

APPLICATION FOR CERTIFICATION

On Behalf of
FUTABA Corporation
Radio Control
Model No. : R7008SB
FCC ID : AZPR7008SB-24G
Brand: Futaba

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

Prepared by : AUDIX Technology Corporation
EMC Department
No. 53-11, Dingfu, Linkou Dist.,
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Date of Report : Nov. 30, 2011

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TEST REPORT CERTIFICATION

Applicant : FUTABA Corporation
 Manufacturer : FUTABA Corporation
 EUT Description : Radio Control
 FCC ID : AZPR7008SB-24G
 (A) Model No. : R7008SB
 (B) Serial No. : N/A
 (C) Brand : Futaba
 (D) Power Supply : DC 4.8V

Measurement Procedure Used:

FCC RULES AND REGULATIONS PART 15 SUBPART C, Oct. 2010
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 B & 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 : Nov. 10 ~ 24, 2011 Date of Report : Nov. 30, 2011

Producer : 
 (Nita Lee /Administrator)

Signatory : 
 (Ben Cheng/Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	Radio Control
Model Number	:	R7008SB
Serial Number	:	N/A
FCC ID	:	AZPR7008SB-24G
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.
Radio Technology	:	DSSS Modulation
Frequency Band	:	2405.376MHz ~ 2472.960MHz
Tested Frequency	:	2405.376MHz (Channel 02) 2439.168MHz (Channel 35) 2472.960MHz (Channel 68)
Frequency Channel	:	23 channels
Antenna Gain	:	-1.16dBi
Date of Receipt of Sample	:	Oct. 24, 2011
Date of Test	:	Nov. 10 ~ 24, 2011

1.2. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**
EMC Department
 No. 53-11, Dingfu, Linkou Dist.,
 New Taipei City 244, Taiwan, R.O.C.

Test Location & Facility (AC) : **Semi-Anechoic Chamber**
 No. 53-11, Dingfu, Linkou Dist.,
 New Taipei City 244, Taiwan, R.O.C.
 May 14, 2009 Renewal on
 Federal Communication Commission
 Registration Number: 90993

NVLAP Lab. Code : 200077-0

TAF Accreditation No : 1724

1.3. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Radiation Test (Distance: 3m)	30MHz~300MHz	± 2.91dB
	300MHz~1000MHz	± 2.74dB
	Above 1GHz	± 5.02dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Maximum peak output power	± 0.33dBm
Emission Limitations	± 0.13dB
Band edges	± 0.13dB
Power spectral density	± 0.13dB

2. CONDUCTED EMISSION MEASUREMENT

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

3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

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

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

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 04, 11'	Aug. 03, 12'
2.	Test Receiver	R & S	ESCS30	100339	Jun. 23, 11'	Jun. 22, 12'
3.	Amplifier	HP	8447D	2944A06305	Feb. 10, 11'	Feb. 09, 12'
4.	Log Periodic Antenna	Schwarzbeck	UHALP 9108-A	0810	Mar. 08, 11'	Mar. 07, 12'
5.	Biconical Antenna	CHASE	VBA6106A	1264	Mar. 08, 11'	Mar. 07, 12'

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

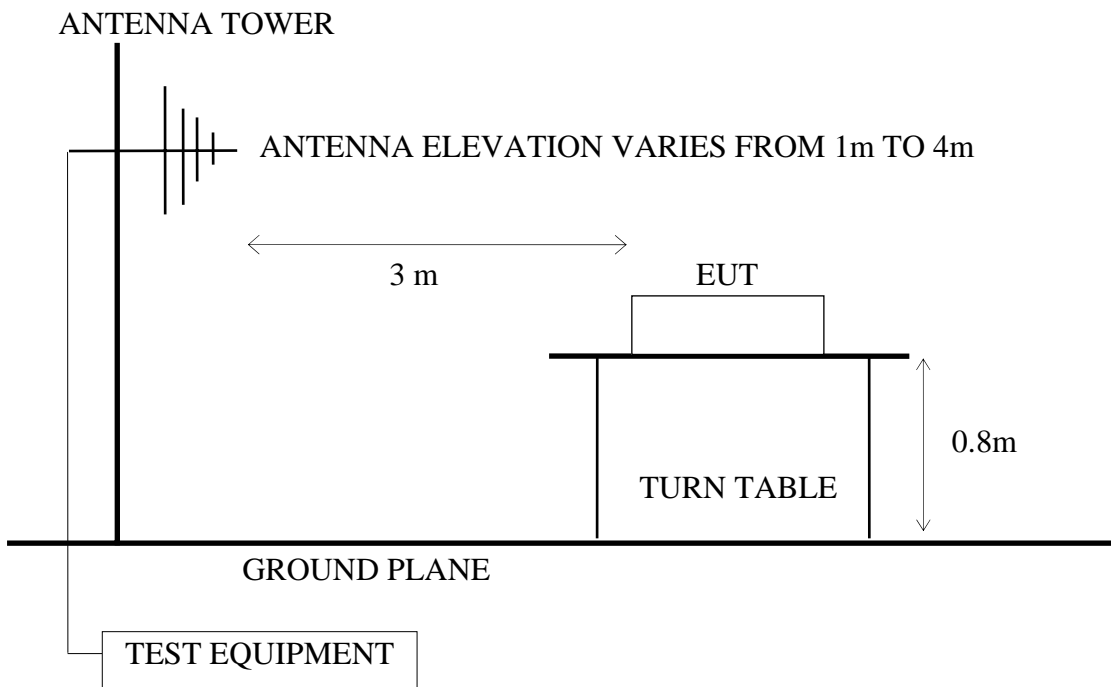
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 04, 11'	Aug. 03, 12'
2.	Test Receiver	R & S	ESCS30	100339	Jun. 23, 11'	Jun. 22, 12'
3.	Amplifier	HP	8449B	3008A00529	Dec. 10, 10'	Dec. 09, 11'
4.	Horn Antenna	EMCO	3115	9112-3775	May 09, 11'	May 08, 12'
5.	Horn Antenna	EMCO	3116	2653	Oct. 07, 11'	Oct. 06, 12'
6.	2.4GHz Notch Filter	EWT	EWT-14-007 0-R1	G2	Dec. 05, 10'	Dec. 04, 11'
7.	3.5GHz High Pass Filter	HP	84300-80038	005	Jan. 05, 11'	Jan. 04, 12'

3.2. Test Setup

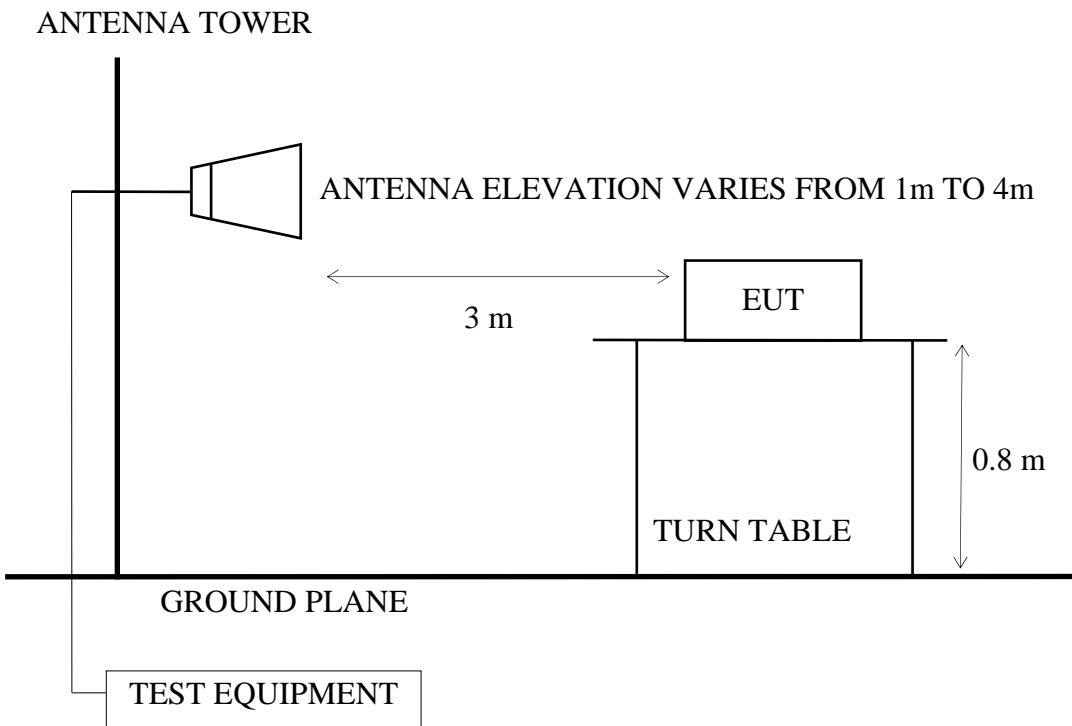
3.2.1. Block Diagram of connection between EUT and simulators

RADIO CONTROL (EUT)

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



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



3.3. Radiated Emission Limits (§15.209)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMITS	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
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 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

- Remark :
- (1) Emission level ($\text{dB}\mu\text{V/m}$) = 20 log Emission level ($\mu\text{V/m}$)
 - (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).

3.4. Operating Condition of EUT

- 3.4.1. Set up the EUT (Radio Control) as shown on 3.2.
- 3.4.2. To turn on the power of all equipment.
- 3.4.3. The EUT was set the PC system using test program “Futaba Term”.
- 3.4.4. The EUT was set to continuously transmit signals at 2405.376MHz, 2439.168MHz and 2472.960MHz during testing.

3.5. 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 to 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 antenna 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 10th harmonics from fundamental frequency) was checked.

Above 1GHz was measured with peak and average detector. For frequency from 7.5GHz 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.

3.6. Radiated Emission Measurement Results

PASSED.

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

EUT : Radio Control M/N : R7008SB

Test Date : Nov. 22, 2011 Temperature : 25 Humidity : 51%

For Frequency Range 30MHz~1000MHz:

R7008SB has two antennas, but can't transmit simultaneously. We performed all testing at antenna A as it has a worse performance.

The EUT with following test modes was performed during this section testing and all the test results are listed in section 3.6.1.

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	02	2405.376MHz	Transmit	# 17	# 18
2.	35	2439.168MHz		# 18	# 17
3.	68	2472.960MHz		# 17	# 18

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

For Frequency above 1GHz:

The EUT with following test modes was performed during this section testing and all the test results are listed in section 3.6.2.

Mode	Chnnel	Frequency	Test Mode	Test Frequency Range
1.	02	2405.376MHz	Transmit	1000-2680MHz
2.				2680-4000MHz*
3.				4000-5500MHz*
4.				5500-7500MHz*
5.				7500-10000MHz*
6.				10000-15000MHz*
7.				15000-18000MHz
8.				18000-25000MHz
9.	35	2439.168MHz	Transmit	1000-2680MHz
10.				2680-4000MHz*
11.				4000-5500MHz*
12.				5500-7500MHz*
13.				7500-10000MHz*
14.				10000-15000MHz*
15.				15000-18000MHz
16.				18000-25000MHz
17.	68	2472.960MHz	Transmit	1000-2680MHz
18.				2680-4000MHz*
19.				4000-5500MHz*
20.				5500-7500MHz*
21.				7500-10000MHz*
22.				10000-15000MHz*
23.				15000-18000MHz
24.				18000-25000MHz

Remark 1 : The emissions level were too low against the official limit and not report.

Remark 2 : "*" means there is spurious emission falling the frequency band and be measures.

For Restricted Bands:

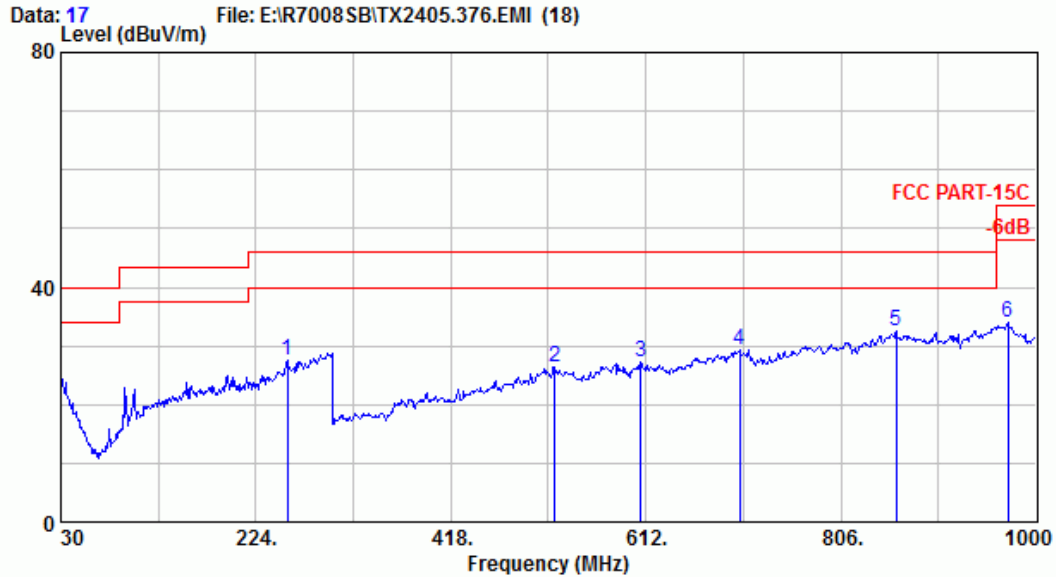
The EUT was tested in restricted bands and all the test results are listed in section 3.6.3. (The restricted bands defined in part 15.205(a))

Mode	Channel	Frequency	Test Mode	Reference Test Data	
				Horizontal	Vertical
1.	02	2405.376MHz	Transmit	# 3	#4
2.	68	2472.960MHz	Transmit	#2	#1

3.6.1. Frequency Range 30-1000MHz



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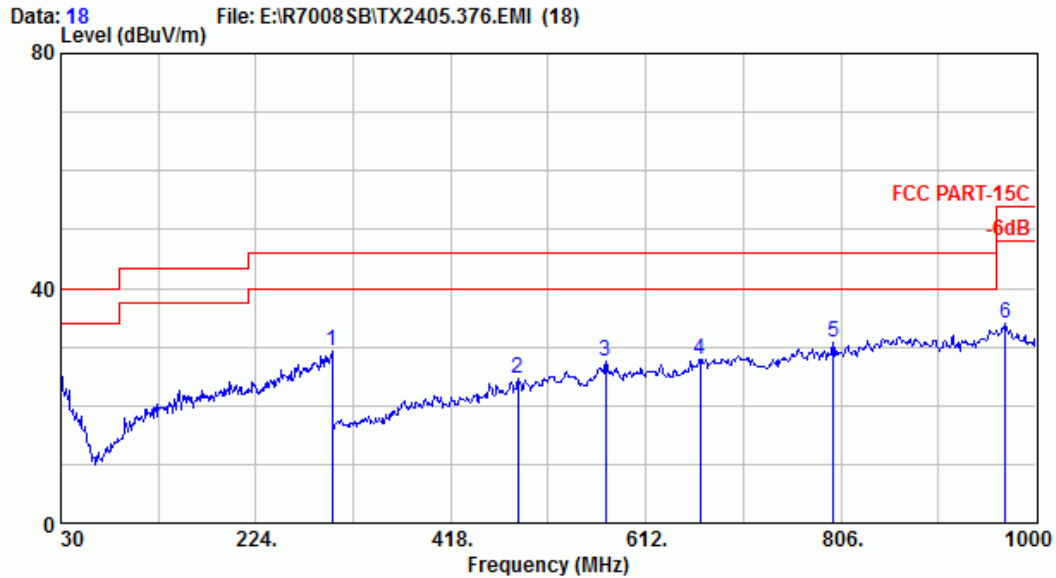
Site no. : A/C Chamber Data no. : 17
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2405.376

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	255.040	24.19	3.56	-0.30	27.45	46.00	18.55	
2	521.790	19.91	6.90	-0.47	26.35	46.00	19.65	
3	607.150	21.49	6.20	-0.52	27.17	46.00	18.83	
4	705.120	23.56	6.60	-0.80	29.36	46.00	16.64	
5	861.290	26.09	7.20	-0.65	32.64	46.00	13.36	
6	971.870	26.79	7.70	-0.41	34.08	54.00	19.92	

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



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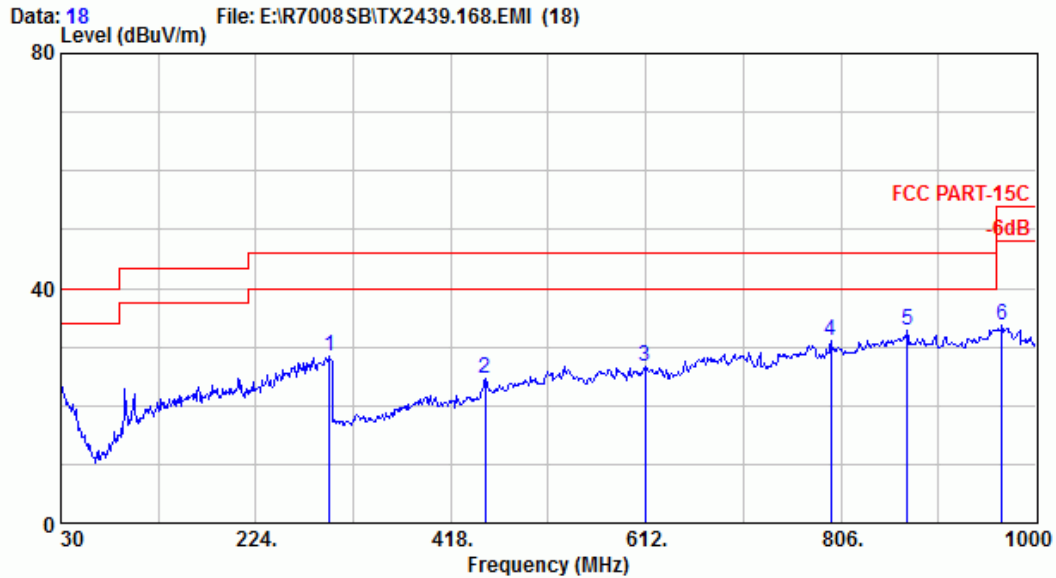
Site no. : A/C Chamber Data no. : 18
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2405.376

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	299.660	26.77	3.90	-1.51	29.16	46.00	16.84	
2	484.930	18.80	6.20	-0.42	24.58	46.00	21.42	
3	572.230	21.12	6.50	0.00	27.61	46.00	18.39	
4	666.320	22.78	6.40	-1.26	27.91	46.00	18.09	
5	798.240	24.09	6.90	-0.28	30.71	46.00	15.29	
6	969.930	26.83	7.69	-0.60	33.93	54.00	20.07	

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



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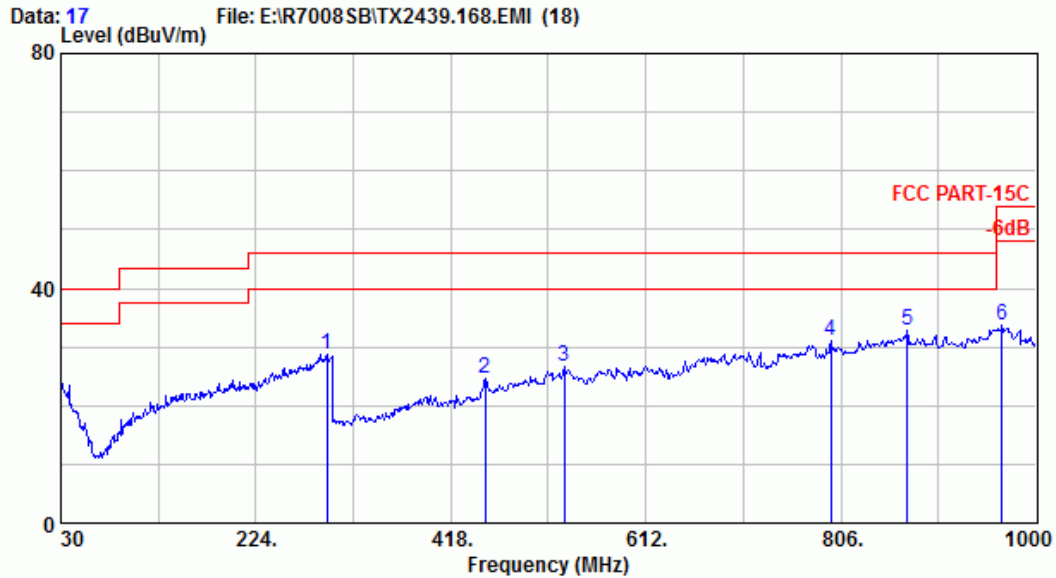
Site no. : A/C Chamber Data no. : 18
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2439.168

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	297.720	26.68	3.98	-2.13	28.53	46.00	17.47	
2	451.950	17.65	5.40	1.42	24.47	46.00	21.53	
3	611.030	21.41	6.30	-1.04	26.67	46.00	19.33	
4	796.300	24.04	6.90	0.13	31.07	46.00	14.93	
5	871.960	25.52	7.20	0.13	32.85	46.00	13.15	
6	966.050	26.89	7.70	-0.97	33.62	54.00	20.38	

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



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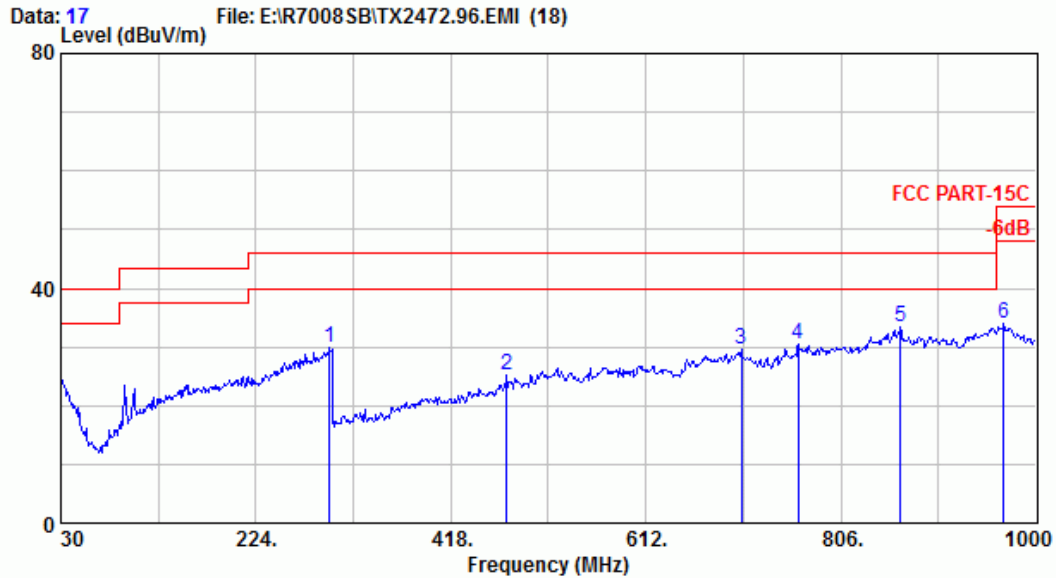
Site no. : A/C Chamber Data no. : 17
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2439.168

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	294.810	26.43	3.99	-1.77	28.65	46.00	17.35	
2	451.950	17.65	5.40	1.42	24.47	46.00	21.53	
3	530.520	19.70	6.90	-0.02	26.58	46.00	19.42	
4	796.300	24.04	6.90	0.13	31.07	46.00	14.93	
5	871.960	25.52	7.20	0.13	32.85	46.00	13.15	
6	966.050	26.89	7.70	-0.97	33.62	54.00	20.38	

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



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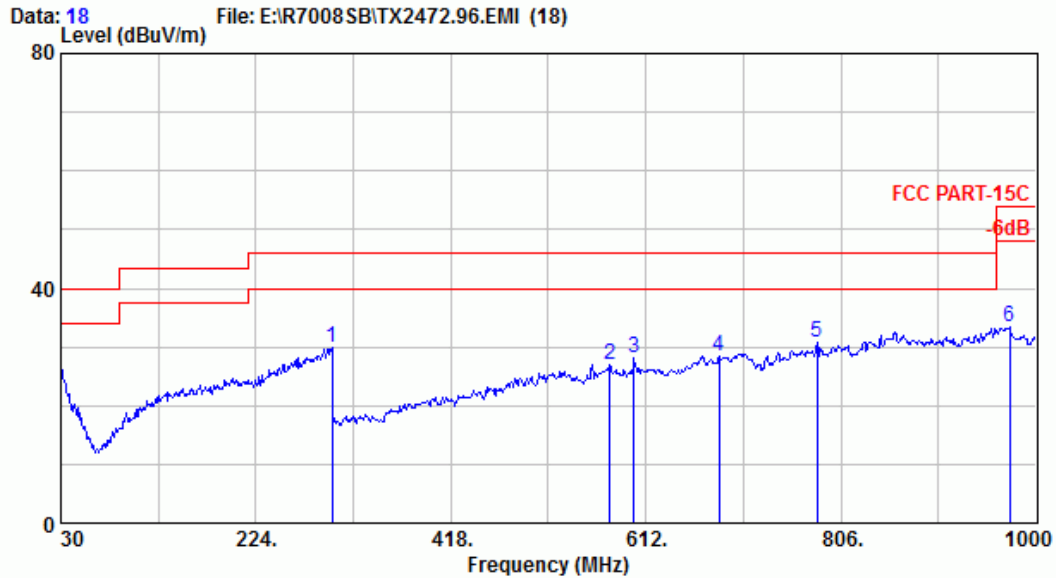
Site no. : A/C Chamber Data no. : 17
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2472.960

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	297.720	26.68	3.98	-0.84	29.82	46.00	16.18	
2	473.290	18.45	5.80	0.87	25.12	46.00	20.88	
3	707.060	23.55	6.60	-0.66	29.49	46.00	16.51	
4	763.320	23.75	6.74	-0.04	30.45	46.00	15.55	
5	865.170	26.00	7.20	0.11	33.31	46.00	12.69	
6	967.990	26.90	7.69	-0.72	33.87	54.00	20.13	

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



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 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2472.960

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	299.660	26.77	3.90	-0.79	29.88	46.00	16.12	
2	576.110	21.05	6.40	-0.38	27.07	46.00	18.93	
3	600.360	21.31	6.30	0.38	27.99	46.00	18.01	
4	684.750	23.11	6.49	-1.05	28.56	46.00	17.44	
5	782.720	23.99	6.90	-0.24	30.64	46.00	15.36	
6	973.810	26.64	7.70	-1.06	33.29	54.00	20.71	

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

3.6.2. Above 1GHz Frequency Range Measurement Results

Date of Test : Nov. 22, 2011 Temperature : 25

EUT : Radio Control Humidity : 51%

Test Mode : Transmitting Mode, Frequency: 2405.376MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
3206.680	30.51	7.36	15.51	53.39	74.00	20.61
4813.000	32.92	9.14	21.27	63.33	74.00	10.67
7218.000	35.84	11.25	20.87	67.97	74.00	6.03
* 9622.500	37.77	13.03	12.72	63.52	83.50	19.98
* 12020.000	38.69	14.96	14.67	68.32	83.50	15.18

- Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All final readings of measurement were with Peak values.
 4. *: Measured at 1m and limit is transformed to 83.5dBμV/m by adding a factor 9.5 which is calculated from $20\log(3/1)$.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Factor (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3206.68	52.94	-32.77	20.17	54.00	33.83
4813.00	63.33	-32.77	30.56	54.00	23.44
7218.00	67.97	-32.77	35.20	54.00	18.80
* 9622.50	63.52	-32.77	30.75	63.50	32.75
* 12020.00	68.32	-32.77	35.55	63.50	27.95

- Remarks: 1. Duty Cycle Factor= $20\log(\text{dwell time}/100\text{ms})=20\log(2.300\text{ms}/100\text{ms})=-32.77$
 2. Average value=Peak value+ Duty Cycle Factor
 3. All final readings of measurement were with Average values.
 4. *: Measured at 1m and limit is transformed to 63.5dBμV/m by adding a factor 9.5 which is calculated from $20\log(3/1)$.

Date of Test : Nov. 22, 2011 Temperature : 25

EUT : Radio Control Humidity : 51%

Test Mode : Transmitting Mode, Frequency: 2405.376MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Vertical (dBμV)	Emission Level Vertical (dBμV/m)	Limits (dBμV/m)	Margin (dB)
3206.680	30.51	7.36	14.65	52.53	74.00	21.47
4813.000	32.92	9.14	27.05	69.11	74.00	4.89
7218.000	35.84	11.25	24.52	71.62	74.00	2.38
* 9617.500	37.77	13.03	15.68	66.48	83.50	17.02
* 12035.000	38.69	14.96	16.06	69.71	83.50	13.79

- Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All final readings of measurement were with Peak values.
 4. *: Measured at 1m and limit is transformed to 83.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3206.68	52.53	-32.77	19.76	54.00	34.24
4813.00	69.11	-32.77	36.34	54.00	17.66
7218.00	71.62	-32.77	38.85	54.00	15.15
* 9617.50	66.48	-32.77	33.71	63.50	29.79
* 12020.00	69.71	-32.77	36.94	63.50	26.56

- Remarks: 1. Duty Cycle Factor=20log(dwell time/100ms)=20log(2.300ms/100ms)=-32.77
 2. Average value=Peak value+ Duty Cycle Factor
 3. All final readings of measurement were with Average values.
 4. *: Measured at 1m and limit is transformed to 63.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Date of Test : Nov. 22, 2011 Temperature : 25
 EUT : Radio Control Humidity : 51%
 Test Mode : Transmitting Mode, Frequency: 2439.168MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
3252.880	30.62	7.40	13.87	51.89	74.00	22.11
4880.500	33.06	9.15	16.76	58.96	74.00	15.04
7318.000	36.09	11.41	15.92	63.41	74.00	10.59
* 9755.000	37.86	12.94	13.91	64.71	83.50	18.79
* 12195.000	38.62	15.01	12.03	65.65	83.50	17.85

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All final readings of measurement were with Peak values.
 4. *: Measured at 1m and limit is transformed to 83.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Factor (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3252.88	51.89	-32.77	19.12	54.00	34.88
4880.50	58.96	-32.77	26.19	54.00	27.81
7318.00	63.41	-32.77	30.64	54.00	23.36
* 9755.00	64.71	-32.77	31.94	63.50	31.56
* 12195.00	65.65	-32.77	32.88	63.50	30.62

Remarks: 1. Duty Cycle Factor=20log(dwelling time/100ms)=20log(2.300ms/100ms)=-32.77
 2. Average value=Peak value+ Duty Cycle Factor
 3. All final readings of measurement were with Average values.
 4. *: Measured at 1m and limit is transformed to 63.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Date of Test : Nov. 22, 2011 Temperature : 25
 EUT : Radio Control Humidity : 51%
 Test Mode : Transmitting Mode, Frequency: 2439.168MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Vertical (dBμV)	Emission Level Vertical (dBμV/m)	Limits (dBμV/m)	Margin (dB)
3252.880	30.62	7.40	12.21	50.23	74.00	23.77
4880.500	33.06	9.15	24.61	66.81	74.00	7.19
7318.000	36.09	11.41	20.86	68.35	74.00	5.65
* 9755.000	37.86	12.94	13.66	64.46	83.50	19.04
* 12195.000	38.62	15.01	14.32	67.94	83.50	15.56

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All final readings of measurement were with Peak values.
 4. *: Measured at 1m and limit is transformed to 83.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3252.88	50.23	-32.77	17.46	54.00	36.54
4880.50	66.81	-32.77	34.04	54.00	19.96
7318.00	68.35	-32.77	35.58	54.00	18.42
* 9755.00	64.46	-32.77	31.69	63.50	31.81
* 12195.00	67.94	-32.77	35.17	63.50	28.33

Remarks: 1. Duty Cycle Factor=20log(dwelling time/100ms)=20log(2.300ms/100ms)=-32.77
 2. Average value=Peak value+ Duty Cycle Factor
 3. All final readings of measurement were with Average values.
 4. *: Measured at 1m and limit is transformed to 63.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Date of Test : Nov. 22, 2011 Temperature : 25
 EUT : Radio Control Humidity : 51%
 Test Mode : Transmitting Mode, Frequency: 2472.960MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
3296.440	30.69	7.45	13.50	51.64	74.00	22.36
4948.000	33.20	9.10	16.95	59.25	74.00	14.75
7414.000	36.29	11.58	16.70	64.56	74.00	9.44
* 9892.500	37.94	12.89	15.84	66.66	83.50	16.84
* 12360.000	38.56	15.01	9.82	63.38	83.50	20.12

Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All final readings of measurement were with Peak values.
 4. *: Measured at 1m and limit is transformed to 83.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Factor (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3296.44	51.64	-32.77	18.87	54.00	35.13
4948.00	59.25	-32.77	26.48	54.00	27.52
7414.00	64.56	-32.77	31.79	54.00	22.21
* 9892.50	66.66	-32.77	33.89	63.50	29.61
* 12360.00	63.38	-32.77	30.61	63.50	32.89

Remarks: 1. Duty Cycle Factor=20log(dwell time/100ms)=20log(2.300ms/100ms)=-32.77
 2. Average value=Peak value+ Duty Cycle Factor
 3. All final readings of measurement were with Average values.
 4. *: Measured at 1m and limit is transformed to 63.5dBμV/m by adding a factor 9.5 which is calculated from 20log(3/1).

Date of Test : Nov. 22, 2011 Temperature : 25

EUT : Radio Control Humidity : 51%

Test Mode : Transmitting Mode, Frequency: 2472.960MHz

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Vertical (dBμV)	Emission Level Vertical (dBμV/m)	Limits (dBμV/m)	Margin (dB)
3296.440	30.69	7.45	11.46	49.60	74.00	24.40
4948.000	33.20	9.10	25.83	68.13	74.00	5.87
7414.000	36.29	11.58	23.15	71.01	74.00	2.99
* 9885.000	37.94	12.89	15.64	66.46	83.50	17.04
* 12360.000	38.56	15.01	15.76	69.32	83.50	14.18

- Remarks: 1. Emission level=Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.
 3. All final readings of measurement were with Peak values.
 4. *: Measured at 1m and limit is transformed to 83.5dBμV/m by adding a factor 9.5 which is calculated from $20\log(3/1)$.

Emission Frequency (MHz)	Peak Value (dB/m)	Duty Cycle Factor (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3296.44	49.60	-32.77	16.83	54.00	37.17
4948.00	68.13	-32.77	35.36	54.00	18.64
7414.00	71.01	-32.77	38.24	54.00	15.76
* 9885.50	66.46	-32.77	33.69	63.50	29.81
* 12360.00	69.32	-32.77	36.55	63.50	26.95

- Remarks: 1. Duty Cycle Factor= $20\log(\text{dwell time}/100\text{ms})=20\log(2.300\text{ms}/100\text{ms})=-32.77$
 2. Average value=Peak value+ Duty Cycle Factor
 3. All final readings of measurement were with Average values.
 4. *: Measured at 1m and limit is transformed to 63.5dBμV/m by adding a factor 9.5 which is calculated from $20\log(3/1)$.

3.6.3. Restricted Bands Measurement Results

Date of Test : Nov. 22, 2011 Temperature : 25

EUT : Radio Control Humidity : 51%

Test Mode : Transmit, Channel: 02, Frequency: 2405.376MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak*	2335.520	28.04	6.27	15.25	49.56	74.00	24.44

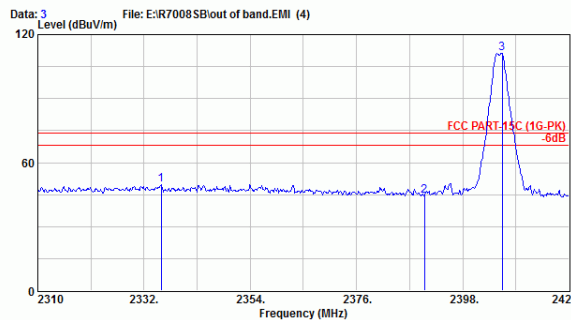
- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2420MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency (MHz)	Peak Value (dB/m)	PDCF (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average*	2335.520	49.56	-32.77	16.79	54.00	37.21

- Remarks: 1. PDCF=20log(dwell time/100ms)=20log(2.300ms/100ms)=-32.77
 2. Average value=Peak value+PDCF
 3. Low frequency section (spurious in the restricted band 2310-2420MHz).
 4. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Site no. : A/C Chamber Data no. : 3
 Dis. / Ant. : 3m 3115(3775) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.6W
 Test Mode : TX2405.376

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2335.520	28.04	6.27	15.25	49.57	74.00	24.43	Peak
2	2390.080	28.10	6.34	10.13	44.57	74.00	29.43	Peak
3	2406.140	28.11	6.36	76.81	111.29	74.00	-37.29	Peak

- 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 : Nov. 22, 2011 Temperature : 25
 EUT : Radio Control Humidity : 51%
 Test Mode : Transmit, Channel: 02, Frequency: 2405.376MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Vertical (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak*	2371.490	28.08	6.31	11.31	45.70	74.00	28.30

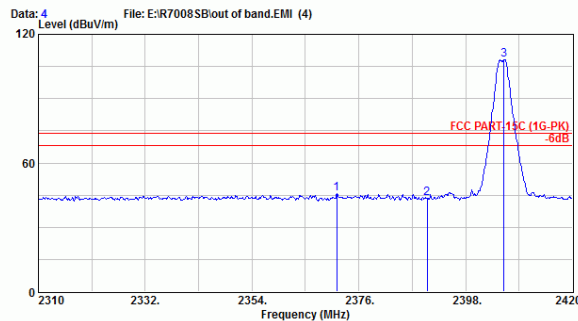
- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2310-2420MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency (MHz)	Peak Value (dB/m)	PDCF (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average*	2371.490	45.70	-32.77	12.93	54.00	41.07

- Remarks: 1. PDCF=20log(dwell time/100ms)=20log(2.300ms/100ms)=-32.77
 2. Average value=Peak value+PDCF
 3. Low frequency section (spurious in the restricted band 2310-2420MHz).
 4. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Site no. : A/C Chamber Data no. : 4
 Dis. / Ant. : 3m 3115 (3775) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2405.376

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2371.490	28.08	6.31	11.31	45.71	74.00	28.29	Peak
2	2390.080	28.10	6.34	9.10	43.54	74.00	30.46	Peak
3	2405.920	28.11	6.36	73.64	108.12	74.00	-34.12	Peak

- 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 : Nov. 22, 2011 Temperature : 25

EUT : Radio Control Humidity : 51%

Test Mode : Transmit, Channel: 68, Frequency: 2472.960MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Horizontal (dBμV)	Emission Level Horizontal (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak*	2483.600	28.18	6.45	11.92	46.55	74.00	27.45

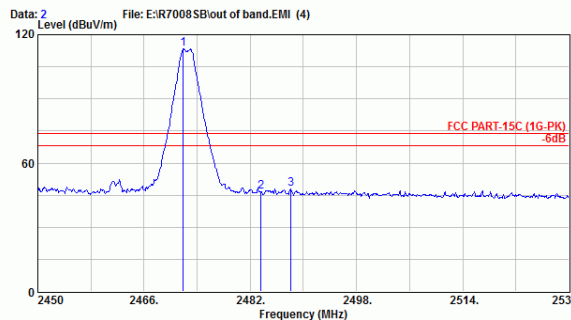
- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2450-2530MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency (MHz)	Peak Value (dB/m)	PDCF (dB)	Average Value Horizontal (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average*	2483.600	46.55	-32.77	13.78	54.00	40.22

- Remarks: 1. $PDCF=20\log(\text{dwell time}/100\text{ms})=20\log(2.300\text{ms}/100\text{ms})=-32.77$
 2. Average value=Peak value+PDCF
 3. Low frequency section (spurious in the restricted band 2450-2530MHz).
 4. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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 Email:ttemc@ttemc.com.tw



Site no. : A/C Chamber Data no. : 2
 Dis. / Ant. : 3m 3115(3775) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.6W
 Test Mode : TX2472.960

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2471.920	28.18	6.43	78.73	113.35	74.00	-39.35	Peak
2	2483.600	28.18	6.45	11.92	46.56	74.00	27.44	Peak
3	2488.160	28.20	6.45	13.34	47.99	74.00	26.01	Peak

- 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 : Nov. 22, 2011 Temperature : 25
 EUT : Radio Control Humidity : 51%
 Test Mode : Transmit, Channel: 68, Frequency: 2472.960MHz

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading Vertical (dBμV)	Emission Level Vertical (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Peak*	2490.720	28.20	6.46	10.79	45.45	74.00	28.55

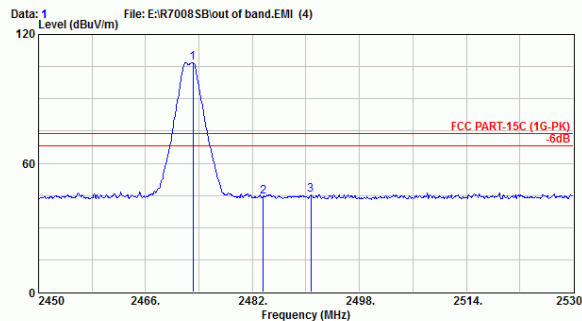
- Remark : 1. Emission Level = Antenna Factor + Cable Loss + Meter Reading.
 2. Low frequency section (spurious in the restricted band 2450-2530MHz).
 3. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.

	Emission Frequency (MHz)	Peak Value (dB/m)	PDCF (dB)	Average Value Vertical (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average*	2490.720	45.45	-32.77	12.68	54.00	41.32

- Remarks: 1. PDCF=20log(dwelling time/100ms)=20log(2.300ms/100ms)=-32.77
 2. Average value=Peak value-PDCF
 3. Low frequency section (spurious in the restricted band 2450-2530MHz).
 4. '*' The field strength of emission appearing within Part 15.205(a) shall not exceed the limits shown in section 15.209.



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Site no. : A/C Chamber Data no. : 1
 Dis. / Ant. : 3m 3115(3775) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/51% Jarwei Wang
 EUT : R7008SB
 Power Rating : DC 4.8V
 Test Mode : TX2472.960

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	2473.120	28.18	6.43	72.41	107.03	74.00	-33.03	Peak x
2	2483.600	28.18	6.45	9.81	44.45	74.00	29.55	Peak
3	2490.720	28.20	6.46	10.79	45.46	74.00	28.54	Peak

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

4. DUTY CYCLE FACTOR

4.1. Test Equipment

The following test equipment was used during the duty cycle factor measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 14, 11'	Oct. 13, 12'

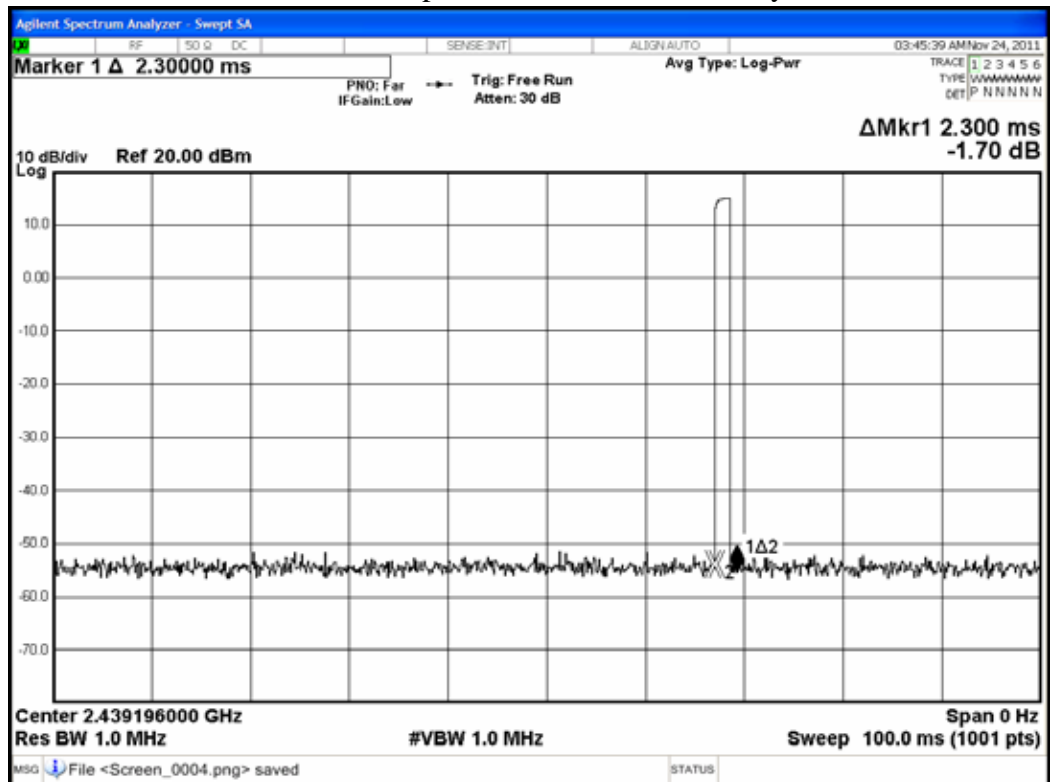
4.2. Block Diagram of Test Setup



4.3. Test Results

PASSED.

Test Date: Nov. 24, 2011 Temperature : 23 Humidity : 55 %



$$\begin{aligned}
 \text{Duty Cycle Factor} &= 20\log(\text{dwell time}/100\text{ms}) \\
 &= 20\log(2.300\text{ms}/100\text{ms}) = -32.77
 \end{aligned}$$

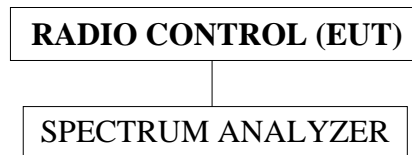
5. 6dB BANDWIDTH MEASUREMENT

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	Agilent	N9030A-54 4	US51350140	Oct. 14, 11'	Oct. 13, 12'

5.2. Block Diagram of Test Setup



5.3. Specification Limits (§15.247(a)(2))

The minimum 6dB bandwidth shall be at least 500kHz.

5.4. Operating Condition of EUT

5.4.1. Set up the EUT and simulator as shown on 5.2.

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 bandwidth of the fundamental frequency was measure by spectrum analyzer with 100kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

The measurement guideline was according to KDB 558074.

5.6. Test Results

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

(Test Date: Nov. 24, 2011 Temperature : 23 Humidity : 55%)

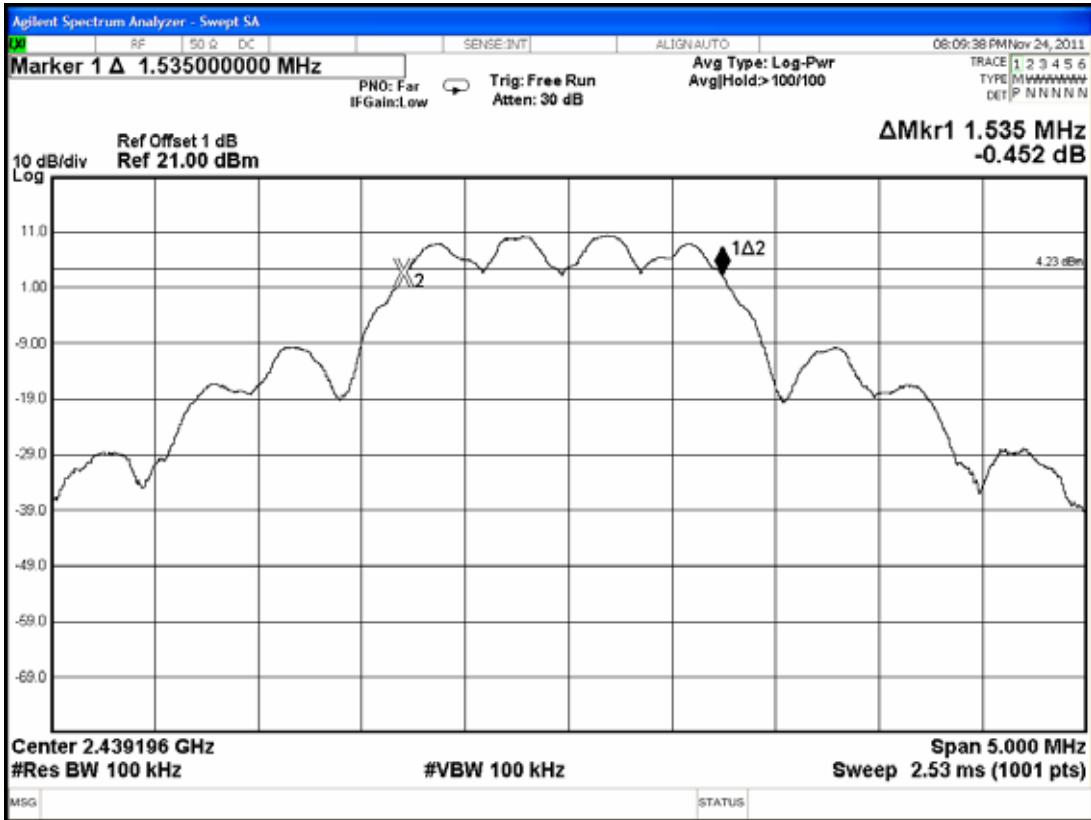
Mode	Channel	Frequency	6dB Bandwidth
1.	CH 02	2405.376MHz	1.440MHz
2.	CH 35	2439.168MHz	1.535MHz
3.	CH 68	2472.960MHz	1.575MHz

[Limit: least 500kHz]

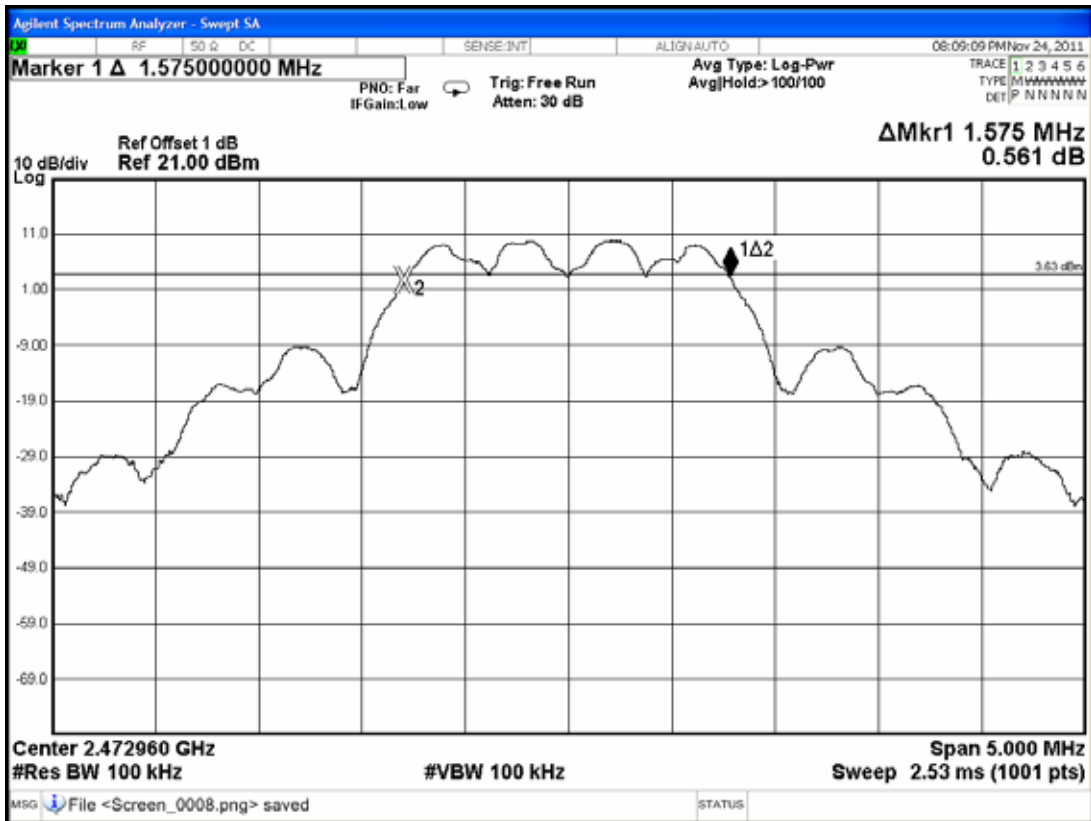
5.6.1. Channel 02, Frequency: 2405.376MHz



5.6.2. Channel 35, Frequency: 2439.168MHz



5.6.3. Channel 68, Frequency: 2472.960MHz



6. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

6.1. 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	Agilent	N9030A-54 4	US51350140	Oct. 14, 11'	Oct. 13, 12'

6.2. Block Diagram of Test Setup

The same as section.4.2.

6.3. Specification Limits (§15.247(b)-(3))

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm)

6.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 5.4 except the test set up replaced by section 6.2.

6.5. Test Procedure

Setting the spectrum span to encompass the EBW, RBW=2MHz and VBW=3MHz. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The measurement guideline was according to KDB 558074.

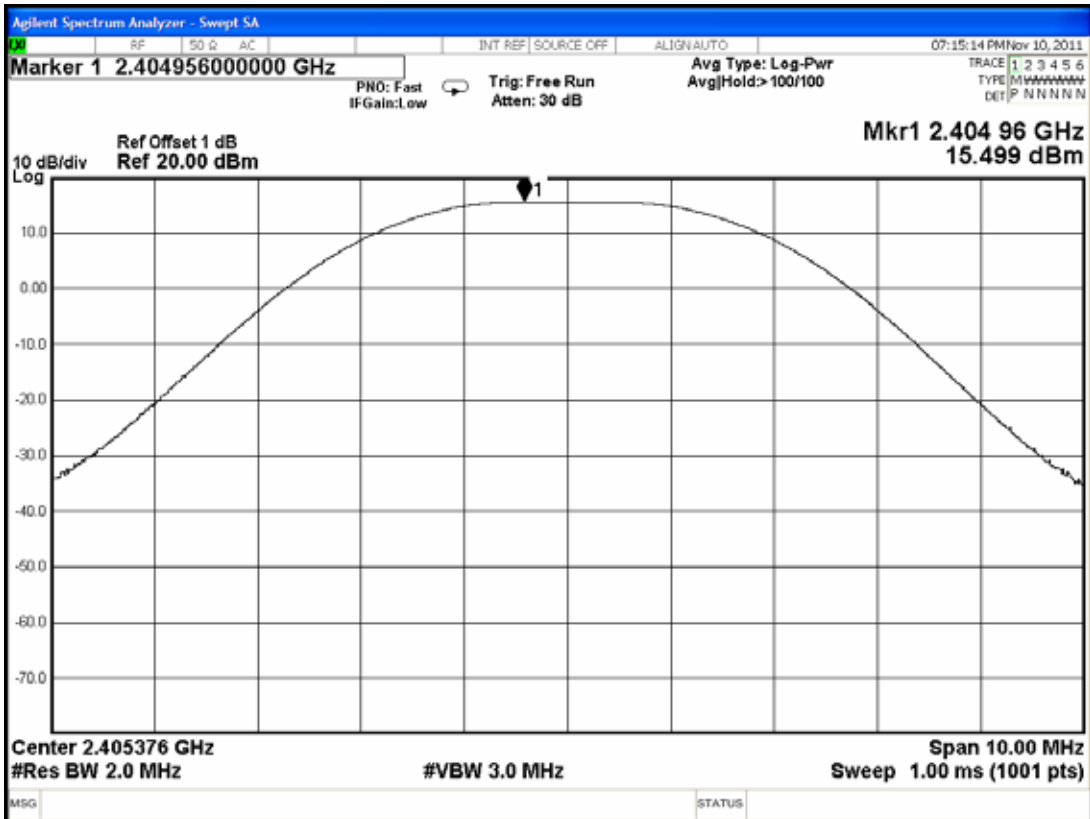
6.6. Test Results

PASSED. All the test results are listed below.

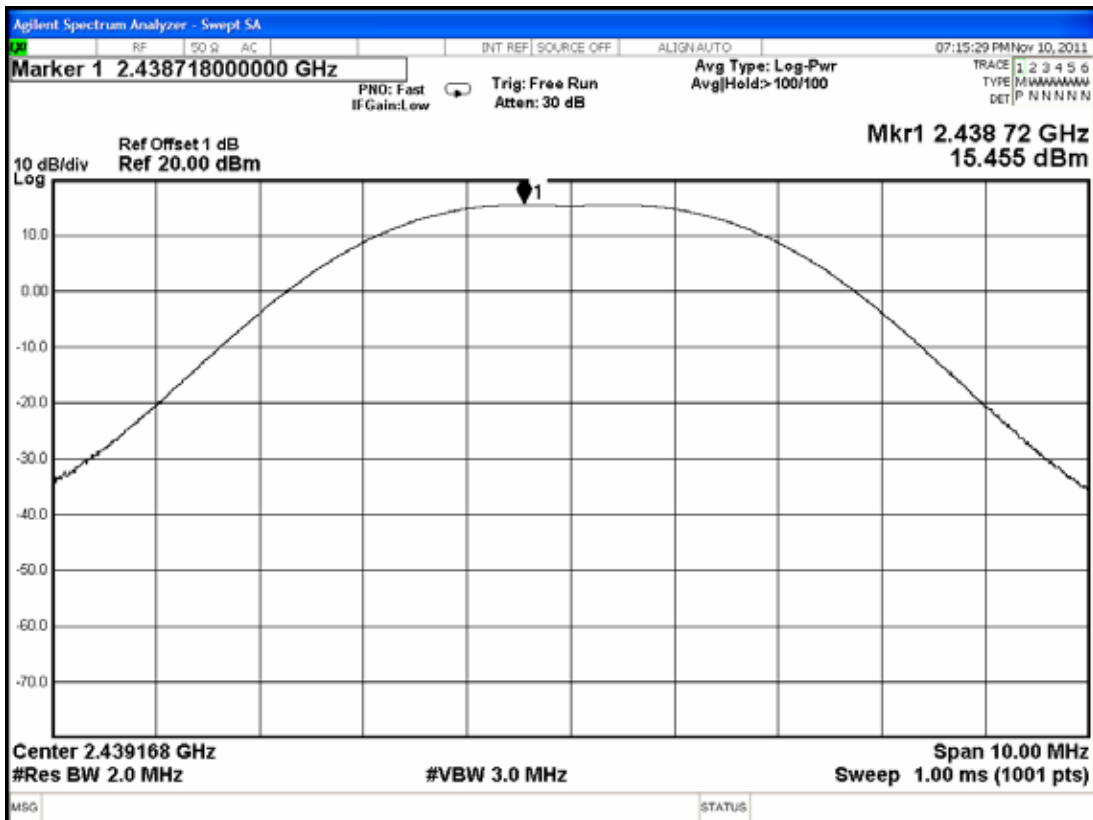
(Test Date: Nov. 10, 2011 Temperature : 26 Humidity : 53%)

No.	Channel	Test Frequency	Peak Output Power	Limit
1.	CH 02	2405.376MHz	15.499dBm	30dBm
2.	CH 35	2439.168MHz	15.455dBm	30dBm
3.	CH 68	2472.960MHz	15.580dBm	30dBm

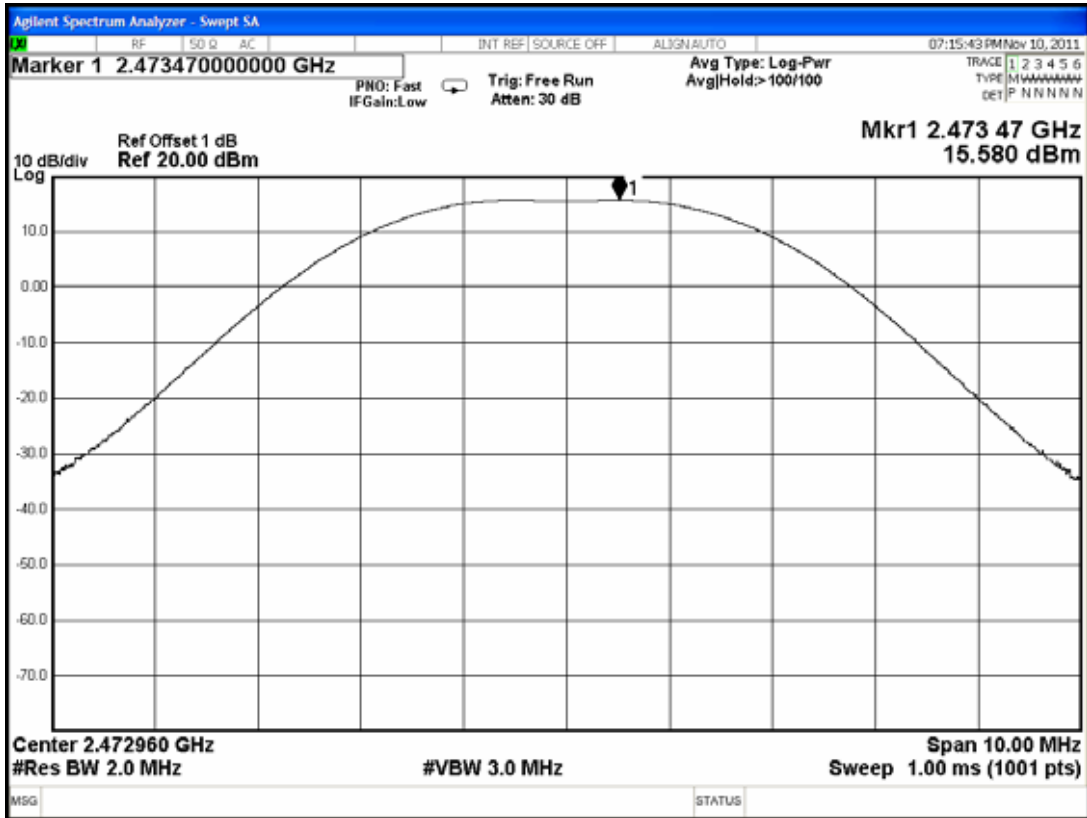
6.6.1. Channel 02, Frequency: 2405.376MHz



6.6.2. Channel 35, Frequency: 2439.168MHz



6.6.3. Channel 68, Frequency: 2472.960MHz



7. EMISSION LIMITATIONS MEASUREMENT

7.1. 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	Agilent	N9030A-54 4	US51350140	Oct. 14, 11'	Oct. 13, 12'

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. 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)

7.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 5.4 except the test set up replaced by section 7.2.

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 100kHz RBW and 100kHz VBW.

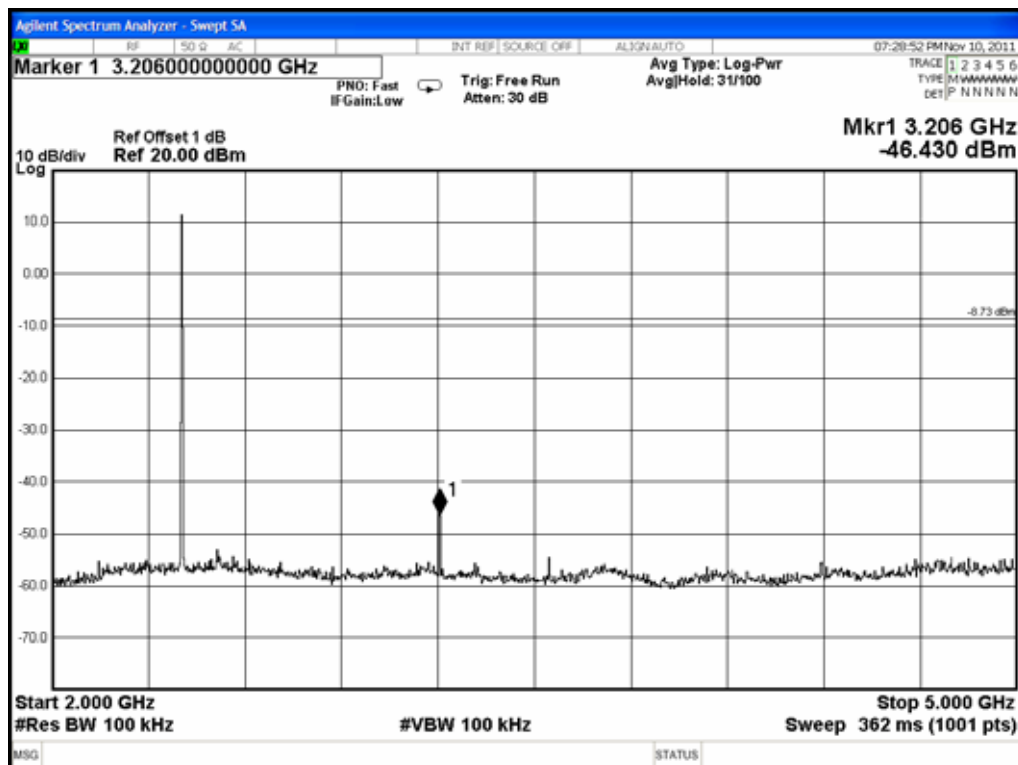
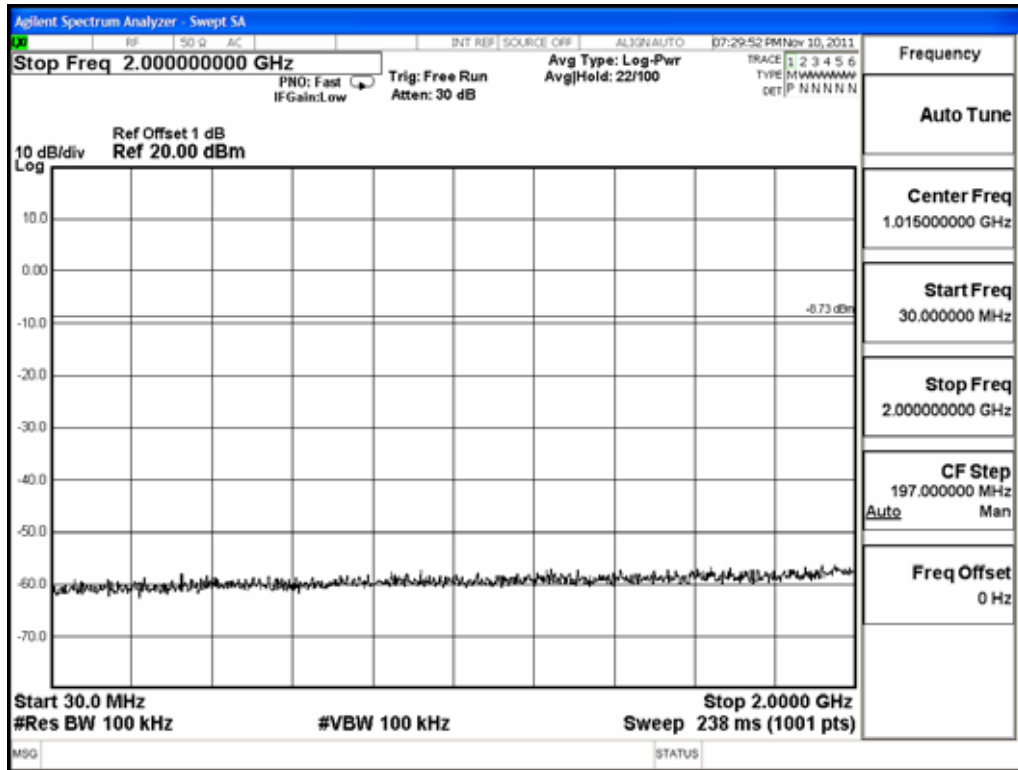
The measurement guideline was according to KDB 558074.

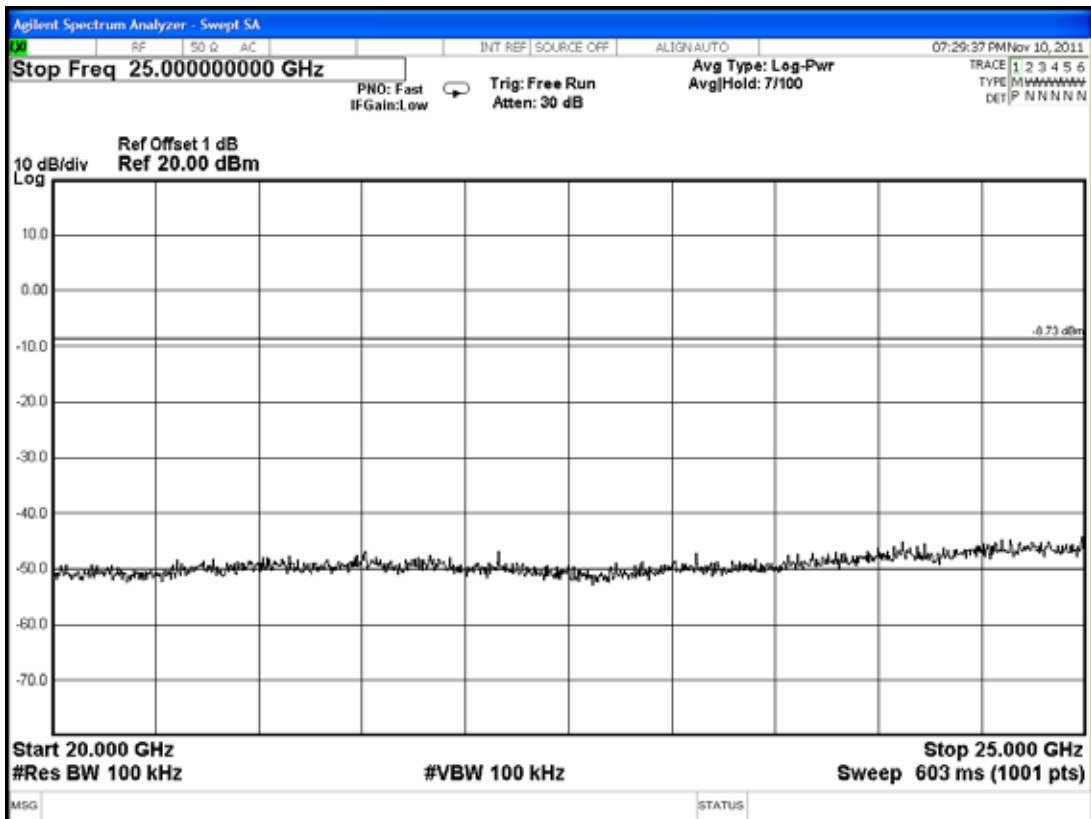
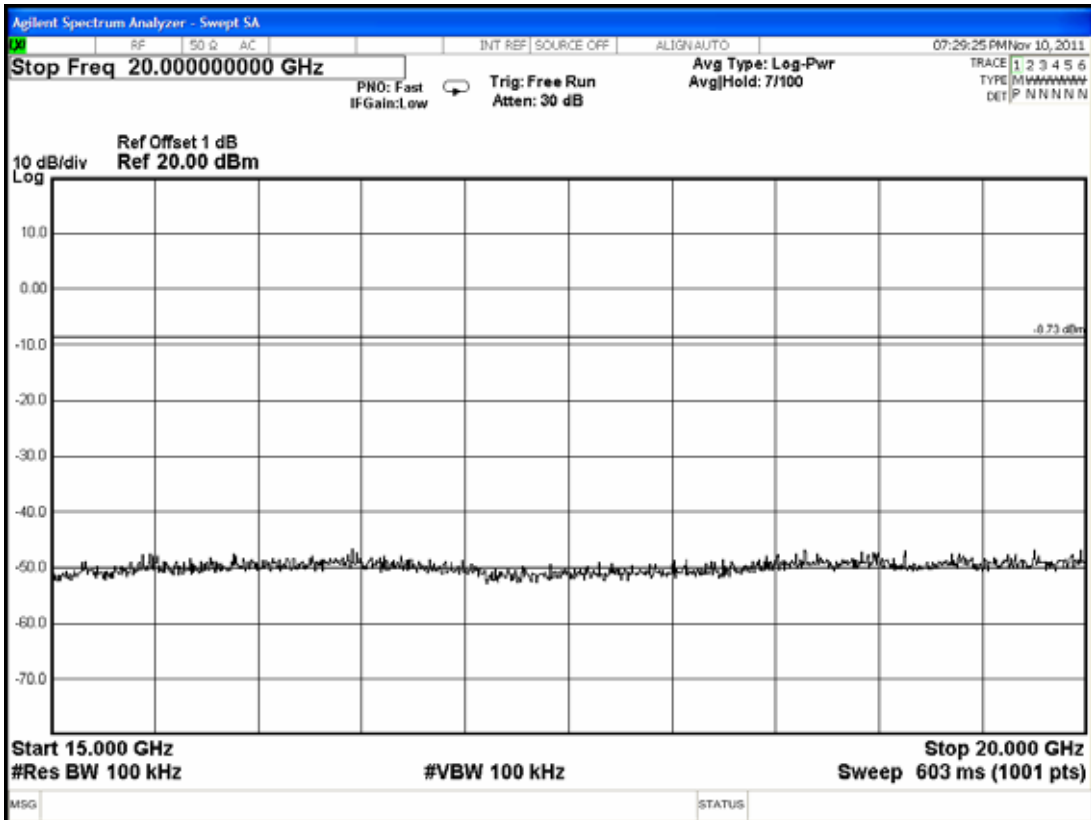
7.6. Test Results

PASSED. The testing data was attached in the next pages.

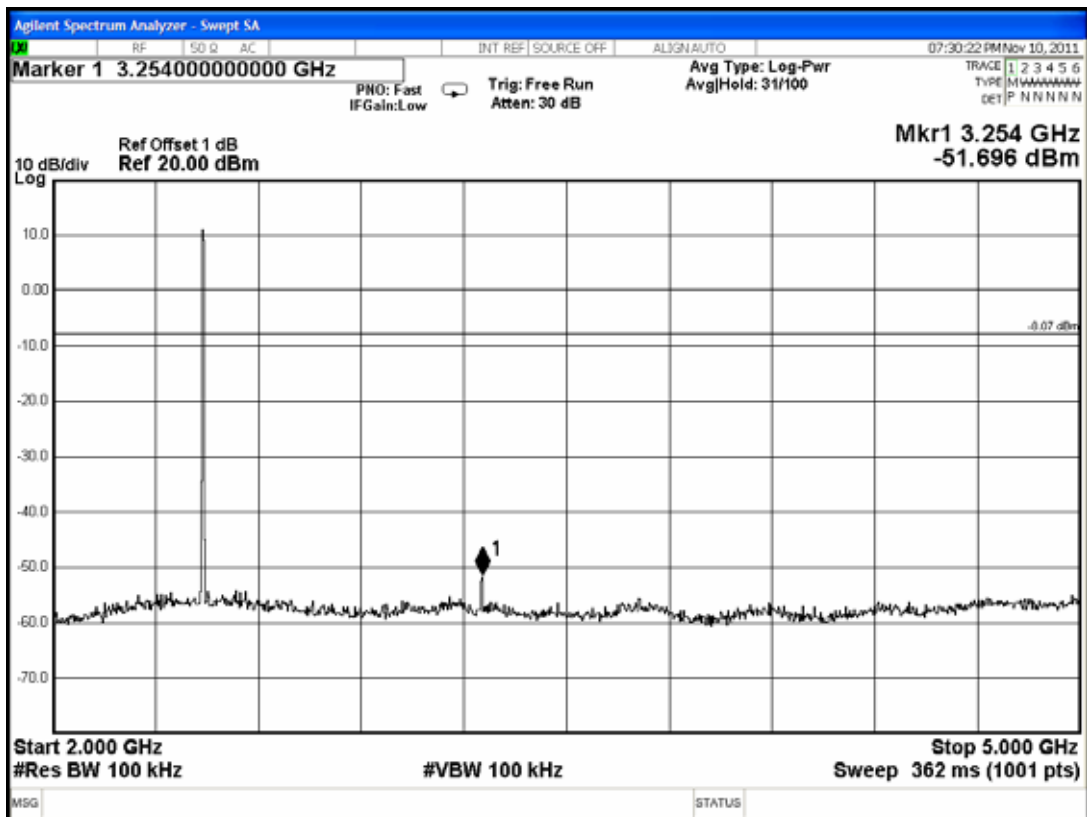
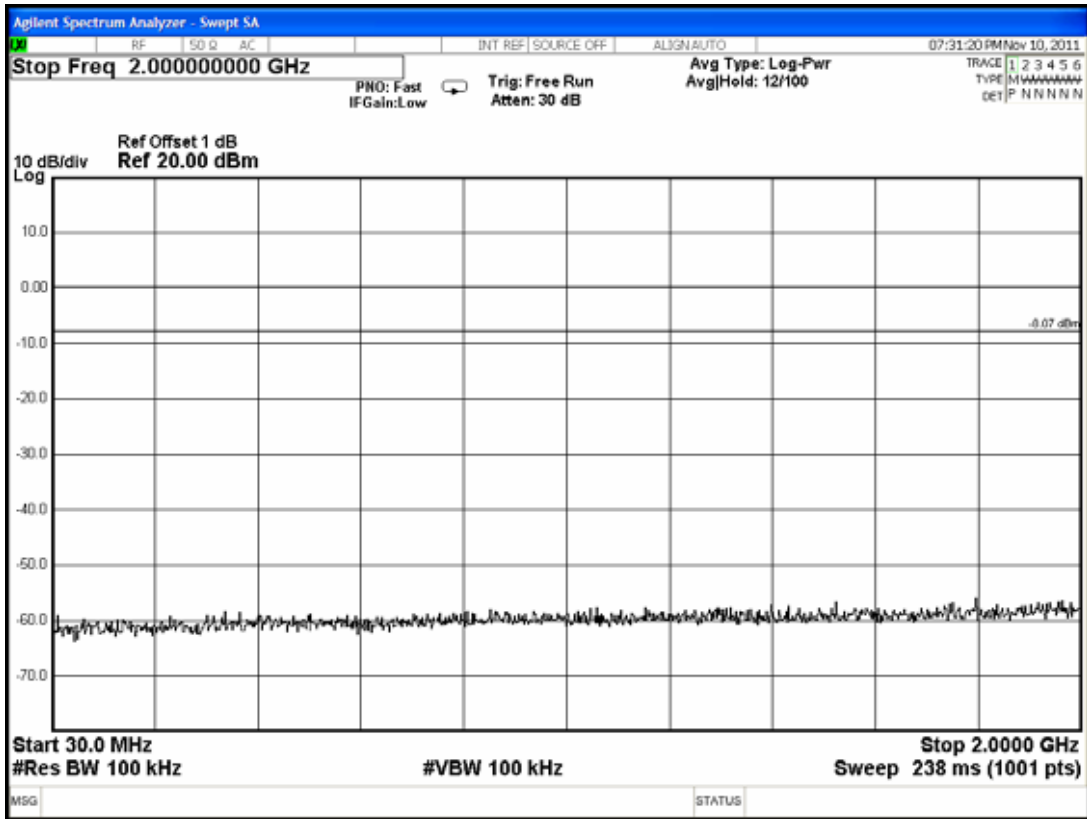
(Test Date: Nov. 10, 2011 Temperature : 26 Humidity : 53%)

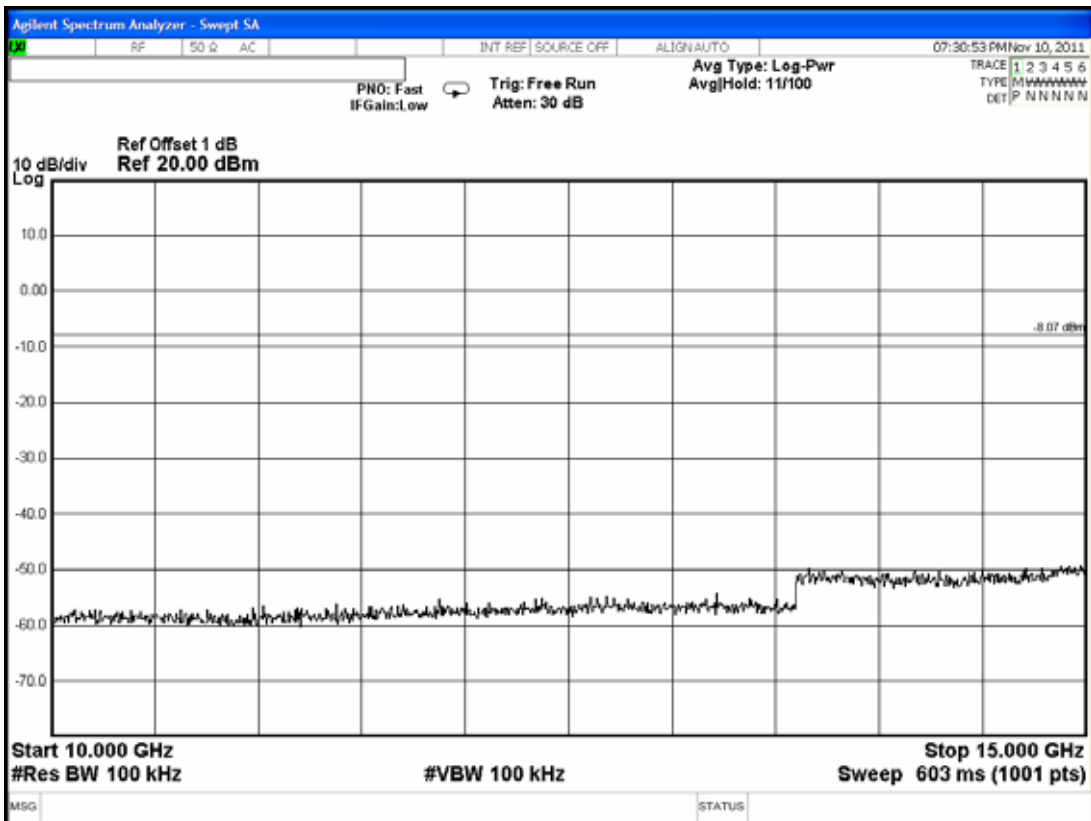
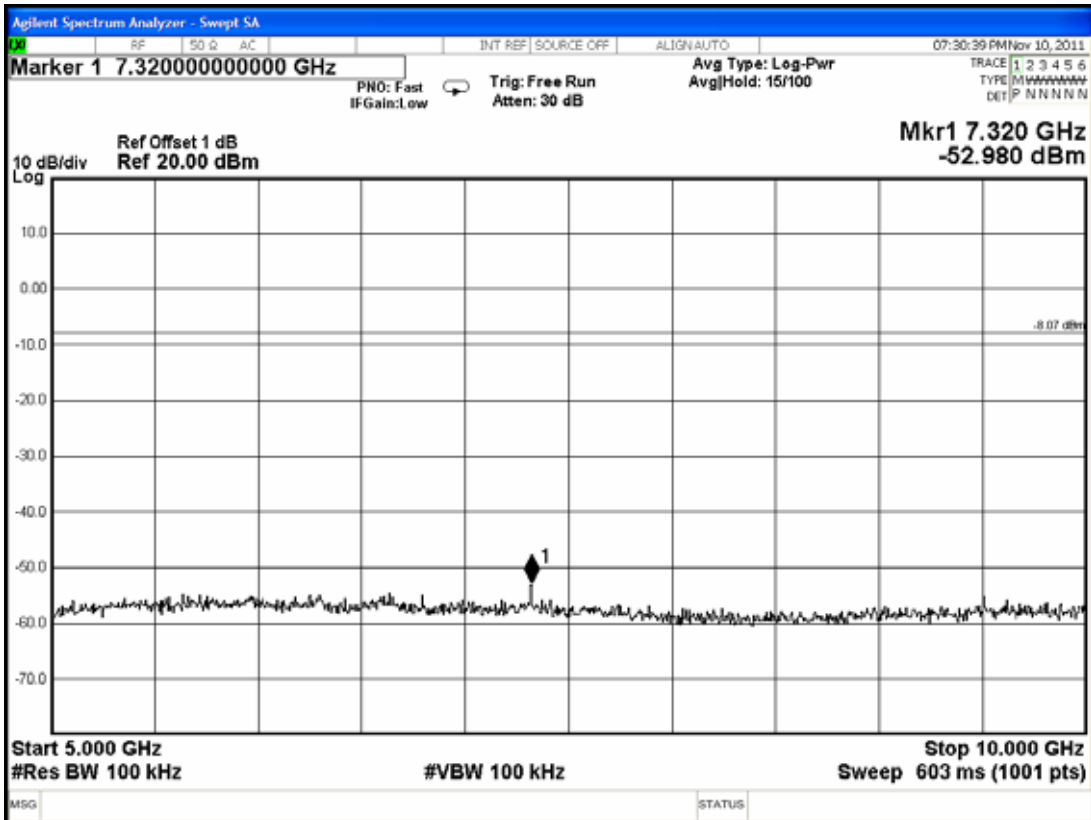
7.6.1. Channel 02, Frequency: 2405.376MHz

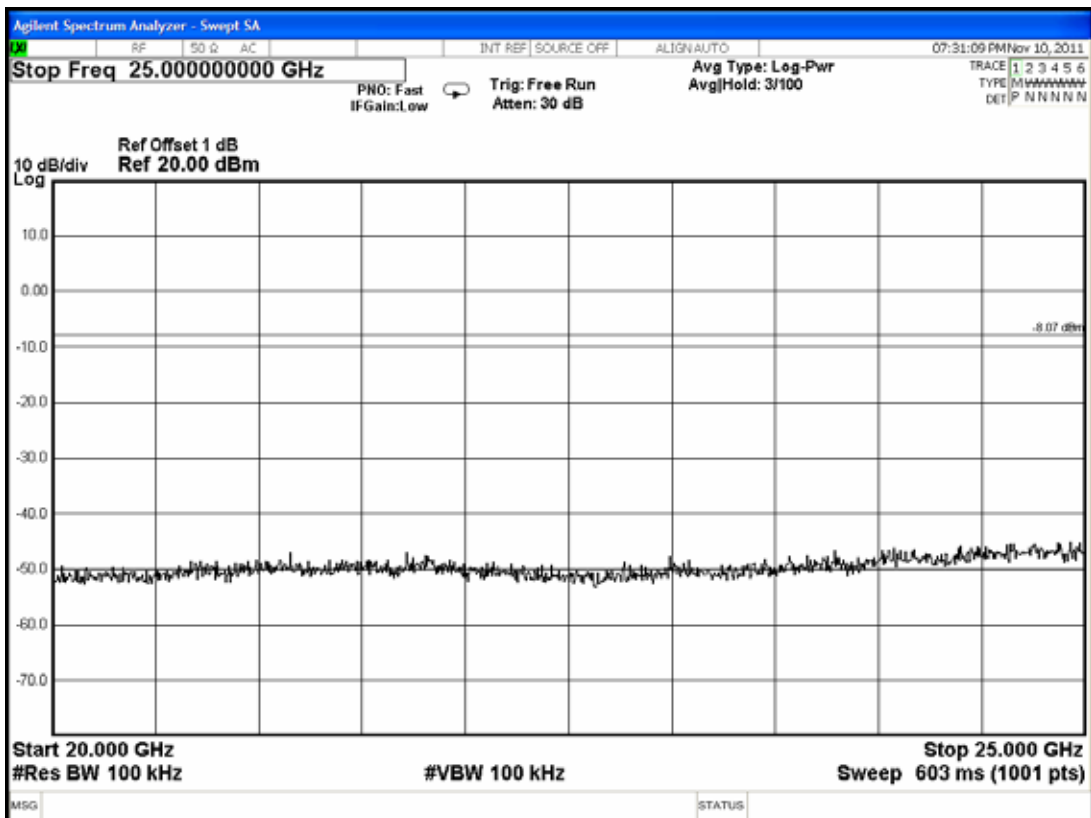
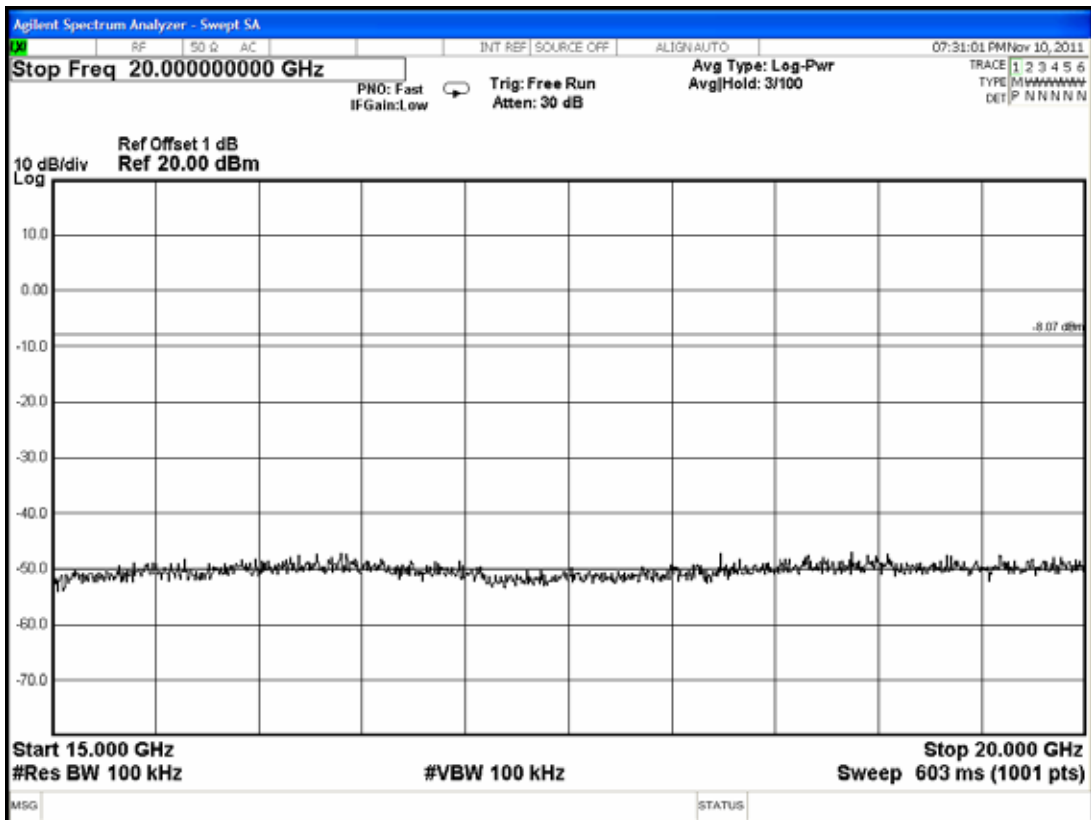




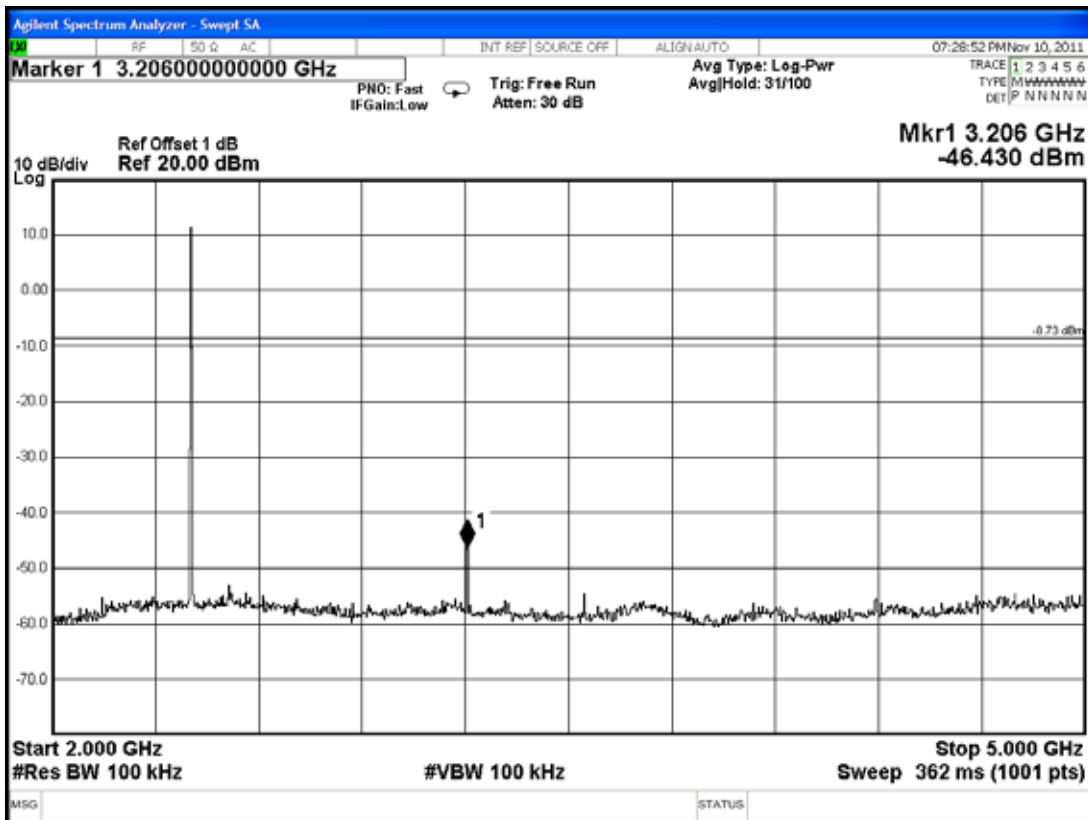
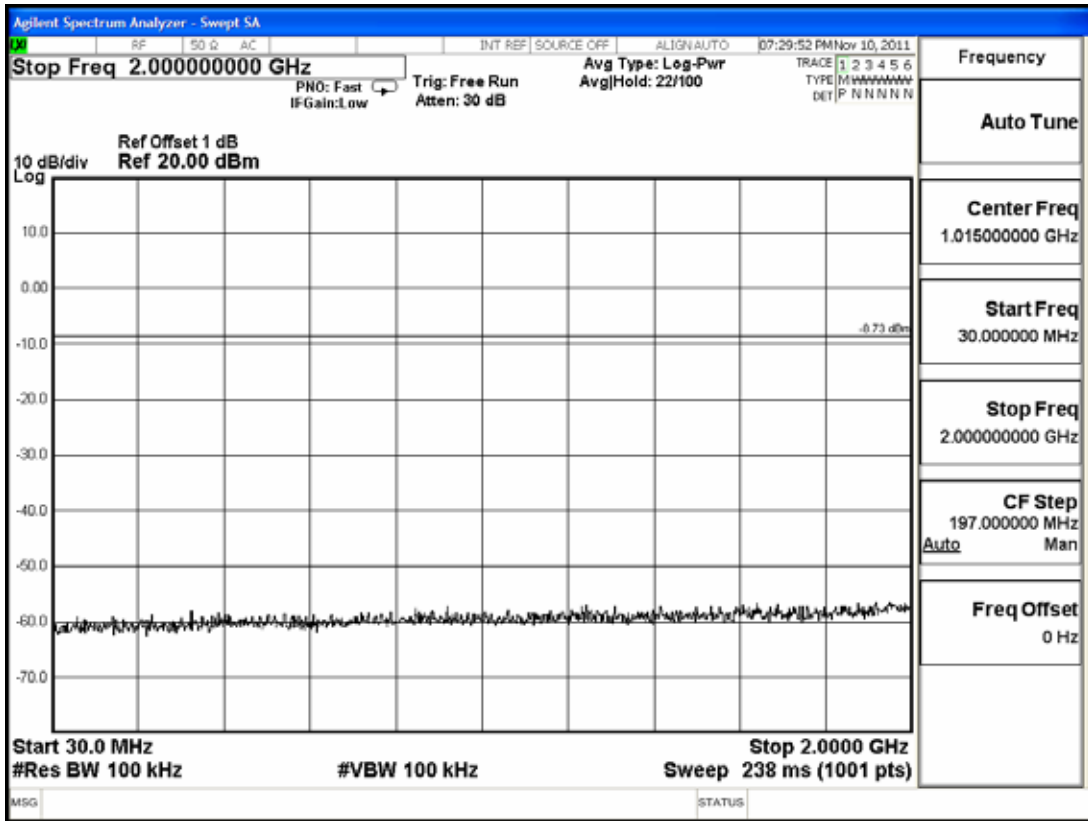
7.6.2. Channel 35, Frequency: 2439.168MHz

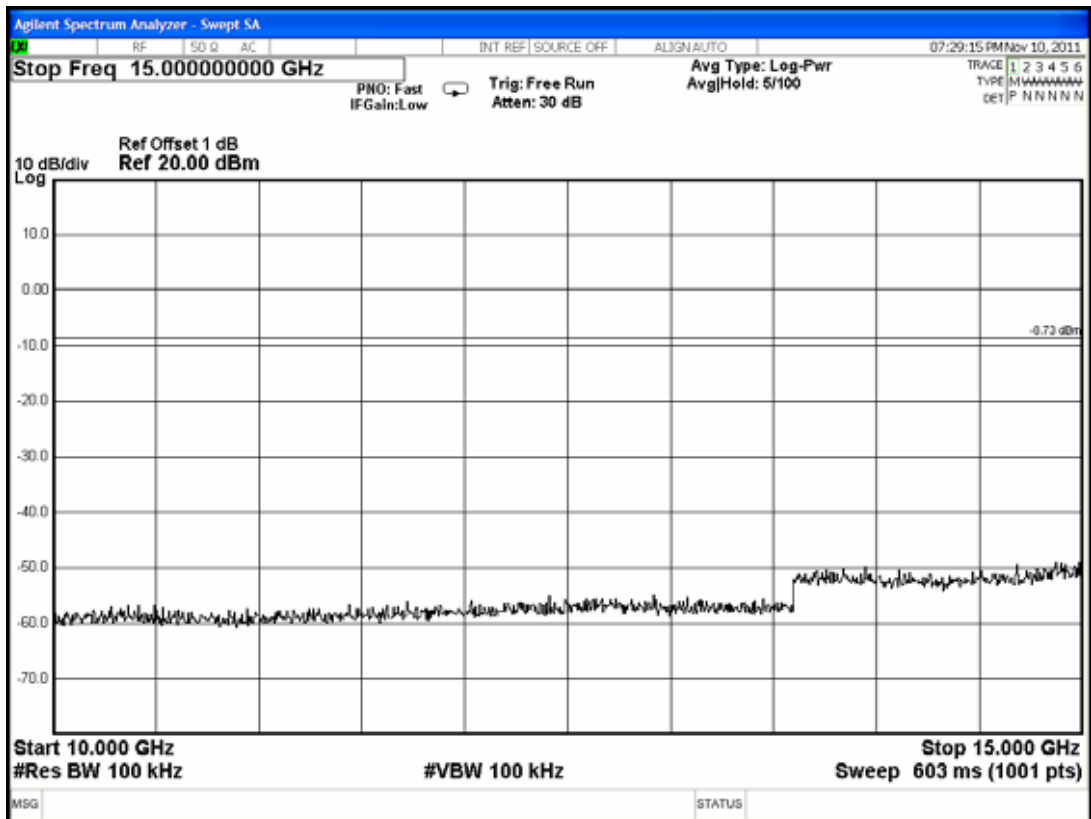
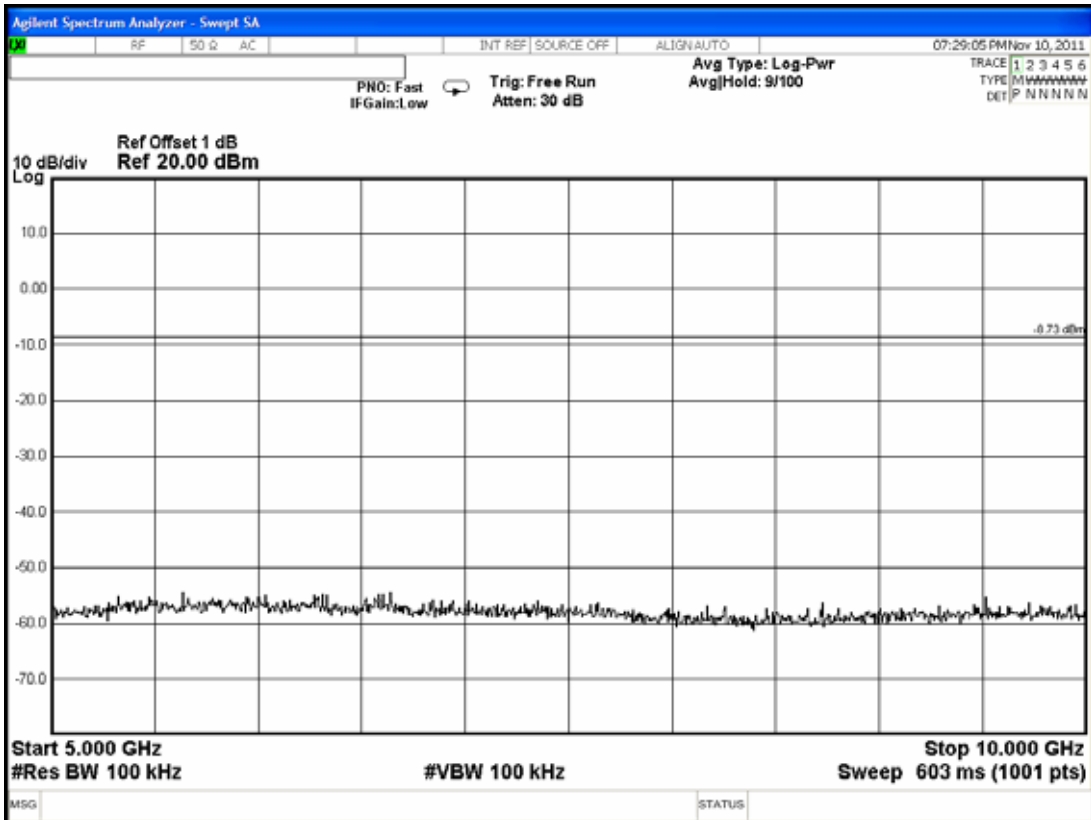


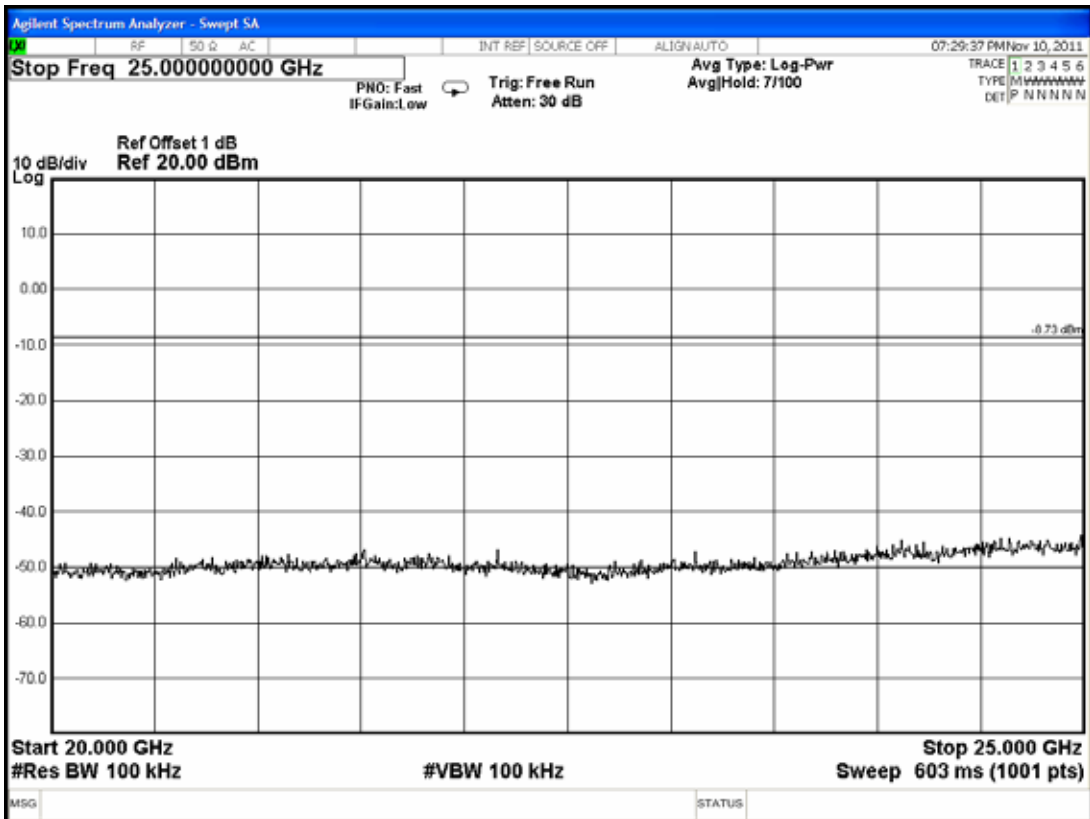
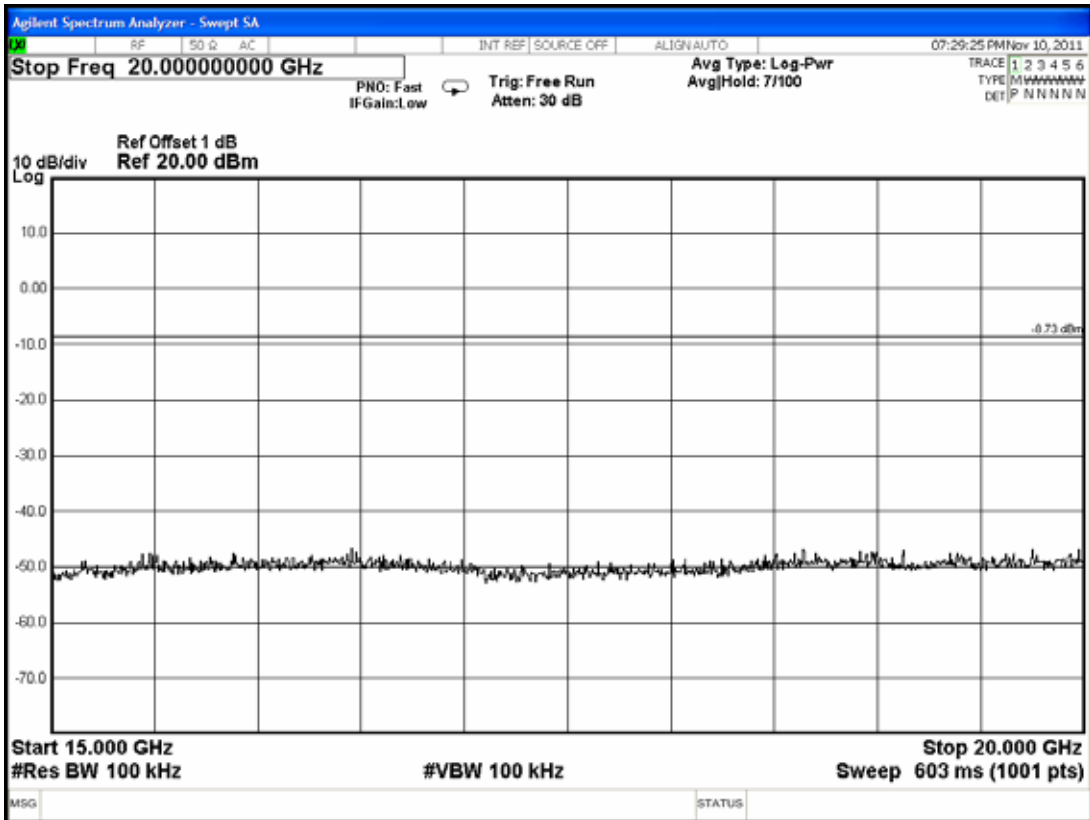




7.6.3. Channel 68, Frequency: 2472.960MHz







8. BAND EDGES MEASUREMENT

8.1. 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	Agilent	N9030A-54 4	US51350140	Oct. 14, 11'	Oct. 13, 12'

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. Specification Limits (§15.247(c))

The highest level should be at least 20 dB below that in the 100kHz bandwidth.

8.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 5.4 except the test set up replaced by section 8.2.

8.5. 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 KDB 558074.

8.6. Test Results

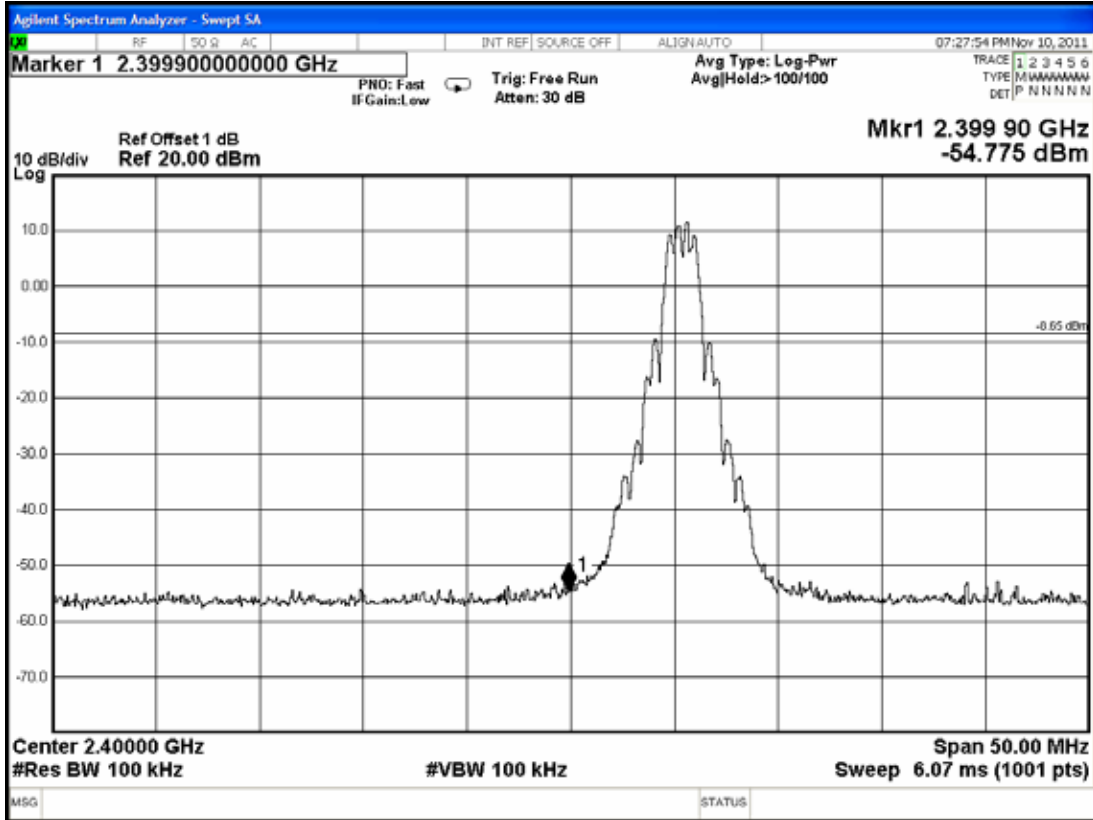
PASSED. All the test results are attached in next pages.

(Test Date: Nov. 10, 2011 Temperature : 26 Humidity : 53%)

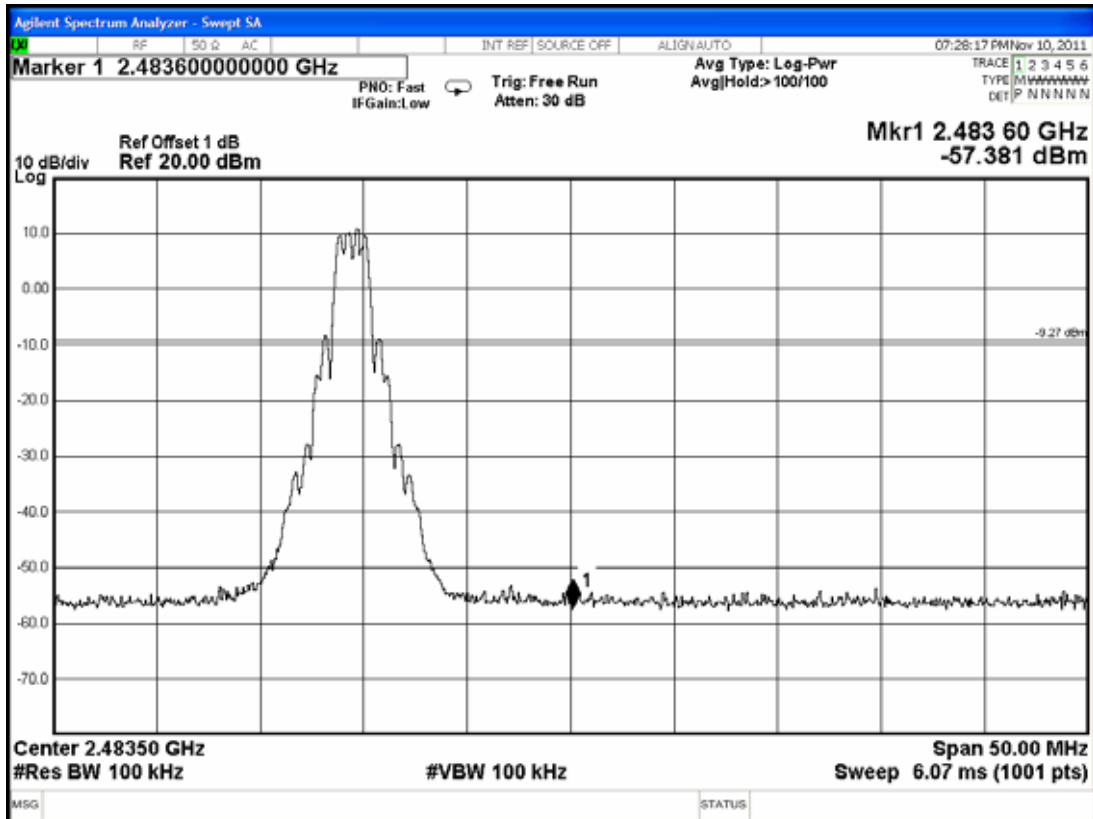
Below Band edge: The highest emission level is -54.775dBm on 2.39990GHz .

Upper Band edge : The highest emission level is -57.381dBm on 2.48360GHz .

Below Band edge



Upper Band edge



9. POWER SPECTRAL DENSITY MEASUREMENT

9.1. Test Equipment

The following test equipment was used during the power spectral density measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-54 4	US51350140	Oct. 14, 11'	Oct. 13, 12'

9.2. Block Diagram of Test Setup

The same as section.4.2.

9.3. Specification Limits (§15.247(d))

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

9.4. Operating Condition of EUT

Same as 6dB bandwidth measurement which was listed in 5.4 except the test set up replaced by section 9.2.

9.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/300kHz.

The measurement guideline was according to KDB 558074.

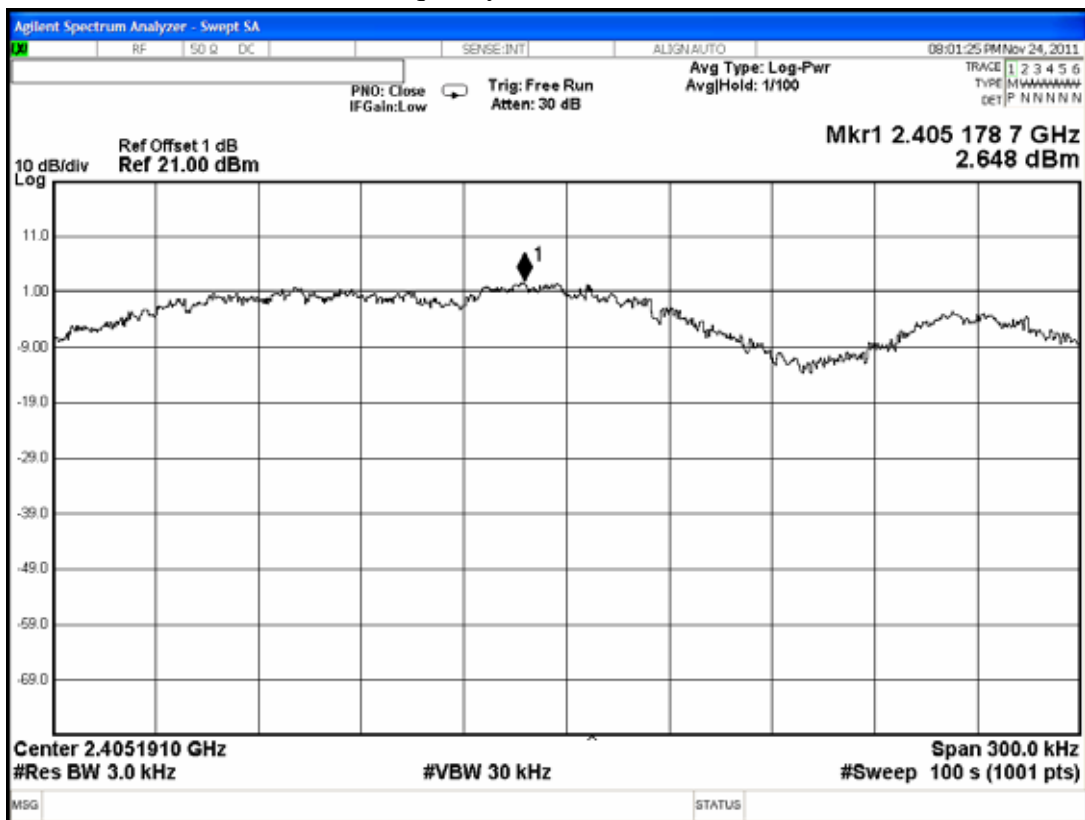
9.6. Test Results

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

(Test Date: Nov. 24, 2011 Temperature : 23 Humidity : 55%)

No.	Channel	Test Frequency	Power Spectral Density (dBm)	Limit
1.	CH 02	2405.376MHz	2.648dBm	8dBm
2.	CH 35	2439.168MHz	3.176dBm	8dBm
3.	CH 68	2472.960MHz	3.718dBm	8dBm

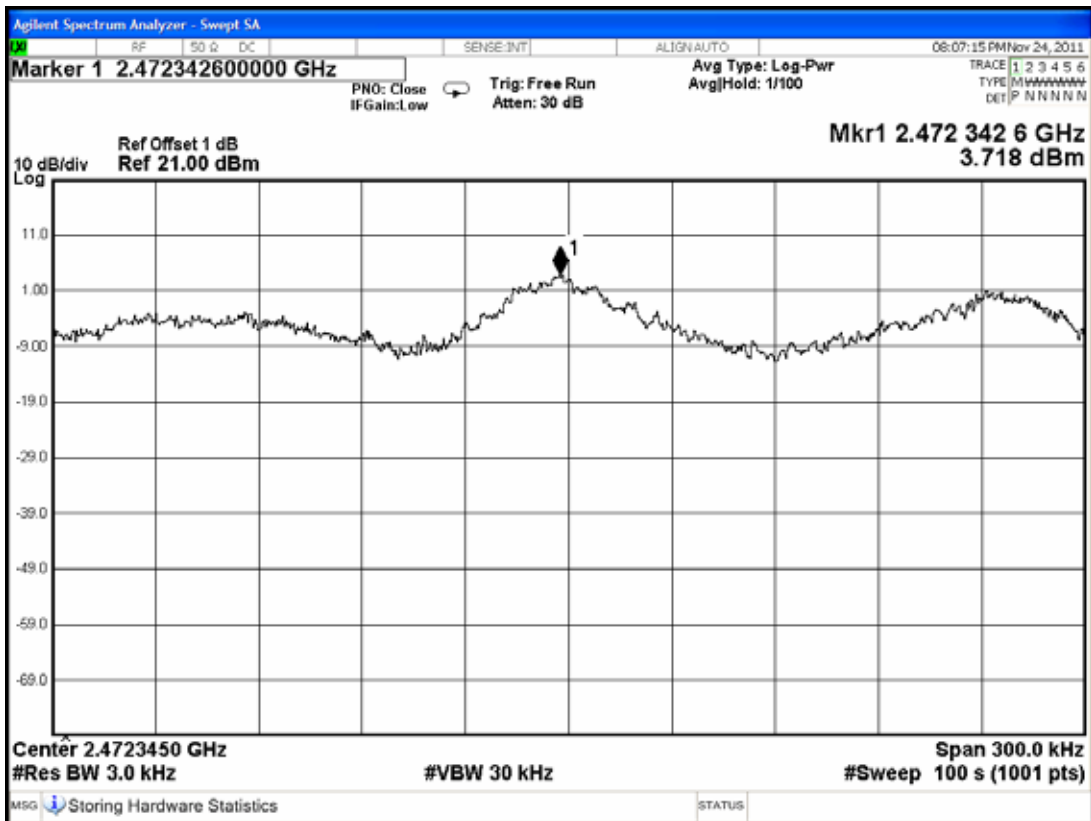
9.6.1. Channel 02, Frequency: 2405.376MHz



9.6.2. Channel 35, Frequency: 2439.168MHz



9.6.3. Channel 68, Frequency: 2472.960MHz



10.DEVIATION TO TEST SPECIFICATIONS

【NONE】