SPORTON International Inc.
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FCC RADIO TEST REPORT

Applicant's company	**Realtek Semiconductor Corp.**
Applicant Address	No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan
FCC ID	**TX2-RTL8191SE**
Manufacturer's company	**Realtek Semiconductor Corp.**
Manufacturer Address	No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan

Product Name	802.11b/g/n RTL8191SE miniCard
Brand Name	Realtek
Model Name	RTL8191SE
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Dec. 25, 2008
Final Test Date	Jan. 15, 2009
Submission Type	Original Equipment

Statement

Test result included in this report is for the Draft n and 802.11b/g part 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 C**.

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

TAF
Testing Laboratory
1190

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History of This Test Report

Original Issue Date: Jan. 16, 2009

Report No.: FR8D2518

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

Certificate No.: CB9801059

1. CERTIFICATE OF COMPLIANCE

Product Name	:	802.11b/g/n RTL8191SE miniCard
Brand Name	:	Realtek
Model Name	:	RTL8191SE
Applicant	:	Realtek Semiconductor Corp.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 25, 2008 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.

Wayne Hsu 2009/1/22

Wayne Hsu
SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	10.12 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	11.76 dB
4.3	15.247(e)	Power Spectral Density	Complies	19.62 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	1.11 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.37 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	$\pm 8.5\times10^{-8}$	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°C	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

Draft n

Items	Description
Product Type	WLAN (1TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	see the below table for draft n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for Draft n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth ; 7 for 40MHz bandwidth
Channel Band Width (99%)	MCS0 (20MHz): 17.62 MHz ; MCS0 (40MHz): 37.70 MHz
Conducted Output Power	MCS0 (20MHz): 16.58 dBm ; MCS0 (40MHz): 16.58 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

802.11b/g

Items	Description
Product Type	802.11b :WLAN (1TX, 2RX) 802.11g :WLAN (1TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11
Channel Band Width (99%)	11b: 14.80 MHz ; 11g: 16.44 MHz
Conducted Output Power	11b: 18.24 dBm ; 11g: 16.61 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)	
Band width Mode	20 MHz	40 MHz
802.11b	V	X
802.11g	V	X
Draft n	V	V

Draft n spec

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Datarate(Mbps)			
									800nsGI		400nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	guard interval

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
A.(Main)	WNC	DQ661500301	PIFA Antenna	I-PEX	3.95
B. (Aux)	WNC	DQ661500301	PIFA Antenna	I-PEX	3.90

Note:

(1) There are four types of EUT.

EUT 1 : Full Size Module with one Antenna Connector

EUT 2 : Full Size Module with two Antenna Connectors

EUT 3 : Half Size Module with one Antenna Connector

EUT 4 : Half Size Module with two Antenna Connectors

Connector 1 : Ant. A

Connector 2 : Ant. B

The EUT 2 / EUT 4 have two antenna connectors, the Connector 1 have TX function , Connector 2 have only RX function.

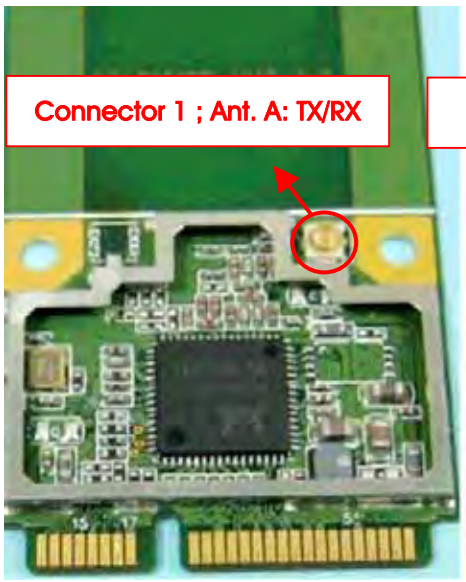
The EUT 1 / EUT 3 have one antenna connector, the Connector 1 have both TX/RX function.

(2) Only one of all antennas is used as transmitting antenna.

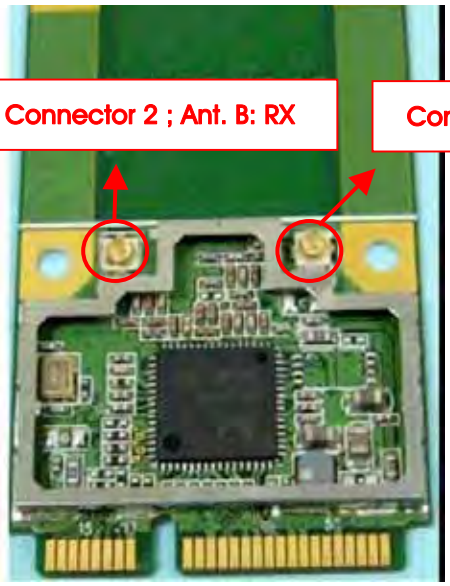
Due to Ant. A is the highest gain value among PIFA antennas, only Ant. A was tested and recorded in this report.

Please refer to Appendix. D for all antennas.

1. EUT 1 / EUT 3 with one Connector :



2. EUT 2 / EUT 4 with two Connectors :



3.4. Table for Carrier Frequencies

There are two bandwidth systems for draft n.

For both 20MHz bandwidth systems, use Channel 1~Channel 11.

For both 40MHz bandwidth systems, use Channel 3~Channel 9.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 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 Line Conducted Emissions	Normal Link	-	-	-
Maximum Peak Conducted Output Power	MCS0/20MHz	6.5 Mbps	1/6/11	A
	MCS0/40MHz	13.5 Mbps	3/6/9	A
	11b/BPSK	1 Mbps	1/6/11	A
	11g/BPSK	6 Mbps	1/6/11	A
Power Spectral Density 6dB Spectrum Bandwidth	MCS0/20MHz	6.5 Mbps	1/6/11	A
	MCS0/40MHz	13.5 Mbps	3/6/9	A
	11b/BPSK	1 Mbps	1/6/11	A
	11g/BPSK	6 Mbps	1/6/11	A
Radiated Emissions 9kHz~1GHz	Normal Link	-	-	-
Radiated Emissions 1GHz~10th Harmonic	MCS0/20MHz	6.5 Mbps	1/6/11	A
	MCS0/40MHz	13.5 Mbps	3/6/9	A
	11b/BPSK	1 Mbps	1/6/11	A
	11g/BPSK	6 Mbps	1/6/11	A
Band Edge Emissions	MCS0/20MHz	6.5 Mbps	1/11	A
	MCS0/40MHz	13.5 Mbps	3/9	A
	11b/BPSK	1 Mbps	1/11	A
	11g/BPSK	6 Mbps	1/11	A

Note:

There are four types of EUT , and have two different size.

The EUT 1 and EUT 3 have one antenna connectors, the EUT 2 and EUT 4 have two antenna connectors , but their internal circuit board are exactly identical.

All the test modes were listed as below.

Test Mode 1 (EUT 1) : Full Size Module with one Antenna Connector (with PCB board)

Test Mode 2 (EUT 2) : Full Size Module with two Antenna Connector (with PCB board)

Test Mode 3 (EUT 3) : Half Size Module with one Antenna Connector (without PCB board)

Test Mode 4 (EUT 4) : Half Size Module with two Antenna Connector (without PCB board)

<For Conducted Emissions Test>:

After pretest, it was selected Mode 3 and Mode 4 for for Conducted emission test.

<For Radiated Emissions Test> :

For Radiated Emissions Below 1GHz :

Radiated emissions below 1GHz, Mode 3 and Mode 4 were tested and recorded in this report.

For Radiated Emissions Above 1GHz :

After pretest, it was selected Mode 3 for Radiated emissions above 1GHz test as worse case and recorded the test data in the report.

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	101377	IC 4088	-
CO04-HY	Conduction	Hwa Ya	101377	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	M1330	E2KWM3945ABG
Notebook	DELL	PP25L	E2K4965AGNM
Modem	ACEEX	DM1414	IFAXDM1414
Mouse	HP	M-UAE96	DoC
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 Draft n MCS0 20MHz

Test Software Version	REALTEK		
Frequency	2412 MHz	2437 MHz	2462 MHz
Draft n MCS0 20MHz Ant. A	46	46	43

Power Parameters of Draft n MCS0 40MHz

Test Software Version	REALTEK		
Frequency	2422 MHz	2437 MHz	2452 MHz
Draft n MCS0 40MHz Ant. A	48	48	44

Power Parameters of IEEE 802.11b/g

Test Software Version	REALTEK		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b Ant. A	43	42	42
IEEE 802.11g Ant. A	46	46	45

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

a. Turn on the power of all equipment.

b. The NB sends " H" messages to the panel, and the panel displays " H " patterns on the screen.

c. The NB sends " H " messages to the modem.

d. Repeat the steps from b to c.

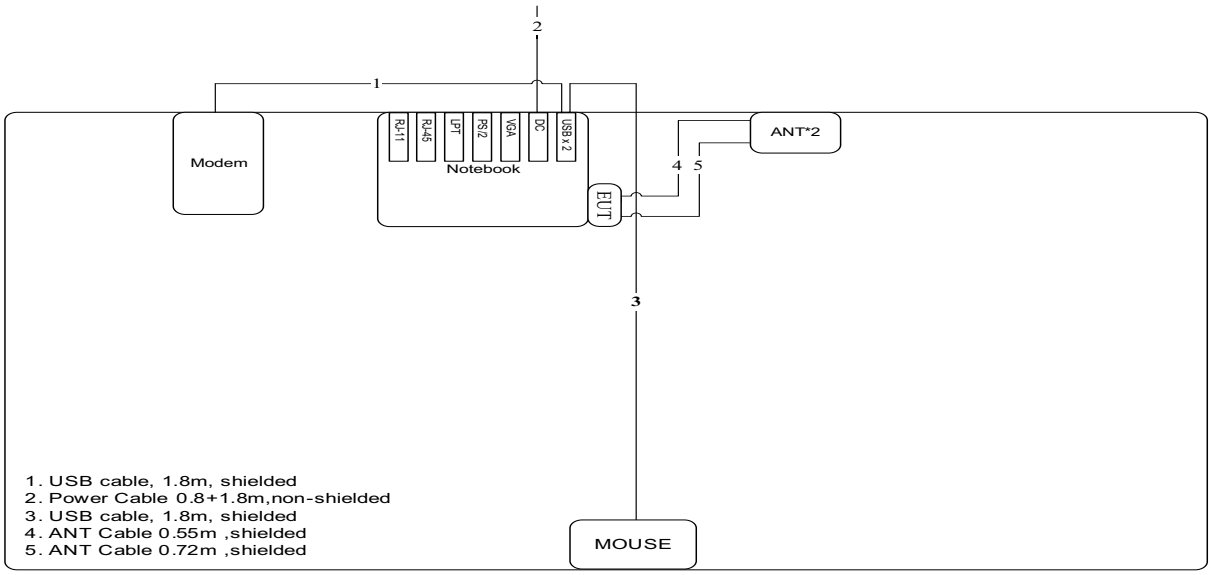
At the same time, "REALTEK" was executed the test program to control the EUT continuously transmit RF signal.

3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration

Test Configuration: 9KHz~1GHz

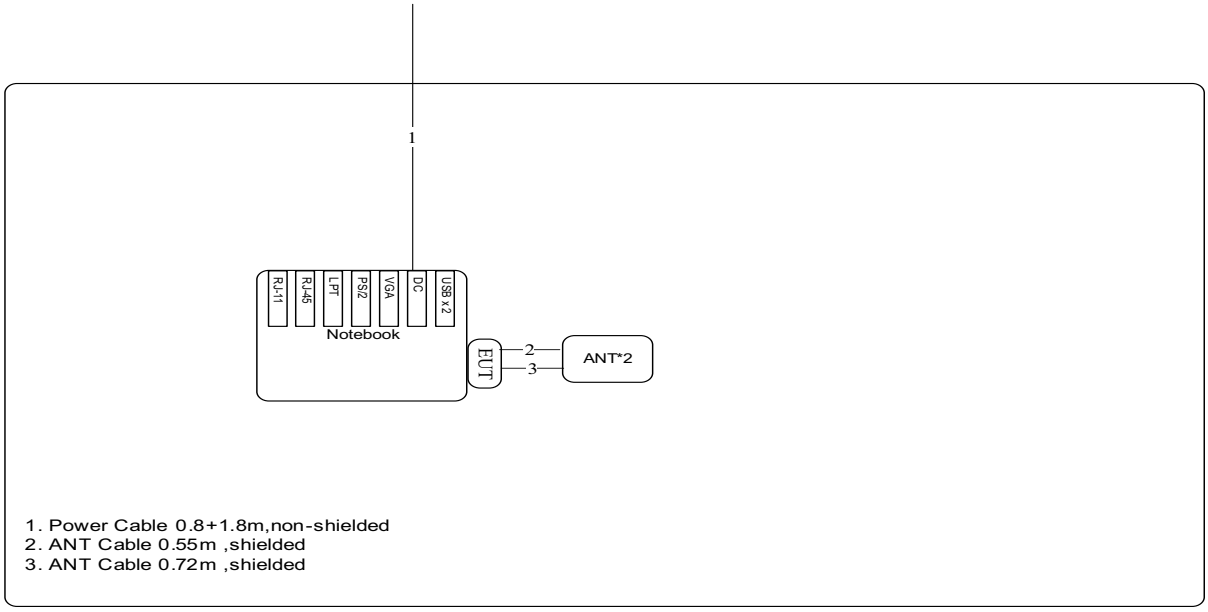
Test Mode: Mode 3 / Mode 4



AP

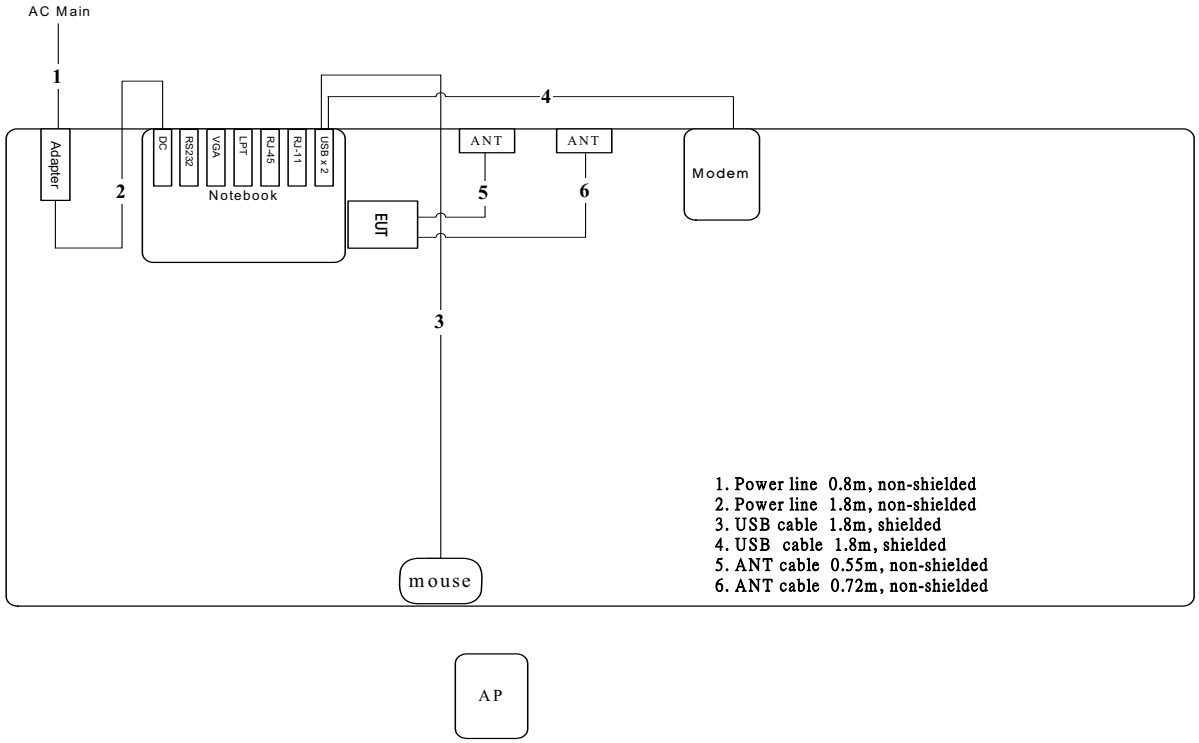
Test Configuration: above 1GHz

Test Mode: Mode 3



3.9.2. AC Power Line Conduction Emissions Test Configuration

Test Mode: Mode 3 / Mode 4



4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected 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

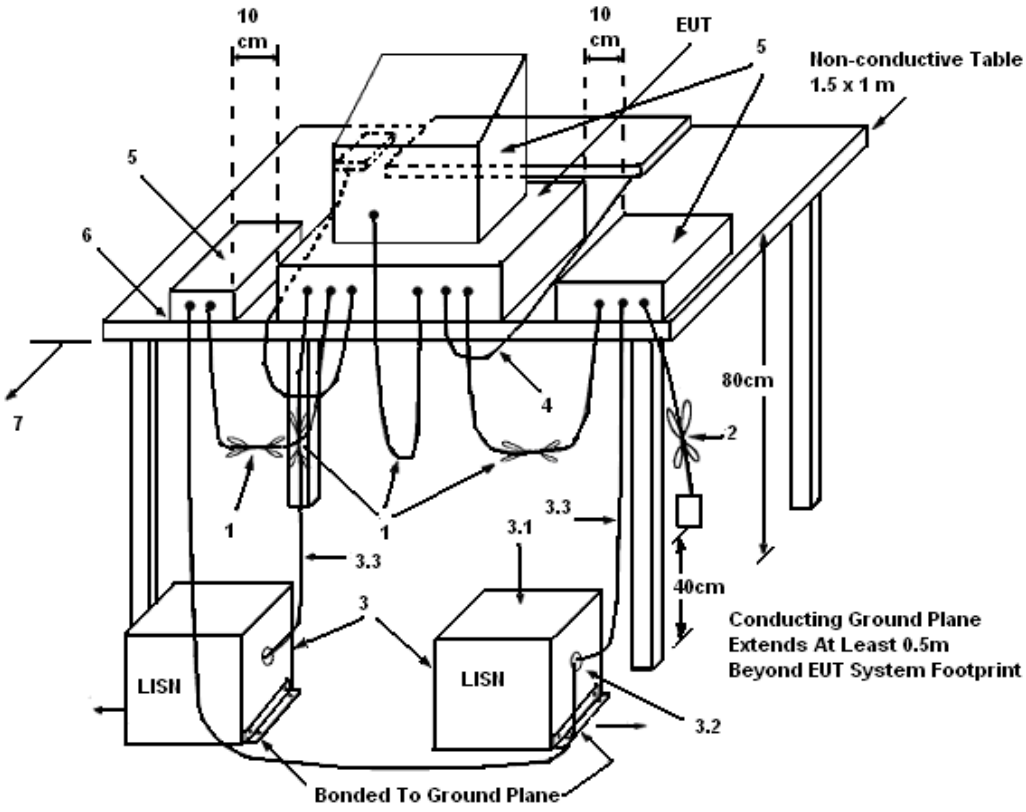
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

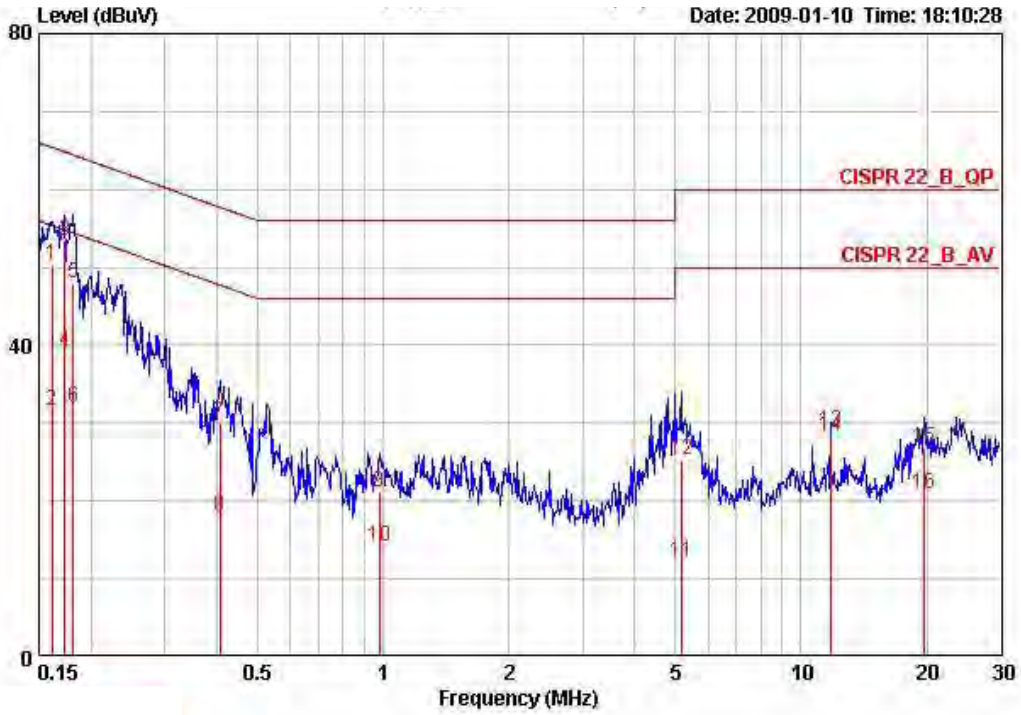
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

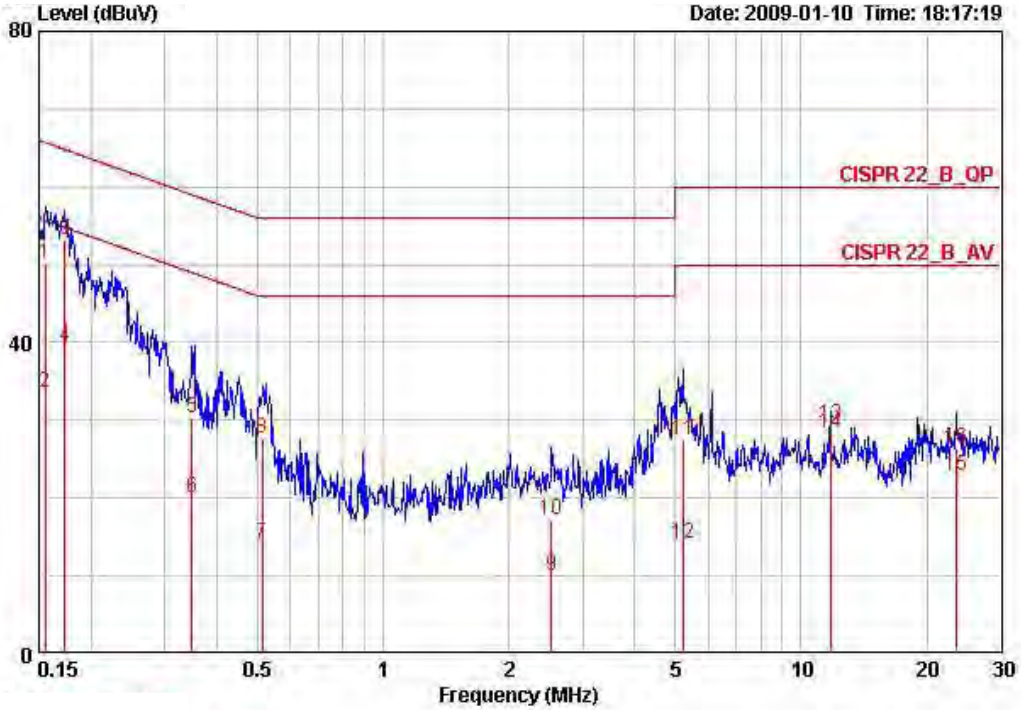
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	56%
Test Engineer	Peter Wu	Phase	Line
Configuration	Normal Link / Mode 3		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16155	50.35	-15.04	65.38	50.08	0.07	0.20	QP
2	0.16155	31.67	-23.72	55.38	31.40	0.07	0.20	AVERAGE
3 @	0.17307	53.40	-11.41	64.81	53.14	0.06	0.20	QP
4	0.17307	39.17	-15.64	54.81	38.91	0.06	0.20	AVERAGE
5	0.18152	48.00	-16.42	64.42	47.74	0.06	0.20	QP
6	0.18152	32.13	-22.29	54.42	31.87	0.06	0.20	AVERAGE
7	0.40615	30.17	-27.56	57.73	29.94	0.03	0.20	QP
8	0.40615	18.10	-29.63	47.73	17.87	0.03	0.20	AVERAGE
9	0.97871	21.04	-34.96	56.00	20.81	0.03	0.20	QP
10	0.97871	14.17	-31.83	46.00	13.94	0.03	0.20	AVERAGE
11	5.166	12.14	-37.86	50.00	11.67	0.17	0.30	AVERAGE
12	5.166	25.18	-34.82	60.00	24.71	0.17	0.30	QP
13	11.760	28.96	-31.04	60.00	28.13	0.43	0.40	QP
14	11.760	28.44	-21.56	50.00	27.61	0.43	0.40	AVERAGE
15	19.631	26.86	-33.15	60.00	25.55	0.80	0.50	QP
16	19.631	21.00	-29.01	50.00	19.69	0.80	0.50	AVERAGE

Temperature	23°C	Humidity	56%
Test Engineer	Peter Wu	Phase	Neutral
Configuration	Normal Link / Mode 3		

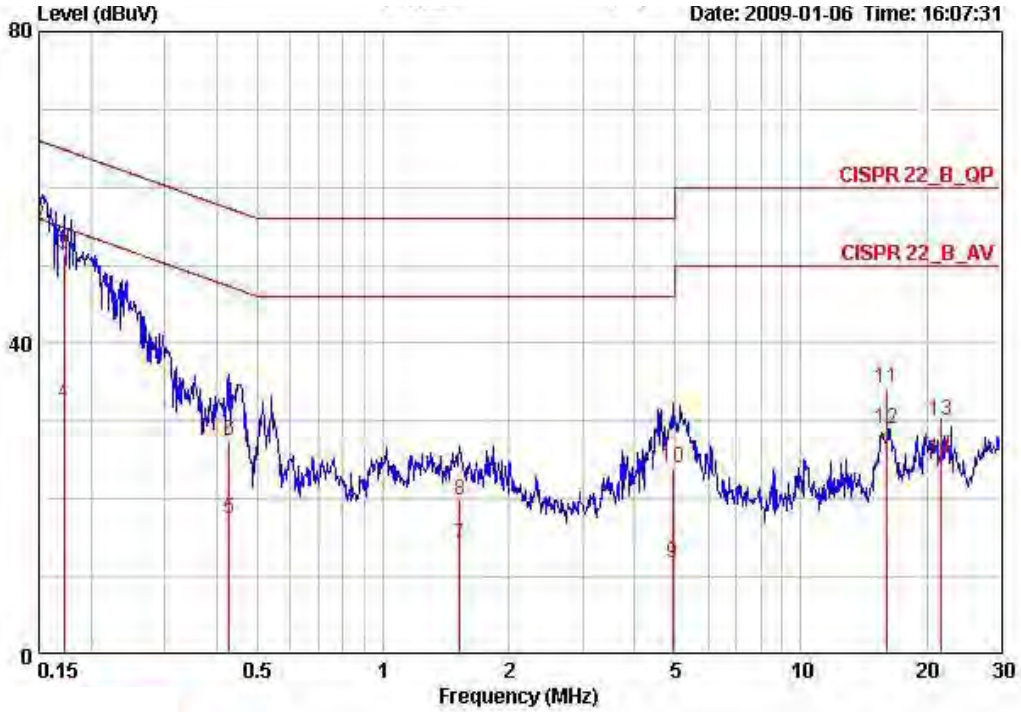


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15567	50.06	-15.63	65.69	49.76	0.10	0.20	QP
2	0.15567	33.51	-22.18	55.69	33.21	0.10	0.20	AVERAGE
3 @	0.17307	53.13	-11.68	64.81	52.84	0.09	0.20	QP
4	0.17307	39.37	-15.44	54.81	39.08	0.09	0.20	AVERAGE
5	0.34838	30.23	-28.77	59.00	29.96	0.07	0.20	QP
6	0.34838	20.14	-28.86	49.00	19.87	0.07	0.20	AVERAGE
7	0.51376	14.24	-31.76	46.00	13.97	0.07	0.20	AVERAGE
8	0.51376	27.58	-28.42	56.00	27.31	0.07	0.20	QP
9	2.527	10.10	-35.90	46.00	9.79	0.11	0.20	AVERAGE
10	2.527	17.20	-38.80	56.00	16.89	0.11	0.20	QP
11	5.221	27.56	-32.44	60.00	27.05	0.21	0.30	QP
12	5.221	14.09	-35.91	50.00	13.58	0.21	0.30	AVERAGE
13	11.760	29.33	-30.67	60.00	28.47	0.46	0.40	QP
14	11.760	28.38	-21.62	50.00	27.52	0.46	0.40	AVERAGE
15	23.520	22.89	-27.11	50.00	21.31	1.08	0.50	AVERAGE
16	23.520	26.46	-33.54	60.00	24.88	1.08	0.50	QP

Note:

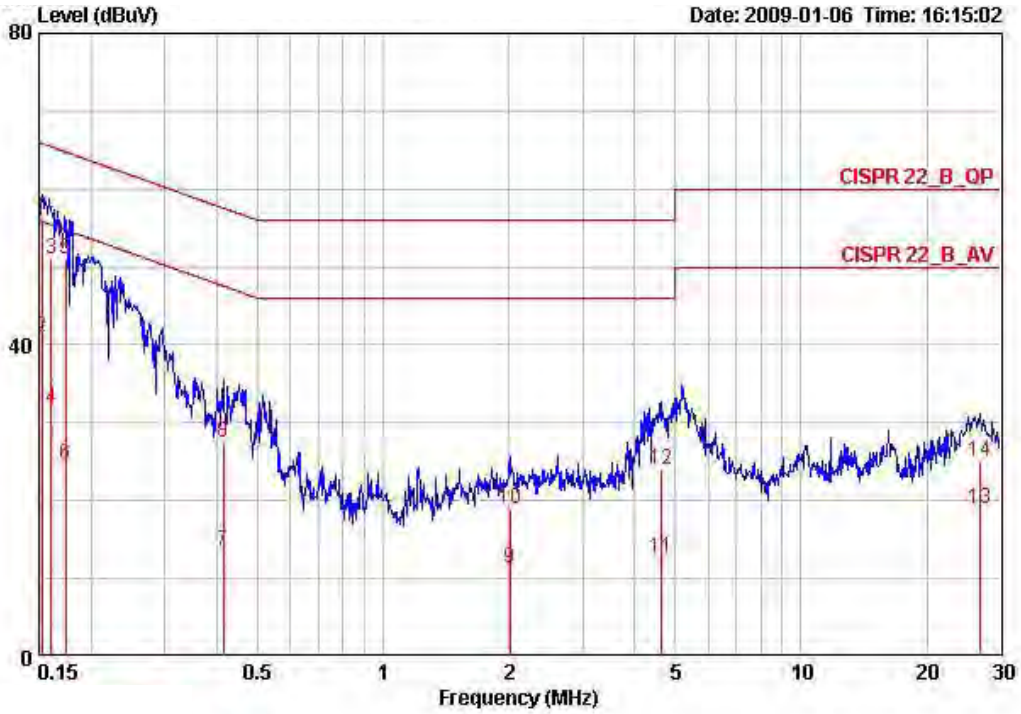
Level = Read Level + LISN Factor + Cable Loss.

Temperature	23°C	Humidity	56%
Test Engineer	Peter Wu	Phase	Line
Configuration	Normal Link / Mode 4		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15000	40.75	-15.25	56.00	40.47	0.08	0.20	AVERAGE
2 @	0.15000	55.19	-10.81	66.00	54.91	0.08	0.20	QP
3 @	0.17215	51.43	-13.42	64.86	51.17	0.06	0.20	QP
4	0.17215	32.22	-22.63	54.86	31.96	0.06	0.20	AVERAGE
5	0.42825	17.54	-29.75	47.29	17.31	0.03	0.20	AVERAGE
6	0.42825	27.57	-29.72	57.29	27.34	0.03	0.20	QP
7	1.527	14.09	-31.91	46.00	13.94	0.04	0.11	AVERAGE
8	1.527	19.88	-36.12	56.00	19.73	0.04	0.11	QP
9	4.926	11.68	-34.32	46.00	11.22	0.16	0.30	AVERAGE
10	4.926	23.98	-32.02	56.00	23.52	0.16	0.30	QP
11	16.055	34.17	-25.83	60.00	33.15	0.62	0.40	QP
12	16.055	29.02	-20.98	50.00	28.00	0.62	0.40	AVERAGE
13	21.715	30.09	-29.91	60.00	28.65	0.94	0.50	QP
14	21.715	25.15	-24.85	50.00	23.71	0.94	0.50	AVERAGE

Temperature	23°C	Humidity	56%
Test Engineer	Peter Wu	Phase	Neutral
Configuration	Normal Link / Mode 4		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.15240	55.74	-10.12	65.87	55.44	0.10	0.20	QP
2	0.15240	40.96	-14.90	55.87	40.66	0.10	0.20	AVERAGE
3	0.16070	50.99	-14.44	65.43	50.69	0.10	0.20	QP
4	0.16070	31.78	-23.65	55.43	31.48	0.10	0.20	AVERAGE
5 @	0.17399	50.96	-13.81	64.77	50.67	0.09	0.20	QP
6	0.17399	24.60	-30.17	54.77	24.31	0.09	0.20	AVERAGE
7	0.41485	13.52	-34.03	47.55	13.25	0.07	0.20	AVERAGE
8	0.41485	27.48	-30.07	57.55	27.21	0.07	0.20	QP
9	2.012	11.34	-34.66	46.00	11.05	0.09	0.20	AVERAGE
10	2.012	18.92	-37.08	56.00	18.63	0.09	0.20	QP
11	4.622	12.69	-33.31	46.00	12.21	0.18	0.30	AVERAGE
12	4.622	23.88	-32.12	56.00	23.40	0.18	0.30	QP
13	26.699	18.99	-31.01	50.00	17.18	1.28	0.53	AVERAGE
14	26.699	25.10	-34.90	60.00	23.29	1.28	0.53	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

4.2.2. Measuring Instruments and Setting

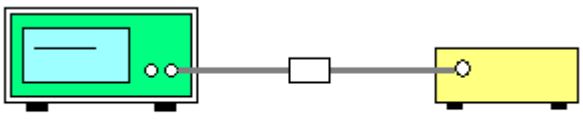
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum 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

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 March 23, 2005.

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 Maximum Conducted Output Power

Temperature	25°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	Draft n
Test Date	Jan. 13, 2009		

Configuration Draft n MCS0 20MHz Ant. A

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	16.48	30.00	Complies
6	2437 MHz	16.58	30.00	Complies
11	2462 MHz	15.13	30.00	Complies

Configuration Draft n MCS0 40MHz Ant. A

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	16.58	30.00	Complies
6	2437 MHz	16.56	30.00	Complies
9	2452 MHz	14.59	30.00	Complies

Temperature	25°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	802.11b/g
Test Date	Jan. 13, 2009		

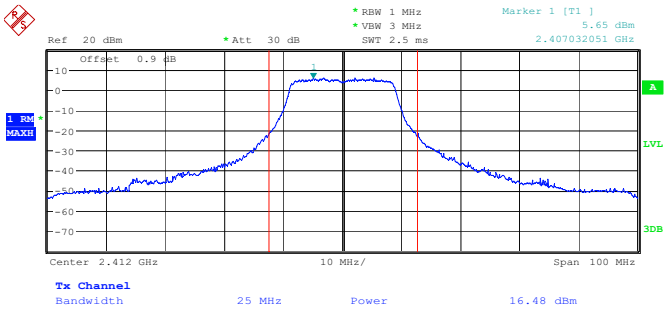
Configuration IEEE 802.11b Ant. A

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	18.24	30.00	Complies
6	2437 MHz	17.73	30.00	Complies
11	2462 MHz	17.78	30.00	Complies

Configuration IEEE 802.11g Ant. A

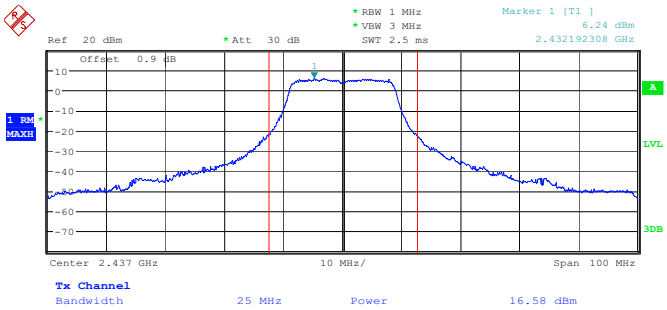
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	16.60	30.00	Complies
6	2437 MHz	16.61	30.00	Complies
11	2462 MHz	15.22	30.00	Complies

Conducted Output Power Plot on Configuration Draft n MCS0 20MHz Ant. A / 2412 MHz



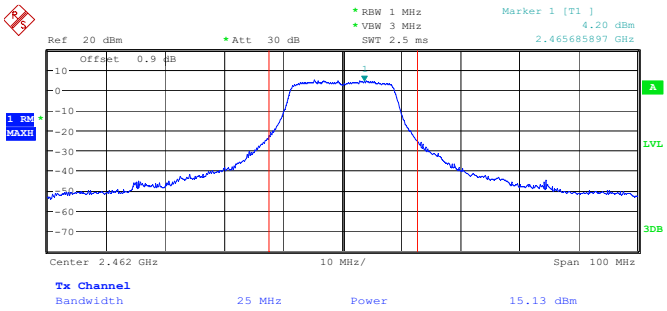
Date: 13.JAN.2009 13:45:02

Conducted Output Power Plot on Configuration Draft n MCS0 20MHz Ant. A / 2437 MHz



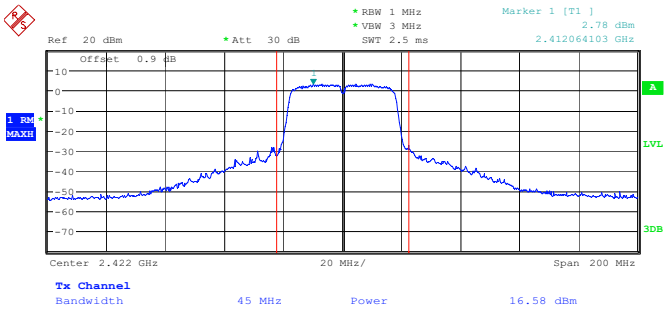
Date: 13.JAN.2009 13:44:15

Conducted Output Power Plot on Configuration Draft n MCS0 20MHz Ant. A / 2462 MHz



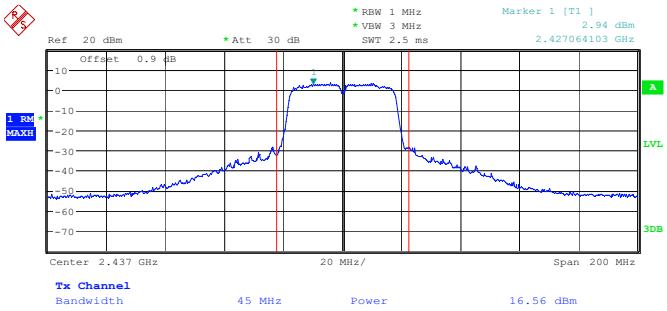
Date: 13.JAN.2009 13:43:21

Conducted Output Power Plot on Configuration Draft n MCS0 40MHz Ant. A / 2422 MHz



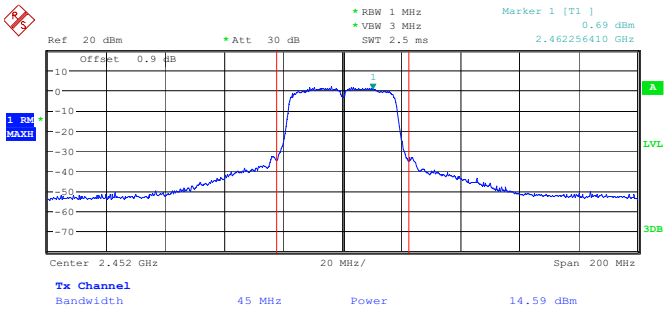
Date: 13.JAN.2009 13:51:45

Conducted Output Power Plot on Configuration Draft n MCS0 40MHz Ant. A / 2437 MHz



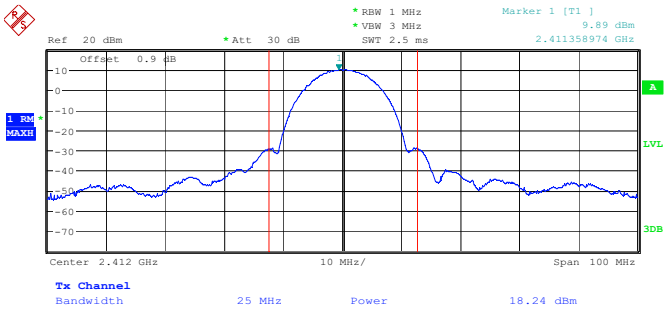
Date: 13.JAN.2009 13:40:38

Conducted Output Power Plot on Configuration Draft n MCS0 40MHz Ant. A / 2452 MHz



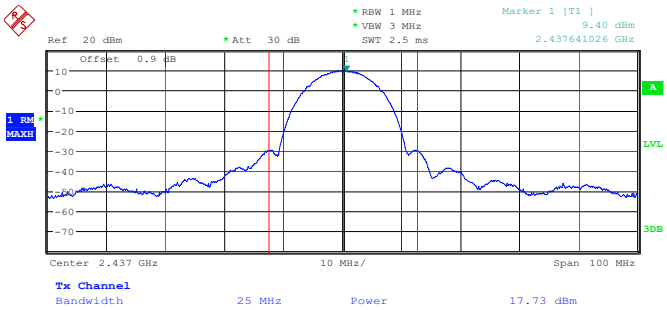
Date: 13.JAN.2009 13:41:34

Conducted Output Power Plot on Configuration IEEE 802.11b Ant. A / 2412 MHz



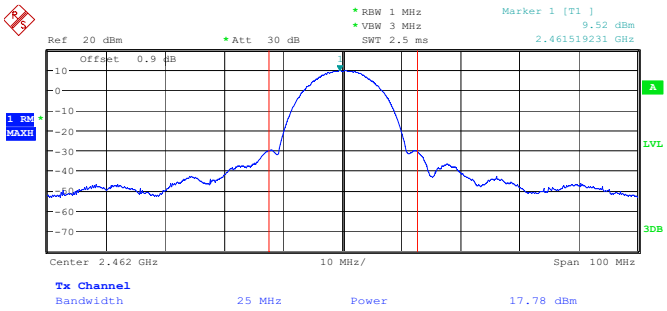
Date: 13.JAN.2009 13:50:05

Conducted Output Power Plot on Configuration IEEE 802.11b Ant. A / 2437 MHz



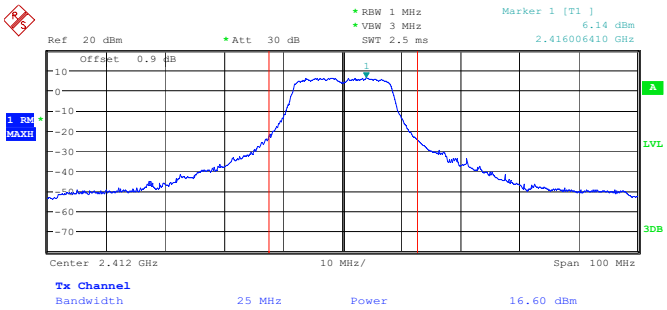
Date: 13.JAN.2009 13:49:38

Conducted Output Power Plot on Configuration IEEE 802.11b Ant. A / 2462 MHz



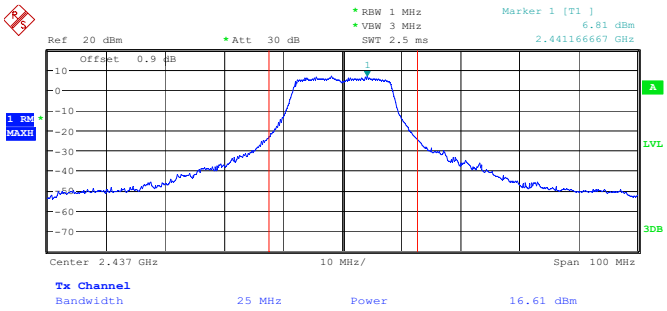
Date: 13.JAN.2009 13:49:05

Conducted Output Power Plot on Configuration IEEE 802.11g Ant. A / 2412 MHz



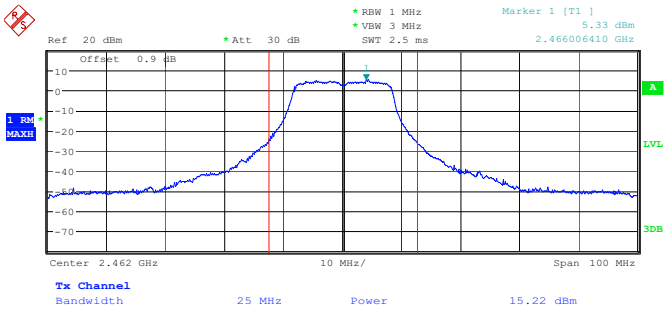
Date: 13.JAN.2009 13:45:58

Conducted Output Power Plot on Configuration IEEE 802.11g Ant. A / 2437 MHz



Date: 13.JAN.2009 13:46:36

Conducted Output Power Plot on Configuration IEEE 802.11g Ant. A / 2462 MHz



Date: 13.JAN.2009 13:47:56

4.3. Power Spectral Density Measurement

4.3.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

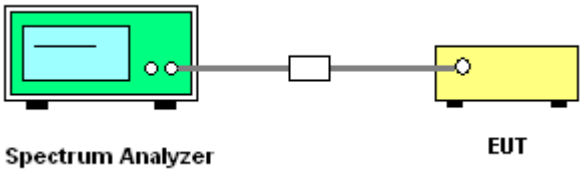
Please refer to section 5 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	30MHz
RB	3 kHz
VB	30 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	10s

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
2. Set RBW of spectrum analyzer to 3kHz and VBW to 30kHz. Set Detector to Peak, Trace to Max Hold.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum.
4. Set the span to 1.5MHz and the sweep time to 500s and record the maximum peak value.

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 Power Spectral Density

Temperature	25°C	**Humidity**	60%
Test Engineer	Johnson Chang	**Configurations**	Draft n
Test Date	Jan. 13, 2009		

Configuration Draft n MCS0 20MHz Ant. A

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-11.86	8.00	Complies
6	2437 MHz	-11.87	8.00	Complies
11	2462 MHz	-11.88	8.00	Complies

Configuration Draft n MCS0 40MHz Ant. A

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-11.92	8.00	Complies
6	2437 MHz	-11.89	8.00	Complies
9	2452 MHz	-11.86	8.00	Complies

Temperature	25°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	802.11b/g
Test Date	Jan. 13, 2009		

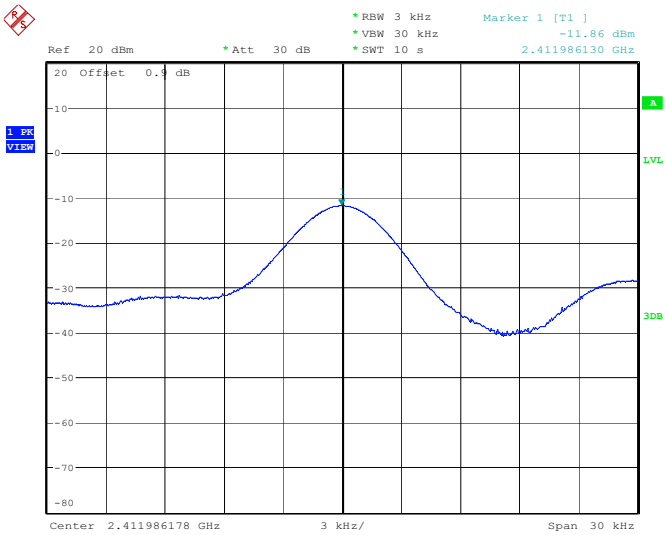
Configuration IEEE 802.11b Ant. A

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-11.67	8.00	Complies
6	2437 MHz	-11.62	8.00	Complies
11	2462 MHz	-11.64	8.00	Complies

Configuration IEEE 802.11g Ant. A

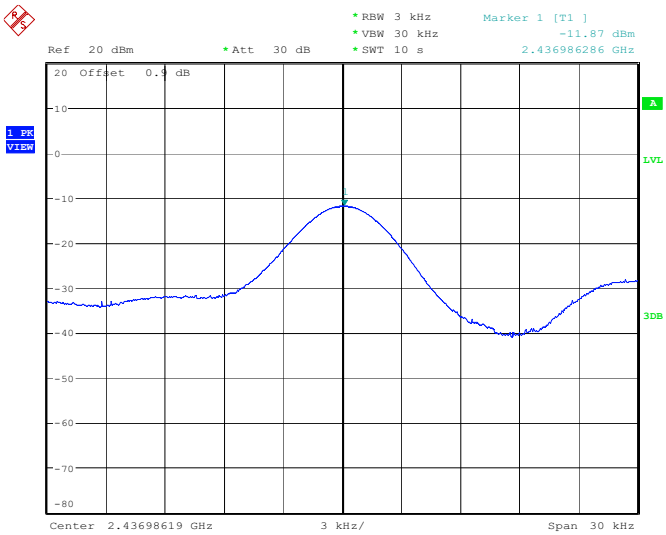
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-11.89	8.00	Complies
6	2437 MHz	-11.85	8.00	Complies
11	2462 MHz	-11.76	8.00	Complies

Power Density Plot on Configuration Draft n MCS0 20MHz Ant. A / 2412 MHz



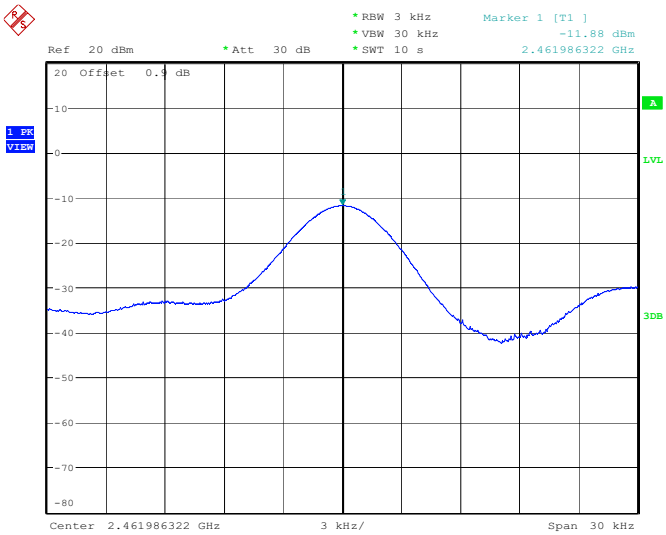
Date: 13.JAN.2009 14:57:34

Power Density Plot on Configuration Draft n MCS0 20MHz Ant. A / 2437 MHz



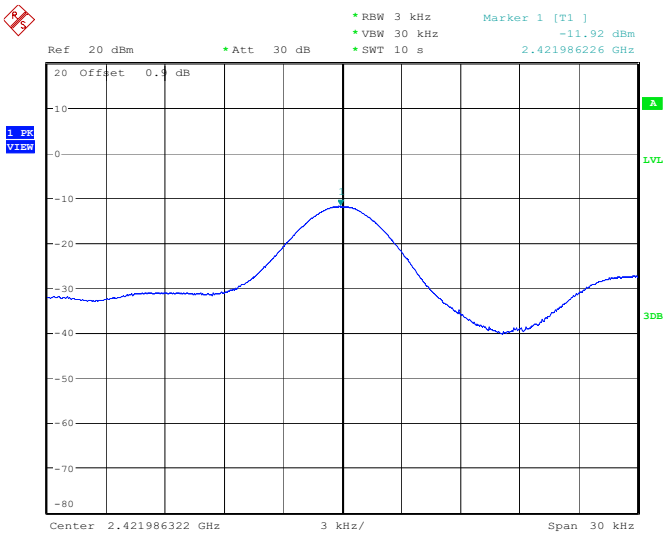
Date: 13.JAN.2009 15:02:53

Power Density Plot on Configuration Draft n MCS0 20MHz Ant. A / 2462 MHz



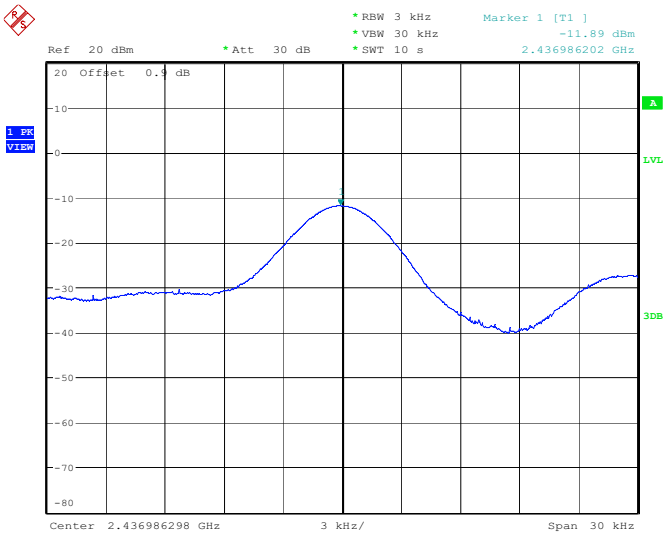
Date: 13.JAN.2009 13:27:57

Power Density Plot on Configuration Draft n MCS0 40MHz Ant. A / 2422 MHz



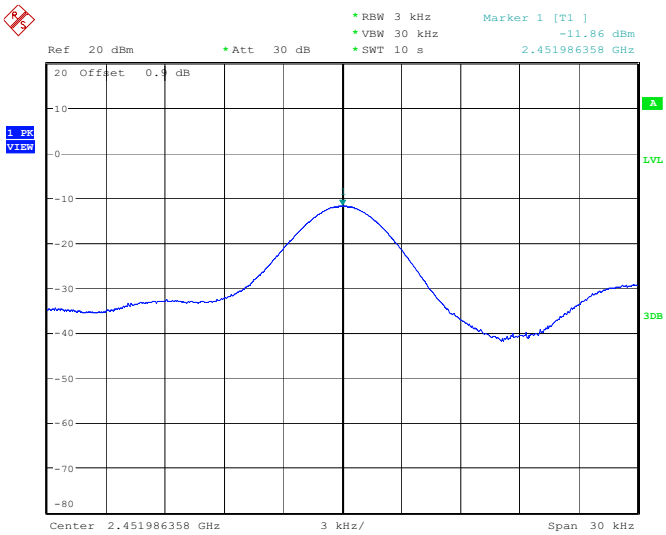
Date: 13.JAN.2009 13:34:22

Power Density Plot on Configuration Draft n MCS0 40MHz Ant. A / 2437 MHz



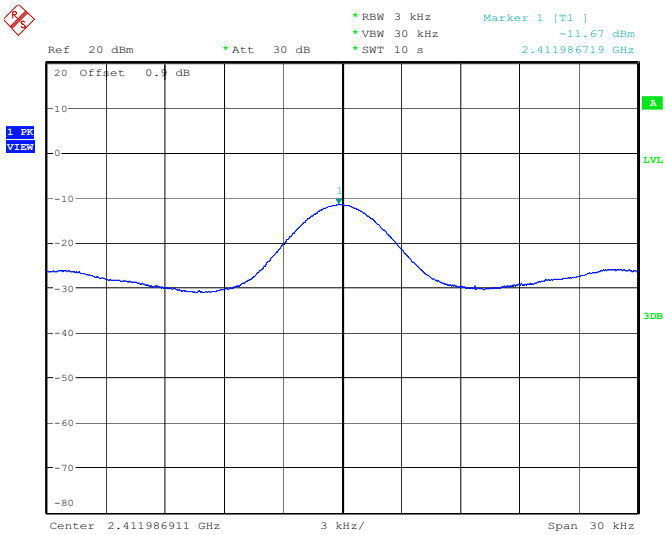
Date: 13.JAN.2009 13:32:27

Power Density Plot on Configuration Draft n MCS0 40MHz Ant. A / 2452 MHz



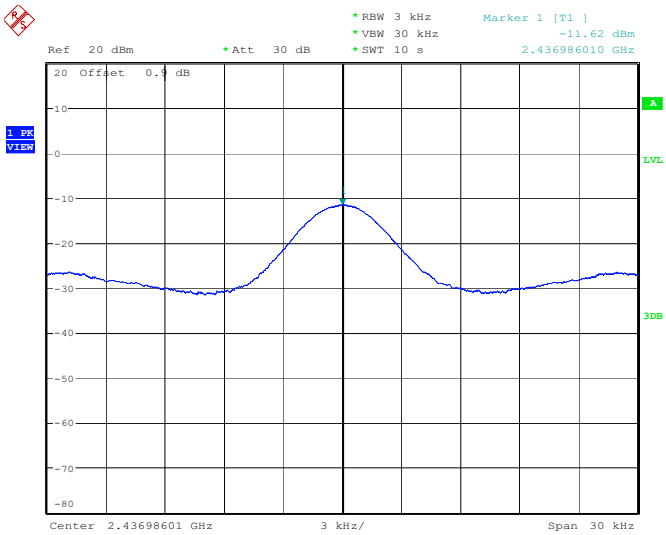
Date: 13.JAN.2009 13:30:14

Power Density Plot on Configuration IEEE 802.11b Ant. A / 2412 MHz



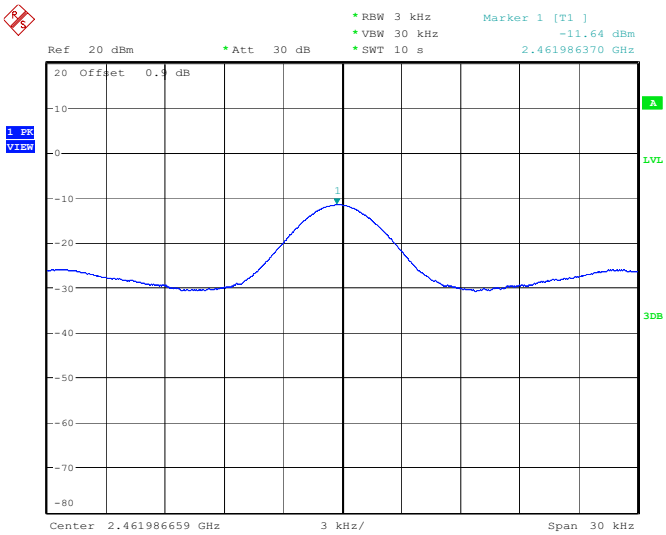
Date: 13.JAN.2009 13:08:03

Power Density Plot on Configuration IEEE 802.11b Ant. A / 2437 MHz



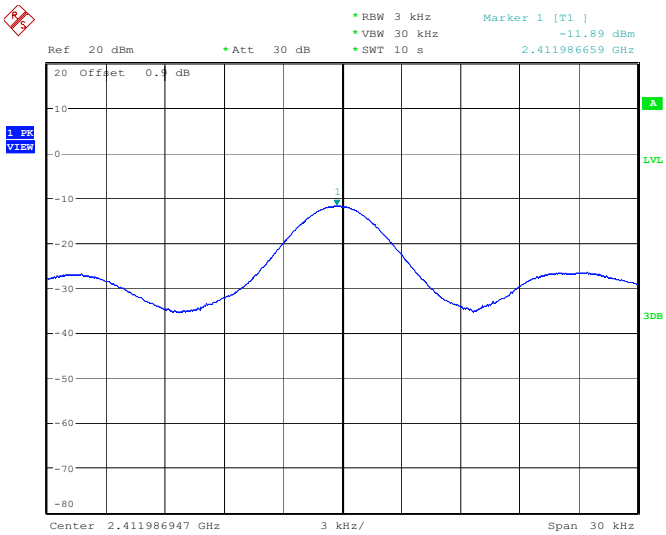
Date: 13.JAN.2009 14:51:18

Power Density Plot on Configuration IEEE 802.11b Ant. A / 2462 MHz



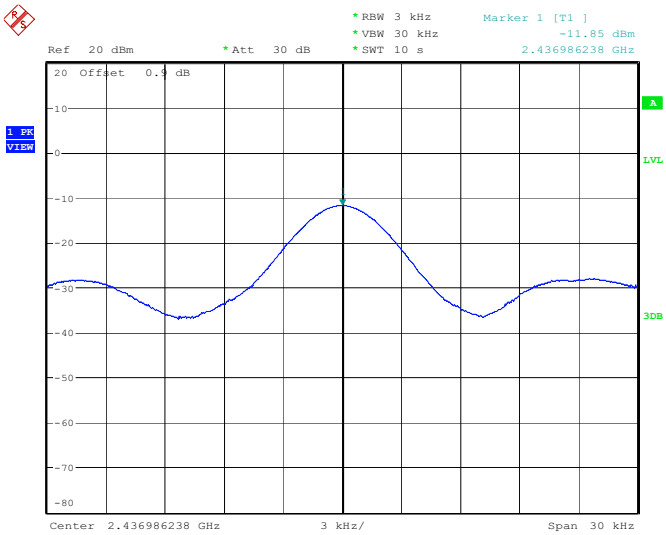
Date: 13.JAN.2009 14:02:37

Power Density Plot on Configuration IEEE 802.11g Ant. A / 2412 MHz



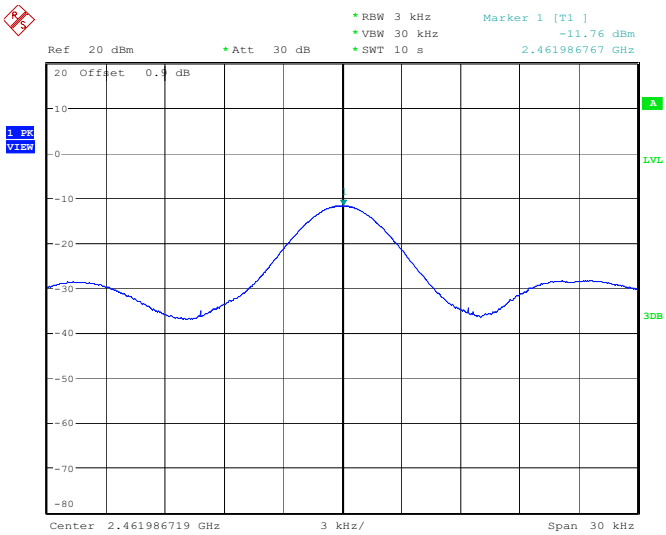
Date: 13.JAN.2009 14:14:27

Power Density Plot on Configuration IEEE 802.11g Ant. A / 2437 MHz



Date: 13.JAN.2009 14:41:29

Power Density Plot on Configuration IEEE 802.11g Ant. A / 2462 MHz



Date: 13.JAN.2009 13:15:56

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

4.4.2. Measuring Instruments and Setting

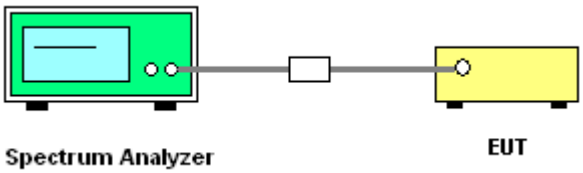
Please refer to section 5 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

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 6dB Spectrum Bandwidth

Temperature	25°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	Draft n
Test Date	Jan. 13, 2009		

Configuration Draft n MCS0 20MHz Ant. A

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.62	17.62	500	Complies
6	2437 MHz	17.62	17.62	500	Complies
11	2462 MHz	17.66	17.62	500	Complies

Configuration Draft n MCS0 40MHz Ant. A

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	35.57	37.70	500	Complies
6	2437 MHz	35.89	35.70	500	Complies
9	2452 MHz	35.96	35.64	500	Complies

Temperature	25°C	Humidity	60%
Test Engineer	Johnson Chang	Configurations	802.11b/g
Test Date	Jan. 13, 2009		

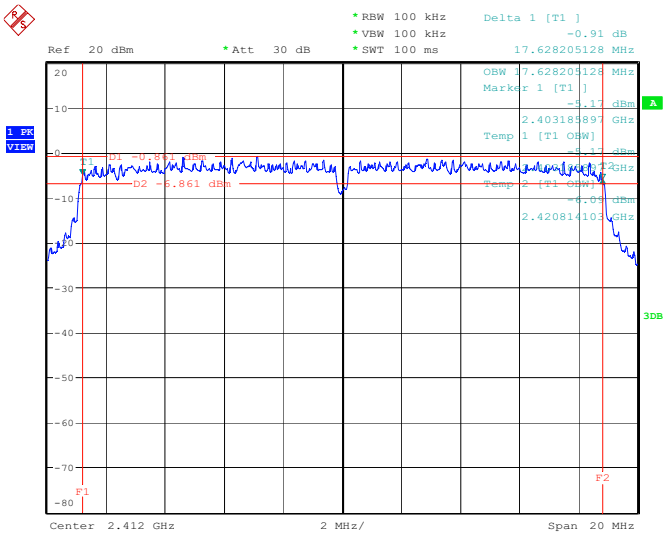
Configuration IEEE 802.11b Ant. A

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.60	14.80	500	Complies
6	2437 MHz	10.06	14.77	500	Complies
11	2462 MHz	10.09	14.77	500	Complies

Configuration IEEE 802.11g Ant. A

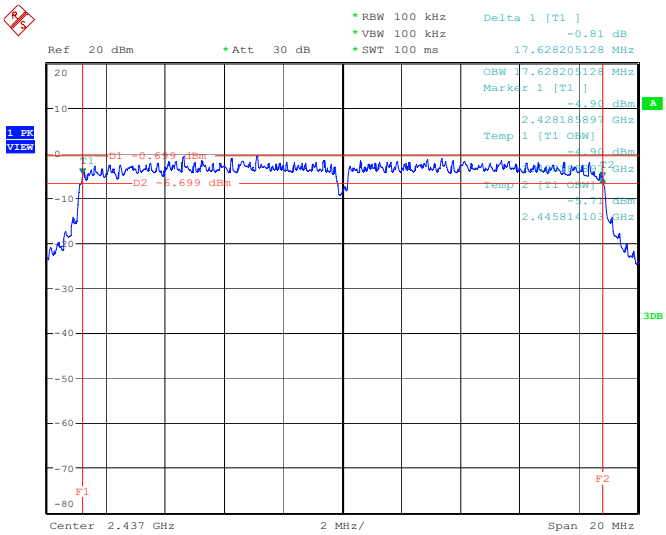
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.44	16.44	500	Complies
6	2437 MHz	16.47	16.44	500	Complies
11	2462 MHz	16.44	16.44	500	Complies

6 dB Bandwidth Plot on Configuration Draft n MCS0 20MHz Ant. A / 2412 MHz



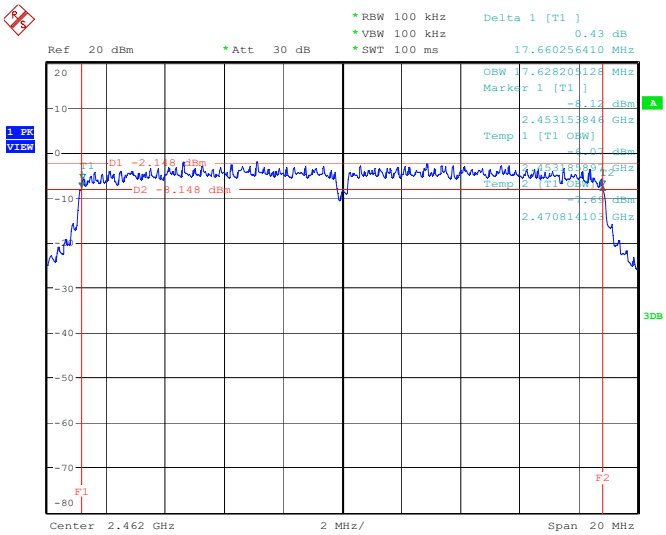
Date: 13.JAN.2009 14:56:07

6 dB Bandwidth Plot on Configuration Draft n MCS0 20MHz Ant. A / 2437 MHz



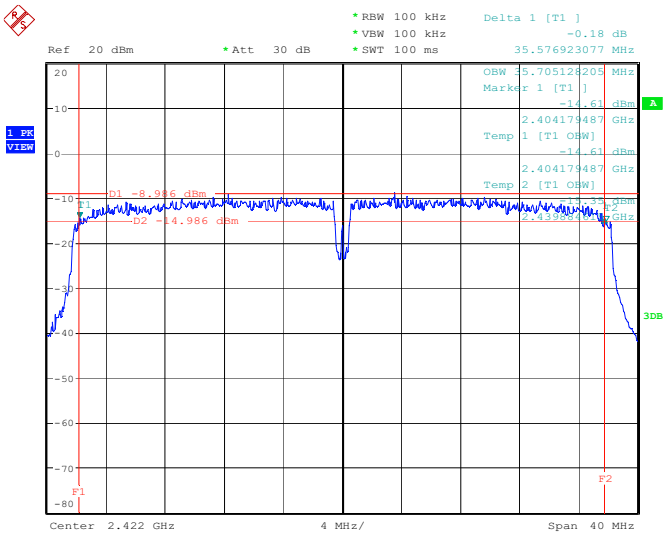
Date: 13.JAN.2009 15:01:24

6 dB Bandwidth Plot on Configuration Draft n MCS0 20MHz Ant. A / 2462 MHz



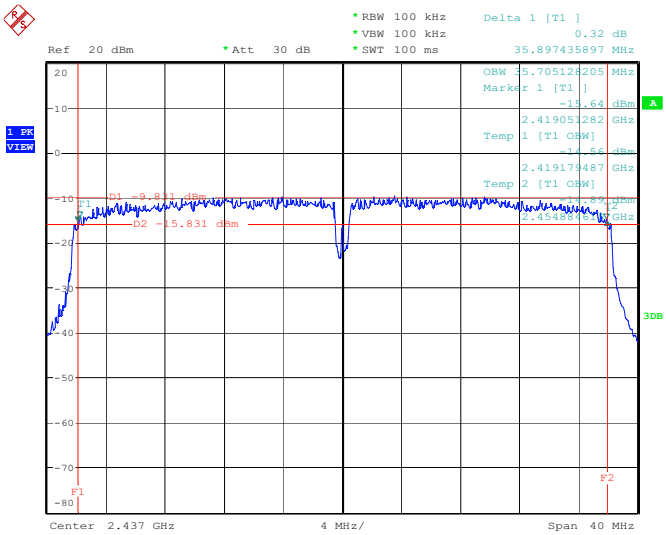
Date: 13.JAN.2009 13:26:29

6 dB Bandwidth Plot on Configuration Draft n MCS0 40MHz Ant. A / 2422 MHz



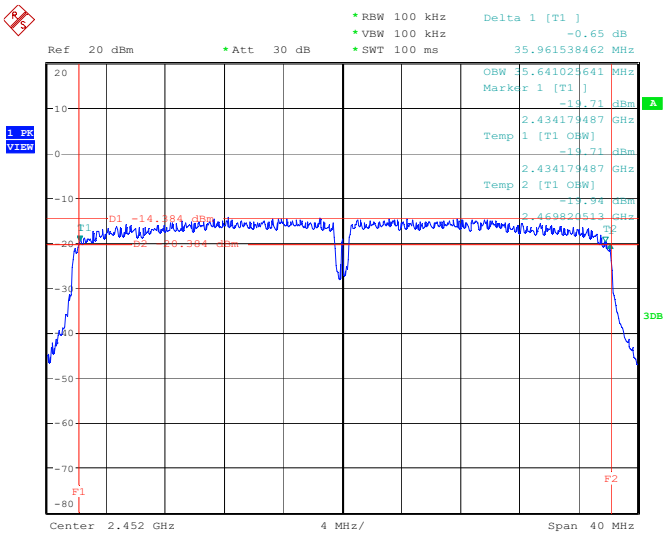
Date: 15.JAN.2009 13:47:01

6 dB Bandwidth Plot on Configuration Draft n MCS0 40MHz Ant. A / 2437 MHz



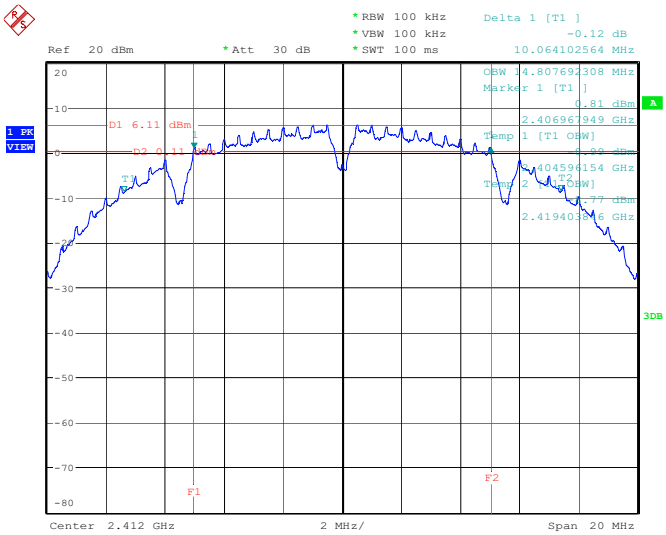
Date: 15.JAN.2009 13:50:18

6 dB Bandwidth Plot on Configuration Draft n MCS0 40MHz Ant. A / 2452 MHz

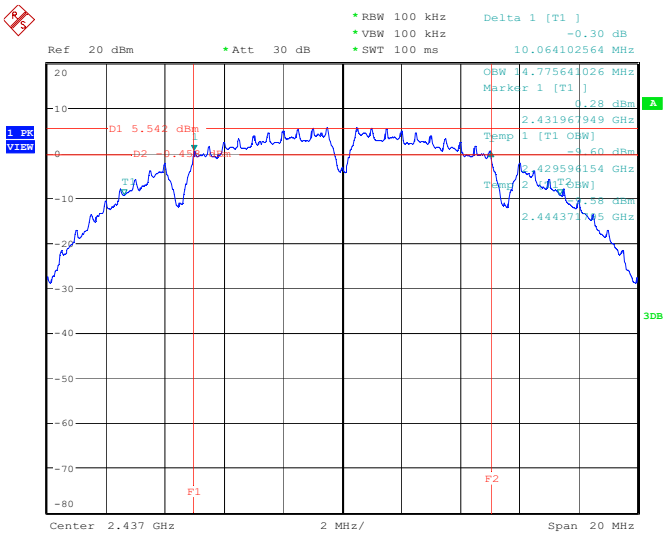


Date: 15.JAN.2009 13:53:10

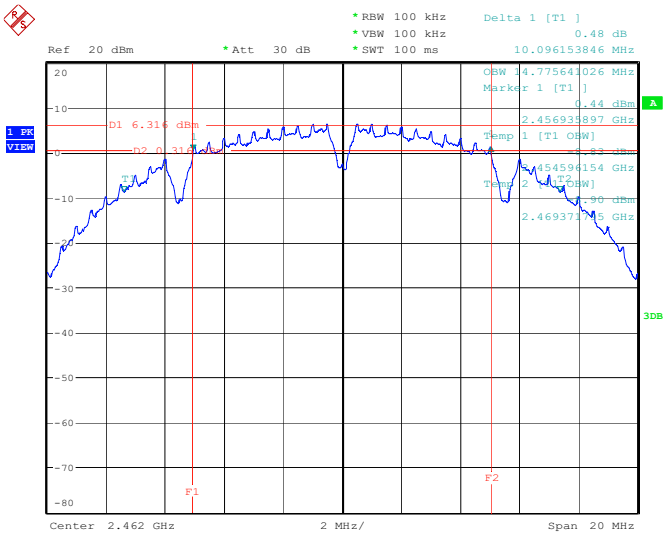
6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. A / 2412 MHz



6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. A / 2437 MHz

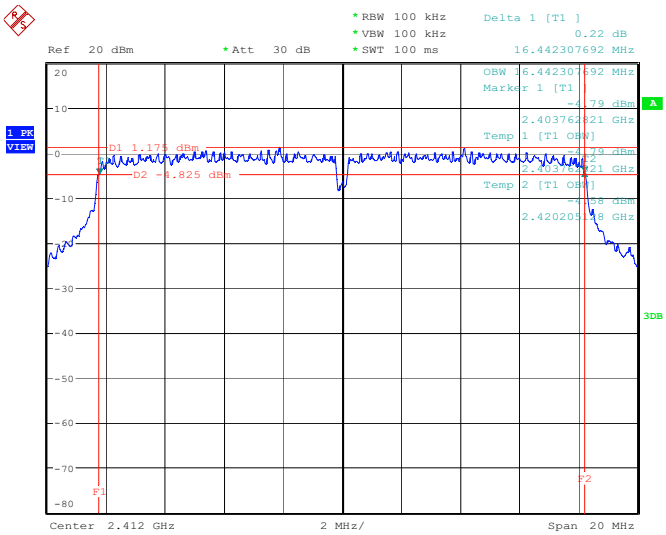


6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. A / 2462 MHz



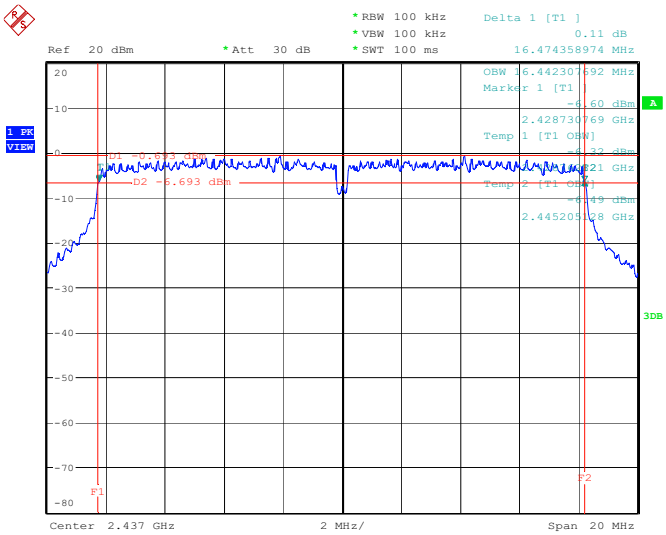
Date: 13.JAN.2009 14:01:10

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. A / 2412 MHz



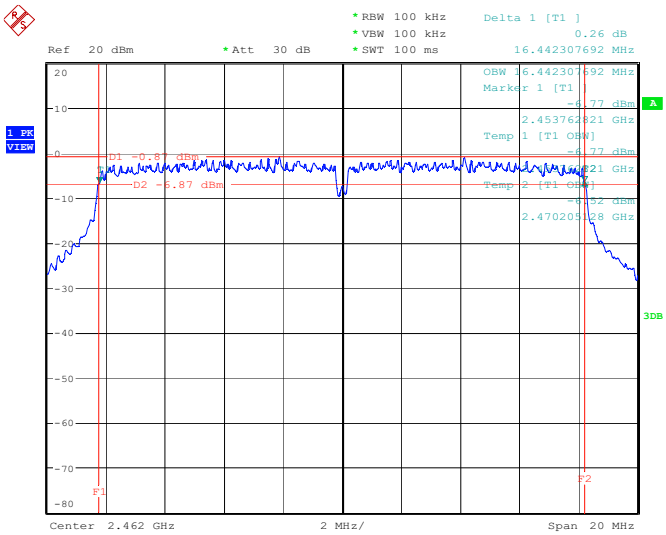
Date: 13.JAN.2009 14:13:00

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. A / 2437 MHz



Date: 13.JAN.2009 14:40:00

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. A / 2462 MHz



Date: 13.JAN.2009 13:14:29

4.5. Radiated Emissions Measurement

4.5.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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

4.5.2. 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	10th carrier harmonic
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

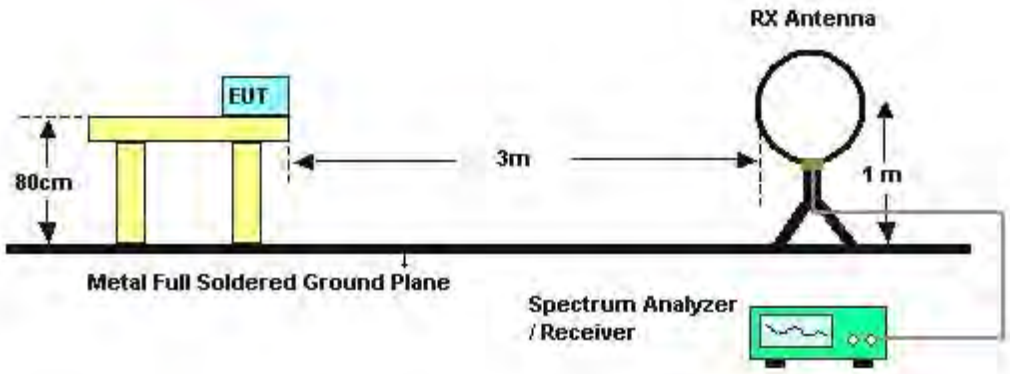
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.5.3. Test Procedures

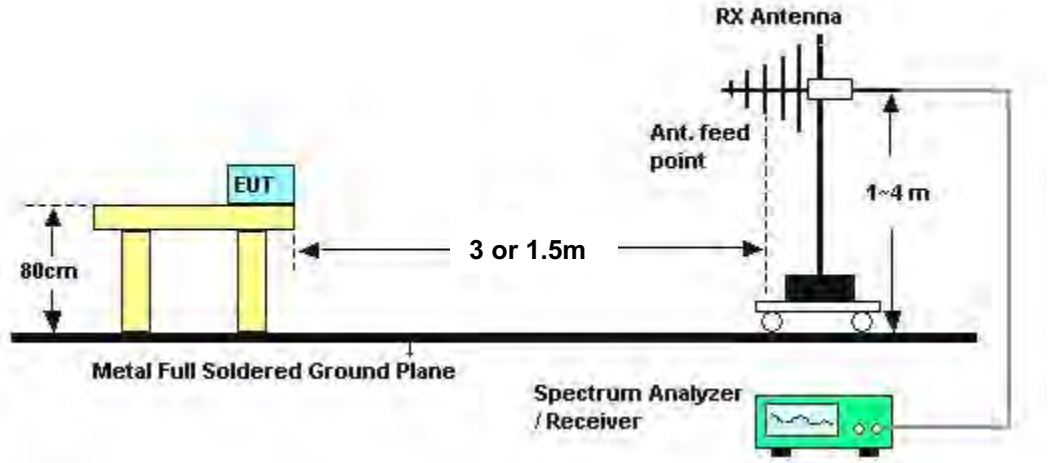
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

4.5.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz 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 distanc [3m] / test distance [1.5m]) (dB);

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

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

Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Normal Link

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

Note:

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

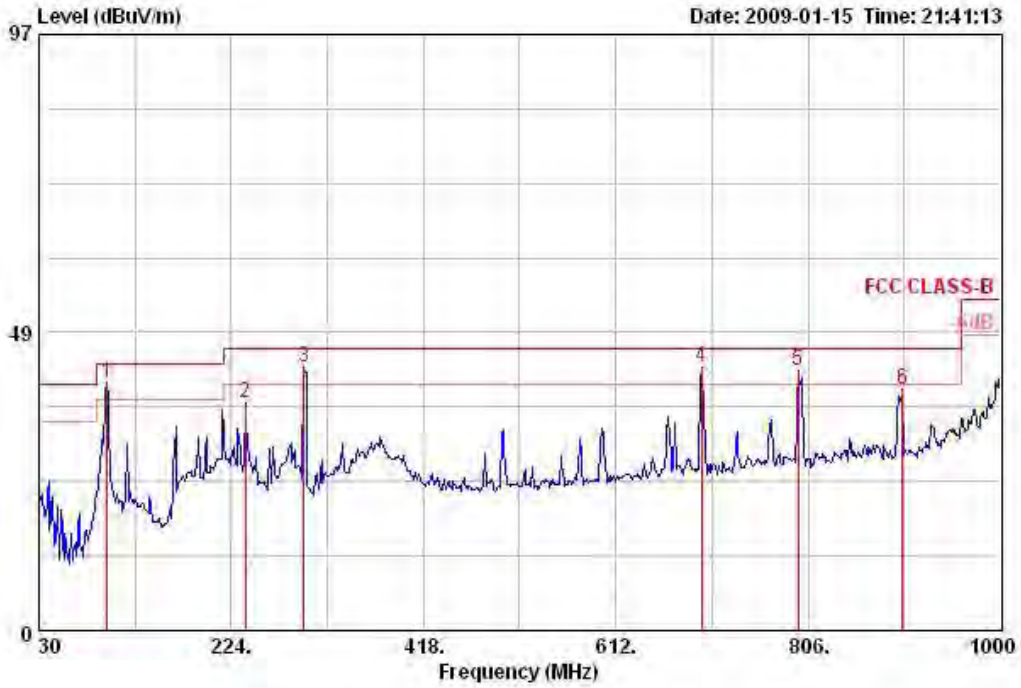
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

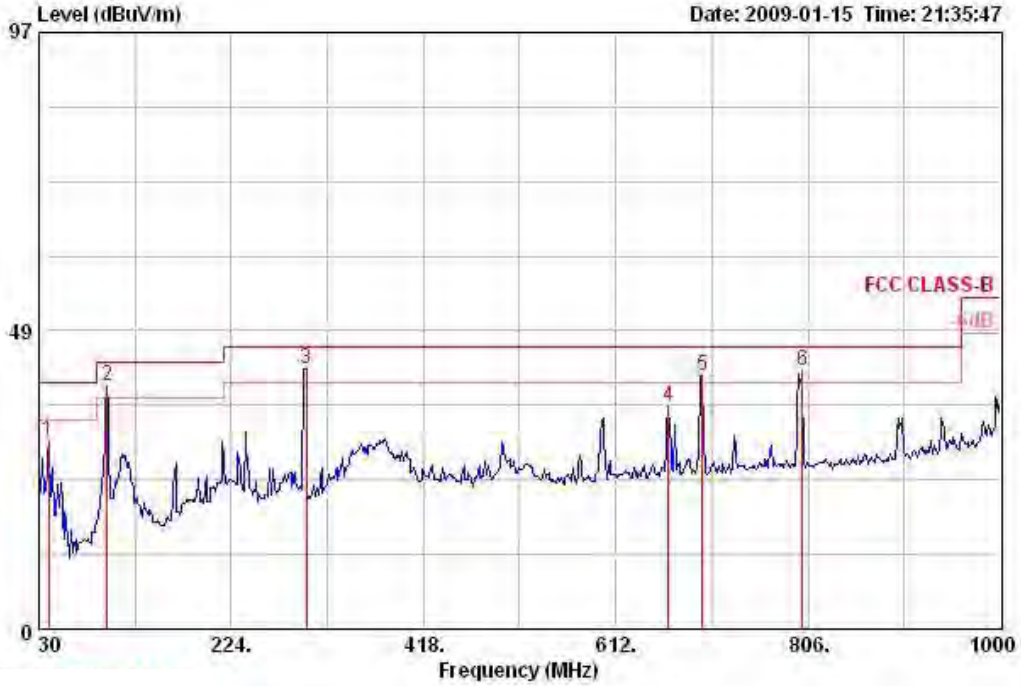
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Normal Link / Mode 3

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 @	98.870	40.37	-3.13	43.50	56.00	10.79	27.61	1.18	Peak	HORIZONTAL	22	115
2	238.550	36.97	-9.03	46.00	50.23	11.91	27.02	1.85	Peak	HORIZONTAL	0	100
3 @	297.720	42.72	-3.28	46.00	54.19	13.34	26.91	2.09	Peak	HORIZONTAL	0	100
4 @	698.330	42.73	-3.27	46.00	48.34	19.08	28.00	3.31	Peak	HORIZONTAL	0	100
5 !	796.300	42.26	-3.74	46.00	46.82	19.74	27.62	3.32	Peak	HORIZONTAL	0	100
6	901.060	39.19	-6.81	46.00	42.45	20.54	27.39	3.60	Peak	HORIZONTAL	0	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	39.700	30.74	-9.26	40.00	44.73	13.11	27.80	0.70	Peak	VERTICAL	0	400
2 !	98.870	39.45	-4.05	43.50	55.08	10.79	27.61	1.18	Peak	VERTICAL	0	400
3 @	299.660	42.33	-3.67	46.00	53.78	13.36	26.90	2.10	Peak	VERTICAL	0	400
4	665.350	36.31	-9.69	46.00	41.93	18.98	28.03	3.44	Peak	VERTICAL	0	400
5 !	699.300	41.14	-4.86	46.00	46.75	19.09	28.00	3.30	Peak	VERTICAL	0	400
6 !	800.180	41.98	-4.02	46.00	46.51	19.77	27.60	3.30	Peak	VERTICAL	0	400

Note:

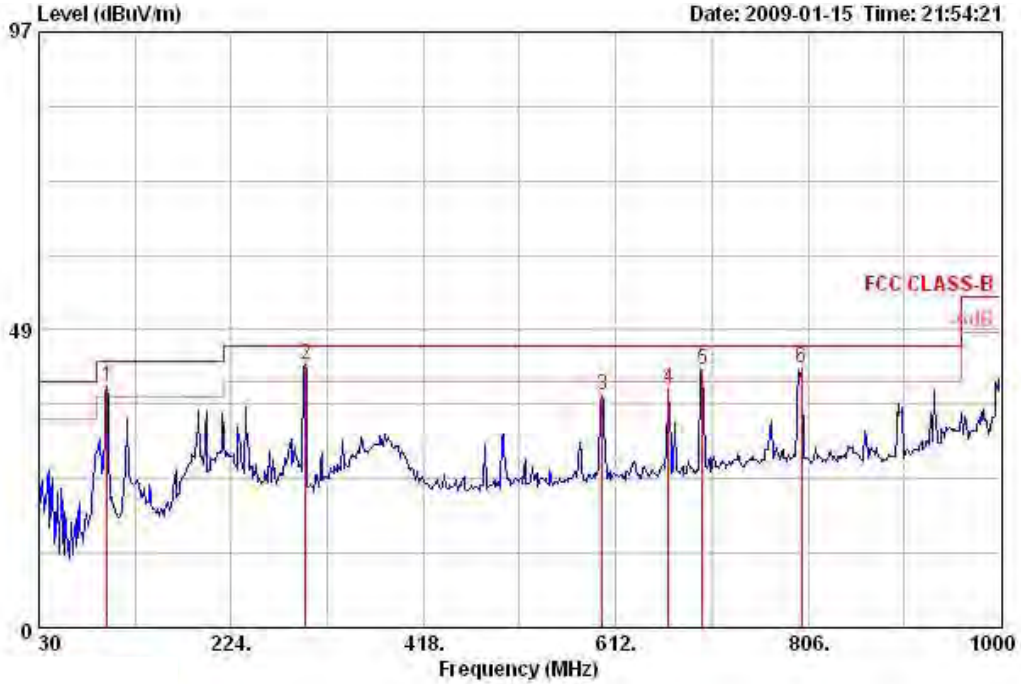
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

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

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

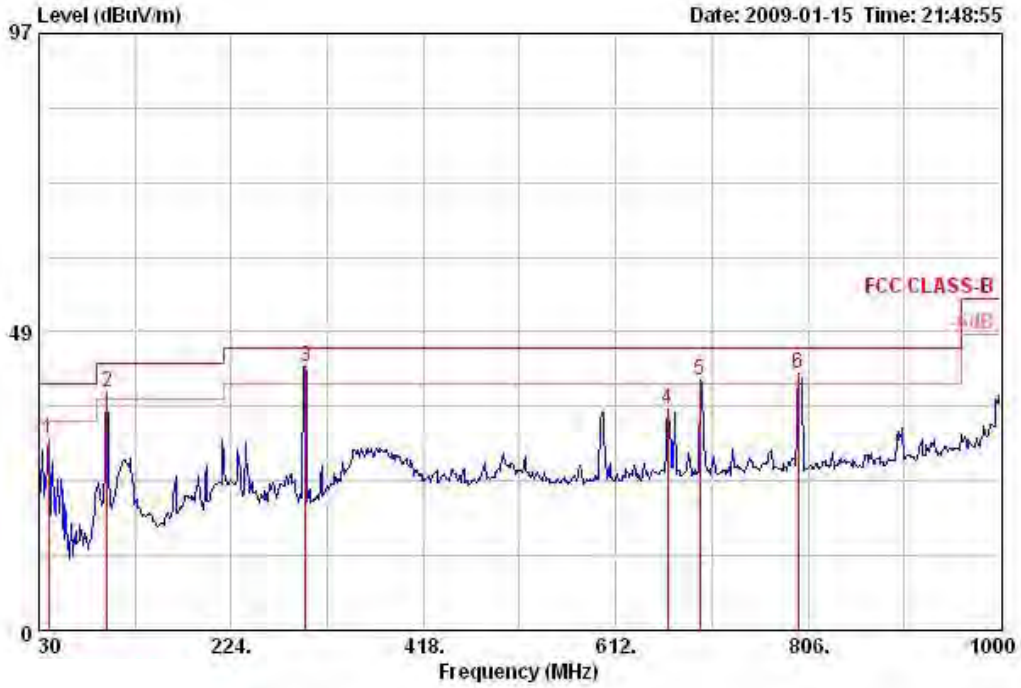
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Normal Link / Mode 4

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Rnt Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1 !	98.870	39.29	-4.21	43.50	54.93	10.79	27.61	1.18	Peak	HORIZONTAL	0	100
2 @	298.690	42.80	-3.20	46.00	54.26	13.35	26.90	2.10	Peak	HORIZONTAL	0	100
3	598.420	37.89	-8.11	46.00	44.35	18.75	28.10	2.90	Peak	HORIZONTAL	0	100
4	665.350	38.95	-7.05	46.00	44.57	18.98	28.03	3.44	Peak	HORIZONTAL	0	100
5 !	699.300	42.11	-3.89	46.00	47.72	19.09	28.00	3.30	Peak	HORIZONTAL	0	100
6 @	799.210	42.32	-3.68	46.00	46.86	19.76	27.61	3.30	Peak	HORIZONTAL	0	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	39.700	30.94	-9.06	40.00	44.93	13.11	27.80	0.70	Peak	VERTICAL	0	400
2 !	98.870	38.56	-4.94	43.50	54.19	10.79	27.61	1.18	Peak	VERTICAL	0	400
3 @	298.690	42.89	-3.11	46.00	54.34	13.35	26.90	2.10	Peak	VERTICAL	87	100
4	664.380	35.90	-10.10	46.00	41.51	18.98	28.04	3.44	Peak	VERTICAL	0	400
5 !	696.390	40.74	-5.26	46.00	46.35	19.08	28.00	3.32	Peak	VERTICAL	0	400
6 !	796.300	41.67	-4.33	46.00	46.22	19.74	27.62	3.32	Peak	VERTICAL	0	400

Note:

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

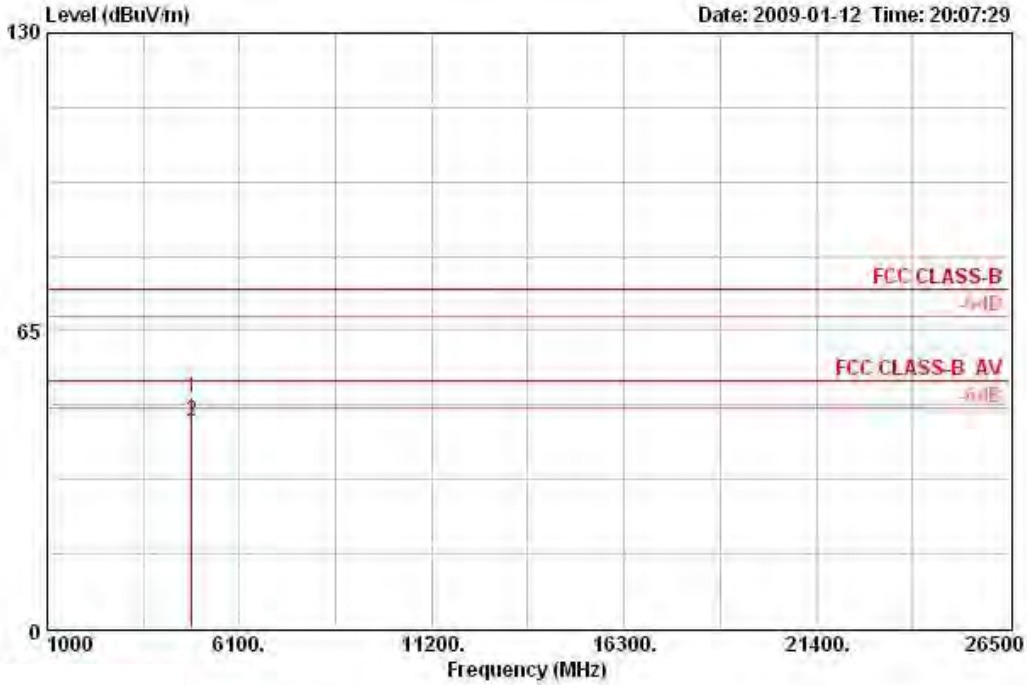
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

4.5.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 20MHz Ch 1 / Mode 3

Horizontal



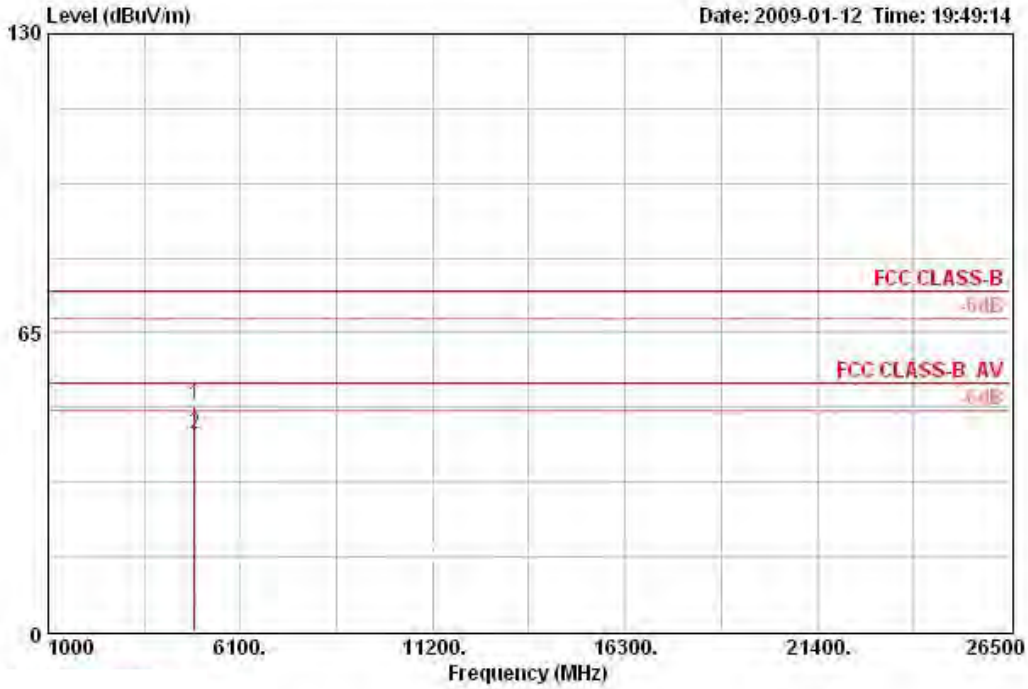
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB			deg	cm
1	4823.970	50.38	-23.62	74.00	48.40	33.06	35.04	3.96	PEAK	HORIZONTAL	133	116
2 @	4823.990	45.04	-8.96	54.00	43.06	33.06	35.04	3.96	AVERAGE	HORIZONTAL	133	116

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	4823.710	51.83	-22.17	74.00	49.86	33.06	35.04	3.96	PEAK	VERTICAL	116	117
2 @	4823.970	47.72	-6.28	54.00	45.74	33.06	35.04	3.96	AVERAGE	VERTICAL	116	117

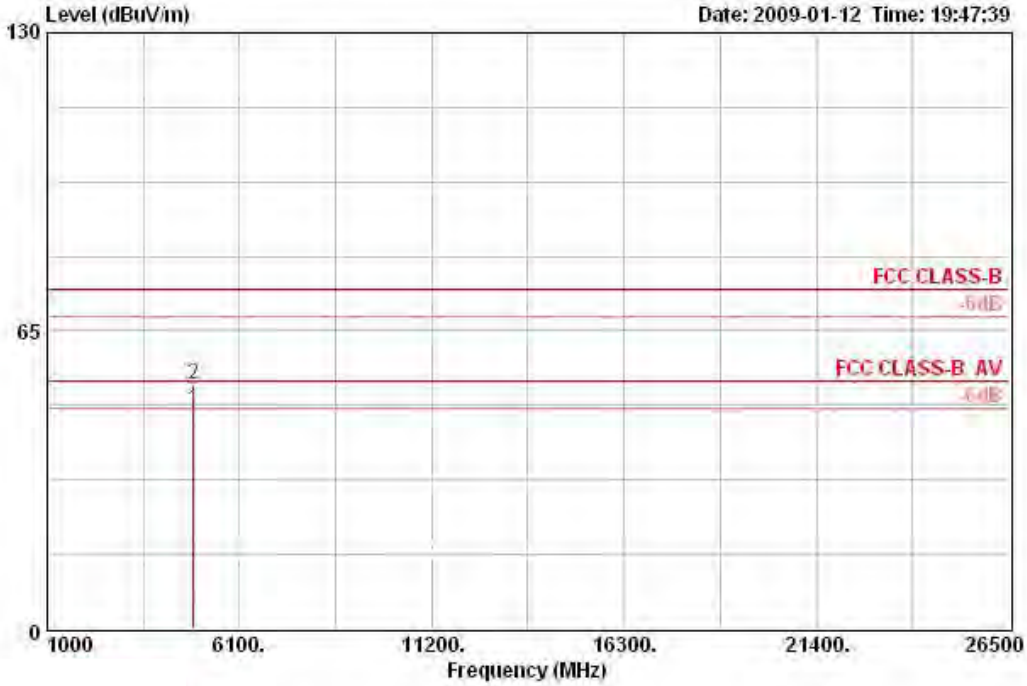
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 20MHz Ch 6 / Mode 3

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	4873.880	49.27	-24.73	74.00	47.17	33.16	35.03	3.97	PEAK	HORIZONTAL	138	102
2	4873.970	42.94	-11.06	54.00	40.84	33.16	35.03	3.97	AVERAGE	HORIZONTAL	138	102

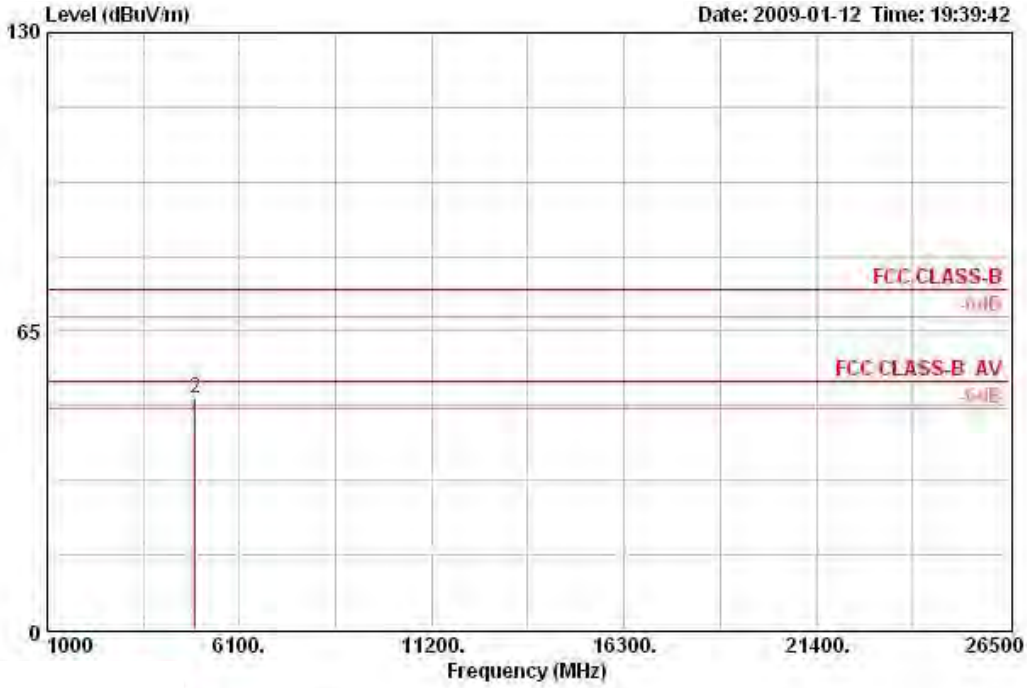
Vertical



	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 @	4873.950	47.93	-6.07	54.00	45.83	33.16	35.03	3.97	AVERAGE	VERTICAL	120	130
2	4873.960	53.31	-20.69	74.00	51.21	33.16	35.03	3.97	PEAK	VERTICAL	120	130

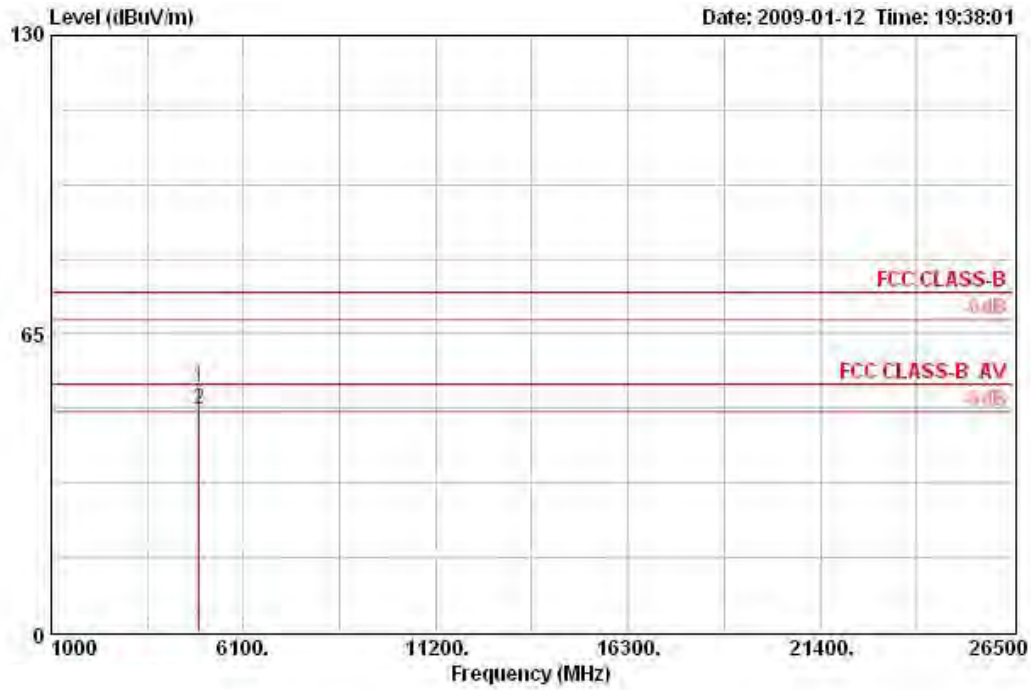
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 20MHz Ch11 / Mode 3

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	4923.970	44.46	-9.54	54.00	42.24	33.26	35.02	3.97	AVERAGE	HORIZONTAL	138	115
2	4924.170	50.46	-23.54	74.00	48.24	33.26	35.02	3.97	PEAK	HORIZONTAL	138	115

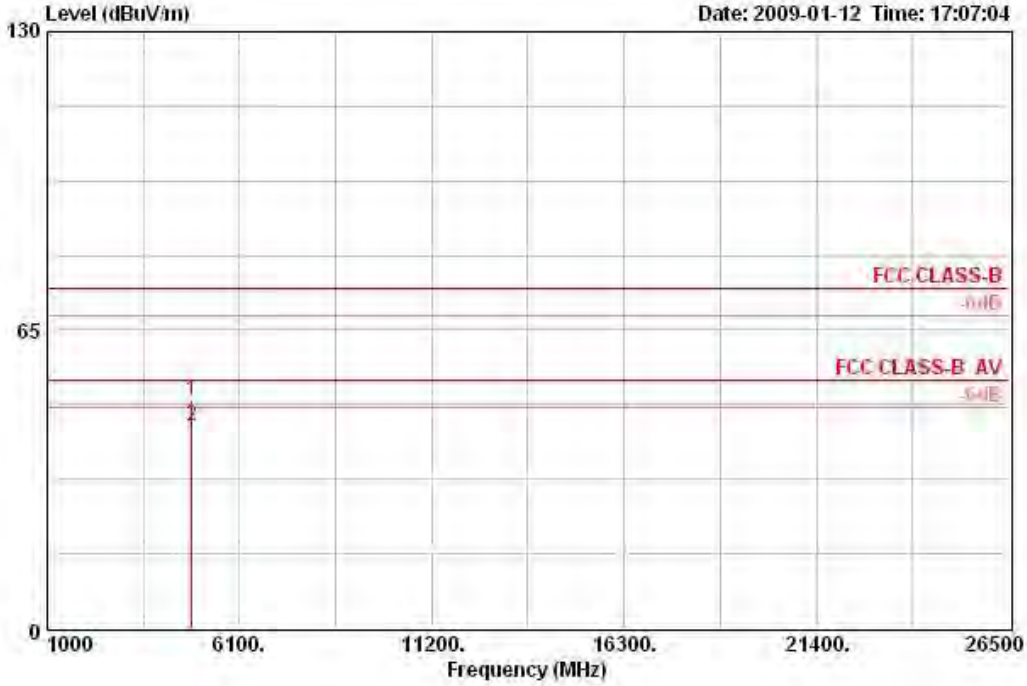
Vertical



	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	4923.920	53.27	-20.73	74.00	51.05	33.26	35.02	3.97	PEAK	VERTICAL	125	100
2 @	4923.970	48.68	-5.32	54.00	46.46	33.26	35.02	3.97	AVERAGE	VERTICAL	125	100

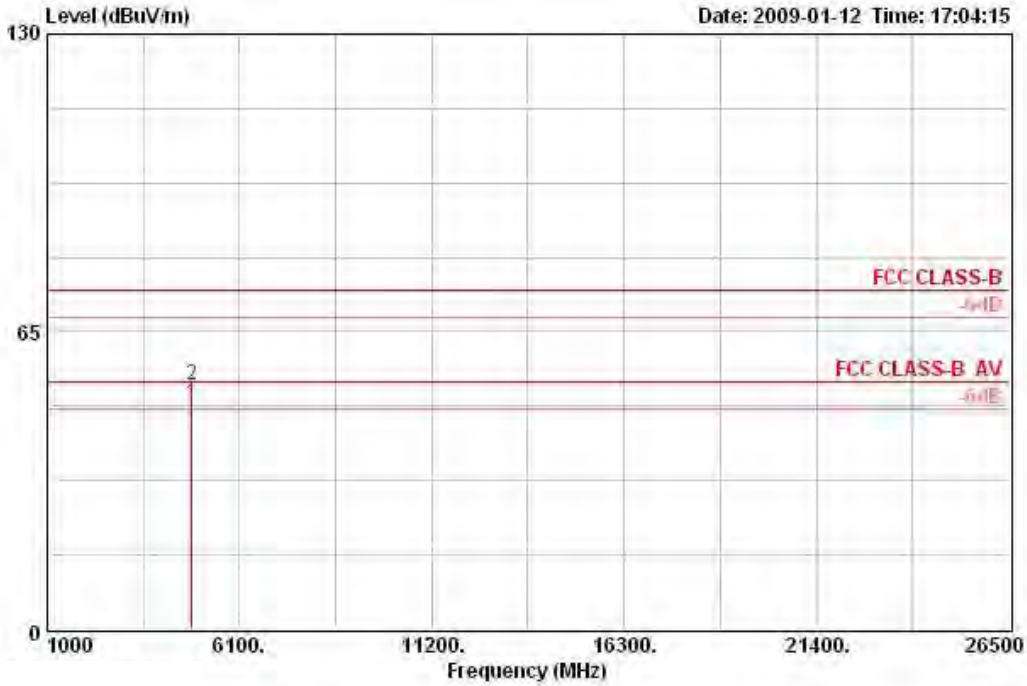
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 40MHz Ch 3 / Mode 3

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	4843.830	49.76	-24.24	74.00	47.74	33.09	35.03	3.96	PEAK	HORIZONTAL	137	116
2	4843.970	44.14	-9.86	54.00	42.12	33.09	35.03	3.96	AVERAGE	HORIZONTAL	137	116

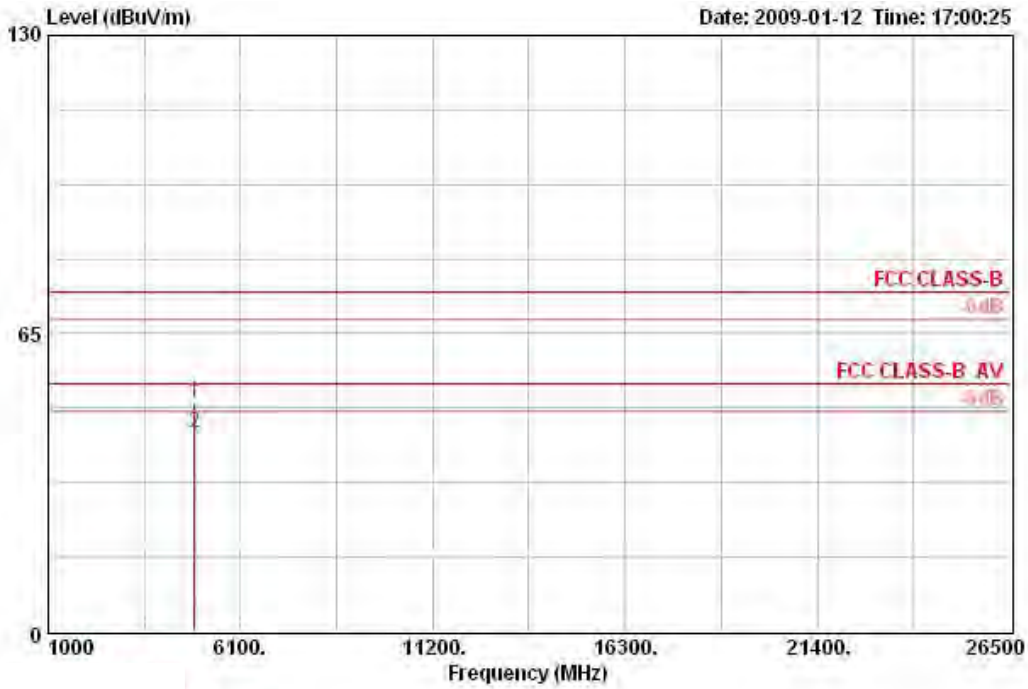
Vertical



	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 @	4843.970	49.09	-4.91	54.00	47.07	33.09	35.03	3.96	AVERAGE	VERTICAL	121	102
2	4843.970	53.38	-20.62	74.00	51.36	33.09	35.03	3.96	PEAK	VERTICAL	121	102

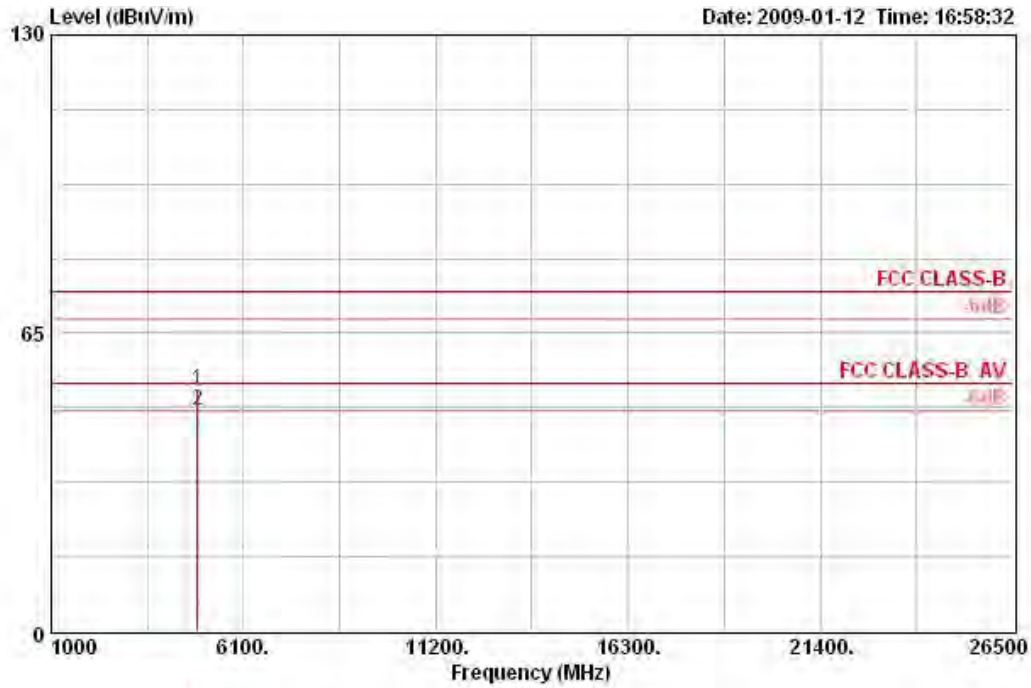
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 40MHz Ch 6 / Mode 3

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	4873.660	50.15	-23.85	74.00	48.05	33.16	35.03	3.97	PEAK	HORIZONTAL	139	113
2	4873.970	43.51	-10.49	54.00	41.41	33.16	35.03	3.97	AVERAGE	HORIZONTAL	139	113

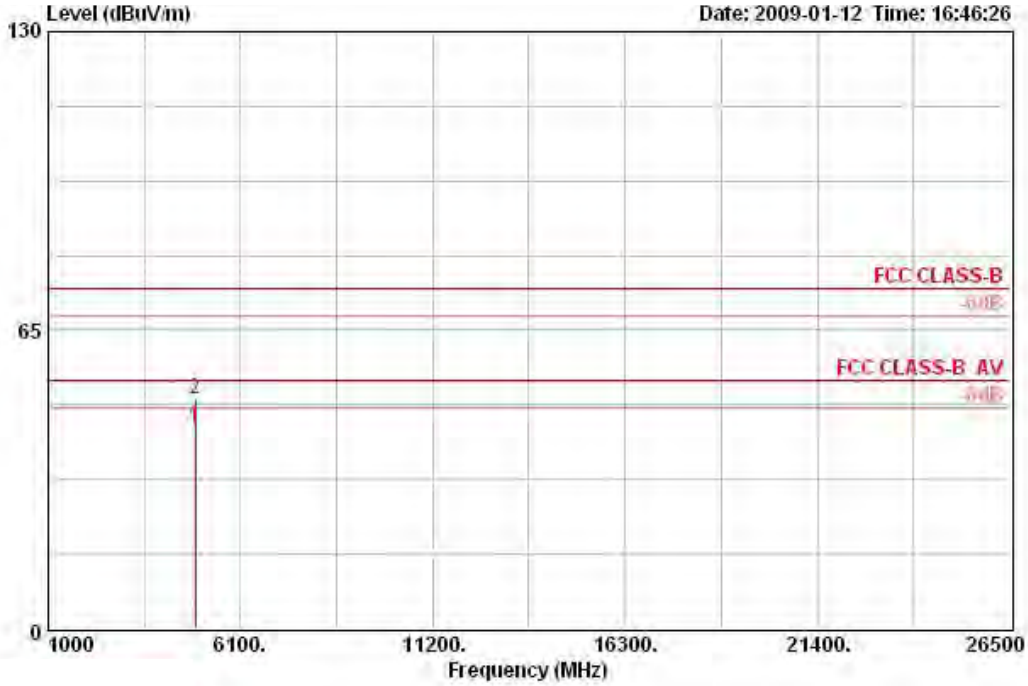
Vertical



	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	4873.830	52.69	-21.31	74.00	50.59	33.16	35.03	3.97	PEAK	VERTICAL	120	143
2 @	4873.970	48.18	-5.82	54.00	46.08	33.16	35.03	3.97	AVERAGE	VERTICAL	120	143

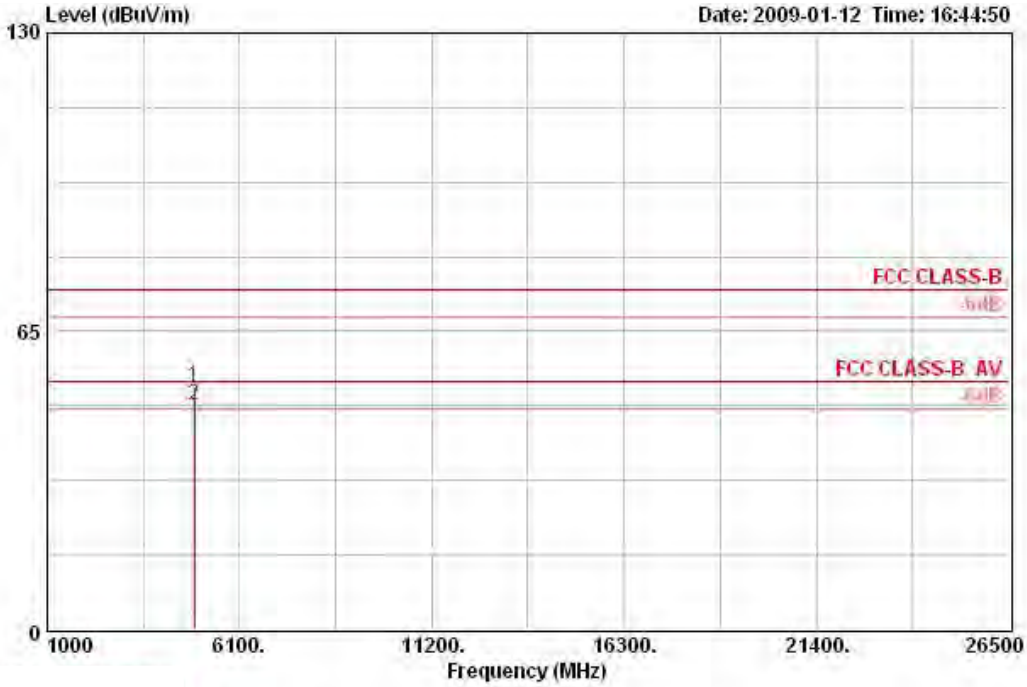
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 40MHz Ch 9 / Mode 3

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	4903.990	43.57	-10.43	54.00	41.43	33.19	35.02	3.97	AVERAGE	HORIZONTAL	141	103
2	4904.020	50.11	-23.89	74.00	47.97	33.19	35.02	3.97	PEAK	HORIZONTAL	141	103

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	4903.850	53.10	-20.90	74.00	50.96	33.19	35.02	3.97	PEAK	VERTICAL	138	103
2 @	4903.950	48.83	-5.17	54.00	46.69	33.19	35.02	3.97	AVERAGE	VERTICAL	138	103

Note:

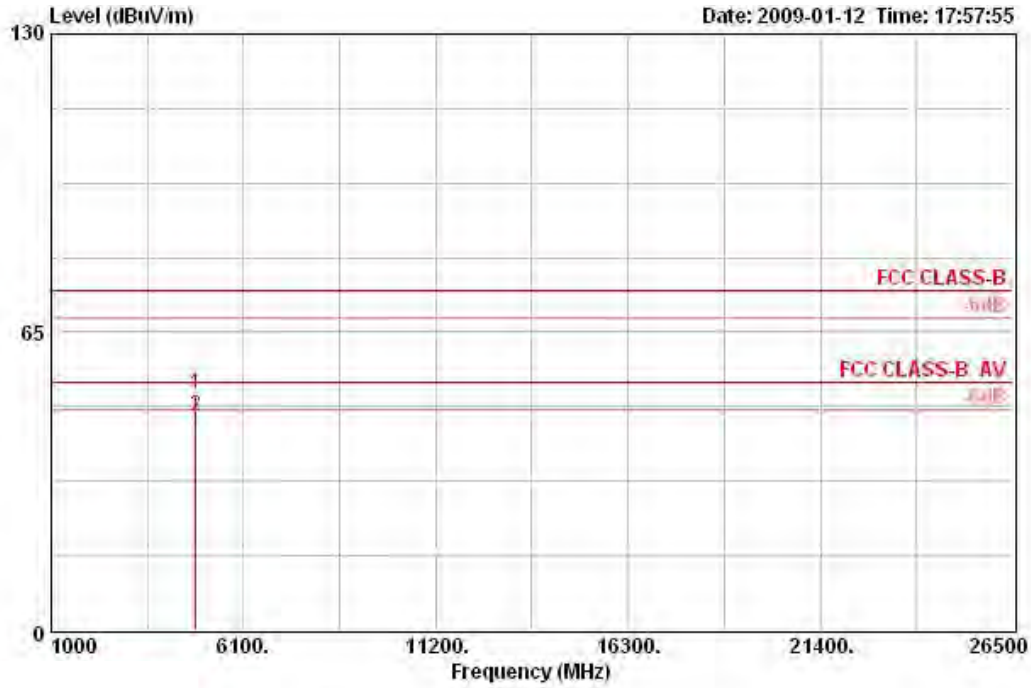
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

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

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

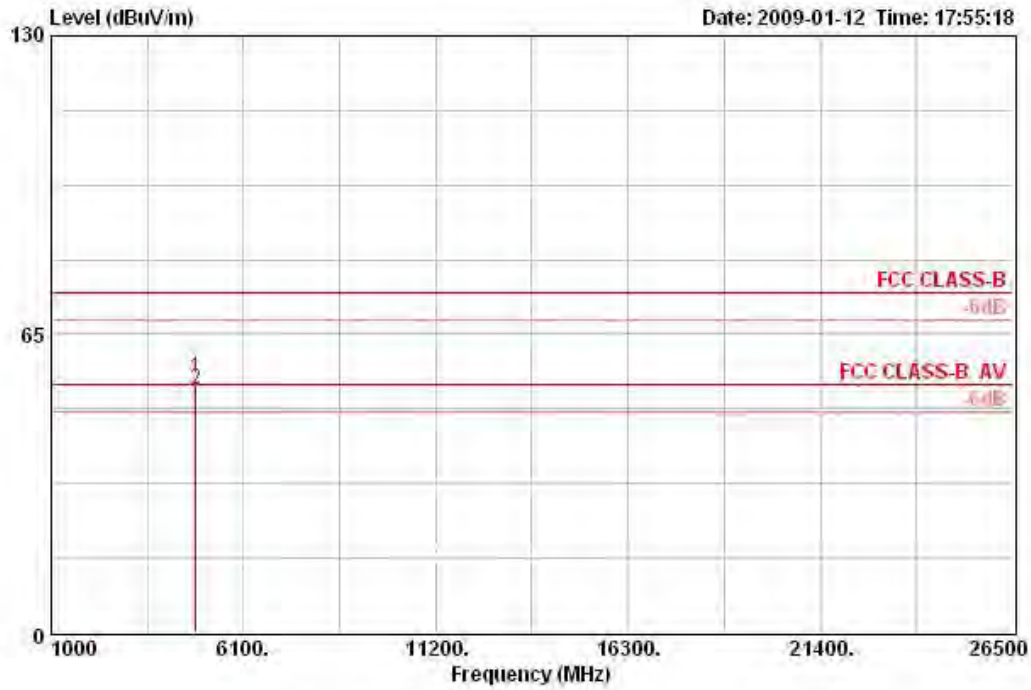
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11b CH 1 / Mode 3

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	4823.660	51.58	-22.42	74.00	49.60	33.06	35.04	3.96	PEAK	HORIZONTAL	119	100
2 @	4823.970	46.50	-7.50	54.00	44.52	33.06	35.04	3.96	AVERAGE	HORIZONTAL	119	100

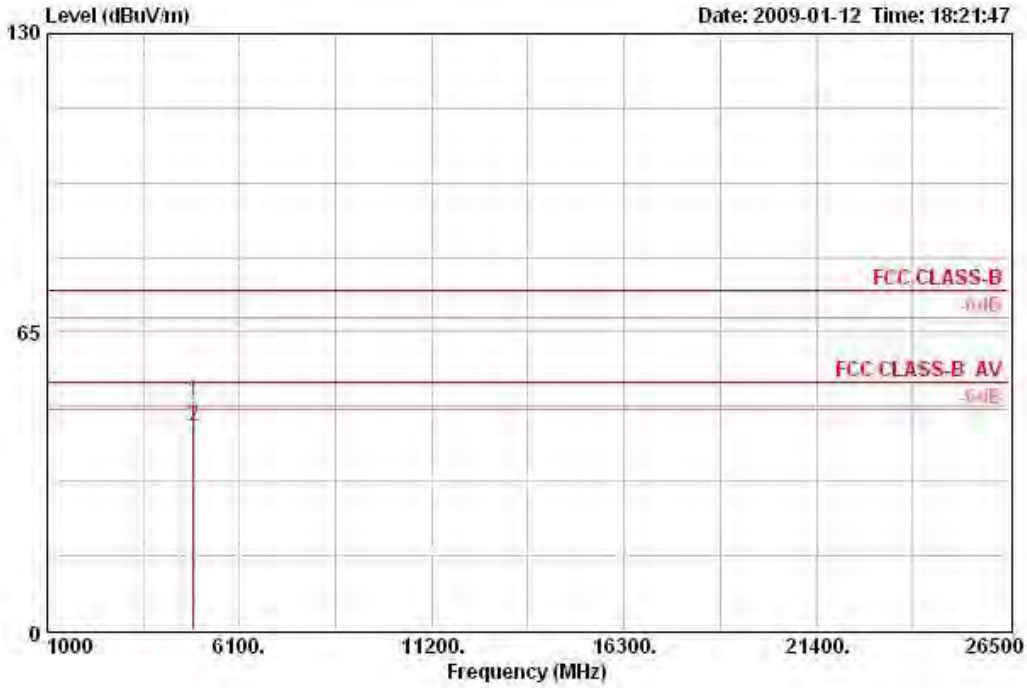
Vertical



	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	4823.980	55.72	-18.28	74.00	53.74	33.06	35.04	3.96	PEAK	VERTICAL	122	104
2 @	4823.990	52.89	-1.11	54.00	50.91	33.06	35.04	3.96	AVERAGE	VERTICAL	122	104

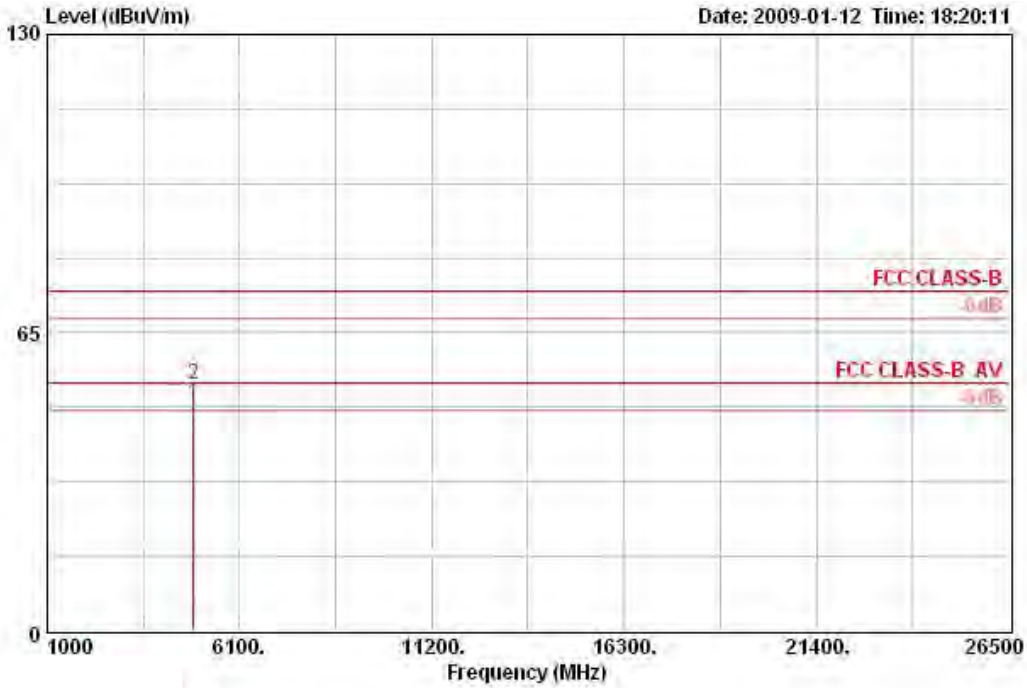
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11b CH 6 / Mode 3

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	4873.960	50.04	-23.96	74.00	47.94	33.16	35.03	3.97	PEAK	HORIZONTAL	134	166
2	4873.970	44.53	-9.47	54.00	42.43	33.16	35.03	3.97	AVERAGE	HORIZONTAL	134	166

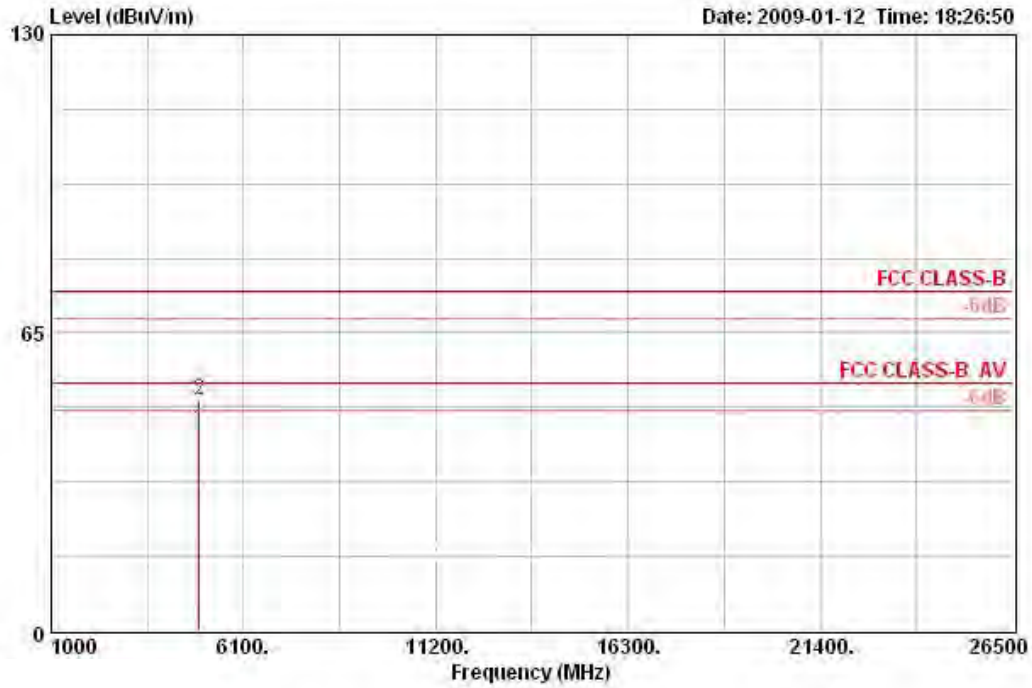
Vertical



	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 @	4873.950	49.74	-4.26	54.00	47.65	33.16	35.03	3.97	AVERAGE	VERTICAL	113	101
2	4873.950	53.88	-20.12	74.00	51.78	33.16	35.03	3.97	PEAK	VERTICAL	113	101

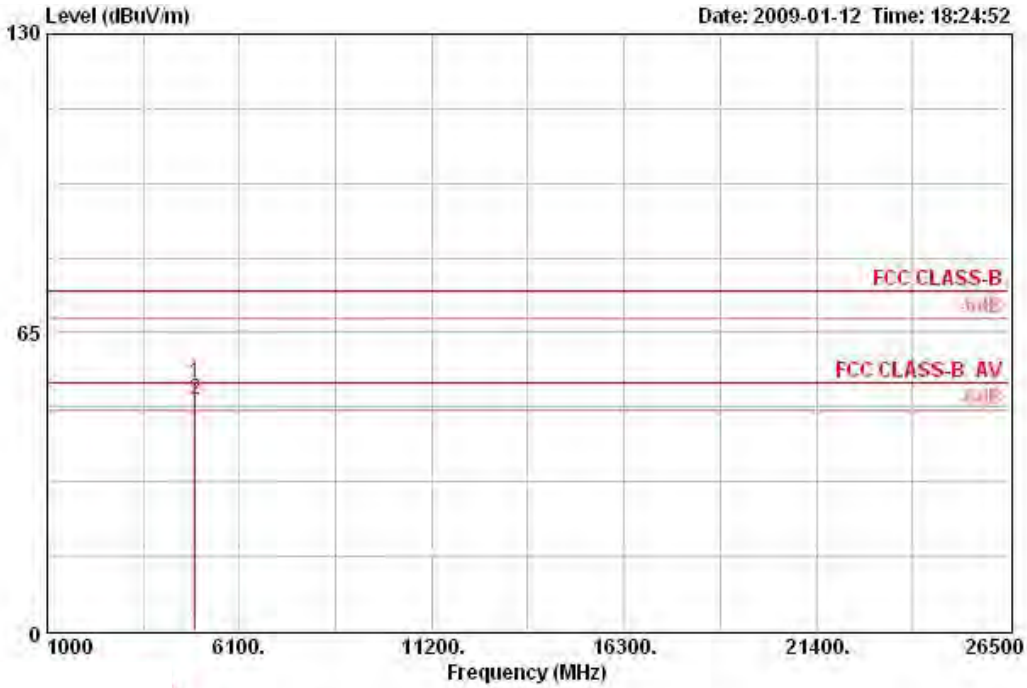
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11b CH 11 / Mode 3

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	4923.970	44.13	-9.87	54.00	41.91	33.26	35.02	3.97	AVERAGE	HORIZONTAL	147	162
2	4924.080	50.27	-23.73	74.00	48.05	33.26	35.02	3.97	PEAK	HORIZONTAL	147	162

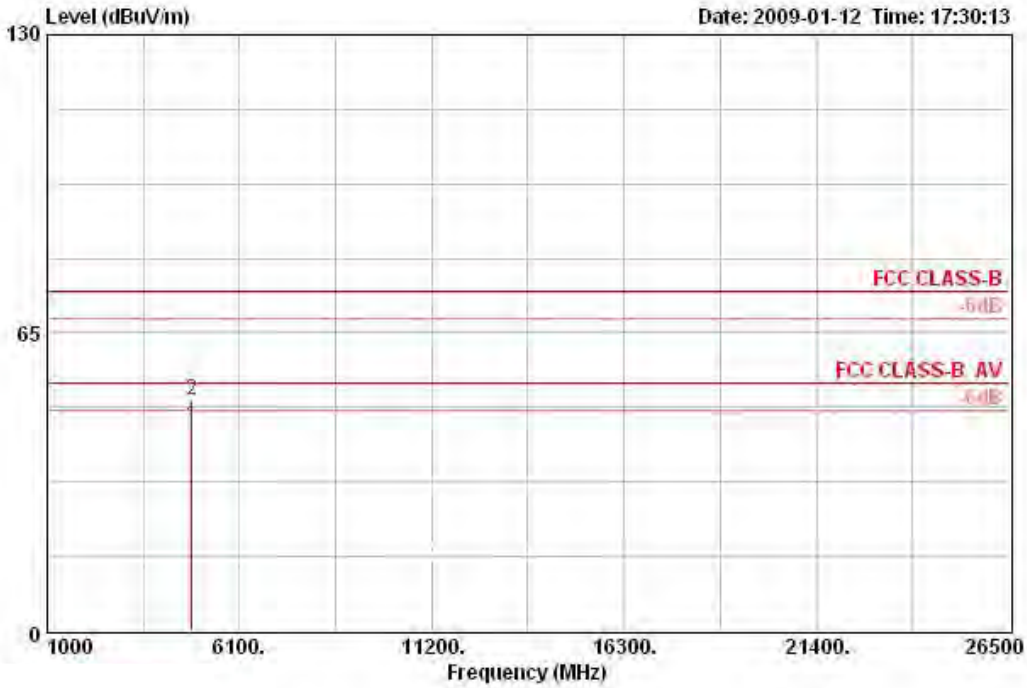
Vertical



	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	4923.950	53.93	-20.07	74.00	51.71	33.26	35.02	3.97	PEAK	VERTICAL	130	100
2 @	4923.970	50.25	-3.75	54.00	48.04	33.26	35.02	3.97	AVERAGE	VERTICAL	130	100

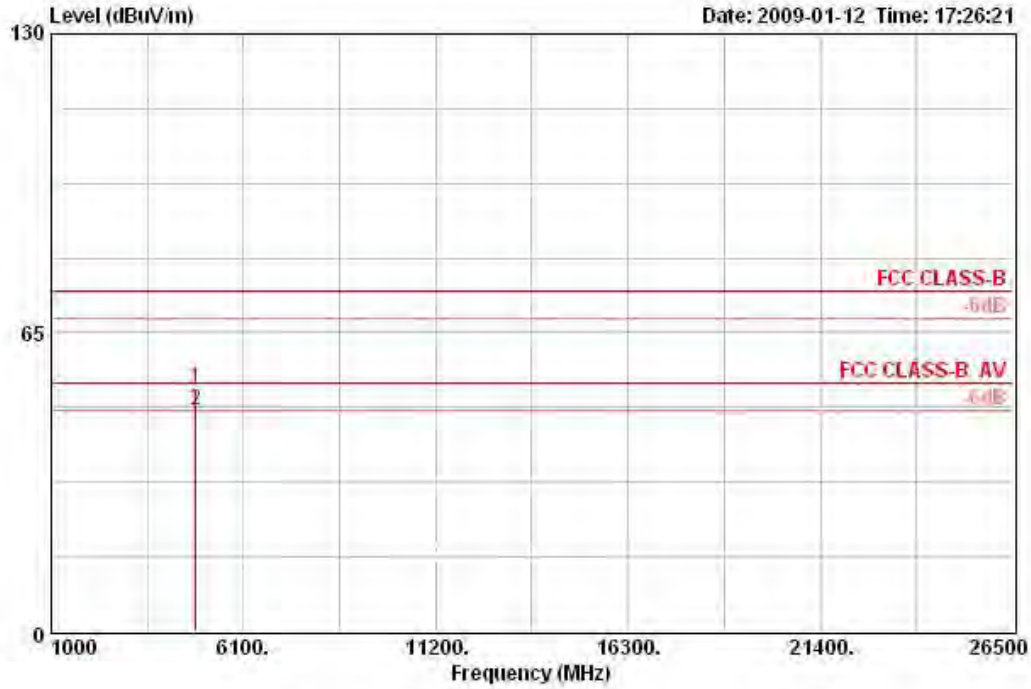
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11g CH 1 / Mode 3

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	4823.990	44.66	-9.34	54.00	42.68	33.06	35.04	3.96	AVERAGE	HORIZONTAL	135	104
2	4824.000	50.53	-23.47	74.00	48.55	33.06	35.04	3.96	PEAK	HORIZONTAL	135	104

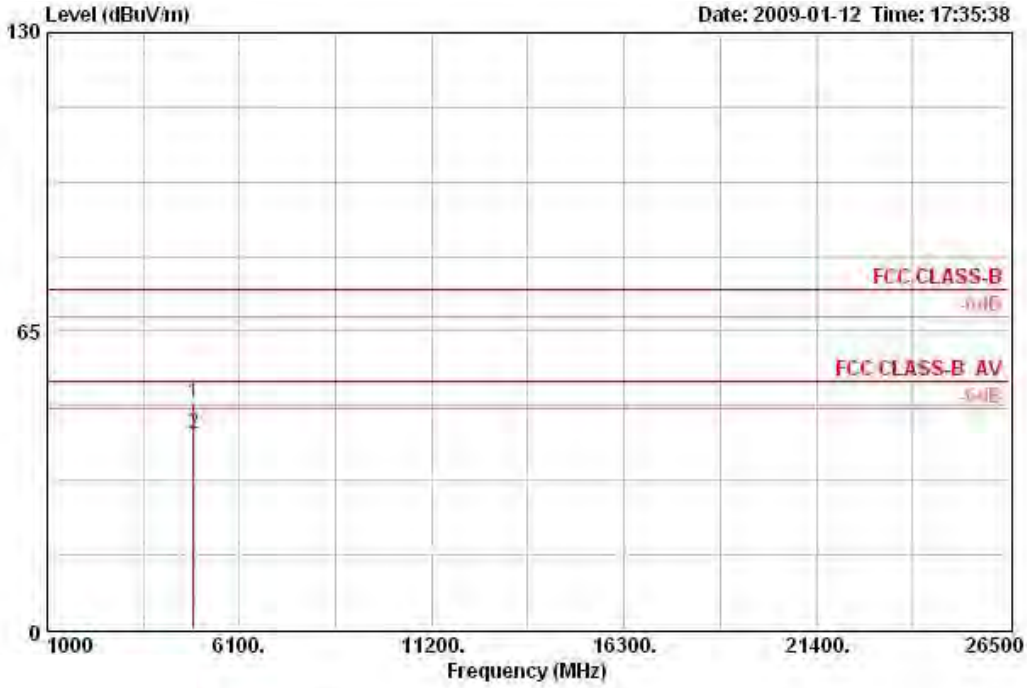
Vertical



	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	4823.910	53.02	-20.98	74.00	51.04	33.06	35.04	3.96	PEAK	VERTICAL	118	103
2 @	4823.970	48.31	-5.69	54.00	46.33	33.06	35.04	3.96	AVERAGE	VERTICAL	118	103

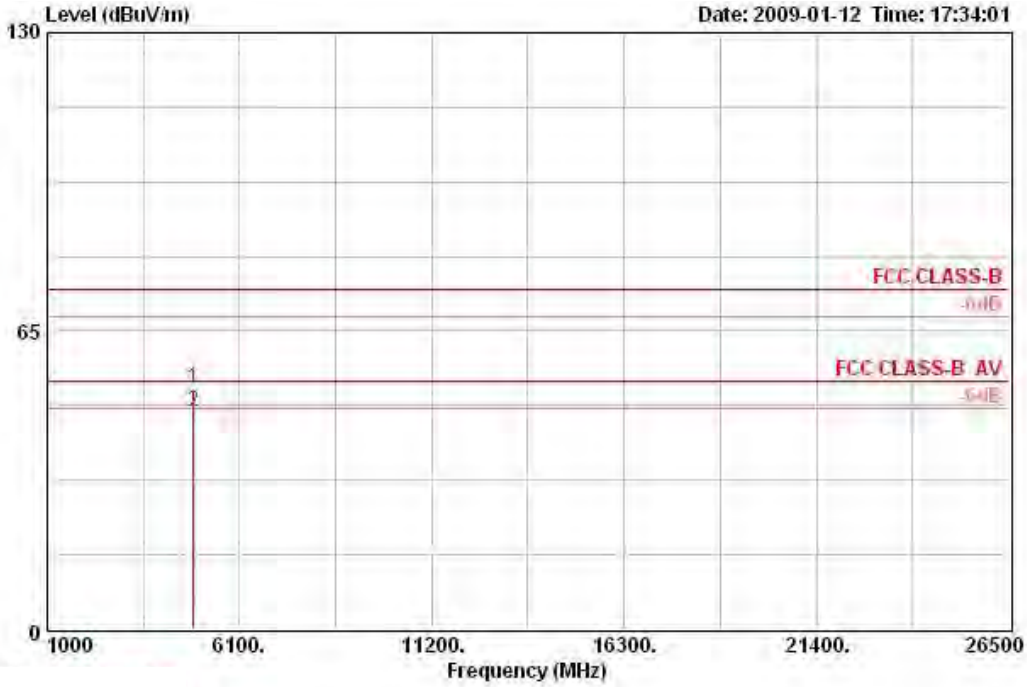
Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11g CH 6 / Mode 3

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	4873.950	49.23	-24.77	74.00	47.13	33.16	35.03	3.97	PEAK	HORIZONTAL	138	114
2	4873.990	42.47	-11.53	54.00	40.37	33.16	35.03	3.97	AVERAGE	HORIZONTAL	138	114

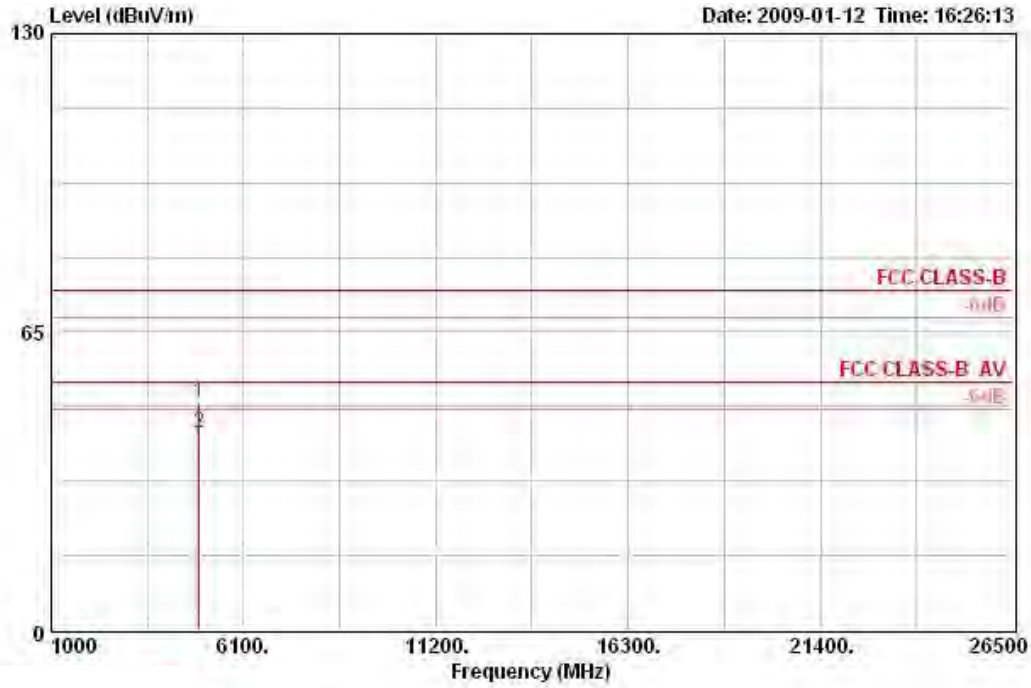
Vertical



	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	4873.800	52.57	-21.43	74.00	50.47	33.16	35.03	3.97	PEAK	VERTICAL	119	142
2 @	4873.990	47.51	-6.49	54.00	45.41	33.16	35.03	3.97	AVERAGE	VERTICAL	119	142

Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11g CH 11 / Mode 3

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	4923.860	49.47	-24.53	74.00	47.25	33.26	35.02	3.97	PEAK	HORIZONTAL	140	113
2	4923.970	42.93	-11.07	54.00	40.71	33.26	35.02	3.97	AVERAGE	HORIZONTAL	140	113

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	4923.910	53.71	-20.29	74.00	51.49	33.26	35.02	3.97	PEAK	VERTICAL	124	142
2 @	4923.970	49.11	-4.89	54.00	46.89	33.26	35.02	3.97	AVERAGE	VERTICAL	124	142

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. Band Edge Emissions Measurement

4.6.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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 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)	100 KHz /100 KHz for Peak

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the freqeuncy 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.

4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

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. Test Result of Band Edge and Fundamental Emissions

Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 20MHz Ch 1, 6, 11 / Mode 3
Test Date	Jan. 12, 2009		

Channel 1

	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 @	2390.000	48.27	-5.73	54.00	17.34	28.17	0.00	2.76	AVERAGE	HORIZONTAL	101	119
2	2390.000	63.66	-10.34	74.00	32.73	28.17	0.00	2.76	PEAK	HORIZONTAL	101	119
3 @	2408.800	103.83			72.84	28.21	0.00	2.77	PEAK	HORIZONTAL	101	119
4 @	2408.800	92.69			61.71	28.21	0.00	2.77	AVERAGE	HORIZONTAL	101	119

Item 3, 4 are the fundamental frequency at 2412 MHz

Channel 6

	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	2389.400	56.32	-17.68	74.00	25.38	28.17	0.00	2.76	PEAK	HORIZONTAL	99	113
2	2390.000	44.36	-9.64	54.00	13.43	28.17	0.00	2.76	AVERAGE	HORIZONTAL	99	113
3 @	2440.600	102.83			71.76	28.29	0.00	2.78	PEAK	HORIZONTAL	99	113
4 @	2442.400	92.26			61.19	28.29	0.00	2.78	AVERAGE	HORIZONTAL	99	113
5 @	2483.500	45.71	-8.29	54.00	14.52	28.38	0.00	2.81	AVERAGE	HORIZONTAL	99	113
6	2483.700	57.53	-16.47	74.00	26.34	28.38	0.00	2.81	PEAK	HORIZONTAL	99	113

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 11

	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 @	2467.400	93.55			62.42	28.33	0.00	2.80	AVERAGE	HORIZONTAL	98	109
2 @	2468.000	104.46			73.33	28.33	0.00	2.80	PEAK	HORIZONTAL	98	109
3 @	2483.500	53.17	-0.83	54.00	21.99	28.38	0.00	2.81	AVERAGE	HORIZONTAL	98	109
4 @	2483.500	68.26	-5.74	74.00	37.08	28.38	0.00	2.81	PEAK	HORIZONTAL	98	109

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	Draft n MCS0 40MHz Ch 3, 6, 9 / Mode 3
Test Date	Jan. 12, 2009		

Channel 3

	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	2388.800	64.23	-9.77	74.00	33.30	28.17	0.00	2.76	PEAK	HORIZONTAL	99	119
2 @	2390.000	51.10	-2.90	54.00	20.17	28.17	0.00	2.76	AVERAGE	HORIZONTAL	99	119
3 @	2412.400	100.38			69.40	28.21	0.00	2.77	PEAK	HORIZONTAL	99	119
4 @	2412.400	89.72			58.74	28.21	0.00	2.77	AVERAGE	HORIZONTAL	99	119

Item 3, 4 are the fundamental frequency at 2422 MHz.

Channel 6

	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	2389.200	59.10	-14.90	74.00	28.17	28.17	0.00	2.76	PEAK	HORIZONTAL	254	128
2 @	2390.000	45.58	-8.42	54.00	14.65	28.17	0.00	2.76	AVERAGE	HORIZONTAL	254	128
3 @	2443.800	89.03			57.96	28.29	0.00	2.78	AVERAGE	HORIZONTAL	254	128
4 @	2444.200	99.86			68.79	28.29	0.00	2.78	PEAK	HORIZONTAL	254	128
5 @	2483.500	49.43	-4.57	54.00	18.24	28.38	0.00	2.81	AVERAGE	HORIZONTAL	254	128
6	2483.900	64.39	-9.61	74.00	33.20	28.38	0.00	2.81	PEAK	HORIZONTAL	254	128

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 9

	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 @	2454.800	96.93			65.80	28.33	0.00	2.80	PEAK	HORIZONTAL	274	109
2 @	2455.600	88.79			57.66	28.33	0.00	2.80	AVERAGE	HORIZONTAL	274	109
3 @	2483.500	53.34	-0.66	54.00	22.15	28.38	0.00	2.81	AVERAGE	HORIZONTAL	274	109
4 @	2485.100	66.81	-7.19	74.00	35.58	28.42	0.00	2.81	PEAK	HORIZONTAL	274	109

Item 1, 2 are the fundamental frequency at 2452 MHz.

Note:

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

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

Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11b CH 1, 6, 11 / Mode 3
Test Date	Jan. 12, 2009		

Channel 1

	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 @	2386.400	47.00	-7.00	54.00	16.07	28.17	0.00	2.76	AVERAGE	HORIZONTAL	102	120
2	2387.200	58.12	-15.88	74.00	27.19	28.17	0.00	2.76	PEAK	HORIZONTAL	102	120
3 @	2411.000	104.87			73.89	28.21	0.00	2.77	PEAK	HORIZONTAL	102	120
4 @	2411.200	100.24			69.26	28.21	0.00	2.77	AVERAGE	HORIZONTAL	102	120

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

	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	2389.800	56.94	-17.06	74.00	26.01	28.17	0.00	2.76	PEAK	HORIZONTAL	97	117
2	2390.000	44.33	-9.67	54.00	13.40	28.17	0.00	2.76	AVERAGE	HORIZONTAL	97	117
3 @	2437.800	99.62			68.55	28.29	0.00	2.78	AVERAGE	HORIZONTAL	97	117
4 @	2438.200	104.48			73.41	28.29	0.00	2.78	PEAK	HORIZONTAL	97	117
5	2483.500	57.72	-16.28	74.00	26.54	28.38	0.00	2.81	PEAK	HORIZONTAL	97	117
6 @	2483.500	45.10	-8.90	54.00	13.91	28.38	0.00	2.81	AVERAGE	HORIZONTAL	97	117

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 11

	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 @	2462.800	102.41			71.28	28.33	0.00	2.80	AVERAGE	HORIZONTAL	63	112
2 @	2463.200	107.08			75.95	28.33	0.00	2.80	PEAK	HORIZONTAL	63	112
3	2488.100	61.87	-12.13	74.00	30.64	28.42	0.00	2.81	PEAK	HORIZONTAL	63	112
4 @	2488.500	52.60	-1.40	54.00	21.37	28.42	0.00	2.81	AVERAGE	HORIZONTAL	63	112

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	25°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	802.11g CH 1, 6, 11 / Mode 3
Test Date	Jan. 12, 2009		

Channel 1

	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 @	2390.000	47.20	-6.80	54.00	16.27	28.17	0.00	2.76	AVERAGE	HORIZONTAL	102	118
2	2390.000	60.51	-13.49	74.00	29.58	28.17	0.00	2.76	PEAK	HORIZONTAL	102	118
3 @	2407.800	103.81			72.83	28.21	0.00	2.77	PEAK	HORIZONTAL	102	118
4 @	2408.800	93.42			62.44	28.21	0.00	2.77	AVERAGE	HORIZONTAL	102	118

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

	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	2388.800	56.57	-17.43	74.00	25.63	28.17	0.00	2.76	PEAK	HORIZONTAL	101	116
2	2390.000	44.43	-9.57	54.00	13.50	28.17	0.00	2.76	AVERAGE	HORIZONTAL	101	116
3 @	2442.400	103.18			72.11	28.29	0.00	2.78	PEAK	HORIZONTAL	101	116
4 @	2443.200	93.10			62.03	28.29	0.00	2.78	AVERAGE	HORIZONTAL	101	116
5	2483.500	58.07	-15.93	74.00	26.88	28.38	0.00	2.81	PEAK	HORIZONTAL	101	116
6 @	2483.500	45.60	-8.40	54.00	14.41	28.38	0.00	2.81	AVERAGE	HORIZONTAL	101	116

Item 3, 4 are the fundamental frequency at 2437 MHz.

Channel 11

	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 @	2466.800	105.72			74.59	28.33	0.00	2.80	PEAK	HORIZONTAL	218	106
2 @	2468.200	95.16			63.99	28.38	0.00	2.80	AVERAGE	HORIZONTAL	218	106
3 @	2483.500	53.63	-0.37	54.00	22.45	28.38	0.00	2.81	AVERAGE	HORIZONTAL	218	106
4 @	2483.500	71.37	-2.63	74.00	40.18	28.38	0.00	2.81	PEAK	HORIZONTAL	218	106

Item 1, 2 are the fundamental frequency at 2462 MHz.

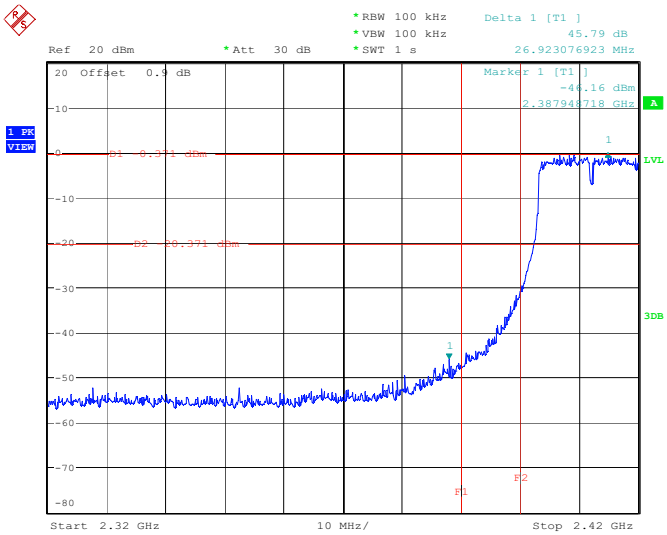
Note:

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

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

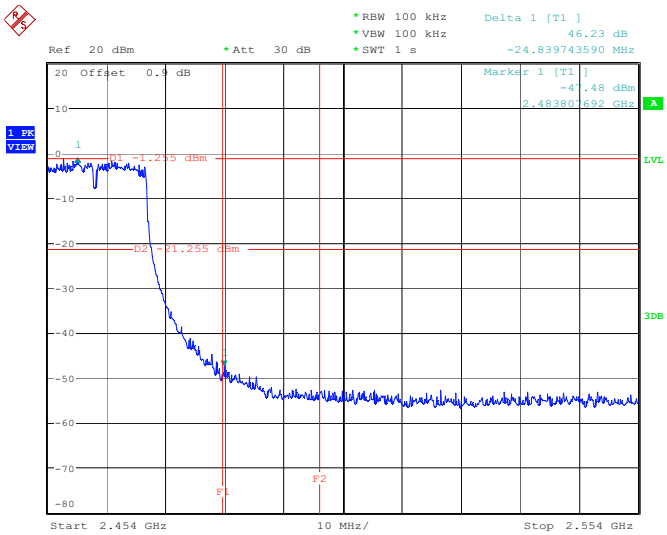
For Emission not in Restricted Band

Low Band Edge Plot on Configuration Draft n MCS0 20MHz Ant. A / 2412 MHz



Date: 13.JAN.2009 14:57:43

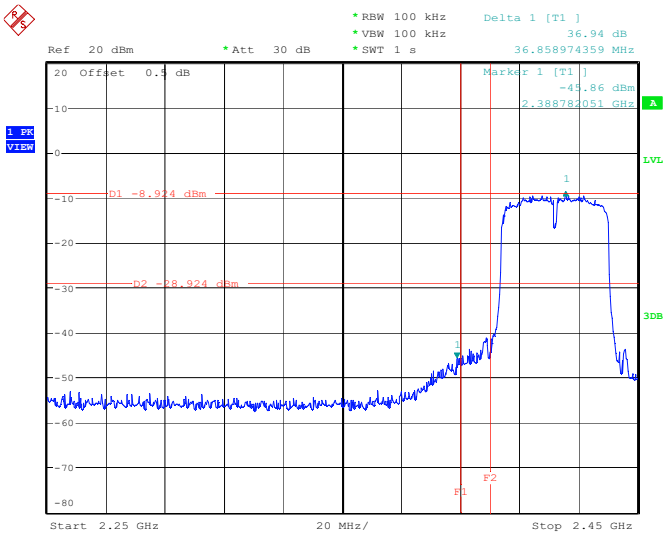
High Band Edge Plot on Configuration Draft n MCS0 20MHz Ant. A / 2462 MHz



Date: 13.JAN.2009 13:28:05

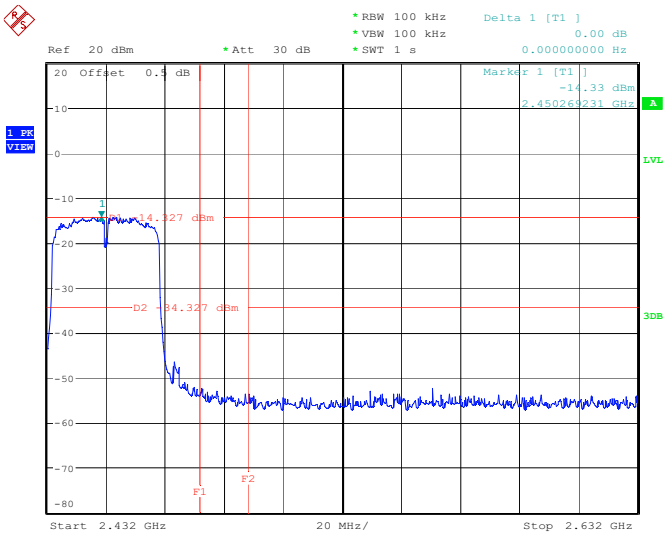
For Emission not in Restricted Band

Low Band Edge Plot on Configuration Draft n MCS0 40MHz Ant. A / 2422 MHz



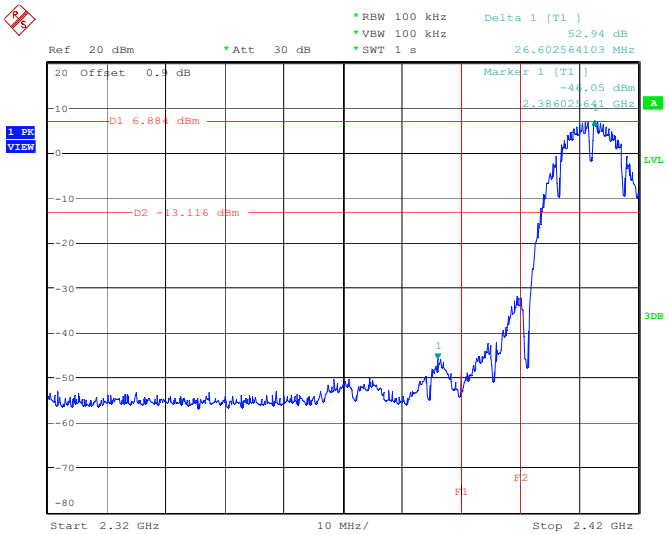
Date: 15.JAN.2009 13:48:38

High Band Edge Plot on Configuration Draft n MCS0 40MHz Ant. A / 2452 MHz



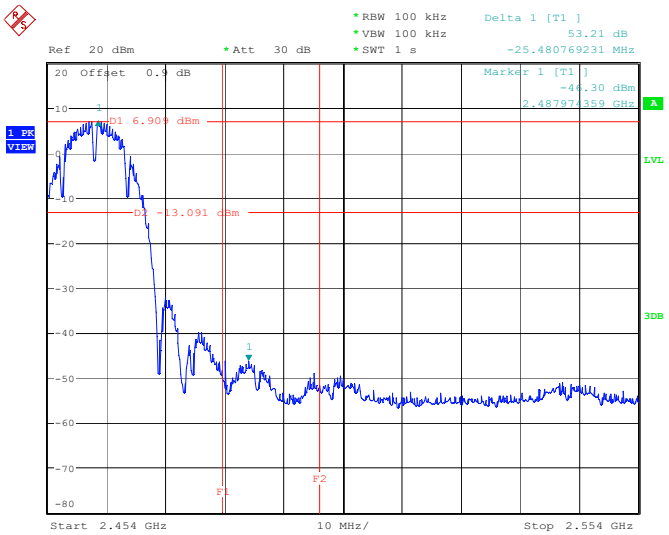
Date: 15.JAN.2009 13:54:46

Low Band Edge Plot on Configuration IEEE 802.11b Ant. A / 2412 MHz



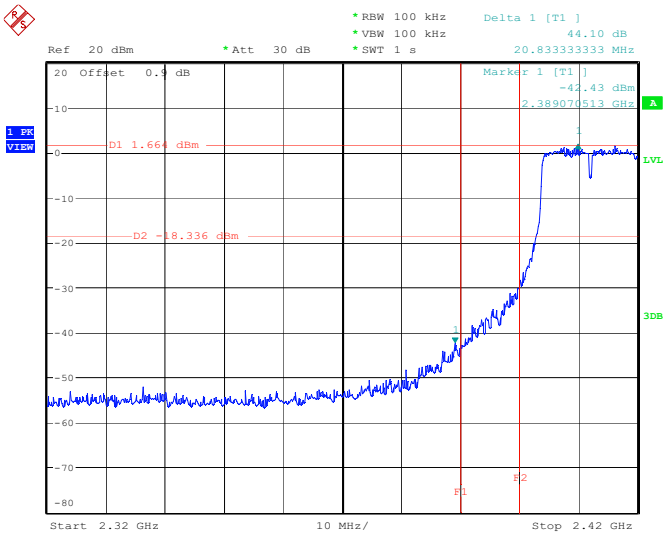
Date: 13.JAN.2009 13:08:11

High Band Edge Plot on Configuration IEEE 802.11b Ant. A / 2462 MHz



Date: 13.JAN.2009 14:02:46

Low Band Edge Plot on Configuration IEEE 802.11g Ant. A / 2412 MHz



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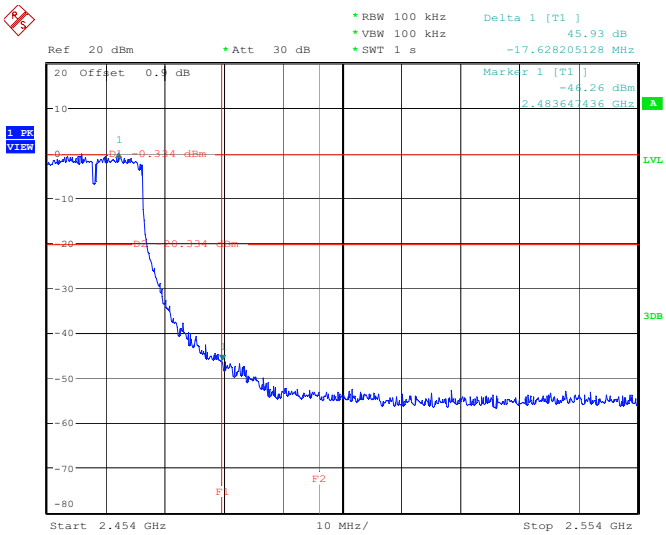
High Band Edge Plot on Configuration IEEE 802.11g Ant. A / 2462 MHz



Date: 13.JAN.2009 13:16:05

4.7. Antenna Requirements

4.7.1. 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.

4.7.2. 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	Mar. 03, 2008	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 31, 2008	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2008	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2008	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN ST08	21653	9kHz –30MHz	Mar. 27, 2008	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. 14, 2008	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 14, 2008	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jul. 21, 2008	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Jan. 22, 2007*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP30	100023	9 kHz - 30 GHz	Jan. 10, 2008	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. 12, 2008	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 04, 2008	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan.18, 2008	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec. 01, 2008	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec. 01, 2008	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	FSP30	100023	9kHz ~ 30GHz	Jan. 10, 2008	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100458	DC ~ 30GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 11, 2008	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	May 30, 2008*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2008	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Jul. 18, 2008	Conducted (TH01-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
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	Dec. 14, 2008	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 10, 2008	Conducted (TH01-HY)
Oscilloscope	Tektonix	TDS380	B016197	400MHz/ 2GS/s	Jun. 27, 2008	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

TAF

Certificate No. : 1190-081212

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 Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities

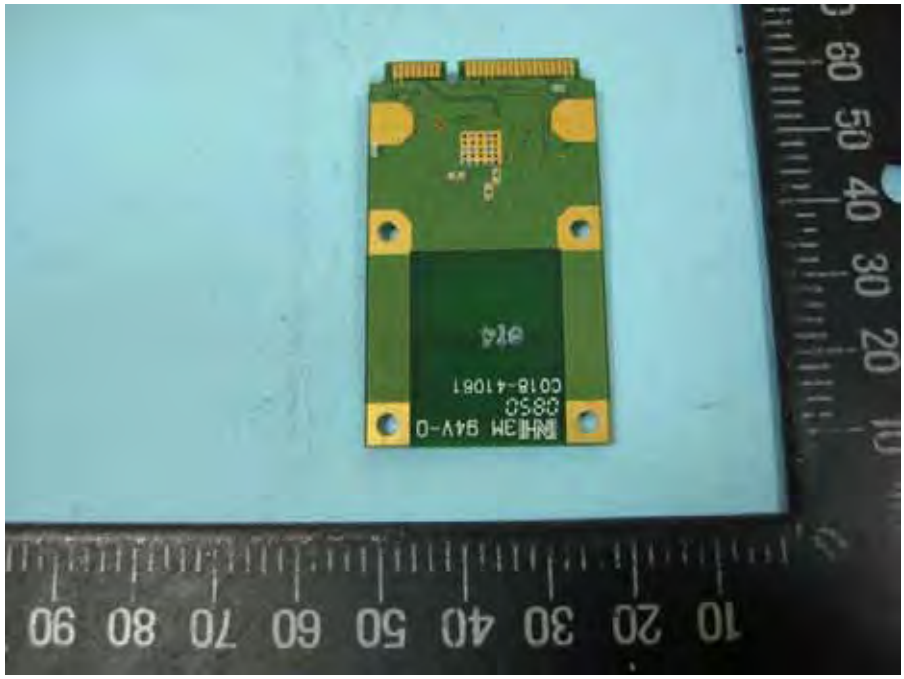
Jay-San Chen
President, Taiwan Accreditation Foundation
Date : December 12, 2008

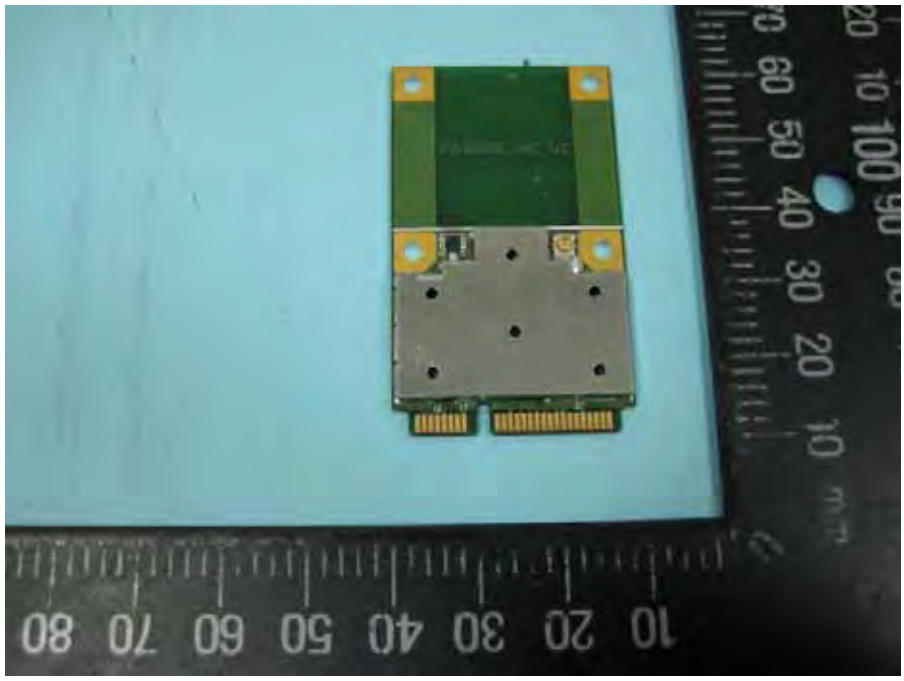
P1, total 18 pages

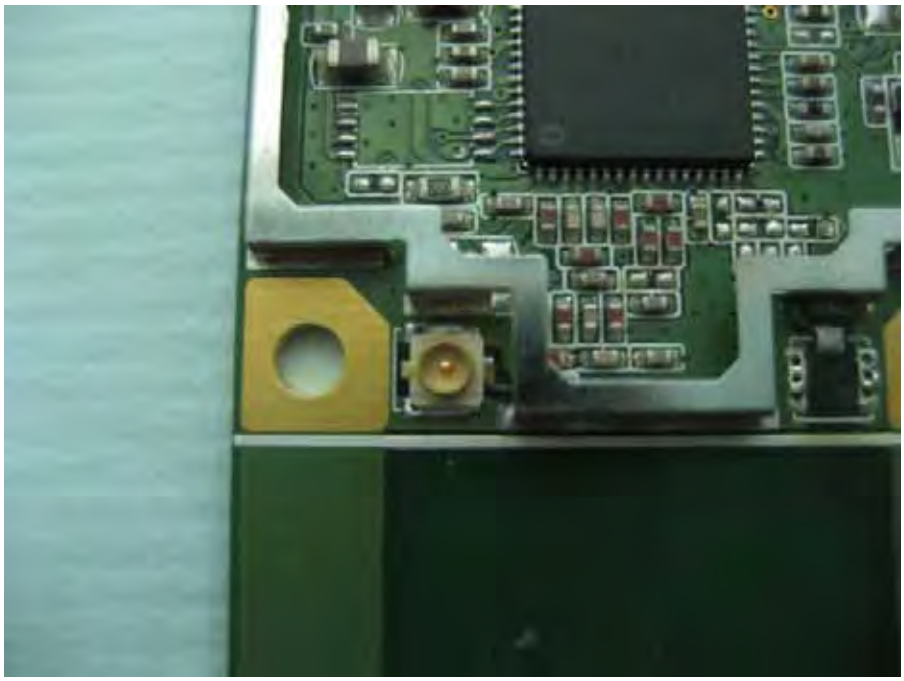
The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix

APPENDIX A. Photographs of EUT

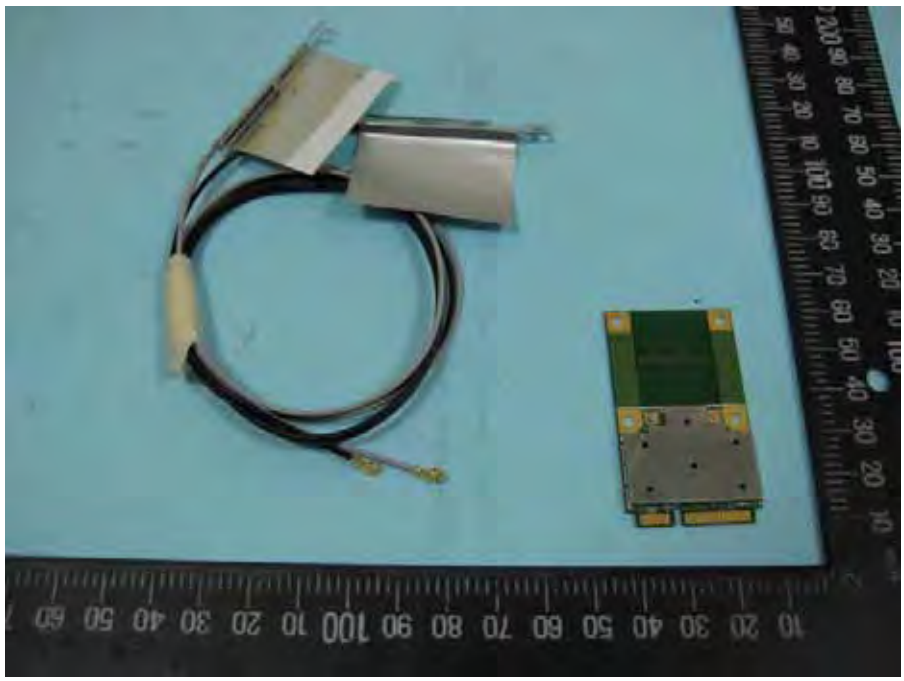
EUT 1:
Full Size Module with one Antenna Connector

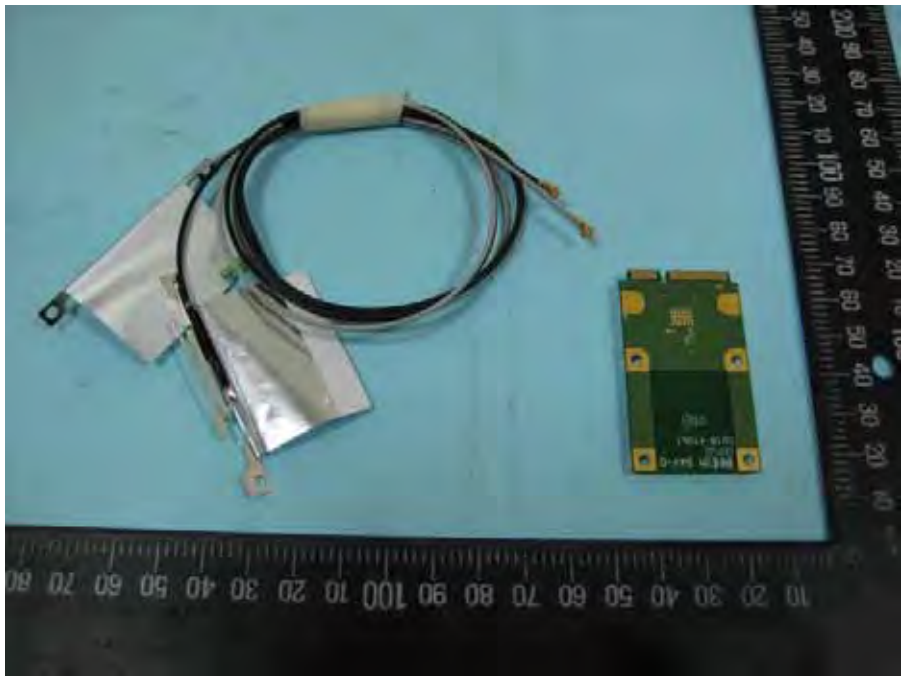


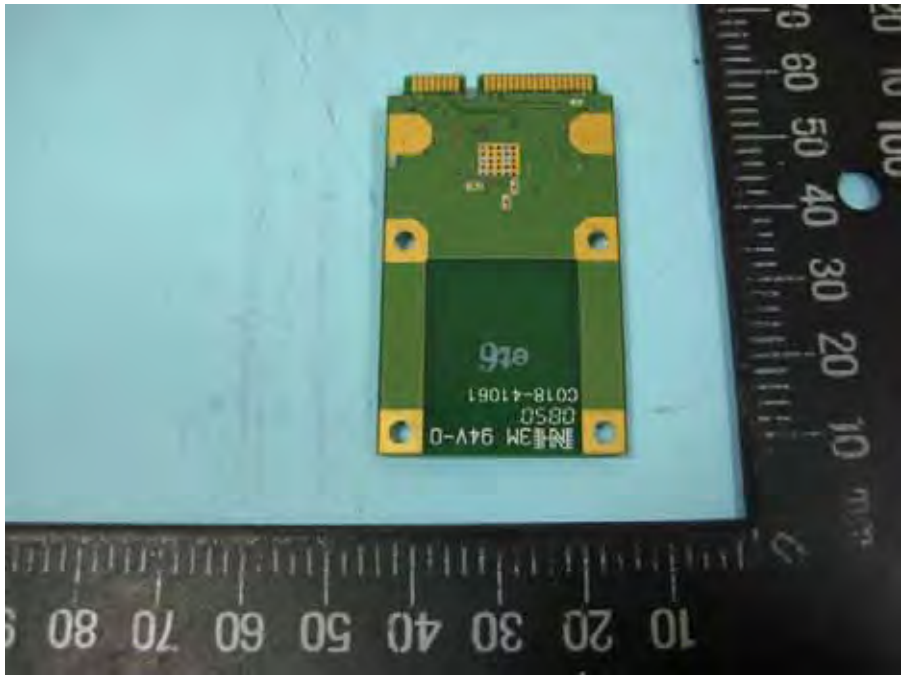


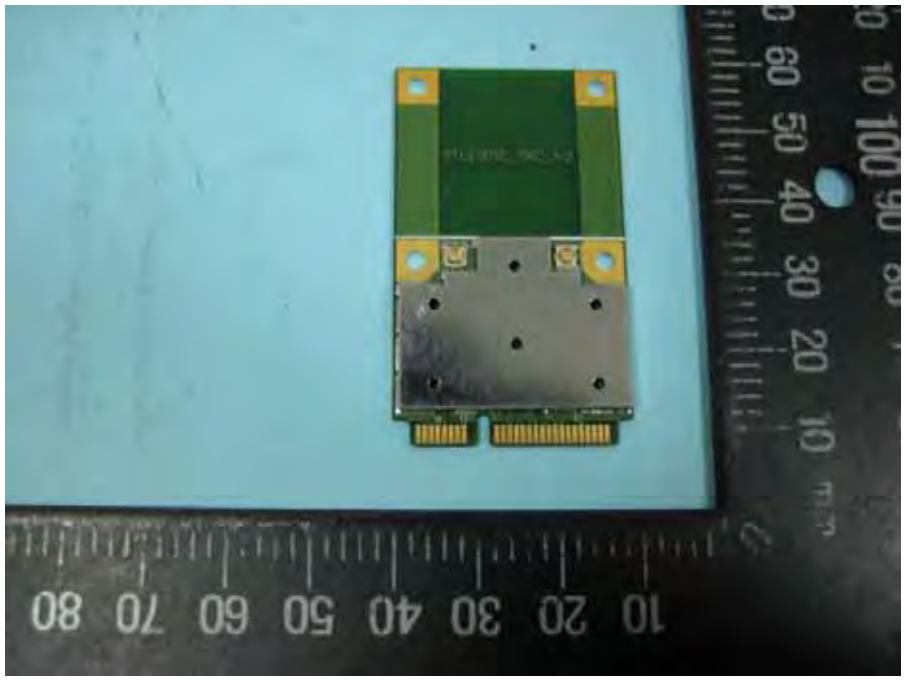


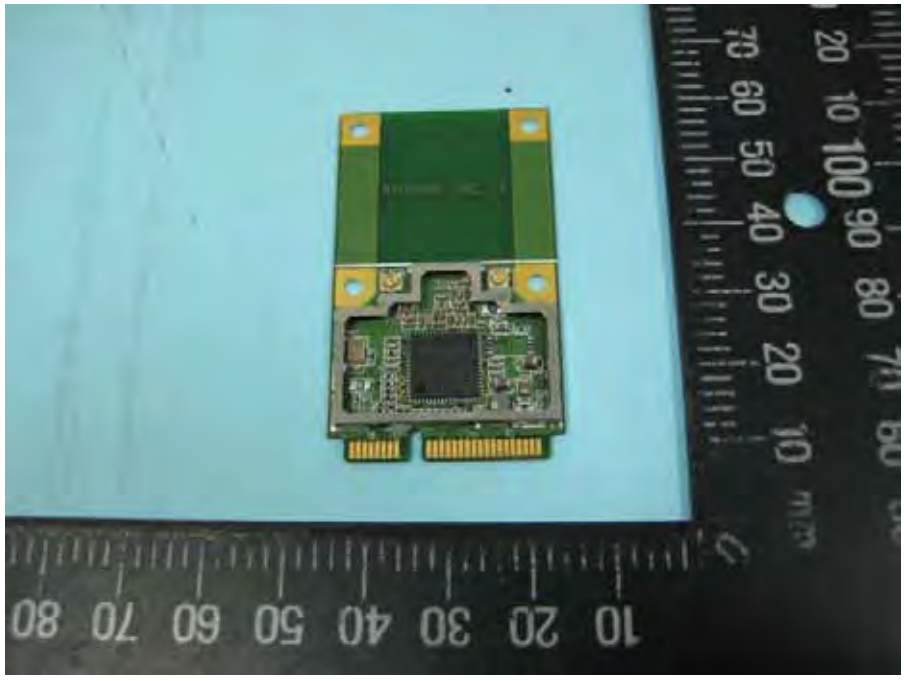
EUT 2:
Full Size Module with two
Antenna Connectors

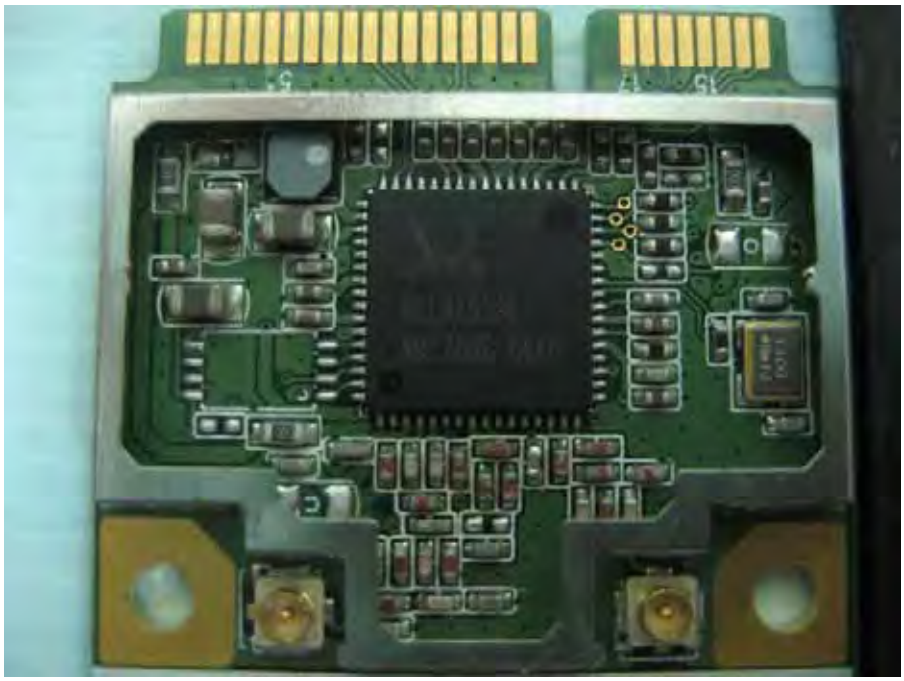


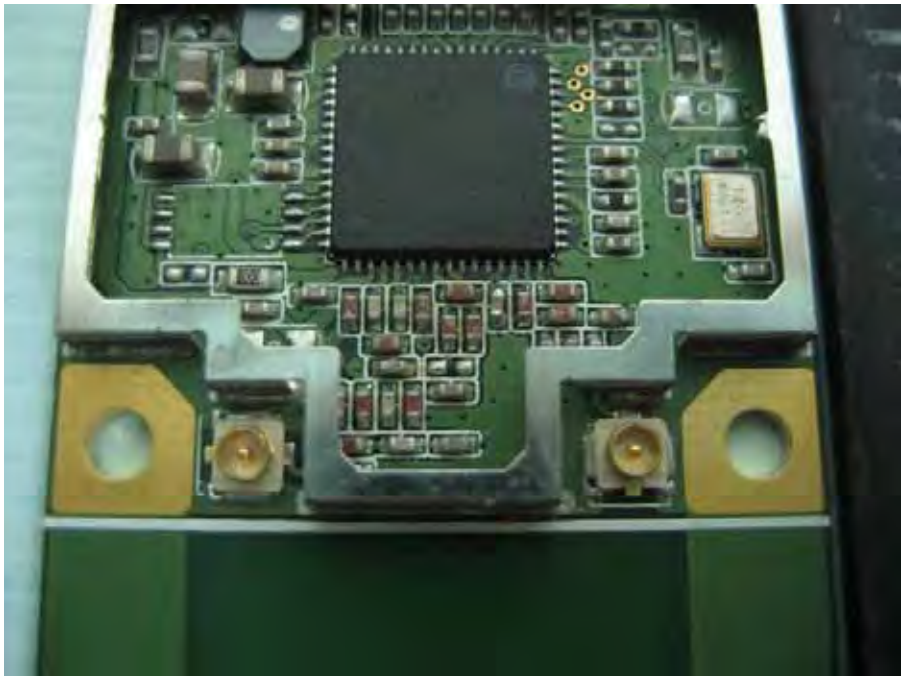






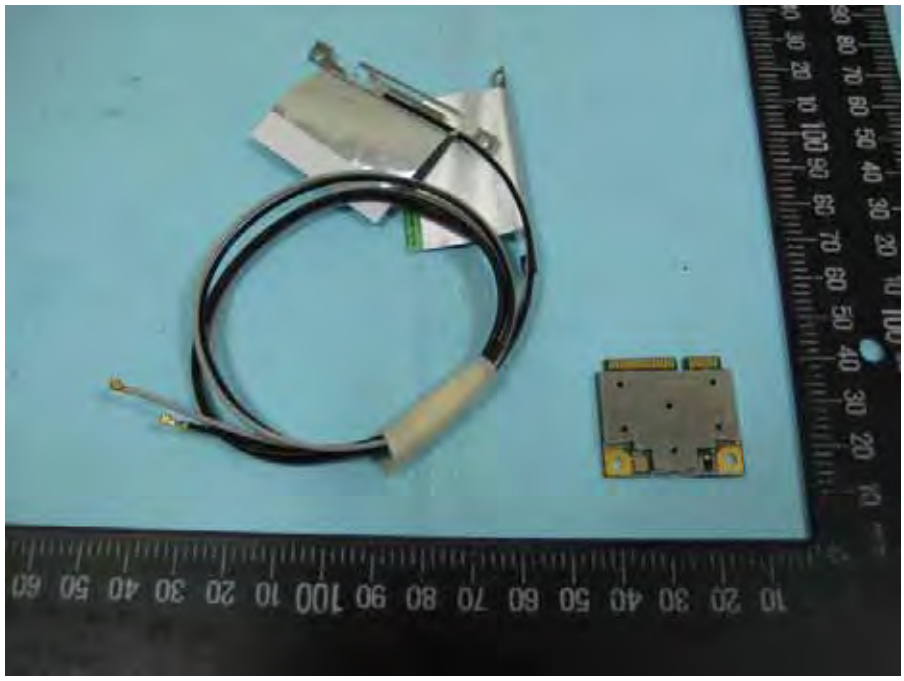


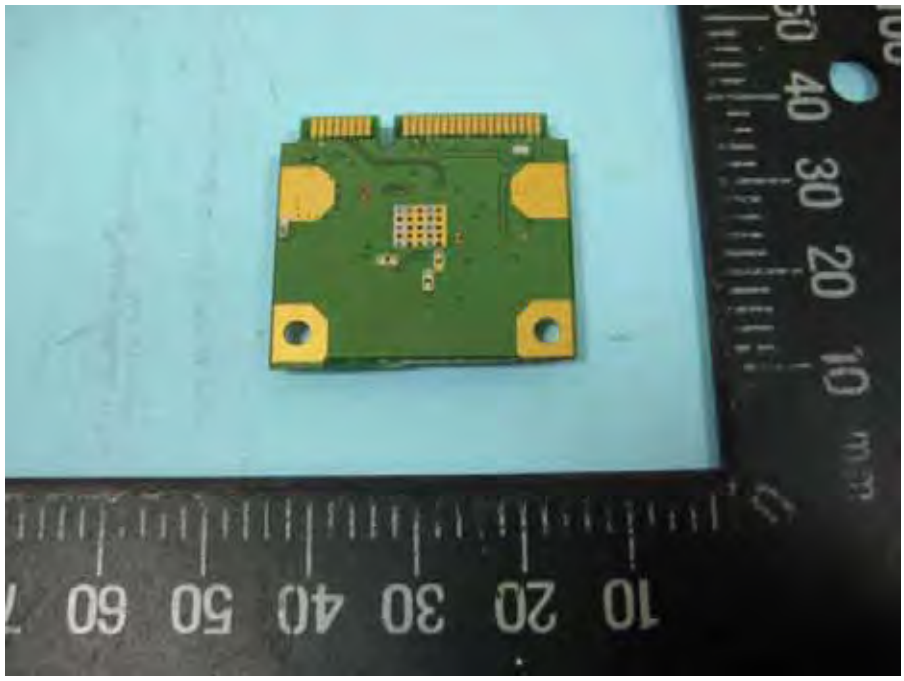


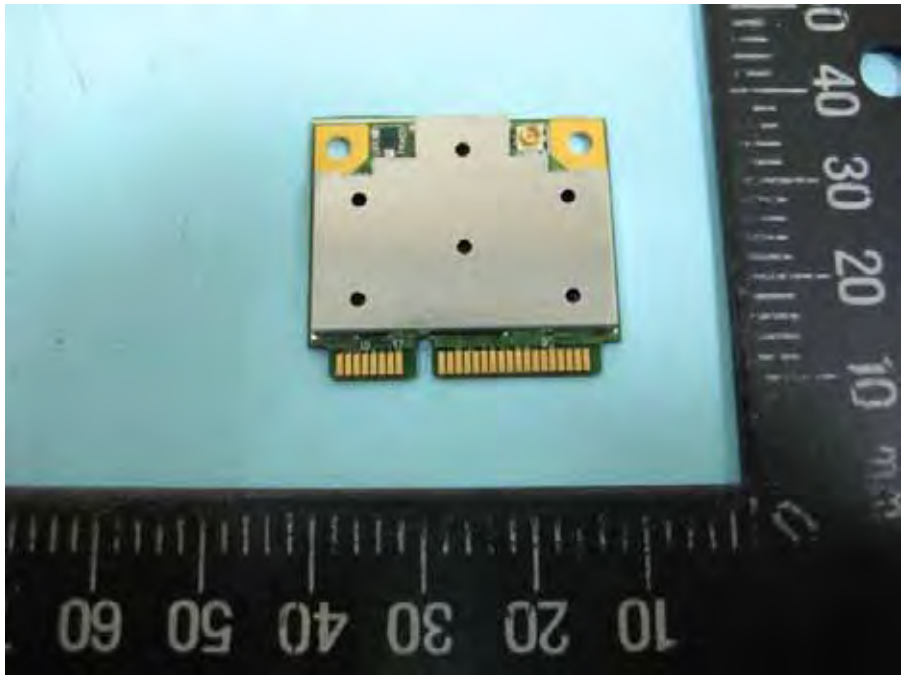


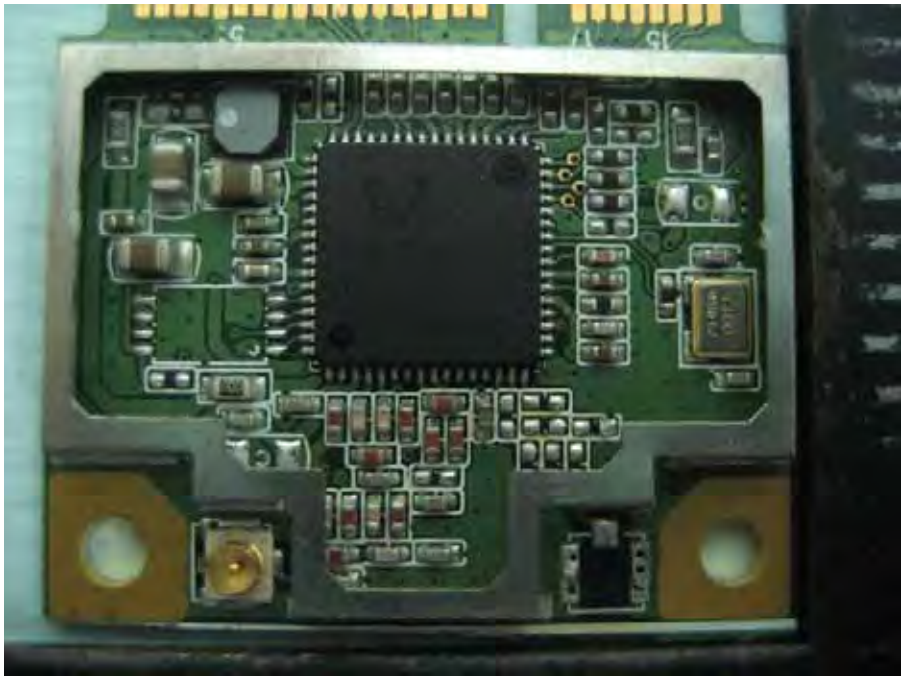
EUT 3:

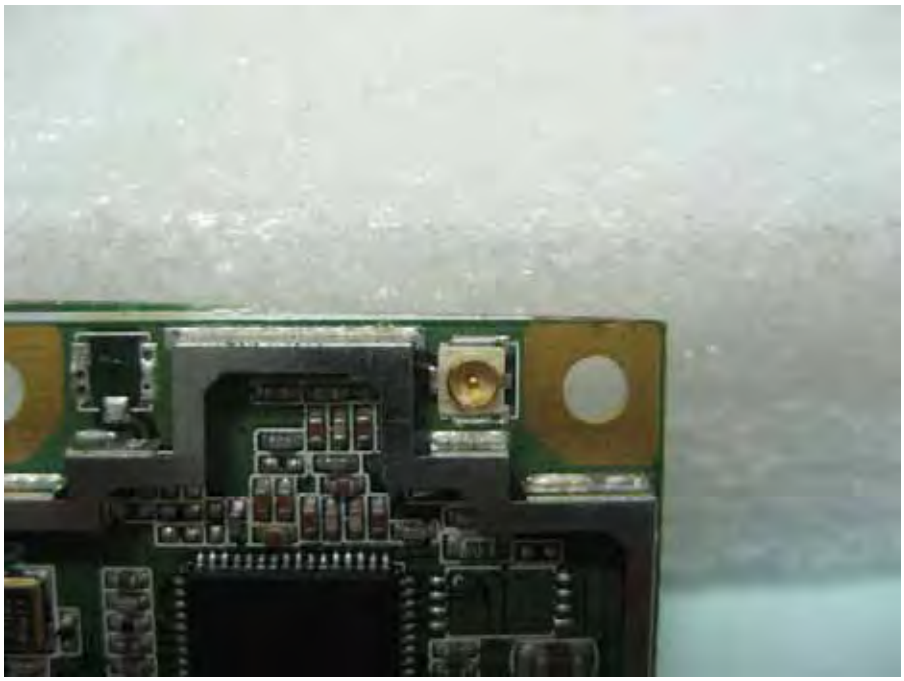
Half Size Module with one Antenna Connector

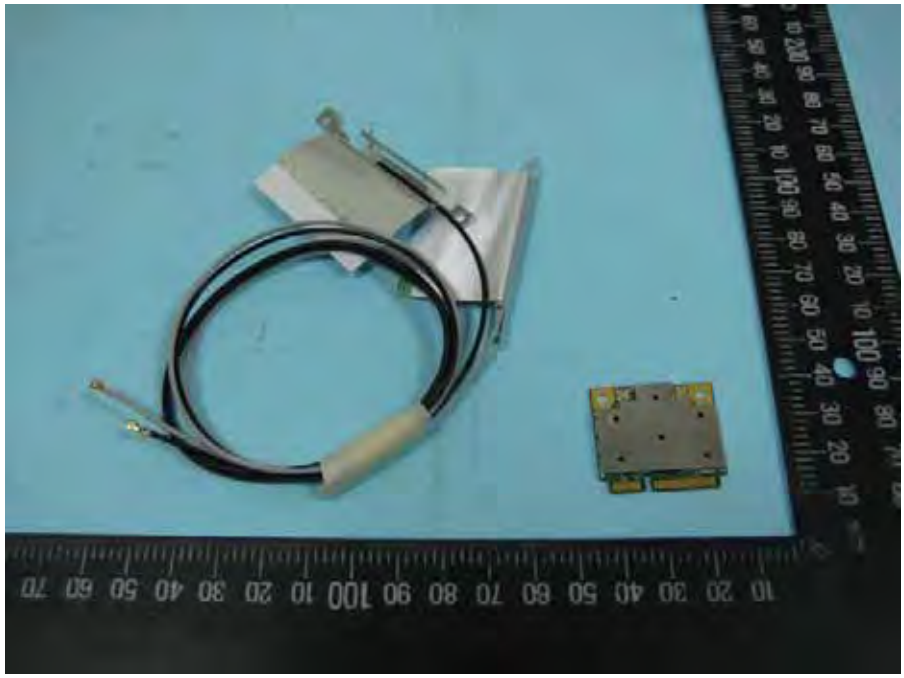




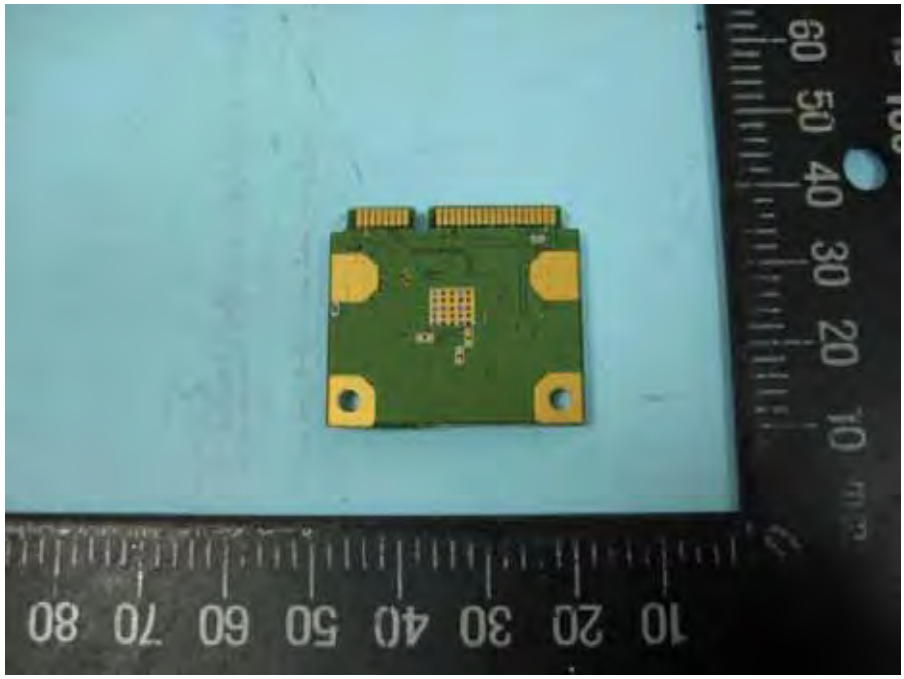


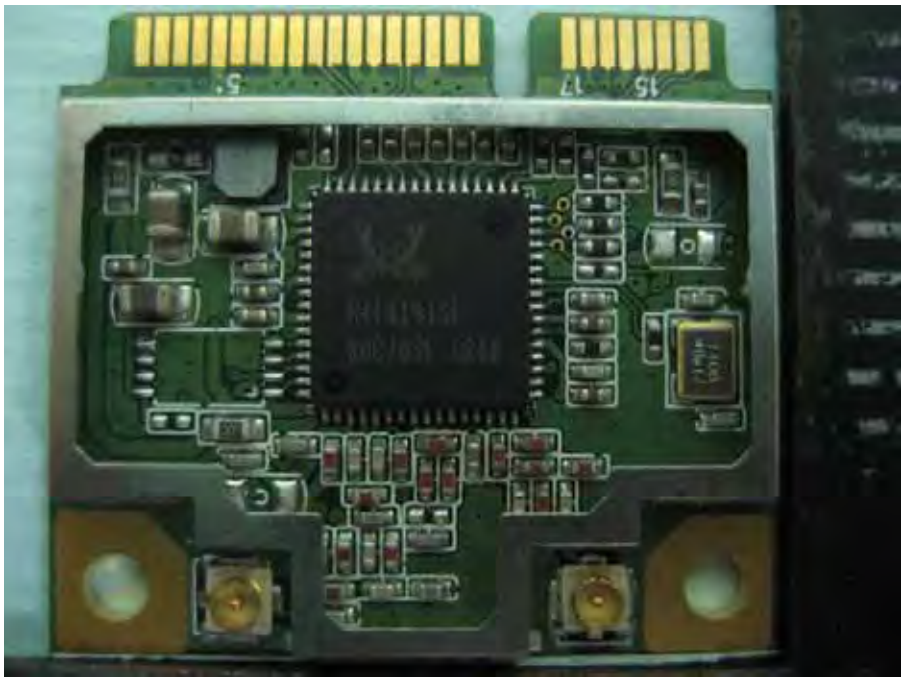




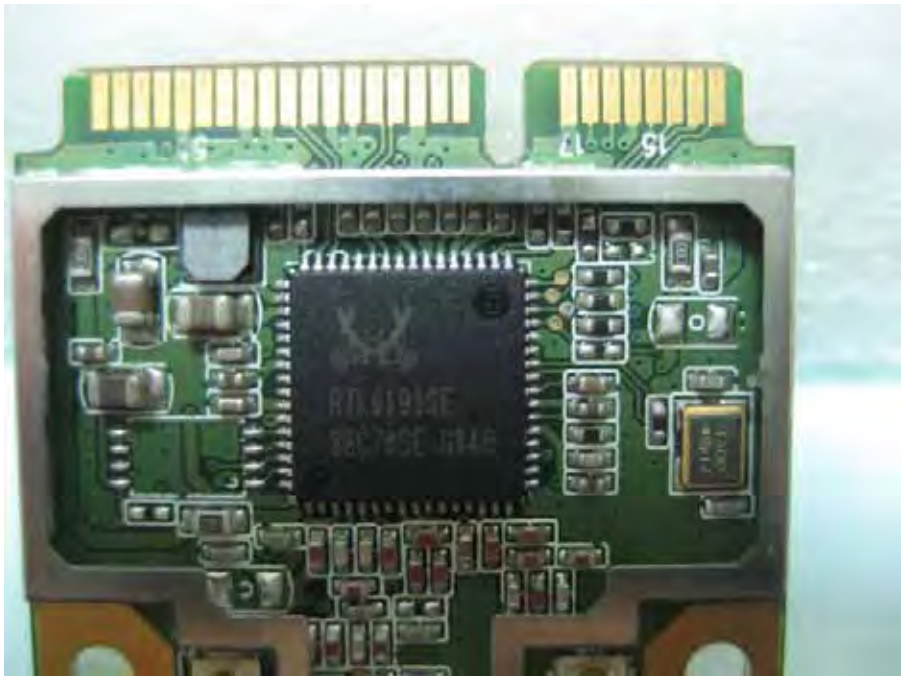


EUT 4:
Half Size Module with two
Antenna Connectors






T400
15
17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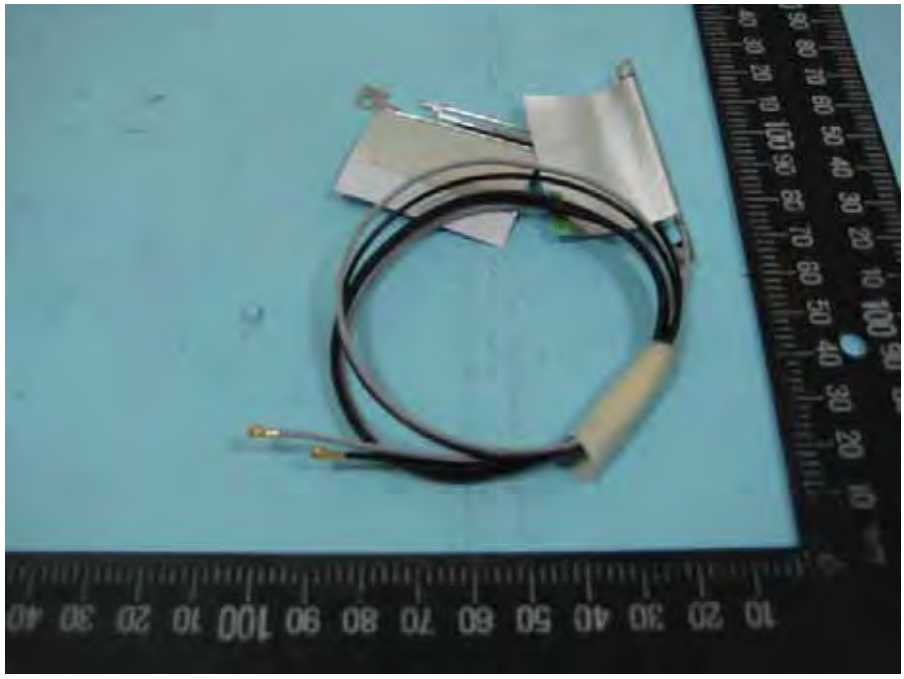
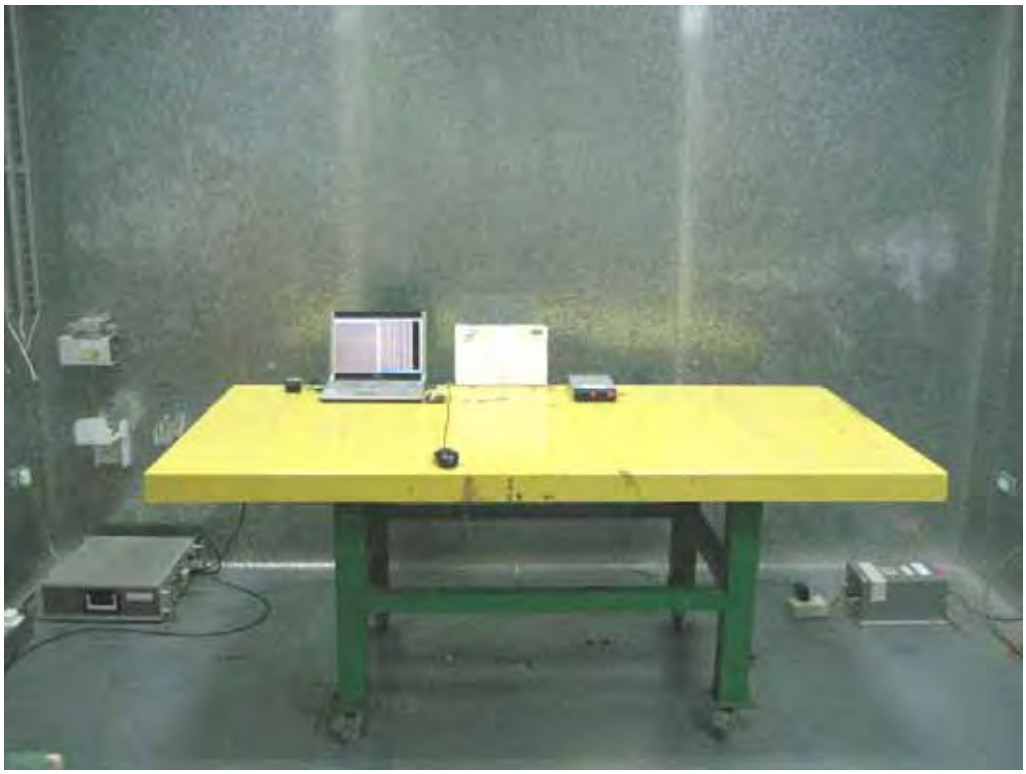


Appendix B. Test Photos

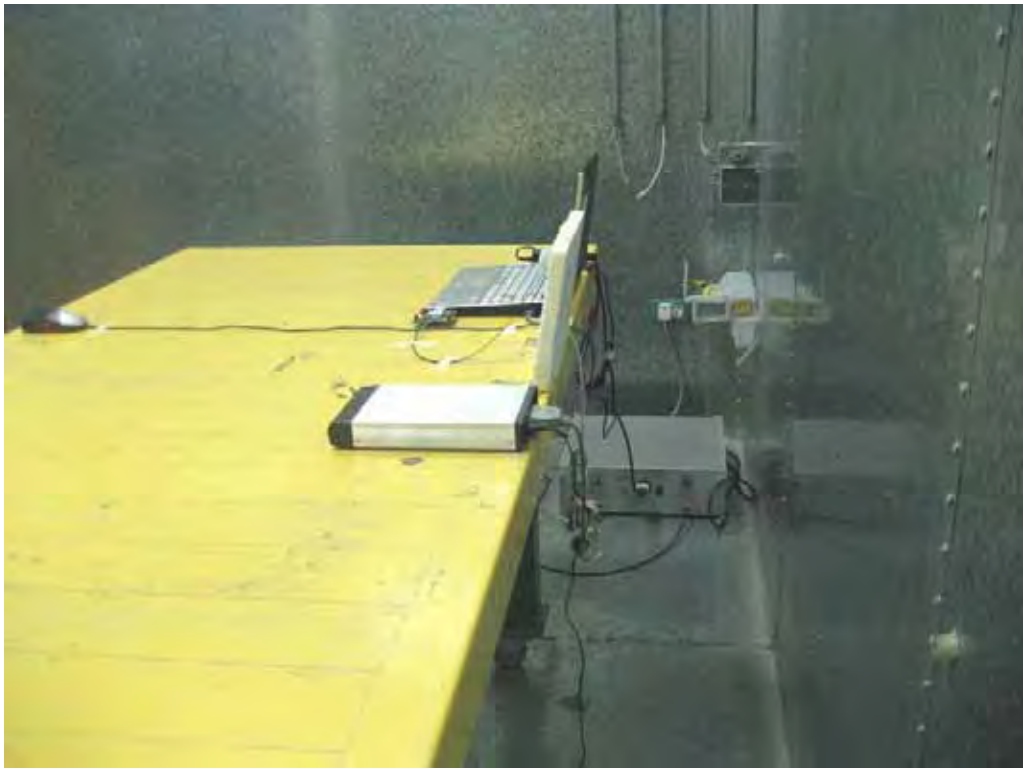
1. Photographs of Conducted Emissions Test Configuration

Test Mode : Mode 3

FRONT VIEW



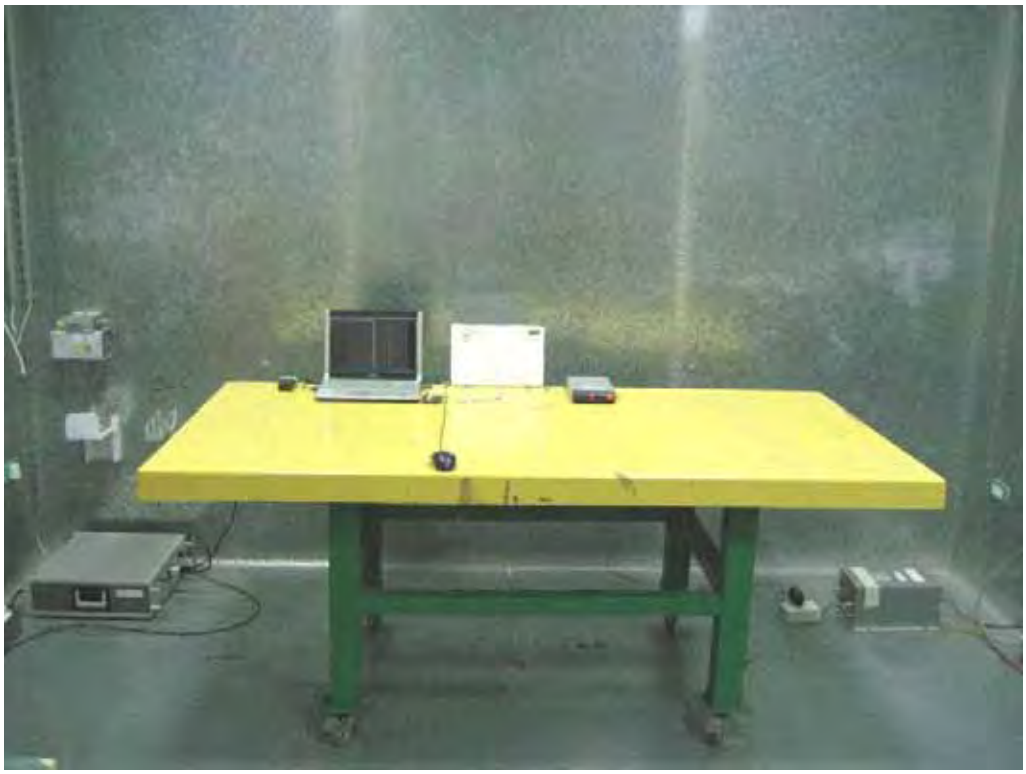
REAR VIEW



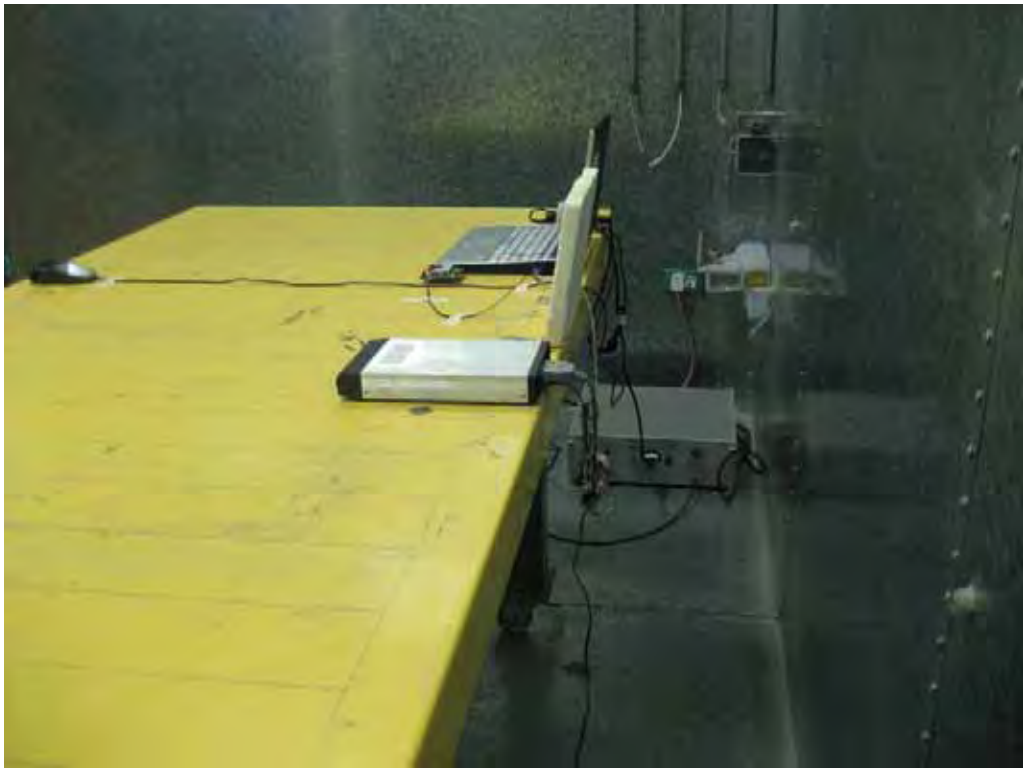
SIDE VIEW

Test Mode : Mode 4

FRONT VIEW



REAR VIEW



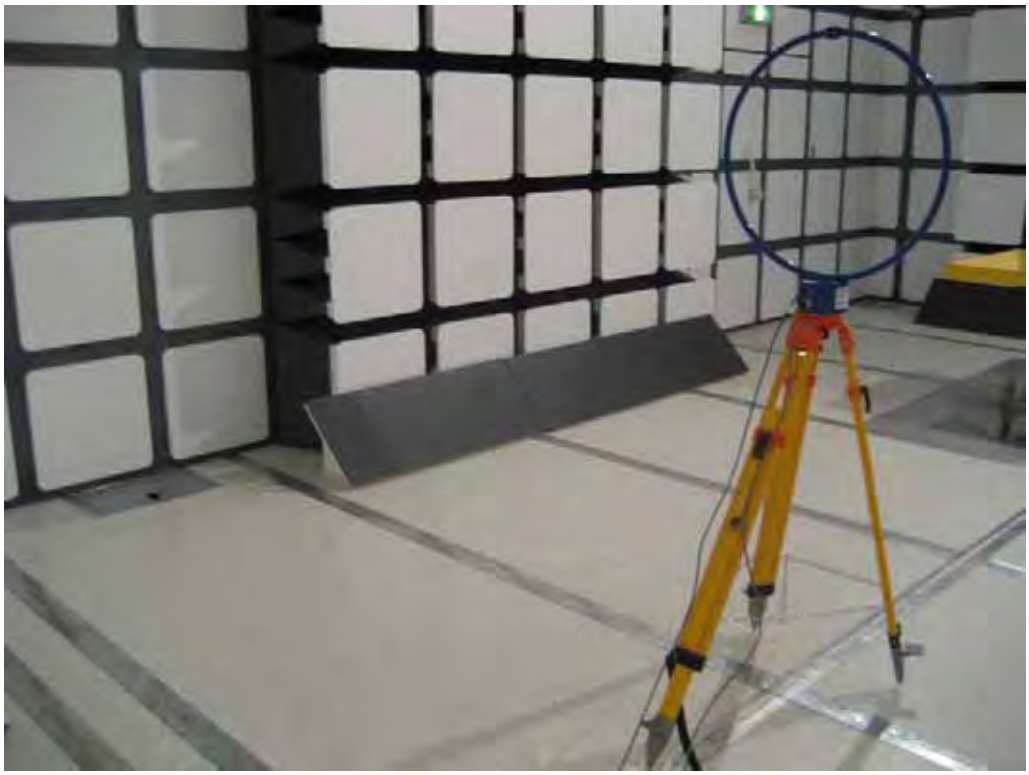
SIDE VIEW

2. Photographs of Radiated Emissions Test Configuration

9kHz ~30MHz

FRONT VIEW

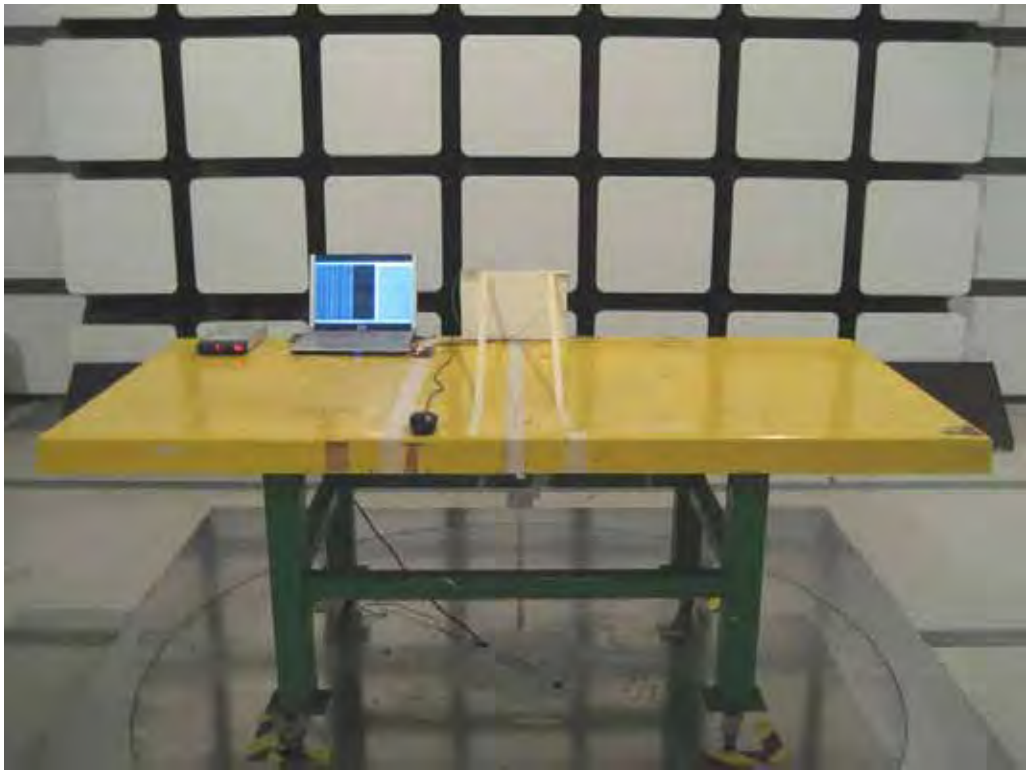
REAR VIEW



30MHz~1GHz

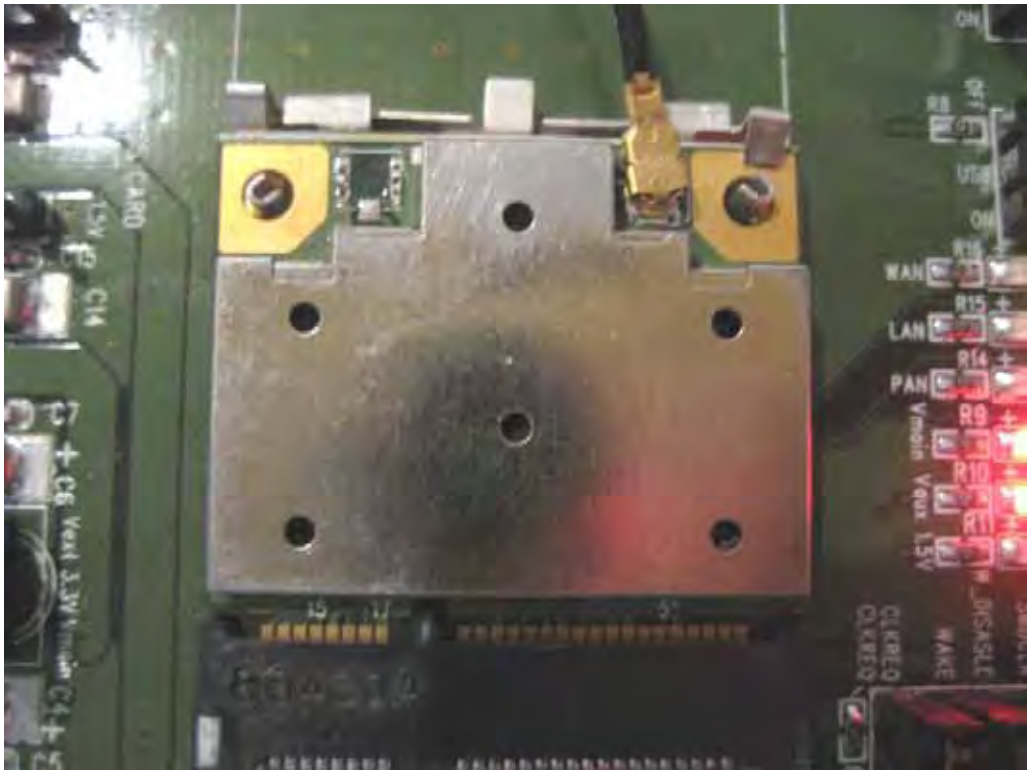
Test Mode : Mode 3

FRONT VIEW



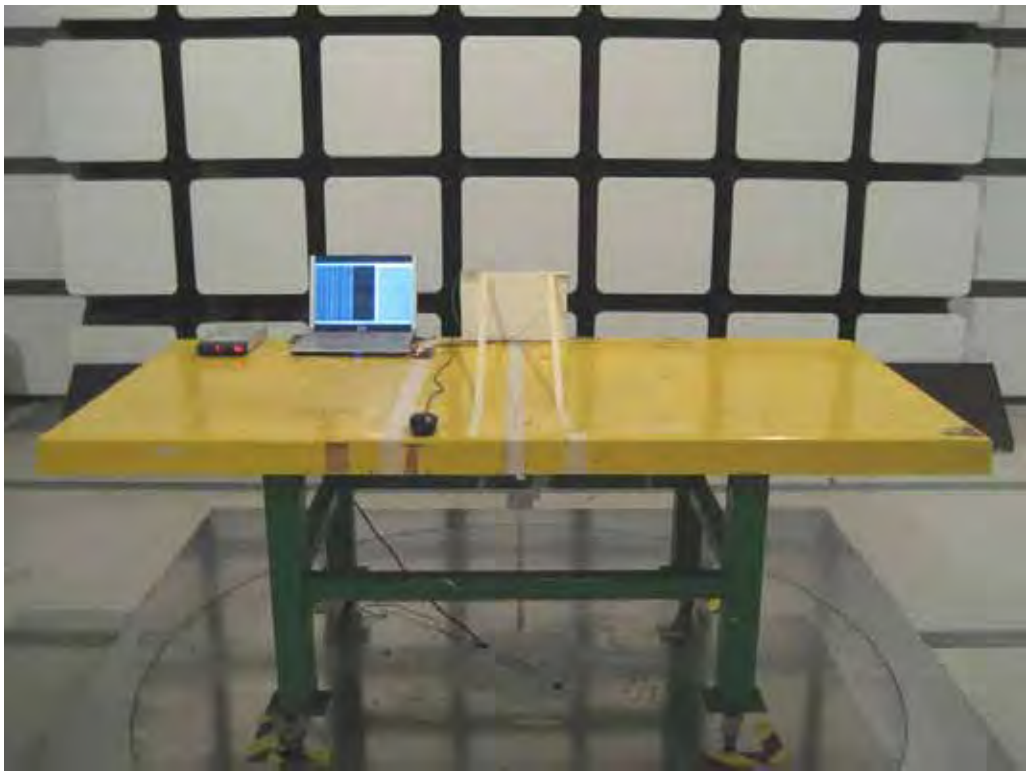
REAR VIEW

SIDE VIEW



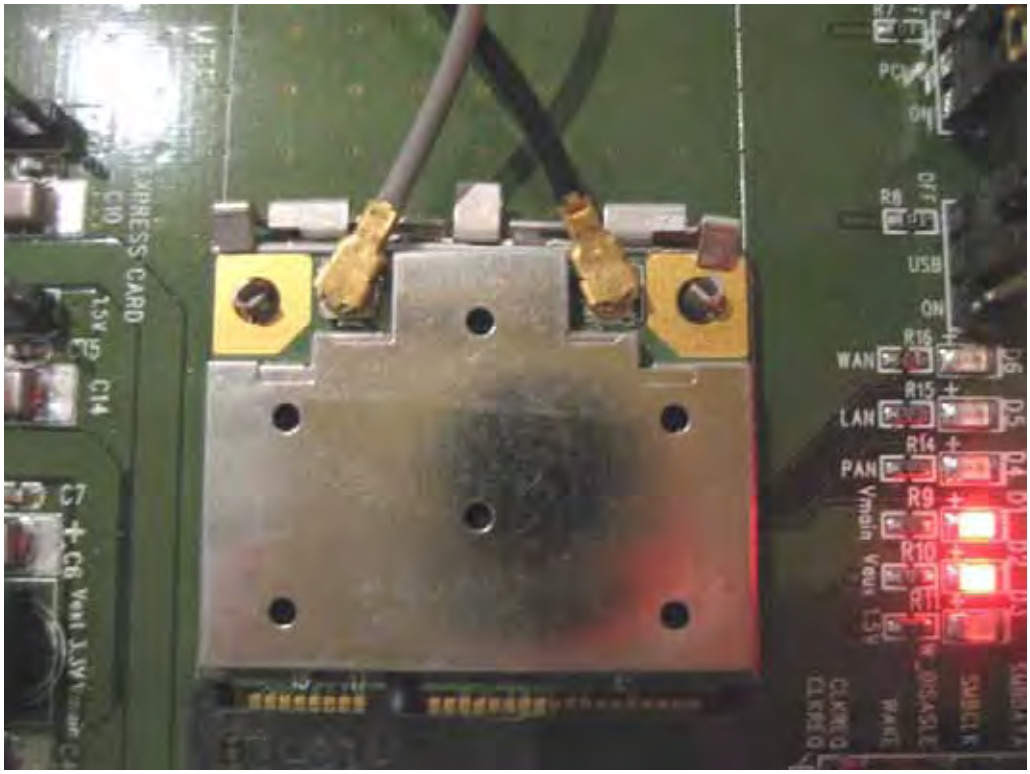
Test Mode : Mode 4

FRONT VIEW



REAR VIEW

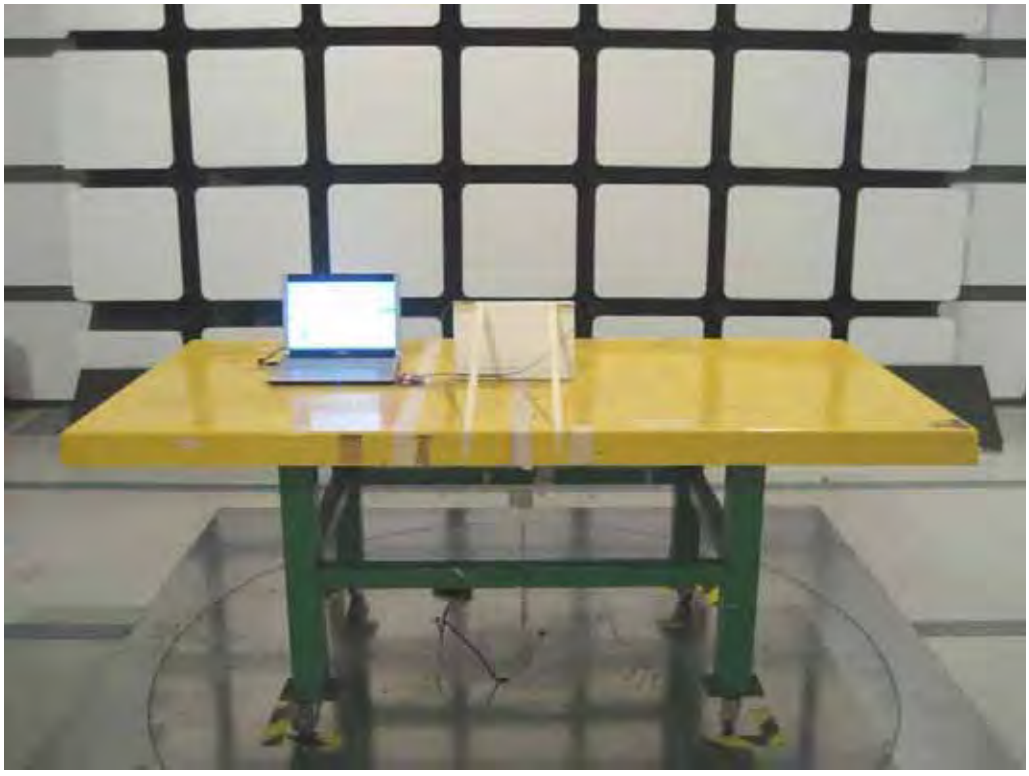
SIDE VIEW


EXPRESS CARD
C10
1.5V
C14
C7
C6
R6
OFF
USB
ON
R16
WAN
R15
LAN
R14
PAN
R9
R10
R11

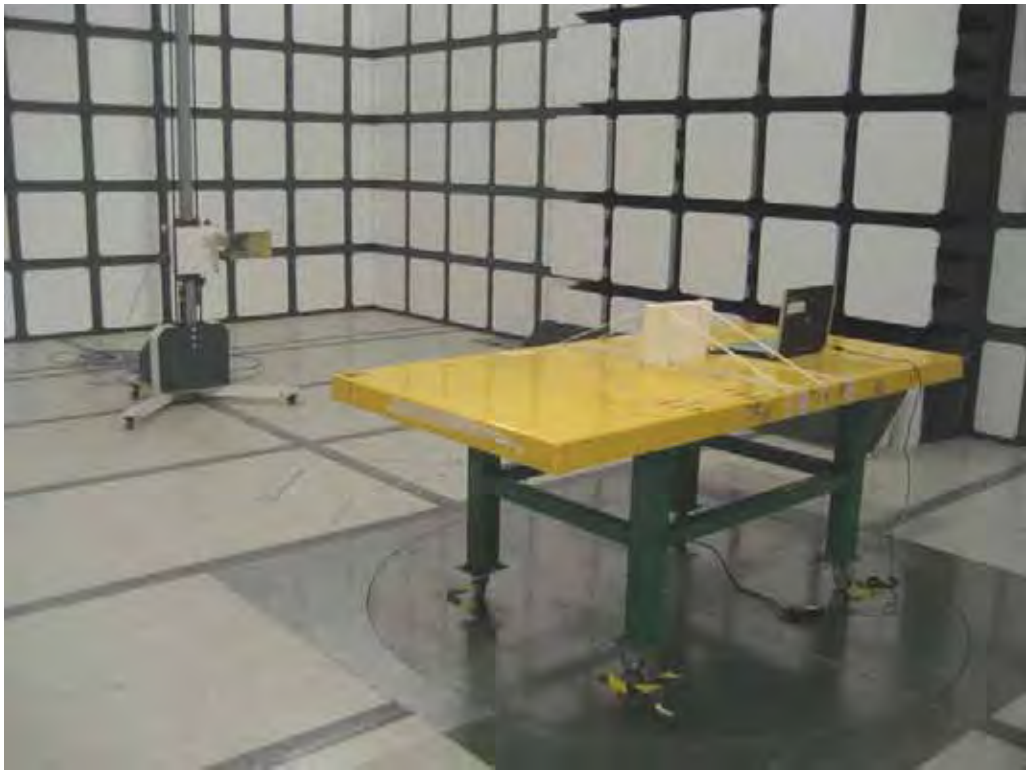
Above 1GHz

Test Mode : Mode 3

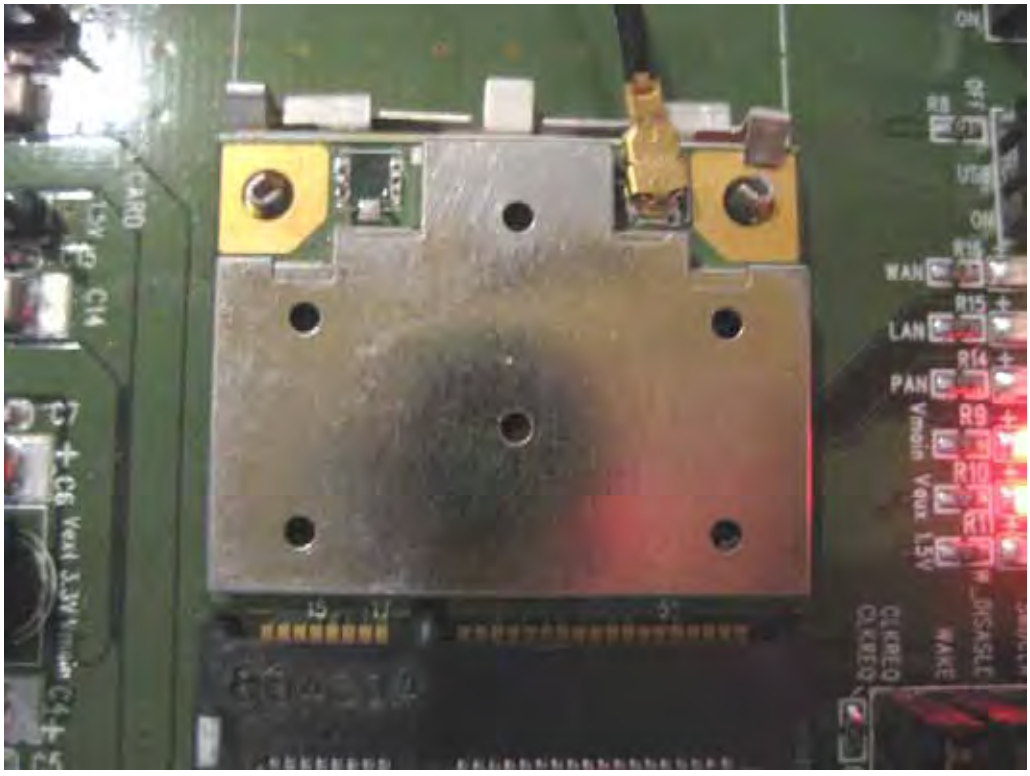
FRONT VIEW



REAR VIEW



SIDE VIEW



Appendix C. Maximum Permissible Exposure

1. Maximum Permissible Exposure

1.1. Applicable Standard

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

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

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

1.2. MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

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

The formula can be changed to

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

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

1.3. Calculated Result and Limit

For 2.4GHz Band: 802.11b/g

Antenna Type : PIFA Antenna

Max Conducted Power for IEEE 11b/g Ant.A : 18.24 dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
3.95	2.4831	18.2400	66.6807	0.032957	1	Complies

Appendix D. Antenna List

Table for Filed Antenna

1	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 3.95 Aux.: 3.90
		Connector	IPEX	Model No.	DQ661500301
2	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.11 Aux.: 0.64
		Connector	IPEX	Model No.	DQ661500115
3	Brand name: wgt	Ant. Type	PIFA	PK Gain(dBi)	Main(L): 2.17 Aux.(R): 2.39
		Connector	IPEX	Model No.	Main(L): AR830WIPI01A Aux.(R): AR830WIPI02A
4	Brand name: Wgt	Ant. Type	PIFA	PK Gain(dBi)	Main (L): 0.86 Aux. (R): 2.11
		Connector	IPEX	Model No.	Main: AR320WIPI01B Aux.: AR320WIP102B
5	Brand name: wgt	Ant. Type	PIFA	PK Gain(dBi)	Main (L): 2.48 Aux. (R): 1.63
		Connector	IPEX	Model No.	Main: ARW62WIP101G Aux.: ARW62WIP102G
6	Brand name: wgt	Ant. Type	PIFA	PK Gain(dBi)	Main (L): 2.41 Aux. (R): 2.07
		Connector	IPEX	Model No.	Main: ARUMPWIPI02+C Aux.: ARUMPWIPI01+D
7	Brand name: Gateway	Ant. Type	PIFA	PK Gain(dBi)	Main: -0.25 Aux.: 3.64
		Connector	IPEX	Model No.	Main: 021020168NC3587 Aux.: 021020168NC3587-1
8	Brand name: Gateway	Ant. Type	PIFA	PK Gain(dBi)	Main: -0.04 Aux.: 3.25
		Connector	IPEX	Model No.	Main: 021020168NC3586 Aux.: 021020168NC3586-1
9	Brand name: High-Tek	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.86 Aux.: 1.52
		Connector	IPEX	Model No.	Main: AAFQ5050001LK0 Aux.: AAFQ5050001RK0

10	Brand name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.48 Aux.: 0.64
		Connector	IPEX	Model No.	Main: HFT40-IV17 Aux.: HMG03-IV17
11	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.34 Aux.: 0.79
		Connector	IPEX	Model No.	Main: 81.EE215.016.
12	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Left: 1.34 Right: 1.25
		Connector	IPEX	Model No.	ASAW001
13	Brand name: Well Green	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.03 Aux.: 0.63
		Connector	IPEX	Model No.	Main: B1425050G0003 Aux.: B1425050G0002
14	Brand name: tyco	Ant. Type	PIFA	PK Gain(dBi)	Right: 0.16 Left: 0.61
		Connector	IPEX	Model No.	ASAT001
15	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	Left: 1.56 Right: 1.36
		Connector	IPEX	Model No.	ASAA001
16	Brand name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.58 Aux.: 1.12
		Connector	IPEX	Model No.	HFT40-IV19W
17	Brand name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	Main: -1.65 Aux.: -0.92
		Connector	IPEX	Model No.	HFT60-QT05W
18	Brand name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.24 Aux.: 1.84
		Connector	IPEX	Model No.	HTL008-CP29NN
19	Brand name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.82 Aux.: 2.94
		Connector	IPEX	Model No.	HTL017-QT03NN
20	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: -1.10 Aux.: 1.76
		Connector	IPEX	Model No.	Main: 81.EE215.002 Aux.: 81.EE215.001

21	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 1.18 Aux. 1.75
		Connector	IPEX	Model No.	WNC002 (81.EG645.001)
22	Brand name: tyco	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.57 Aux.: 0.87
		Connector	IPEX	Model No.	TIAN01 (1747862-1)
23	Brand name: Tyco	Ant. Type	PIFA	PK Gain(dBi)	Main: 3.45 Aux: 2.41
		Connector	IPEX	Model No.	TBN001 (1909890-1)
24	Brand name: Tyco	Ant. Type	PIFA	PK Gain(dBi)	Main: -1.11 Aux.: -1.11
		Connector	IPEX	Model No.	TBN003 (1909881-1)
25	Brand name: Tyco	Ant. Type	PIFA	PK Gain(dBi)	TX 1 (Main): 2.95 TX 2 (Aux.): 1.90
		Connector	IPEX	Model No.	TX 1 (Main): 2023935-1 TX 2 (Aux.): 2023936-1
26	Brand Name: Tyco	Ant. Type	PIFA	PK Gain(dBi)	TX 1 (Main): 1.60 TX 2 (Aux.): 0.05 TX 3 (MINO) : -0.28
		Connector	IPEX	Model No.	TX 1 & 2: 2023937-1 TX 3 (MINO): 2023934-1
27	Brand Name: Tyco	Ant. Type	PIFA	PK Gain(dBi)	TX 1 (Main): 1.41 TX 2 (Aux.): 1.24 TX 3 (MINO): 0.04
		Connector	IPEX	Model No.	TX 1 (Main): 2023938-1 TX 2 (Aux.): 2023938-1 TX 3 (MINO) : 2023939-1
28	Brand Name: Tyco	Ant. Type	PIFA	PK Gain(dBi)	TX 1 (Main): 1.68 TX 2 (Aux.): 0.92 TX 3 (MINO): 1.98
		Connector	IPEX	Model No.	TX 1 (Main): 2023954-1 TX 2 (Aux.): 2023954-1 TX 3 (MINO): 2023955-1
29	Brand Name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	TX 1: 2.19 TX 2: -0.33
		Connector	IPEX	Model No.	HBY07

30	Brand Name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	TX 1: 2.91 TX 2: 2.82
		Connector	IPEX	Model No.	HBY051
31	Brand Name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	TX 1: 0.27 TX 2: 0.02
		Connector	IPEX	Model No.	HBY052
32	Brand Name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	TX 1: 1.30 TX 2: 2.42
		Connector	IPEX	Model No.	HBY061
33	Brand Name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	TX 1: -1.04 TX 2: -1.19
		Connector	IPEX	Model No.	HBY062
34	Brand Name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	TX 1: -1.74 TX 2: 1.16
		Connector	IPEX	Model No.	HFT65
35	Brand Name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.87 Aux.: 1.94
		Connector	IPEX	Model No.	HCT01
36	Brand Name: Tyco	Ant. Type	PIFA	PK Gain(dBi)	-1.11
		Connector	IPEX	Model No.	TBN005(2040170) & TBN006(2040171)
37	FOXCONN	Ant. Type	PIFA	PK Gain(dBi)	TX 1: -0.43 TX 2: -0.7
		Connector	IPEX	Model No.	WDAN-TQ
38	Brand name: Auden	Ant. Type	PIFA	PK Gain(dBi)	Main: -1.42 Aux.: -1.76
		Connector	IPEX	Model No.	ZM1
39	Brand name: FOXCONN	Ant. Type	PIFA	PK Gain(dBi)	Main: -1.86 Aux.: -1.49
		Connector	IPEX	Model No.	ZM1
40	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	Main: -1.18 Aux.: -0.93
		Connector	IPEX	Model No.	ZM1
41	Brand name: Yageo	Ant. Type	PIFA	PK Gain(dBi)	Main: -0.99 Aux.: -1.34
		Connector	IPEX	Model No.	ZM1

42	Brand name: Quanta	Ant. Type	PIFA	PK Gain(dBi)	Main: 1.31 Aux.: 0.09
		Connector	IPEX	Model No.	DQ652016100
43	Brand name: Quanta	Ant. Type	PIFA	PK Gain(dBi)	TX 1: -1.4 TX 2: -2.2
		Connector	IPEX	Model No.	TX 1: AN-090-B TX 2: AN-090-A
44	Brand name: Quanta	Ant. Type	PIFA	PK Gain(dBi)	TX 1 (Main): 1.13 TX 2 (Aux.): 0.74
		Connector	IPEX	Model No.	DQ652015800
45	Brand name: Quanta	Ant. Type	PIFA	PK Gain(dBi)	TX 1: 1.8 TX 2: 0.1
		Connector	IPEX	Model No.	ON1
46	Brand name: Wanshih	Ant. Type	PIFA	PK Gain(dBi)	2.05
		Connector	IPEX	Model No.	1415-00JL000
47	Brand name: Wanshih	Ant. Type	PIFA	PK Gain(dBi)	2.40
		Connector	IPEX	Model No.	1415-00JK000
48	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.31 Aux.: 1.50
		Connector	IPEX	Model No.	WNC004
49	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.52 Aux.: 1.07
		Connector	IPEX	Model No.	WNC003
50	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 1.19 Aux.: 0.28
		Connector	IPEX	Model No.	WNC001
51	Brand name: NISSEI	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.80 RX: 0.54
		Connector	IPEX	Model No.	TX: 3172509 RX: 3172467
52	Brand name: Amphenol	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.68 RX: 1.47
		Connector	IPEX	Model No.	TX: LX0968-11-000-R RX: LX0970-11-000-R

53	Brand name: FOXCONN	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.10 RX: -0.4
		Connector	IPEX	Model No.	TX: WDAN-L1ML3002-DF RX: WDAN-L1ML3001-DF
54	Brand name: NISSEI	Ant. Type	PIFA	PK Gain(dBi)	TX: -0.61 RX: -0.83
		Connector	IPEX	Model No.	TX: 3176674 RX: 3176658
55	Brand name: FOXCONN	Ant. Type	PIFA	PK Gain(dBi)	TX: -0.88 RX: 1.16
		Connector	IPEX	Model No.	TX: 024-01F0-2243 RX: 024-01F0-2242
56	Brand name: NISSEI	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.99 RX: 1.35
		Connector	IPEX	Model No.	TX: 3172566 RX: 3172525
57	Brand name: Amphenol	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.57 RX: 1.61
		Connector	IPEX	Model No.	TX: LX0983-11-000-R RX: LX0980-11-000-R
58	Brand name: Hitachi	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.54 RX: 1.82
		Connector	IPEX	Model No.	TX: HMT14-AUX RX: HMT14-MAIN
59	Brand name: FOXCONN	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.43 RX: 1.71
		Connector	IPEX	Model No.	TX: WDAN-L1WK1002-DF RX: WDAN-L1WK1001-DF
60	Brand name: NISSEI	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.26 RX: 1.88
		Connector	IPEX	Model No.	TX: 3210002 RX: 3209970
61	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	TX: -0.86 RX: -0.96
		Connector	IPEX	Model No.	TX: APM6P-700034 RX: APM6P-700033

62	Brand name: Amphenol	Ant. Type	PIFA	PK Gain(dBi)	TX: -1.6 RX: -1.85
		Connector	IPEX	Model No.	TX: 14G152168131LV RX: 14G152168231LV
63	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	TX: -0.23 RX: -1.32
		Connector	IPEX	Model No.	TX: APM6P-700029 RX: APM6P-700027
64	Brand name: TYCO	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.52 RX: -2.39
		Connector	IPEX	Model No.	TX: 2023944-1 RX: 2023940-1
65	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	TX: -0.74 RX: -1.16
		Connector	IPEX	Model No.	TX: APM6P-700030 RX: APM6P-700028
66	Brand name: TYCO	Ant. Type	PIFA	PK Gain(dBi)	TX: -0.11 RX: -0.58
		Connector	IPEX	Model No.	TX: 2023950-1 RX: 2023946-1
67	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.04 RX: 1.17
		Connector	IPEX	Model No.	TX: 25.90597.001 RX: 25.90598.001
68	Brand name: Wistron NW	Ant. Type	PIFA	PK Gain(dBi)	TX: 0.59 RX: 1.94
		Connector	IPEX	Model No.	TX: 25.90586.001 RX: 25.90587.001
69	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	TX: -0.13 RX: -1.21
		Connector	IPEX	Model No.	TX: 25.90654.001 RX: 25.90700.001
70	Brand name: Wistron NW	Ant. Type	PIFA	PK Gain(dBi)	TX: 0.31 RX: 1.37
		Connector	IPEX	Model No.	TX: 25.90650.001 RX: 25.90800.001

71	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.27 RX: -0.42
		Connector	IPEX	Model No.	TX: 25.90702.001 RX: 25.90653.001
72	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	TX: 1.21 RX: -0.52
		Connector	IPEX	Model No.	TX: 25.90802.001 RX: 25.90649.001
73	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.34 Aux.: 0.79
		Connector	IPEX	Model No.	81.EE215.016.
74	Brand name: Joymax	Ant. Type	PIFA	PK Gain(dBi)	0.8
		Connector	IPEX	Model No.	TFF-A011MPXX-361
75	Brand name: ACON	Ant. Type	PIFA	PK Gain(dBi)	Right: 1.19 Left: -0.57
		Connector	IPEX	Model No.	Right: APP6P-700238 Left: APP6P-700239
76	Brand name: INPAQ	Ant. Type	PIFA	PK Gain(dBi)	1.05
		Connector	IPEX	Model No.	EAMS13001XXX
77	Brand name: JEM	Ant. Type	PIFA	PK Gain(dBi)	WM1: -2.04 WM2: 0.83
		Connector	IPEX	Model No.	M810L
78	Brand name: WGT	Ant. Type	PIFA	PK Gain(dBi)	Ant.1: 3.15 Ant.2: 2.99
		Connector	IPEX	Model No.	M810L
79	Brand name: WGT	Ant. Type	PIFA	PK Gain(dBi)	Ant.1: 2.94 Ant.2: 2.56
		Connector	IPEX	Model No.	M980N

80	Brand name: Clevo	Ant. Type	PIFA	PK Gain(dBi)	Ant.1: 1.38 Ant.2: 2.8
		Connector	IPEX	Model No.	Ant.1: TN120R-WLAN-1 Ant.2: TN120R-WLAN-2
81	Brand name: Smart Approach	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.95 Aux.: 0.97 BT: 2.90
		Connector	IPEX	Model No.	Main: PE-150080 Aux.: PE-150100 BT: PE-240220
82	Brand name: ARISTOTLE	Ant. Type	PIFA	PK Gain(dBi)	Right: -5 Left: -5
		Connector	IPEX	Model No.	Right: RFA-02-P23-70B-350-R Left: RFA-02-P23-70-300-L
83	Brand name: ARISTOTLE	Ant. Type	PIFA	PK Gain(dBi)	Right: -5 Left: -5
		Connector	IPEX	Model No.	Right: RFA-02-P24-70B-340-R Left: RFA-02-P24-70-305-L
84	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.71 Aux.: 1.75 MINO: 2.57
		Connector	IPEX	Model No.	Main: 81.EEO15.001 Aux.: 81.EEO15.002 MINO: 81.EEO15.003
85	Brand name: Foxconn	Ant. Type	PIFA	PK Gain(dBi)	Main: 1.31 Aux.: 0.54 MINO: 1.34
		Connector	IPEX	Model No.	Main: WDAN-M1OS1001-DF Aux.: WDAN-M1OS1002-DF MINO: WDAN-M1OS1003-DF
86	Brand name: Amphenol KAE	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.49 Aux.: 0.58 MINO: 0.65
		Connector	IPEX	Model No.	Main: SS-03-03-099 Aux.: SS-03-03-100 MINO: SS-03-03-101

87	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.23 Aux.: 1.18
		Connector	IPEX	Model No.	Main: 81.EHD15.003 Aux.: 81.EHD15.002
88	Brand name: Foxconn	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.18 Aux.: 1.11
		Connector	IPEX	Model No.	Main: WDAN-M1SN1002-DF Aux.: WDAN-M1SN1001-DF
89	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	Main: 2.37 Aux.: -0.77
		Connector	IPEX	Model No.	Main: 81.EHD15.004 Aux.: 81.EHD15.005
90	Brand name: Foxconn	Ant. Type	PIFA	PK Gain(dBi)	Main: 0.38 Aux.: 0.61
		Connector	IPEX	Model No.	Main: WDAN-M1WC1002-DF Aux.: WDAN-M1WC1001-DF
91	Brand name: Foxconn	Ant. Type	PIFA	PK Gain(dBi)	0.72
		Connector	IPEX	Model No.	WDAN-M1NY1001-DF
92	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	0.35
		Connector	IPEX	Model No.	81.EHD15.006
93	Brand name: Foxconn	Ant. Type	PIFA	PK Gain(dBi)	-0.14
		Connector	IPEX	Model No.	WDAN-M1BN1001-DF
94	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	0.99
		Connector	IPEX	Model No.	81.EHD15.007
95	Brand name: Foxconn	Ant. Type	PIFA	PK Gain(dBi)	-1.24
		Connector	IPEX	Model No.	WDAN-M1MM1001-DF
96	Brand name: WNC	Ant. Type	PIFA	PK Gain(dBi)	TX1: 1.86 TX2: 1.19
		Connector	IPEX	Model No.	TX1: 81.EHD15.G09 TX2: 81.EHD15.G10
97	Brand name: Foxconn	Ant. Type	PIFA	PK Gain(dBi)	TX1: 0.54 TX2: -1.40
		Connector	IPEX	Model No.	TX1: WDAN-M1PB1001-DF TX2: WDAN-M1PB1002-DF

98	Brand name: FVC	Ant. Type	PIFA	PK Gain(dBi)	WM1: 2.87 WM2: 2.22
		Connector	IPEX	Model No.	WM1: W760-WiMAX-1 WM2: W760-WiMAX-2