SPORTON International Inc.
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FCC RADIO TEST REPORT

Applicant's company	**Wistron NeWeb Corporation**
Applicant Address	No.10-1,Li-hsin Road I,Hsinchu Science Park,Hsinchu 300,Taiwan, R.O.C.
FCC ID	**NKR-DCMA-86**
Manufacturer's company	**Wistron NeWeb Corporation**
Manufacturer Address	No.10-1,Li-hsin Road I,Hsinchu Science Park,Hsinchu 300,Taiwan, R.O.C.

Product Name	802.11a Hi-power mini-PCI module
Brand Name	WNC
Model Name	DCMA-86
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5350MHz / 5470 ~ 5725MHz
Received Date	Jul. 28, 2009
Final Test Date	Aug. 07, 2009
Submission Type	Original Equipment
Operating Mode	Client (without radar detection function)

Statement

Test result included is only for the 802.11a (5150 ~ 5350MHz / 5470 ~ 5725MHz) of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart E**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Testing Laboratory
1190

Table of Contents

History of This Test Report

Original Issue Date: Sep. 01, 2009

Report No.: FR931911-03AA

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

Certificate No.: CB9809001

1. CERTIFICATE OF COMPLIANCE

Product Name	:	802.11a Hi-power mini-PCI module
Brand Name	:	WNC
Model Name	:	DCMA-86
Applicant	:	Wistron NeWeb Corporation
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jul. 28, 2009 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Jordan Hsiao 2009.9.3

Jordan Hsaio

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	21.79 dB
4.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.25 dB
4.4	15.407(a)	Power Spectral Density	Complies	1.12 dB
4.5	15.407(a)	Peak Excursion	Complies	7.28 dB
4.6	15.407(b)	Radiated Emissions	Complies	1.08 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.29 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.5dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
Peak Excursion	±0.5dB	Confidence levels of 95%
26dB Spectrum Bandwidth / Frequency Stability	$\pm 8.5\times10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From Host System From Power Supply (only for test)
Modulation	OFDM for IEEE 802.11a
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	OFDM (6/9/12/18/24/36/48/54)
Frequency Range	5150 ~ 5350MHz / 5470 ~ 5725MHz
Channel Number	19
Channel Band Width (99%)	18.08 MHz
Conducted Output Power	Band 1: 16.75 dBm ; Band 2: 23.53 dBm ; Band 3: 23.43 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	LCU	F1B-294405-52	Dipole Antenna	Reverse SMA(M)-MMCX(F)	3.68

Note: The EUT has one antenna.

Ant. 1 can be used as transmitter/receiver antenna.

3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5250 MHz Band 1	36	5180 MHz	44	5220 MHz
	40	5200 MHz	48	5240 MHz
5250~5350 MHz Band 2	52	5260 MHz	60	5300 MHz
	56	5280 MHz	64	5320 MHz
5470~5725 MHz Band 3	100	5500 MHz	124	5620 MHz
	104	5520 MHz	128	5640 MHz
	108	5540 MHz	132	5660 MHz
	112	5560 MHz	136	5680 MHz
	116	5580 MHz	140	5700 MHz
	120	5600 MHz		

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Conducted Emission	Normal Link	Auto	-	-
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Max. Conducted Output Power Power Spectral Density Peak Excursion	Band 1~2/BPSK	6Mbps	36/40/48/52/60/64	-
	Band 3/BPSK	6Mbps	100/116/140	-
Radiated Emission Below 1GHz	Normal Link	Auto	-	-
Radiated Emission Above 1GHz	Band 1~2/BPSK	6Mbps	36/40/48/52/60/64	1
	Band 3/BPSK	6Mbps	100/116/140	1
Band Edge Emission	Band 1~2/BPSK	6Mbps	36/40/60/64	1
	Band 3/BPSK	6Mbps	100/140	1
Frequency Stability	Un-modulation	-	60	-

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH03-HY	SAC	Hwa Ya	480872	IC 4088	-
CO04-HY	Conduction	Hwa Ya	480872	IC 4088	-
TH01-HY	OVEN Room	Hwa Ya	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	1200	E2K4965AGNM
Mouse	iCooky	AMS0706W	DoC
Modem	ACEEX	DM1414	IFAXDM1414
POWER SUPPLY	GW	GPC-6030D	N/A
Wireless AP	Planex	GW-AP54SGX	N/A

3.8. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

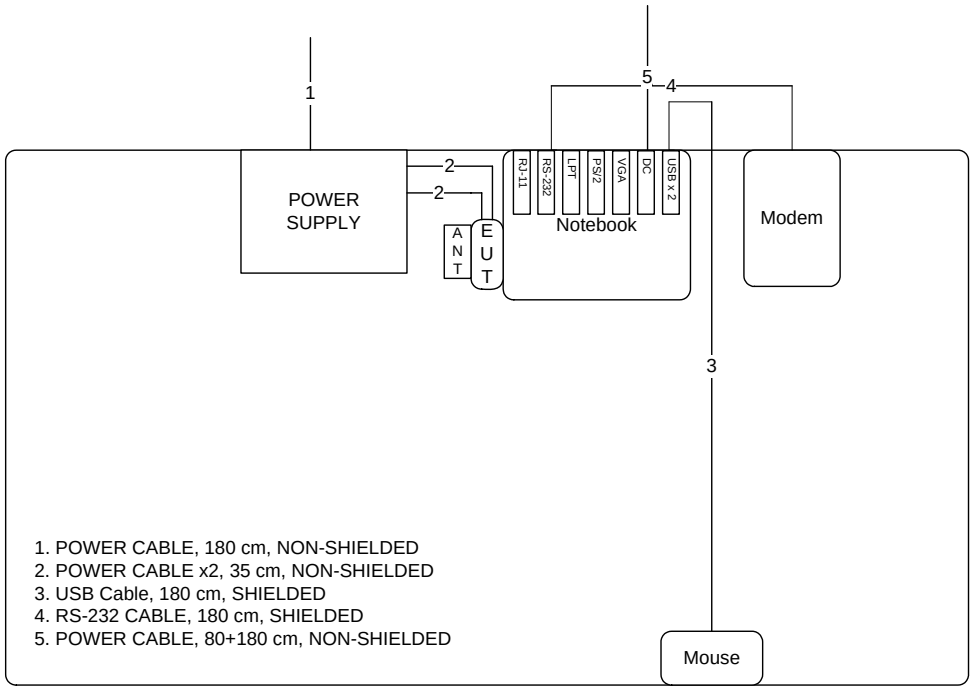
Power Parameters of IEEE 802.11a

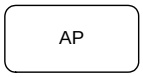
Test Software Version	ART								
Frequency	5180 MHz	5200 MHz	5240 MHz	5260 MHz	5300 MHz	5320 MHz	5500 MHz	5580 MHz	5700 MHz
IEEE 802.11a	15	16	16	18	23	22.5	17.5	23	10

3.9. Test Configurations

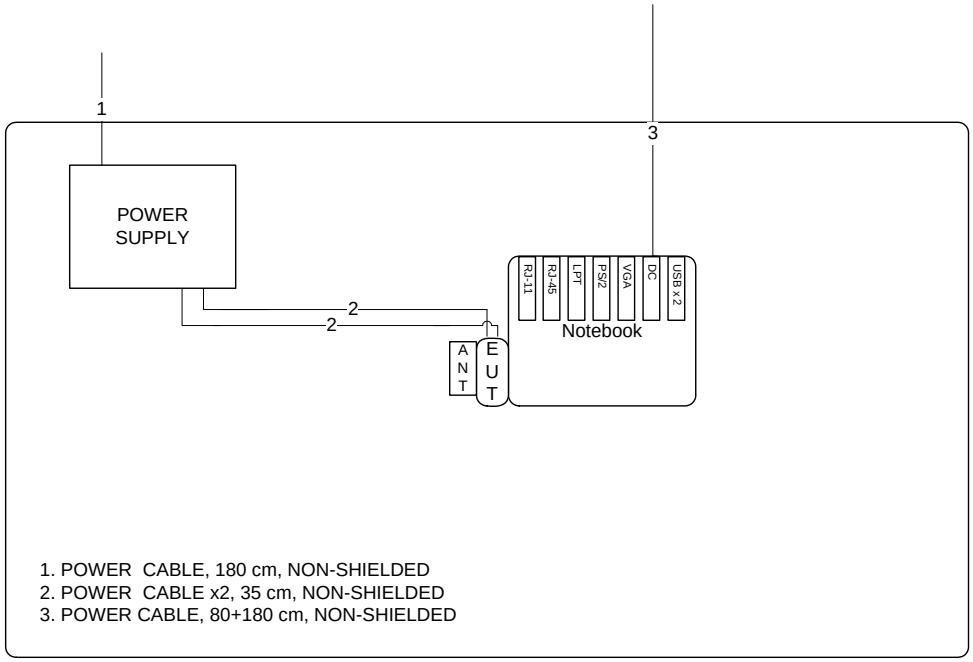
3.9.1. Radiation Emissions Test Configuration

Test Configurations: 30MHz~1GHz

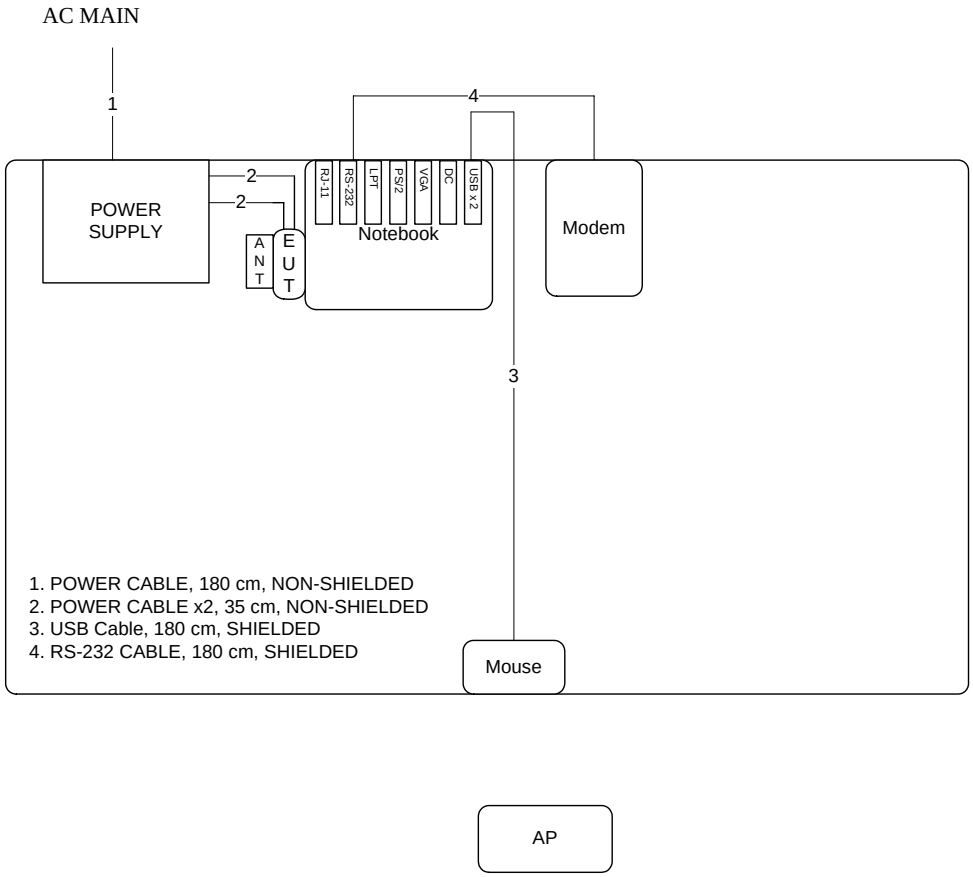




Test Configurations: Above 1GHz



3.9.2. AC Power Line Conduction Emissions Test Configuration



4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product that is designed to connect to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

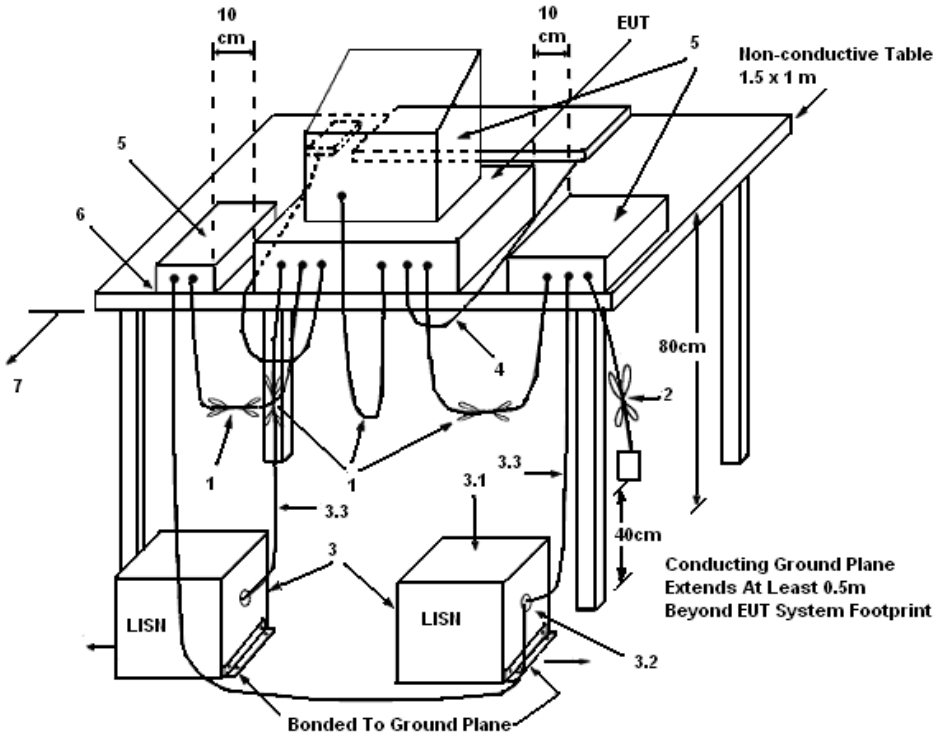
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

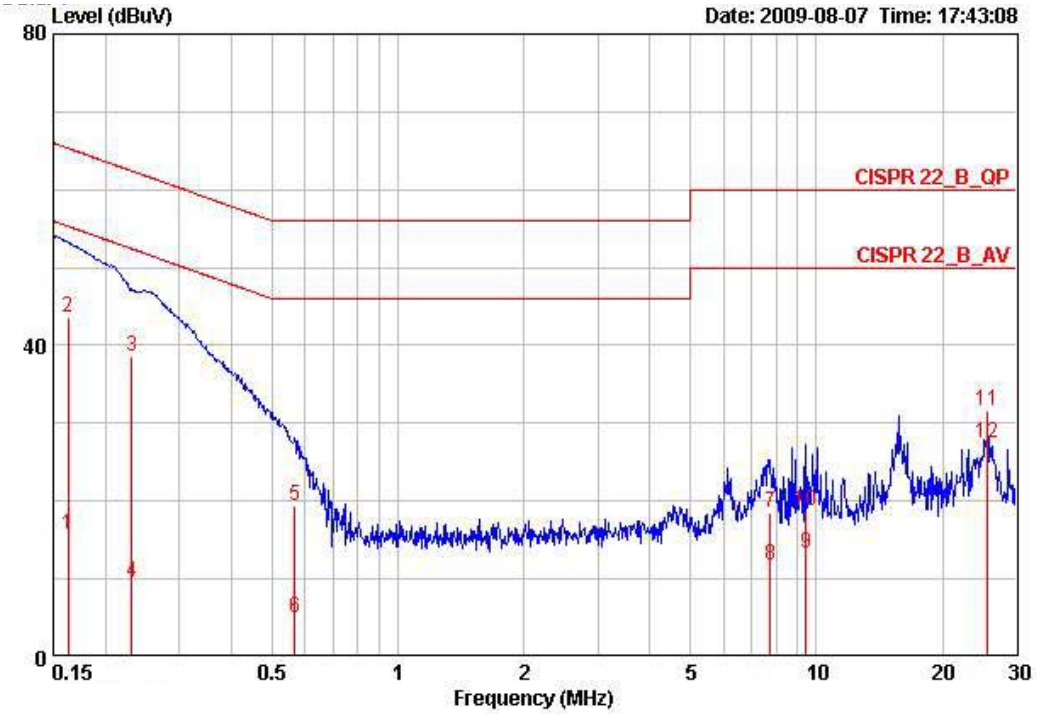
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

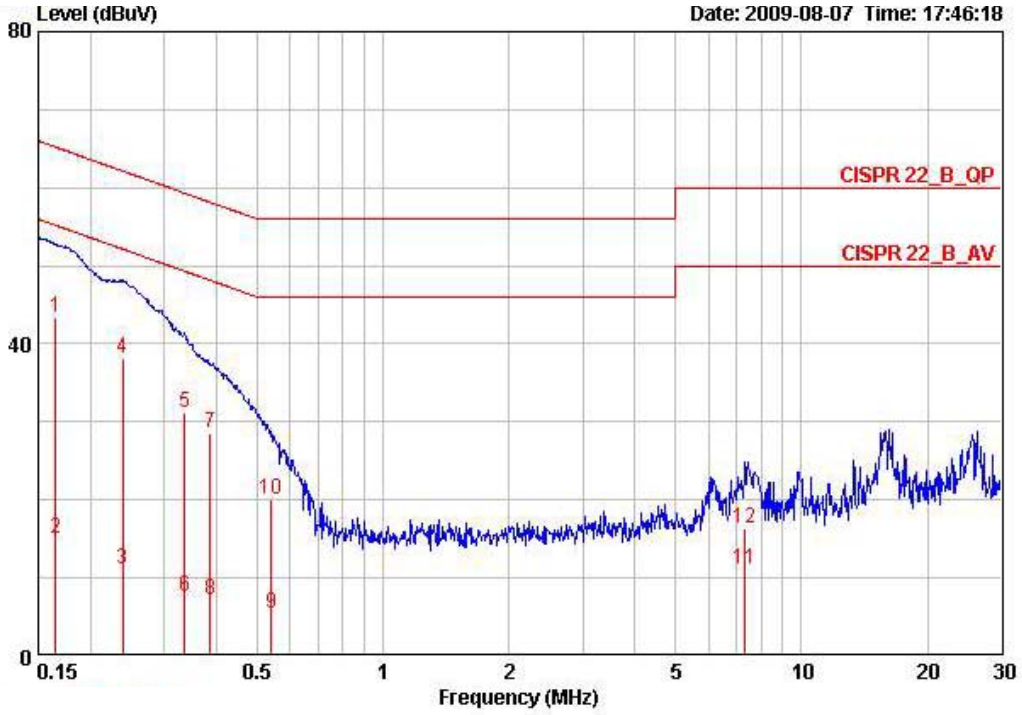
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23.5°C	Humidity	53.6%
Test Engineer	Aric Li	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16241	15.66	-39.68	55.34	15.39	0.07	0.20	AVERAGE
2 @	0.16241	43.55	-21.79	65.34	43.28	0.07	0.20	QP
3	0.23162	38.67	-23.73	62.39	38.42	0.05	0.20	QP
4	0.23162	9.51	-42.89	52.39	9.26	0.05	0.20	AVERAGE
5	0.56709	19.35	-36.65	56.00	19.12	0.03	0.20	QP
6	0.56709	5.08	-40.92	46.00	4.85	0.03	0.20	AVERAGE
7	7.769	18.42	-41.58	60.00	17.74	0.28	0.40	QP
8	7.769	11.77	-38.23	50.00	11.09	0.28	0.40	AVERAGE
9	9.451	13.38	-36.62	50.00	12.75	0.33	0.30	AVERAGE
10	9.451	18.66	-41.34	60.00	18.03	0.33	0.30	QP
11	25.591	31.59	-28.41	60.00	29.82	1.17	0.60	QP
12	25.591	27.57	-22.43	50.00	25.80	1.17	0.60	AVERAGE

Temperature	23.5°C	Humidity	53.6%
Test Engineer	Aric Li	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.16501	43.37	-21.84	65.21	43.07	0.10	0.20	QP
2	0.16501	15.00	-40.21	55.21	14.70	0.10	0.20	AVERAGE
3	0.23910	11.09	-41.04	52.13	10.81	0.08	0.20	AVERAGE
4	0.23910	38.09	-24.04	62.13	37.81	0.08	0.20	QP
5	0.33562	31.19	-28.12	59.31	30.92	0.07	0.20	QP
6	0.33562	7.54	-41.77	49.31	7.27	0.07	0.20	AVERAGE
7	0.38724	28.51	-29.61	58.12	28.24	0.07	0.20	QP
8	0.38724	7.12	-41.00	48.12	6.85	0.07	0.20	AVERAGE
9	0.54068	5.43	-40.57	46.00	5.16	0.07	0.20	AVERAGE
10	0.54068	20.04	-35.96	56.00	19.77	0.07	0.20	QP
11	7.329	11.19	-38.81	50.00	10.52	0.31	0.37	AVERAGE
12	7.329	16.27	-43.73	60.00	15.60	0.31	0.37	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. 99% Occupied Bandwidth Measurement

4.2.1. Limit

No restriction limits. But resolution bandwidth within band edge measurement is 1% of the 99% occupied bandwidth.

4.2.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RB	300 kHz
VB	1000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 300 kHz and the video bandwidth of 1000 kHz were used.
3. Measured the spectrum width with power higher than 26dB below carrier.

4.2.4. Test Setup Layout

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

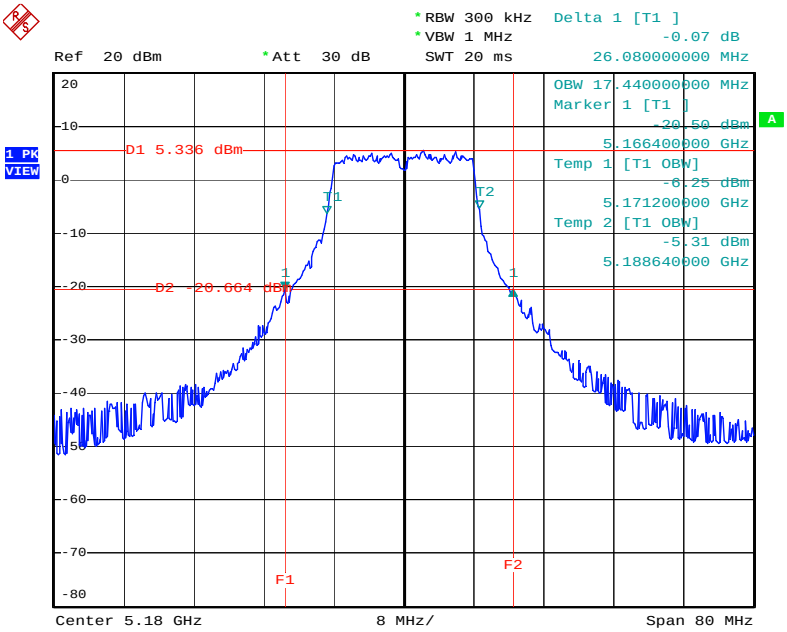
4.2.7. Test Result of 99% Occupied Bandwidth

Temperature	23°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	802.11a

Configuration IEEE 802.11a

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	26.08	17.44
40	5200 MHz	24.96	17.44
48	5240 MHz	24.64	17.44
52	5260 MHz	24.96	17.60
60	5300 MHz	29.76	18.08
64	5320 MHz	29.28	17.76
100	5500 MHz	25.28	17.44
116	5580 MHz	29.12	17.92
140	5700 MHz	24.32	17.28

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5180 MHz



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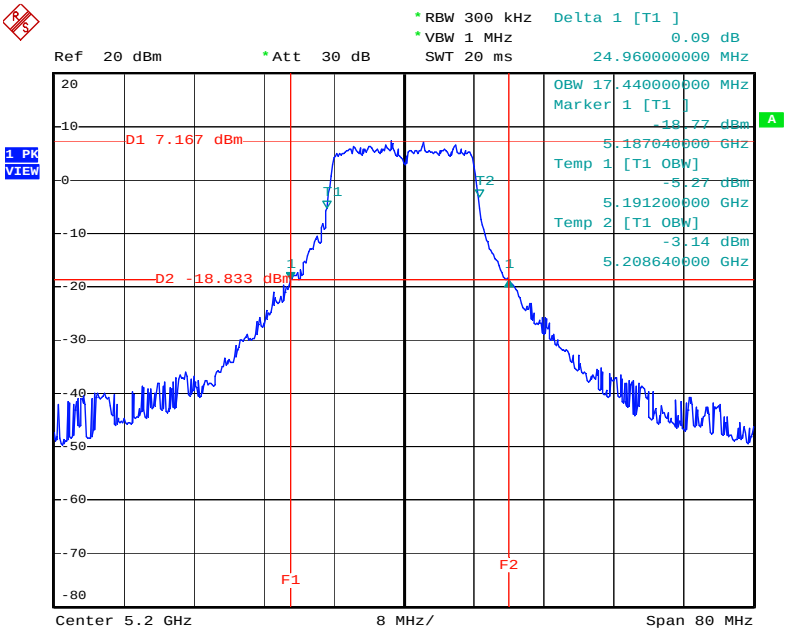
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5200 MHz



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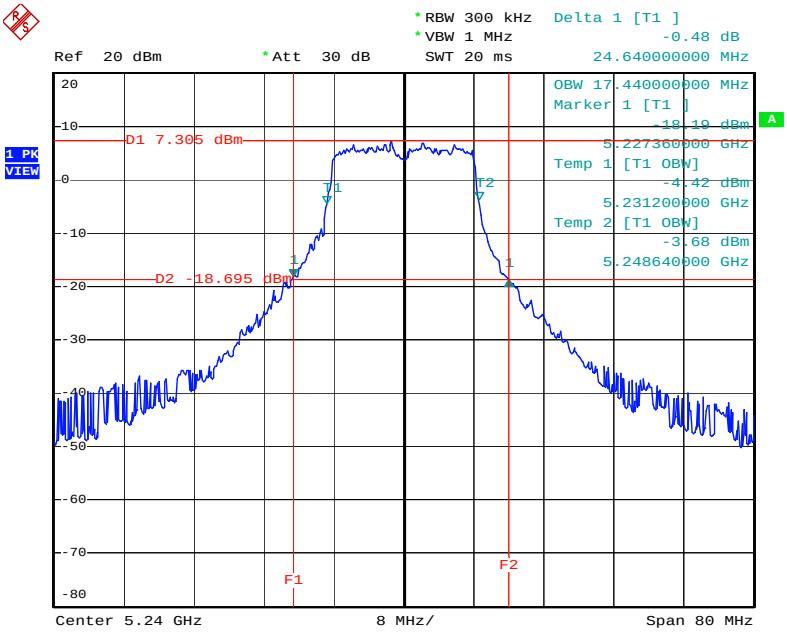
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5240 MHz



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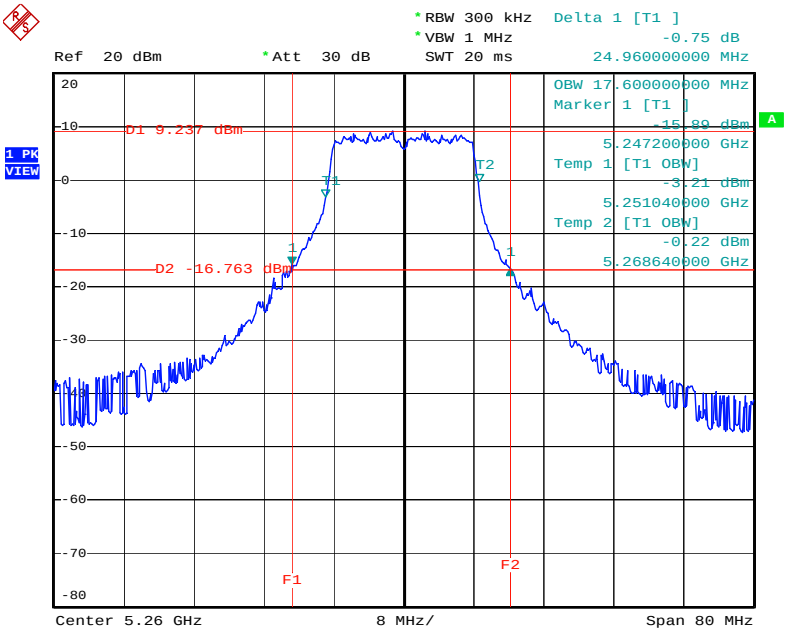
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5260 MHz



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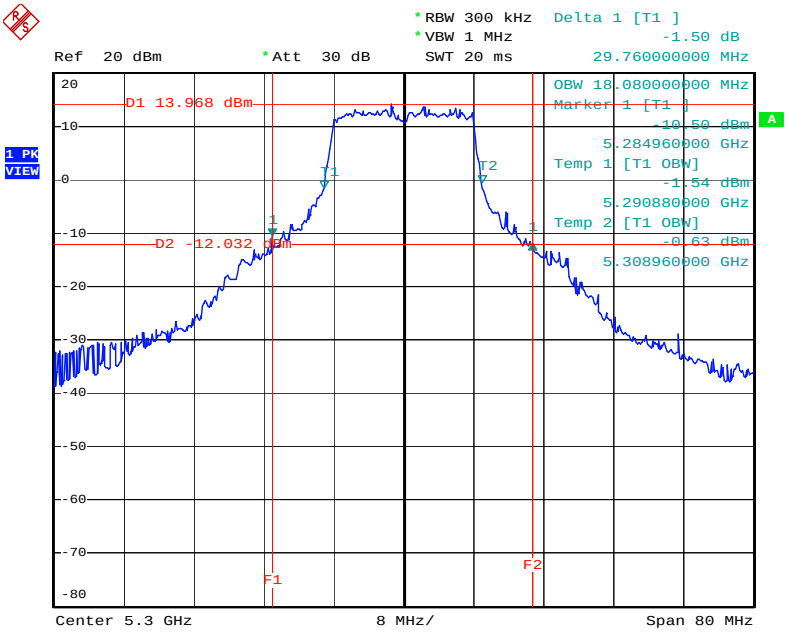
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5300 MHz



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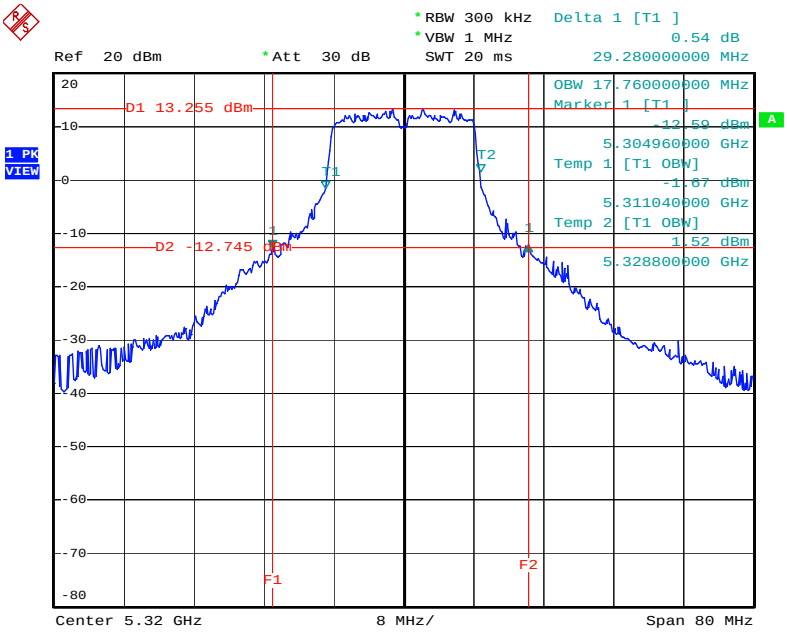
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5320 MHz



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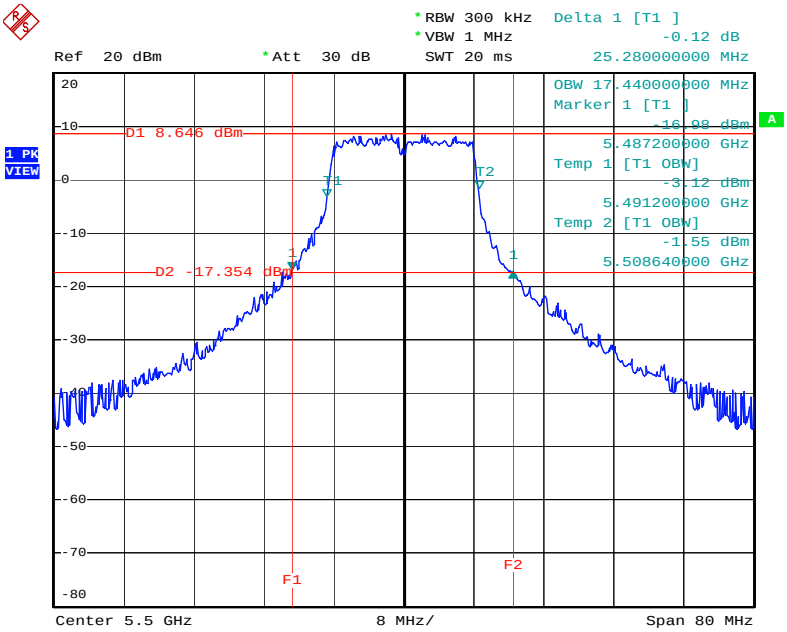
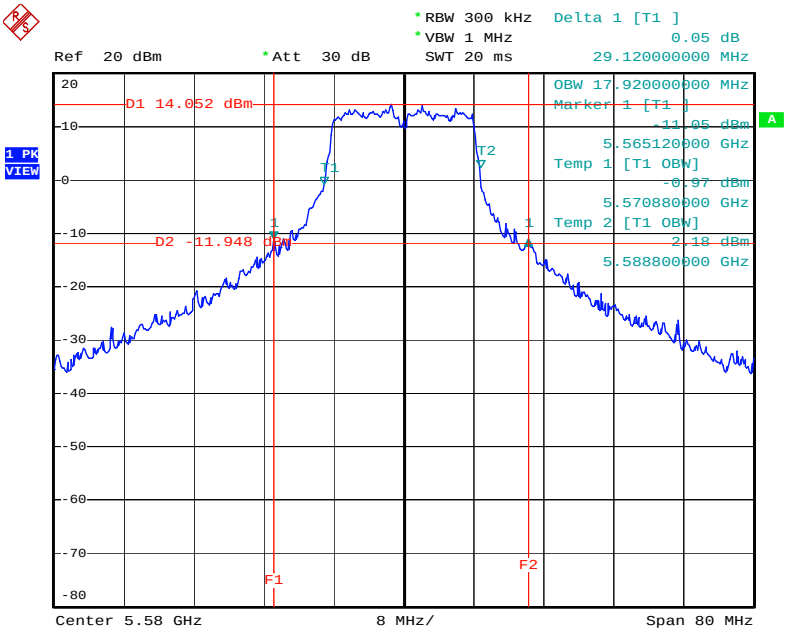
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5500 MHz



Date: 5.AUG.2009 14:45:49

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5580 MHz



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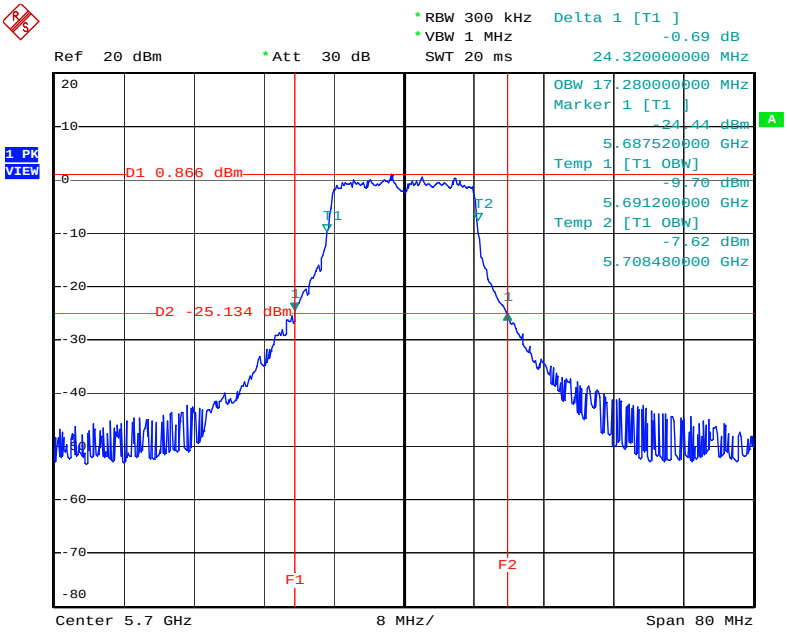
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5700 MHz



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4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

For the band 5.15~5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B, where B is the 26 dB emissions bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power and power density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.470-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power and power density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W (30dBm) or 17 dBm + 10log B. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power and power density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power and peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required.

4.3.2. Measuring Instruments and Setting

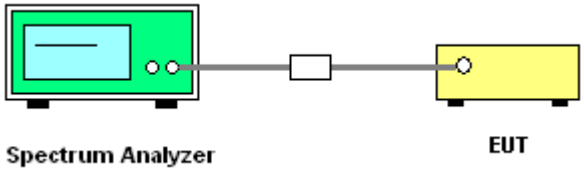
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 kHz
Detector	RMS
Trace	MAX HOLD
Sweep Time	Auto

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with FCC Public Notice DA 02-2138, August 30, 2002.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

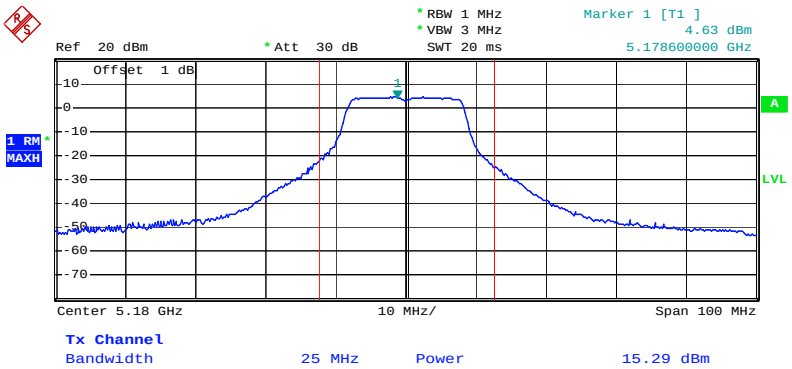
4.3.7. Test Result of Maximum Conducted Output Power

Temperature	23°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	802.11a

Configuration IEEE 802.11a

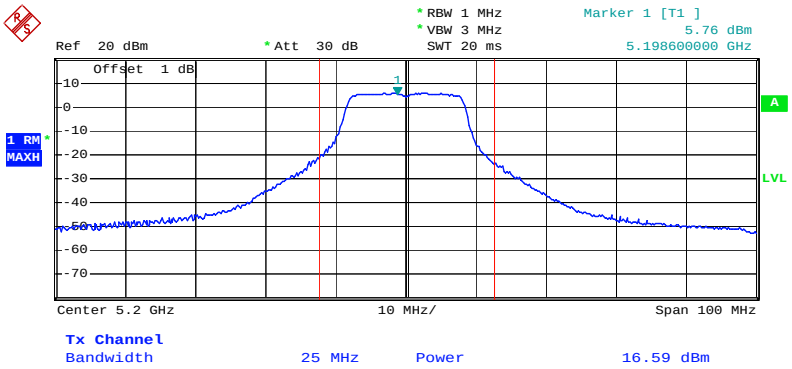
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	15.29	17.00	Complies
40	5200 MHz	16.59	17.00	Complies
48	5240 MHz	16.75	17.00	Complies
52	5260 MHz	18.89	24.00	Complies
60	5300 MHz	23.53	24.00	Complies
64	5320 MHz	23.00	24.00	Complies
100	5500 MHz	18.40	24.00	Complies
116	5580 MHz	23.43	24.00	Complies
140	5700 MHz	11.01	24.00	Complies

Conducted Output Power Plot on Configuration IEEE 802.11a / 5180 MHz



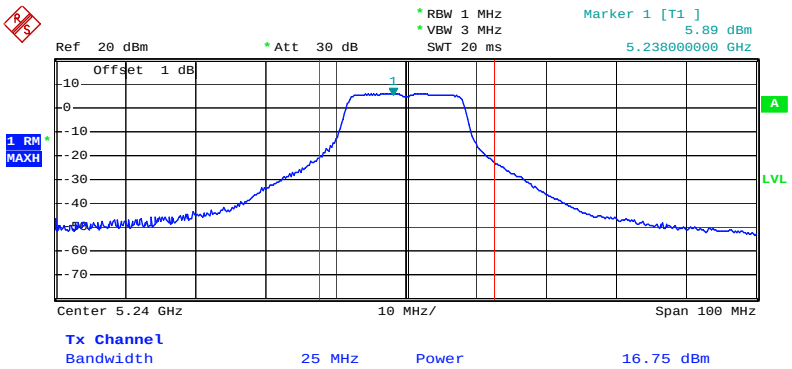
Date: 5.AUG.2009 14:23:56

Conducted Output Power Plot on Configuration IEEE 802.11a / 5200 MHz



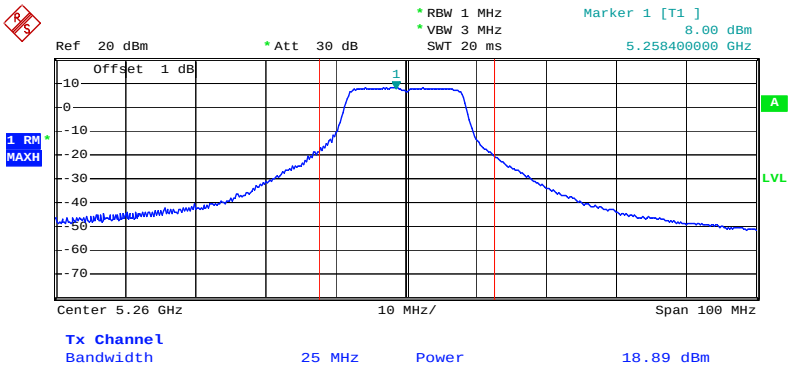
Date: 5.AUG.2009 14:23:10

Conducted Output Power Plot on Configuration IEEE 802.11a / 5240 MHz



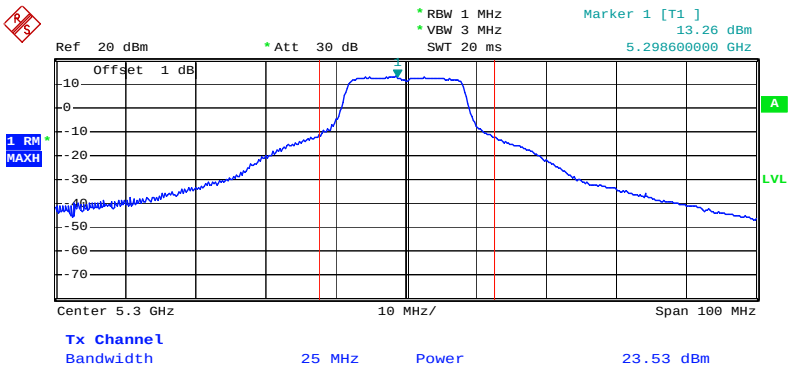
Date: 5.AUG.2009 14:27:12

Conducted Output Power Plot on Configuration IEEE 802.11a / 5260 MHz



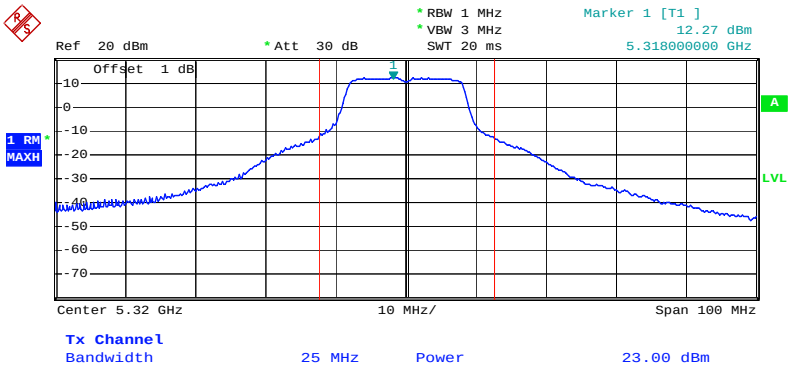
Date: 5.AUG.2009 14:27:54

Conducted Output Power Plot on Configuration IEEE 802.11a / 5300 MHz



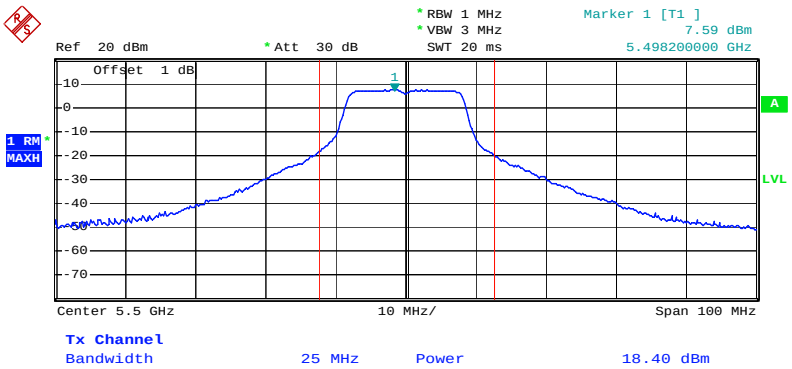
Date: 5.AUG.2009 14:29:02

Conducted Output Power Plot on Configuration IEEE 802.11a / 5320 MHz



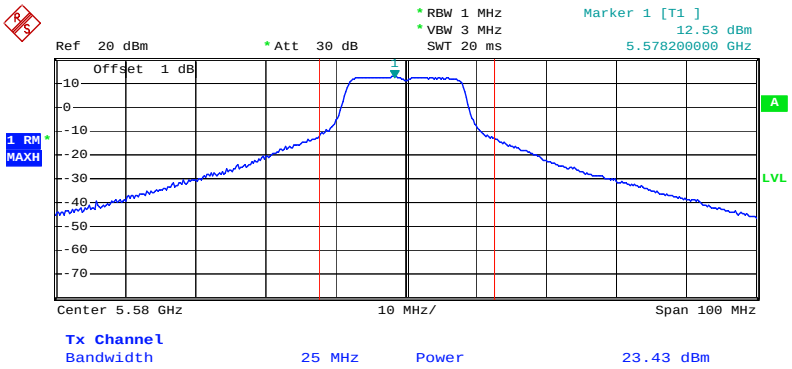
Date: 5.AUG.2009 14:29:51

Conducted Output Power Plot on Configuration IEEE 802.11a / 5500 MHz



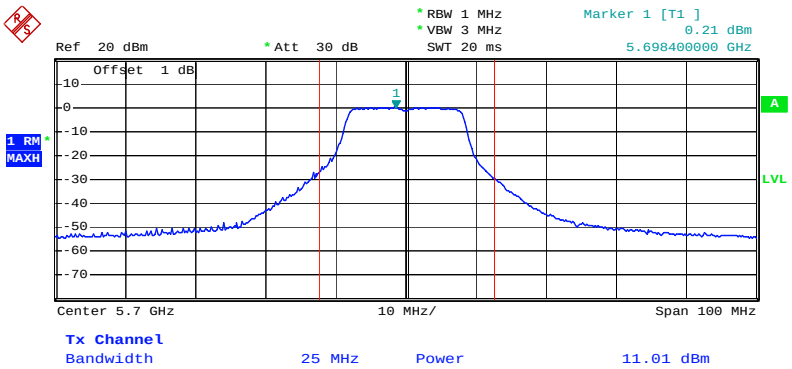
Date: 5.AUG.2009 14:30:52

Conducted Output Power Plot on Configuration IEEE 802.11a / 5580 MHz



Date: 5.AUG.2009 14:31:35

Conducted Output Power Plot on Configuration IEEE 802.11a / 5700 MHz



Date: 5.AUG.2009 14:32:22

4.4. Power Spectral Density Measurement

4.4.1. Limit

The power spectral density is defined as the highest level of power in dBm per MHz generated by the transmitter within the power envelope. The following table is power spectral density limits and decrease power density limit rule refer to section 4.3.1.

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.15~5.25 GHz	4
5.25-5.35 GHz	11
5470-5725	11

4.4.2. Measuring Instruments and Setting

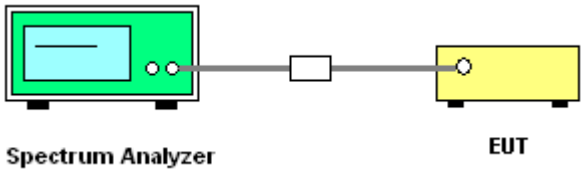
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 kHz
Detector	Sample
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 1000kHz and VBW to 3000kHz. Set Detector to Peak, Trace to Max Hold. Mark the frequency with maximum peak power as the center of the display of the spectrum.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

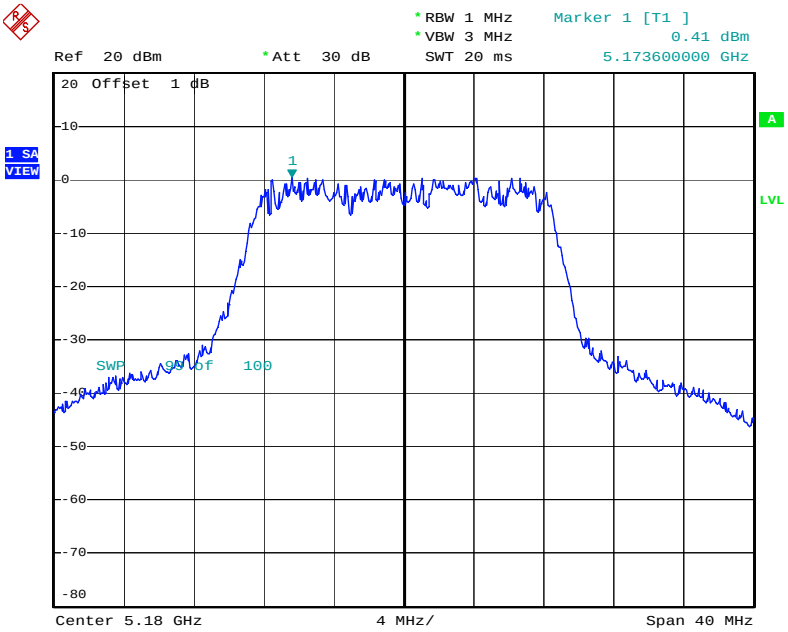
4.4.7. Test Result of Power Spectral Density

Temperature	23°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	802.11a

Configuration IEEE 802.11a

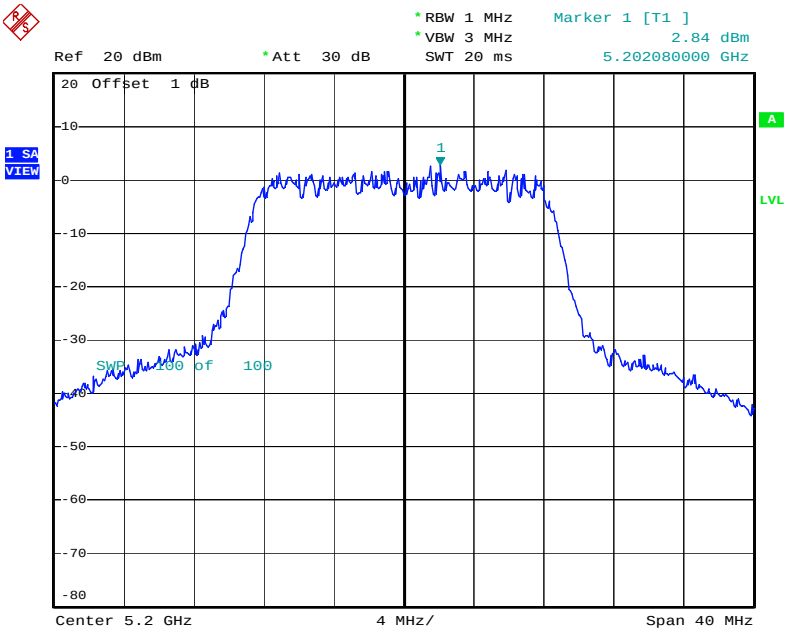
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	0.41	4.00	Complies
40	5200 MHz	2.84	4.00	Complies
48	5240 MHz	1.83	4.00	Complies
52	5260 MHz	5.01	11.00	Complies
60	5300 MHz	9.88	11.00	Complies
64	5320 MHz	8.16	11.00	Complies
100	5500 MHz	4.05	11.00	Complies
116	5580 MHz	9.34	11.00	Complies
140	5700 MHz	-4.17	11.00	Complies

Power Density Plot on Configuration IEEE 802.11a / 5180 MHz



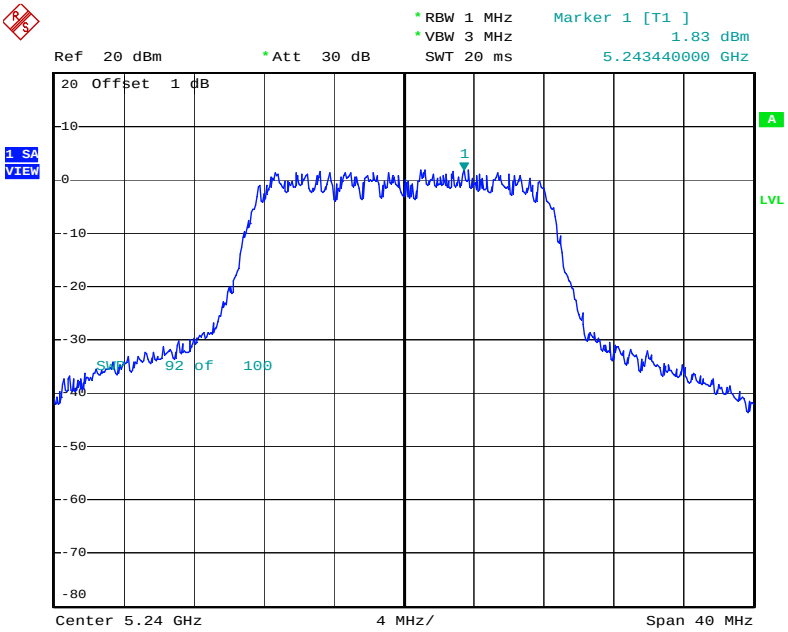
Date: 5.AUG.2009 14:38:30

Power Density Plot on Configuration IEEE 802.11a / 5200 MHz



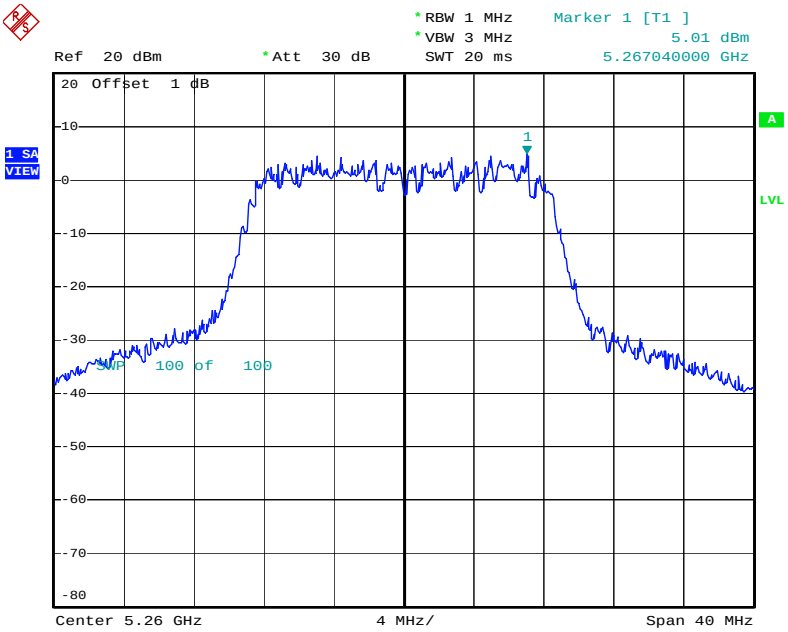
Date: 5.AUG.2009 14:39:36

Power Density Plot on Configuration IEEE 802.11a / 5240 MHz



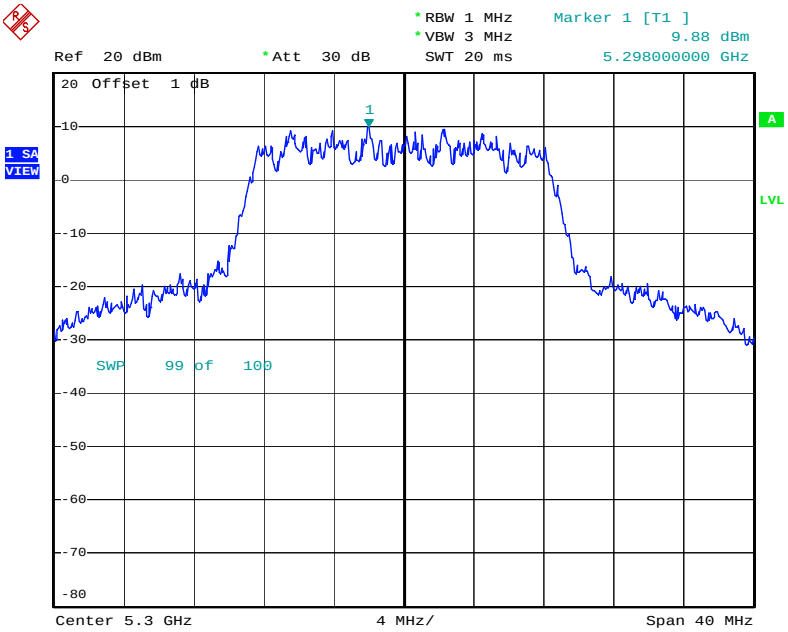
Date: 5.AUG.2009 14:41:20

Power Density Plot on Configuration IEEE 802.11a / 5260 MHz



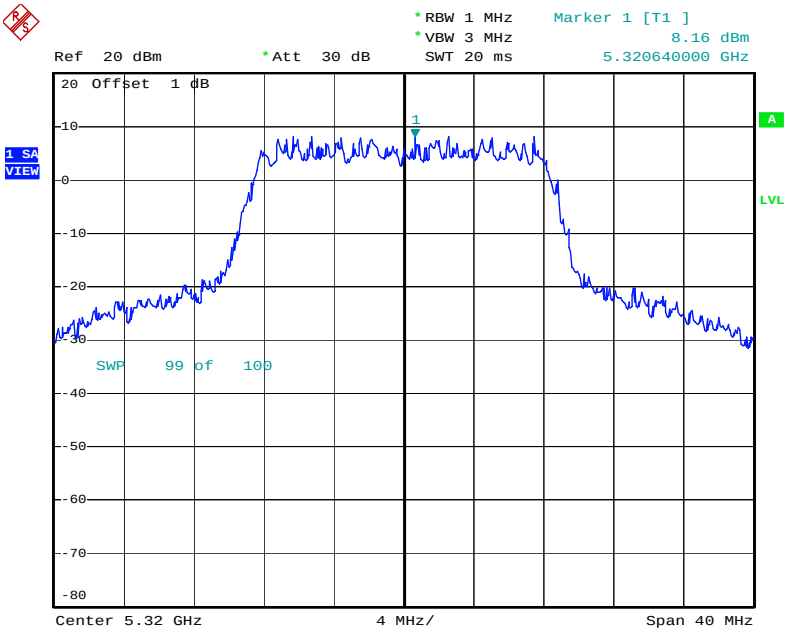
Date: 5.AUG.2009 14:42:11

Power Density Plot on Configuration IEEE 802.11a / 5300 MHz



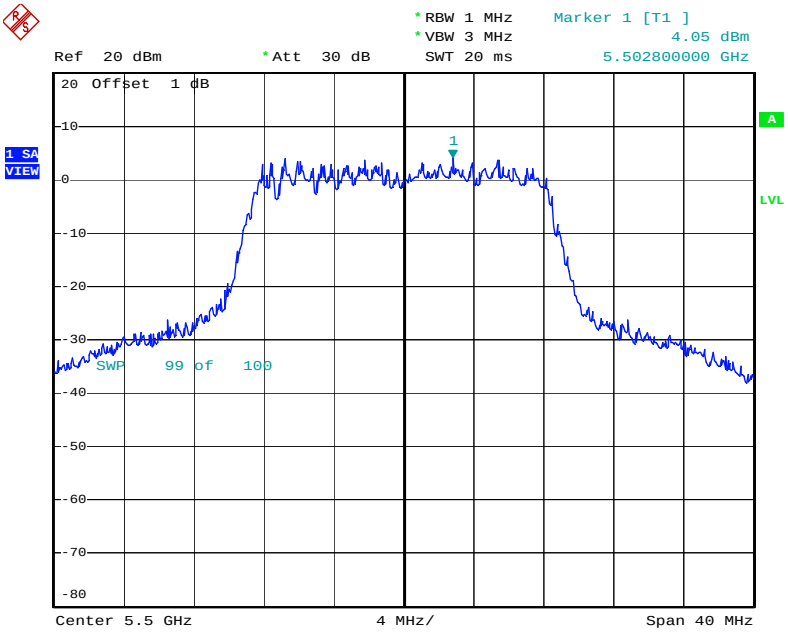
Date: 5.AUG.2009 14:43:50

Power Density Plot on Configuration IEEE 802.11a / 5320 MHz



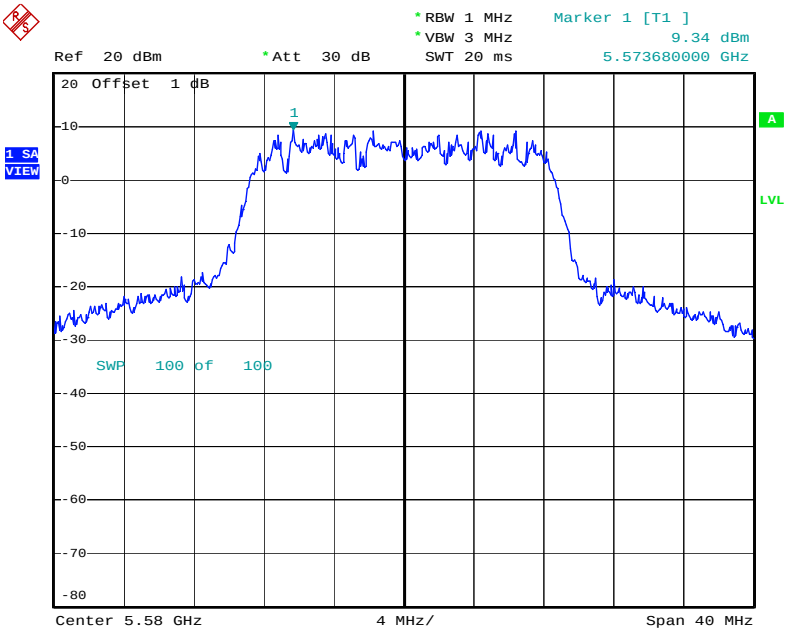
Date: 5.AUG.2009 14:44:43

Power Density Plot on Configuration IEEE 802.11a / 5500 MHz



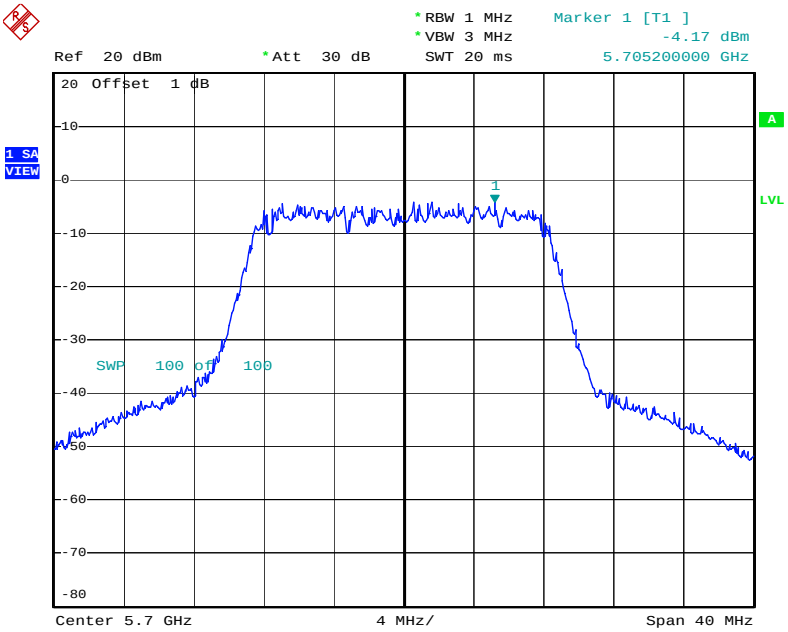
Date: 5.AUG.2009 14:45:57

Power Density Plot on Configuration IEEE 802.11a / 5580 MHz



Date: 5.AUG.2009 14:46:56

Power Density Plot on Configuration IEEE 802.11a / 5700 MHz



Date: 5.AUG.2009 14:48:05

4.5. Peak Excursion Measurement

4.5.1. Limit

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emissions bandwidth whichever is less.

4.5.2. Measuring Instruments and Setting

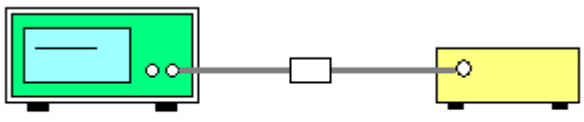
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz (Peak Trace) / 1000 kHz (Average Trace)
VB	3000 kHz (Peak Trace) / 300 kHz (Average Trace)
Detector	Peak (Peak Trace) / Sample (Average Trace)
Trace	Max Hold
Sweep Time	60s

4.5.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emissions bandwidth. The largest difference between the following two traces (Peak Trace and Average Trace) must be ≤ 13 dB for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace: Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and max-hold settings.
4. Average Trace: Method #3—video averaging with max hold--and sum power across the band. Set span to encompass the entire emissions bandwidth (EBW) of the signal. Set sweep trigger to "free run". Set RBW = 1 MHz. Set VBW ≥ 1/T (IEEE 802.11a VBW = 300kHz ≥ 1/4μs). Use sample detector mode if bin width (i.e., span/number of points in spectrum) < 0.5 RBW. Otherwise use peak detector mode . Set max hold. Allow max hold to run for 60 seconds.

4.5.4. Test Setup Layout



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

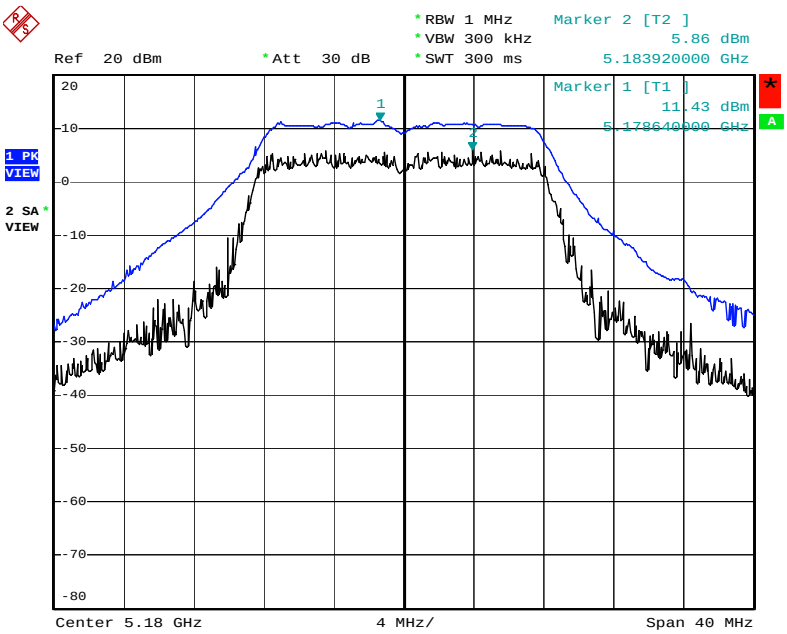
4.5.7. Test Result of Peak Excursion

Temperature	23°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	802.11a

Configuration IEEE 802.11a

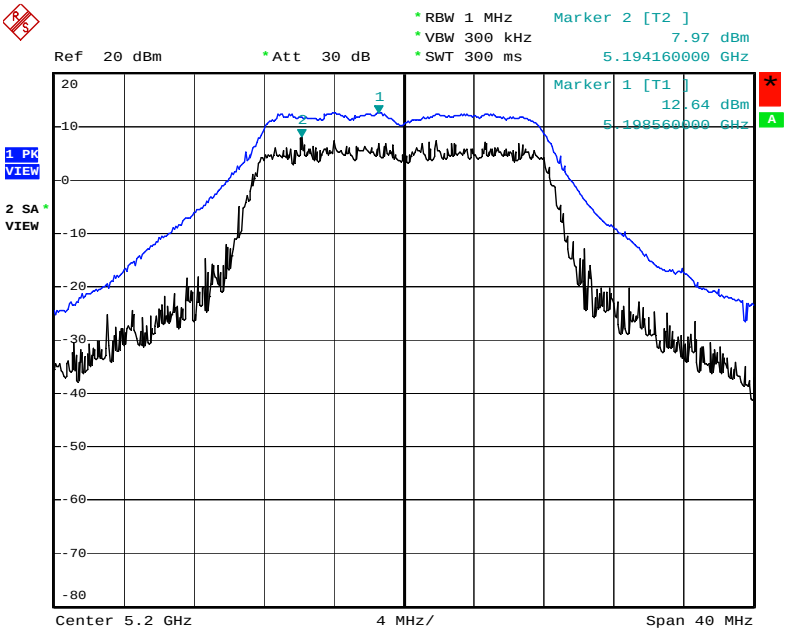
Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
36	5180 MHz	5.57	13	Complies
40	5200 MHz	4.67	13	Complies
48	5240 MHz	5.05	13	Complies
52	5260 MHz	4.57	13	Complies
60	5300 MHz	5.00	13	Complies
64	5320 MHz	4.32	13	Complies
100	5500 MHz	5.67	13	Complies
116	5580 MHz	5.14	13	Complies
140	5700 MHz	5.72	13	Complies

Peak Excursion Plot on Configuration IEEE 802.11a / 5180 MHz



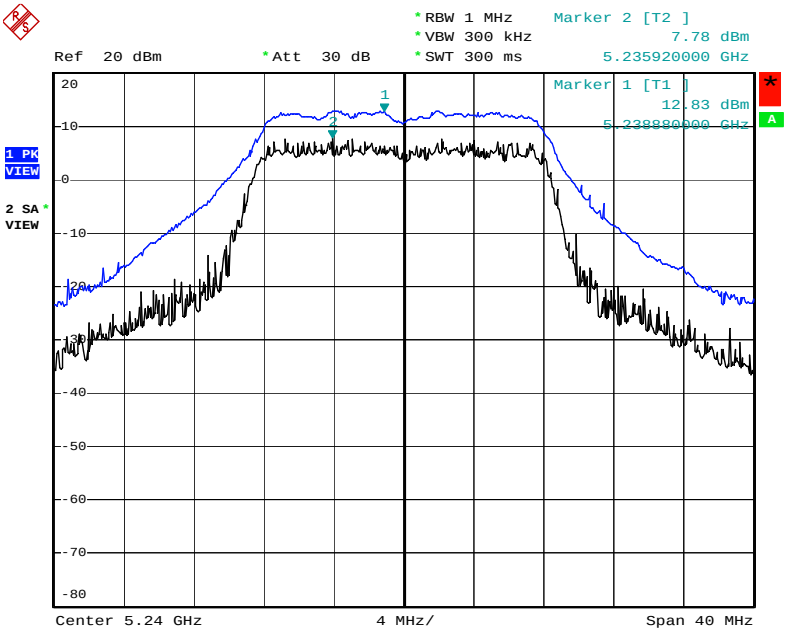
Date: 5.AUG.2009 14:38:42

Peak Excursion Plot on Configuration IEEE 802.11a / 5200 MHz



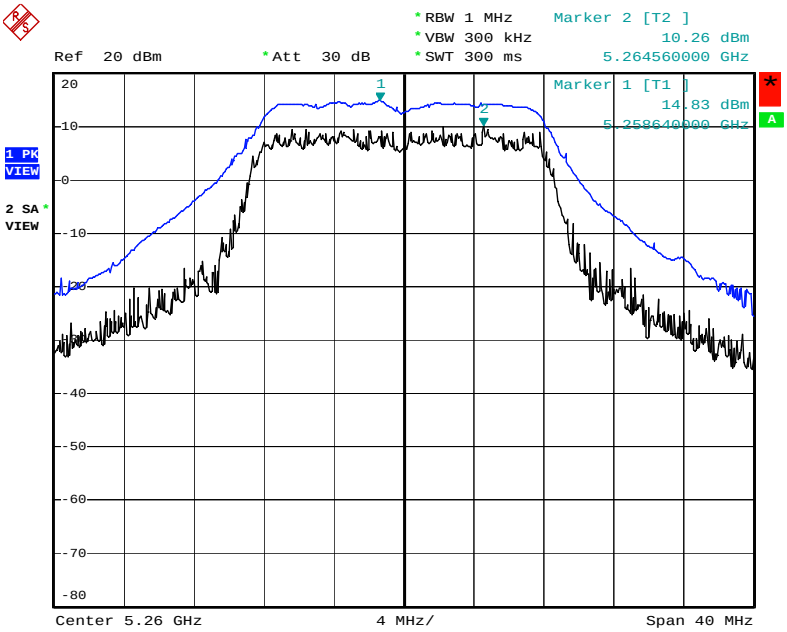
Date: 5.AUG.2009 14:39:48

Peak Excursion Plot on Configuration IEEE 802.11a / 5240 MHz



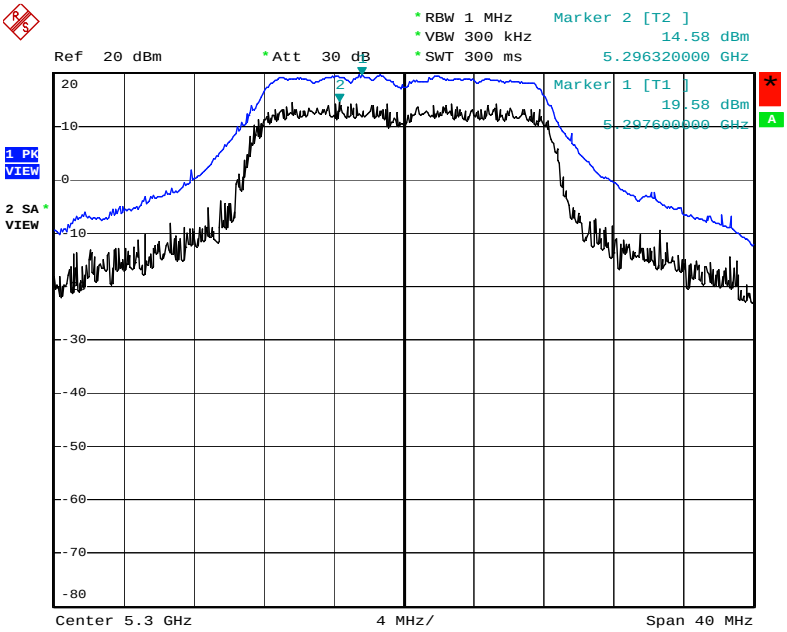
Date: 5.AUG.2009 14:41:32

Peak Excursion Plot on Configuration IEEE 802.11a / 5260 MHz



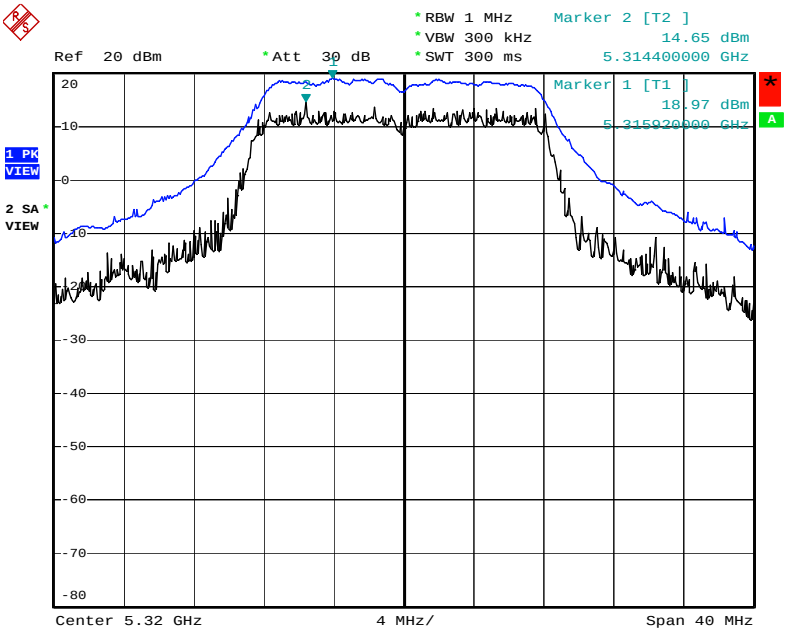
Date: 5.AUG.2009 14:42:23

Peak Excursion Plot on Configuration IEEE 802.11a / 5300 MHz



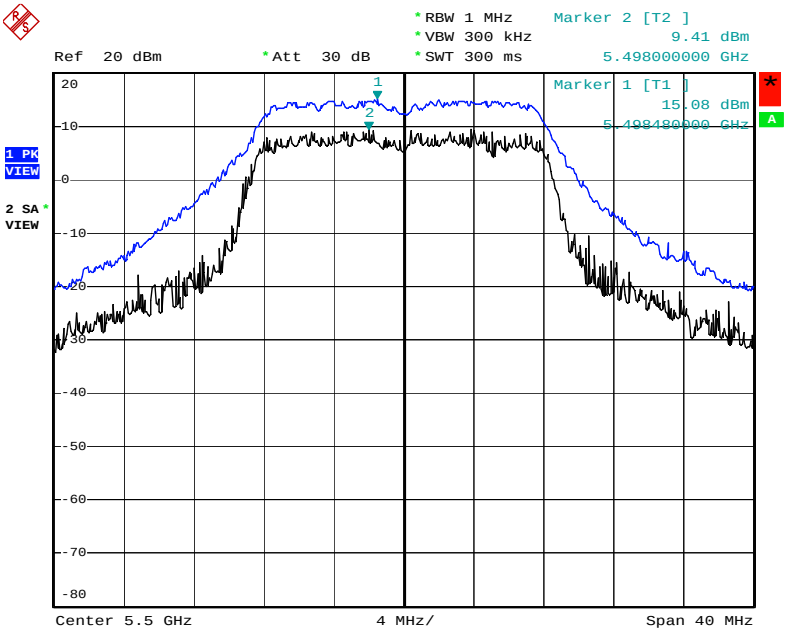
Date: 5.AUG.2009 14:44:02

Peak Excursion Plot on Configuration IEEE 802.11a / 5320 MHz



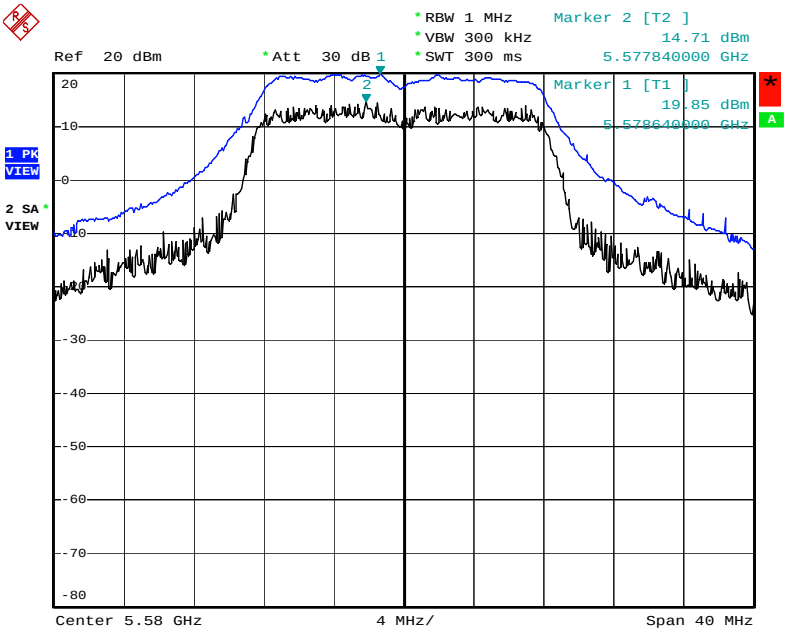
Date: 5.AUG.2009 14:44:55

Peak Excursion Plot on Configuration IEEE 802.11a / 5500 MHz



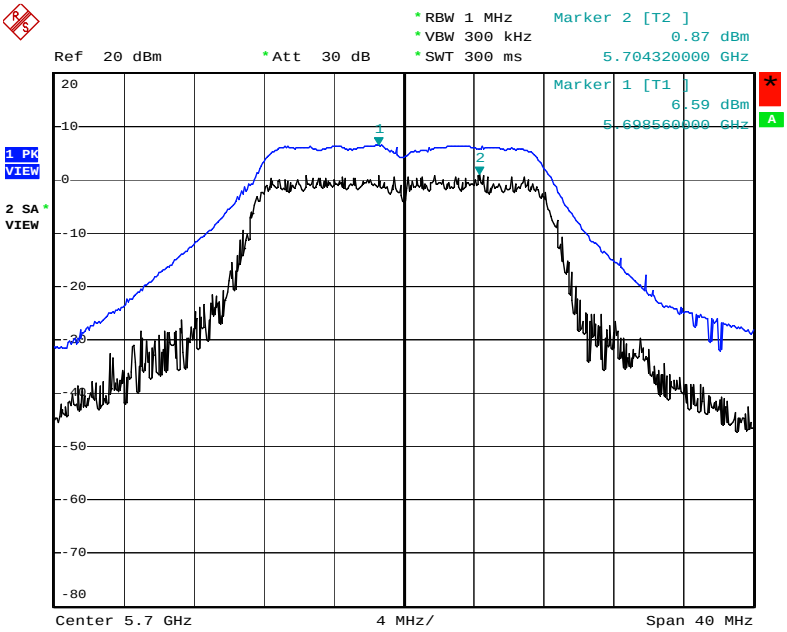
Date: 5.AUG.2009 14:46:10

Peak Excursion Plot on Configuration IEEE 802.11a / 5580 MHz



Date: 5.AUG.2009 14:47:10

Peak Excursion Plot on Configuration IEEE 802.11a / 5700 MHz



Date: 5.AUG.2009 14:48:18

4.6. Radiated Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1000KHz / 1000KHz for peak

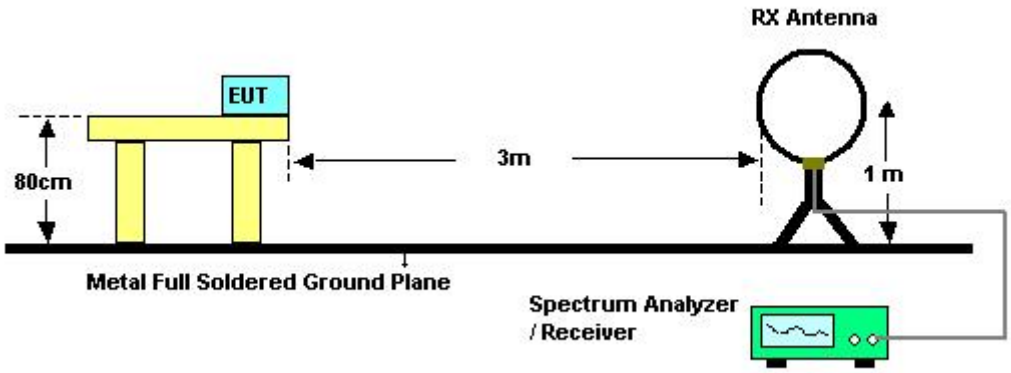
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.6.3. Test Procedures

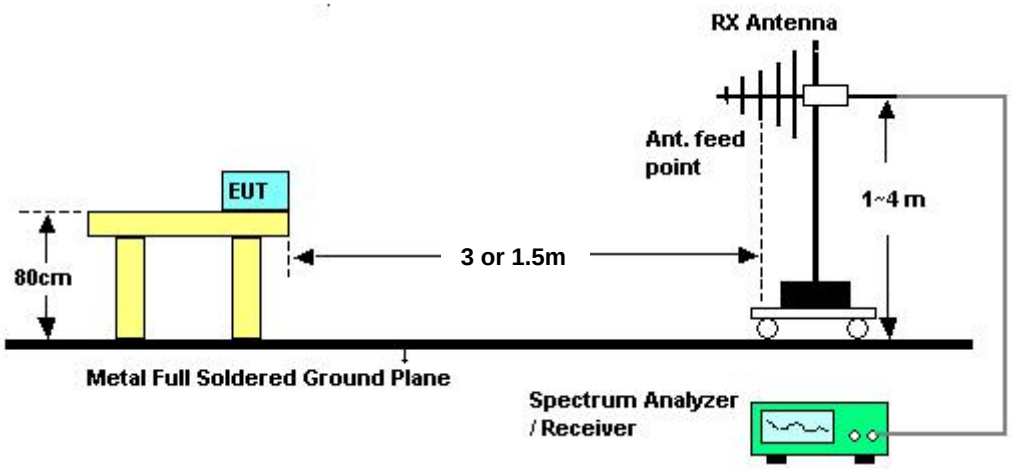
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.6.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

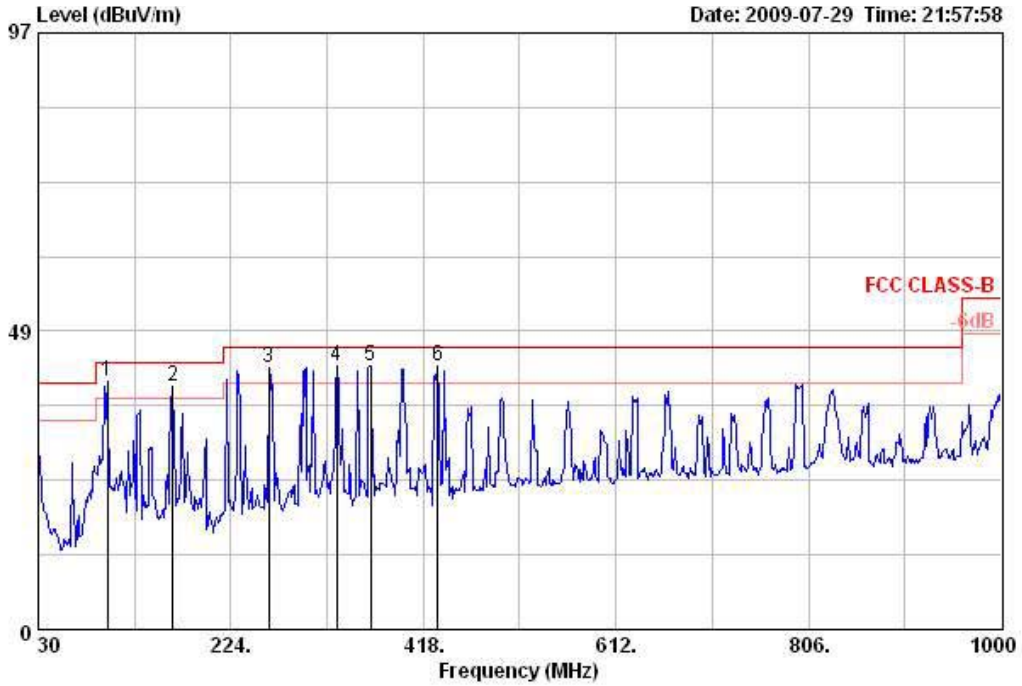
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.6.8. Results of Radiated Emissions (30MHz~1GHz)

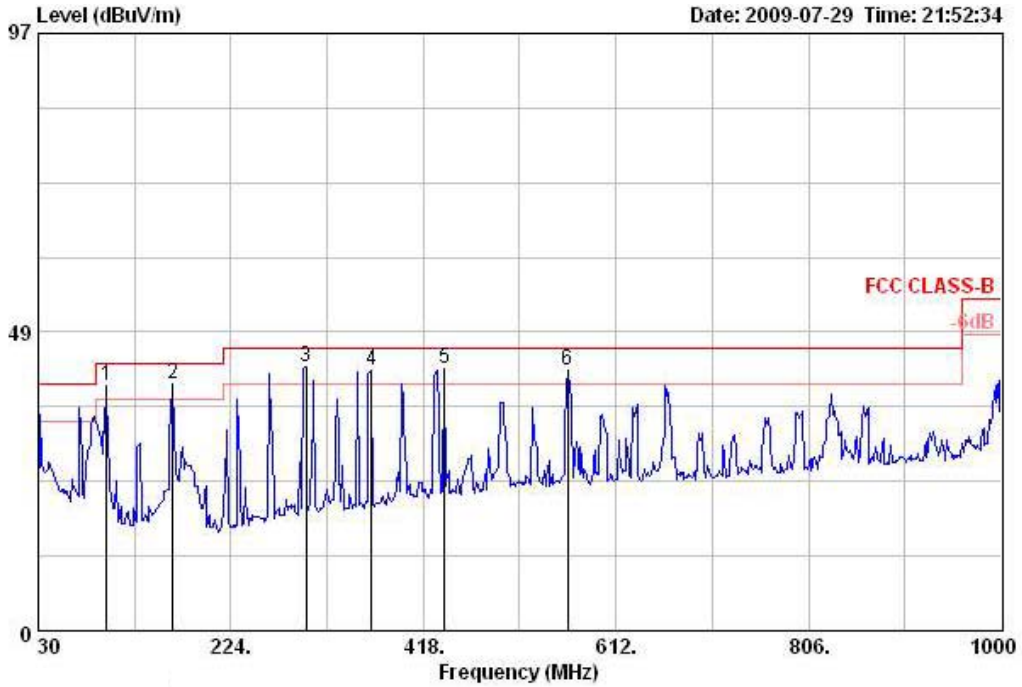
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Normal Link

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 !	99.840	40.35	-3.15	43.50	55.76	10.99	27.60	1.20	Peak	HORIZONTAL	0	100
2 !	165.800	39.57	-3.93	43.50	52.85	12.47	27.27	1.53	Peak	HORIZONTAL	0	100
3 !	261.830	42.45	-3.55	46.00	54.57	12.91	26.98	1.95	Peak	HORIZONTAL	0	100
4 !	330.700	42.92	-3.08	46.00	53.67	14.20	27.12	2.16	Peak	HORIZONTAL	0	100
5 !	364.650	42.89	-3.11	46.00	52.89	15.12	27.35	2.23	Peak	HORIZONTAL	0	100
6 @	432.550	42.96	-3.04	46.00	51.66	16.57	27.76	2.50	Peak	HORIZONTAL	113	100

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 !	98.870	39.80	-3.70	43.50	55.43	10.79	27.61	1.18	Peak	VERTICAL	0	400
2 !	165.800	40.04	-3.46	43.50	53.31	12.47	27.27	1.53	Peak	VERTICAL	0	400
3 !	299.660	42.91	-3.09	46.00	54.36	13.36	26.90	2.10	Peak	VERTICAL	163	100
4 !	365.620	42.26	-3.74	46.00	52.24	15.14	27.36	2.23	Peak	VERTICAL	0	400
5 !	439.340	42.55	-3.45	46.00	51.13	16.68	27.80	2.54	Peak	VERTICAL	0	400
6 !	563.500	42.41	-3.59	46.00	49.33	18.35	28.10	2.83	Peak	VERTICAL	0	400

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

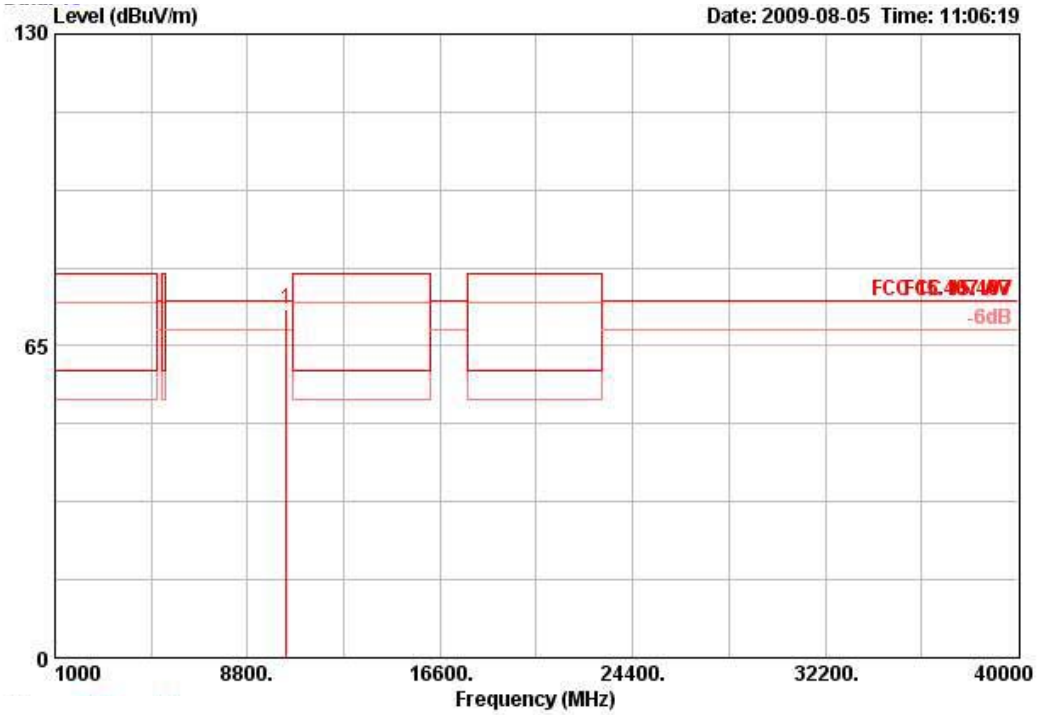
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.6.9. Results for Radiated Emissions (1GHz~40GHz)

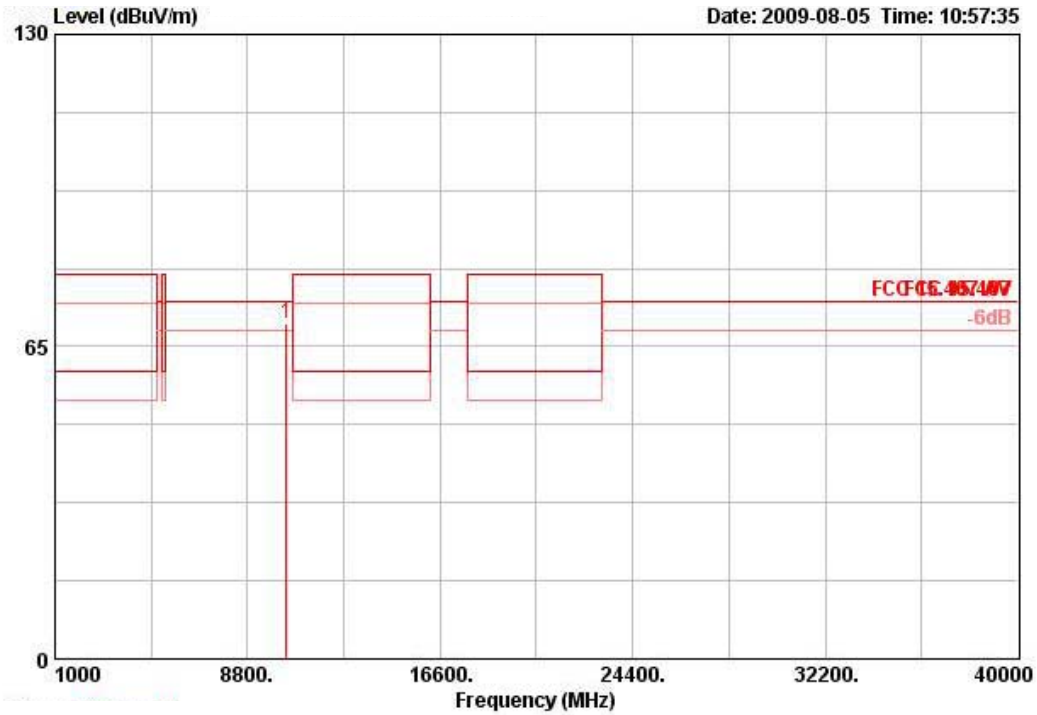
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 36

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10360.010	72.75	-1.55	74.30	64.94	38.52	4.65	35.36	PEAK	120	349	HORIZONTAL

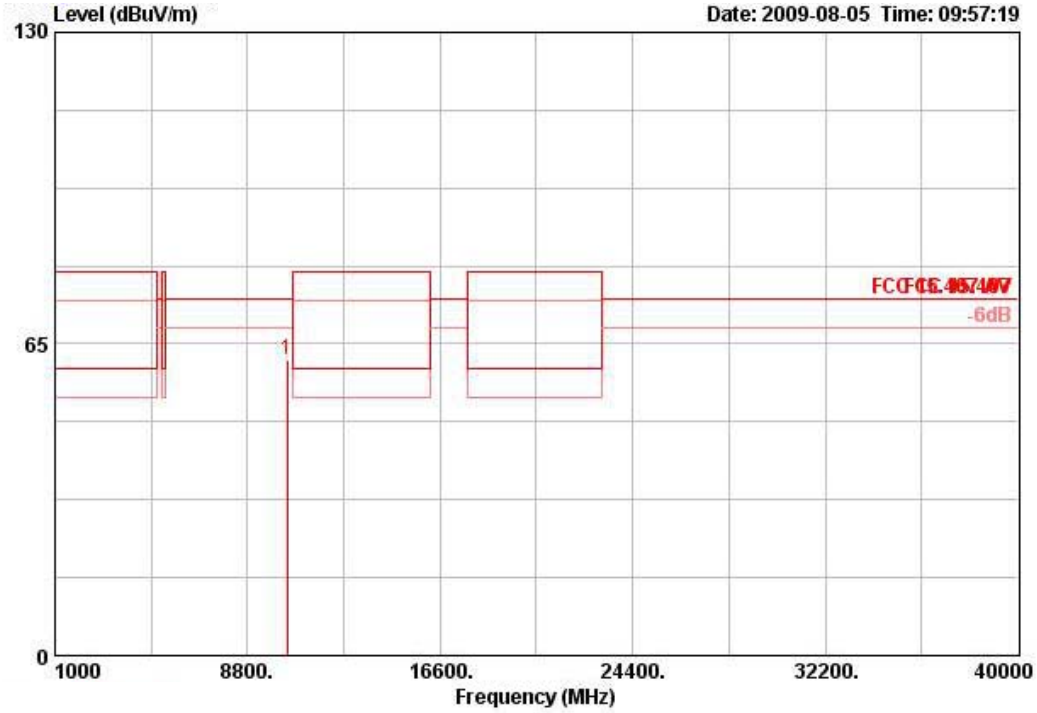
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10359.990	69.80	-4.50	74.30	61.99	38.52	4.65	35.36	PEAK	107	337	VERTICAL

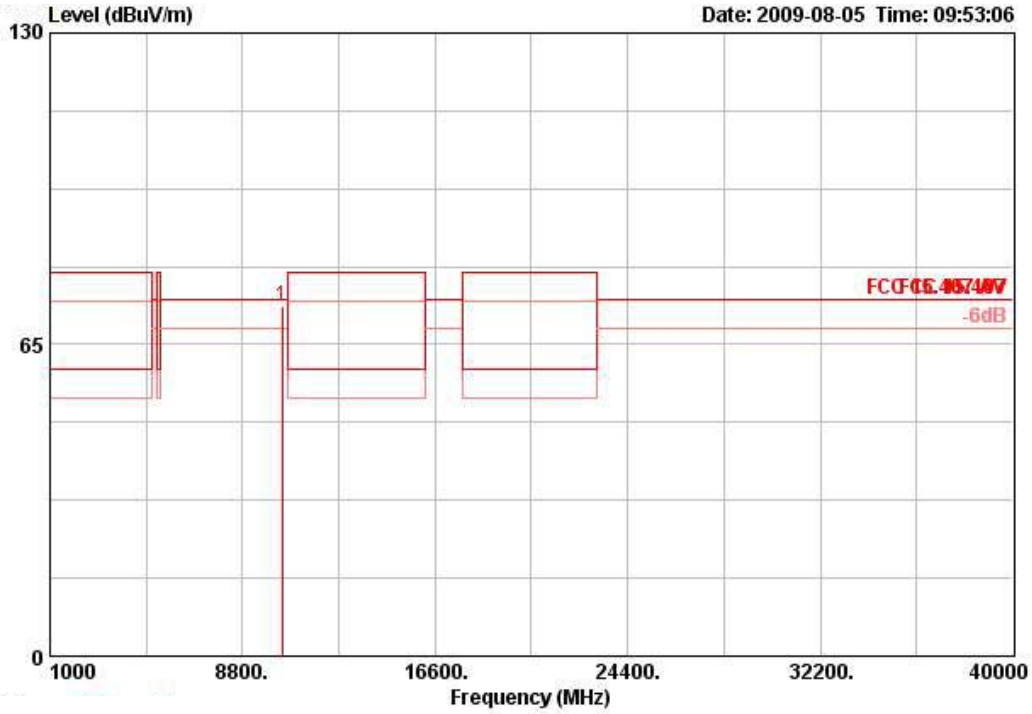
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 40

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10399.640	61.79	-12.51	74.30	53.86	38.54	4.70	35.30		124	329	HORIZONTAL

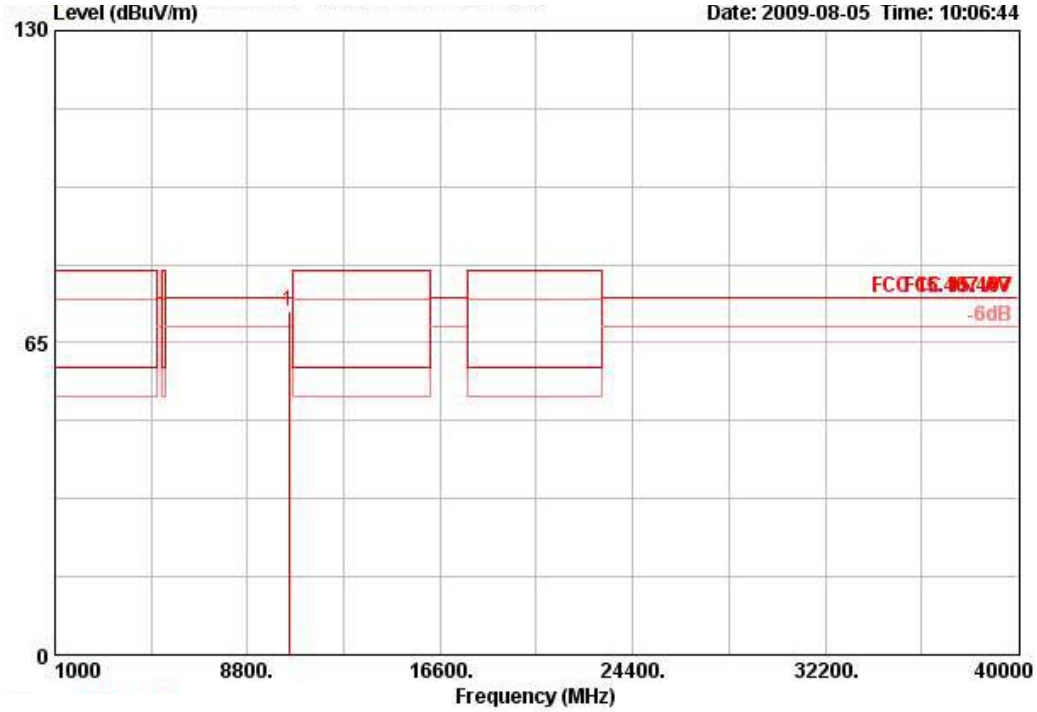
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10400.390	73.11	-1.19	74.30	65.18	38.54	4.70	35.30		114	338	VERTICAL

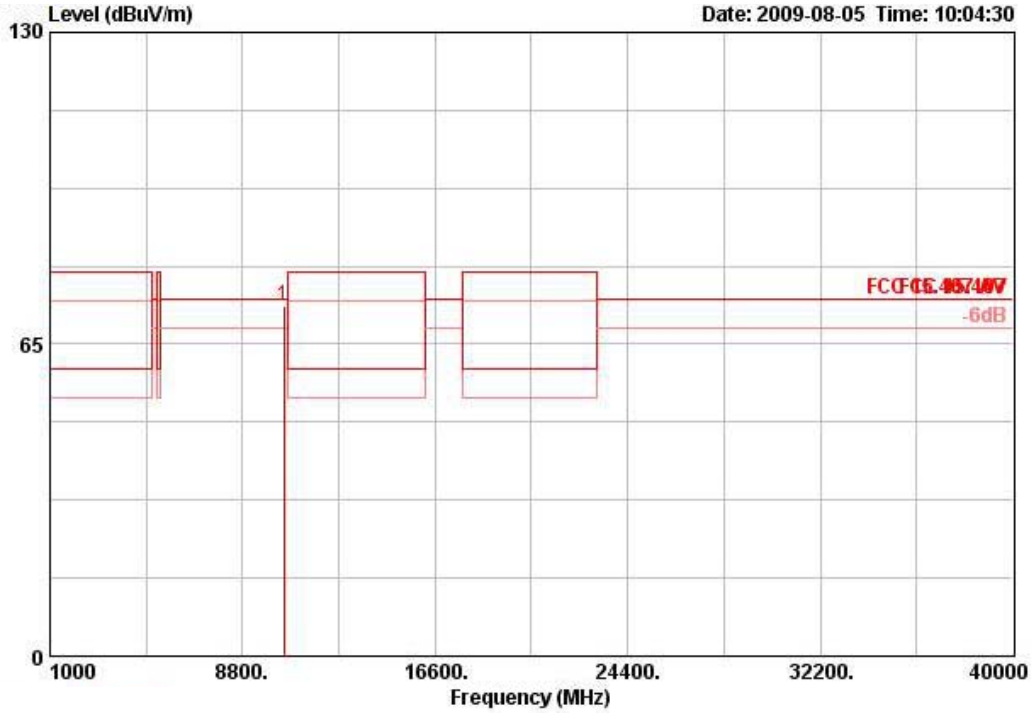
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 48

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10479.730	71.65	-2.65	74.30	63.51	38.59	4.76	35.21	PEAK	114	350	HORIZONTAL

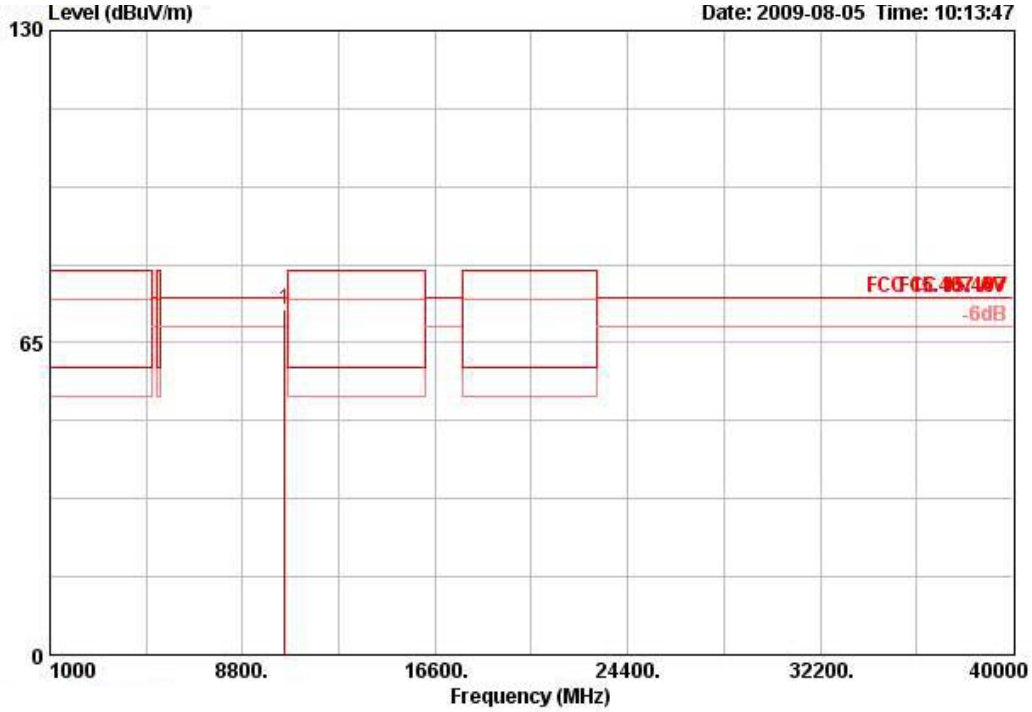
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10480.020	72.96	-1.34	74.30	64.82	38.59	4.76	35.21	PEAK	106	333	VERTICAL

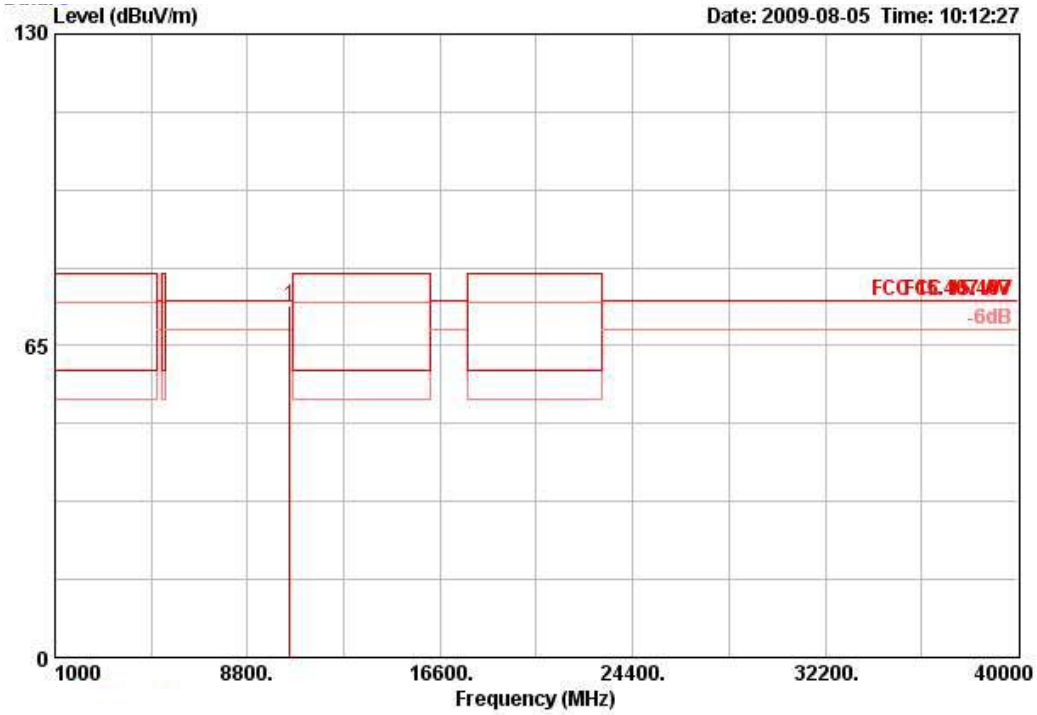
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 52

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10519.910	71.95	-2.35	74.30	63.75	38.59	4.78	35.18	PEAK	119	351	HORIZONTAL

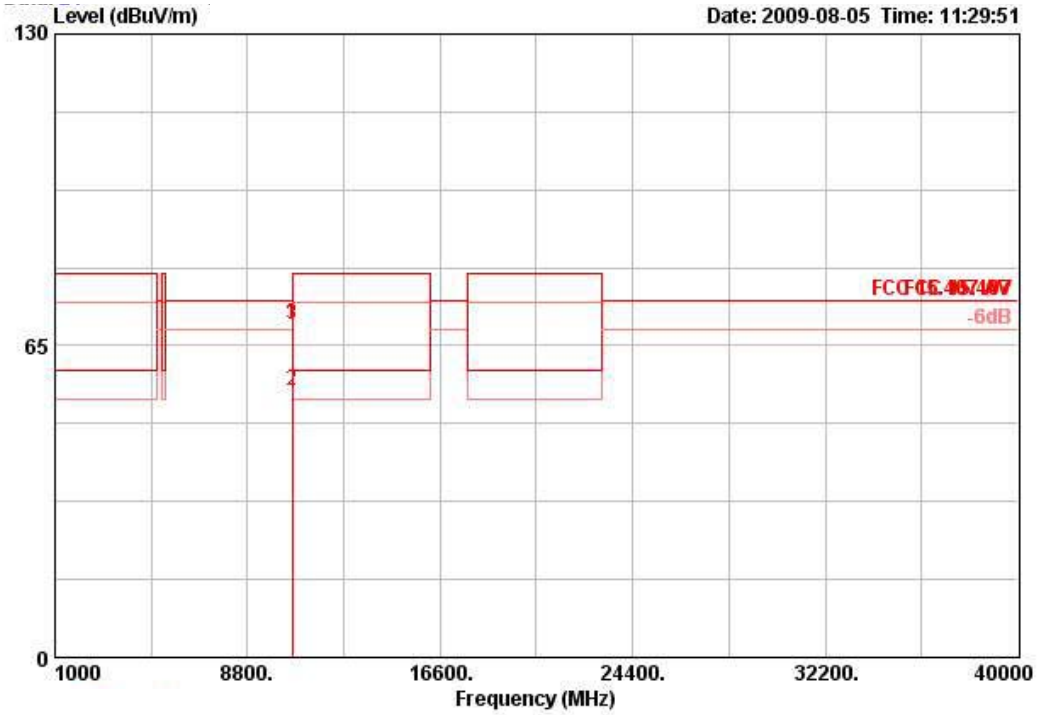
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10520.020	73.22	-1.08	74.30	65.02	38.59	4.78	35.18	PEAK	106	333	VERTICAL

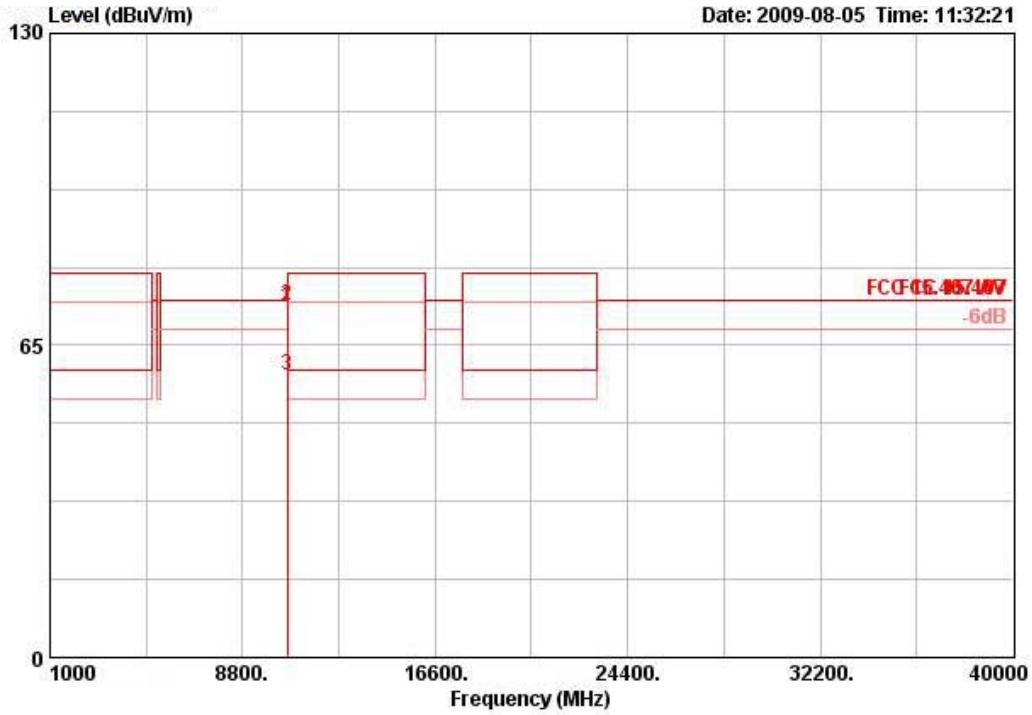
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 60

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10599.980	69.52	-4.78	74.30	61.34	38.56	4.73	35.10	PEAK	129	294	HORIZONTAL
2 @	10600.010	55.46	-4.54	60.00	47.27	38.56	4.73	35.10	AVERAGE	129	294	HORIZONTAL
3 @	10600.010	69.33	-10.67	80.00	61.14	38.56	4.73	35.10	PEAK	129	294	HORIZONTAL

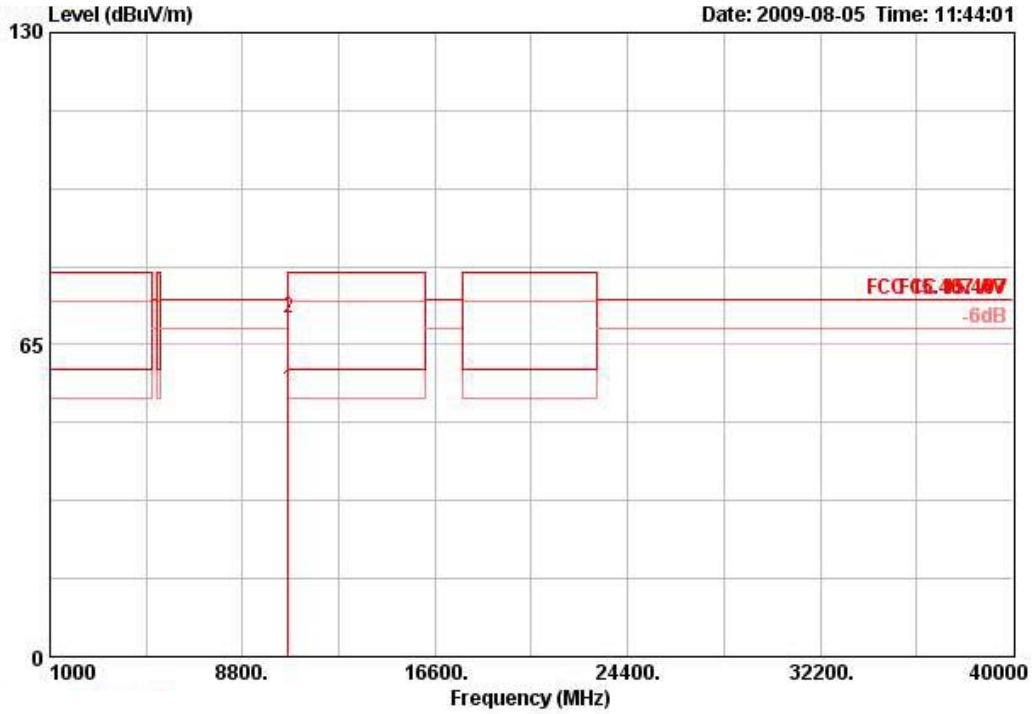
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10599.980	73.02	-1.28	74.30	64.84	38.56	4.73	35.10	PEAK	102	336	VERTICAL
2 @	10600.010	73.20	-6.80	80.00	65.01	38.56	4.73	35.10	PEAK	102	336	VERTICAL
3 @	10600.020	58.81	-1.19	60.00	50.62	38.56	4.73	35.10	AVERAGE	102	336	VERTICAL

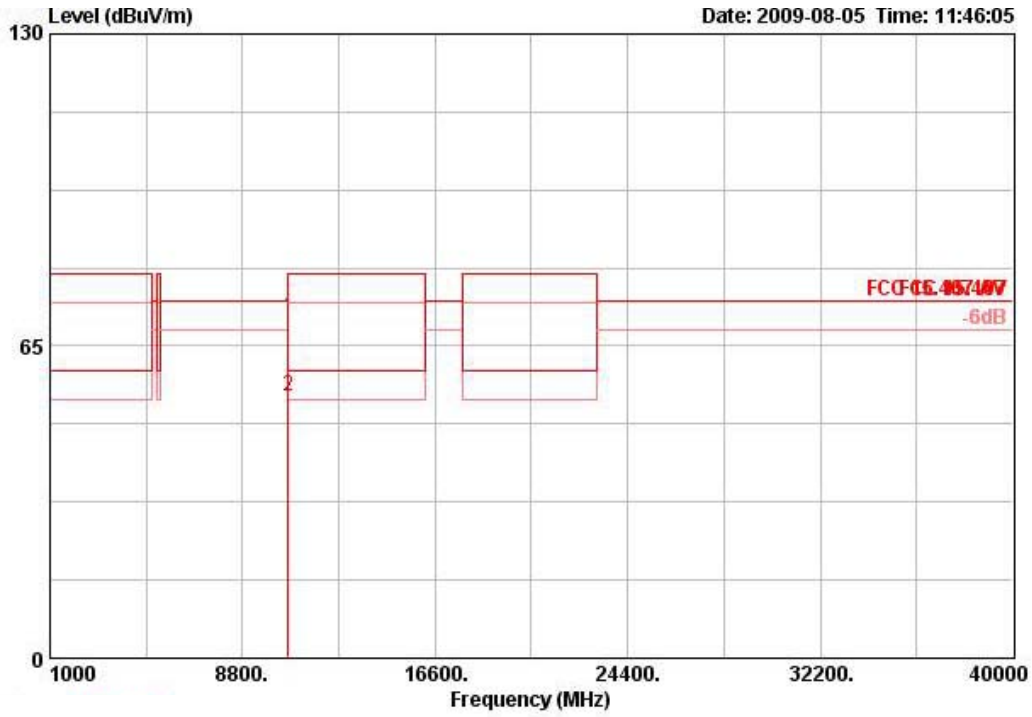
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 64

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 !	10639.970	55.45	-4.55	60.00	47.25	38.54	4.70	35.05	AVERAGE	127	349	HORIZONTAL
2	10640.000	70.33	-9.67	80.00	62.14	38.54	4.70	35.05	PEAK	127	349	HORIZONTAL

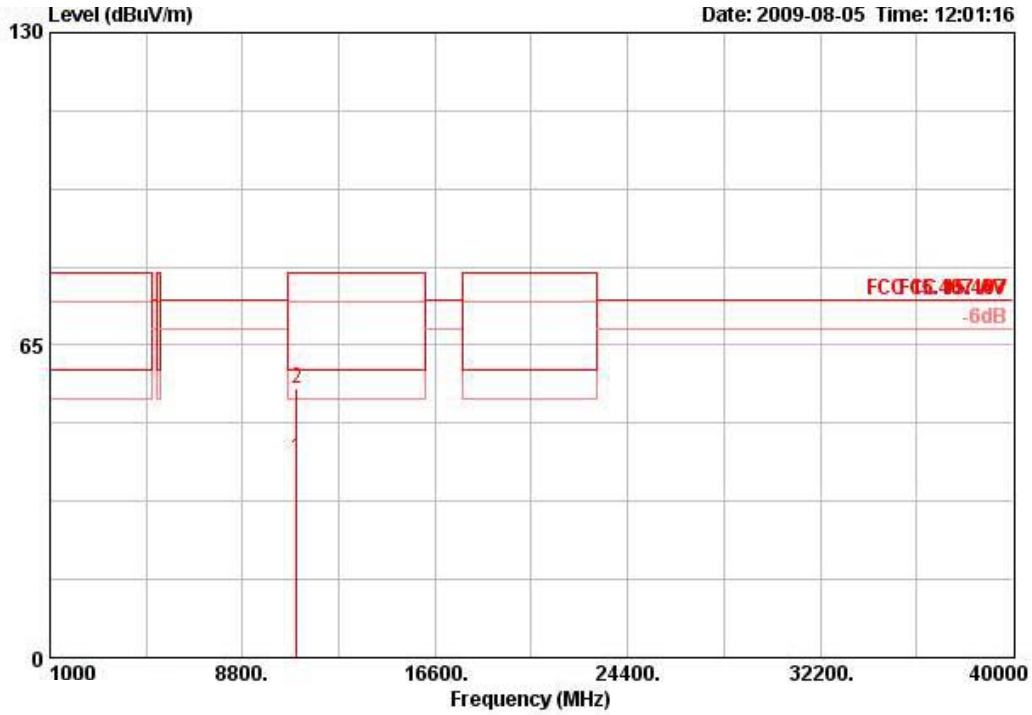
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	10640.020	70.91	-9.09	80.00	62.72	38.54	4.70	35.05	PEAK	100	97	VERTICAL
2 !	10640.030	54.72	-5.28	60.00	46.53	38.54	4.70	35.05	AVERAGE	100	97	VERTICAL

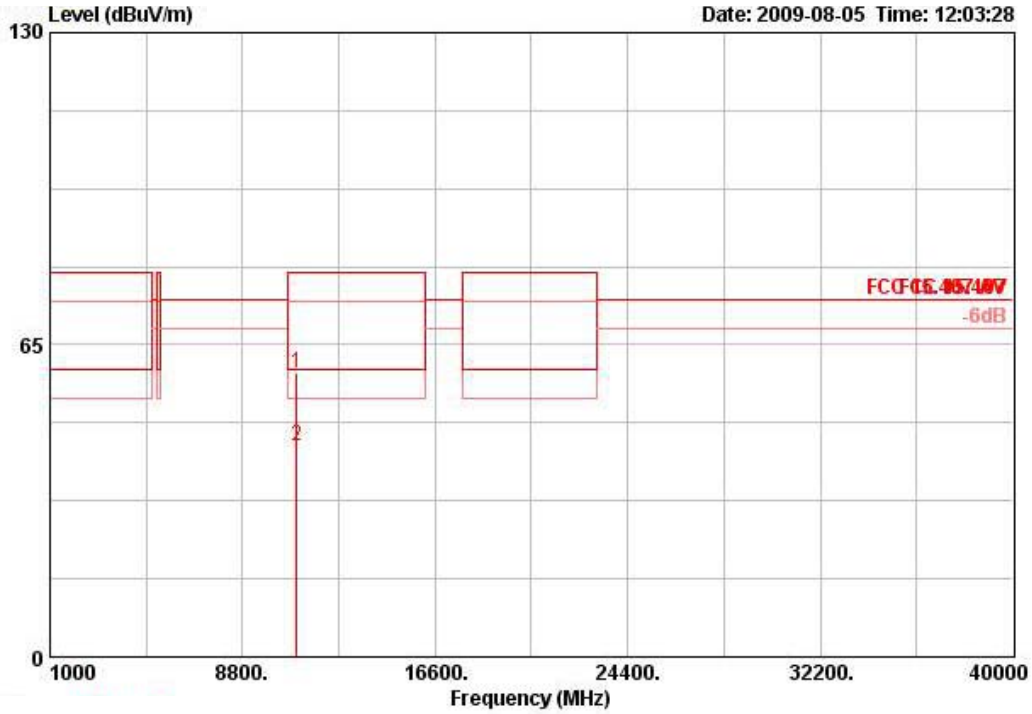
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 100

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	10999.970	41.56	-18.44	60.00	33.38	38.40	4.47	34.69	AVERAGE	100	54	HORIZONTAL
2	11000.000	56.05	-23.95	80.00	47.87	38.40	4.47	34.69	PEAK	100	54	HORIZONTAL

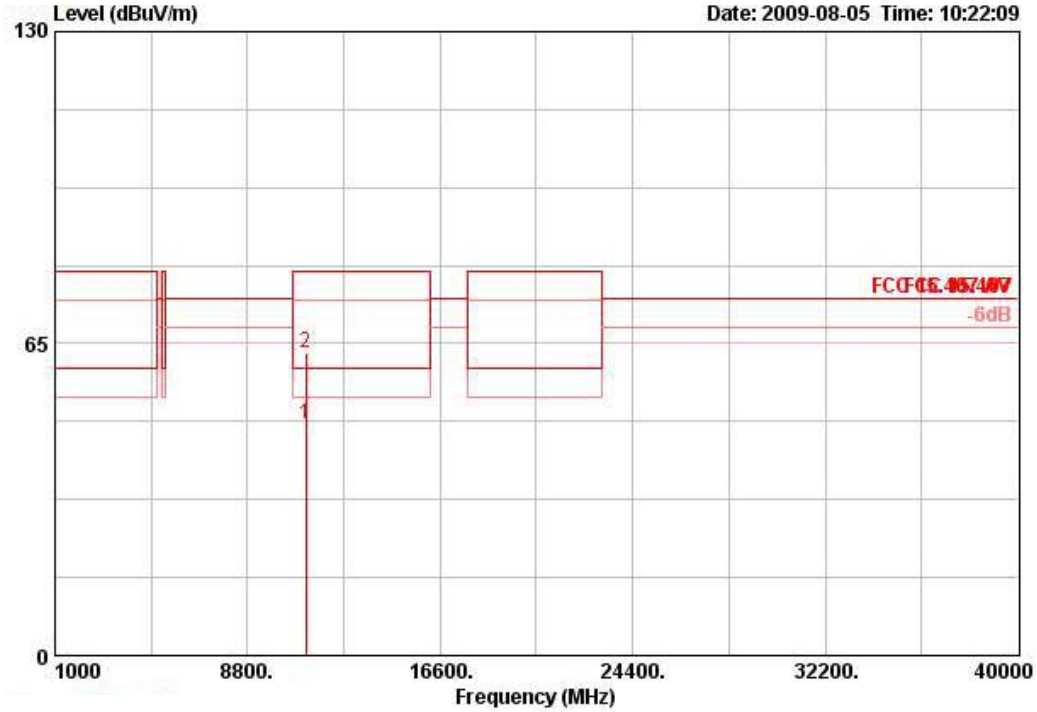
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	10999.980	59.10	-20.90	80.00	50.92	38.40	4.47	34.69	PEAK	103	51	VERTICAL
2 @	11000.030	43.95	-16.05	60.00	35.77	38.40	4.47	34.69	AVERAGE	103	51	VERTICAL

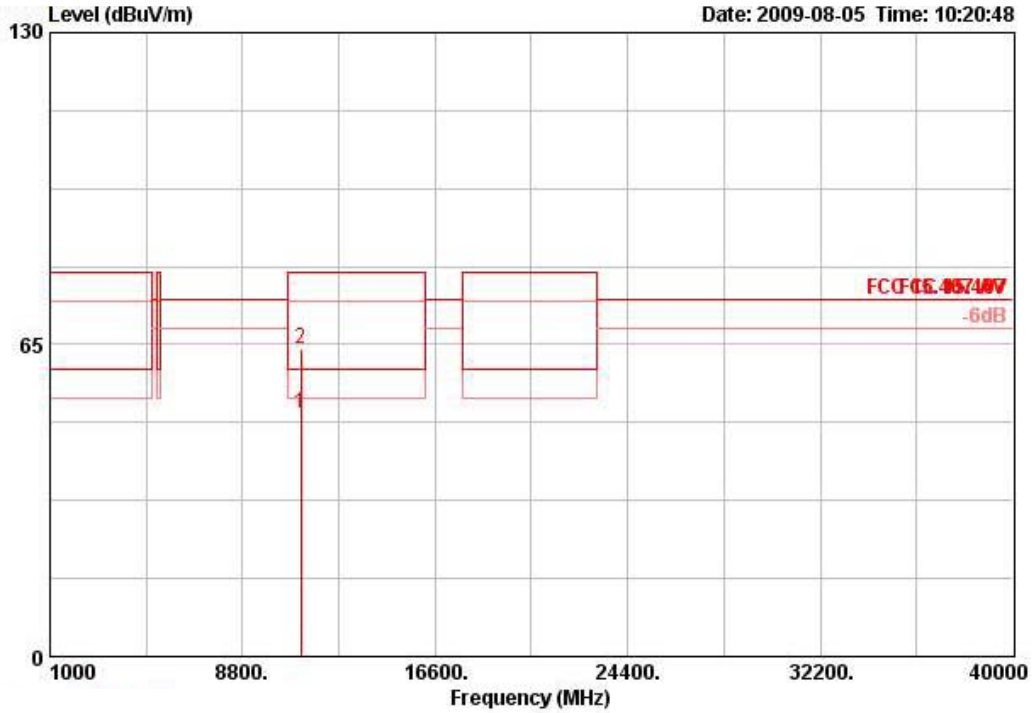
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 116

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	11159.970	48.23	-11.77	60.00	39.94	38.43	4.56	34.71	AVERAGE	108	327	HORIZONTAL
2	11159.980	63.15	-16.85	80.00	54.86	38.43	4.56	34.71	PEAK	108	327	HORIZONTAL

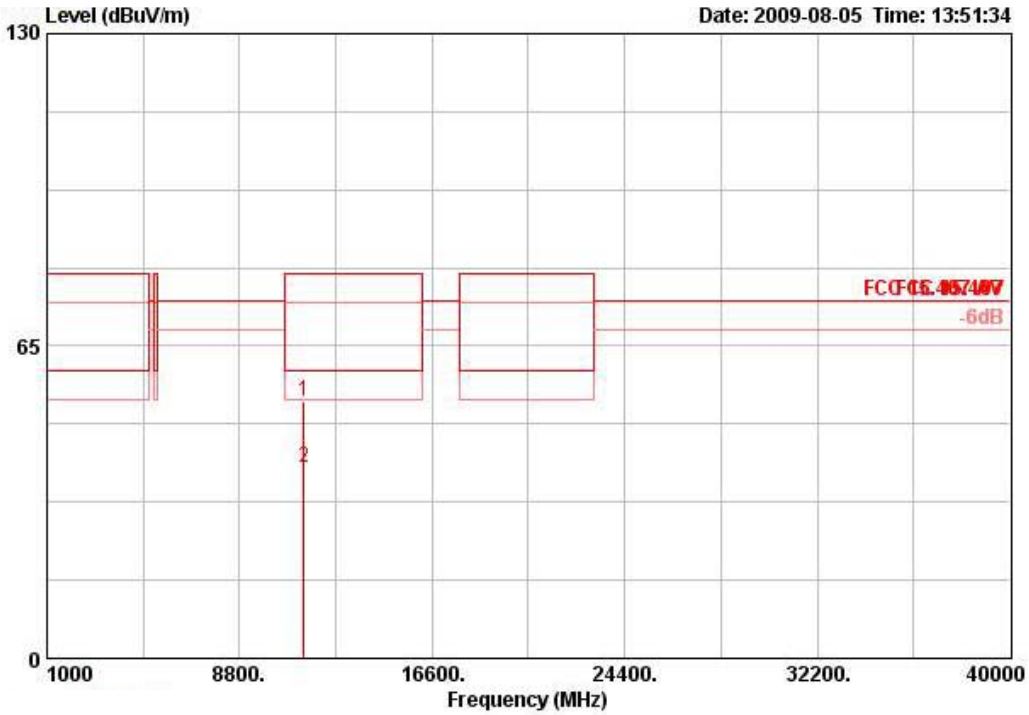
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	11159.970	50.57	-9.43	60.00	42.28	38.43	4.56	34.71	AVERAGE	108	358	VERTICAL
2	11160.020	64.21	-15.79	80.00	55.92	38.43	4.56	34.71	PEAK	108	358	VERTICAL

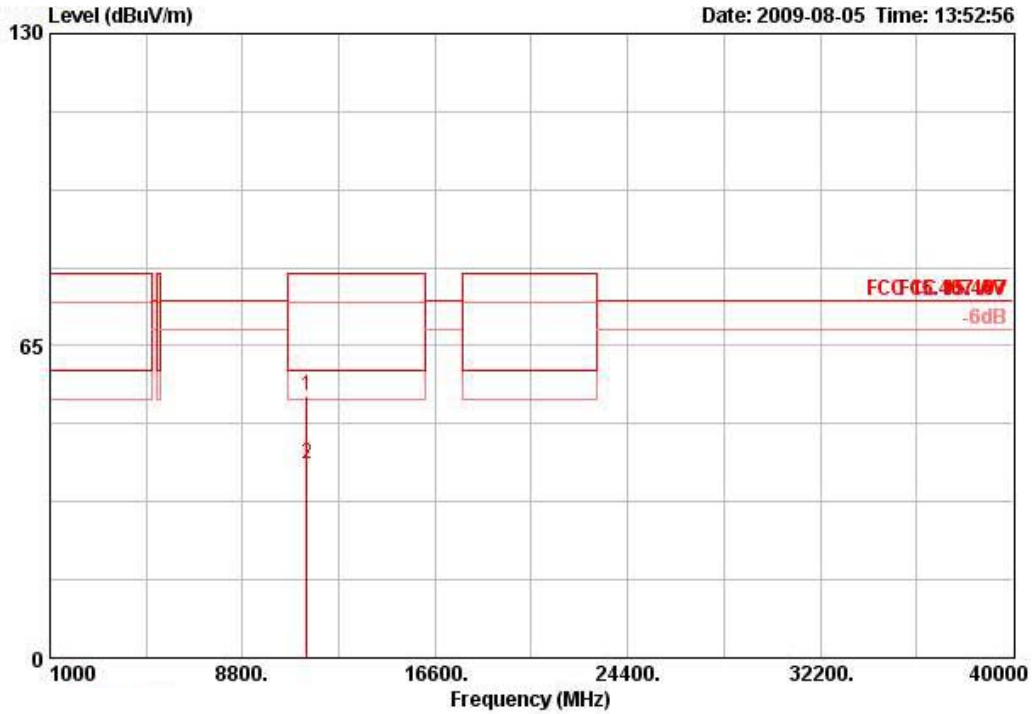
Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 140

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	11400.010	53.41	-26.59	80.00	44.95	38.48	4.72	34.74	PEAK	113	289	HORIZONTAL
2	11400.030	39.65	-20.35	60.00	31.19	38.48	4.72	34.74	AVERAGE	113	289	HORIZONTAL

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	11400.010	54.64	-25.36	80.00	46.18	38.48	4.72	34.74	PEAK	100	302	VERTICAL
2 @	11400.030	40.46	-19.54	60.00	32.00	38.48	4.72	34.74	AVERAGE	100	302	VERTICAL

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

4.7. Band Edge Emissions Measurement

4.7.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.7.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1 MHz /1 MHz for Peak

4.7.3. Test Procedures

1. The test procedure is the same as section 4.6.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

4.7.5. Test Deviation

There is no deviation with the original standard.

4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Channel 36, 40
Test Date	Aug. 05, 2009		

Channel 36

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	5149.800	74.33	-5.67	80.00	38.17	33.07	3.09	0.00	PEAK	100	184	VERTICAL
2 @	5150.000	55.35	-4.65	60.00	19.19	33.07	3.09	0.00	AVERAGE	100	184	VERTICAL
3 @	5178.600	114.73			78.51	33.13	3.10	0.00	PEAK	100	184	VERTICAL
4 @	5184.800	102.94			66.71	33.13	3.10	0.00	AVERAGE	100	184	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 !	5119.600	55.09	-4.91	60.00	19.00	33.01	3.08	0.00	AVERAGE	100	293	VERTICAL
2	5145.200	70.61	-9.39	80.00	34.45	33.07	3.09	0.00	PEAK	100	293	VERTICAL
3 @	5193.200	116.87			80.61	33.16	3.10	0.00	PEAK	100	293	VERTICAL
4 over	5204.000	104.77			68.50	33.16	3.11	0.00	AVERAGE	100	293	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Temperature	23℃	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Ch 60, 64 / Ant. A
Test Date	Aug. 05, 2009		

Channel 60

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	5294.400	118.58			82.11	33.34	3.13	0.00	PEAK	100	186	VERTICAL
2 @	5295.200	106.75			70.27	33.34	3.13	0.00	AVERAGE	100	186	VERTICAL
3 @	5350.000	54.56	-5.44	60.00	17.97	33.43	3.16	0.00	AVERAGE	100	186	VERTICAL
4 @	5351.600	70.26	-9.74	80.00	33.67	33.43	3.16	0.00	PEAK	100	186	VERTICAL

Item 1, 2 are the fundamental frequency at 5300 MHz.

Channel 64

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	5318.600	116.20			79.69	33.37	3.14	0.00	PEAK	100	186	VERTICAL
2 over	5322.800	104.65			68.13	33.37	3.15	0.00	AVERAGE	100	186	VERTICAL
3 !	5350.000	58.70	-1.30	60.00	22.11	33.43	3.16	0.00	AVERAGE	100	186	VERTICAL
4 !	5350.400	74.86	-5.14	80.00	38.27	33.43	3.16	0.00	PEAK	100	186	VERTICAL

Item 1, 2 are the fundamental frequency at 5320 MHz.

Temperature	23℃	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11a Channel 100, 140
Test Date	Aug. 05, 2009		

Channel 100

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	5459.600	70.65	-9.35	80.00	33.85	33.61	3.19	0.00	PEAK	100	184	VERTICAL
2 @	5460.000	54.70	-5.30	60.00	17.89	33.61	3.19	0.00	AVERAGE	100	184	VERTICAL
3 @	5469.200	73.24	-1.06	74.30	36.41	33.64	3.19	0.00	PEAK	100	184	VERTICAL
4 @	5498.600	101.84			64.94	33.70	3.20	0.00	AVERAGE	100	184	VERTICAL
5 @	5505.000	114.86			77.96	33.70	3.20	0.00	PEAK	100	184	VERTICAL

Item 4, 5 are the fundamental frequency at 5500 MHz.

Channel 140

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	5698.600	111.17			73.67	34.27	3.22	0.00	PEAK	100	65	VERTICAL
2 @	5703.600	101.25			63.71	34.32	3.22	0.00	AVERAGE	100	65	VERTICAL
3 @	5726.800	74.01	-0.29	74.30	36.41	34.37	3.23	0.00	PEAK	100	65	VERTICAL

Item 1, 2 are the fundamental frequency at 5700 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

4.8. Frequency Stability Measurement

4.8.1. Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or ±20ppm (IEEE 802.11a specification).

4.8.2. Measuring Instruments and Setting

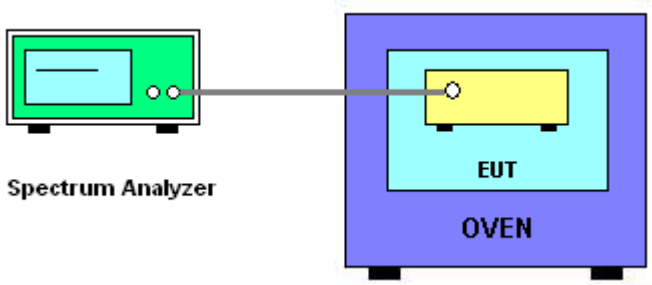
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RB	10 kHz
VB	10 kHz
Sweep Time	Auto

4.8.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±20ppm (IEEE 802.11a specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is -30°C~50°C.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

4.8.7. Test Result of Frequency Stability

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	**5300**
126.50	5300.011100
110.00	5300.021400
93.50	5300.025500
Max. Deviation (MHz)	**0.025500**
Max. Deviation (ppm)	**4.81**

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	**5300**
-30	5300.0360
-20	5300.0330
-10	5300.0306
0	5300.0630
10	5300.0510
20	5300.0576
30	5300.0090
40	5300.0066
50	5300.0186
Max. Deviation (MHz)	**0.063000**
Max. Deviation (ppm)	**11.8868**

4.9. Antenna Requirements

4.9.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.9.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Apr. 15, 2009	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 23, 2009	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2009	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2009	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN T400	21653	9kHz –30MHz	Jun. 11, 2009	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 07, 2009	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 23, 2009	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jul. 21, 2009	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Apr. 06, 2009*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP30	100305	9 kHz - 40 GHz	Feb. 03, 2009	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 28, 2008*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 18, 2009	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 28, 2009	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan.16, 2009	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Oct. 28, 2008	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 31, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100666	DC ~ 30GHz	Aug. 05, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100666	DC ~ 30GHz	Aug. 05, 2009	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 31, 2009	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jul. 12, 2009*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2009	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Aug. 06, 2008	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Aug. 06, 2009	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2008	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2008	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Feb. 13, 2009	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 25, 2009	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Note: Calibration Interval of instruments listed above is two year.

6. TEST LOCATION

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
	TEL	:	886-3-656-9065
	FAX	:	886-3-656-9085

7. TAF CERTIFICATE OF ACCREDITATION

Certificate No. : L1190-070110

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2005
Accreditation Number	:	1190
Originally Accredited	:	December 15, 2003
Effective Period	:	January 10, 2007 to January 09, 2010
Accredited Scope	:	Testing Field, see described in the Appendix
Specific Accreditation Program	:	Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : January 10, 2007

P1, total 9 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when used without the Appendix.