APPLICATION FOR CERTIFICATION

On Behalf of

FUTABA Corporation

Radio Control

Model No.：R3008SB

FCC ID：AZPR3008SB-24G

Brand: Futaba

Prepared for : FUTABA Corporation
1080 Yabutsuka Chosei-son Chosei-gun
Chiba, 299-4395 Japan.

Prepared by : AUDIX Technology Corporation
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File Number	：	C1M1312186
Report Number	：	EM-F140047
Date of Test	：	2014. 01. 08 ~ 09
Date of Report	：	2014. 01. 21

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TEST REPORT CERTIFICATION

Applicant	:	FUTABA Corporation
Manufacturer	:	FUTABA Corporation
EUT Description	:	Radio Control
FCC ID	:	AZPR3008SB-24G

(A) Model No.	:	R3008SB
(B) Serial No.	:	N/A
(C) Brand	:	Futaba
(D) Power Supply	:	DC 6V
(E) Test Voltage	:	DC 6V (Via Battery)

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, Oct. 2013
AND ANSI C63.4/2003

(FCC CFR 47 Part 15C, §15.207 and §15.209 and §15.247)

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the FCC Part 15 subpart C limits.

The measurement results are contained in this test report and AUDIX Technology Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : 2014. 01. 08 ~ 09 Date of Report : 2014. 01. 21

Producer : _____
(Tina Huang/Administrator)

Signatory : _____
(Ben Cheng/Manager)

1. DESCRIPTION OF VERSION

Edition No.	Date of Rev.	Revision Summary	Report No.
0	2014. 01. 21	Original Report.	EM-F140047

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Product	Radio Control
Model Number	R3008SB
Serial Number	N/A
Brand Name	Futaba
Applicant	FUTABA Corporation 1080 Yabutsuka Chosei-son Chosei-gun Chiba, 299-4395 Japan.
Manufacturer	FUTABA Corporation 1080 Yabutsuka Chosei-son Chosei-gun Chiba, 299-4395 Japan.
FCC ID	AZPR3008SB-24G
Fundamental Range	T-FHSS: 2407.500MHz ~ 2467.500MHz
Frequency Channel	T-FHSS: 31 channels
Radio Technology	T-FHSS Modulation
Data Transfer Rate	T-FHSS: 2.0MHz
Date of Receipt of Sample	2013. 12. 20
Date of Test	2014. 01. 08 ~ 09

2.2. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Peak Gain
ANT1409-161G/M-BT-210L	NISSEI	Coaxial Antenna	-5.16dBi

2.3. Tested Supporting System Details

No.	Product	Brand	Model No.	Serial No.	FCC ID	Cable Lists
1	DC Power Supply	TOP WARD	3303A	N/A	FCC DoC Approved	DC Cable*2: Non-Shielded, Detachable, 0.6m Power Cord: Non-Shielded, Detachable, 1.8m
2	SEVER*7	FUTABA Corporation	S3003	N/A	FCC DoC Approved	Data Cord: Non-Shielded, Detachable, 0.4m
3	SWITCH	N/A	N/A	N/A	FCC DoC Approved	Power Cord: Non-Shielded, Detachable, 0.15m
4	Notebook PC	DELL	P20G	N/A	FCC DoC Approved	USB JIG Cable: Non-Shielded, Detachable, 1.0m Adapter: DELL, M/N: AA90PM111 DC Cord: Non-Shielded, Undetachable, 1.8m Bonded a ferrite core AC Power Cord: Non-Shielded, Detachable, 1.8m

2.4. Description of Test Facility

Name of Firm	:	**AUDIX Technology Corporation** **EMC Department** No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility (AC)	:	**Semi-Anechoic Chamber** No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan May 11, 2012 Renewal on Federal Communication Commission Registration Number: 90993
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

2.5. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Radiation Test (Distance: 3m)	30MHz~300MHz	±2.91dB
	300MHz~1000MHz	±2.94dB
	Above 1GHz	± 5.02dB

Remark **:** Uncertainty = $ku_c(y)$

Test Item	Uncertainty
20dB Bandwidth	± 0.2kHz
Carrier Frequency Separation	± 0.2kHz
Time Of Occupancy	± 0.03sec
Maximum peak Output power	± 0.52dBm
Emission Limitations	± 0.13dB
Band Edges	± 0.13dB

3. CONDUCTED EMISSION MEASUREMET

【The EUT only employs DC power for operation, no conductive emission limits are required according to FCC Part 15 Section §15.207】

4. RADIATED EMISSION MEASUREMENT

4.1. Test Equipment

The following test equipment was used during the radiated emission measurement:

4.1.1. For Frequency Range 30MHz~1000MHz (at Semi-Anechoic Chamber)

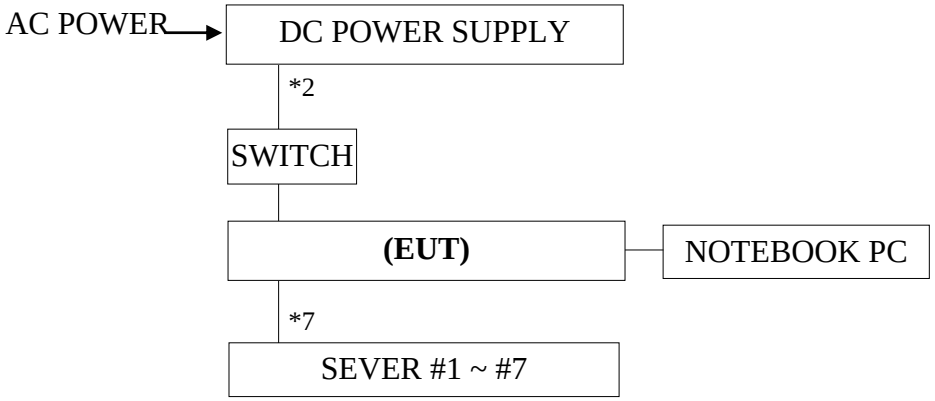
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2013. 07. 30	2014. 07. 29
2	Test Receiver	R & S	ESCS30	100338	2013. 07. 01	2014. 06. 30
3	Amplifier	HP	8447D	2944A06305	2013. 02. 19	2014. 02. 18
4	Bilog Antenna	CHASE	CBL6112D	33821	2013. 08. 08	2014. 08. 07

4.1.2. For Frequency Above 1GHz (at Semi-Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2013 07. 30	2014. 07. 29
2	Test Receiver	R & S	ESCS30	100338	2013. 07. 01	2014. 06. 30
3	Pre-Amplifier	Agilent	8449B	3008A02676	2013. 03. 01	2014. 02. 28
4	2.4GHz Notch Filter	K&L	7NSL10-2441 .5E130.5-00	1	2013. 06. 13	2014. 06. 12
5	3G High Pass Filter	Microware Circuits	H3G018G1	484796	2013. 06. 13	2014. 06. 12
6	Horn Antenna	EMCO	3115	9609-4927	2013. 06. 17	2014. 06. 16
7	Horn Antenna	EMCO	3116	2653	2013. 10. 11	2014. 10. 10

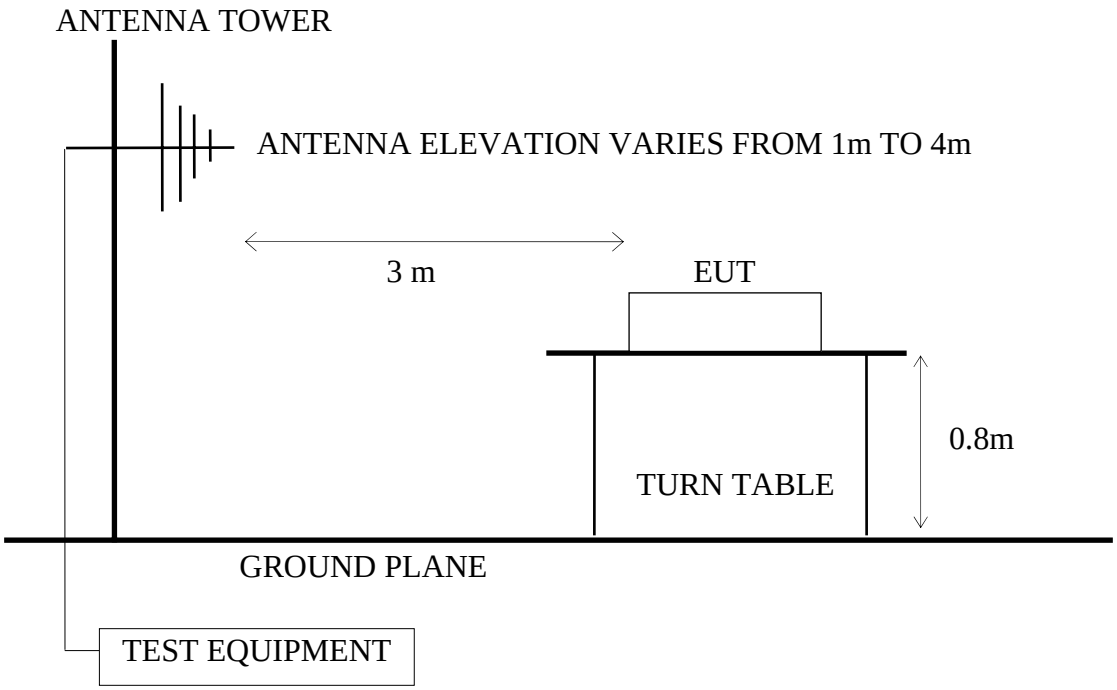
4.2. Test Setup

4.2.1. Block Diagram of connection between EUT and simulators

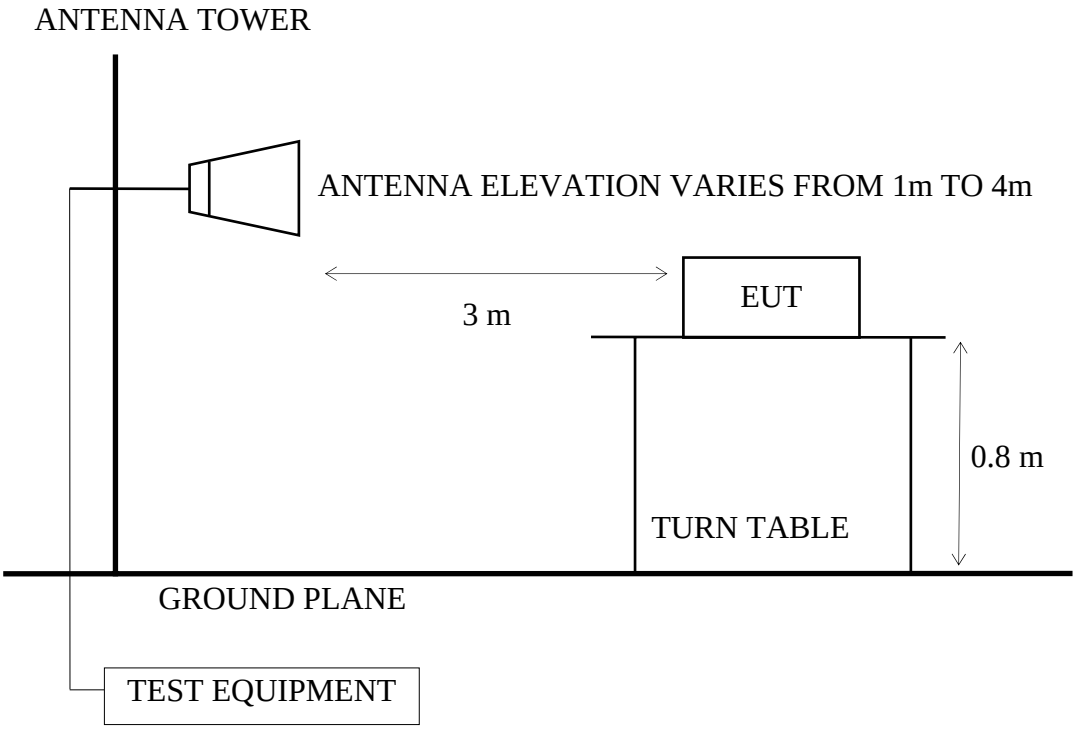


EUT: Radio Control

4.2.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000MHz



4.2.3. Semi-Anechoic Chamber (3m) Setup Diagram for above 1GHz



4.3. Radiated Emission Limits (§15.209)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		μV/m	dBμV/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark：(1) Emission level (dBμV/m) = 20 log Emission level (μV/m)

(2) The tighter limit applies at the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) The limits in this table are based on CFR 47 Part 15.205(a)(b) and Part 15.209 (a).

(5) The over 1GHz limit, FCC limit is used based on CFR 47 Part 15.35 (b) and Part 15.205(b) & Part 15.209(e) and Part 15.207(c).

4.4. Operating Condition of EUT

4.4.1. Set up the EUT (Radio Control) as shown on 4.2.

4.4.2. To turn on the power of all equipment.

4.4.3. The EUT was set the Notebook PC system using test program “Futaba Term”.
(Note: The Notebook PC system is not EUT’s accessory, It’s only used to setup EUT.)

4.4.4. The EUT was set to continuously transmit signals at 2407.500MHz、2435.500MHz and 2467.500MHz at T-FHSS modulation during testing.

4.5. Test Procedure

The EUT and its simulators were placed on a turn table which was 0.8 meter above the ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna could be moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antennas such as calibrated biconical and log-periodical antenna or horn antenna were used as a receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to FCC ANSI C63.4-2003 regulation.

The bandwidth of the R&S Test Receiver ESCS30 was set at 120kHz. (For 30MHz to 1000MHz)

The resolution bandwidth and video bandwidth of test spectrum analyzer is 1MHz for peak detection (PK) at frequency above 1GHz.

The resolution bandwidth of test spectrum analyzer is 1MHz and the video bandwidth is 10Hz for average detection (AV) at frequency above 1GHz.

The frequency range from 30MHz to 25GHz (Up to 10^{th} harmonics from fundamental frequency) was checked. 30MHz to 1000MHz was measured with Quasi-Peak detector. Pursuant to ANSI 4.2.2, peak detector is an alternate option for frequency from 30MHz to 1000MHz.

Above 1GHz was measured with peak and average detector. For frequency from 5.5GHz to 25GHz, we checked it in 1 meter distance and with a shorter cable 2 meter instead of original's. There is no signal exist.

4.6. Radiated Emission Measurement Results

PASSED.

(All emissions not reported below are too low against the prescribed limits.)

EUT：Radio Control M/N：R3008SB

Test Date：2014. 01. 09 Temperature：22℃ Humidity：42%

For Frequency Range 30MHz~1000MHz:

The EUT was measured during this section testing and all the test results are listed in section 4.6.1.

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	01	2407.5MHz	Transmit	# 5	# 1
2.	15	2435.5MHz		# 6	# 2
3.	31	2467.5MHz		# 7	# 3

* Above all final readings were measured with Quasi-Peak detector.

For Frequency above 1GHz:

The EUT was measured during this section testing and all the test results are listed in section 4.6.2.

Mode	Chnnel	Frequency	Test Mode	Test Frequency Range
1.	01	2407.500MH	Transmit	**1000-3000MHz***
2.				3000-5500MHz
3.				5500-8000MHz
4.				8000-12500MHz
5.				12500-18000MHz
6.				18000-25000MHz
7.	15	2435.500MHz	Transmit	**1000-3000MHz***
8.				3000-5500MHz
9.				5500-8000MHz
10.				8000-12500MHz
11.				12500-18000MHz
12.				18000-25000MHz
13.	31	2467.500MHz	Transmit	1000-3000MHz
14.				3000-5500MHz
15.				5500-8000MHz
16.				8000-12500MHz
17.				12500-18000MHz
18.				18000-25000MHz

Note: 1. Above all final readings were measured with Peak and Average detector.
2. The emissions (up to 25GHz) not reported that there is no emission to be found.
3.”*” means there is spurious emission falling the frequency band and be measures.

For Restricted Bands:

The EUT was tested in restricted bands and all the test results are listed in section 4.6.3. (The restricted bands defined in part 15.205(a))

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	01	2407.500MHz	Transmit	# 3	# 4
2.	31	2467.500MHz	Transmit	# 2	# 1

4.6.1. Frequency Range 30-1000MHz

Frequency: 2407.500MHz

Site no. : Audix NO.1 Chamber Data no. : 5
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
Limit : 30M-1G
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2407.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	224.97	10.95	3.30	24.40	38.65	46.00	7.35	Peak
2	348.16	15.25	4.31	20.63	40.19	46.00	5.81	Peak
3	497.54	17.76	6.43	12.03	36.22	46.00	9.78	Peak
4	864.20	21.32	7.20	5.78	34.30	46.00	11.70	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte

Site no. : Audix NO.1 Chamber Data no. : 1
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
Limit : 30M-1G
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2407.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	114.39	12.29	2.30	24.59	39.18	43.50	4.32	Peak
2	450.98	17.11	5.40	18.04	40.55	46.00	5.45	Peak
3	498.51	17.77	6.50	17.34	41.61	46.00	4.39	Peak
4	665.35	19.50	6.40	10.96	36.86	46.00	9.14	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte

Frequency: 2435.500MHz

Site no. : Audix NO.1 Chamber Data no. : 6
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
Limit : 30M-1G
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2435.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	224.97	10.95	3.30	25.09	39.34	46.00	6.66	Peak
2	359.80	15.54	4.40	19.95	39.89	46.00	6.11	Peak
3	498.51	17.77	6.50	12.02	36.29	46.00	9.71	Peak
4	768.17	20.35	6.80	7.06	34.21	46.00	11.79	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte

Site no. : Audix NO.1 Chamber Data no. : 2
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
Limit : 30M-1G
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2435.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	102.75	11.57	2.10	24.86	38.53	43.50	4.97	Peak
2	449.04	17.09	5.40	17.37	39.86	46.00	6.14	Peak
3	498.51	17.77	6.50	17.79	42.06	46.00	3.94	Peak
4	623.64	19.24	6.20	8.58	34.02	46.00	11.98	Peak
5	751.68	20.22	6.70	6.65	33.57	46.00	12.43	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte

Frequency: 2467.500MHz

Site no. : Audix NO.1 Chamber Data no. : 7
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : HORIZONTAL
Limit : 30M-1G
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2467.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	224.97	10.95	3.30	24.06	38.31	46.00	7.69	Peak
2	349.13	15.27	4.30	22.58	42.15	46.00	3.85	Peak
3	497.54	17.76	6.43	11.69	35.88	46.00	10.12	Peak
4	865.17	21.32	7.20	5.57	34.09	46.00	11.91	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte

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Site no. : Audix NO.1 Chamber Data no. : 3
Dis. / Ant. : 3m CBL6112D 33821 Ant. pol. : VERTICAL
Limit : 30M-1G
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2467.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	30.00	19.80	1.10	17.20	38.10	40.00	1.90	Peak
2	450.98	17.11	5.40	17.07	39.58	46.00	6.42	Peak
3	498.51	17.77	6.50	17.44	41.71	46.00	4.29	Peak
4	623.64	19.24	6.20	7.15	32.59	46.00	13.41	Peak
5	697.36	19.50	6.50	4.78	30.78	46.00	15.22	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte

4.6.2. Above 1GHz Frequency Range Measurement Results

Date of Test： 2014. 01. 09 Temperature： 22℃

EUT： Radio Control Humidity： 59%

Test Mode： Transmit, Channel: 01, Frequency: 2407.500MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (Horizontal) (dBμV)	Emission Level (Horizontal) (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Average	2330.00	28.32	6.26	4.41	38.99	54.00	15.01
Peak	2330.00	28.32	6.26	19.34	53.92	74.00	20.08
Average	2352.00	28.40	6.29	5.05	39.74	54.00	14.26
Peak	2352.00	28.40	6.29	23.16	57.85	74.00	16.15

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (Vertical) (dBμV)	Emission Level (Vertica)l (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Average	2350.00	28.36	6.29	12.23	46.88	54.00	7.12
Peak	2350.00	28.36	6.29	18.24	52.89	74.00	21.11

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.

2. The emission levels that are 20dB below the official limit are not reported.

Date of Test： 2014. 01. 09 Temperature： 22℃

EUT： Radio Control Humidity： 59%

Test Mode： Transmit, Channel: 15, Frequency: 2435.500MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (Horizontal) (dBμV)	Emission Level (Horizontal) (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Average	2286.00	28.24	6.21	3.26	37.71	54.00	16.29
Peak	2286.00	28.24	6.21	18.39	52.84	74.00	21.16

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.
3. Vertical not reported that there is no emission to be found.

4.6.3. Restricted Bands Measurement Results

Date of Test： 2014. 01. 09 Temperature： 22℃

EUT： Radio Control Humidity： 59%

Test Mode： Transmit, Channel: 01, Frequency: 2407.500MHz

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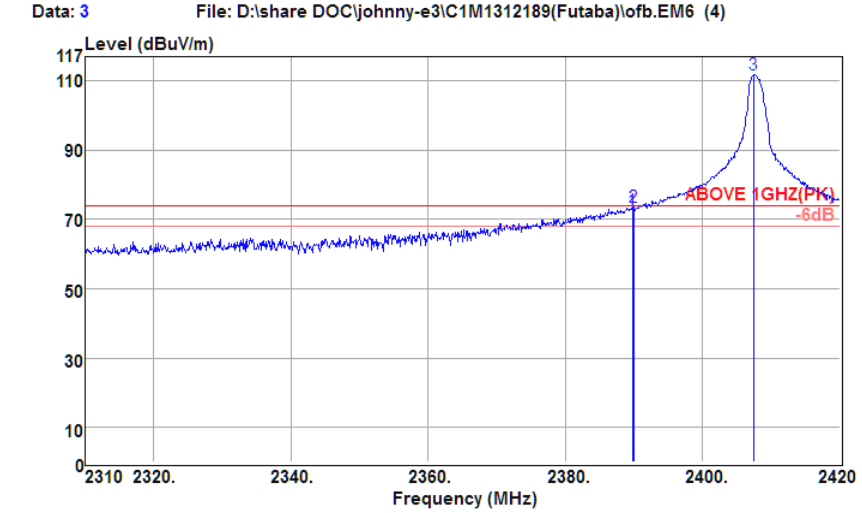

Site no. : Audix NO.1 Chamber Data no. : 3
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2407.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2389.86	28.47	6.34	37.80	72.61	74.00	1.39	Peak
2	2389.97	28.47	6.34	38.75	73.56	74.00	0.44	Peak
@ 3	2407.46	28.51	6.36	76.80	111.67	74.00	-37.67	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte
3. "@" The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value (dBuV/m)	Limit (dBμV/m)	Margin(dB) (dB)
2389.86	72.61	-35.75	36.86	54.00	17.14
2389.97	73.56	-35.75	37.81	54.00	16.19

Remarks: 1. Avearage value=Peak value + Duty Cycle Correction Factor。
2. Duty Cycle Correction Factor = 20log (dwell time/100ms)
= 20log (1.63ms/100ms)=-35.75
3. Margin= Limit –Average Value。

Date of Test： 2014. 01. 09 Temperature： 22℃

EUT： Radio Control Humidity： 59%

Test Mode： Transmit, Channel: 01, Frequency: 2407.500MHz

AUDIX Technology Corporation
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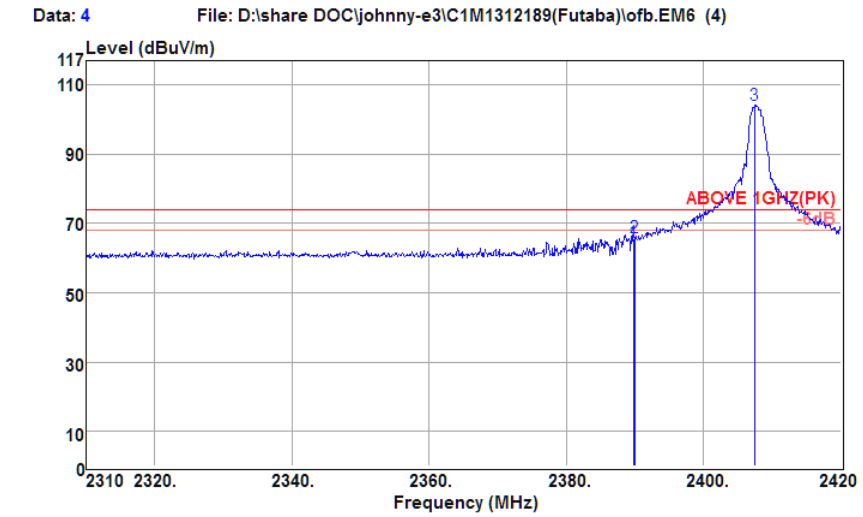


Site no. : Audix NO.1 Chamber Data no. : 4
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2407.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2389.86	28.47	6.34	29.80	64.61	74.00	9.39	Peak
2	2389.97	28.47	6.34	31.29	66.10	74.00	7.90	Peak
@ 3	2407.46	28.51	6.36	69.16	104.03	74.00	-30.03	Peak

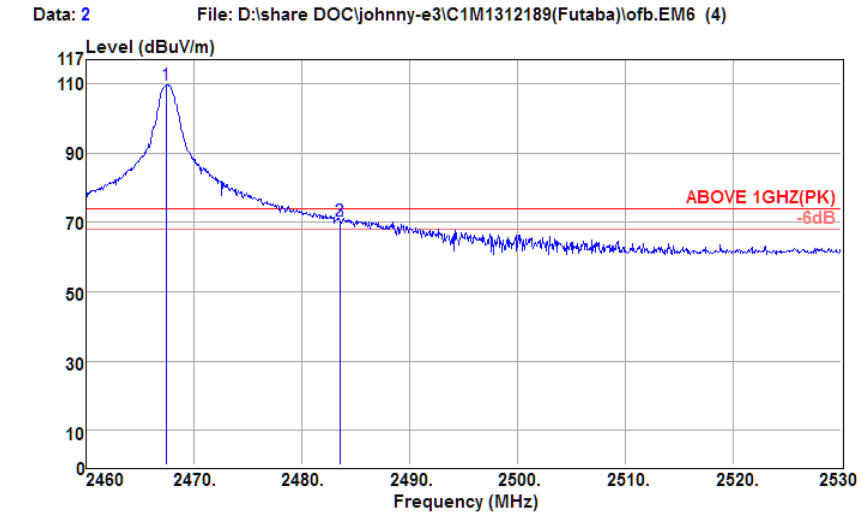
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported
3. "@" The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value (dBuV/m)	Limit (dBμV/m)	Margin(dB) (dB)
2389.86	64.61	-35.75	28.86	54.00	25.14
2389.97	66.10	-35.75	30.35	54.00	23.65

Remarks: 1. Avearage value=Peak value + Duty Cycle Correction Factor。
2. Duty Cycle Correction Factor = 20log (dwell time/100ms)
= 20log (1.63ms/100ms)=-35.75
3. Margin= Limit –Average Value。

Date of Test：	2014. 01. 09	Temperature：	22℃
EUT：	Radio Control	Humidity：	59%
Test Mode：	Transmit, Channel: 31, Frequency: 2467.500MHz		

AUDIX Technology Corporation
EMC Department
No.53-11, Dingfu, Linkou Dist., New Taipei City,
Taiwan R.O.C. Post Code:24443
Tel:+886-2-26092133 Fax:+886-2-26099303
Email:ttemc@ttemc.com.



Site no. : Audix NO.1 Chamber Data no. : 2
Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2467.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
@1	2467.49	28.62	6.42	74.57	109.61	74.00	-35.61	Peak
2	2483.52	28.66	6.45	35.24	70.35	74.00	3.65	Peak
3	2483.59	28.66	6.45	35.54	70.65	74.00	3.35	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte
3. "@" The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value (dBuV/m)	Limit (dBμV/m)	Margin(dB) (dB)
2483.52	70.35	-35.75	34.60	54.00	19.40
2483.59	70.65	-35.75	34.90	54.00	19.10

Remarks: 1. Avearage value=Peak value + Duty Cycle Correction Factor。
2. Duty Cycle Correction Factor = 20log (dwell time/100ms)
= 20log (1.63ms/100ms)=-35.75
3. Margin= Limit –Average Value。

Date of Test： 2014. 01. 09 Temperature： 22℃

EUT： Radio Control Humidity： 59%

Test Mode： Transmit, Channel: 31, Frequency: 2467.500MHz

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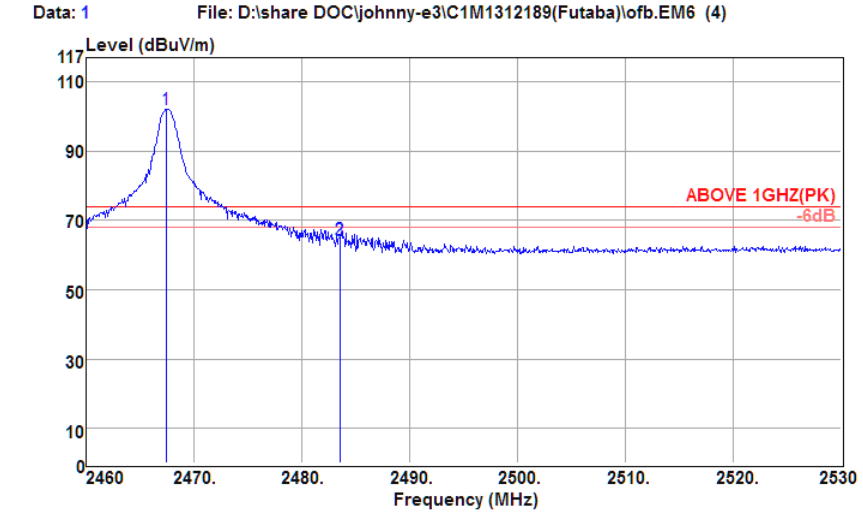


Site no. : Audix NO.1 Chamber Data no. : 1
Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
Limit : ABOVE 1GHZ(PK)
Env. / Ins. : 22*C / 59% N9030A(140) Engineer : Johnny_Hsueh
EUT : R3008SB
Power Rating : DC 6.0V
Test Mode : T-FHSS(Tx2467.5MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
@1	2467.49	28.62	6.42	67.21	102.25	74.00	-28.25	Peak
2	2483.52	28.66	6.45	29.36	64.47	74.00	9.53	Peak
3	2483.59	28.66	6.45	29.13	64.24	74.00	9.76	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reporte
3. "@" The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Correction Factor (dB)	Average Value (dBuV/m)	Limit (dBμV/m)	Margin(dB) (dB)
2483.52	64.47	-35.75	28.72	54.00	25.28
2483.59	64.24	-35.75	28.49	54.00	25.51

Remarks: 1. Avearage value=Peak value + Duty Cycle Correction Factor。
2. Duty Cycle Correction Factor = 20log (dwell time/100ms)
= 20log (1.63ms/100ms)=-35.75
3. Margin= Limit –Average Value。

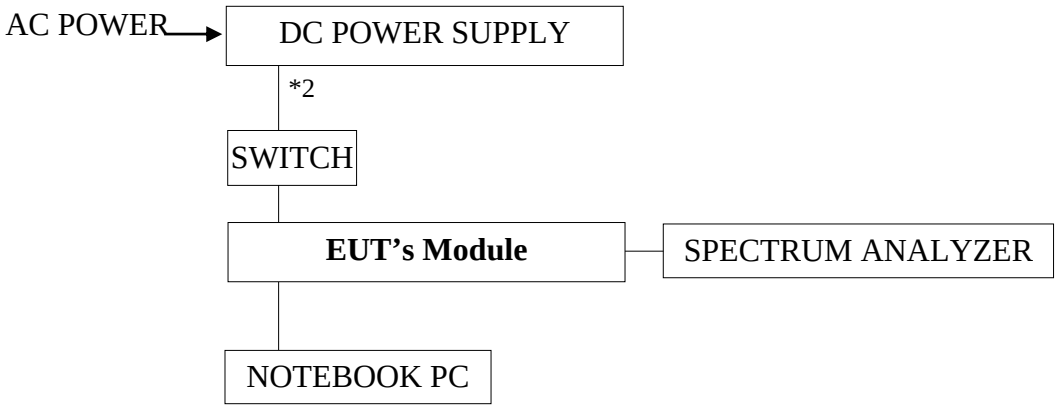
5. 20dB BANDWIDTH MEASUREMENT

5.1. Test Equipment

The following test equipment was used during the 20dB bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	R&S	FSV30	101181	2013. 03. 13	2014. 03. 12

5.2. Block Diagram of Test Setup



EUT: Radio Control

5.3. Specification Limits (§15.247(a)(1))

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

5.4. Operating Condition of EUT

5.4.1. Set up the EUT and simulator as shown on 4.2.

5.4.2. To turn on the power of all equipment.

5.4.3. EUT (Radio Control) was on transmitting frequency function during the testing.

5.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The RBW of the fundamental frequency was measure by spectrum analyzer 1% of the 20dB bandwidth and the setting equal to RBW and VBW is equal to RBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.
The measurement guideline was according to FCC Public Notice DA 00-705.

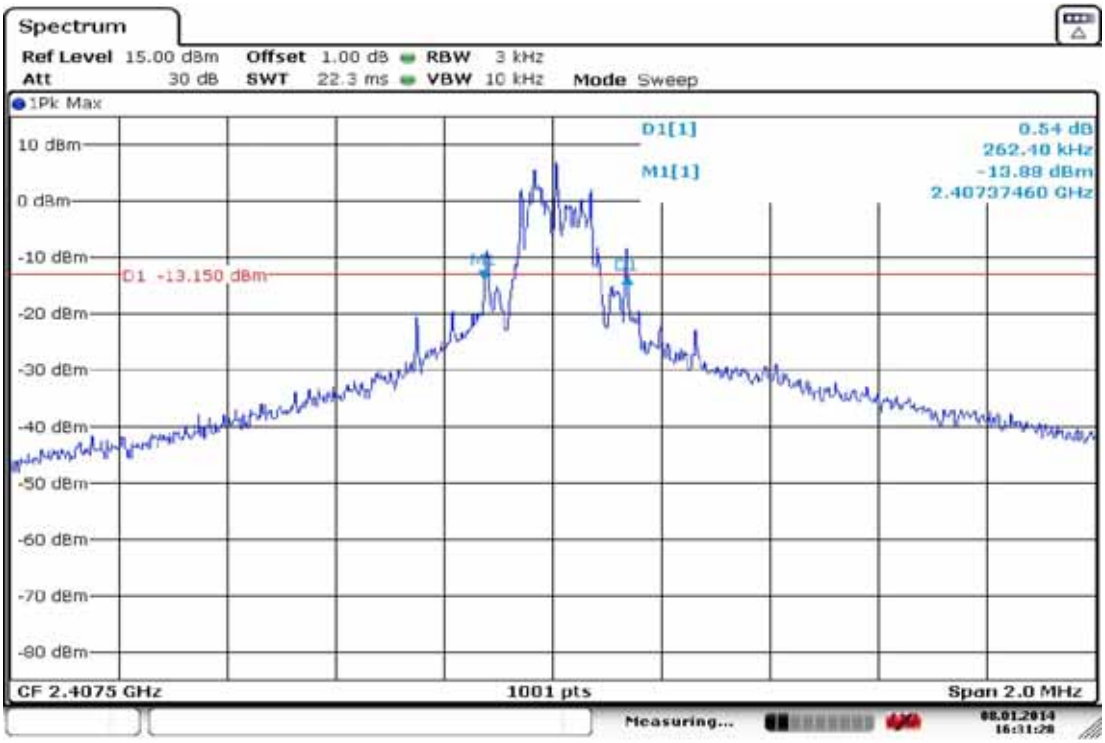
5.6. Test Results

PASSED. All the test results are attached in next pages.
(ANT B was measured for having worst performance.)
Test Date : 2014. 01. 08 Temperature : 24℃ Humidity : 50%

No.	Channel	Test Frequency	**20dB Bandwidth**	**2/3 (20dB Bandwidth)**
1.	01	2407.500MHz	**262.40kHz**	**175kHz**
2.	15	2435.500MHz	**266.90kHz**	**178kHz**
3.	31	2467.500MHz	**263.30kHz**	**176kHz**

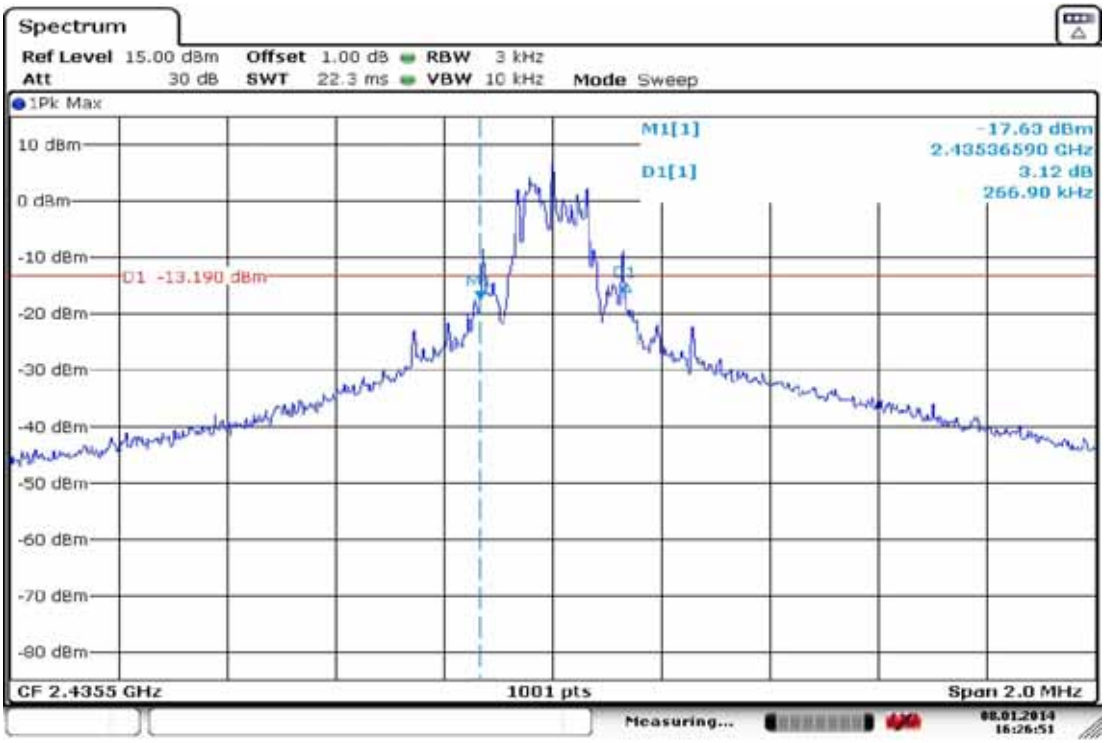
The maximum two-thirds of the 20dB bandwidth shall be at maximum 178kHz.

Channel 01, Frequency: 2407.500MHz



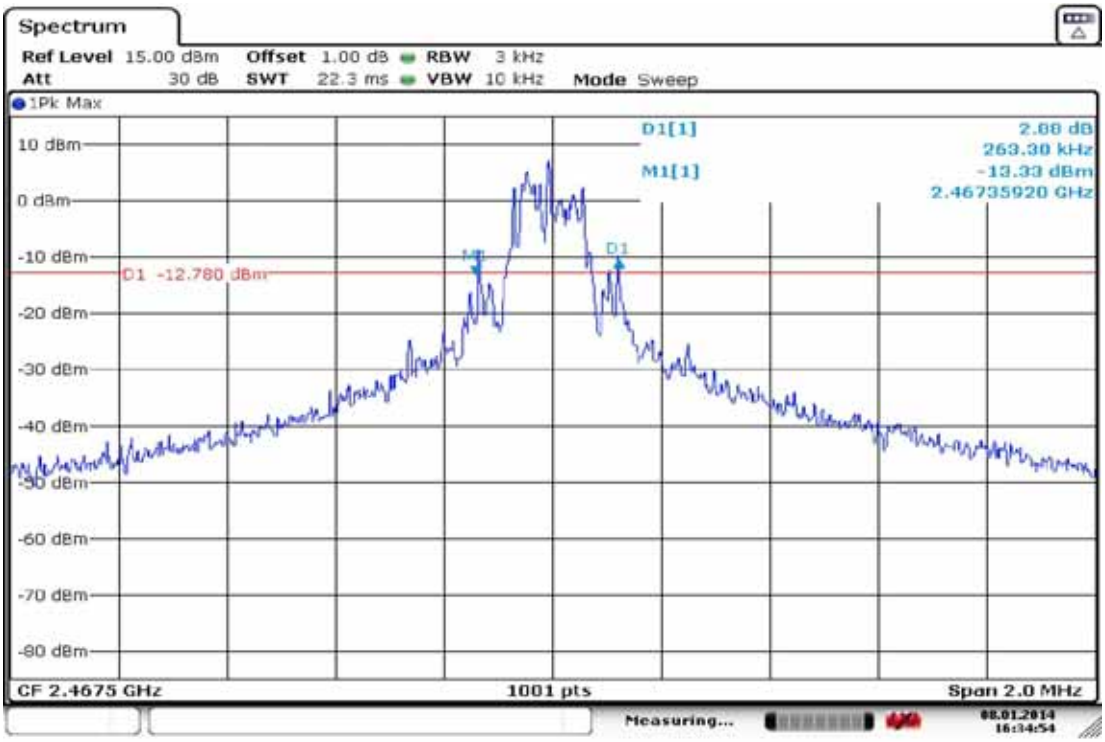
Date: 8.JAN.2014 16:31:28

Channel 30, Frequency: 2435.500MHz



Date: 8.JAN.2014 16:26:51

Channel 60, Frequency: 2467.500MHz



Date: 8.JAN.2014 16:34:54

6. CARRIER FREQUENCY SEPARATION MEASUREMENT

6.1. Test Equipment

The following test equipment was used during the carrier frequency separation measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	R&S	FSV30	101181	2013. 03. 13	2014. 03. 12

6.2. Block Diagram of Test Setup

The same as section.4.2.

6.3. Specification Limits (§15.247(a)(1))

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output no greater than 125mW.

6.4. Operating Condition of EUT

Same as 20dB bandwidth measurement which was listed in section 4.4.

6.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The channel separation was measure by spectrum analyzer with RBW equal to 1% of the span. The video bandwidth not to be smaller than resolution bandwidth, the peak was mark on adjacent bandwidth, the between of peak is carrier frequency separation.
The measurement guideline was according to FCC Public Notice DA 00-705.

6.6. Test Results

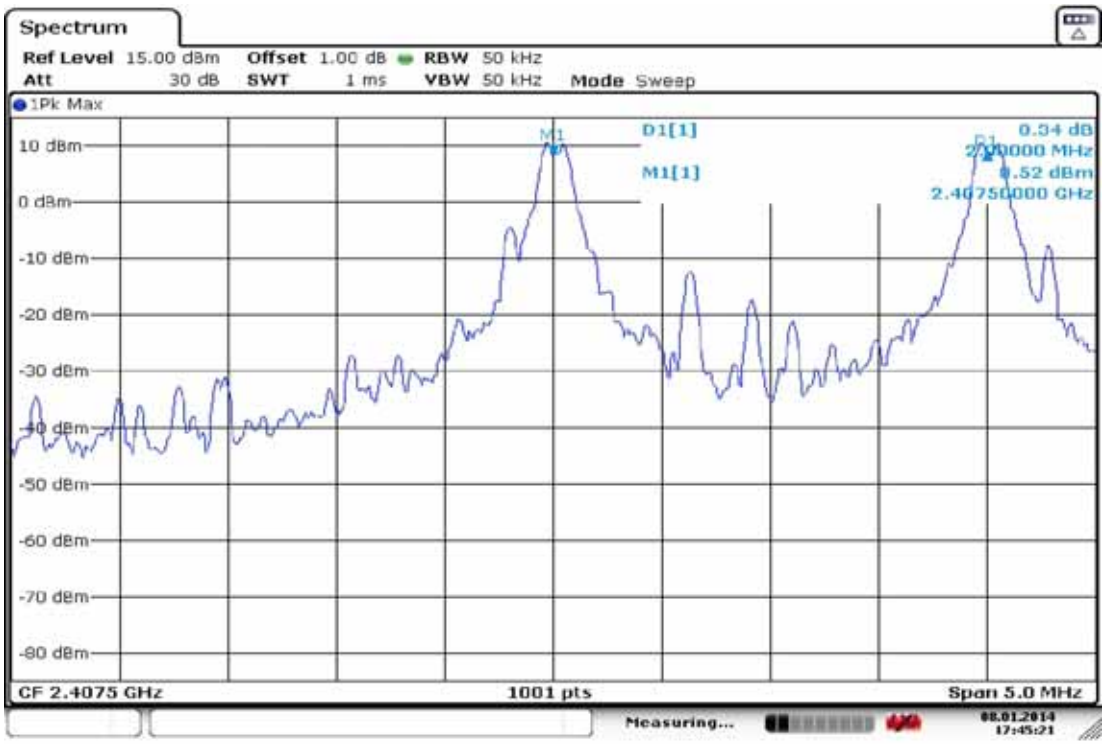
PASSED. All the test results are attached in next pages.
(ANT B was measured for having worst performance.)
Test Date : 2014. 01. 08 Temperature :25℃ Humidity : 60%

6.6.1. Radio Technology: T-FHSS Modulation

1. 2407.500MHz adjacent channel of carrier frequency separation: 2MHz。
2. 2435.500MHz adjacent channel of right carrier frequency separation: 2MHz。
3. 2435.500MHz adjacent channel of left carrier frequency separation: 2MHz。
4. 2467.500MHz adjacent channel of carrier frequency separation: 2MHz。

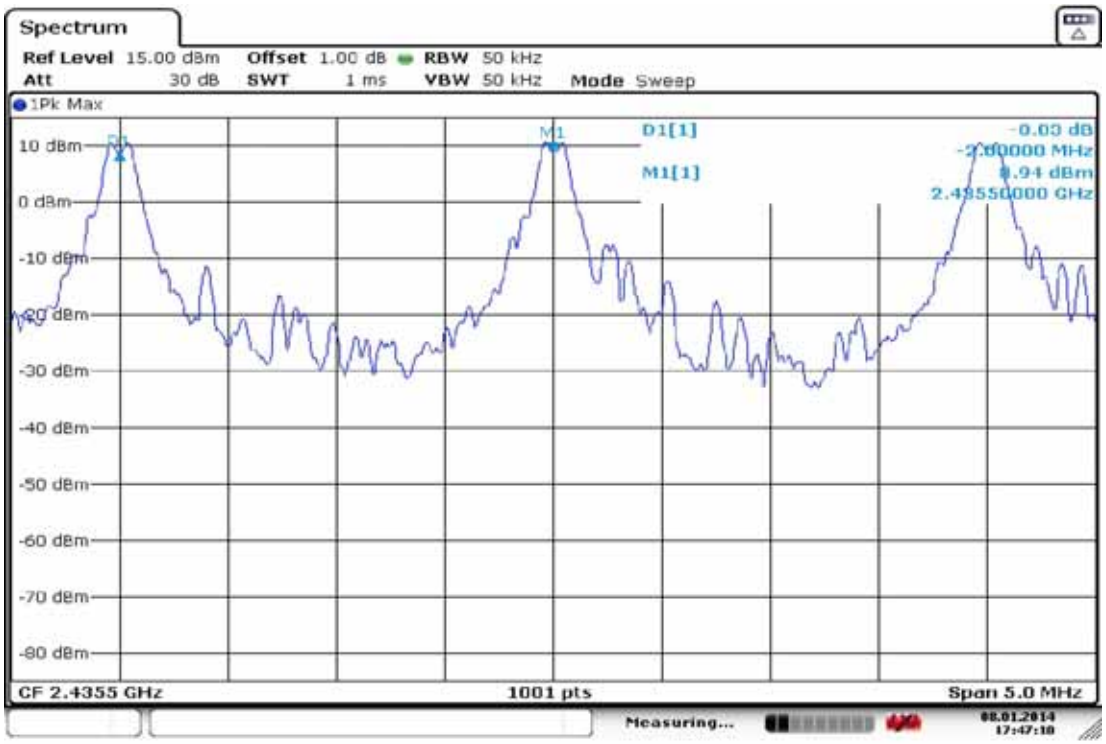
[Above values have met the requirement as specified in section 4.3: frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.]

Channel 01, Test Frequency: 2407.500MHz

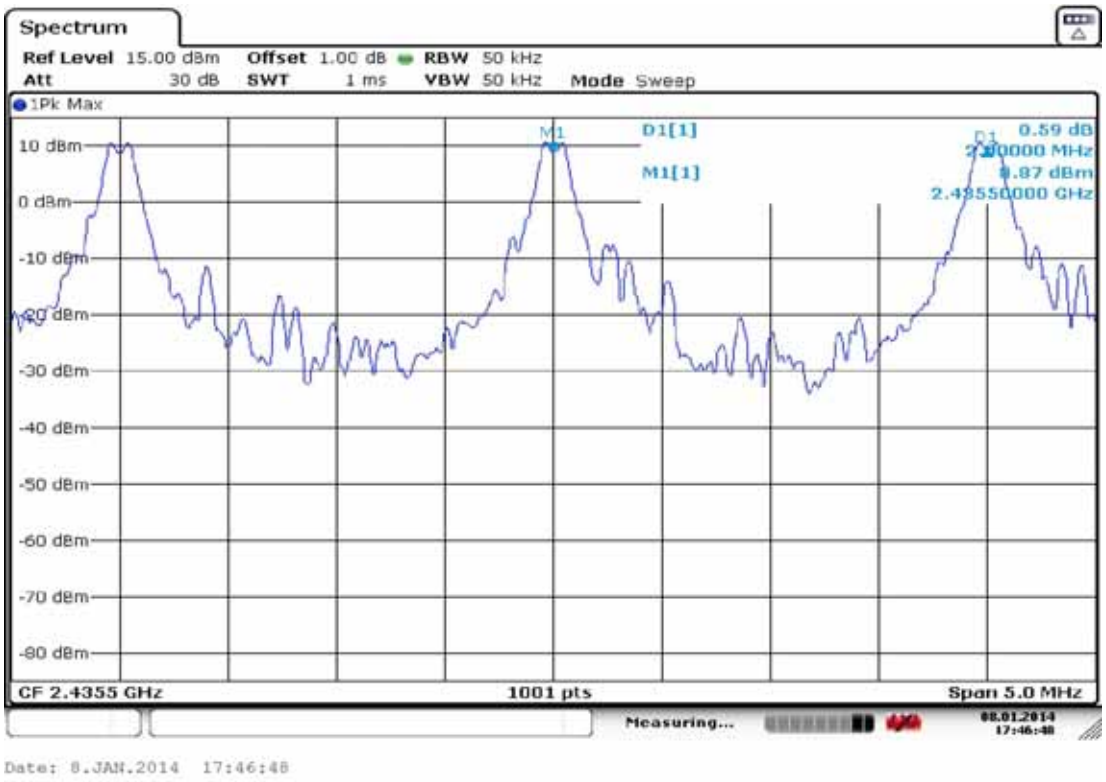


Date: 8.JAN.2014 17:45:21

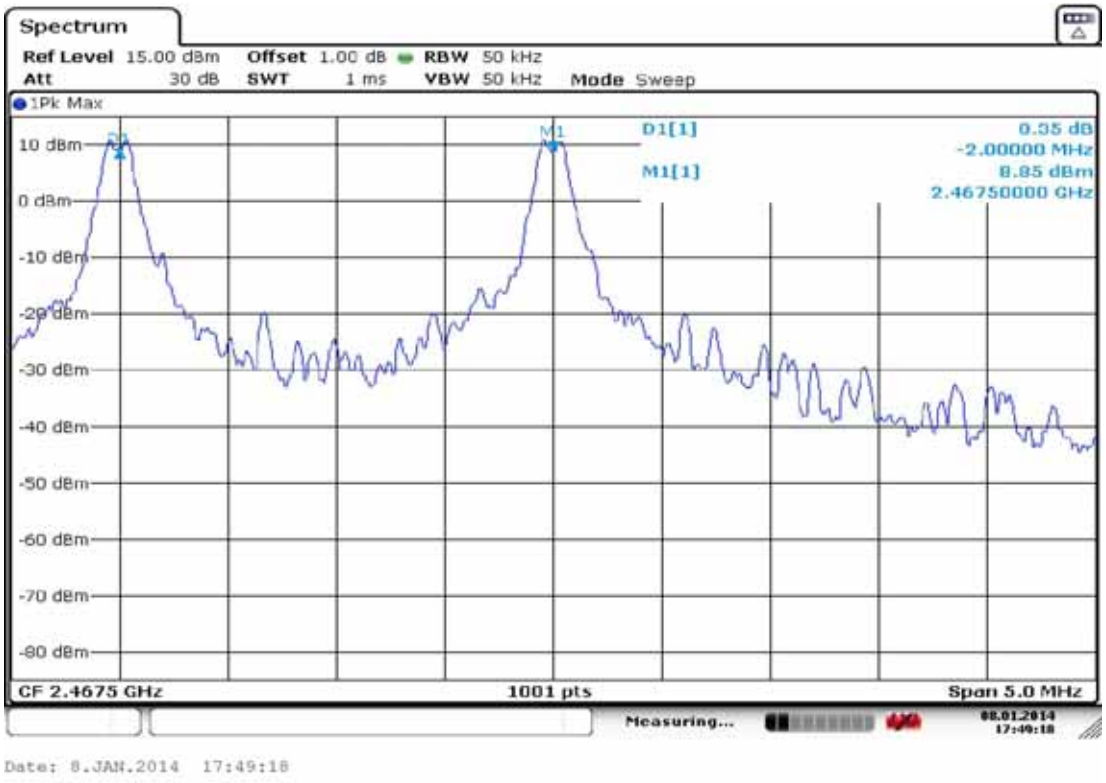
Channel 15, Test Frequency: 2435.500MHz



Date: 8.JAN.2014 17:47:10



Channel 31, Test Frequency: 2467.500MHz



7. TIME OF OCCUPANCY MEASUREMENT

7.1. Test Equipment

The following test equipment was used during the time of occupancy measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	R&S	FSV30	101181	2013. 03. 13	2014. 03. 12

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. Specification Limits (§15.247(a)(1)(iii))

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping 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 number of hopping channels employed.

7.4. Operating Condition of EUT

Same as 20dB bandwidth measurement which was listed in section 4.4.

7.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 1MHz RBW and 1MHz VBW. VBW≥RBW ; Span=zero span.
Centred on a hopping channel sweep=as necessary to capture the entire dwell time per hopping channel ; Detector function=peak ; Trace=Max hold

The measurement guideline was according to FCC Public Notice DA 00-705.

7.6. Test Results

PASSED. All the test results are attached in next pages.

Test Date : 2014. 01. 08 Temperature : 24℃ Humidity : 50%

Duty cycle: 31 channels*0.4 seconds = 12.4 seconds

Test Frequency: 2407.500MHz

For each 5 second of 6 channels appearance, the longest time of occupancy for each of 12.4 seconds is:

6channels*12.4 seconds/5* 1.625ms = 24.180ms (<400ms)

Test Frequency: 2435.500MHz

For each 5 second of 6 channels appearance, the longest time of occupancy for each of 12.4 seconds is:

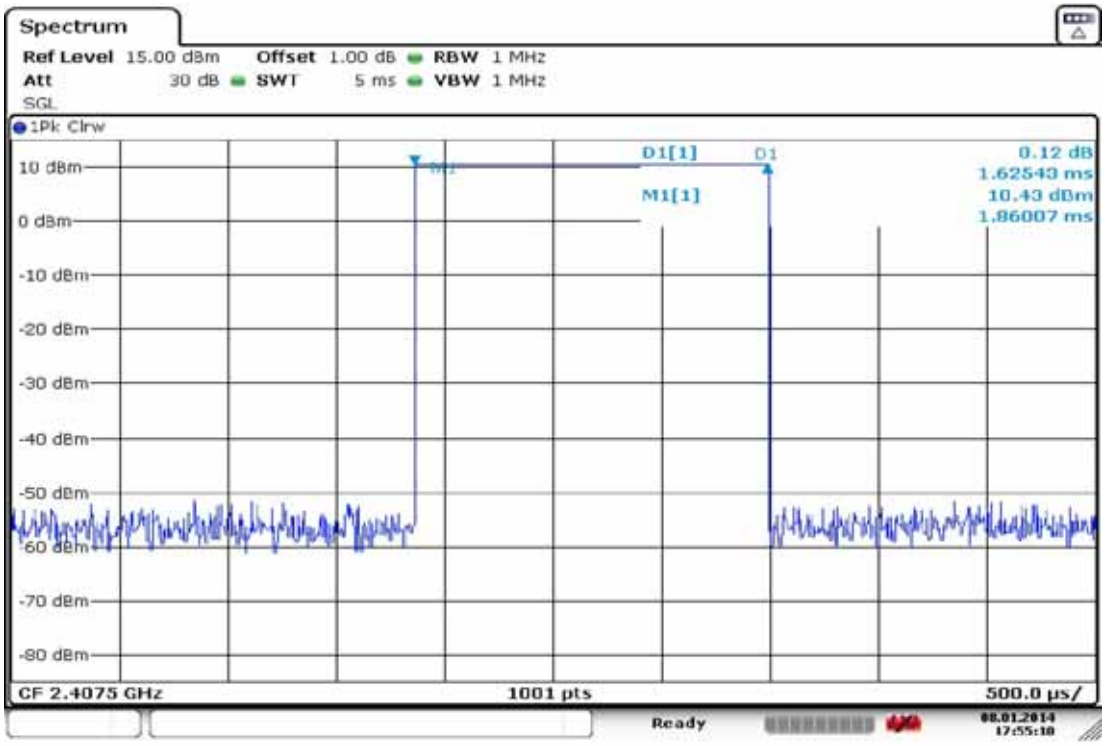
6channels*12.4 seconds/5* 1.628ms = 24.225ms (<400ms)

Test Frequency: 2467.500MHz

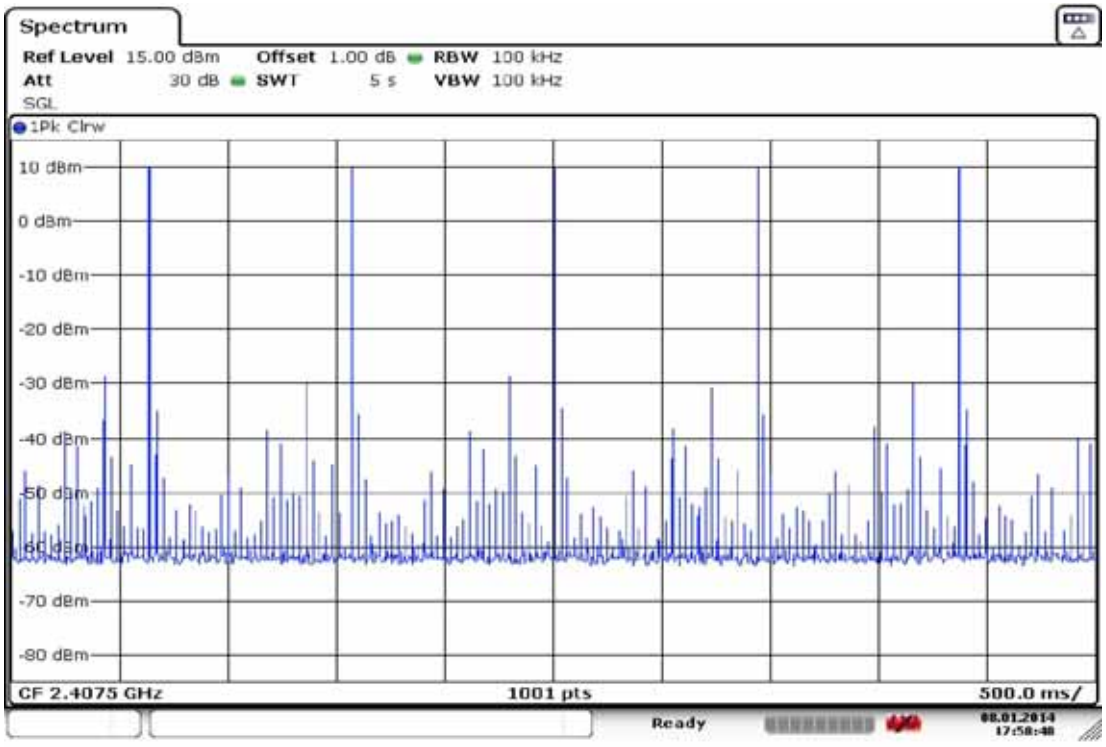
For each 5 second of 6 channels appearance, the longest time of occupancy for each of 12.4 seconds is:

6channels*12.4 seconds/5* 1.536ms = 22.856ms (<400ms)

Channel 01, Test Frequency: 2407.500MHz

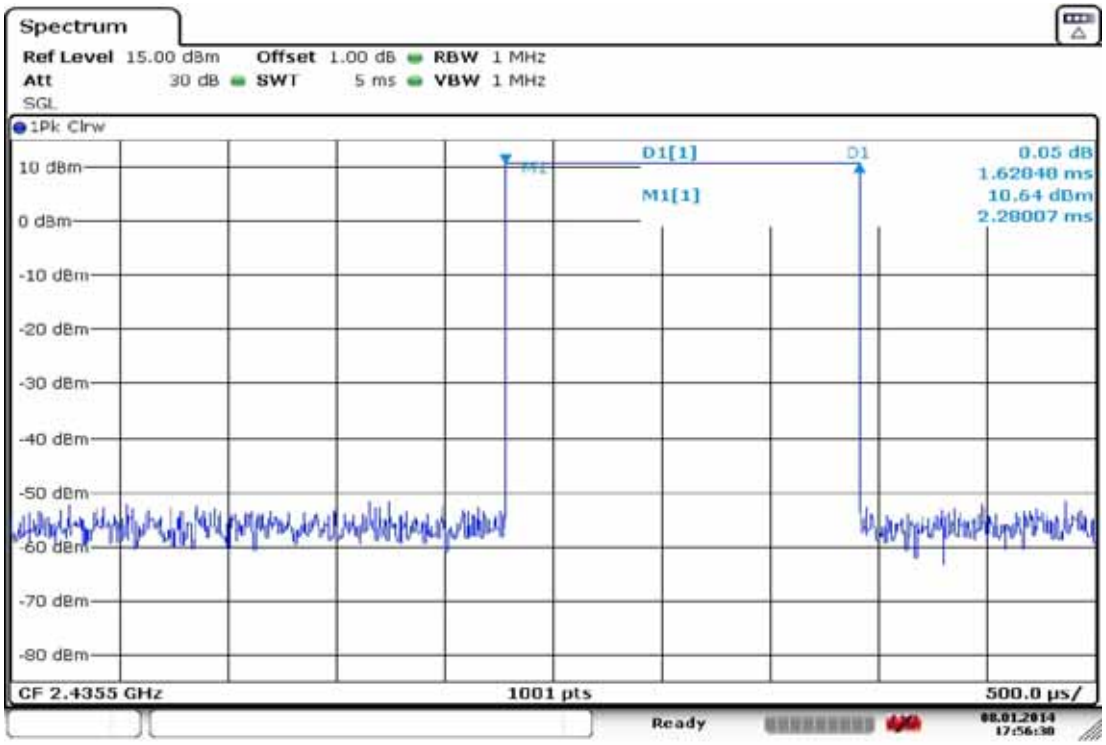


Date: 8.JAN.2014 17:55:10

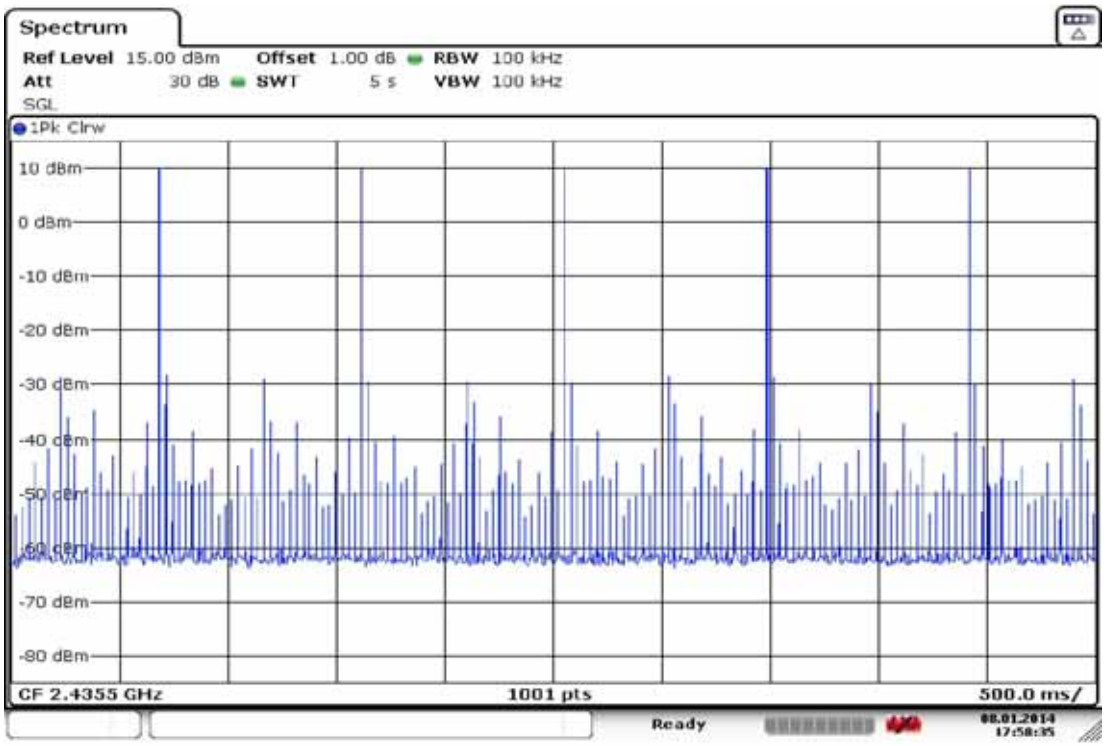


Date: 8.JAN.2014 17:58:47

Channel 15, Test Frequency: 2435.500MHz

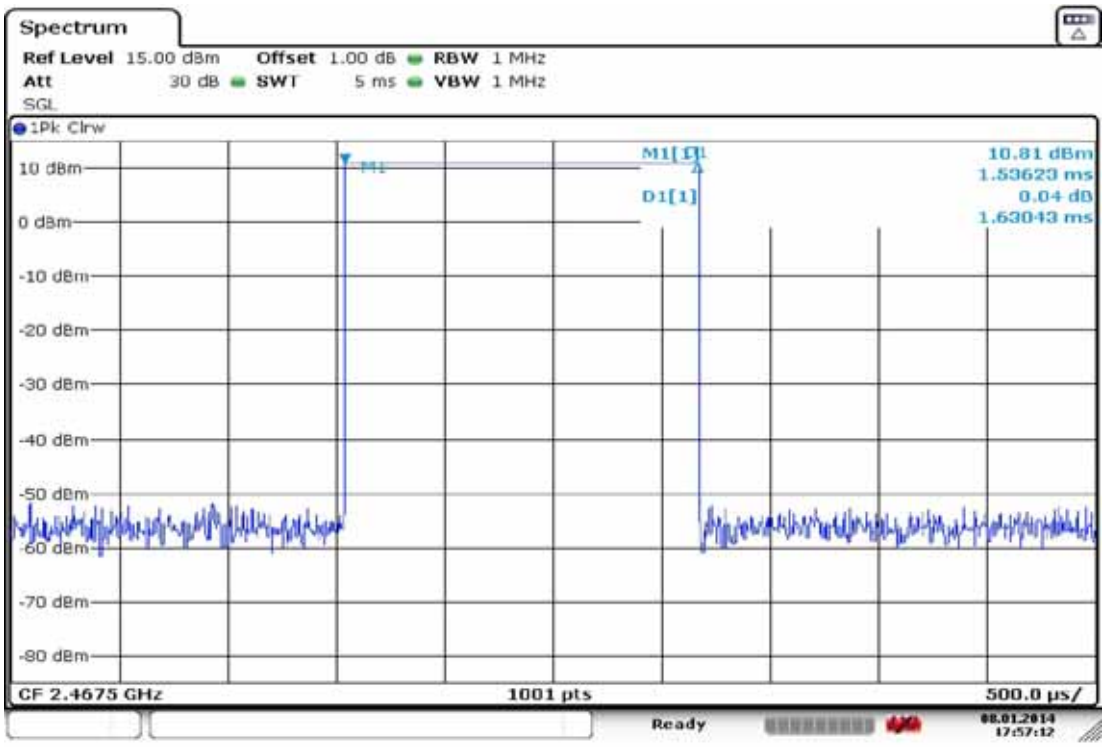


Date: 8.JAN.2014 17:56:30

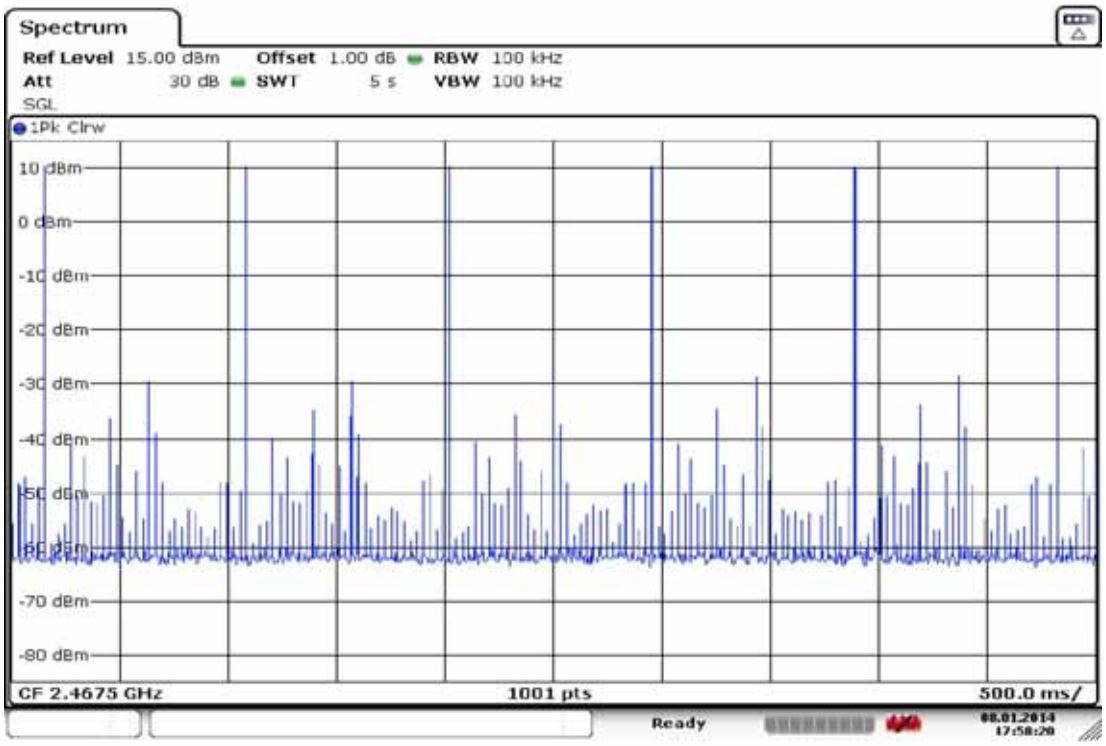


Date: 8.JAN.2014 17:58:35

Channel 60, Test Frequency: 2467.500MHz



Date: 8.JAN.2014 17:57:12



Date: 8.JAN.2014 17:58:20

8. NUMBER OF HOPPING CHANNELS MEASUREMENT

8.1. Test Equipment

The following test equipment was used during the number of hopping channels measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	R&S	FSV30	101181	2013. 03. 13	2014. 03. 12

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. Specification Limits (§15.247(a)(1)(iii))

Frequency hopping systems which use fewer than 20 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels.

8.4. Operating Condition of EUT

Same as 20dB bandwidth measurement which was listed in section 4.4.

8.5. Test Procedure

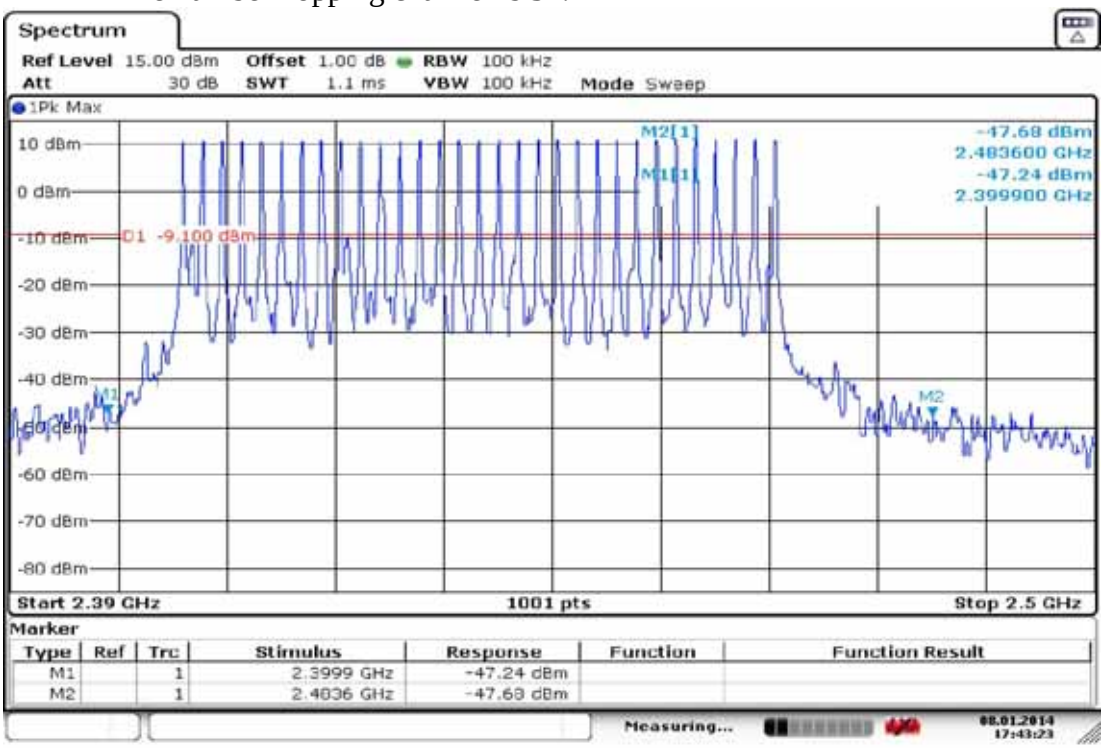
The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW. Sweep=Auto ; Detector function=peak ; Trace=Max hold
The measurement guideline was according to FCC Public Notice DA 00-705.

8.6. Test Results

PASSED. All the test results are attached in next page.

Test Date : 2014. 01. 08 Temperature :24℃ Humidity : 50%

The number hopping channel is 31.



9. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

9.1. Test Equipment

The following test equipment was used during the maximum peak output power measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	R&S	FSV30	101181	2013. 03. 13	2014. 03. 12

9.2. Block Diagram of Test Setup

The same as section.4.2.

9.3. Specification Limits (§15.247(b)-(1))

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

9.4. Operating Condition of EUT

Same as 20dB bandwidth measurement which was listed in section 4.4.

9.5. Test Procedure

The transmitter output was connected to the spectrum analyzer.
Span can encompass the waveform
RBW>EBW
VBW≧RBW
Sweep=1.5MHz

The measurement guideline was according to FCC Public Notice DA 00-705.

9.6. Test Results

PASSED. All the test results are listed below.

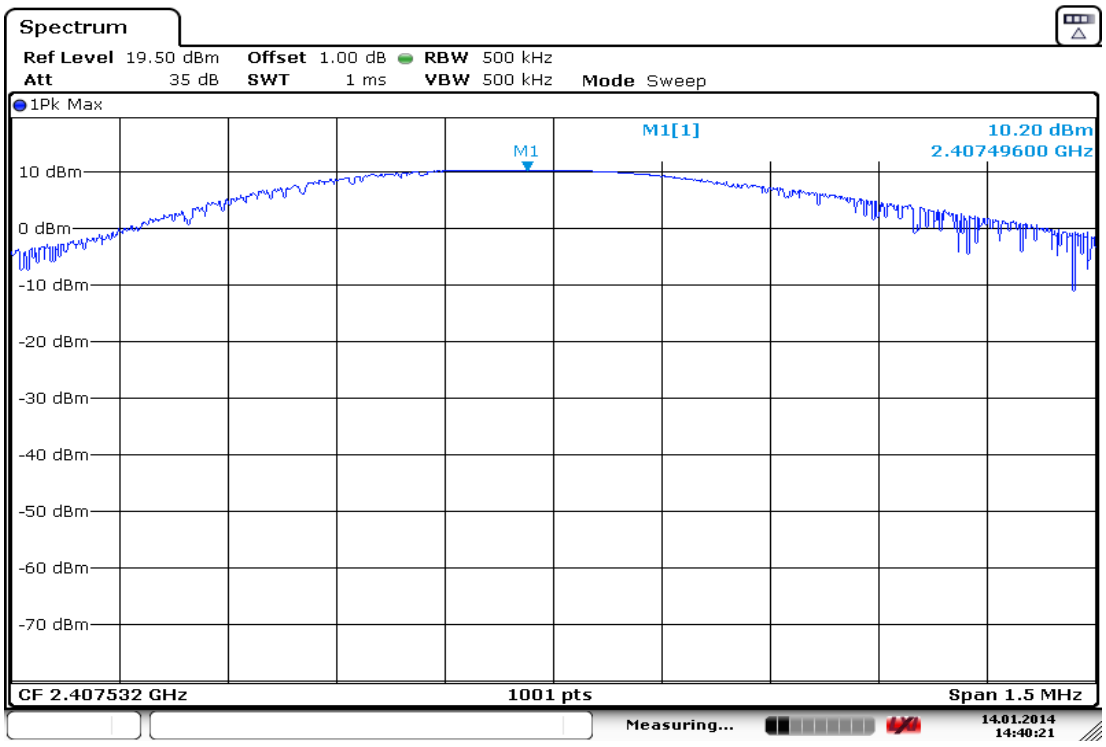
Test Date : 2014. 01. 08 Temperature :24℃ Humidity : 50%

No.	Channel	Test Frequency	**Peak Output Power**		Limit
			ANT A	**ANT B**	
1.	01	2407.500MHz	**10.20 dBm**	**10.21 dBm**	21dBm
2.	15	2435.500MHz	**10.56 dBm**	**10.70 dBm**	21dBm
3.	31	2467.500MHz	**10.69 dBm**	**10.77 dBm**	21dBm

Remark: This device has two antennas for diversity, not supporting simultaneously transmit.

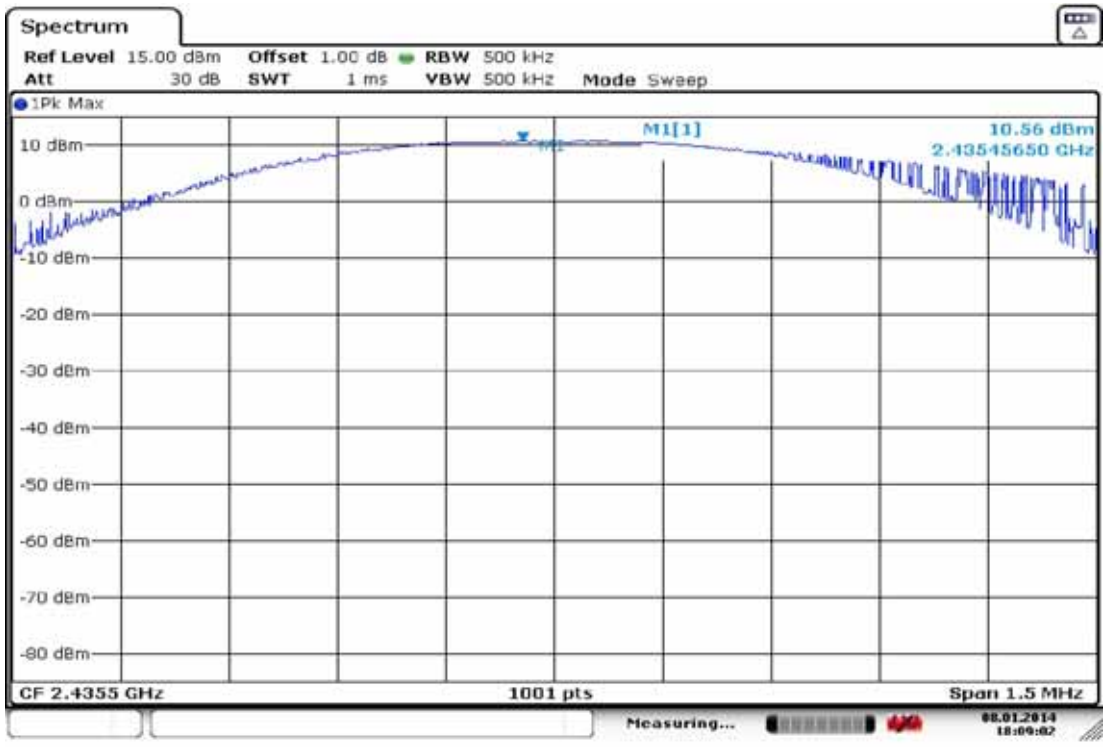
ANT A

Channel 01, Frequency: 2407.500MHz



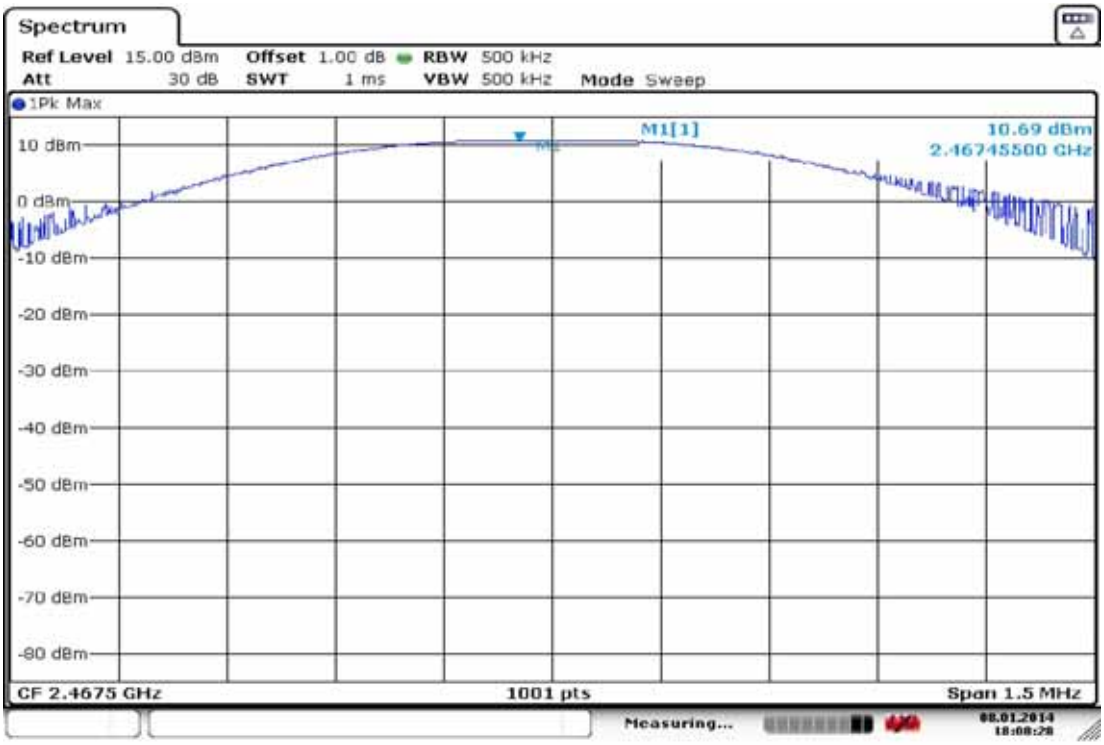
Date: 14.JAN.2014 14:40:21

Channel 15, Frequency: 2435.500MHz



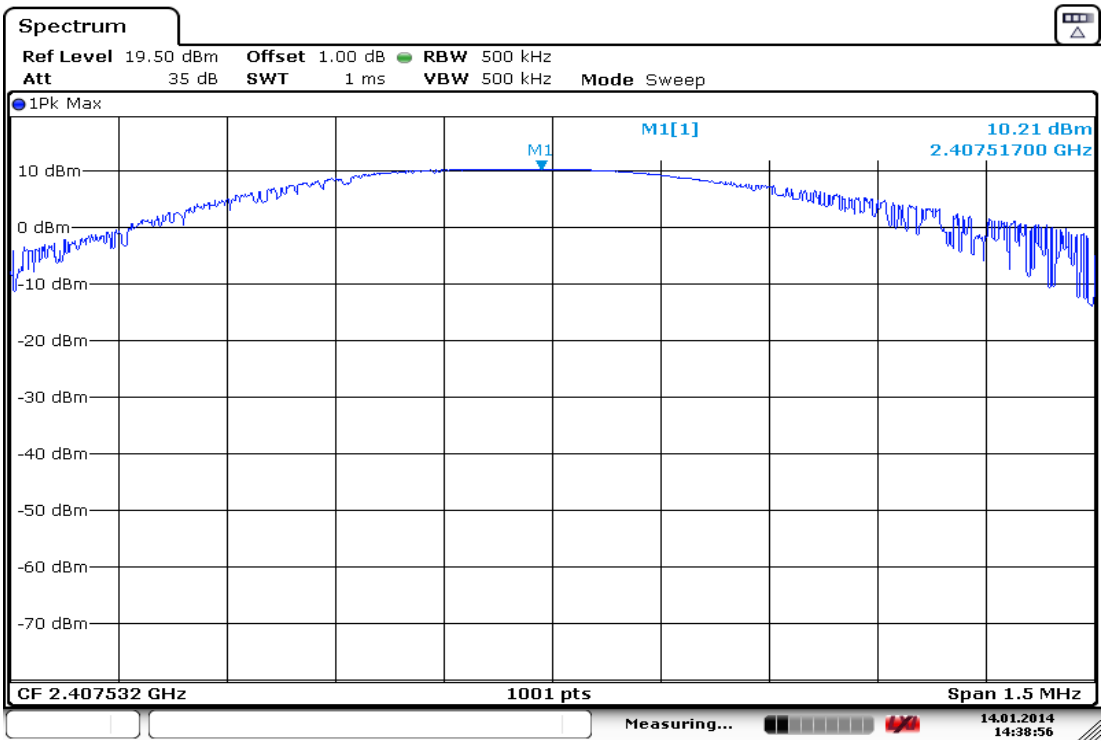
Date: 8.JAN.2014 18:09:02

Channel 31, Frequency: 2467.500MHz

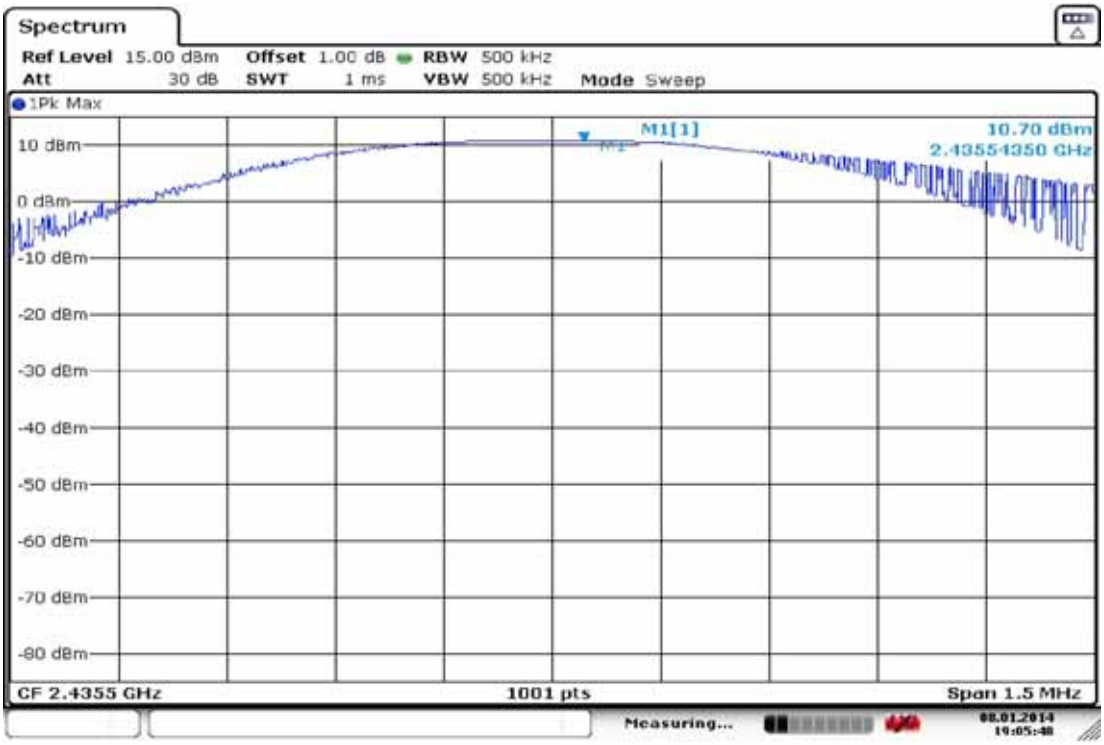


ANT B

Channel 01, Frequency: 2407.500MHz

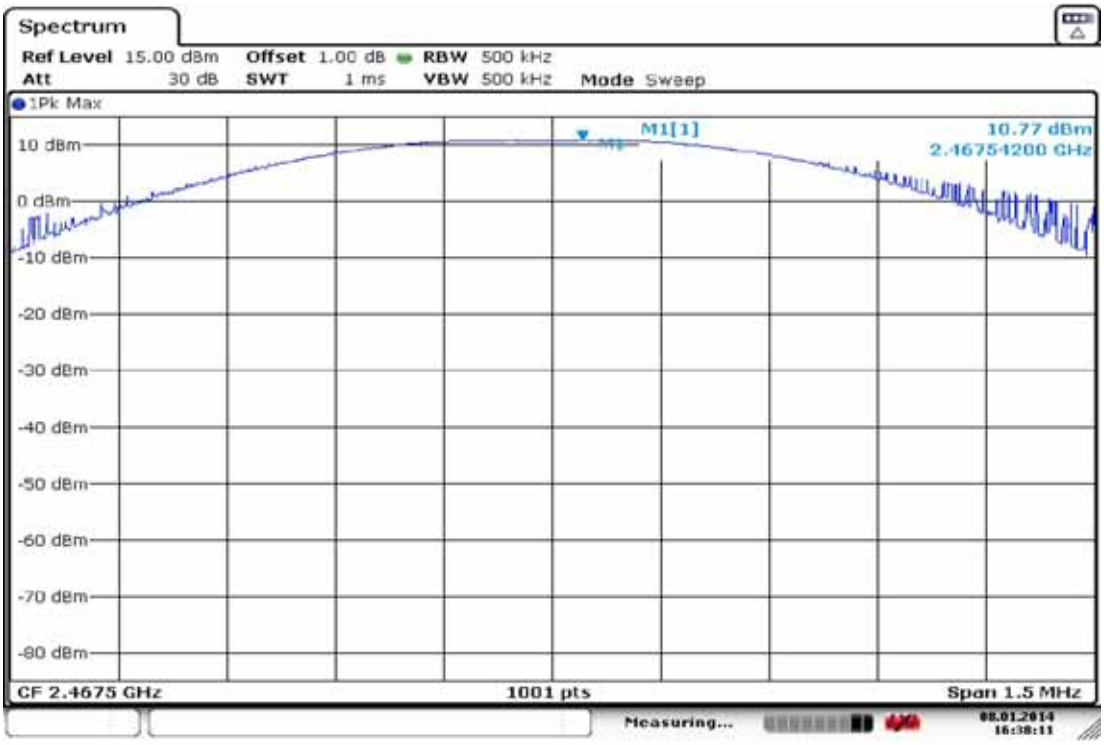


Channel 15, Frequency: 2435.500MHz



Date: 8.JAN.2014 19:05:48

Channel 31, Frequency: 2467.500MHz



Date: 8.JAN.2014 16:38:11

10. EMISSION LIMITATIONS MEASUREMENT

10.1. Test Equipment

The following test equipment was used during the emission limitations test:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	R&S	FSV30	101181	2013. 03. 13	2014. 03. 12

10.2. Block Diagram of Test Setup

The same as section.4.2.

10.3. Specification Limits (§15.247(c))

10.3.1. 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in 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)).(※This test result attaching to §3.6.3)

10.3.2. The reference level for determining limit of emission limitations is according to the value measured indicated in plots at section 8.6.

10.4. Operating Condition of EUT

Same as 20dB bandwidth measurement which was listed in section 4.4.

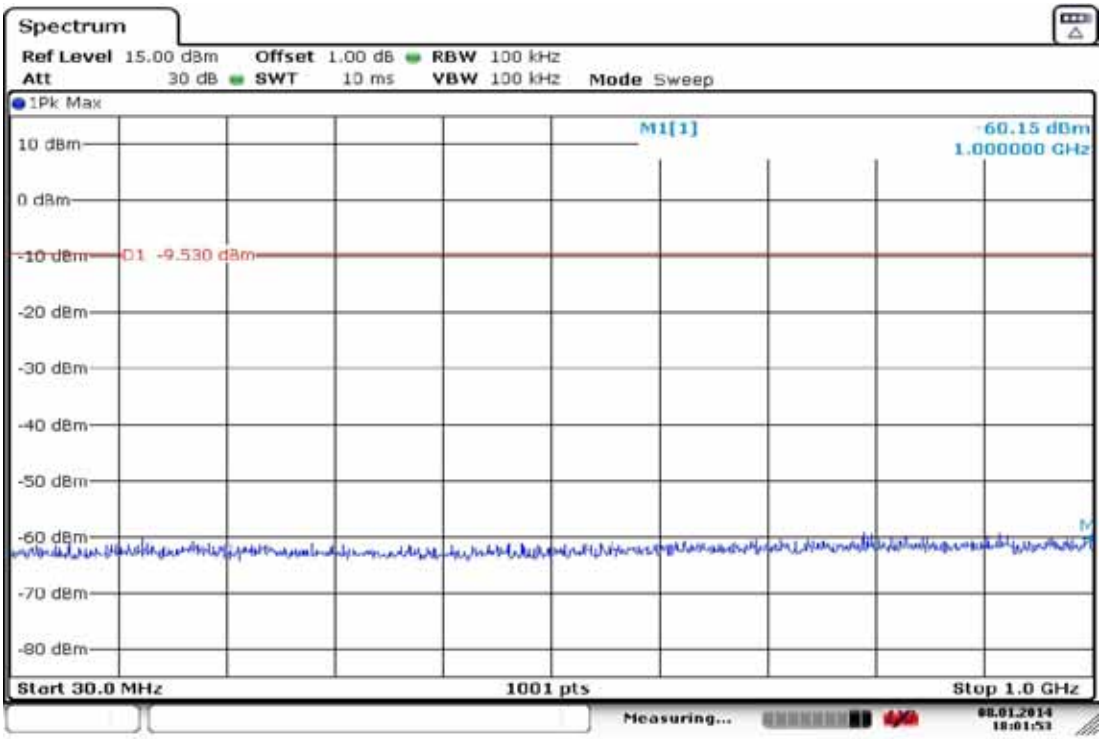
10.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with frequency range from 30MHz to 25GHz.

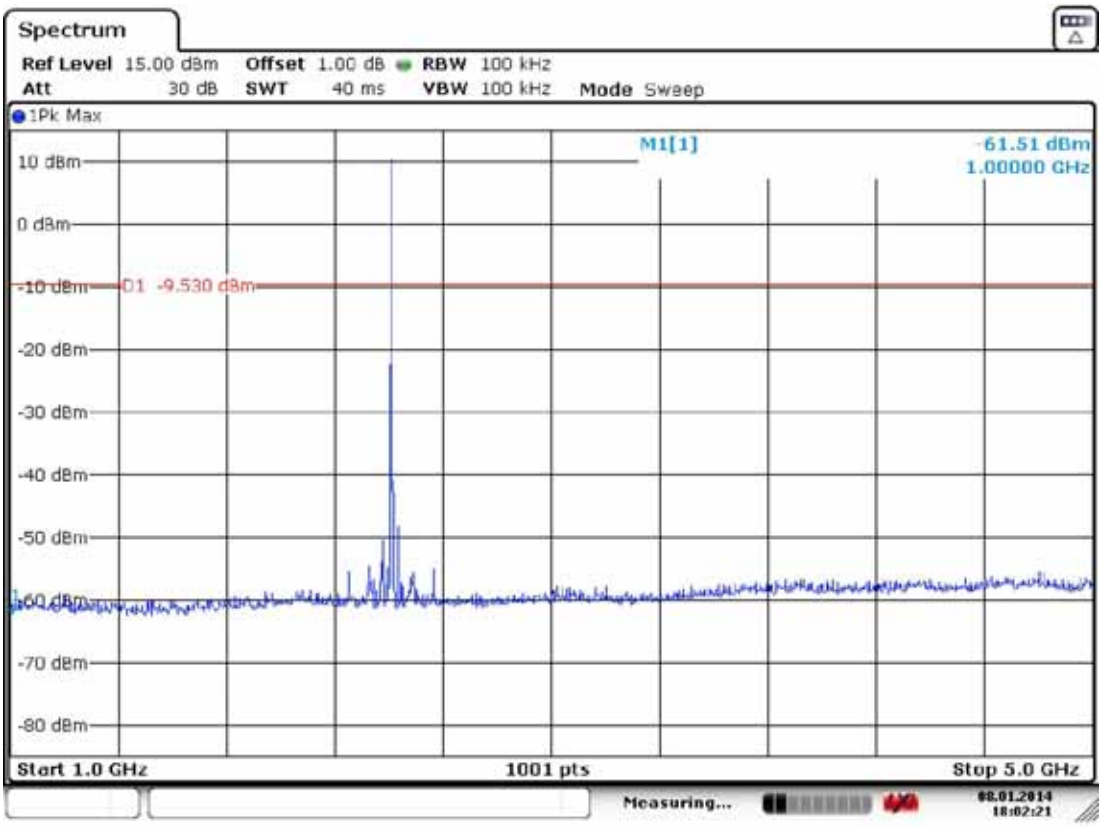
The measurement guideline was according to FCC Public Notice DA 00-705.

10.6. Test Results

PASSED. The testing data was attached in the next pages.
(ANT B was measured for having worst performance.)
Test Date: 2014. 01. 08 Temperature : 24℃ Humidity : 50%
Channel 01, Frequency: 2407.500MHz



Date: 8.JAN.2014 18:01:52



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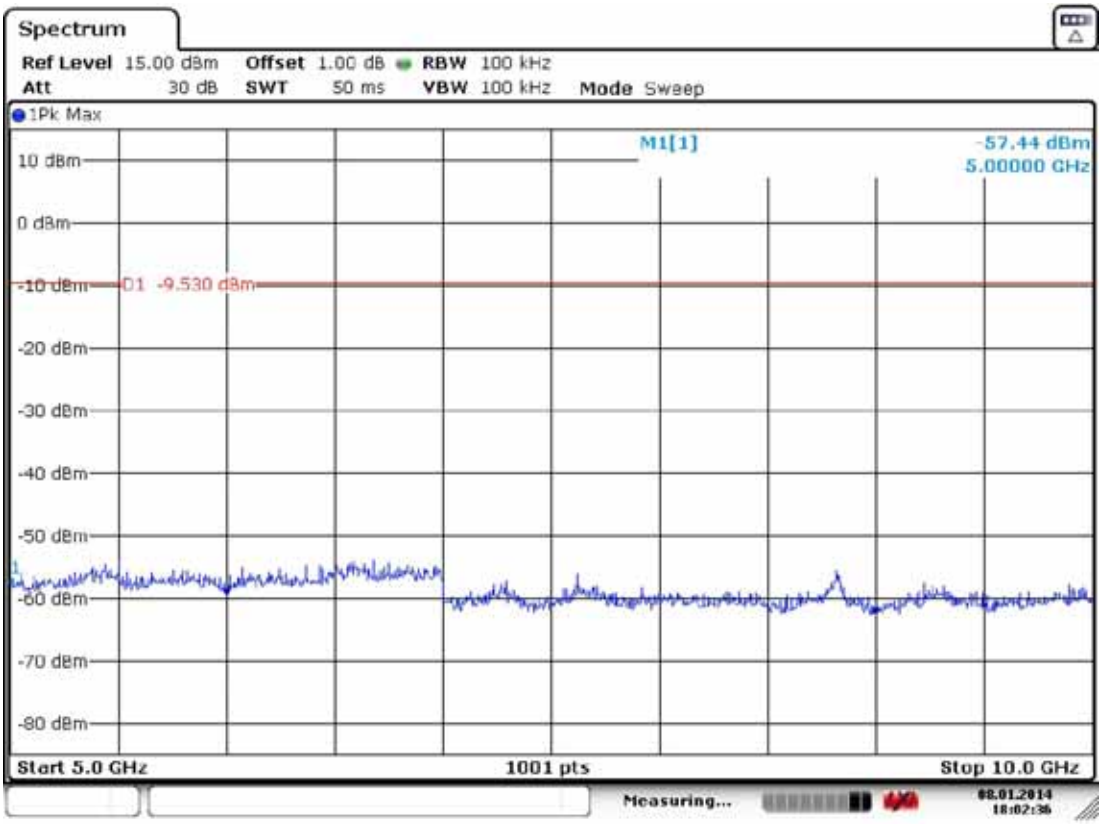

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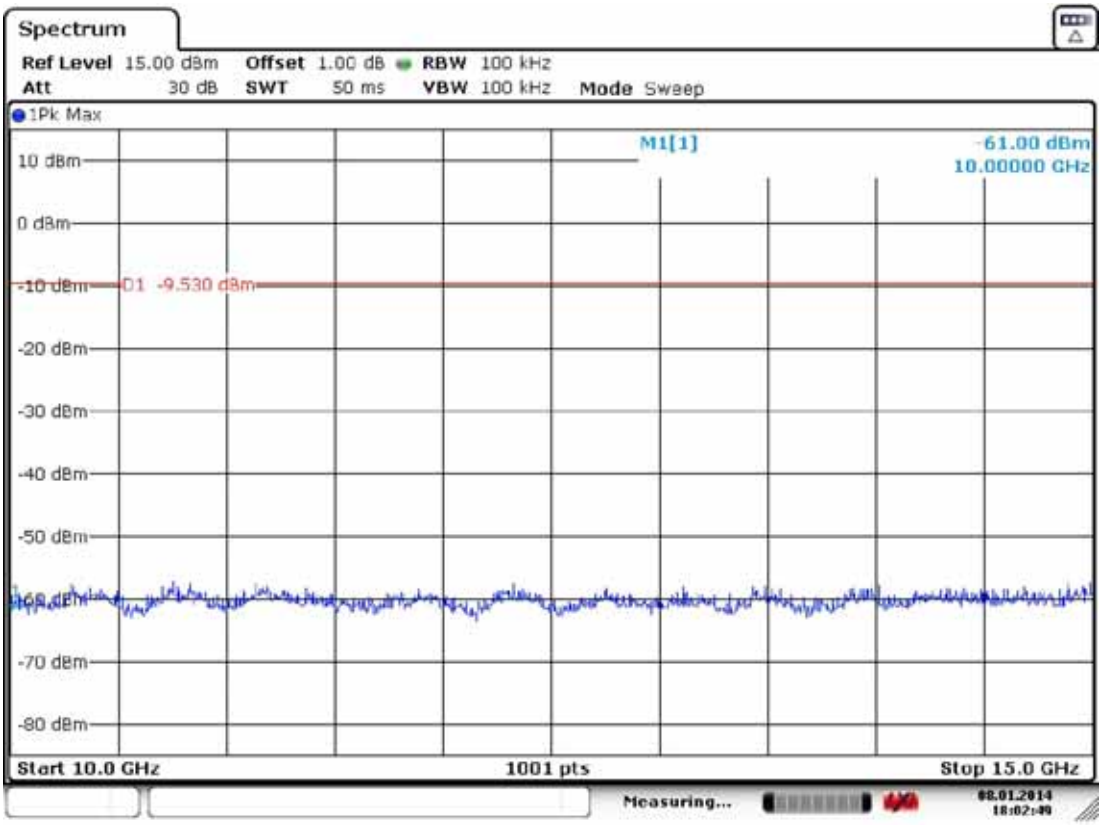

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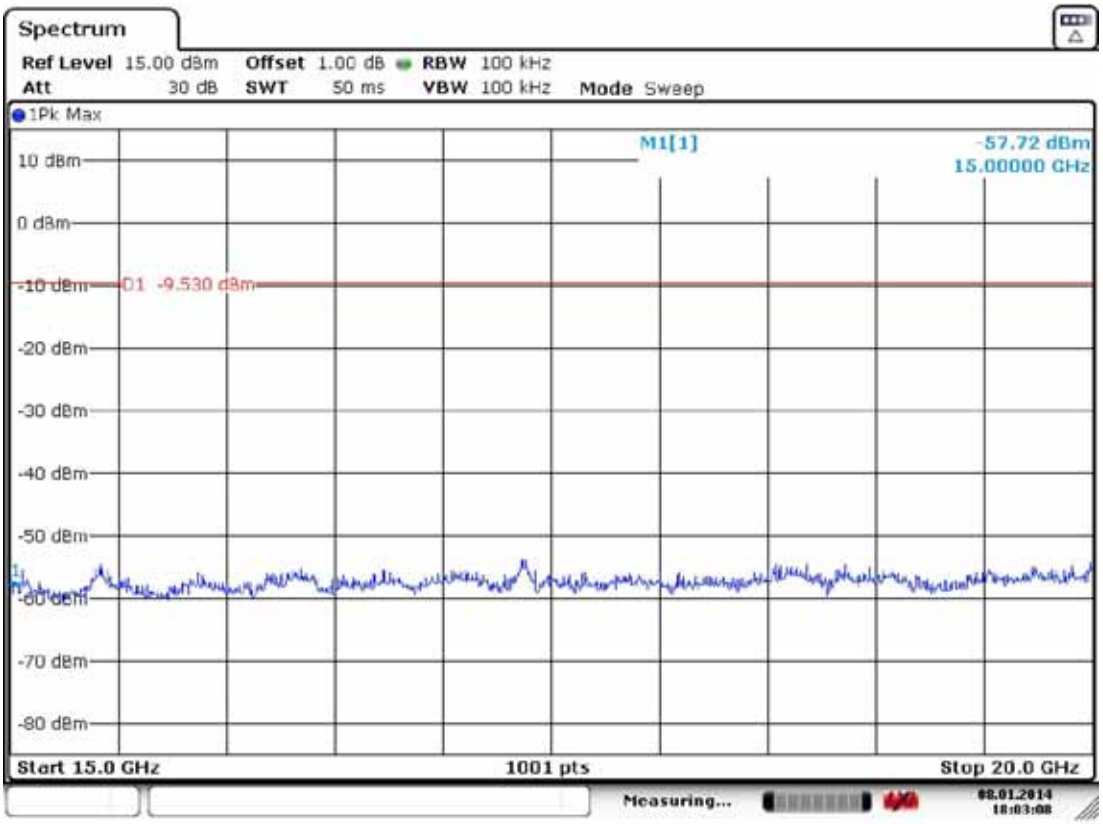
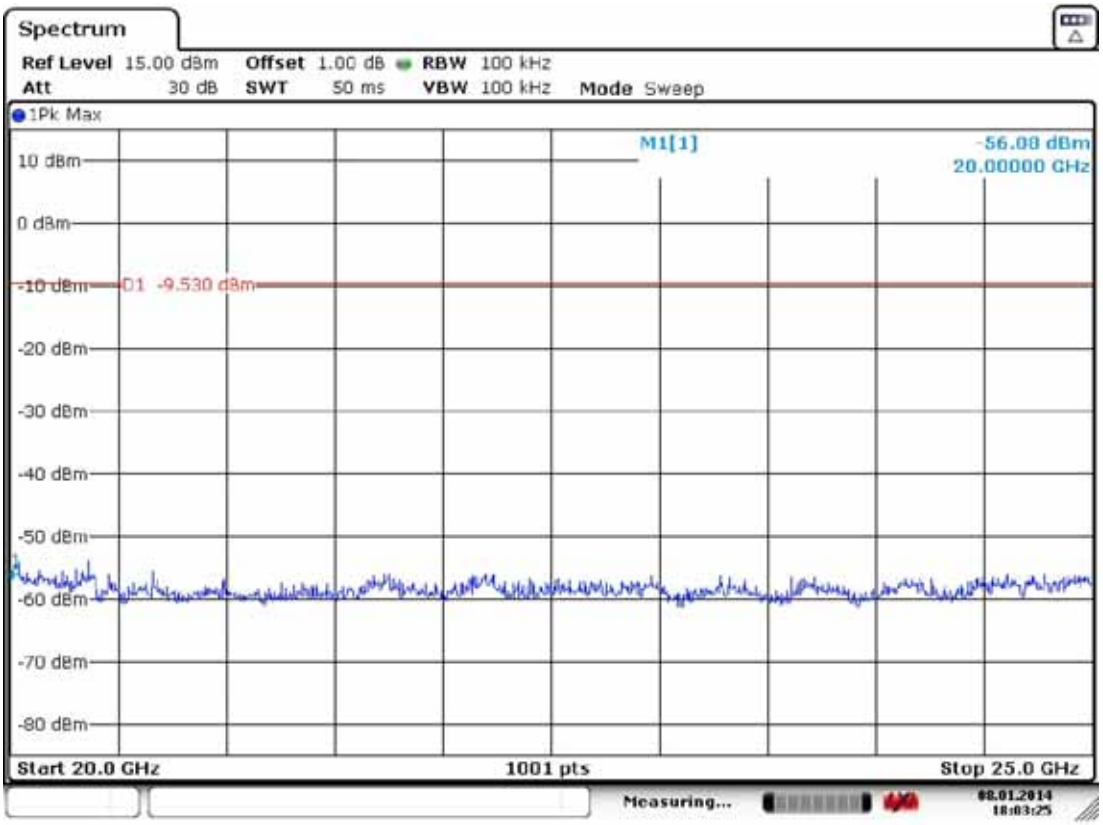
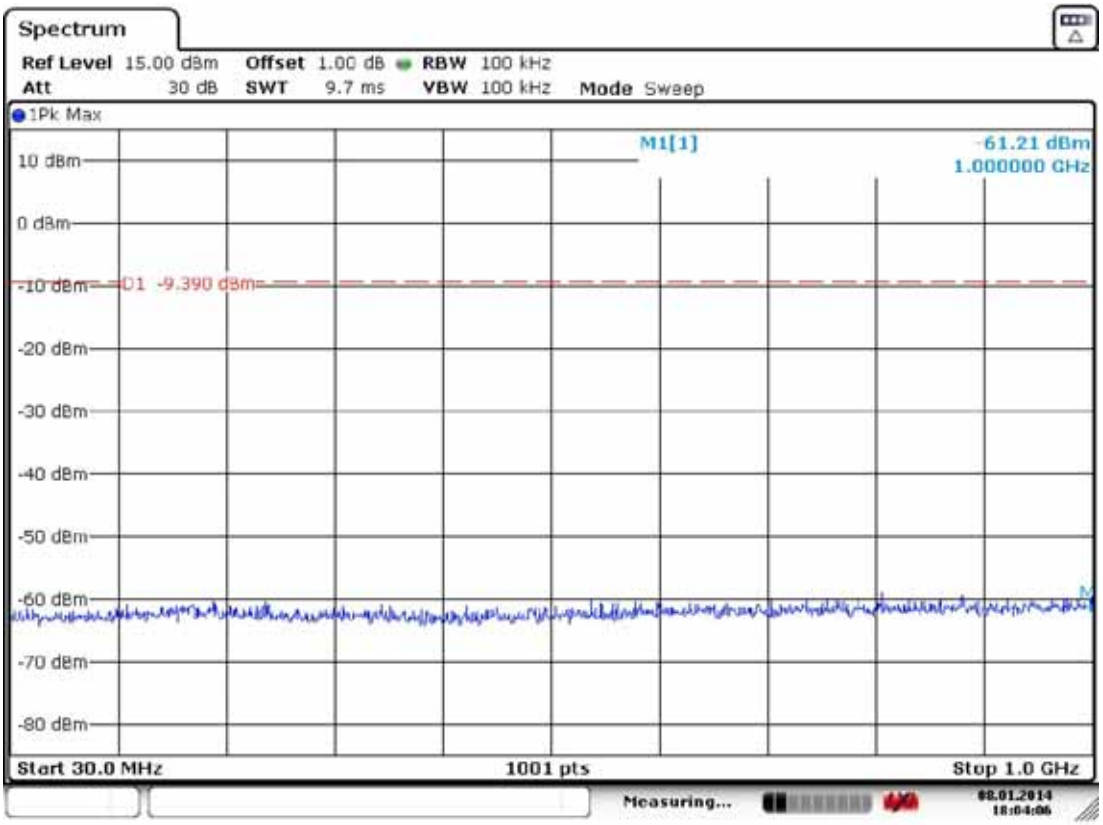


Date: 8.JAN.2014 18:03:08

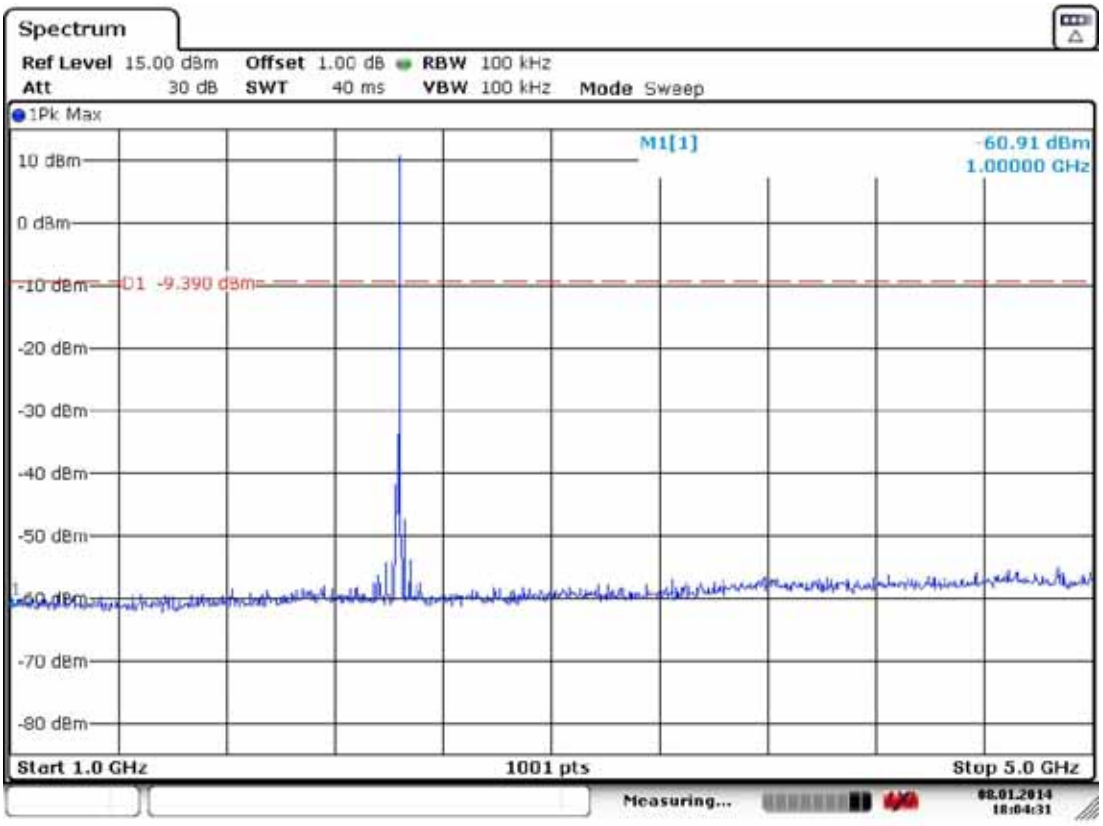


Date: 8.JAN.2014 18:03:25

Channel 15, Frequency: 2435.500MHz



Date: 8.JAN.2014 18:04:06



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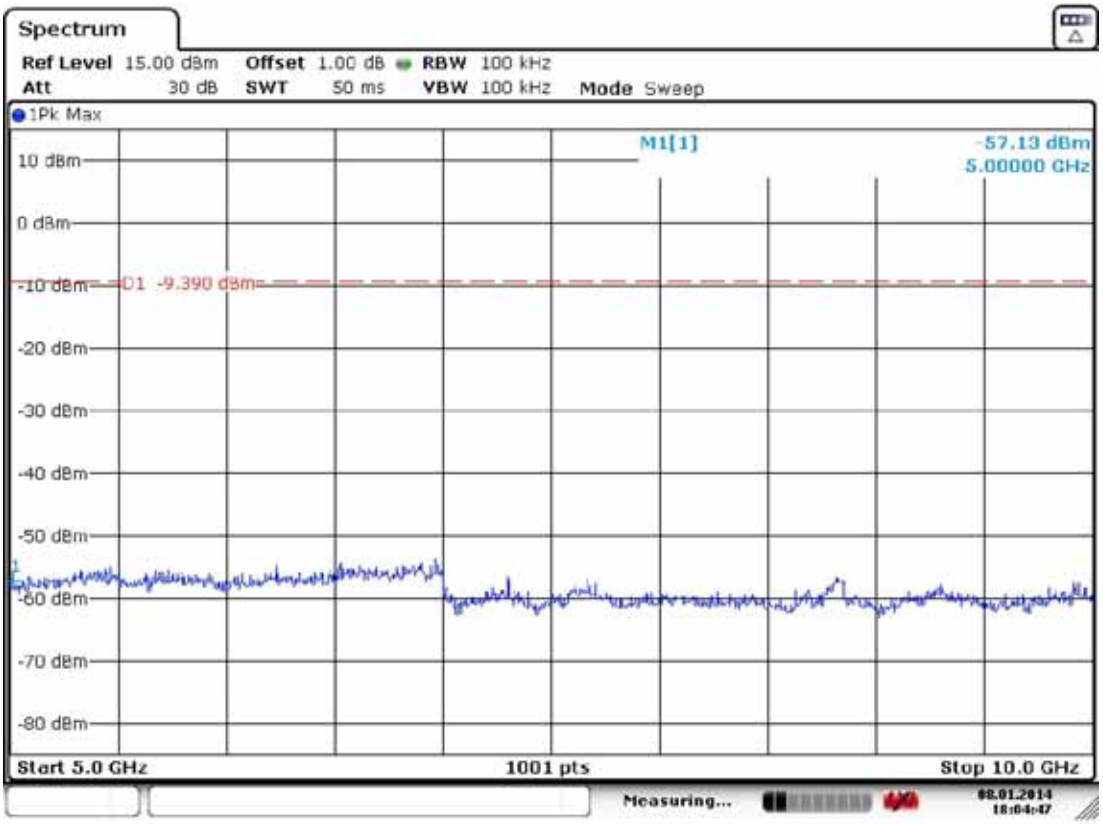

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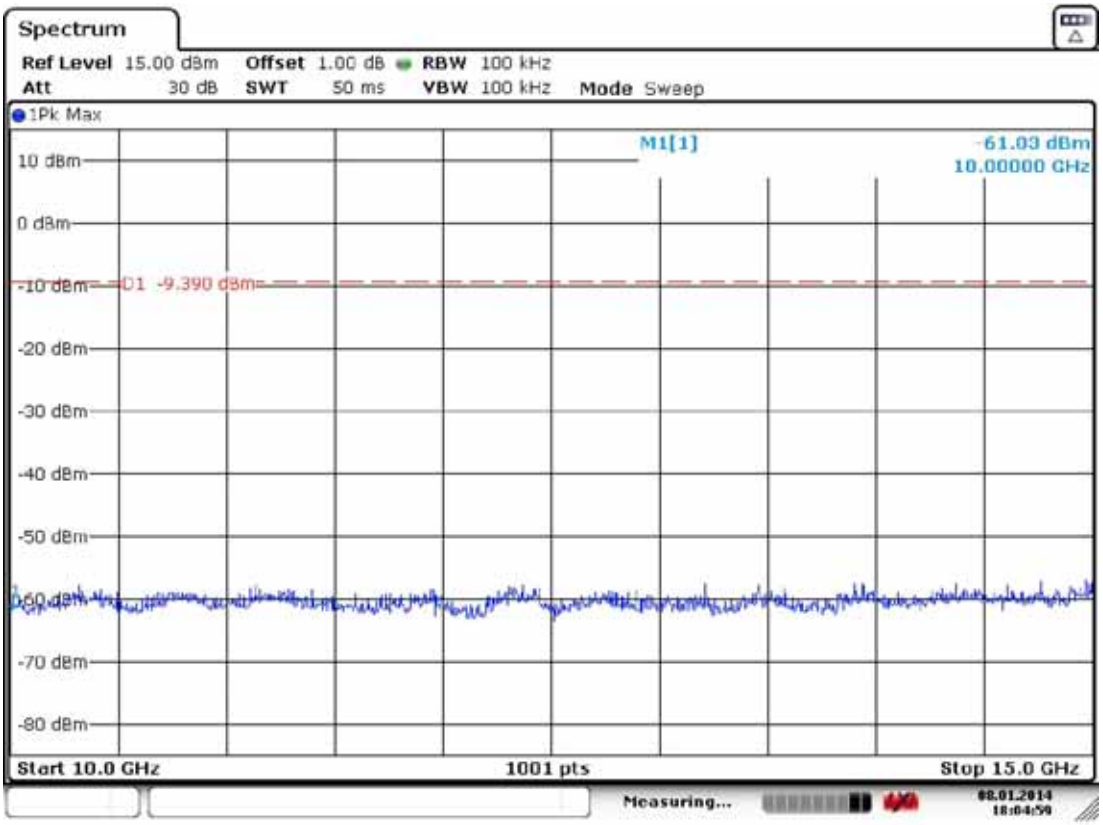

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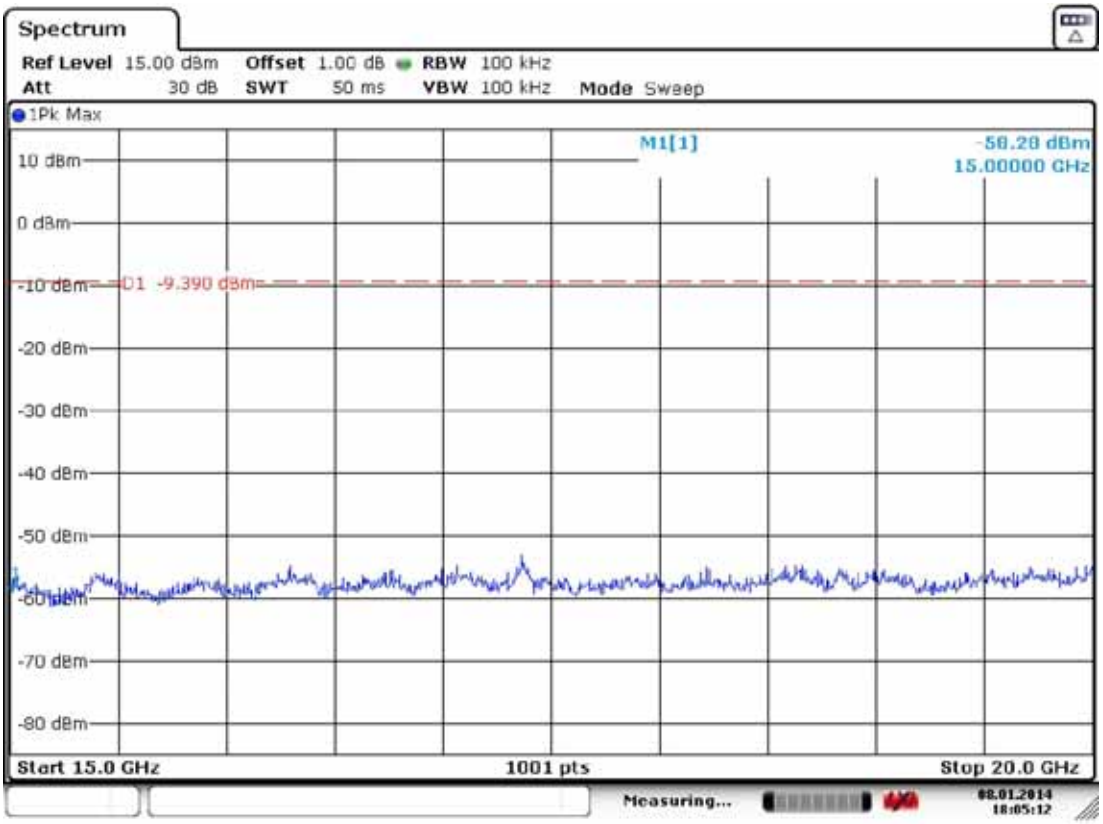

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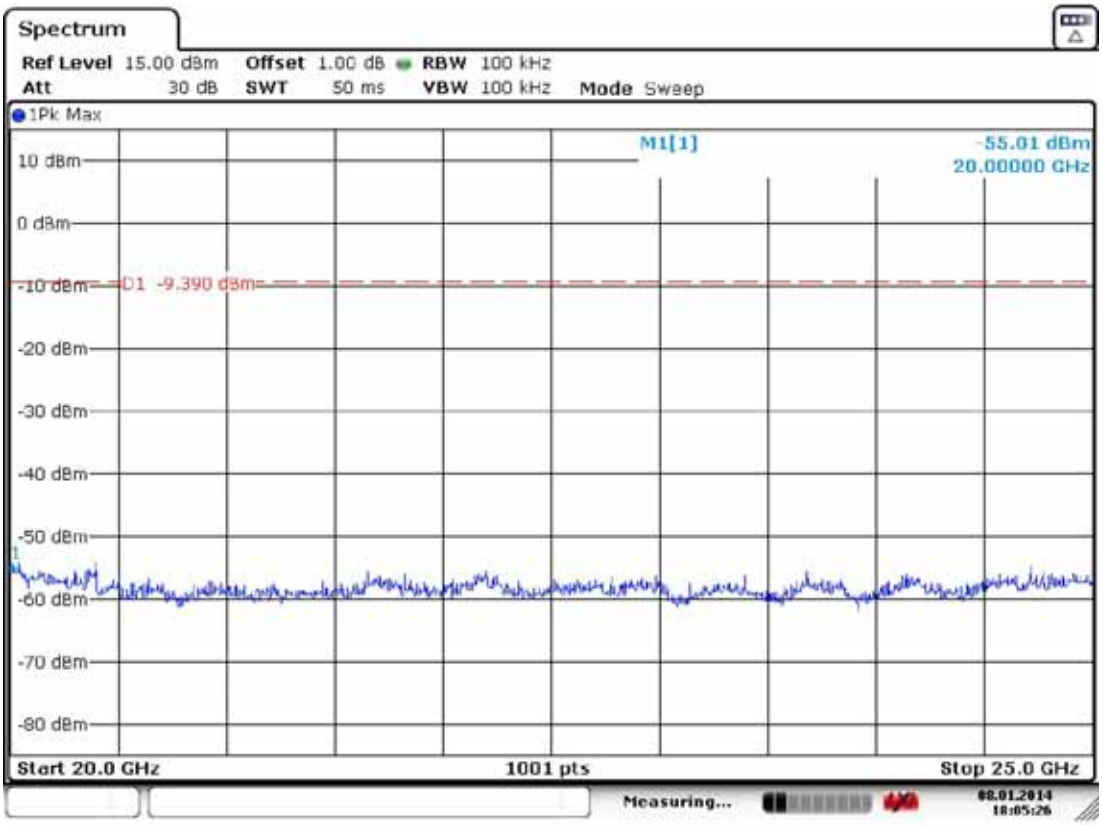
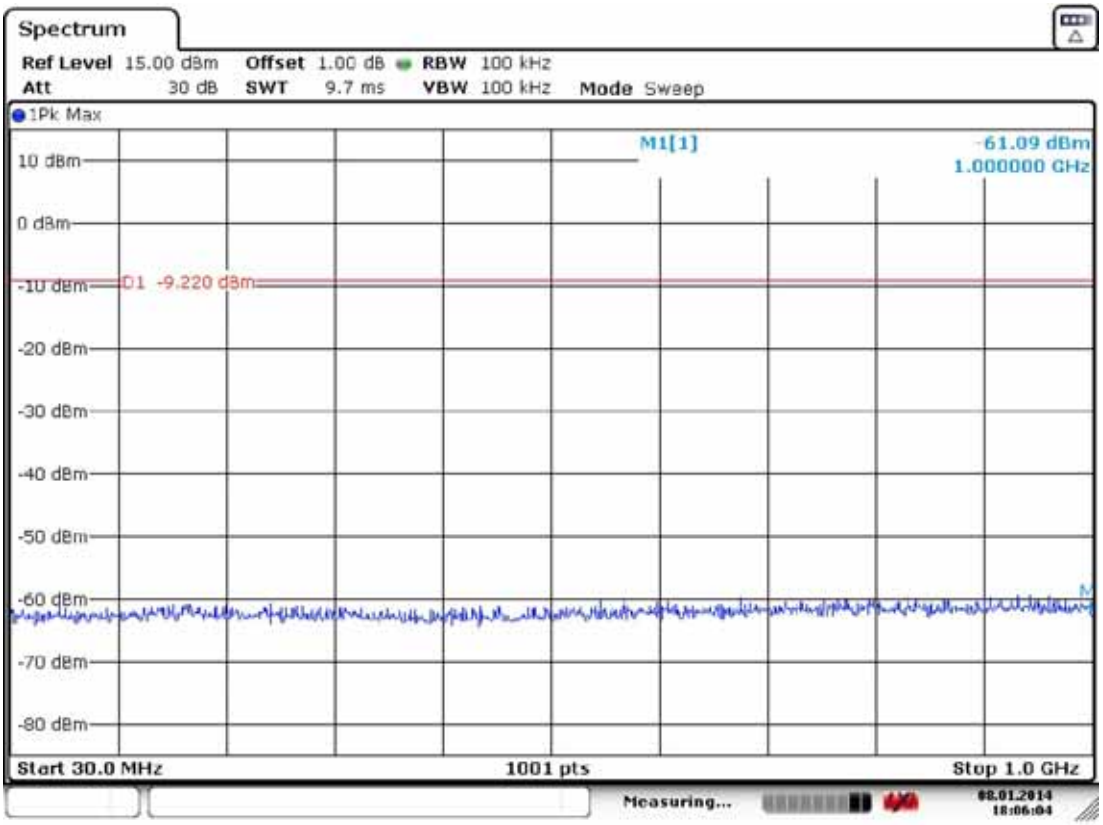


Date: 8.JAN.2014 18:05:25

Channel 31, Frequency: 2467.500MHz



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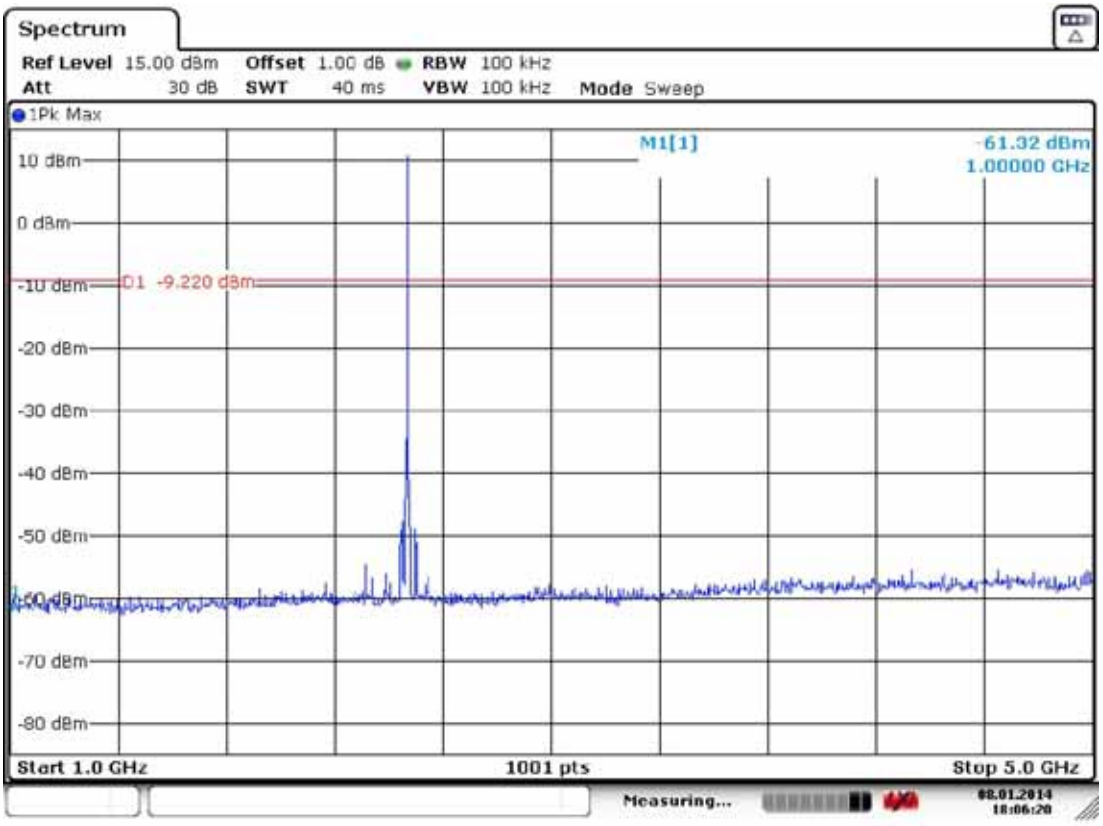

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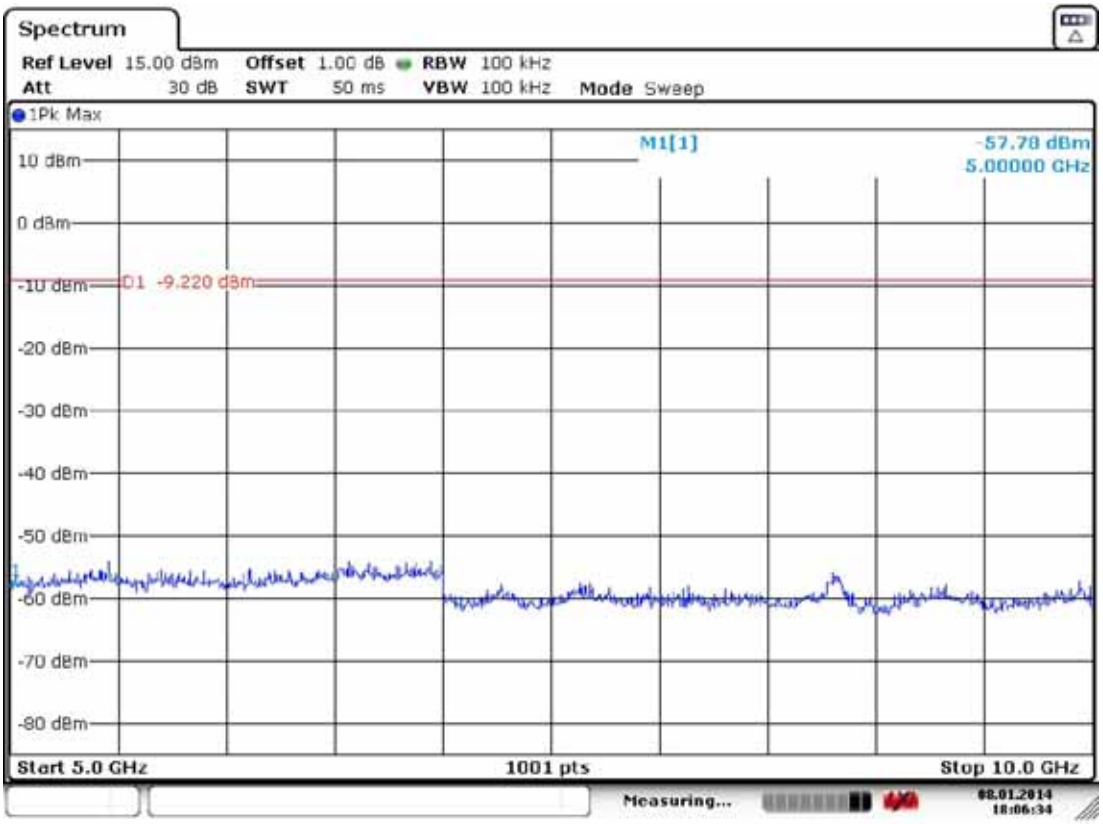

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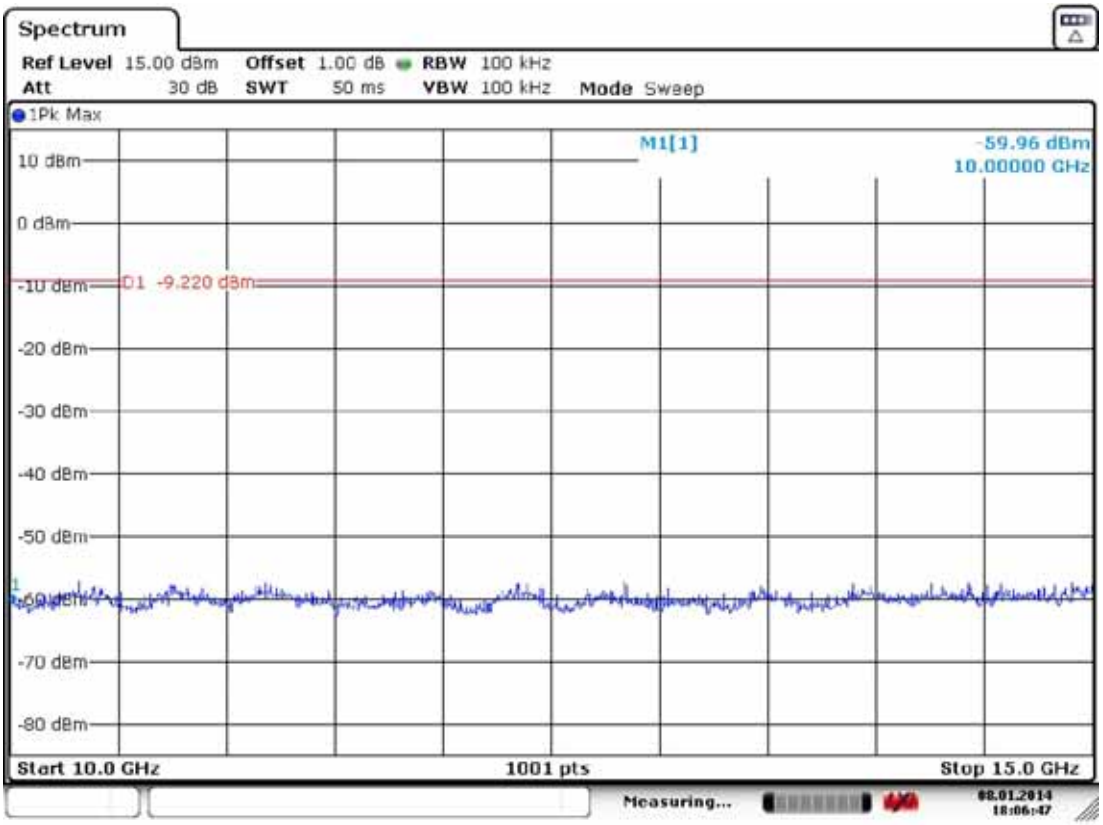

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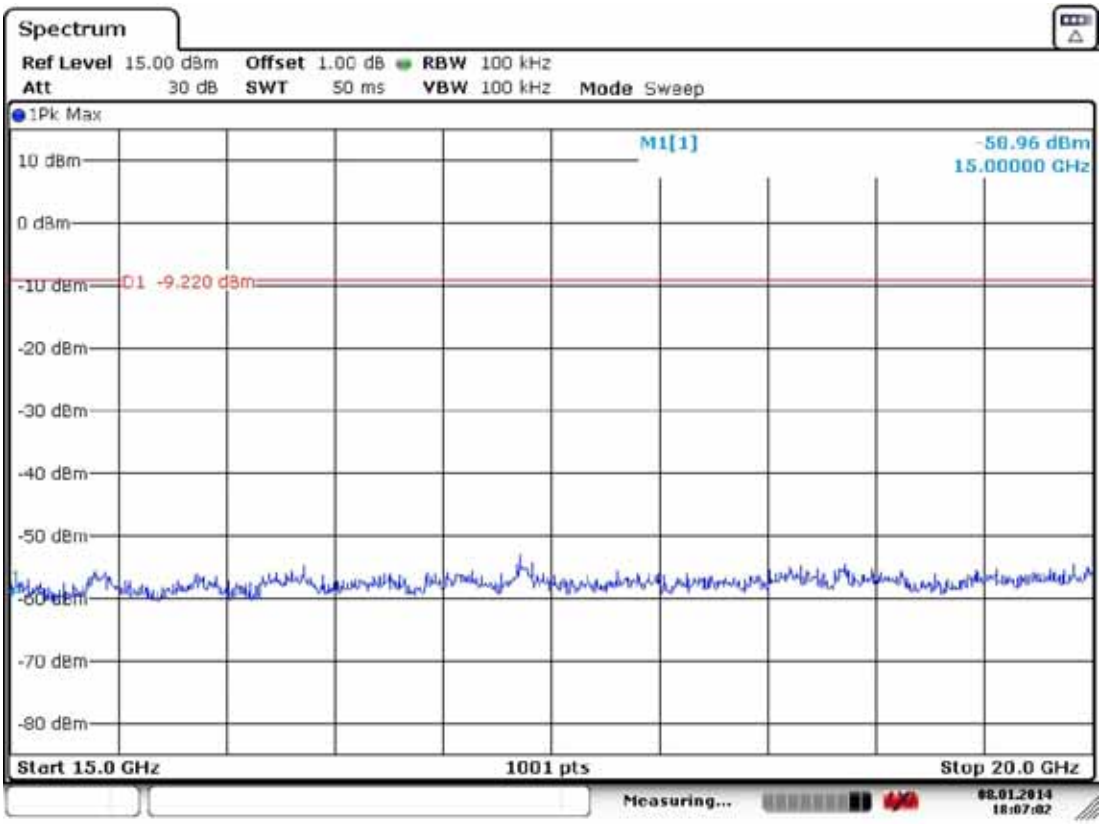

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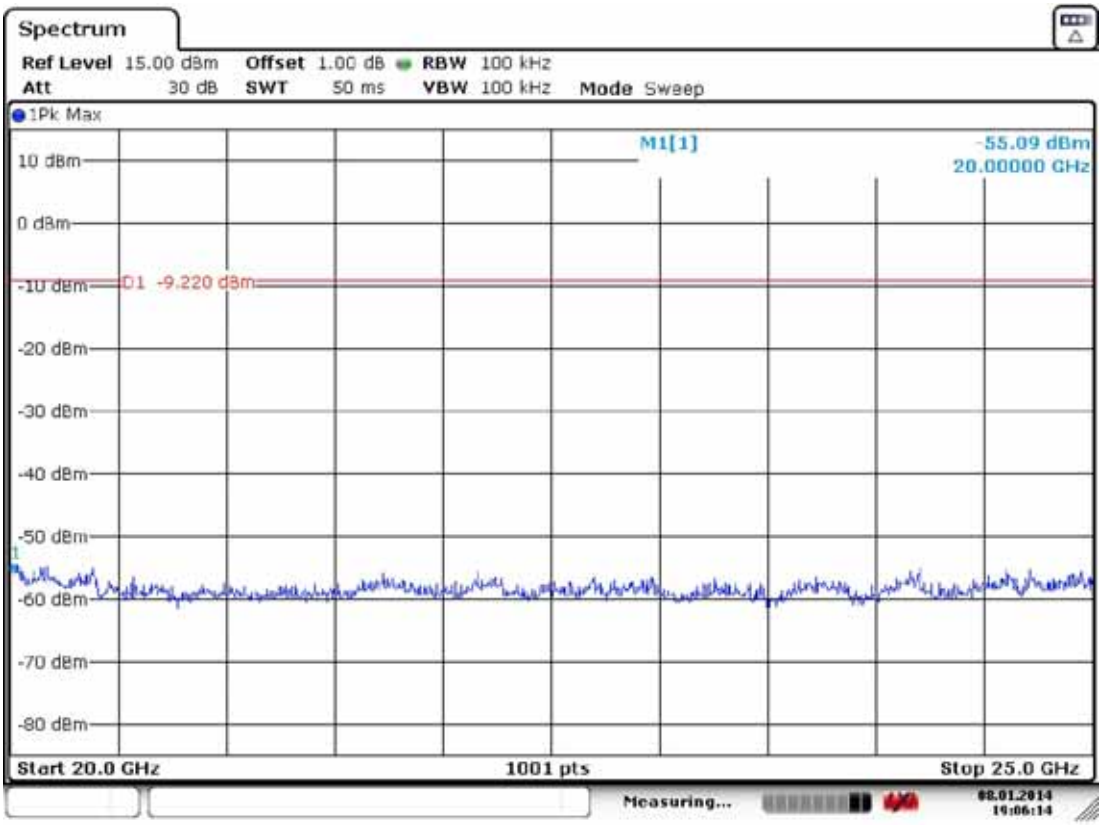


Date: 8.JAN.2014 19:06:14

11. BAND EDGES MEASUREMENT

11.1. Test Equipment

The following test equipment was used during the band edges measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	R&S	FSV30	101181	2013. 03. 13	2014. 03. 12

11.2. Block Diagram of Test Setup

The same as section.4.2.

11.3. Specification Limits (§15.247(c))

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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in 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)). (※ This test result attaching to §3.6.3)

11.4. Operating Condition of EUT

Same as 20dB bandwidth measurement which was listed in section 4.4.

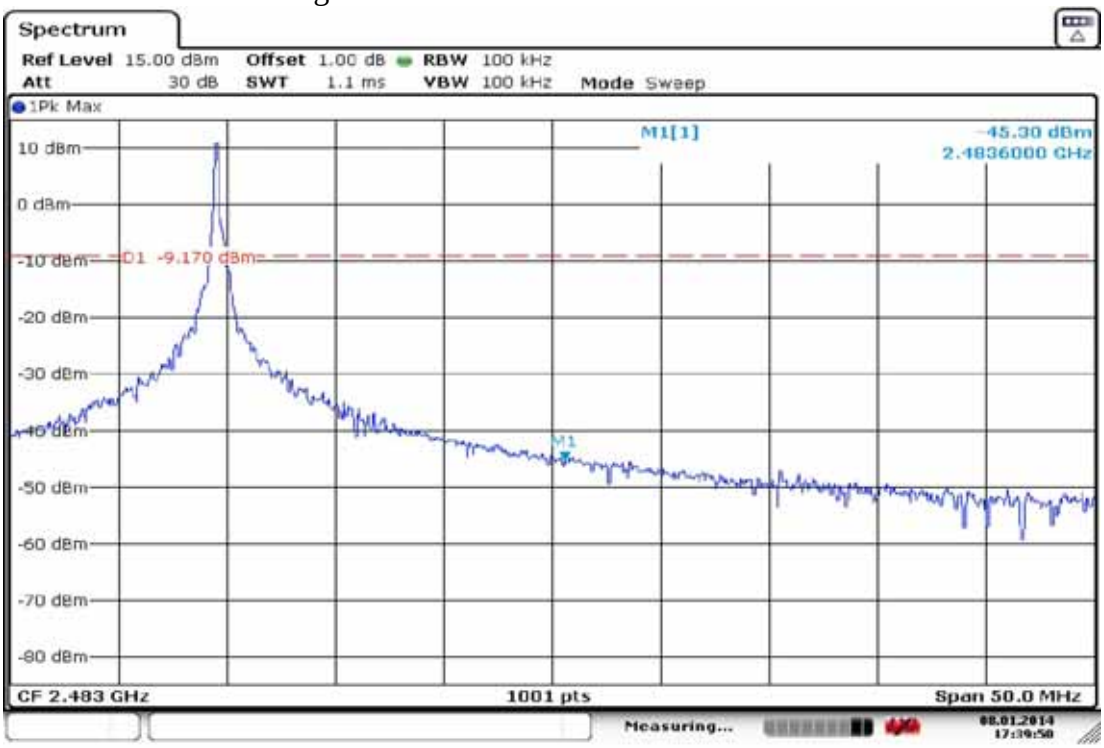
11.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100kHz bandwidth from band edge.
The measurement guideline was according to FCC Public Notice DA 00-705.

11.6.Test Results

PASSED. The testing data was attached in the next pages.
(ANT B was measured for having worst performance.)
Test Date : 2014. 01. 08 Temperature :24℃ Humidity : 50%

Below Band edge



Date: 8.JAN.2014 17:39:49

Upper Band edge

Date: 8.JAN.2014 17:32:29

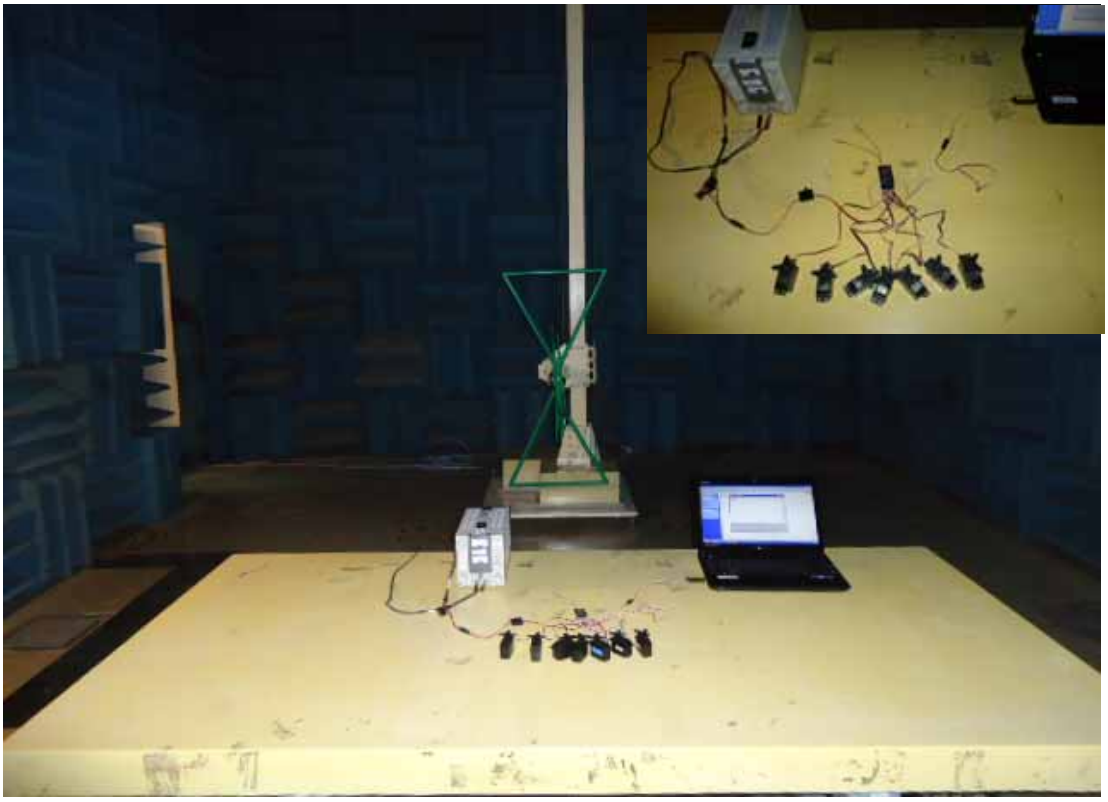
12. DEVIATION TO TEST SPECIFICATIONS

【NONE】

13. PHOTOGRAPHS

13.1. Photos of Radiated Measurement at Semi-Anechoic Chamber

13.1.1. Frequency Range 30MHz~1GHz



13.1.2. Frequency Range Above 1GHz

13.2. Photo of RF Conducted Measurement