

APPLICATION FOR CERTIFICATION

On Behalf of

SMC Networks Inc

5GHz 802.11n 3T3R wifi module

Model No. : SMC-RT359333DB5

FCC ID : JI5-RT359333DB5

Brand : SMC Networks, Inc.

Prepared for : SMC Networks Inc
20 Mason, Irvine, California, United
States, CA 92618

Prepared by : AUDIX Technology Corporation
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TEST REPORT CERTIFICATION

Applicant : SMC Networks Inc
Manufacturer : MAINTEK COMPUTER
EUT Description : 5GHz 802.11n 3T3R wifi module
FCC ID : **JI5-RT359333DB5**
(A) Model No. : SMC-RT359333DB5
(B) Serial No. : N/A
(C) Brand : SMC Networks, Inc.
(D) Power Supply : DC 5V (Powered by Notebook PC)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C, Oct. 2012
And ANSI C63.4:2003

(FCC 47 CFR Part 15C, §15.205 and §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 requirements of FCC standards.

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: Dec. 05 ~ 20, 2012

Date of Report: Jan. 29, 2013

Producer: Annie Yu
(Annie Yu/Assistant Administrator)

Signatory: Leon Liu
(Leon Liu/Deputy General Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Description	:	5GHz 802.11n 3T3R wifi module The frequency range of 5725MHz ~ 5850MHz was tested in this report. The frequency range 5150 ~ 5250MHz has been tested and the test data are reported in other report of EM-F1010979.
Model Number	:	SMC-RT359333DB5
Serial Number	:	N/A
Brand	:	SMC Networks, Inc.
FCC ID	:	J15-RT359333DB5
Applicant	:	SMC Networks Inc 20 Mason, Irvine, California, United States, CA 92618
Manufacturer	:	MAINTEK COMPUTER 233 Jinfeng Rd., Suzhou, Jiangsu, PRC
Fundamental Range	:	5180MHz ~ 5240MHz and 5745MHz ~ 5825MHz
Radio Technology	:	802.11a/n-HT20/n-HT40: OFDM Modulation 3T3R, (BPSK/QPSK/16QAM/64QAM)
Data Transfer Rate	:	802.11a: 6/9/12/18/24/48/54Mbps 802.11n: up to 450Mbps
Antenna Gain	:	1.9dBi (Peak)
Antenna Transmit Type	:	802.11a: 1T1R 802.11n: 3T3R
Antenna Type	:	Embedded Antenna
Date of Receipt of Sample	:	Nov. 23, 2012
Date of Test	:	Dec. 05 ~ 20, 2012

1.2. Data Rate Relative to Output Power

802.11a			
Channel	Modulation	Date Rate (Mbps)	Power (dBm)
151	BPSK	6	20.74
151	BPSK	9	20.72
151	QPSK	12	20.68
151	QPSK	18	20.66
151	16-QAM	24	20.63
151	16-QAM	36	20.62
151	64-QAM	48	20.60
151	64-QAM	54	20.59

802.11n-HT20				802.11n-HT40			
Channel	Modulation	Date Rate (Mbps)	Power (dBm)	Channel	Modulation	Date Rate (Mbps)	Power (dBm)
151	BPSK	13.5	22.85	153	BPSK	13.5	22.17
151	QPSK	27	22.81	153	QPSK	27	22.07
151	QPSK	40.5	22.79	153	QPSK	40.5	21.92
151	16-QAM	54	22.78	153	16-QAM	54	21.84
151	16-QAM	81	22.75	153	16-QAM	81	21.78
151	64-QAM	108	22.71	153	64-QAM	108	21.66
151	64-QAM	121.5	22.69	153	64-QAM	121.5	21.53
151	64-QAM	135	22.67	153	64-QAM	135	21.42

Remark: After confirming, chain 2 has worst perform thus we perform all test items at chain 2.

1.3. Test Configuration for Each Test Item

Test Item	802.11b	802.11g	802.11n-HT20	802.11n-HT40
	Data Rate for Test(Mbps)			
6dB Bandwidth	1	6	6.5	13.5
Peak Power Spectral Density	1	6	6.5	13.5
Peak Output Power	1	6	6.5	13.5
Band Edge	1	6	6.5	13.5

1.4. Tested Supporting System Details

1.4.1. NOTEBOOK PC

Model Number	:	PP19S
Serial Number	:	8285
FCC ID	:	MCLBCM92046
BSMI ID	:	R33002
Brand	:	DELL
Express Card	:	N/A
AC Adapter	:	M/N:AD6513
		DC Cord: Non-Shielded, Undetachable, 2.4m
USB Cable	:	Non-Shielded, Detachable, 0.5m
Power Cord	:	Non-Shielded, Detachable, 1.8m

1.5. 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 Site (C8/Semi-AC)	:	No. 8 Shielded Room & No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan, R.O.C. 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

1.6. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conduction Test	150kHz~30MHz	$\pm 1.73\text{dB}$
Radiation Test (Distance: 3m)	30MHz~300MHz	$\pm 2.91\text{dB}$
	300MHz~1000MHz	$\pm 2.74\text{dB}$
	Above 1GHz	$\pm 5.02\text{dB}$

Remark : Uncertainty = $k_{uc}(y)$

Test Item	Uncertainty
6dB Bandwidth	$\pm 0.05\text{kHz}$
Maximum peak output power	$\pm 0.33\text{dBm}$
Band edges	$\pm 0.13\text{dB}$
Power spectral density	$\pm 0.13\text{dB}$
Emission Limitations	$\pm 0.13\text{dB}$

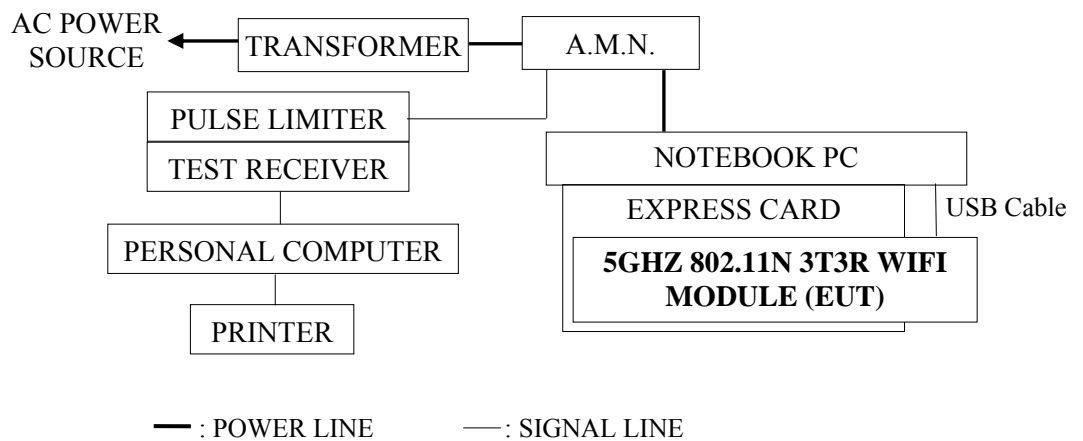
2. CONDUCTED EMISSION MEASUREMENT

2.1. Test Equipment

The following test equipment was used during the conducted emission measurement :
(No. 8 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCS30	100265	Apr. 30, 12'	Apr. 29, 13'
2.	A.M.N.	R&S	ESH2-Z5	100366	Mar. 26, 12'	Mar. 25, 13'
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	Jan. 05, 12'	Jan. 04, 13'

2.2. Block Diagram of Test Setup



2.3. Powerline Conducted Emission Limit §15.207, Class B]

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

2.: The lower limit applies at the band edges.

2.4. Operating Condition of EUT

- 2.4.1. Setup the EUT and simulator as shown on 2.2.
- 2.4.2. Turn on the power of all equipment.
- 2.4.3. The Notebook PC was running test software “RT3593QA” to set EUT (5GHz 802.11n 3T3R wifi module) on transmitting and receiving during all testing.

2.5. Test Procedure

The EUT (link Notebook PC) was placed on the table which was above the ground by 80cm and Notebook PC's adapter's power cord connected to the AC mains through an Artificial Mains Network (A.M.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions simulators of the interface cables should be manipulated according to ANSI C63.4-2003 regulation during conducted measurement.

The bandwidth of the R&S Test Receiver ESCS 30 was set at 9kHz.

The frequency range from 150kHz to 30MHz was checked.

All the final readings from Test Receiver were measured with the Quasi-Peak detector and Average detector. Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

2.6. Conducted Emission Measurement Results

PASSED.

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

EUT was performed during this section testing and all the test results are attached in next pages.

EUT : 5GHz 802.11n 3T3R wifi module M/N : SMC-RT359333DB5

Test Date : Dec. 20, 2012 Temperature : 25 Humidity : 52%

Reference Test Data : Neutral # 2; Line # 1

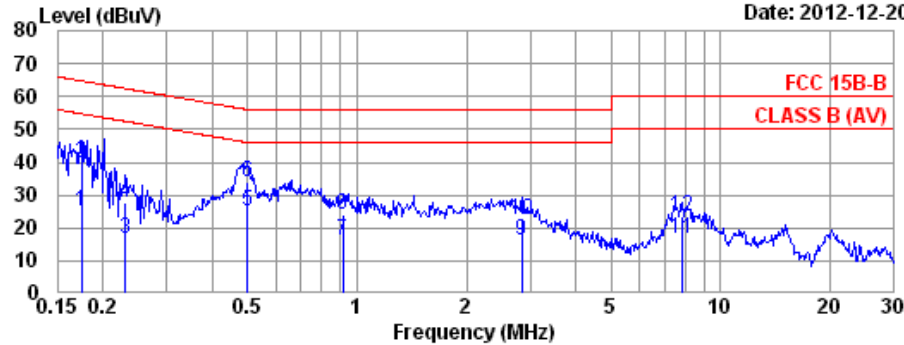


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Data: 2

File: D:\test data\REPORT\1M1211XXX\1M1211260-C-D.EM6 (2)

Date: 2012-12-20



Site no. : No.8 Shielded Room Data no. : 2
 Dis. / Ant. : ESH2-Z5 366 Ant. pol. : NEUTRAL
 Limit : FCC 15B-B
 Env. / Ins. : 25°C / 52% ESCS (265) Engineer : Jack_Wu
 EUT : SMC-RT359333DB5
 Power Rating : 120Vac/60Hz
 Test Mode : OPERATING

	Freq. (MHz)	AMN. Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.175	0.10	0.04	24.81	24.95	54.72	29.77	Average
2	0.175	0.10	0.04	39.82	39.96	64.72	24.76	QP
3	0.230	0.10	0.04	16.66	16.80	52.44	35.64	Average
4	0.230	0.10	0.04	27.62	27.76	62.44	34.68	QP
5	0.499	0.12	0.04	24.81	24.97	46.01	21.04	Average
6	0.499	0.12	0.04	33.80	33.96	56.01	22.05	QP
7	0.914	0.19	0.05	15.72	15.96	46.00	30.04	Average
8	0.914	0.19	0.05	23.98	24.22	56.00	31.78	QP
9	2.839	0.20	0.10	15.67	15.97	46.00	30.03	Average
10	2.839	0.20	0.10	22.04	22.34	56.00	33.66	QP
11	7.810	0.27	0.17	16.45	16.89	50.00	33.11	Average
12	7.810	0.27	0.17	23.24	23.68	60.00	36.32	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Reading.

2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

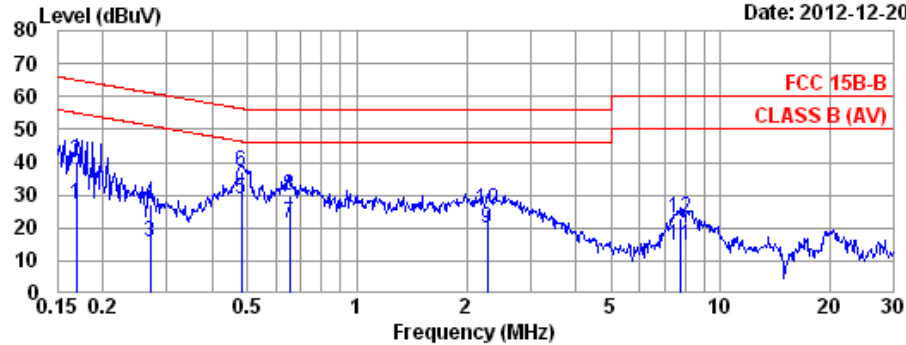


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Data: 1

File: D:\test data\REPORT\1M1211XXX\1M1211260-C-D.EM6 (2)

Date: 2012-12-20



Site no. : No.8 Shielded Room Data no. : 1
 Dis. / Ant. : ESH2-Z5 366 Ant. pol. : LINE
 Limit : FCC 15B-B
 Env. / Ins. : 25°C / 52% ESCS (265) Engineer : Jack_Wu
 EUT : SMC-RT359333DB5
 Power Rating : 120Vac/60Hz
 Test Mode : OPERATING

	Freq. (MHz)	AMN. Factor (dB)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.169	0.10	0.04	26.97	27.11	54.99	27.88	Average
2	0.169	0.10	0.04	40.36	40.50	64.99	24.49	QP
3	0.270	0.10	0.04	15.72	15.86	51.12	35.26	Average
4	0.270	0.10	0.04	27.10	27.24	61.12	33.88	QP
5	0.481	0.12	0.04	28.60	28.76	46.32	17.56	Average
6	0.481	0.12	0.04	36.76	36.92	56.32	19.40	QP
7	0.651	0.15	0.04	21.33	21.52	46.00	24.48	Average
8	0.651	0.15	0.04	29.54	29.73	56.00	26.27	QP
9	2.285	0.20	0.09	19.42	19.71	46.00	26.29	Average
10	2.285	0.20	0.09	25.46	25.75	56.00	30.25	QP
11	7.728	0.27	0.17	14.40	14.84	50.00	35.16	Average
12	7.728	0.27	0.17	22.56	23.00	60.00	37.00	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Reading.

2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

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)

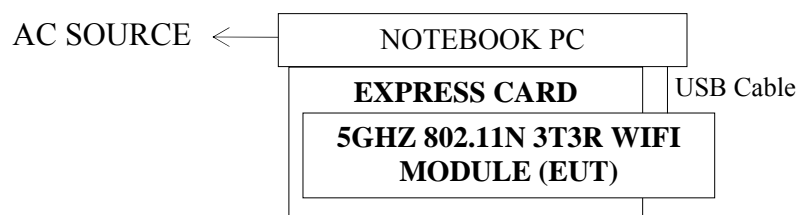
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 08, 12'	Aug. 06, 13'
2.	Test Receiver	R & S	ESCS30	100338	Jul. 04, 12'	Jul. 03, 13'
3.	Amplifier	HP	8447D	2944A06305	Feb. 13, 12'	Feb. 12, 13'
4.	Biconical Antenna	CHASE	VBA6106 A	1264	Mar. 03, 12'	Mar. 02, 13'
5.	Log Periodic Antenna	Schwarzbeck	UHALP91 08-A	0810	Mar. 03, 12'	Mar. 02, 13'

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

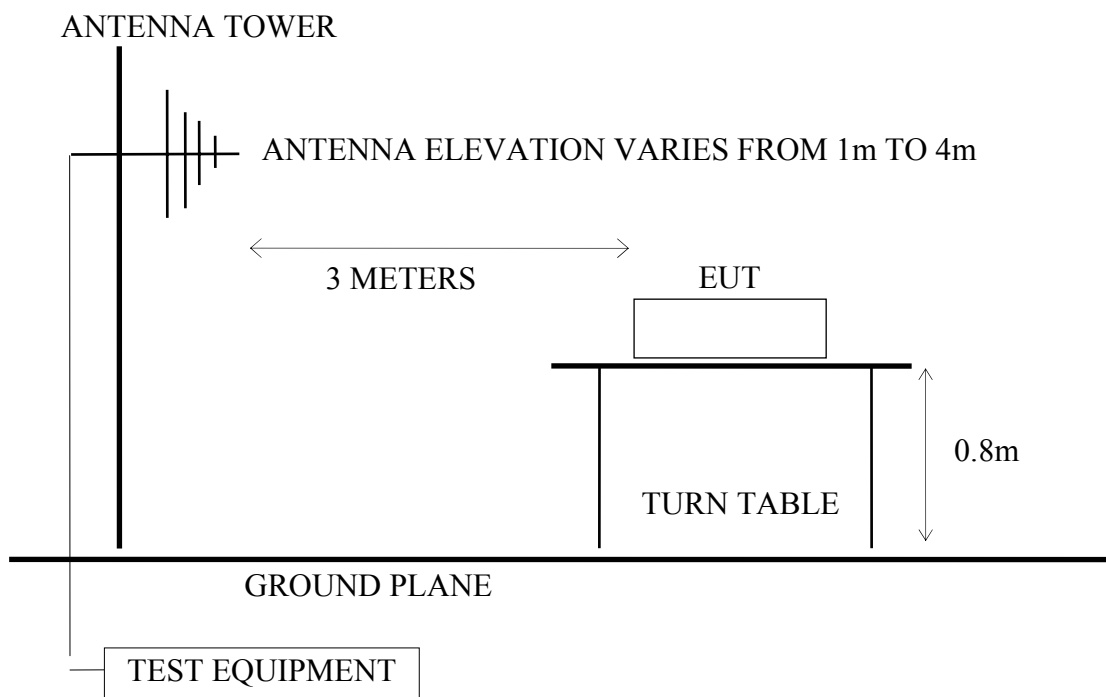
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	Aug. 08, 12'	Aug. 06, 13'
2.	Amplifier	HP	8449B	3008A02678	Mar. 07, 12'	Mar. 06, 13'
3.	Horn Antenna	EMCO	3115	9609-4927	Jul. 05, 12'	Jul. 04, 13'
4.	Horn Antenna	EMCO	3116	2653	Oct. 15, 12'	Oct. 14, 13'
5.	Signal Generator	HP	83732B	US34490489	May 16, 12'	May 15, 13'

3.2. Test Setup

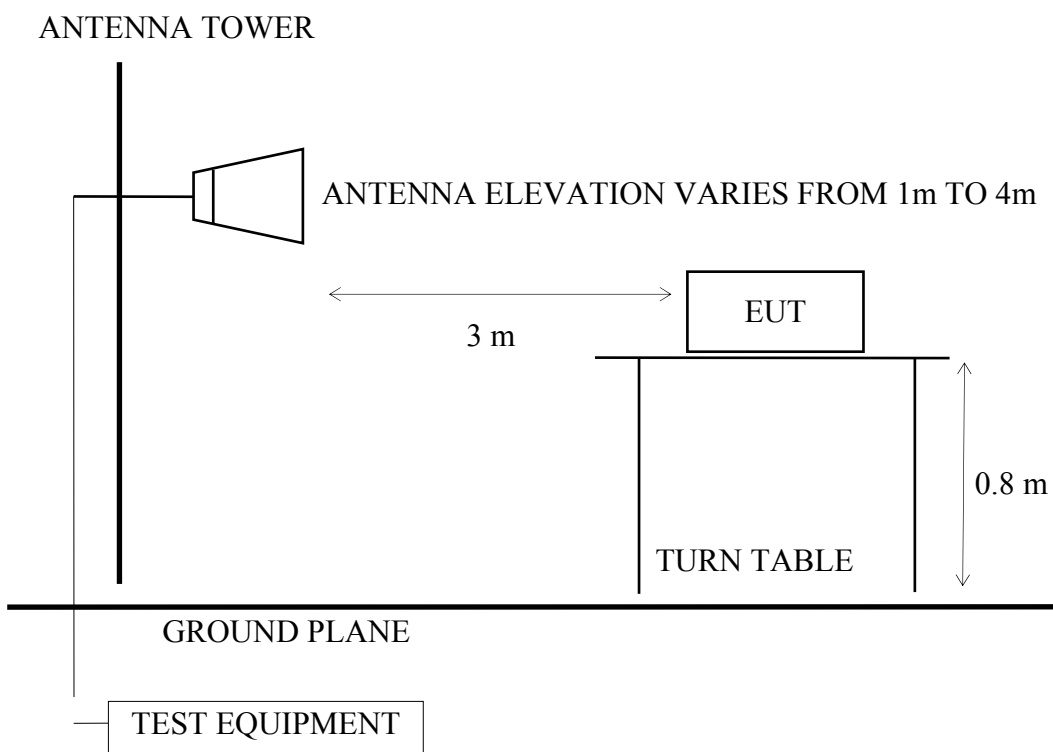
3.2.1. Block Diagram of connection between EUT and simulators



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 (5GHz 802.11n 3T3R wifi module) via Notebook PC and simulator as shown on 3.2.
- 3.4.2. To turn on the power of all equipments.
- 3.4.3. The EUT was set the Notebook PC using test program “RT3593QA”.
- 3.4.4. The EUT supports 802.11a/n-HT20/n-HT40 modes, we performed pre-scan high, middle, low channels for each mode for spurious emission and listed the worst channel of each mode in test report.

The worst channel of each mode as following:

Mode	Type of Network	Channel
1.	802.11a	CH 149
2.	802.11n-HT20	CH 149
3.	802.11n-HT40	CH 151

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 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna 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 ANSI C63.4-2003 regulation.

The bandwidth of the R&S Test Receiver 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 40GHz (Up to 10th 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.

For emissions above 1GHz were measured with peak and average detectors, and performed measurement in 1 m distance for frequency range from 5500MHz up to 40000MHz where there is no emission be found.

Pursuant to ANSI C63.4 8.3.1.2, when peak value complies with the average limit, we didn't perform measurement in average detector.

3.6. Test Results

PASSED.

(All emissions not reported for there is no emission be found.)

EUT : 5GHz 802.11n 3T3R wifi module M/N : SMC-RT359333DB5

Test Date : Dec. 11, 2012 Temperature : 25 Humidity : 61%

For Frequency Range 30MHz~1000MHz:

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

Mode	Type of Network	Channel	Frequency	Test Mode	Reference Test Data	
					Horizontal	Vertical
1.	802.11a	CH 149	5745MHz	Transmit	# 13	# 14
2.	802.11n-HT20	CH 149	5745MHz		# 14	# 13
3.	802.11n-HT40	CH 151	5755MHz		# 13	# 14

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

5.8GHzfor 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	Type of Network	Channel	Frequency	Test Mode	Reference Test Data			
					Horizontal		Vertical	
					Peak	Average	Peak	Average
1.	802.11a	CH 149	5745MHz	Transmit	# 16	# 9	# 15	# 3
2.	802.11n-HT20	CH 149	5745MHz		# 16	# 9	# 15	# 3
3.	802.11n-HT40	CH 151	5755MHz		# 16	# 9	# 15	# 3

Note: 1. Above all final readings were measured with Peak and Average detector.

2. The emissions (up to 40GHz) not reported for there is no emission be found.

3.6.1. For 30-1000MHz Frequency Range Measurement Results

802.11a, Transmit, Frequency: 5745MHz

Site no. : A/C Chamber Data no. : 13
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11a (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	200.720	22.08	3.00	9.96	35.04	43.50	8.46	QP
2	301.600	14.59	3.90	16.02	34.51	46.00	11.49	QP
3	697.360	23.32	6.50	1.87	31.69	46.00	14.31	QP

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

Site no. : A/C Chamber Data no. : 14
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11a (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	35.820	22.49	1.20	14.35	38.03	40.00	1.97	QP
2	299.660	26.77	3.90	0.20	30.87	46.00	15.13	QP
3	501.420	18.95	6.52	4.95	30.43	46.00	15.57	QP

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

802.11n-HT20, Transmit, Frequency: 5745MHz

Site no. : A/C Chamber Data no. : 14
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	55.220	14.39	1.50	11.34	27.23	40.00	12.77	QP
2	200.720	22.08	3.00	6.88	31.96	43.50	11.54	QP
3	301.600	14.59	3.90	17.91	36.40	46.00	9.60	QP

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

Site no. : A/C Chamber Data no. : 13
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	35.820	22.49	1.20	12.33	36.01	40.00	3.99	QP
2	199.750	22.09	3.00	0.25	25.33	43.50	18.17	QP
3	299.660	26.77	3.90	-0.24	30.43	46.00	15.57	QP

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

802.11n-HT40, Transmit, Frequency: 5755MHz

Site no. : A/C Chamber Data no. : 13
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n40 (Tx5755MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	199.750	22.09	3.00	6.63	31.71	43.50	11.79	QP
2	301.600	14.59	3.90	16.91	35.40	46.00	10.60	QP
3	501.420	18.95	6.52	3.08	28.56	46.00	17.44	QP

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

Site no. : A/C Chamber Data no. : 14
 Dis. / Ant. : 3m VBA6106A/UHALP9108A Ant. pol. : VERTICAL
 Limit : FCC PART-15C
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n40 (Tx5755MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	35.820	22.49	1.20	13.74	37.42	40.00	2.58	QP
2	230.790	22.17	3.30	11.17	36.63	46.00	9.37	QP
3	508.210	19.14	6.80	6.02	31.96	46.00	14.04	QP

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. 2.4GHz for Above 1GHz Frequency Range Measurement Results

802.11a, Transmit, Frequency: 5745MHz

Site no.	: A/C Chamber site	Data no.	: 16
Dis. / Ant.	: 3m 3115(4927)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART-15C (1G-PK)		
Env. / Ins.	: E4446A 25°C/61%	Engineer	: Johnny_Hsueh
EUT	: SMC-RT359333DB5		
Power Rating	: DC 5V		
Test Mode	: 802.11a (Tx5745MHz)		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5574.000	34.23	9.83	15.58	59.63	74.00	14.37	Peak

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

Site no.	: A/C Chamber	Data no.	: 9
Dis. / Ant.	: 3m 3115(4927)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART-15C (1G-AV)		
Env. / Ins.	: E4446A 25°C/61%	Engineer	: Johnny_Hsueh
EUT	: SMC-RT359333DB5		
Power Rating	: DC 5V		
Test Mode	: 802.11a (Tx5745MHz)		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5574.000	34.23	9.83	5.58	49.63	54.00	4.37	Average

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

802.11a, Transmit, Frequency: 5745MHz

Site no.	: A/C Chamber site	Data no.	: 15
Dis. / Ant.	: 3m 3115(4927)	Ant. pol.	: VERTICAL
Limit	: FCC PART-15C (1G-PK)		
Env. / Ins.	: E4446A 25°C/61%	Engineer	: Johnny_Hsueh
EUT	: SMC-RT359333DB5		
Power Rating	: DC 5V		
Test Mode	: 802.11a (Tx5745MHz)		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5528.000	34.21	9.79	15.09	59.08	74.00	14.92	Peak

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

Site no.	: A/C Chamber	Data no.	: 3
Dis. / Ant.	: 3m 3115(4927)	Ant. pol.	: VERTICAL
Limit	: FCC PART-15C (1G-AV)		
Env. / Ins.	: E4446A 25°C/61%	Engineer	: Johnny_Hsueh
EUT	: SMC-RT359333DB5		
Power Rating	: DC 5V		
Test Mode	: 802.11a (Tx5745MHz)		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5528.000	34.21	9.79	2.72	46.71	54.00	7.29	Average

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

802.11n-HT20, Transmit, Frequency: 5745MHz

Site no. : A/C Chamber site Data no. : 16
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5574.000	34.23	9.83	10.53	54.58	74.00	19.42	Peak

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

Site no. : A/C Chamber Data no. : 9
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5574.000	34.23	9.83	-3.47	40.58	54.00	13.42	

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

802.11n-HT20, Transmit, Frequency: 5745MHz

Site no. : A/C Chamber site Data no. : 15
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5508.000	34.20	9.78	10.73	54.70	74.00	19.30	Peak

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

Site no. : A/C Chamber Data no. : 3
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n (Tx5745MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5508.000	34.20	9.78	-3.27	40.70	54.00	13.30	Average

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

802.11n-HT40, Transmit, Frequency: 5755MHz

Site no. : A/C Chamber site Data no. : 16
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n40 (Tx5755MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5564.000	34.22	9.82	11.19	55.23	74.00	18.77	Peak

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

Site no. : A/C Chamber Data no. : 9
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : HORIZONTAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n40 (Tx5755MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5564.000	34.22	9.82	0.19	44.23	54.00	9.77	Average

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

802.11n-HT40, Transmit, Frequency: 5755MHz

Site no. : A/C Chamber site Data no. : 15
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-PK)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n40 (Tx5755MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5548.000	34.22	9.79	11.89	55.90	74.00	18.10	Peak

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

Site no. : A/C Chamber Data no. : 3
 Dis. / Ant. : 3m 3115(4927) Ant. pol. : VERTICAL
 Limit : FCC PART-15C (1G-AV)
 Env. / Ins. : E4446A 25°C/61% Engineer : Johnny_Hsueh
 EUT : SMC-RT359333DB5
 Power Rating : DC 5V
 Test Mode : 802.11n40 (Tx5755MHz)

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
1	5548.000	34.22	9.79	-0.11	43.90	54.00	10.10	Average

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

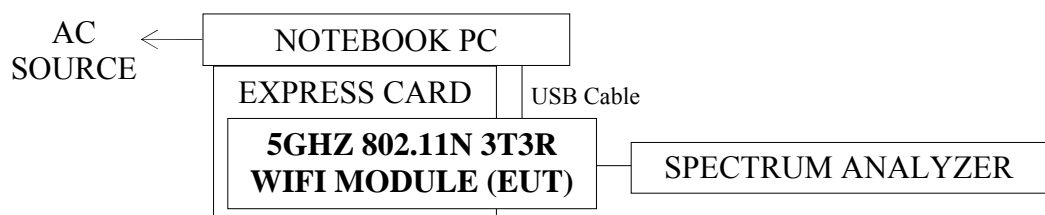
4. 6dB BANDWIDTH MEASUREMENT

4.1. Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	Oct. 17, 12'	Oct. 16, 13'

4.2. Block Diagram of Test Setup



4.3. Specification Limits [§15.247(a)(2)]

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

4.4. Operating Condition of EUT

The test program “RT3593QA” was used to enable the EUT to transmit data at different channel frequency individually.

4.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with 1-5% EBW, $VBW \geq 3 \times RBW$. 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 D02.

4.6. Test Results

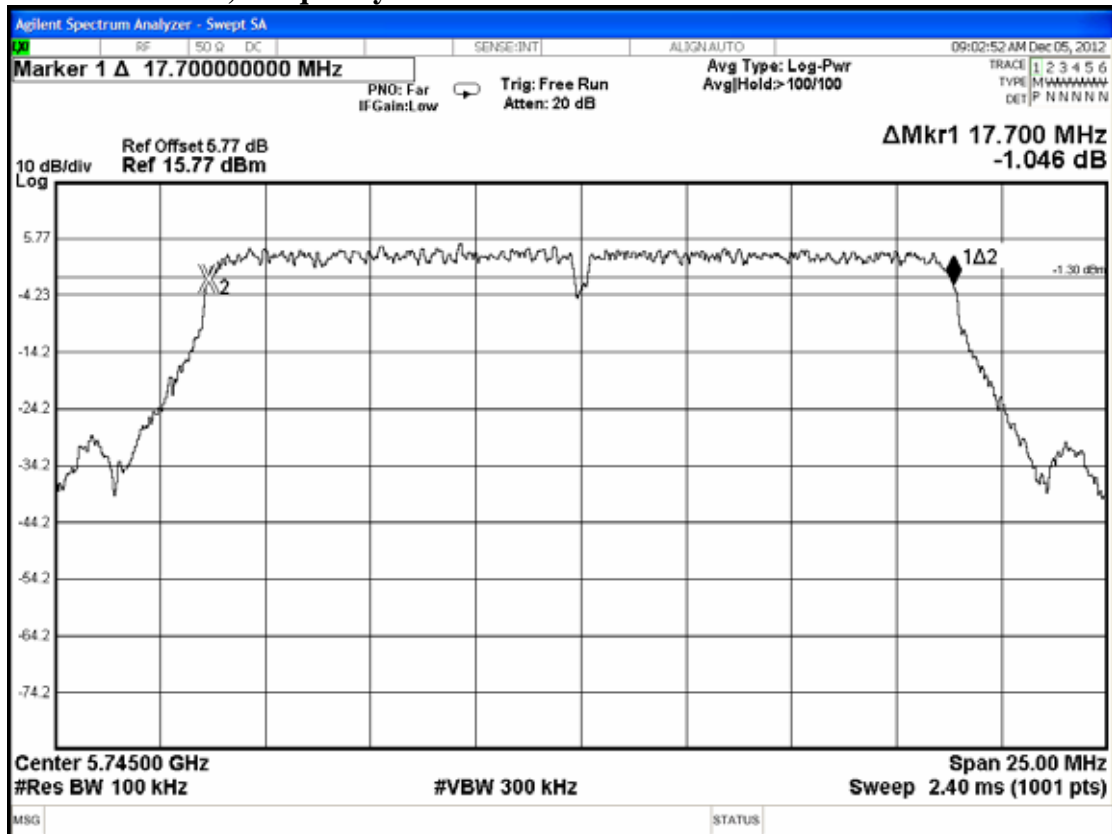
PASSED. All the test results are attached in next pages.

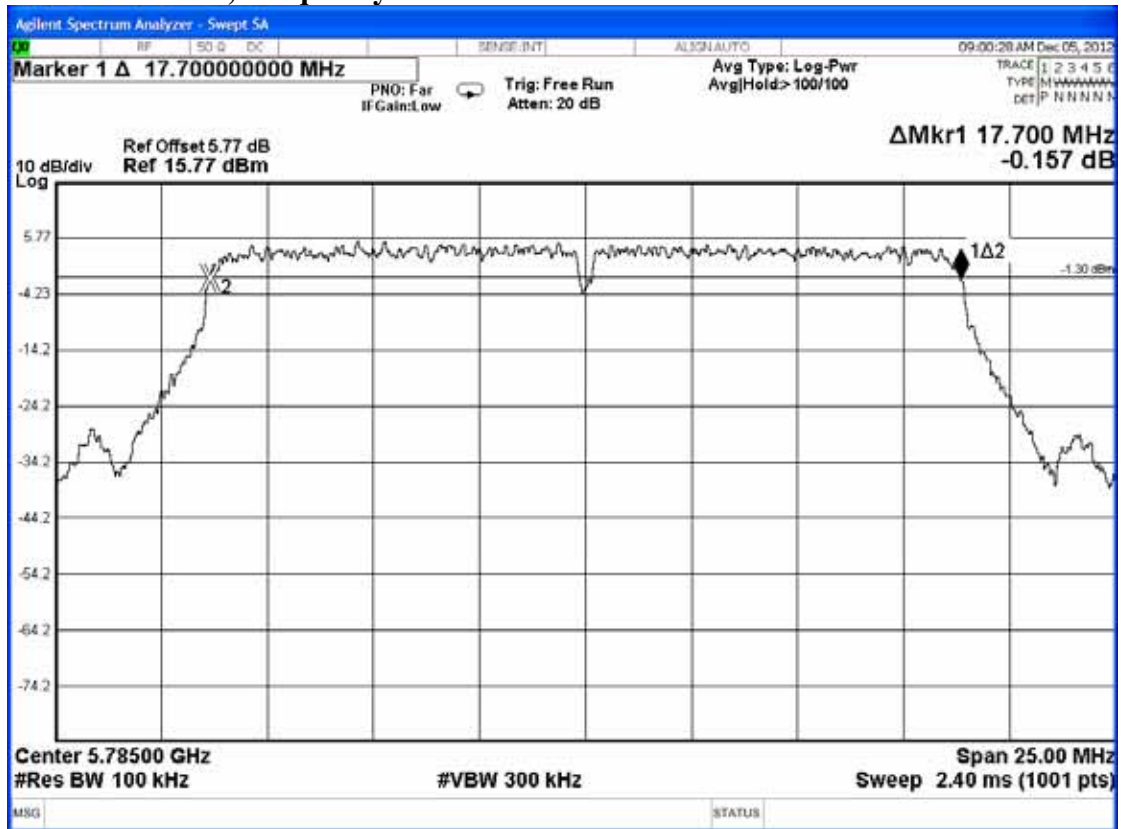
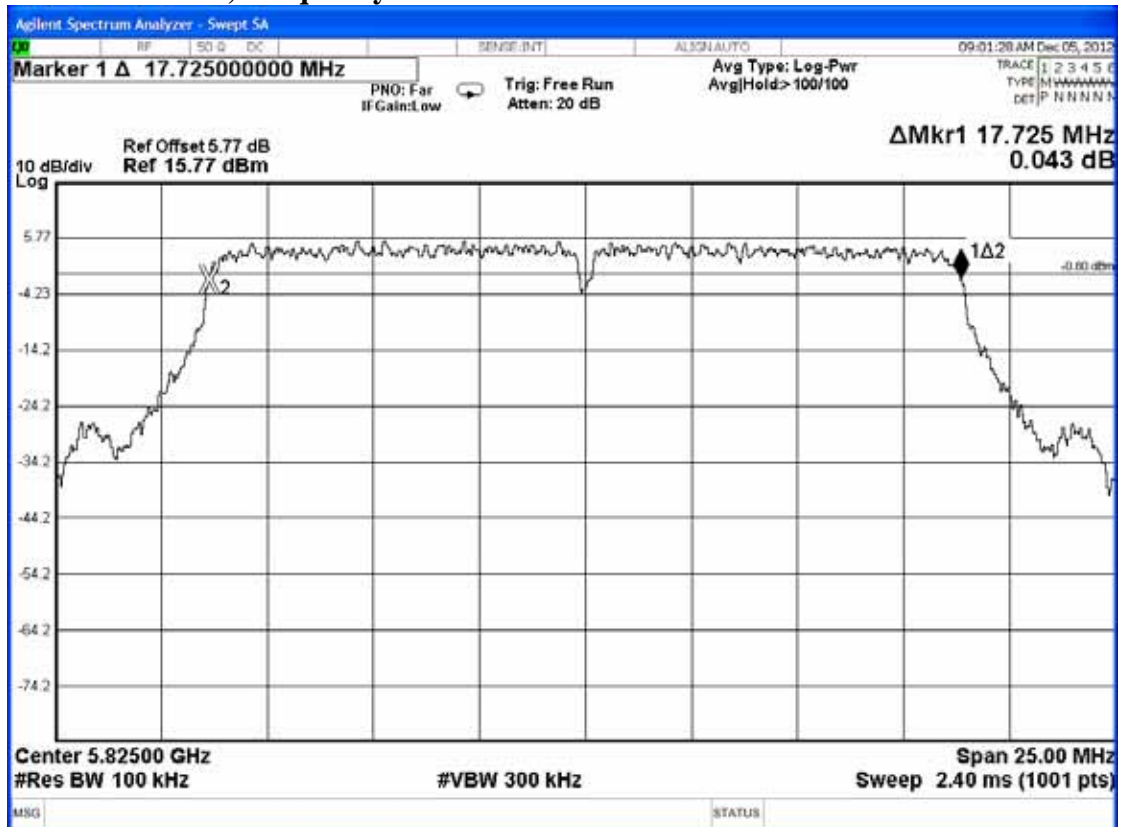
(Test Date : Dec. 05, 2012 Temperature : 25 Humidity : 61%)

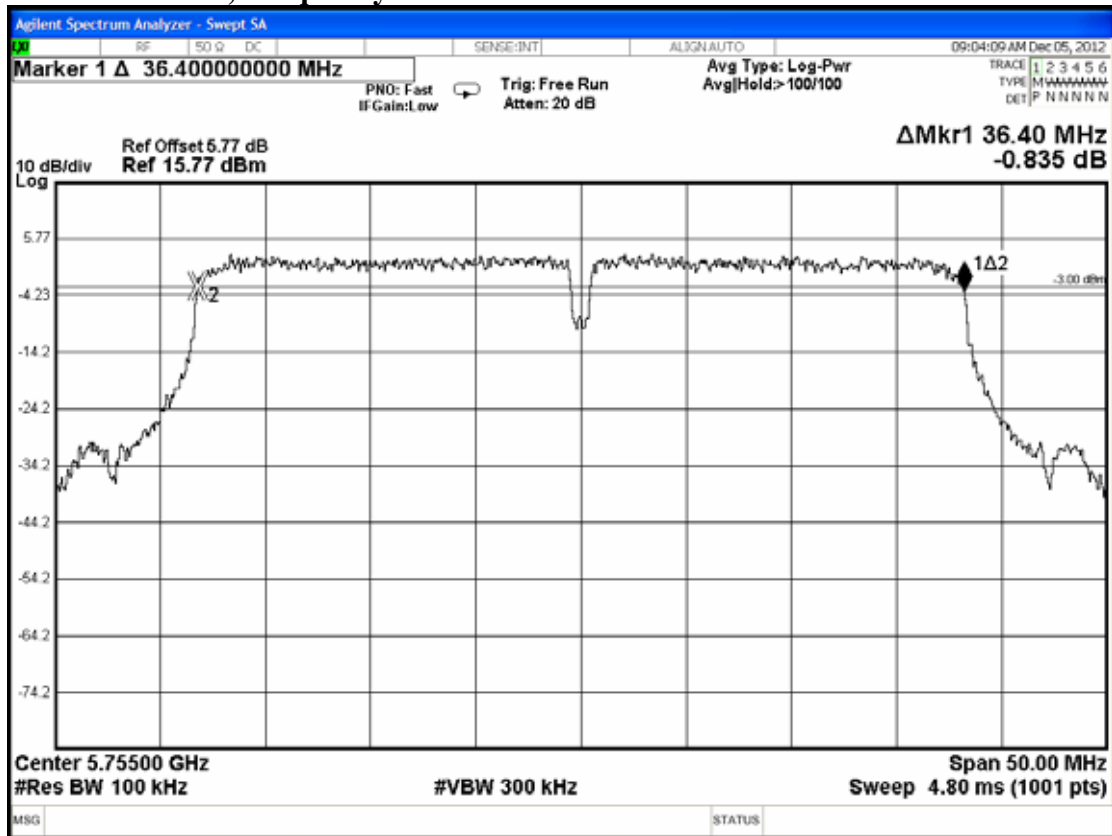
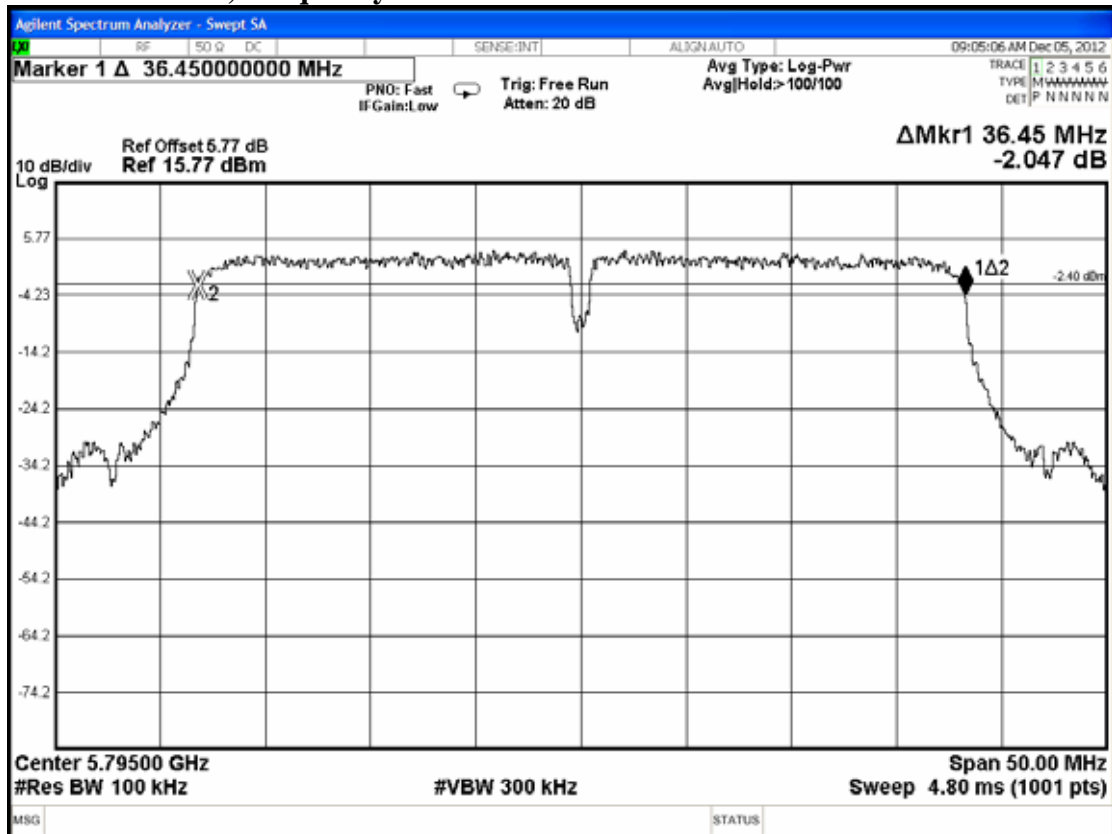
Mode	Type of Network	Channel	Frequency	6dB Bandwidth
1.	802.11a	CH 149	5745MHz	16.625MHz
2.		CH 157	5785MHz	16.550MHz
3.		CH 165	5825MHz	16.600MHz
4.	802.11n-HT20	CH 149	5745MHz	17.700MHz
5.		CH 157	5785MHz	17.700MHz
6.		CH 165	5825MHz	17.725MHz
7.	802.11n-HT40	CH 151	5755MHz	36.40MHz
8.		CH 159	5795MHz	36.45MHz

[Limit: least 500kHz]

802.11a, Frequency: 5745MHz**802.11a, Frequency: 5785MHz**

802.11a, Frequency: 5825MHz**802.11n-HT20, Frequency: 5745MHz**

802.11n-HT20, Frequency: 5785MHz**802.11n-HT20, Frequency: 5825MHz**

802.11n-HT40, Frequency: 5755MHz**802.11n-HT40, Frequency: 5795MHz**

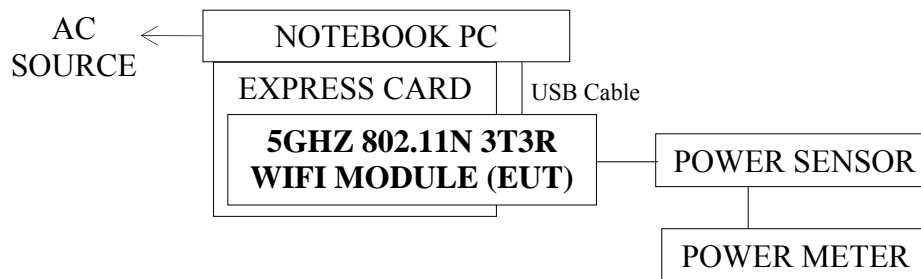
5. MAXIMUM PEAK OUTPUT POWER MEASUREMENT

5.1. 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.	Power Meter	Anritsu	ML2487A	6K00005406	Feb. 13, 12'	Feb. 12, 13'
2.	Power Sensor	Anritsu	MA2491A	030873	Feb. 13, 12'	Feb. 12, 13'

5.2. Block Diagram of Test Setup



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

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz & 5725-5850MHz is : 1Watt. (30dBm)

5.4. Operating Condition of EUT

The test program “RT3593QA” was used to enable the EUT to transmit data at different channel frequency individually.

5.5. Test Procedure

The transmitter output was connected to the power sensor and record the reading of power meter.

The measurement guideline was according to KDB 558074 D02.

5.6. Test Results

PASSED. All the test results are listed below.

(Test Date : Dec. 05, 2012 Temperature : 25 Humidity : 61%)

5.6.1. For 802.11a/802.11n-HT20/802.11n-HT40

Mode	Type of Network	Channel	Frequency	Peak Output Power (dBm)			Total Peak Output Power (dBm)
				Ant.0	Ant.1	Ant.2	
1.	802.11a	CH 149	5745MHz	24.40	23.93	24.39	N/A
2.		CH 157	5785MHz	24.62	24.45	24.16	N/A
3.		CH 165	5825MHz	24.07	24.50	24.42	N/A
4.	802.11n-HT20	CH 149	5745MHz	23.32	24.50	23.96	28.72
5.		CH 157	5785MHz	23.91	23.22	23.63	28.37
6.		CH 165	5825MHz	24.10	23.30	23.44	28.40
7.	802.11n-HT40	CH 151	5755MHz	24.50	23.82	24.25	28.97
8.		CH 159	5795MHz	23.62	23.82	24.21	28.66

Remark: After confirming, chain 2 has worst perform thus we perform peak output power at chain 2 for 802.11a.

[Limit: 1Watt. (30dBm)]

6. EMISSION LIMITATIONS MEASUREMENT

Pursuant to KDB558074 D02 that emission levels below limits specified in 15.209 would not be required.

7. BAND EDGES MEASUREMENT

7.1. 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-544	US51350140	Oct. 17, 12'	Oct. 16, 13'

7.2. Block Diagram of Test Setup

The same as section.4.2.

7.3. Specification Limits [§15.247(c)]

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

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

7.4. Operating Condition of EUT

The test program “RT3593QA” was used to enable the EUT to transmit data at different channel frequency individually.

7.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. Set both RBW=100 kHz and VBW to 300kHz with suitable frequency span including 100kHz bandwidth from band edge.

The measurement guideline was according to KDB 558074 D02.

Pursuant to KDB 662911, we performed conducted tests for both antenna chains and submit test data measured on chain 0 as worse performance.

7.6. Test Results

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

Pursuant to KDB 662911, the test results of 802.11n-H20/H40 have been included 3 dB is calculated from $10\log(N)$, where N is the number of outputs.

(Test Date : Dec. 05, 2012 Temperature : 25 Humidity : 61%)

802.11a

Below Band edge: The highest emission level is -42.165dBm on 5.72500GHz.

Upper Band edge : The highest emission level is -46.672dBm on 5.85000GHz.

802.11n-HT20

Below Band edge: The highest emission level is -41.894dBm on 5.72500GHz.

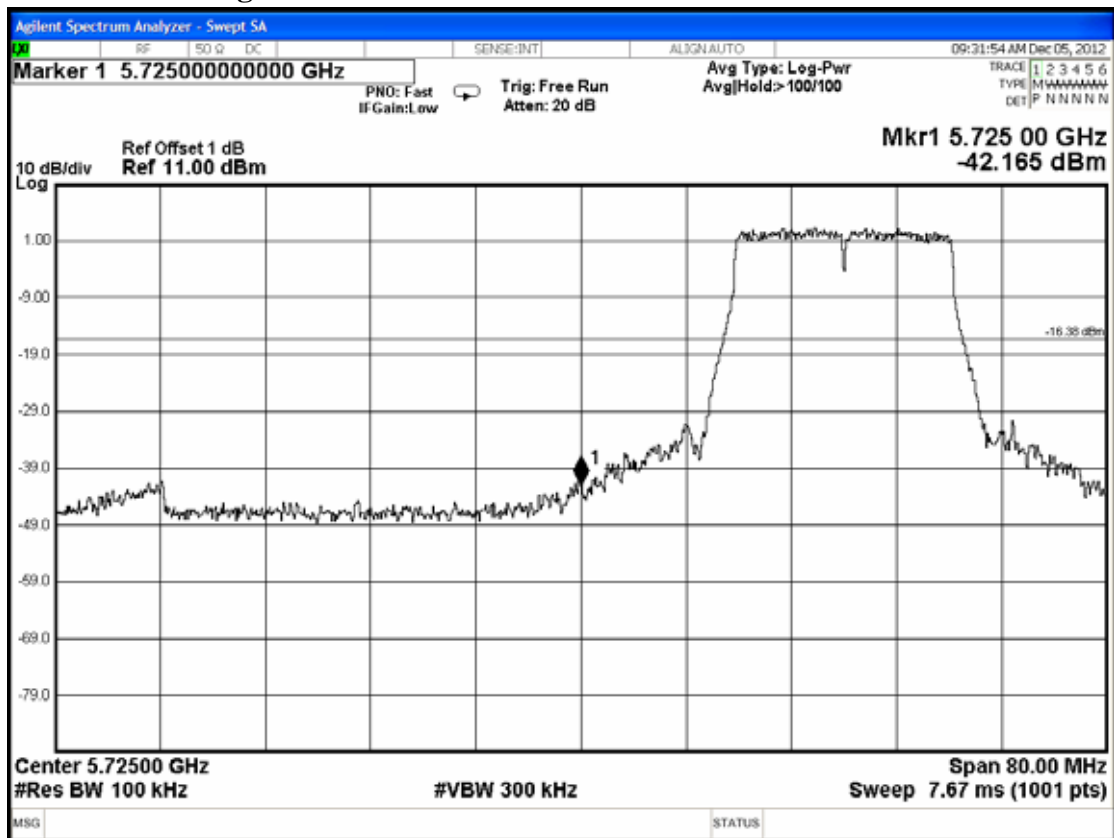
Upper Band edge : The highest emission level is -45.336dBm on 5.85000GHz.

802.11n-HT40

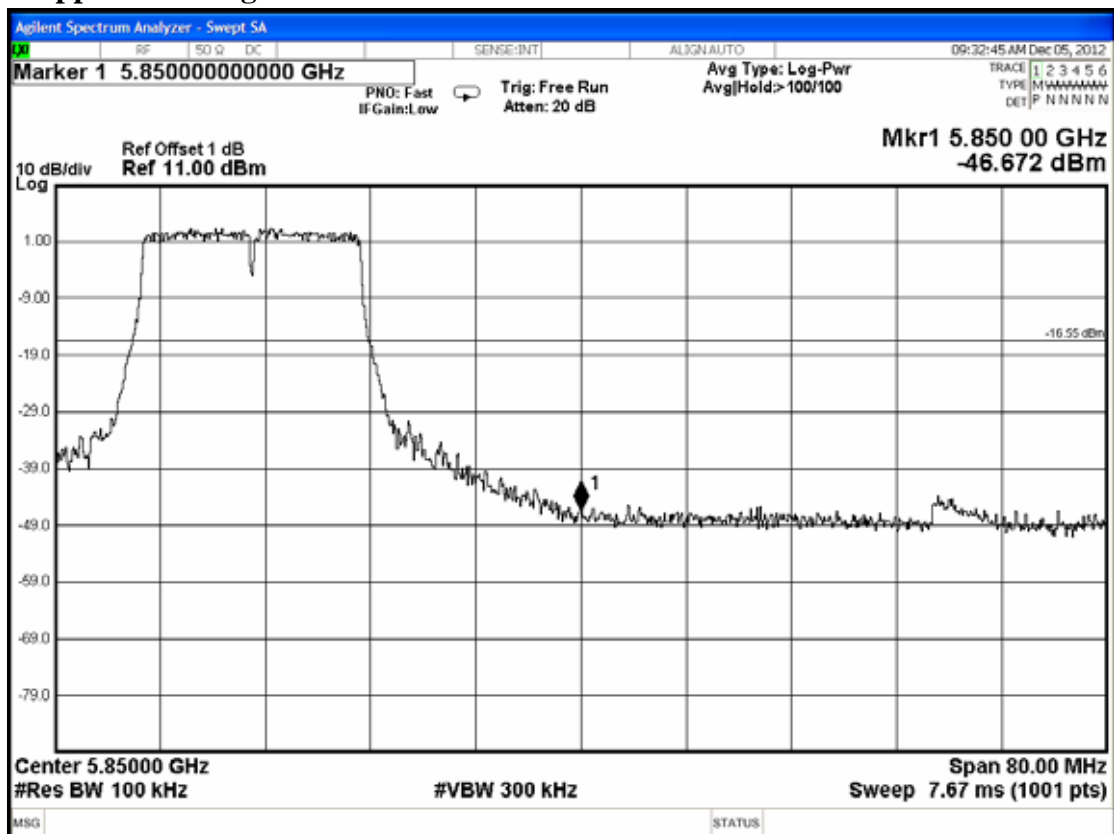
Below Band edge: The highest emission level is -38.530dBm on 5.72500GHz.

Upper Band edge : The highest emission level is -47.236dBm on 5.85000GHz.

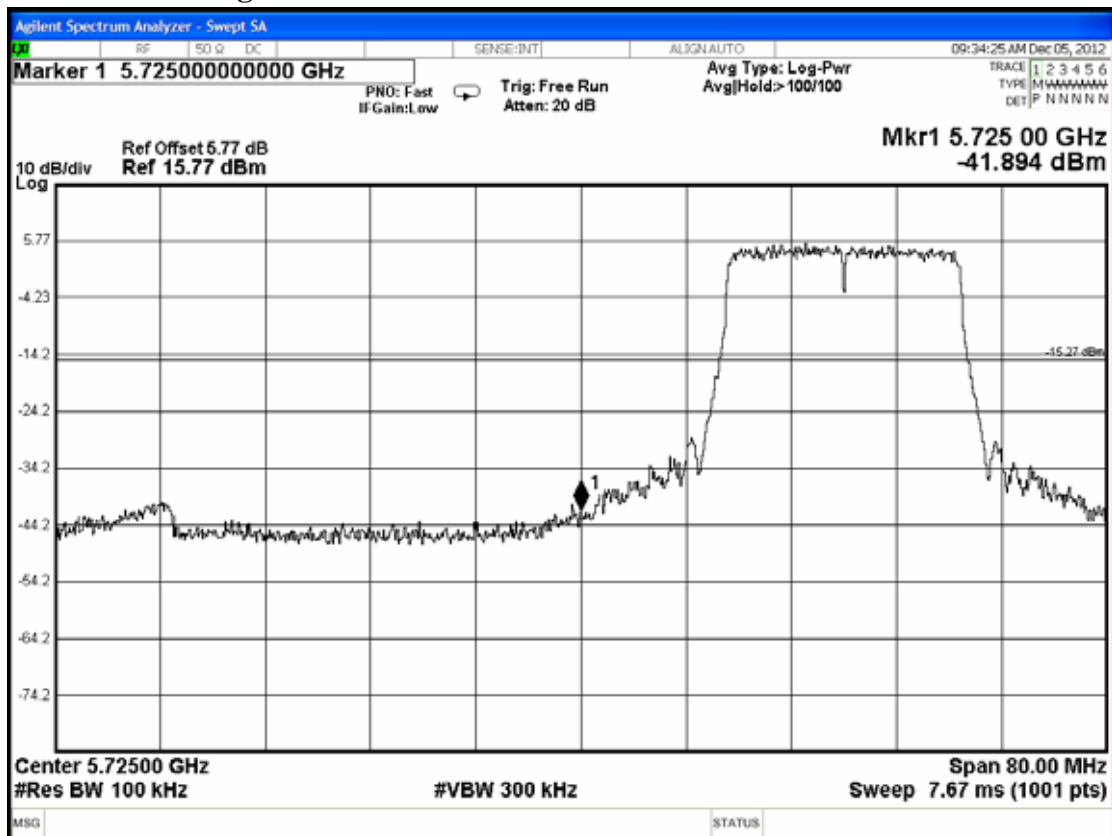
802.11a Below Band edge



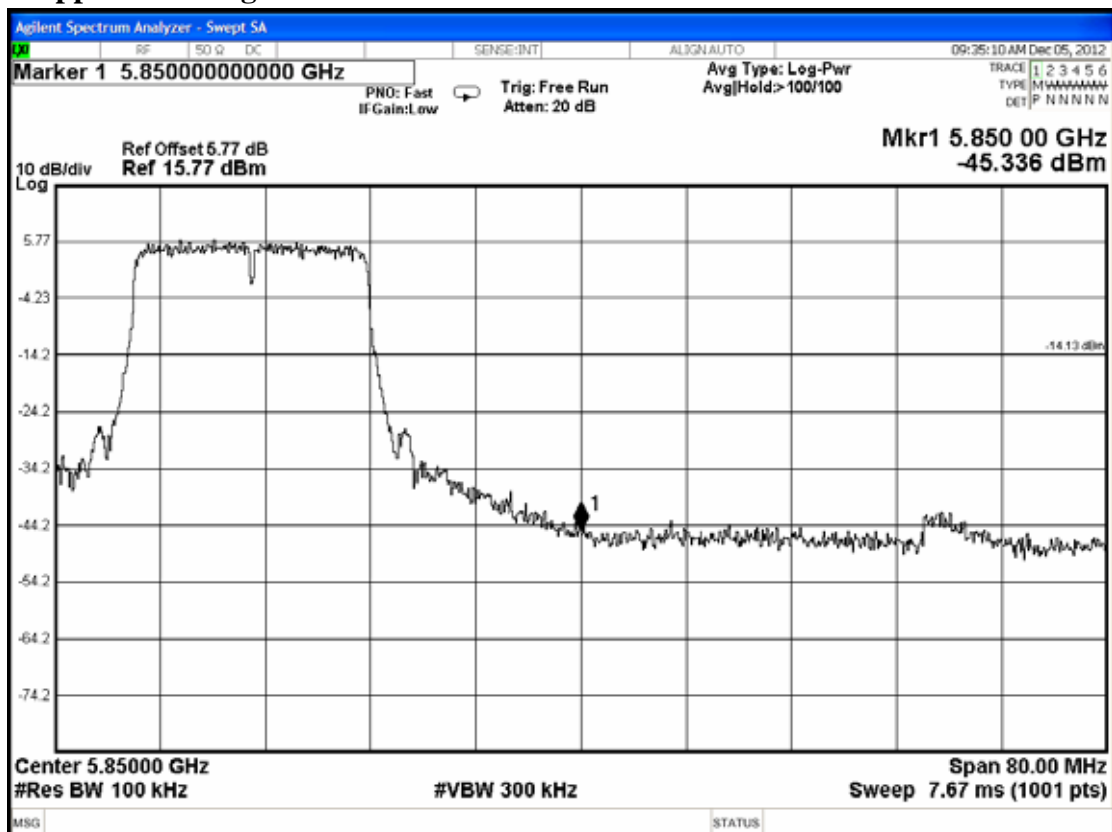
Upper Band edge



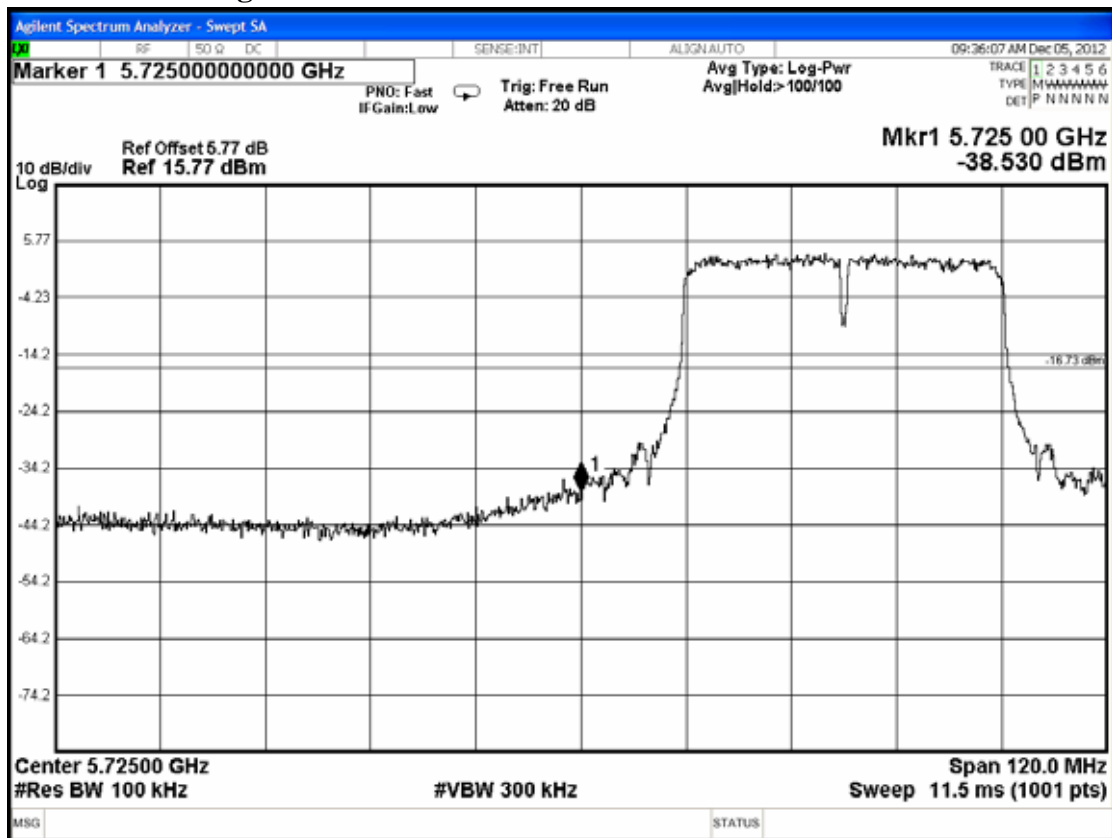
802.11n-HT20 Below Band edge



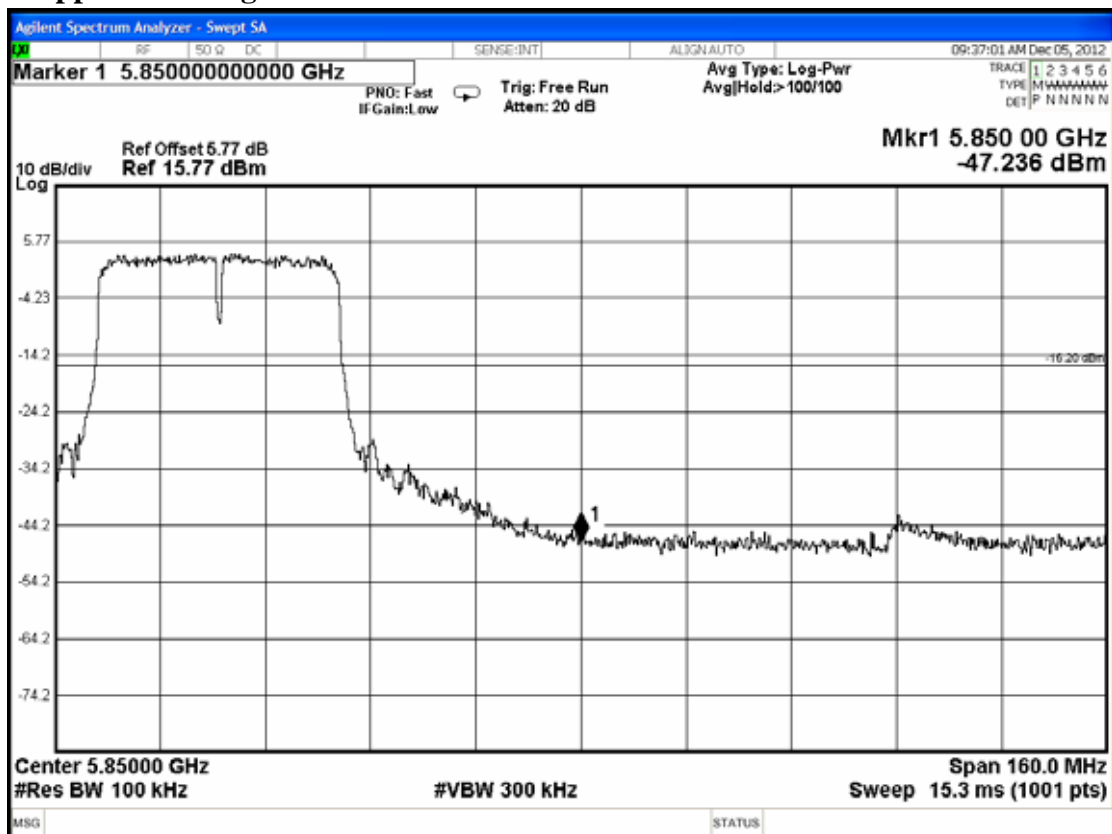
Upper Band edge



802.11n-HT40 Below Band edge



Upper Band edge



8. POWER SPECTRAL DENSITY MEASUREMENT

8.1. 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-544	US51350140	Oct. 17, 12'	Oct. 16, 13'

8.2. Block Diagram of Test Setup

The same as section.4.2.

8.3. 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.

8.4. Operating Condition of EUT

The test program “RT3593QA” was used to enable the EUT to transmit data at different channel frequency individually.

8.5. Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 100kHz RBW and ≥ 300 kHz VBW, set sweep time = Auto.

The measurement guideline was according to KDB 558074 D02.

Pursuant to KDB 662911, we performed conducted tests for both antenna chains and submit test data measured on chain 0 as worse performance.

8.6. Test Results

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

Pursuant to KDB 662911, the test results of 802.11n-H20/H40 have been included 3 dB is calculated from $10\log(N)$, where N is the number of outputs.

(Test Date : Dec. 05, 2012 Temperature : 25 Humidity : 61%)

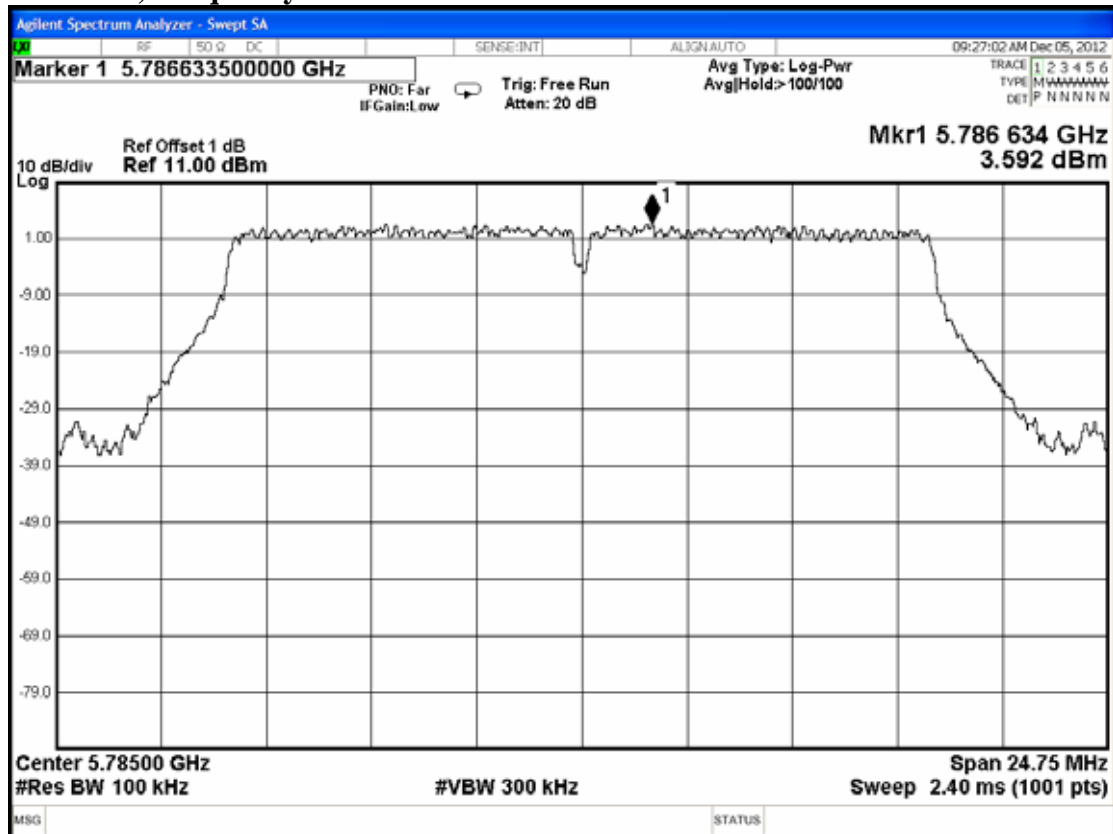
8.6.1. For 802.11a/802.11n-HT20/802.11n-HT40

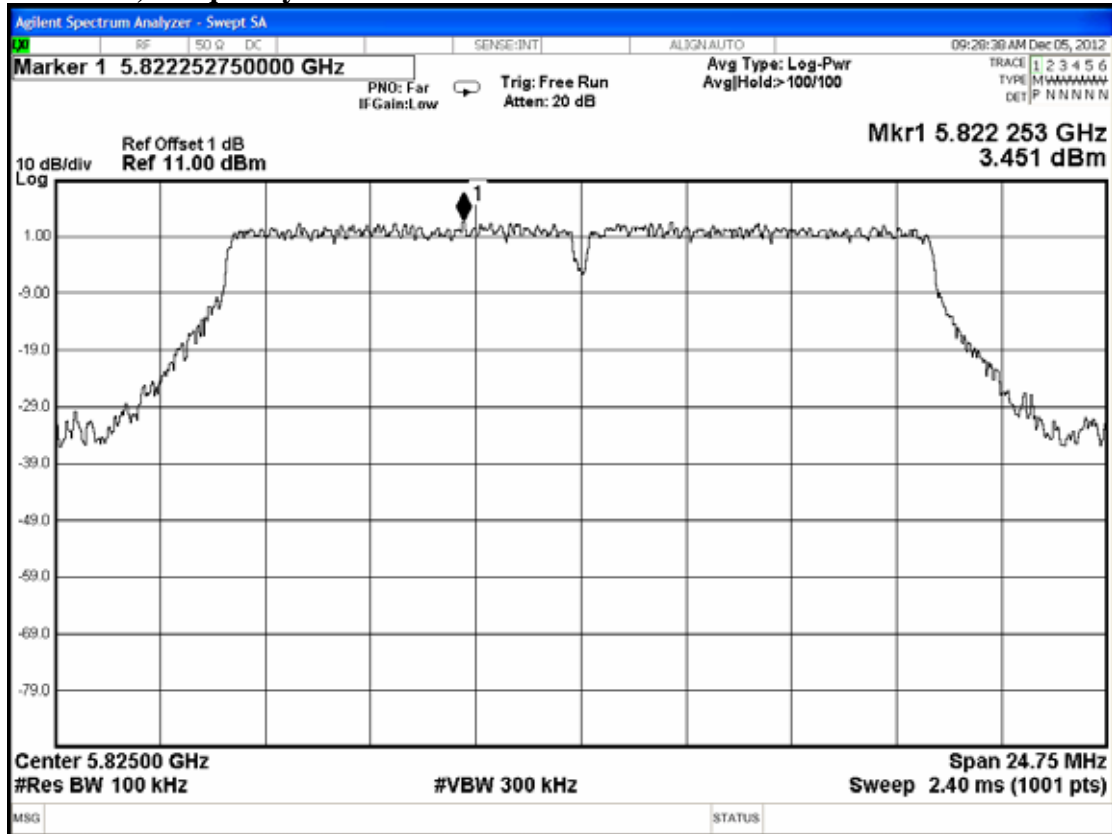
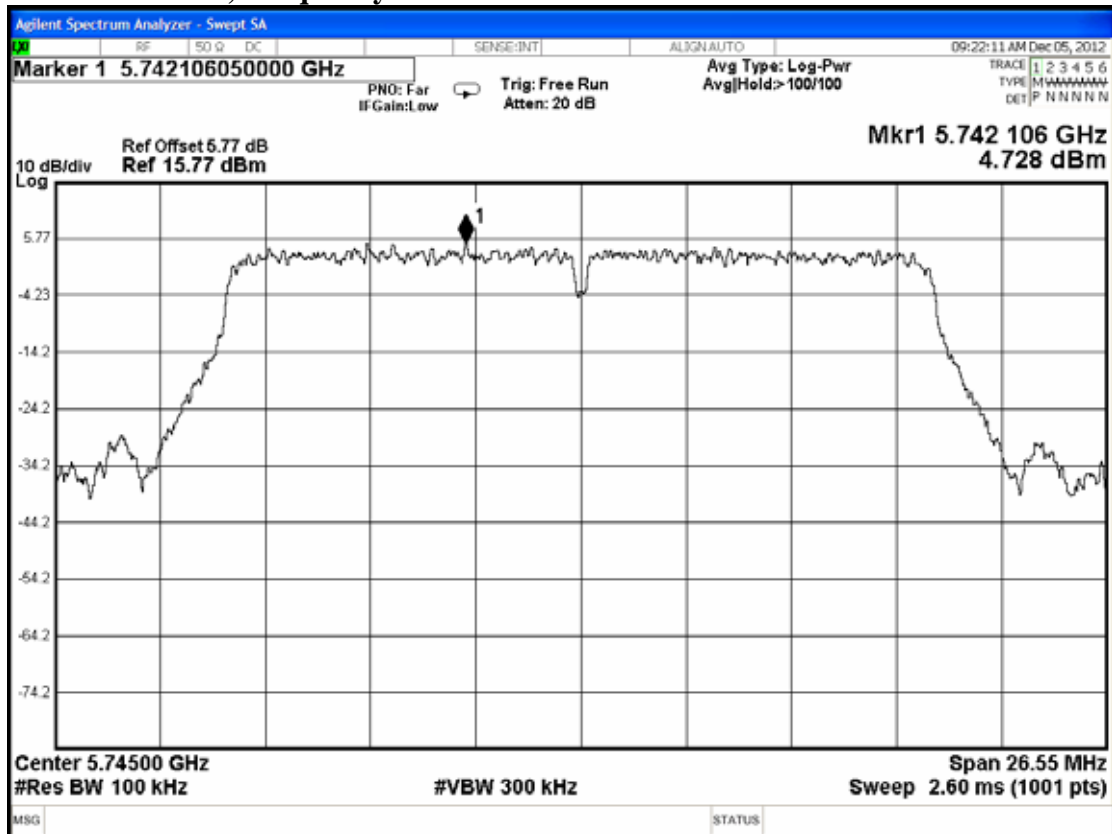
Mode	Type of Network	Channel	Frequency	Power Spectral Density (dBm)	Limit (dBm)
1.	802.11a	CH 149	5745MHz	3.618	8
2.		CH 157	5785MHz	3.592	8
3.		CH 165	5825MHz	3.451	8
4.	802.11n-HT20	CH 149	5745MHz	4.728	8
5.		CH 157	5785MHz	5.630	8
6.		CH 165	5825MHz	5.867	8
7.	802.11n-HT40	CH 151	5755MHz	3.274	8
8.		CH 159	5795MHz	3.795	8

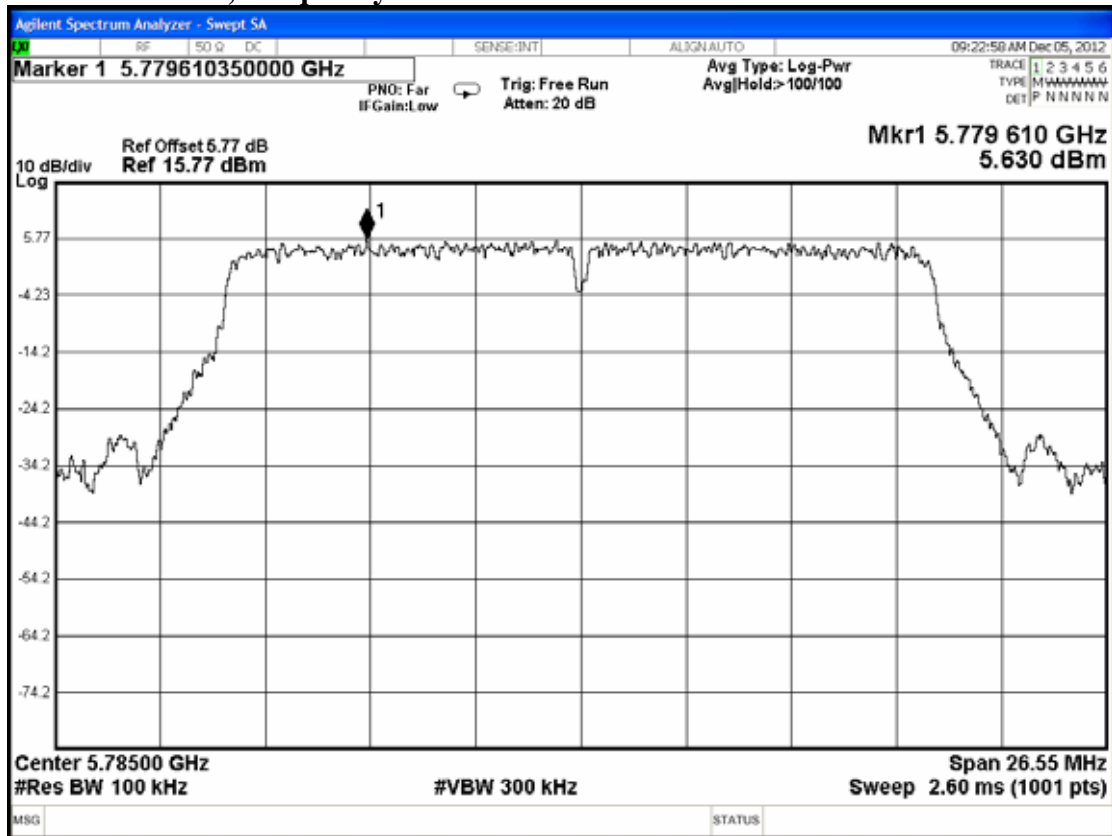
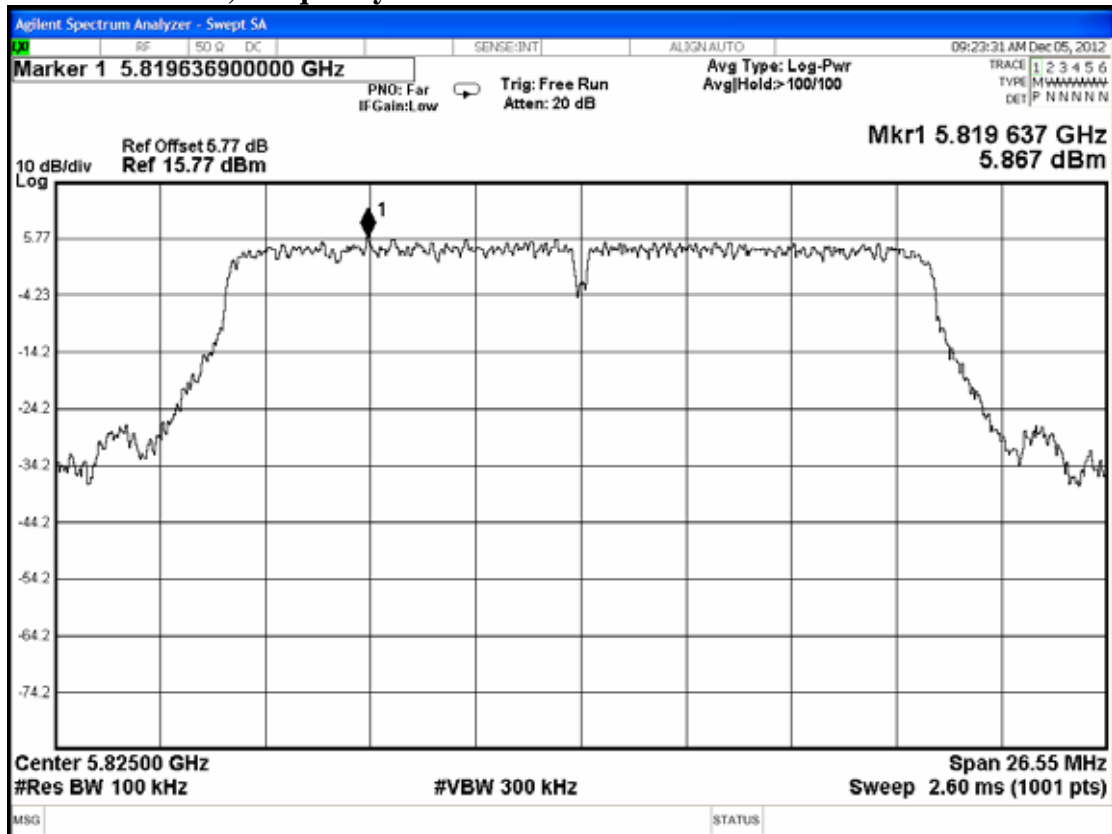
802.11a, Frequency: 5475MHz

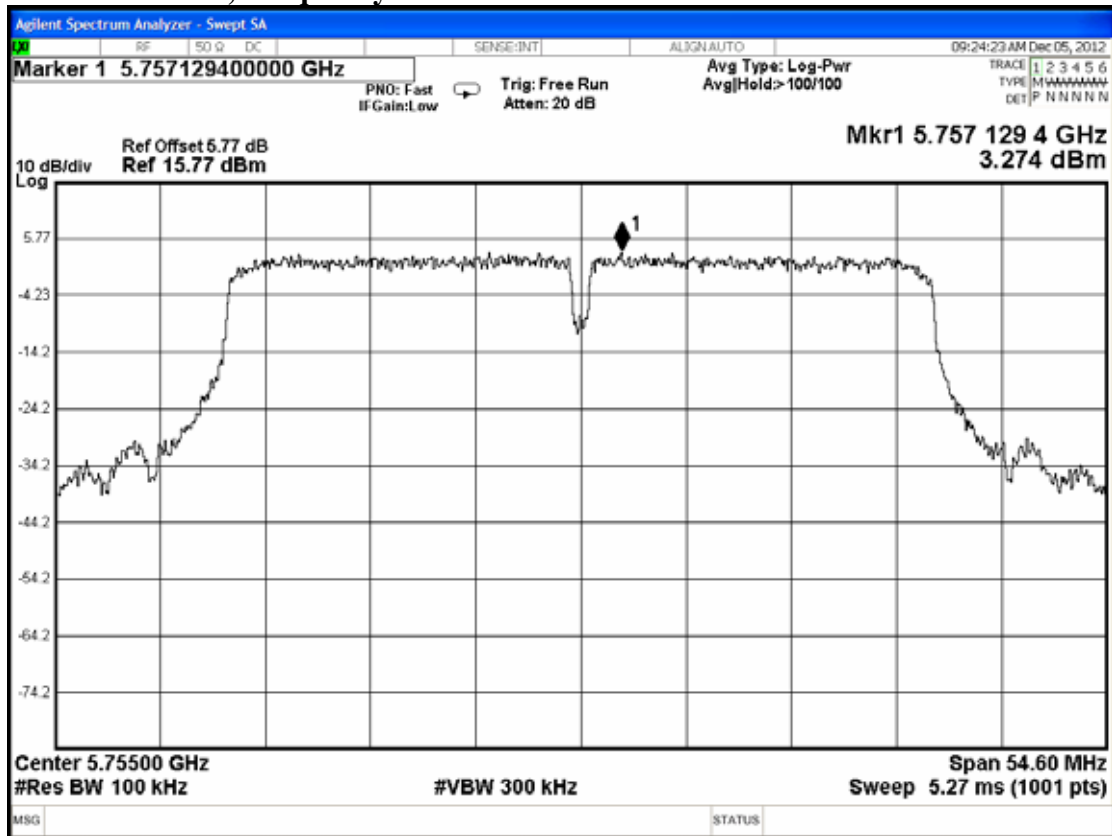
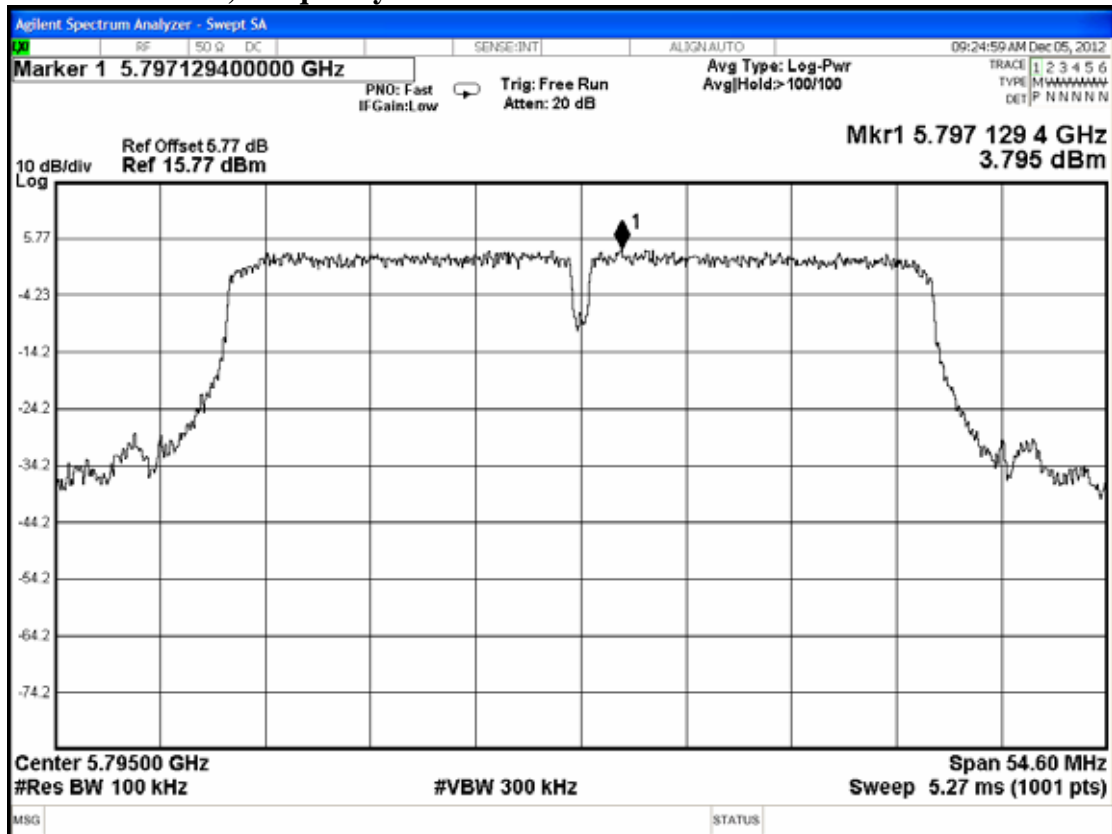


802.11a, Frequency: 5785MHz



802.11a, Frequency: 5825MHz**802.11n-HT20, Frequency: 5745MHz**

802.11n-HT20, Frequency: 5785MHz**802.11n-HT20, Frequency: 5825MHz**

802.11n-HT40, Frequency: 5755MHz**802.11n-HT40, Frequency: 5795MHz**

9. DEVIATION TO TEST SPECIFICATIONS

【NONE】

10. PHOTOGRAPHS

10.1. Photos of Conducted Disturbance Measurement



FRONT VIEW OF CONDUCTED MEASUREMENT



BACK VIEW OF CONDUCTED MEASUREMENT

10.2.Photos of Radiated Measurement at Semi-Anechoic Chamber

10.2.1.Frequency Below 1GHz



10.2.2. Frequency Above 1GHz



10.3.Photo of Section RF Conducted Measurement

