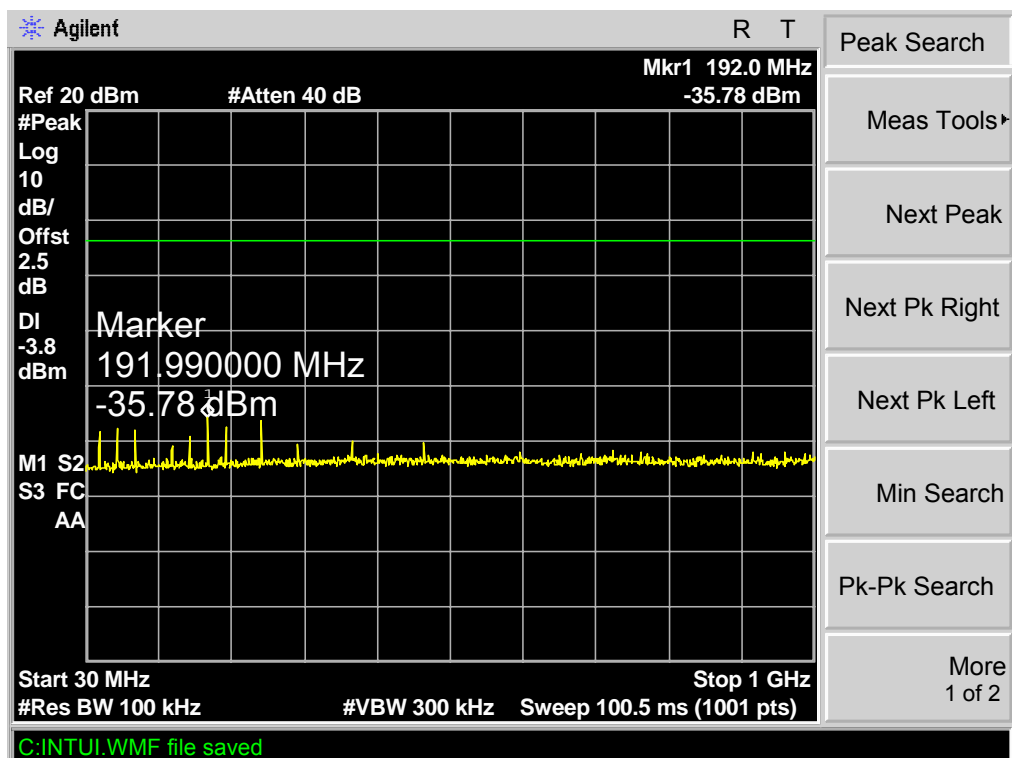
Test result plots shown as follows:

Modulation:GFSK

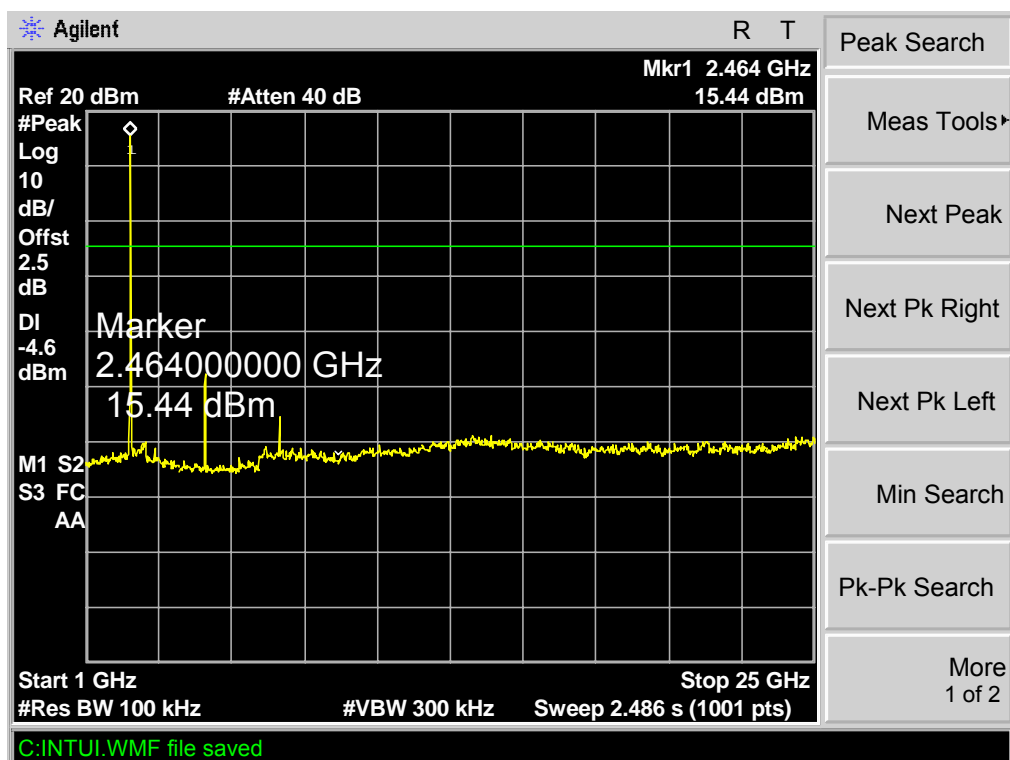
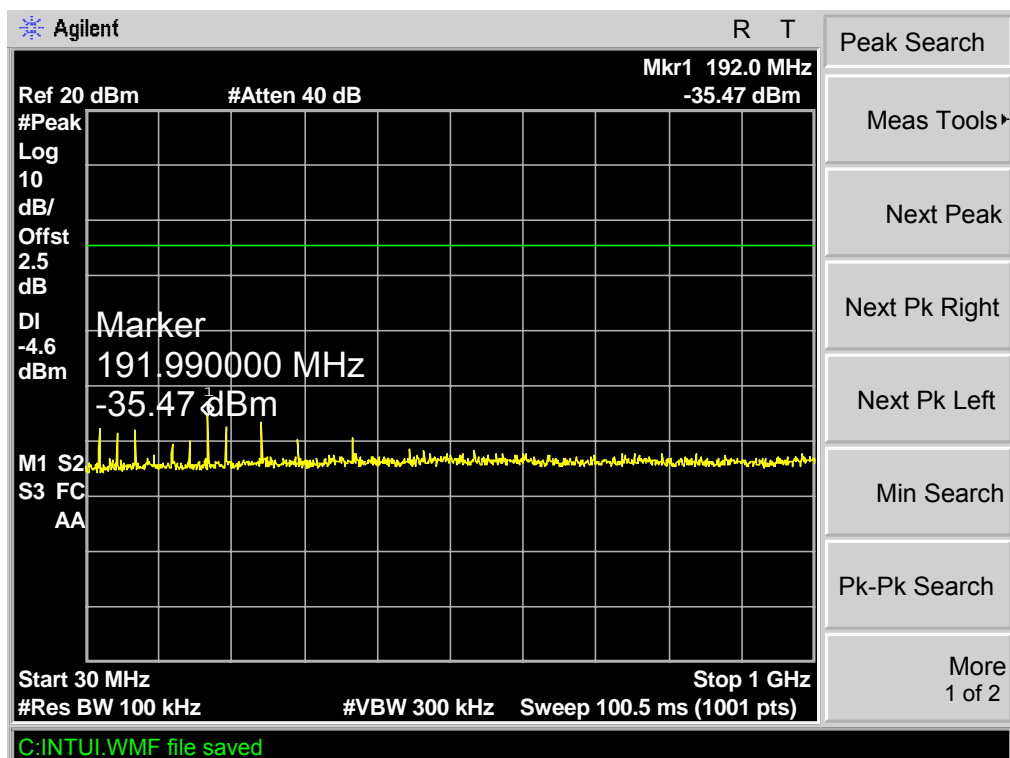
Lower Channel



Middle Channel



Upper Channel



12 Maximum Peak Output Power

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	ANSI C63.4:2003
Test Limit:	Regulation 15.247 (b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result "Number of Hopping Frequency" of this document. The 0.125watts (20.97 dBm) limit applies.
Test mode:	Test in fixing frequency transmitting mode.

12.1 Test Procedure:

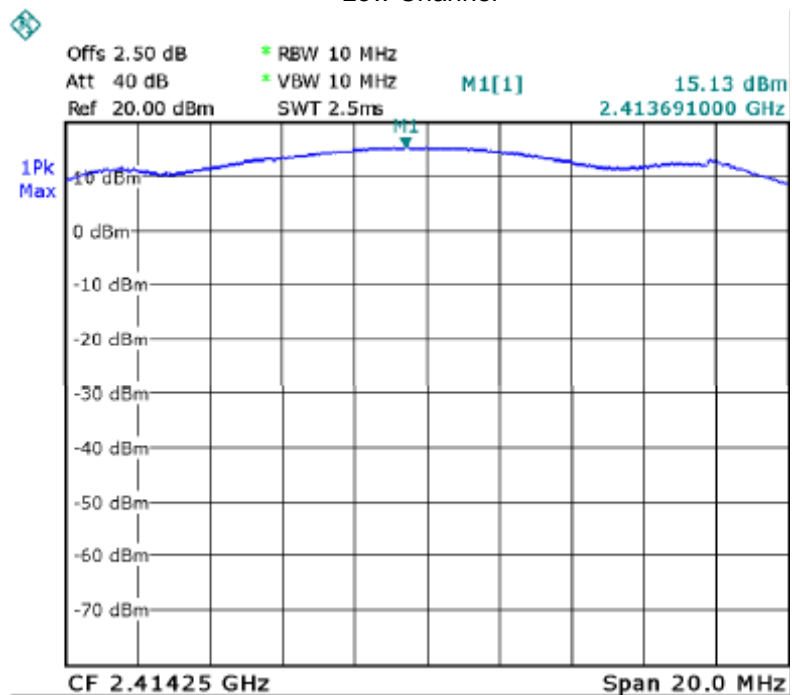
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 10 MHz. VBW = 10 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

12.2 Test Result:

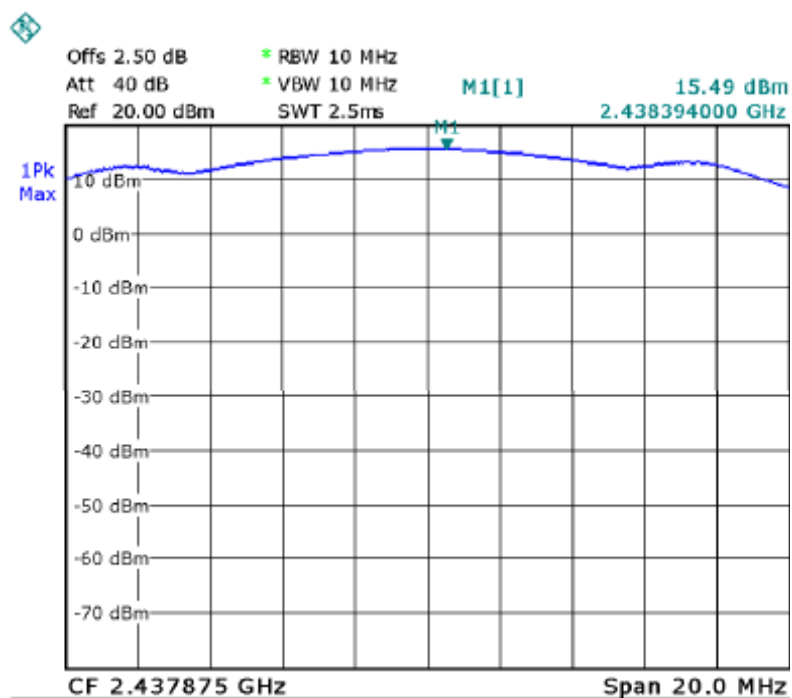
Test Channel	Output Power (dBm)	Limit (dBm)
Low	15.13	20.97
Middle	15.49	20.97
High	14.42	20.97

Test result plot as follows:

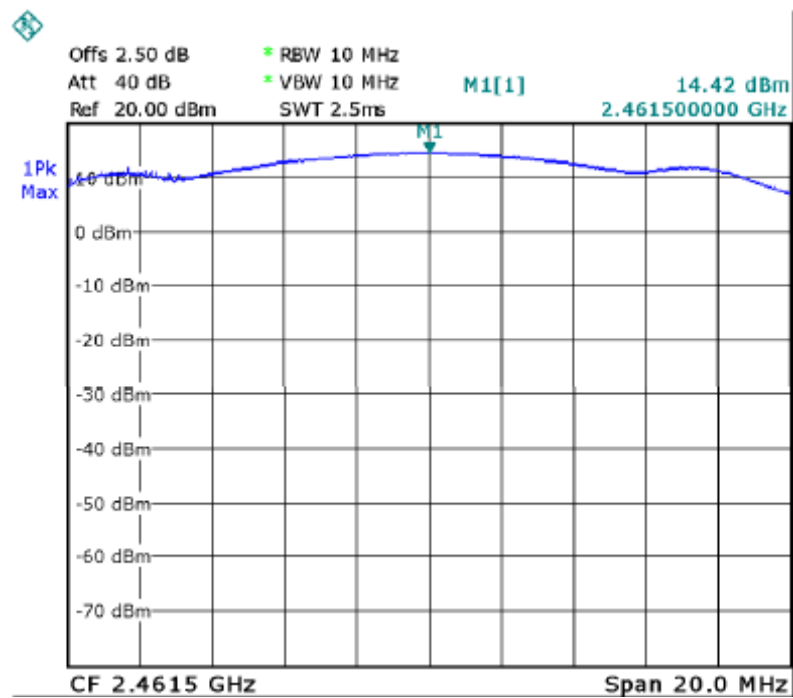
Low Channel



Middle Channel



High Channel



13 Channel Separated

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 1W.
Test Mode:	Test in hopping transmitting operating mode.

13.1 Test Procedure:

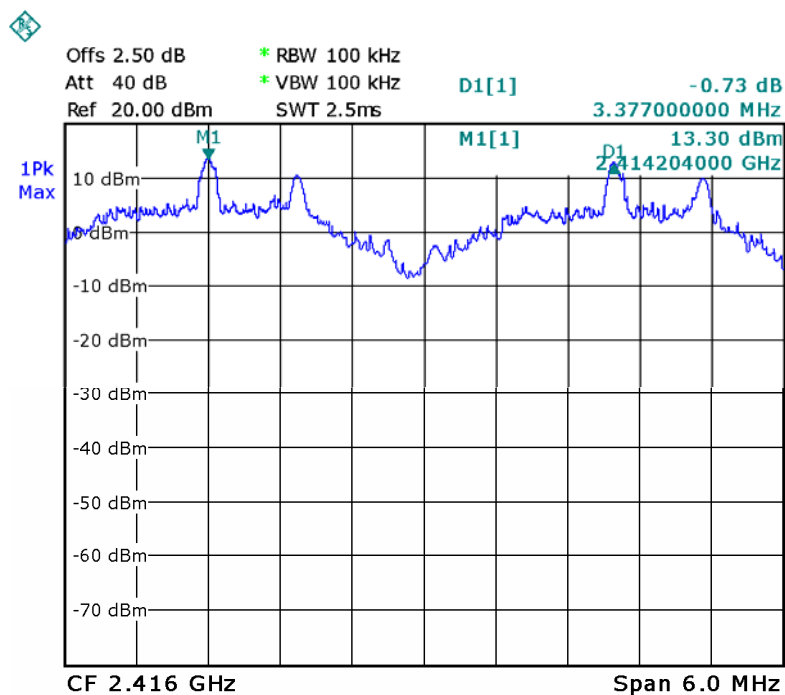
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 6MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

13.2 Test Result:

Test Channel	Separation (MHz)	Result
Low	3.377MHz	PASS
Middle	3.377MHz	PASS
High	3.377MHz	PASS

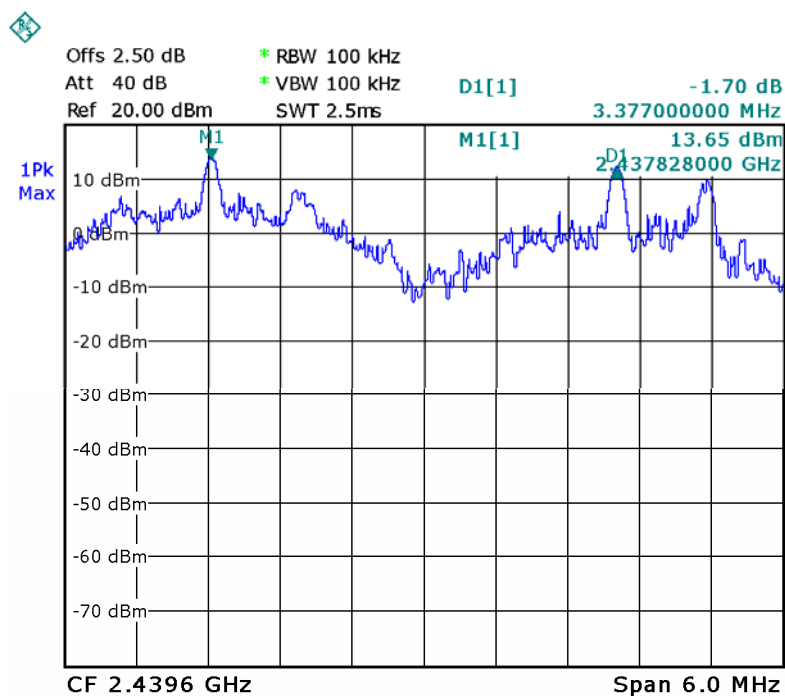
Test result plot as follows:

Low Channel



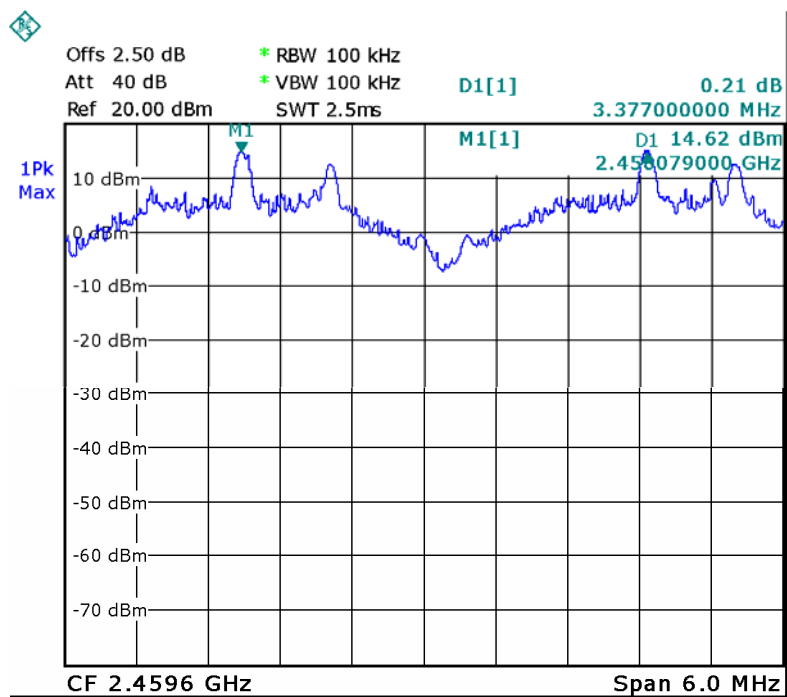
Date: 20.MAY.2013 14:14:16

Middle Channel



Date: 20.MAY.2013 14:16:43

High Channel



Date: 20.MAY.2013 14:23:50

14 Hopping Channel number

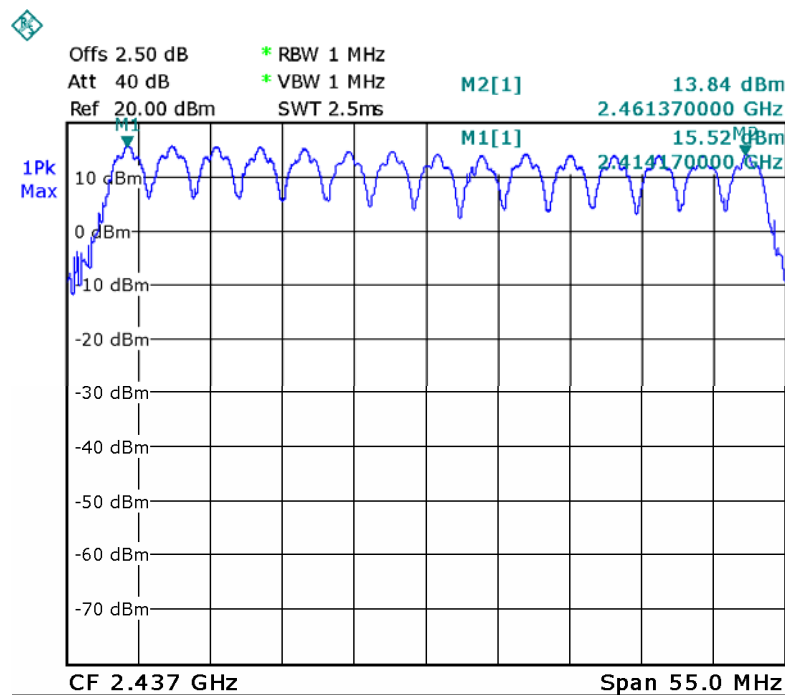
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Mode:	Test in hopping transmitting operating mode.

14.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 100 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Center Frequency = 2437MHz, Span = 55MHz. Submit the test result graph.

14.2 Test Result

Total Channels are 15 Channels.



Date: 20.MAY.2013 14:31:32

15 Dwell Time

Test Requirement: FCC CFR47 Part 15 Section 15.247
 Test Method: DA 00-705
 Test Limit: Regulation 15.247(a)(1)(iii) Frequency hopping systems

in

the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Mode: Test in hopping transmitting operating mode.

15.1 Test Procedure:

- 1.Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
 - 2.Set spectrum analyzer span = 0. centered on a hopping channel;
 - 3.Set RBW = 1MHz and VBW = 1MHz.Sweep = as necessary to capture the entire dwell time per hopping channel.
 - 4.Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation.
- The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

15.2 Test Result

The test period: $T = 0.4(s) * 15 = 6(s)$

So, the Dwell Time can be calculated as follows:

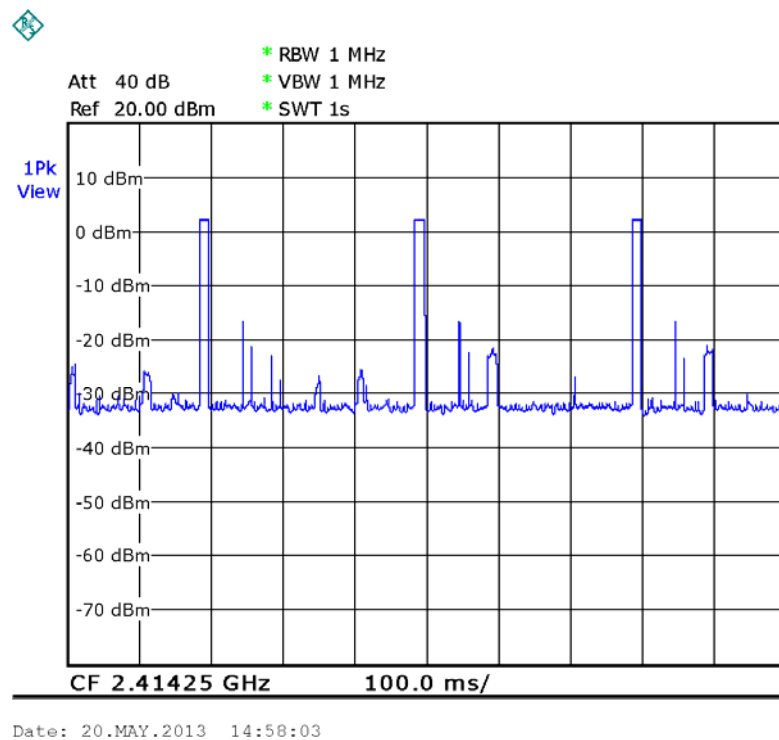
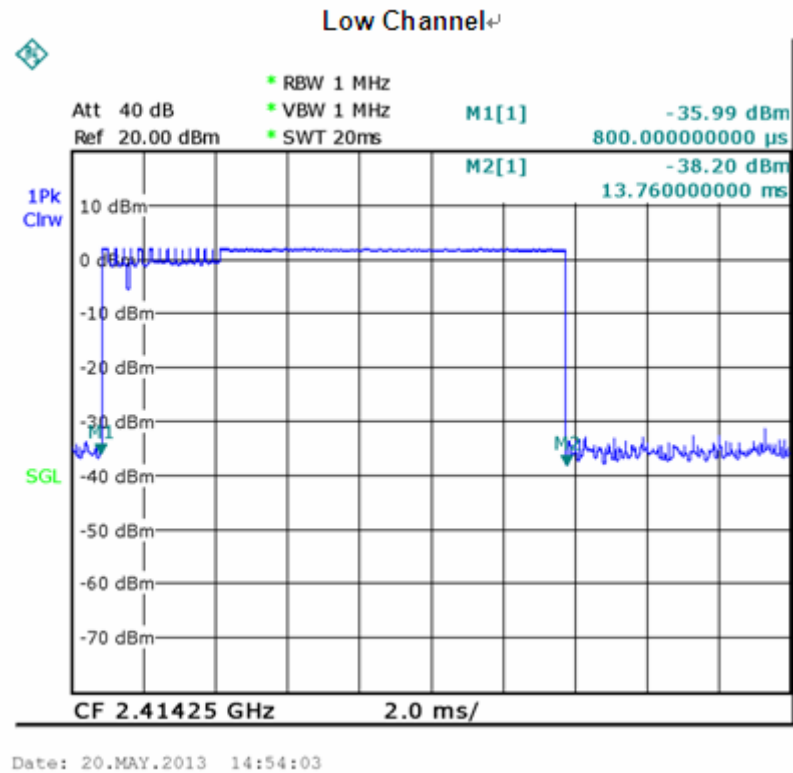
Low channel: slot time= $3(times)/1(s)*12.96(ms)*6(s)=0.233(s)$

Middle channel: slot time= $3(times)/1(s)*12.92(ms)*6(s)=0.233(s)$

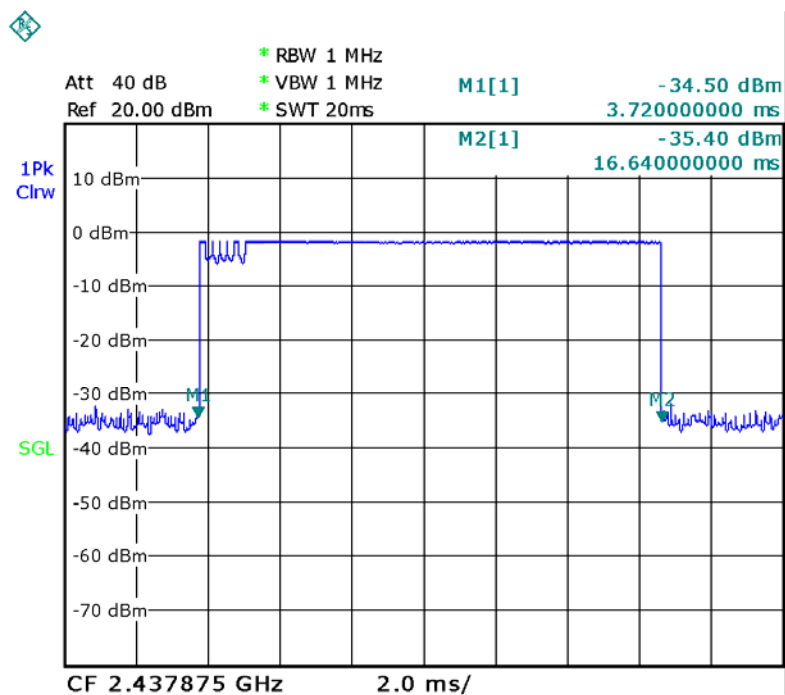
High channel: slot time= $3(times)/1(s)*13.00(ms)*6(s)=0.234(s)$

Note : Mkr Delta is once pulse time.

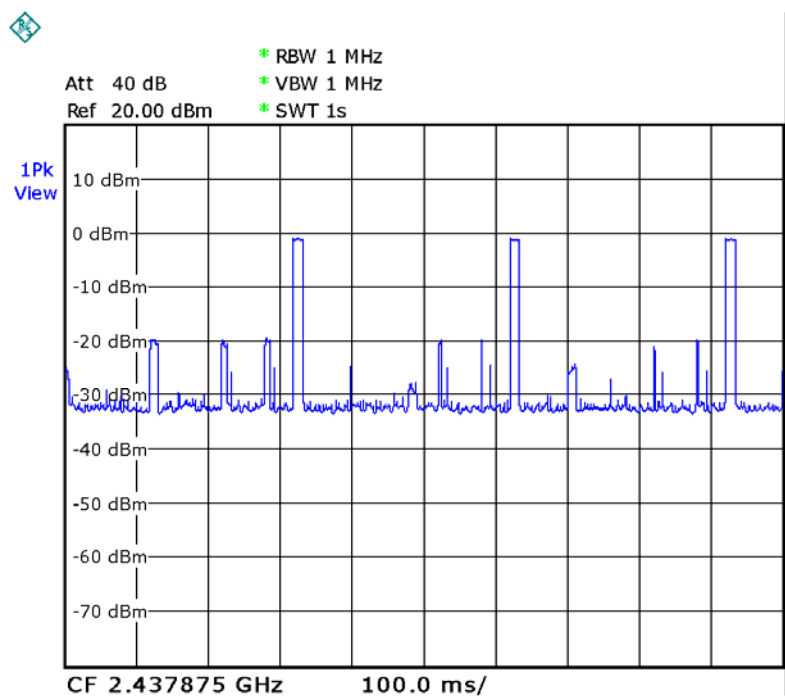
Frequency	Mkr Delta(ms)	Dwell Time(s)	Limits(s)	Result
2414.25 MHz	12.96	0.233	0.400	Pass
2437.85 MHz	12.92	0.233	0.400	Pass
2461.5 MHz	13.00	0.234	0.400	Pass



Middle Channel

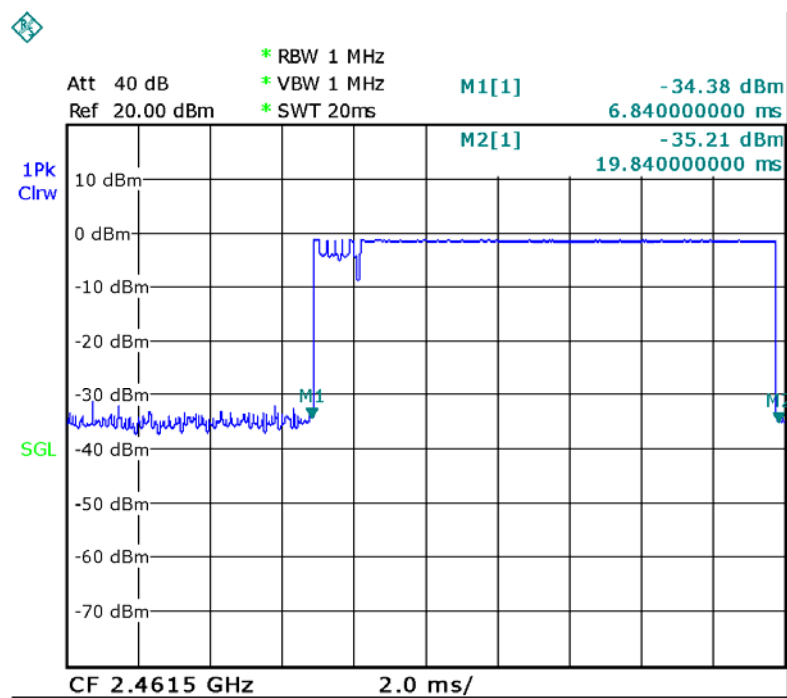


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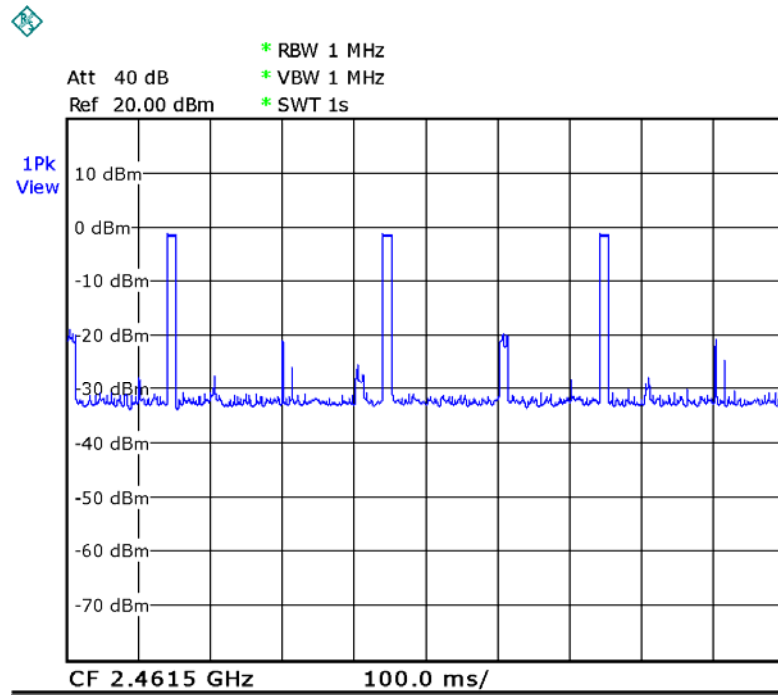


Date: 20.MAY.2013 14:56:38

High Channel



Date: 20.MAY.2013 14:53:23



Date: 20.MAY.2013 14:55:56

16 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, 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. This product has a detachable antenna with RP SMA connector, fulfill the requirement of this section.

17 RF Exposure

Test Requirement: FCC Part 1.1307

Test Mode: The EUT work in test mode(Tx).

17.1 Requirments:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

17.2 The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

17.3 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G / C}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

C = Cable loss (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G / C}{377 \times d^2}$$

$$\text{dBm} = 10 \lg \text{mW}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

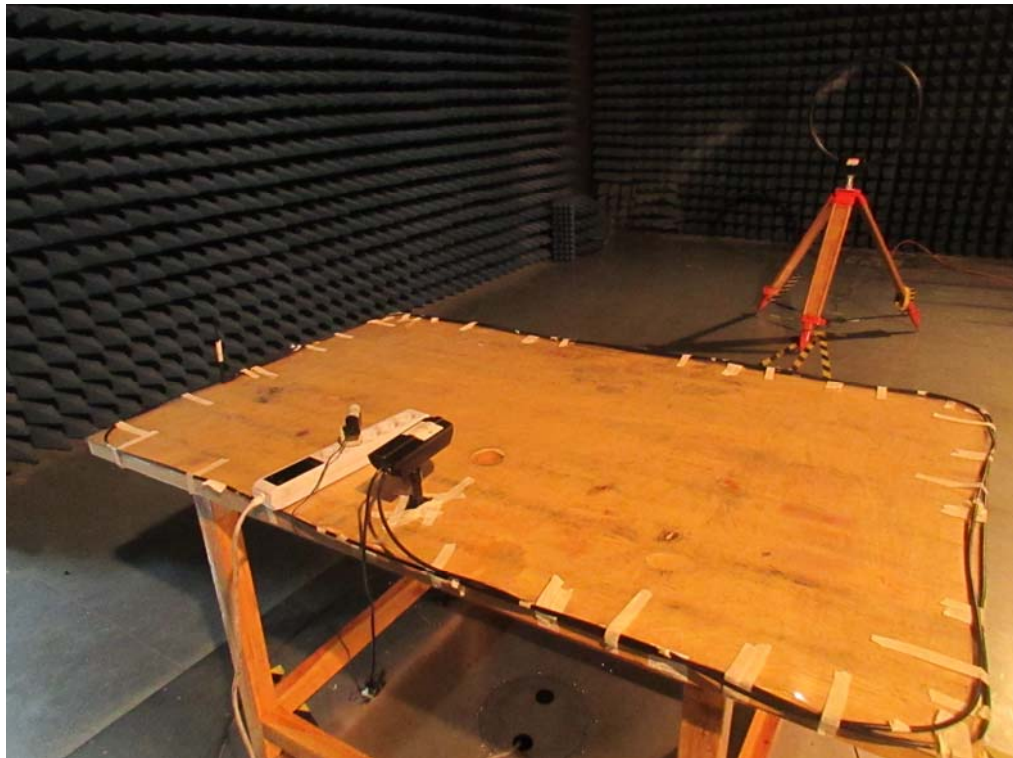
Cable (m)	Peak Output Power (mW)	Antenna Gain (numeric)	Cable loss (numeric)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
--	35.400	1.995	--	0.0140	1
3	35.400	3.162	1.433	0.0155	1
9	35.400	3.162	2.967	0.0075	1

18 Photographs – Test Setup

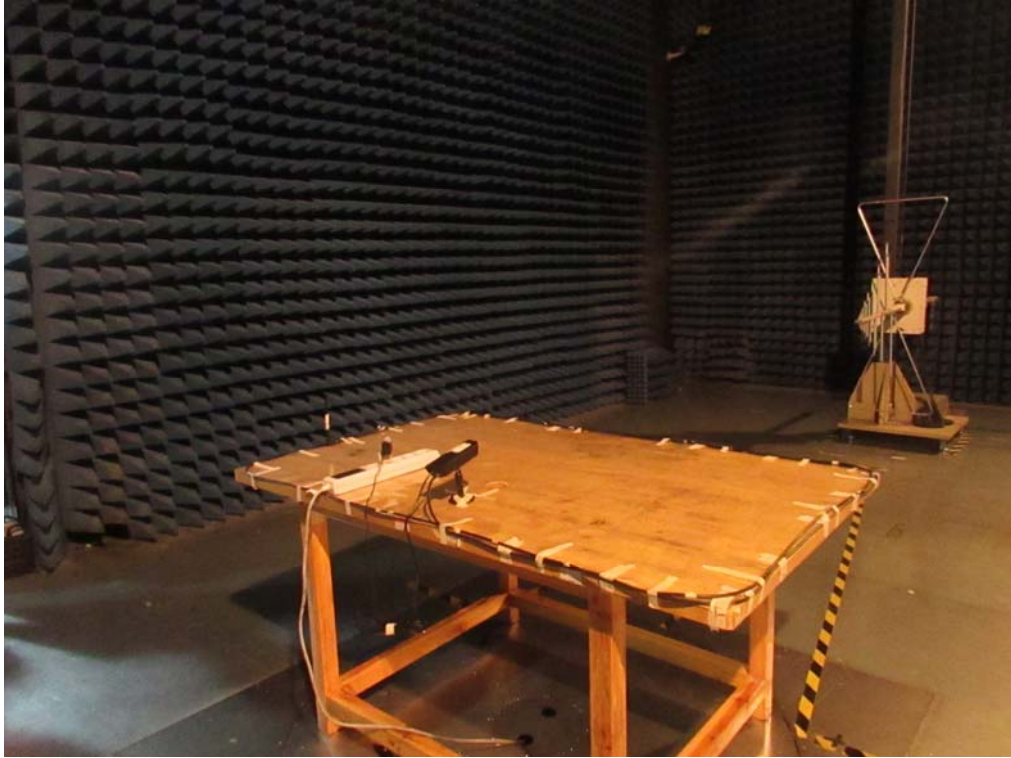
18.1 Photograph –Conducted Emissions Test Setup



18.2 Photograph –Radiated Emissions Test Setup



30MHz-1GHz,



Above 1GHz



19 Photographs - Constructional Details

19.1 EUT - External View

Detail reference to “BARNVIEWMON_External photos”

19.2 EUT - Internal View

Detail reference to “BARNVIEWCAM_Internal photos”

20 FCC Label

FCC Label Sample for model: BARNVIEWCAM

FCC ID: 2AABVBARNVIEWCAM

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

FCC Label Location for model: BARNVIEWCAM

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.



=End of report=