



SPORTON International Inc.

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FCC RADIO TEST REPORT

Applicant's company	U-MEDIA Communications, Inc.
Applicant Address	9F, No. 1, Jin-Shan 7th St., Hsinchu 300, Taiwan, R.O.C.
FCC ID	SI5WRT390L
Manufacturer's company	U-MEDIA Communications, Inc.
Manufacturer Address	9F, No. 1, Jin-Shan 7th St., Hsinchu 300, Taiwan, R.O.C.

Product Name	2.4GHz Wireless 802.11n(DRAFT) Giga Router
Brand Name	U-MEDIA
Model Name	WRT-390L
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Oct. 09, 2008
Final Test Date	Oct. 21, 2008
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.



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History of This Test Report

Original Issue Date: Oct. 22, 2008

Report No.: FR8O0919

- No additional attachment.
- Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



1. CERTIFICATE OF COMPLIANCE

Product Name : 2.4GHz Wireless 802.11n(DRAFT) Giga Router
Brand Name : U-MEDIA
Model Name : WRT-390L
Applicant : U-MEDIA Communications, Inc.
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 Oct. 09, 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.

A handwritten signature in blue ink, appearing to read 'Wayne Hsu 24.10.08', is written over a horizontal line.

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	1.97 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	0.19 dB
4.3	15.247(e)	Power Spectral Density	Complies	17.03 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	0.17 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.08 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	±8.5×10 ⁻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 (2TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	Power Adapter
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%)	MCS8 (20MHz): 17.60 MHz ; MCS8 (40MHz): 36.08 MHz
Conducted Output Power	MCS8 (20MHz): 29.81 dBm ; MCS8 (40MHz): 23.36 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

802.11b/g

Items	Description
Product Type	WLAN (1TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	Power Adapter
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: 15.00 MHz ; 11g: 16.56 MHz
Conducted Output Power	11b: 17.99 dBm ; 11g: 27.11 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

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

Draft n spec

MCS Index	Nss	Modulation	R	NBPCS	NCBPS		NDBPS		Datarate(Mbps)			
					20MHz	40MHz	20MHz	40MHz	800nsGI		400nsGI	
									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
8	2	BPSK	1/2	1	104	216	52	108	13.0	27.0	14.444	30
9	2	QPSK	1/2	2	208	432	104	216	26.0	54.0	28.889	60
10	2	QPSK	3/4	2	208	432	156	324	39.0	81.0	43.333	90
11	2	16-QAM	1/2	4	416	864	208	432	52.0	108.0	57.778	120
12	2	16-QAM	3/4	4	416	864	312	648	78.0	162.0	86.667	180
13	2	64-QAM	2/3	6	624	1296	416	864	104.0	216.0	115.556	240
14	2	64-QAM	3/4	6	624	1296	468	972	117.0	243.0	130.000	270
15	2	64-QAM	5/6	6	624	1296	520	1080	130.0	270.0	144.444	300

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPCS	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

Power	Brand	Model	Rating
Adapter	LEADER	MT12-4120100-A1	Input: 120V, 50/60Hz, 0.3A Output: 12V, 1.0A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
A	JOYMAX	IWF-152XMPXX-711	Dipole Antenna	UFL	4.00	TX / RX Ant.
B	JOYMAX	IWF-152XMPXX-711	Dipole Antenna	UFL	4.00	RX Ant.
C	JOYMAX	IWF-152XMPXX-711	Dipole Antenna	UFL	4.00	TX / RX Ant.

Note: The EUT has three antennas.

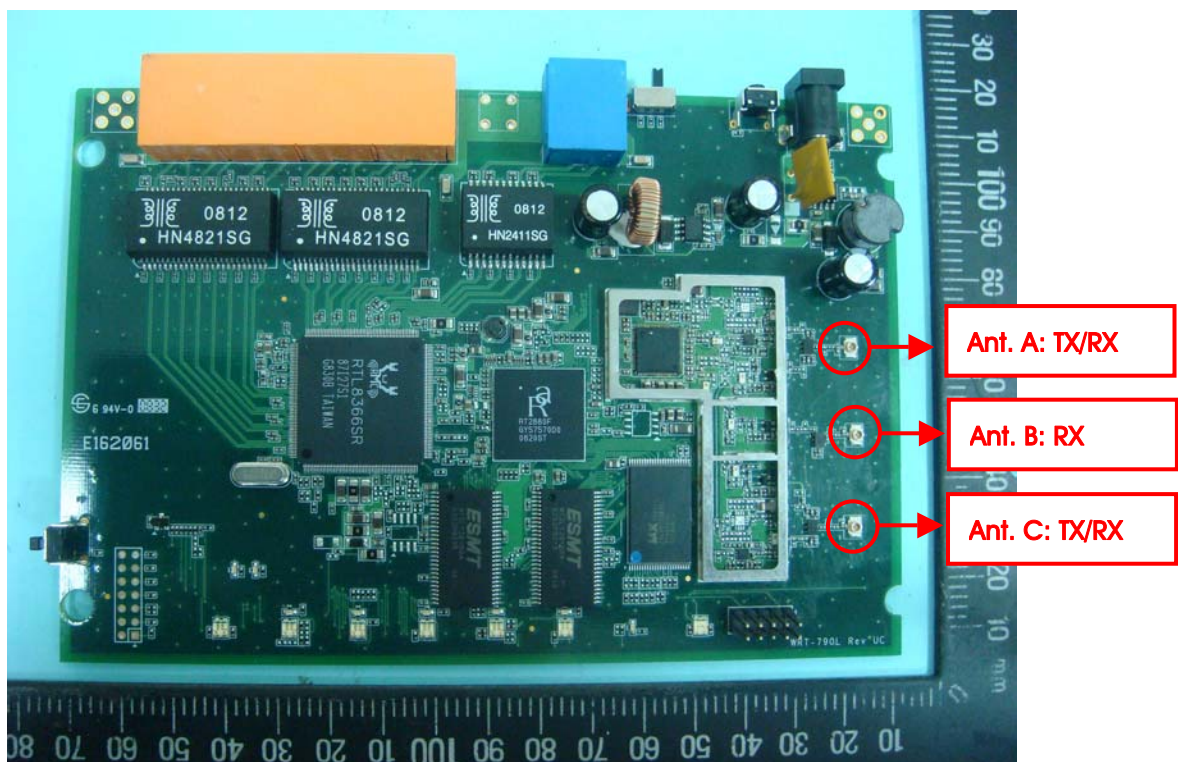
For 802.11b/g mode:

Only Ant. A can be used as transmitting antenna.

For Draft n mode:

Ant. A and Ant. C will transmit the same signal simultaneously.

Ant. A, Ant. B and Ant. C will receive the same signal simultaneously.



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	MCS8/20MHz	13 Mbps	1/6/11	A/C/A+C
	MCS8/40MHz	27 Mbps	3/6/9	A/C/A+C
	11b/BPSK	1 Mbps	1/6/11	A
	11g/BPSK	6 Mbps	1/6/11	A
Power Spectral Density 6dB Spectrum Bandwidth	MCS8/20MHz	13 Mbps	1/6/11	A+C
	MCS8/40MHz	27 Mbps	3/6/9	A+C
	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~10 th Harmonic	MCS8/20MHz	13 Mbps	1/6/11	A+C
	MCS8/40MHz	27 Mbps	3/6/9	A+C
	11b/BPSK	1 Mbps	1/6/11	A
	11g/BPSK	6 Mbps	1/6/11	A
Band Edge Emissions	MCS8/20MHz	13 Mbps	1/11	A+C
	MCS8/40MHz	27 Mbps	3/9	A+C
	11b/BPSK	1 Mbps	1/11	A
	11g/BPSK	6 Mbps	1/11	A

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
HUB	Lanreed	LD-LSW16C/AT	DoC
Notebook	DELL	I200	E2K4965AGNM
Notebook	DELL	D505	E2K24GBRL
Notebook	DELL	M1330	E2KWM3945ABG

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 MCS8 20MHz Ant. A + Ant. C

Test Software Version	QA		
Frequency	2412 MHz	2437 MHz	2462 MHz
Ant. A + Ant. C	0C/13	1F/1F	10/17

Power Parameters of Draft n MCS8 40MHz Ant. A + Ant. C

Test Software Version	QA		
Frequency	2422 MHz	2437 MHz	2452 MHz
Ant. A + Ant. C	0F/16	15/1C	13/1B

Power Parameters of IEEE 802.11b/g Ant. A

Test Software Version	QA		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	0A	08	09
IEEE 802.11g	11	1F	11

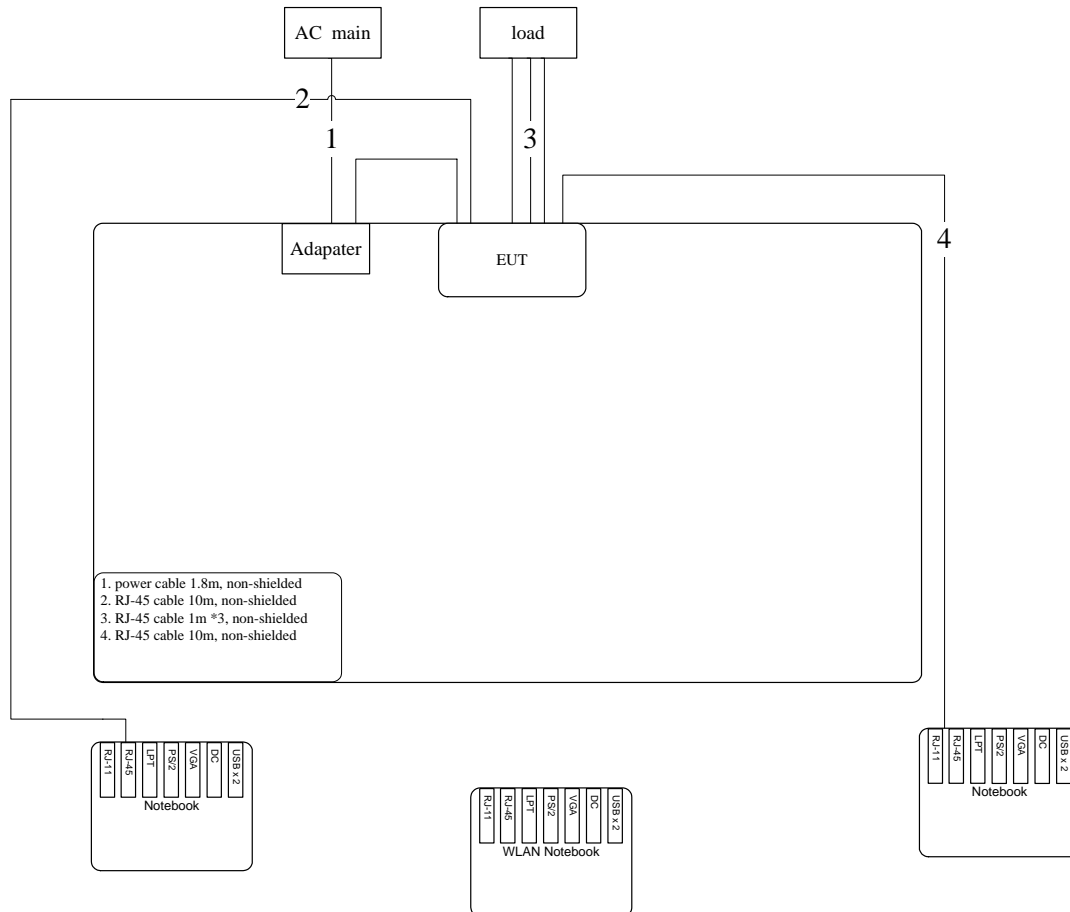
During the test, the following programs under WIN XP were executed:

“QA” was Executed the test program to control the EUT continuously transmit RF signal.

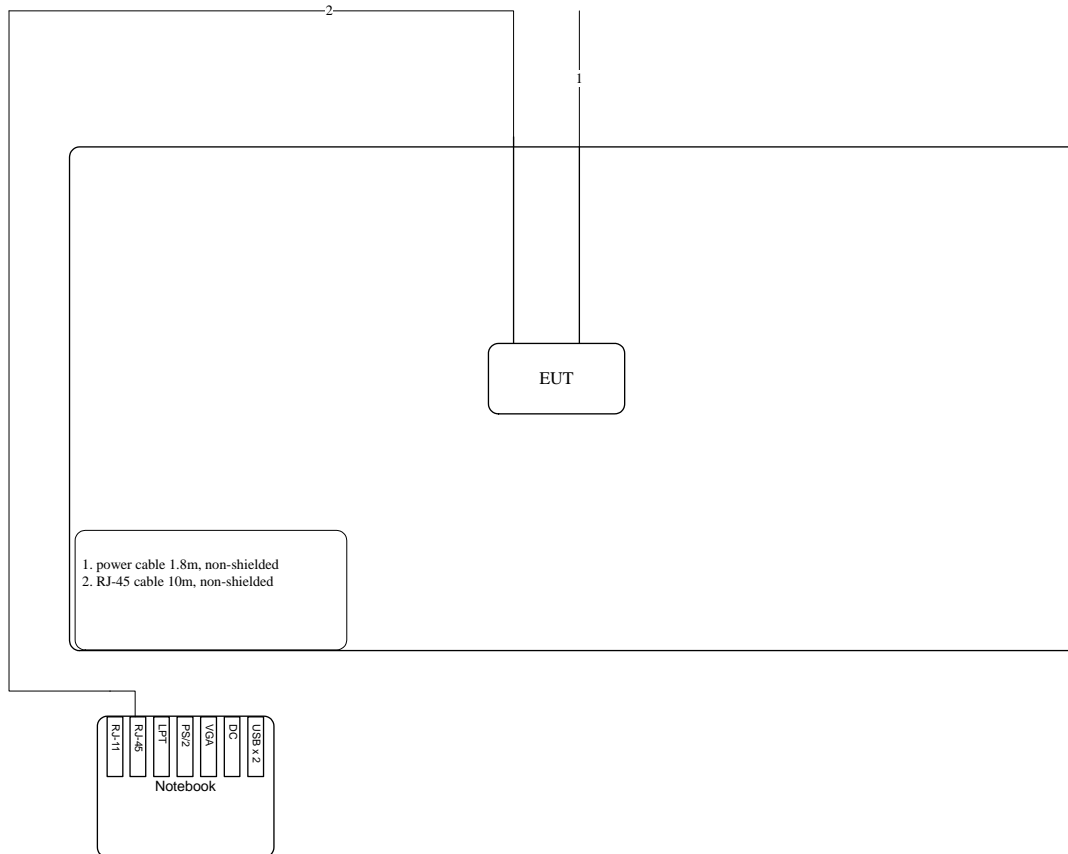
3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration

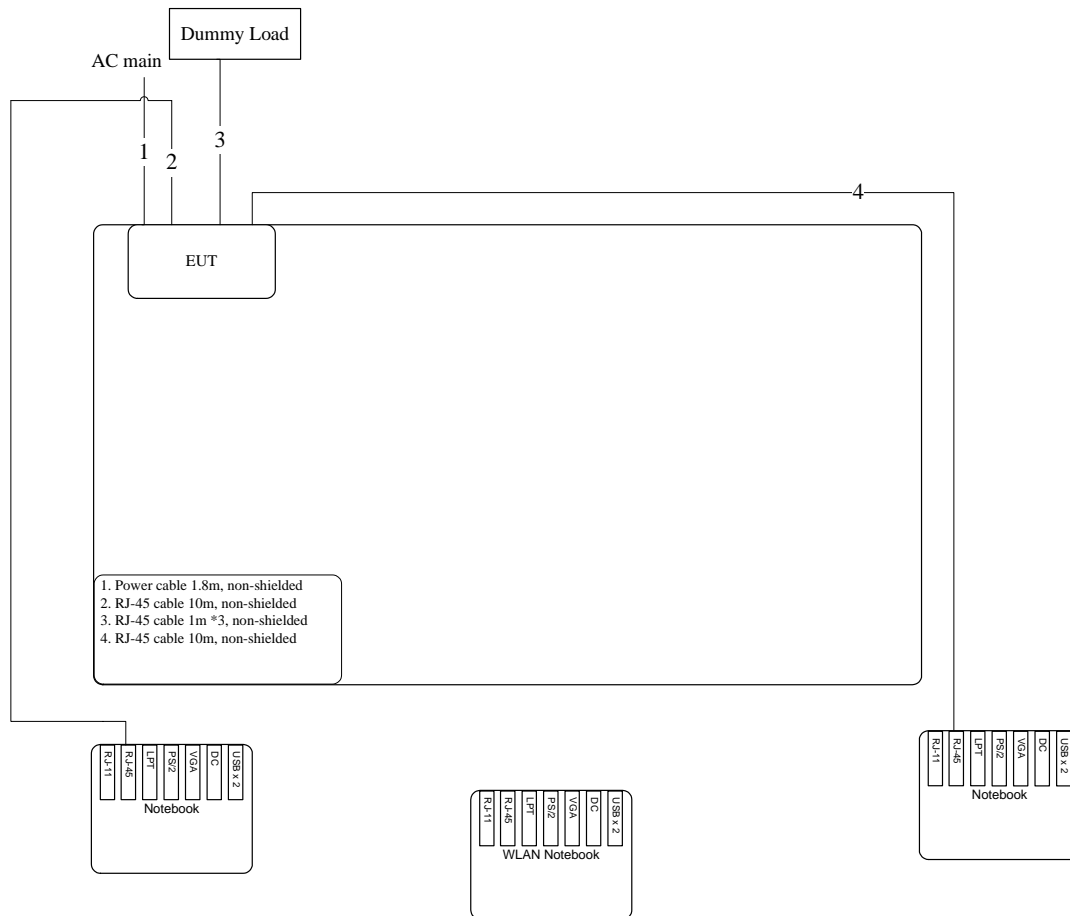
Test Configuration: 9KHz~1GHz



Test Configuration: above 1GHz



3.9.2. AC Power Line Conduction Emissions Test Configuration



4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product 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

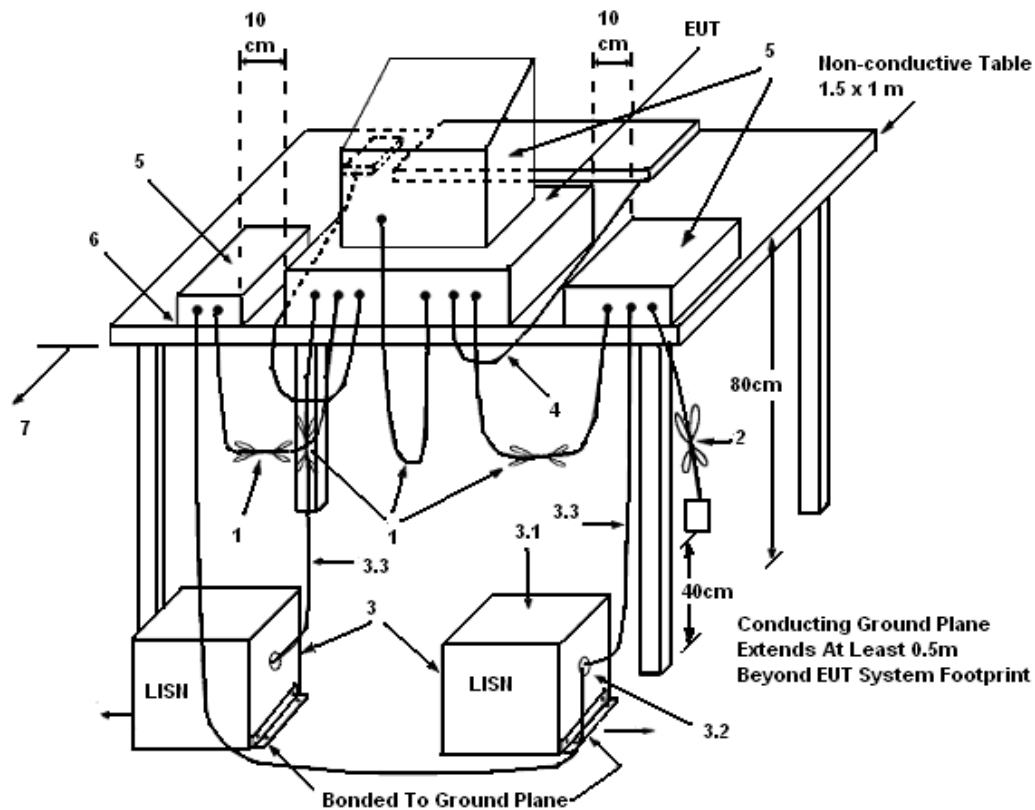
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

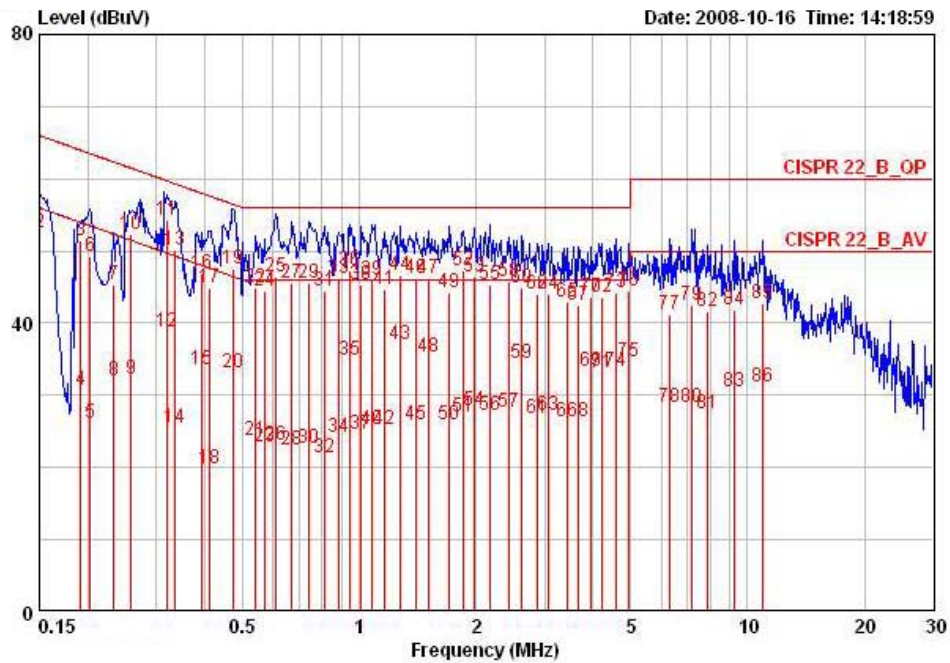
There is no deviation with the original standard.

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	26°C	Humidity	62%
Test Engineer	Aric Li	Phase	Line
Configuration	Normal Link		

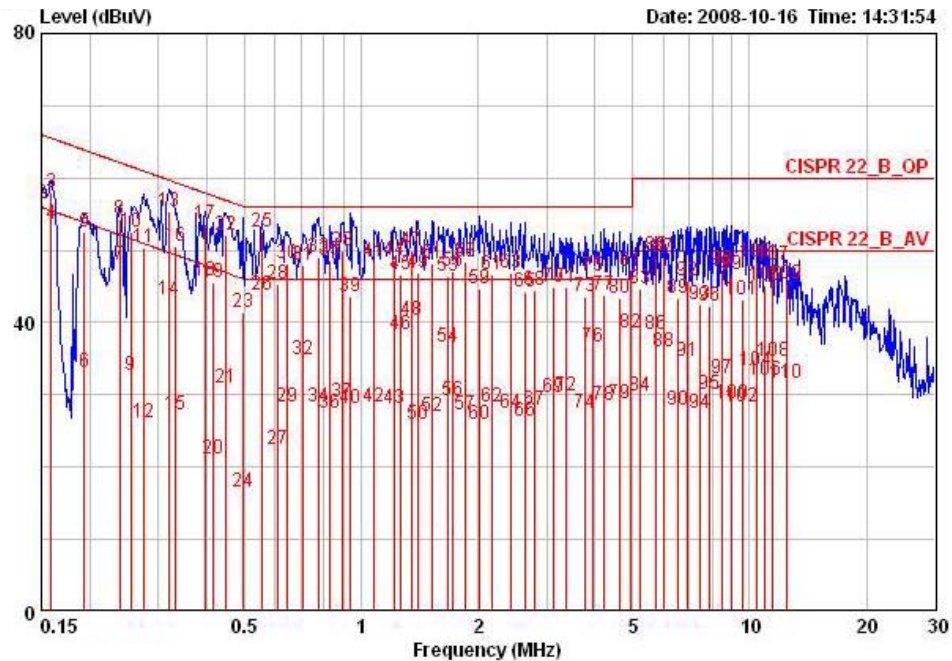


	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.15000	34.08	-21.92	56.00	33.80	0.08	0.20	AVERAGE
2	0.15000	52.53	-13.47	66.00	52.25	0.08	0.20	QP
3	0.19140	51.42	-12.55	63.98	51.17	0.05	0.20	QP
4	0.19140	30.80	-23.17	53.98	30.55	0.05	0.20	AVERAGE
5	0.20289	26.16	-27.33	53.49	25.91	0.05	0.20	AVERAGE
6	0.20289	49.30	-14.19	63.49	49.05	0.05	0.20	QP
7	0.23285	45.38	-16.97	62.35	45.13	0.05	0.20	QP
8	0.23285	32.12	-20.23	52.35	31.87	0.05	0.20	AVERAGE
9	0.25852	32.23	-19.25	51.48	31.99	0.04	0.20	AVERAGE
10	0.25852	52.21	-9.27	61.48	51.97	0.04	0.20	QP
11	0.31855	54.33	-5.42	59.74	54.09	0.04	0.20	QP
12	0.31855	38.86	-10.89	49.74	38.62	0.04	0.20	AVERAGE
13	0.33562	50.08	-9.24	59.31	49.84	0.04	0.20	QP
14	0.33562	25.56	-23.76	49.31	25.32	0.04	0.20	AVERAGE
15	0.39136	33.59	-14.44	48.03	33.36	0.03	0.20	AVERAGE
16	0.39136	46.88	-11.15	58.03	46.65	0.03	0.20	QP
17	0.41266	44.94	-12.65	57.59	44.71	0.03	0.20	QP
18	0.41266	19.79	-27.80	47.59	19.56	0.03	0.20	AVERAGE
19	0.47360	47.51	-8.95	56.45	47.30	0.03	0.18	QP
20	0.47360	33.23	-13.23	46.45	33.02	0.03	0.18	AVERAGE
21	0.54068	23.75	-22.25	46.00	23.52	0.03	0.20	AVERAGE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
22	0.54068	44.95	-11.05	56.00	44.72	0.03	0.20	QP
23	0.57010	22.80	-23.20	46.00	22.57	0.03	0.20	AVERAGE
24	0.57010	44.45	-11.55	56.00	44.22	0.03	0.20	QP
25	0.61075	46.42	-9.58	56.00	46.19	0.03	0.20	QP
26	0.61075	23.21	-22.79	46.00	22.98	0.03	0.20	AVERAGE
27	0.67187	45.59	-10.41	56.00	45.36	0.03	0.20	QP
28	0.67187	22.51	-23.49	46.00	22.28	0.03	0.20	AVERAGE
29	0.73910	45.62	-10.38	56.00	45.39	0.03	0.20	QP
30	0.73910	22.69	-23.31	46.00	22.46	0.03	0.20	AVERAGE
31	0.81306	44.56	-11.44	56.00	44.33	0.03	0.20	QP
32	0.81306	21.47	-24.53	46.00	21.24	0.03	0.20	AVERAGE
33	0.88499	46.20	-9.80	56.00	45.97	0.03	0.20	QP
34	0.88499	24.13	-21.87	46.00	23.90	0.03	0.20	AVERAGE
35	0.94809	34.85	-11.15	46.00	34.62	0.03	0.20	AVERAGE
36	0.94809	47.33	-8.67	56.00	47.10	0.03	0.20	QP
37	1.010	24.53	-21.47	46.00	24.30	0.03	0.20	AVERAGE
38	1.010	45.40	-10.60	56.00	45.17	0.03	0.20	QP
39	1.077	46.01	-9.99	56.00	45.80	0.03	0.18	QP
40	1.077	25.23	-20.77	46.00	25.02	0.03	0.18	AVERAGE
41	1.166	44.77	-11.23	56.00	44.57	0.03	0.16	QP
42	1.166	25.33	-20.67	46.00	25.13	0.03	0.16	AVERAGE
43	1.269	36.95	-9.05	46.00	36.77	0.04	0.14	AVERAGE
44	1.269	46.57	-9.43	56.00	46.39	0.04	0.14	QP
45	1.396	26.04	-19.96	46.00	25.88	0.04	0.12	AVERAGE
46	1.396	46.21	-9.79	56.00	46.05	0.04	0.12	QP
47	1.511	46.18	-9.82	56.00	46.04	0.04	0.10	QP
48	1.511	35.28	-10.72	46.00	35.14	0.04	0.10	AVERAGE
49	1.707	44.33	-11.67	56.00	44.14	0.05	0.14	QP
50	1.707	26.03	-19.97	46.00	25.84	0.05	0.14	AVERAGE
51	1.848	27.03	-18.97	46.00	26.81	0.05	0.17	AVERAGE
52	1.848	47.24	-8.76	56.00	47.02	0.05	0.17	QP
53	1.970	46.33	-9.67	56.00	46.09	0.05	0.19	QP
54	1.970	27.87	-18.13	46.00	27.63	0.05	0.19	AVERAGE
55	2.178	45.24	-10.76	56.00	44.98	0.06	0.20	QP
56	2.178	27.36	-18.64	46.00	27.10	0.06	0.20	AVERAGE
57	2.422	27.65	-18.35	46.00	27.39	0.06	0.20	AVERAGE
58	2.422	45.88	-10.12	56.00	45.62	0.06	0.20	QP
59	2.622	34.53	-11.47	46.00	34.26	0.07	0.20	AVERAGE
60	2.622	44.82	-11.18	56.00	44.55	0.07	0.20	QP
61	2.884	26.85	-19.15	46.00	26.57	0.08	0.20	AVERAGE
62	2.884	44.10	-11.90	56.00	43.82	0.08	0.20	QP
63	3.058	27.17	-18.83	46.00	26.88	0.08	0.21	AVERAGE
64	3.058	44.13	-11.87	56.00	43.84	0.08	0.21	QP
65	3.436	42.91	-13.09	56.00	42.53	0.09	0.29	QP
66	3.436	26.36	-19.64	46.00	25.98	0.09	0.29	AVERAGE
67	3.681	42.56	-13.44	56.00	42.17	0.09	0.30	QP
68	3.681	26.46	-19.54	46.00	26.07	0.09	0.30	AVERAGE
69	3.964	33.28	-12.72	46.00	32.88	0.10	0.30	AVERAGE
70	3.964	43.61	-12.39	56.00	43.21	0.10	0.30	QP
71	4.202	33.04	-12.96	46.00	32.63	0.11	0.30	AVERAGE
72	4.202	43.58	-12.42	56.00	43.17	0.11	0.30	QP
73	4.598	44.20	-11.80	56.00	43.76	0.14	0.30	QP
74	4.598	33.26	-12.74	46.00	32.82	0.14	0.30	AVERAGE
75	4.926	34.64	-11.36	46.00	34.18	0.16	0.30	AVERAGE
76	4.926	44.55	-11.45	56.00	44.09	0.16	0.30	QP
77	6.285	41.17	-18.83	60.00	40.59	0.22	0.36	QP
78	6.285	28.36	-21.64	50.00	27.78	0.22	0.36	AVERAGE
79	7.175	42.41	-17.59	60.00	41.81	0.26	0.34	QP
80	7.175	28.25	-21.75	50.00	27.65	0.26	0.34	AVERAGE
81	7.893	27.52	-22.48	50.00	26.84	0.28	0.40	AVERAGE
82	7.893	41.62	-18.38	60.00	40.94	0.28	0.40	QP
83	9.204	30.62	-19.38	50.00	29.99	0.33	0.30	AVERAGE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
84	9.204	41.83	-18.17	60.00	41.20	0.33	0.30	QP
85 ☺	10.963	42.71	-17.29	60.00	41.92	0.39	0.40	QP
86	10.963	31.25	-18.75	50.00	30.46	0.39	0.40	AVERAGE

Temperature	26°C	Humidity	62%
Test Engineer	Aric Li	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.15000	40.76	-15.24	56.00	40.45	0.11	0.20	AVERAGE
2	0.15000	56.36	-9.64	66.00	56.05	0.11	0.20	QP
3	0.15900	58.08	-7.44	65.52	57.78	0.10	0.20	QP
4	0.15900	53.55	-1.97	55.52	53.25	0.10	0.20	AVERAGE
5	0.19344	52.43	-11.45	63.89	52.15	0.08	0.20	QP
6	0.19344	33.06	-20.82	53.89	32.78	0.08	0.20	AVERAGE
7	0.23910	47.97	-4.16	52.13	47.69	0.08	0.20	AVERAGE
8	0.23910	54.35	-7.78	62.13	54.07	0.08	0.20	QP
9	0.25480	32.67	-18.93	51.60	32.39	0.08	0.20	AVERAGE
10	0.25480	52.52	-9.08	61.60	52.24	0.08	0.20	QP
11	0.27587	50.26	-10.68	60.94	49.98	0.08	0.20	QP
12	0.27587	26.27	-24.67	50.94	25.99	0.08	0.20	AVERAGE
13	0.31830	55.33	-4.42	59.75	55.06	0.07	0.20	QP
14	0.31830	43.12	-6.63	49.75	42.85	0.07	0.20	AVERAGE
15	0.33208	27.26	-22.14	49.40	26.99	0.07	0.20	AVERAGE
16	0.33208	50.55	-8.85	59.40	50.28	0.07	0.20	QP
17	0.39553	53.73	-4.22	57.95	53.46	0.07	0.20	QP
18	0.39553	45.86	-2.09	47.95	45.59	0.07	0.20	AVERAGE
19	0.41705	45.45	-12.06	57.51	45.18	0.07	0.20	QP
20	0.41705	21.25	-26.26	47.51	20.98	0.07	0.20	AVERAGE
21	0.44916	30.94	-15.95	46.89	30.67	0.07	0.20	AVERAGE



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
22	0.44916	52.10	-4.79	56.89	51.83	0.07	0.20	QP
23	0.49411	41.48	-14.62	56.10	41.26	0.07	0.15	QP
24	0.49411	16.57	-29.53	46.10	16.35	0.07	0.15	AVERAGE
25	0.55520	52.61	-3.39	56.00	52.34	0.07	0.20	QP
26	0.55520	43.82	-2.18	46.00	43.55	0.07	0.20	AVERAGE
27	0.61075	22.40	-23.60	46.00	22.13	0.07	0.20	AVERAGE
28	0.61075	45.41	-10.59	56.00	45.14	0.07	0.20	QP
29	0.64398	28.23	-17.77	46.00	27.96	0.07	0.20	AVERAGE
30	0.64398	48.18	-7.82	56.00	47.91	0.07	0.20	QP
31	0.70842	47.90	-8.10	56.00	47.63	0.07	0.20	QP
32	0.70842	34.90	-11.10	46.00	34.63	0.07	0.20	AVERAGE
33	0.77519	49.13	-6.87	56.00	48.86	0.07	0.20	QP
34	0.77519	28.25	-17.75	46.00	27.98	0.07	0.20	AVERAGE
35	0.83047	48.55	-7.45	56.00	48.28	0.07	0.20	QP
36	0.83047	27.49	-18.51	46.00	27.22	0.07	0.20	AVERAGE
37	0.89441	29.00	-17.00	46.00	28.73	0.07	0.20	AVERAGE
38	0.89441	49.85	-6.15	56.00	49.58	0.07	0.20	QP
39	0.93810	43.61	-12.39	56.00	43.34	0.07	0.20	QP
40	0.93810	28.04	-17.96	46.00	27.77	0.07	0.20	AVERAGE
41	1.082	48.37	-7.63	56.00	48.12	0.07	0.18	QP
42	1.082	28.31	-17.69	46.00	28.06	0.07	0.18	AVERAGE
43	1.216	28.18	-17.82	46.00	27.95	0.08	0.15	AVERAGE
44	1.216	48.61	-7.39	56.00	48.38	0.08	0.15	QP
45	1.262	46.61	-9.39	56.00	46.39	0.08	0.14	QP
46	1.262	38.31	-7.69	46.00	38.09	0.08	0.14	AVERAGE
47	1.345	49.82	-6.18	56.00	49.61	0.08	0.13	QP
48	1.345	40.40	-5.60	46.00	40.19	0.08	0.13	AVERAGE
49	1.396	46.82	-9.18	56.00	46.62	0.08	0.12	QP
50	1.396	26.02	-19.98	46.00	25.82	0.08	0.12	AVERAGE
51	1.527	48.15	-7.85	56.00	47.96	0.08	0.11	QP
52	1.527	26.94	-19.06	46.00	26.75	0.08	0.11	AVERAGE
53	1.671	46.41	-9.59	56.00	46.19	0.08	0.14	QP
54	1.671	36.68	-9.32	46.00	36.46	0.08	0.14	AVERAGE
55	1.725	47.18	-8.82	56.00	46.95	0.09	0.15	QP
56	1.725	29.20	-16.80	46.00	28.97	0.09	0.15	AVERAGE
57	1.848	27.27	-18.73	46.00	27.01	0.09	0.17	AVERAGE
58	1.848	48.29	-7.71	56.00	48.03	0.09	0.17	QP
59	2.023	44.70	-11.30	56.00	44.41	0.09	0.20	QP
60	2.023	25.93	-20.07	46.00	25.64	0.09	0.20	AVERAGE
61	2.167	46.71	-9.29	56.00	46.41	0.10	0.20	QP
62	2.167	28.27	-17.73	46.00	27.97	0.10	0.20	AVERAGE
63	2.422	46.92	-9.08	56.00	46.62	0.10	0.20	QP
64	2.422	27.44	-18.56	46.00	27.14	0.10	0.20	AVERAGE
65	2.636	44.23	-11.77	56.00	43.92	0.11	0.20	QP
66	2.636	26.32	-19.68	46.00	26.01	0.11	0.20	AVERAGE
67	2.794	27.96	-18.04	46.00	27.65	0.11	0.20	AVERAGE
68	2.794	44.51	-11.49	56.00	44.20	0.11	0.20	QP
69	3.123	29.54	-16.46	46.00	29.19	0.12	0.23	AVERAGE
70	3.123	44.83	-11.17	56.00	44.48	0.12	0.23	QP
71	3.381	44.93	-11.07	56.00	44.53	0.13	0.28	QP
72	3.381	29.78	-16.22	46.00	29.38	0.13	0.28	AVERAGE
73	3.759	43.51	-12.49	56.00	43.07	0.14	0.30	QP
74	3.759	27.53	-18.47	46.00	27.09	0.14	0.30	AVERAGE
75	3.964	46.53	-9.47	56.00	46.09	0.14	0.30	QP
76	3.964	36.66	-9.34	46.00	36.22	0.14	0.30	AVERAGE
77	4.224	43.79	-12.21	56.00	43.33	0.16	0.30	QP
78	4.224	28.54	-17.46	46.00	28.08	0.16	0.30	AVERAGE
79	4.622	28.84	-17.16	46.00	28.36	0.18	0.30	AVERAGE
80	4.622	43.35	-12.65	56.00	42.87	0.18	0.30	QP
81	4.926	46.99	-9.01	56.00	46.49	0.20	0.30	QP
82	4.926	38.63	-7.37	46.00	38.13	0.20	0.30	AVERAGE
83	5.221	44.76	-15.24	60.00	44.25	0.21	0.30	QP



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
84	5.221	29.86	-20.14	50.00	29.35	0.21	0.30	AVERAGE
85 ☒	5.713	49.30	-10.70	60.00	48.76	0.24	0.30	QP
86 ☒	5.713	38.28	-11.72	50.00	37.74	0.24	0.30	AVERAGE
87 ☒	6.024	49.14	-10.86	60.00	48.58	0.25	0.31	QP
88 ☒	6.024	36.07	-13.93	50.00	35.51	0.25	0.31	AVERAGE
89 ☒	6.557	43.47	-16.53	60.00	42.81	0.27	0.39	QP
90	6.557	27.92	-22.08	50.00	27.26	0.27	0.39	AVERAGE
91 ☒	6.914	34.76	-15.24	50.00	34.16	0.29	0.31	AVERAGE
92 ☒	6.914	45.71	-14.29	60.00	45.11	0.29	0.31	QP
93 ☒	7.486	42.42	-17.58	60.00	41.71	0.31	0.40	QP
94	7.486	27.57	-22.43	50.00	26.86	0.31	0.40	AVERAGE
95	7.893	29.98	-20.02	50.00	29.26	0.32	0.40	AVERAGE
96	7.893	42.27	-17.73	60.00	41.55	0.32	0.40	QP
97	8.501	32.34	-17.66	50.00	31.69	0.35	0.30	AVERAGE
98 ☒	8.501	47.41	-12.59	60.00	46.76	0.35	0.30	QP
99 ☒	9.011	46.57	-13.43	60.00	45.91	0.36	0.30	QP
100	9.011	28.80	-21.20	50.00	28.14	0.36	0.30	AVERAGE
101 ☒	9.552	43.14	-16.86	60.00	42.46	0.38	0.30	QP
102	9.552	28.38	-21.62	50.00	27.70	0.38	0.30	AVERAGE
103 ☒	10.397	48.48	-11.52	60.00	47.69	0.41	0.38	QP
104 ☒	10.397	33.34	-16.66	50.00	32.55	0.41	0.38	AVERAGE
105 ☒	10.963	45.02	-14.98	60.00	44.19	0.43	0.40	QP
106	10.963	32.10	-17.90	50.00	31.27	0.43	0.40	AVERAGE
107 ☒	11.498	48.03	-11.97	60.00	47.18	0.45	0.40	QP
108 ☒	11.498	34.63	-15.37	50.00	33.78	0.45	0.40	AVERAGE
109 ☒	12.449	45.40	-14.60	60.00	44.51	0.49	0.40	QP
110	12.449	31.67	-18.33	50.00	30.78	0.49	0.40	AVERAGE

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

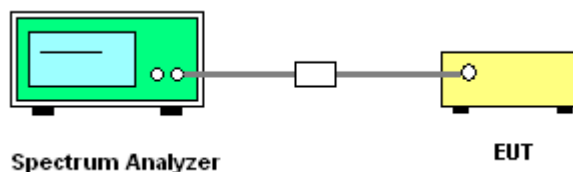
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

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	26°C	Humidity	62%
Test Engineer	Sam Chen	Configurations	Draft n

Configuration Draft n MCS8 20MHz Ant. A

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	19.27	30.00	Complies
6	2437 MHz	27.80	30.00	Complies
11	2462 MHz	20.83	30.00	Complies

Configuration Draft n MCS8 20MHz Ant. C

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	19.68	30.00	Complies
6	2437 MHz	25.59	30.00	Complies
11	2462 MHz	20.19	30.00	Complies

Configuration Draft n MCS8 20MHz Ant. A + Ant. C

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	22.49	30.00	Complies
6	2437 MHz	29.81	30.00	Complies
11	2462 MHz	23.53	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. A

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	17.10	30.00	Complies
6	2437 MHz	20.32	30.00	Complies
9	2452 MHz	19.08	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. C

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	17.51	30.00	Complies
6	2437 MHz	20.37	30.00	Complies
9	2452 MHz	19.65	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. A + Ant. C

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	20.32	30.00	Complies
6	2437 MHz	23.36	30.00	Complies
9	2452 MHz	22.38	30.00	Complies

Temperature	26°C	Humidity	62%
Test Engineer	Sam Chen	Configurations	802.11b/g

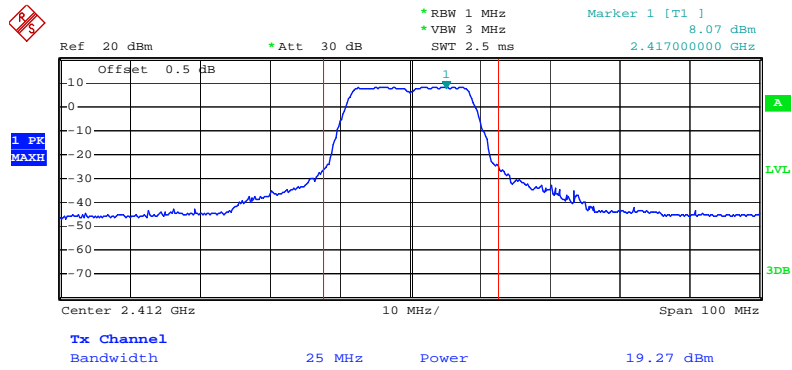
Configuration IEEE 802.11b Ant. A

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	17.99	30.00	Complies
6	2437 MHz	16.08	30.00	Complies
11	2462 MHz	16.75	30.00	Complies

Configuration IEEE 802.11g Ant. A

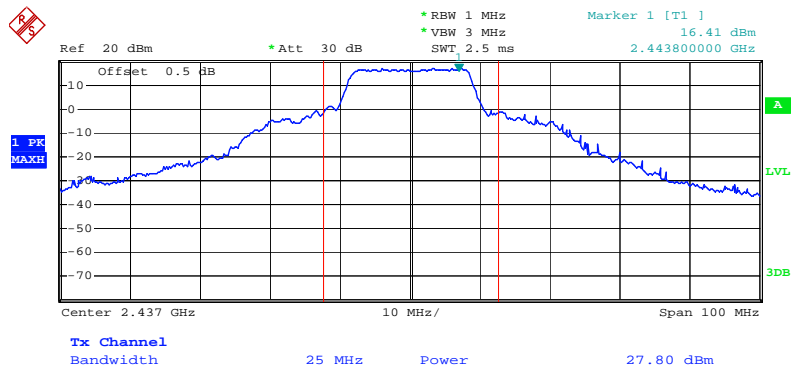
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	21.74	30.00	Complies
6	2437 MHz	27.11	30.00	Complies
11	2462 MHz	21.07	30.00	Complies

Conducted Output Power Plot on Configuration Draft n MCS8 20MHz Ant. A / 2412 MHz



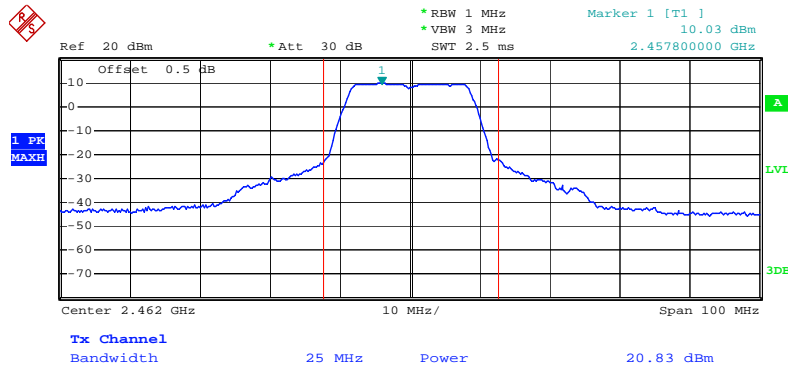
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Conducted Output Power Plot on Configuration Draft n MCS8 20MHz Ant. A / 2437 MHz



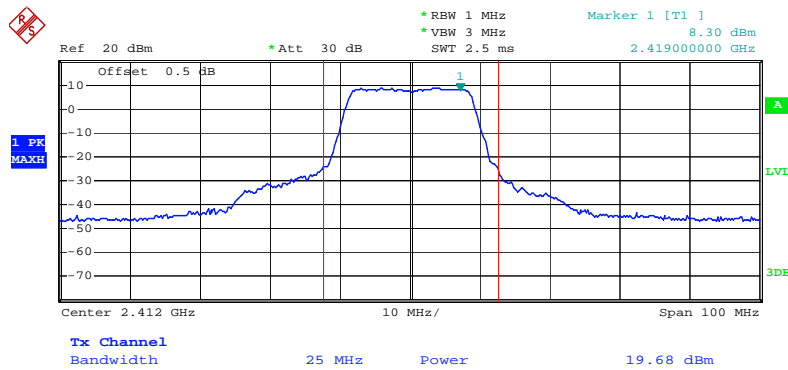
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Conducted Output Power Plot on Configuration Draft n MCS8 20MHz Ant. A / 2462 MHz



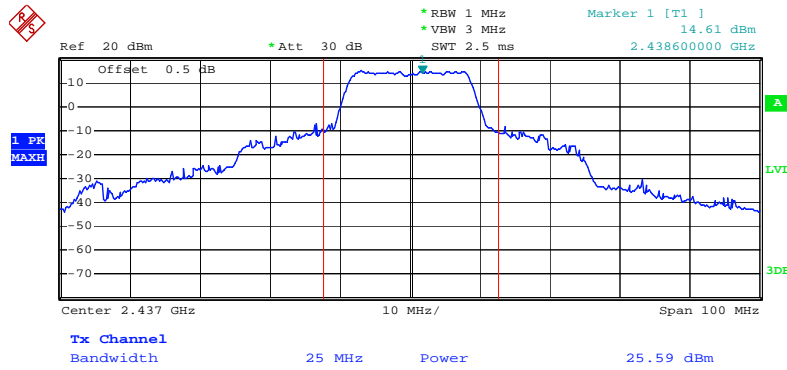
Date: 19.OCT.2008 13:22:43

Conducted Output Power Plot on Configuration Draft n MCS8 20MHz Ant. C / 2412 MHz



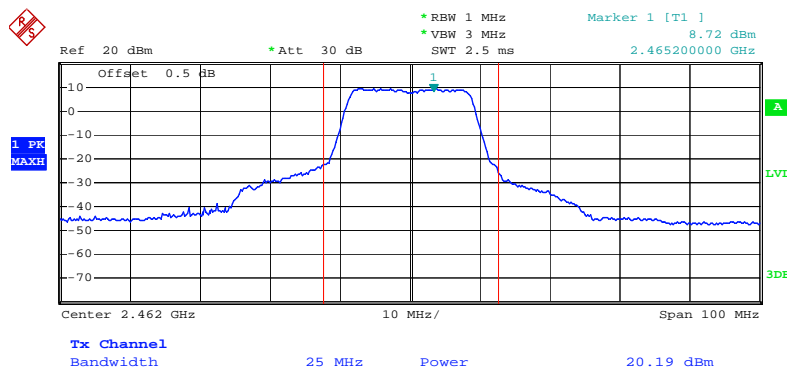
Date: 19.OCT.2008 13:18:27

Conducted Output Power Plot on Configuration Draft n MCS8 20MHz Ant. C / 2437 MHz



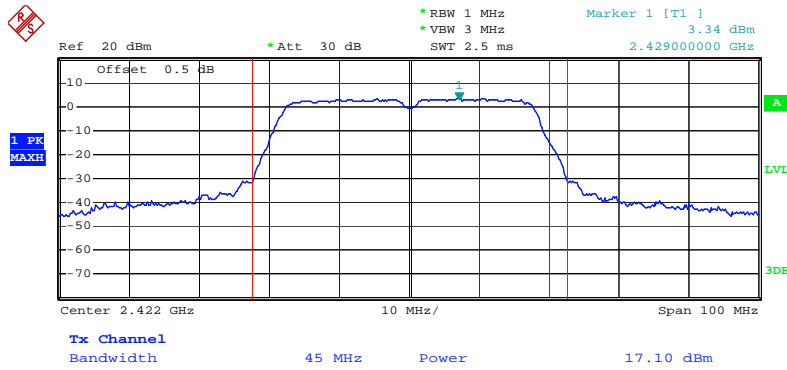
Date: 19.OCT.2008 13:19:41

Conducted Output Power Plot on Configuration Draft n MCS8 20MHz Ant. C / 2462 MHz



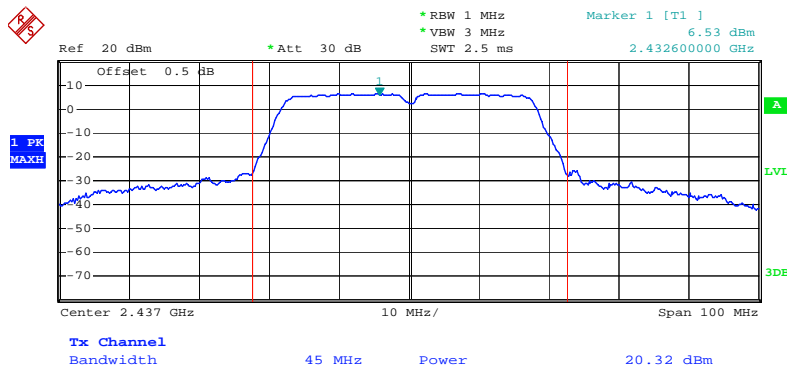
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Conducted Output Power Plot on Configuration Draft n MCS8 40MHz Ant. A / 2422 MHz



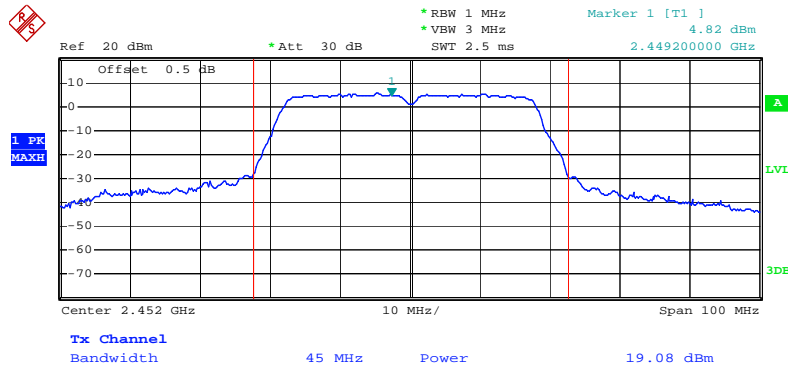
Date: 19.OCT.2008 13:27:57

Conducted Output Power Plot on Configuration Draft n MCS8 40MHz Ant. A / 2437 MHz



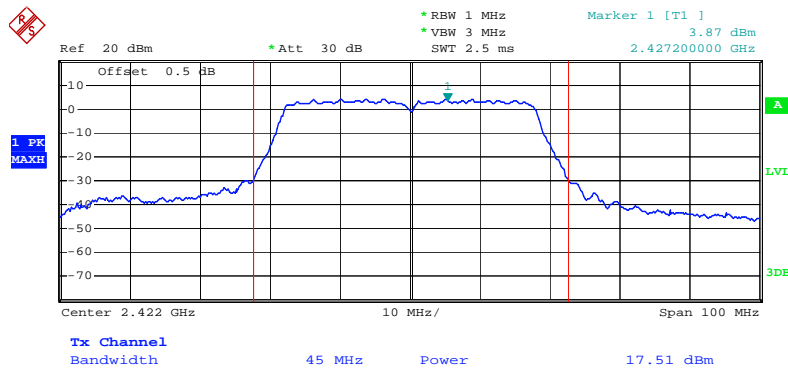
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Conducted Output Power Plot on Configuration Draft n MCS8 40MHz Ant. A / 2452 MHz



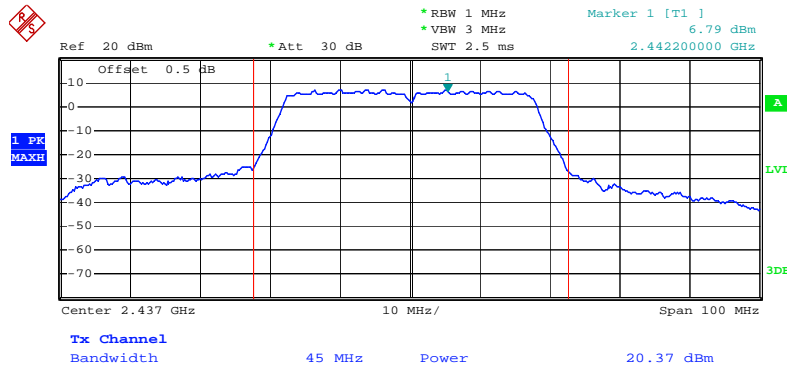
Date: 19.OCT.2008 13:33:31

Conducted Output Power Plot on Configuration Draft n MCS8 40MHz Ant. C / 2422 MHz



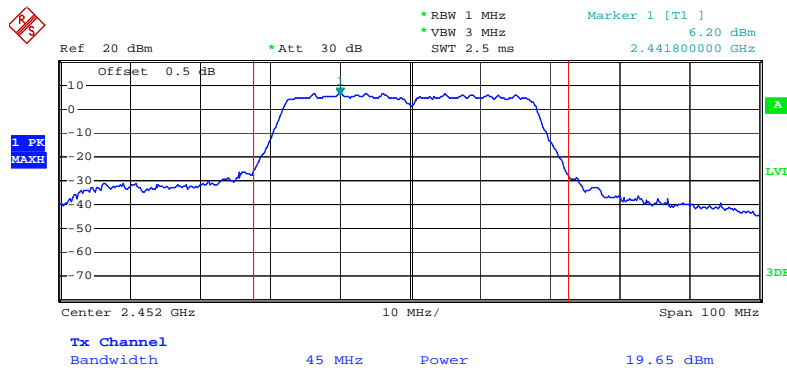
Date: 19.OCT.2008 13:27:12

Conducted Output Power Plot on Configuration Draft n MCS8 40MHz Ant. C / 2437 MHz



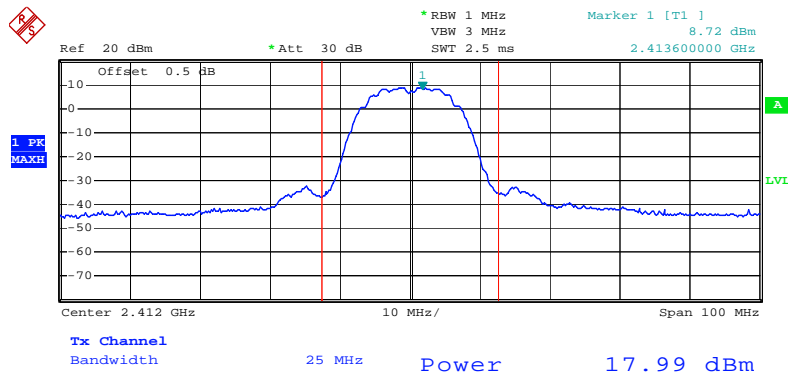
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Conducted Output Power Plot on Configuration Draft n MCS8 40MHz Ant. C / 2452 MHz



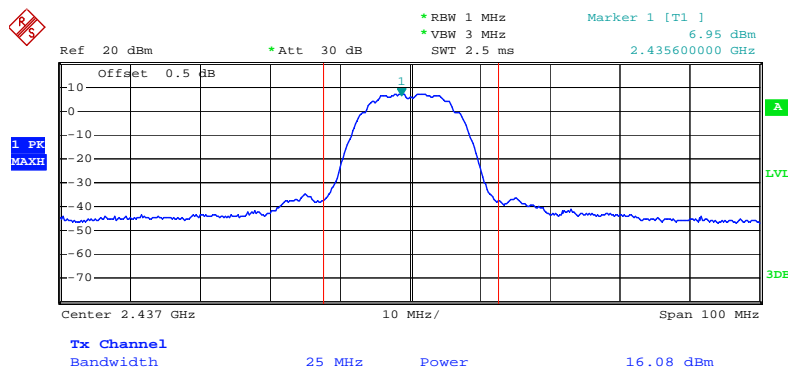
Date: 19.OCT.2008 13:32:41

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



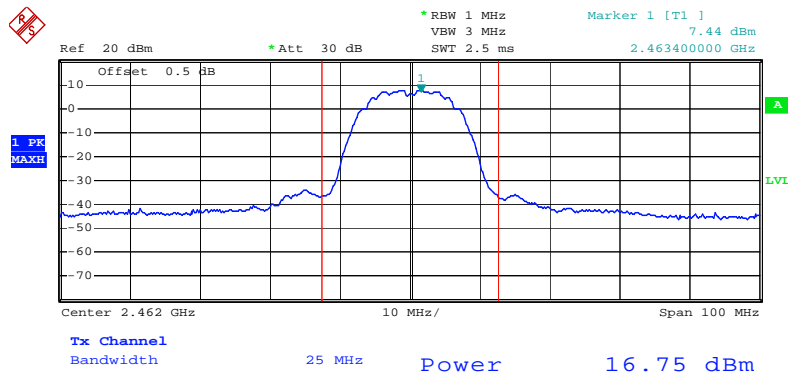
Date: 20.OCT.2008 10:26:11

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



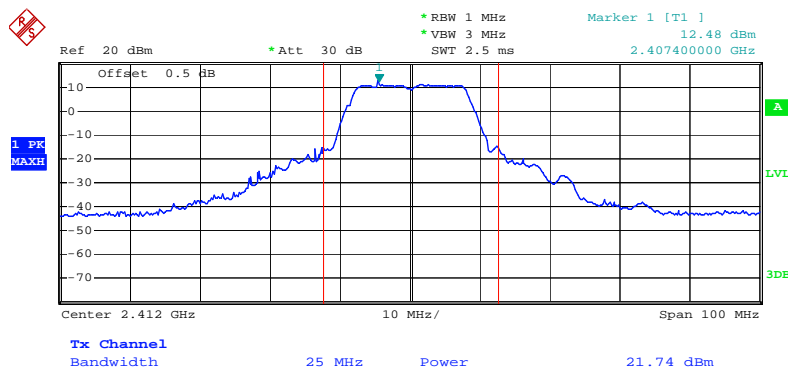
Date: 19.OCT.2008 13:01:35

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



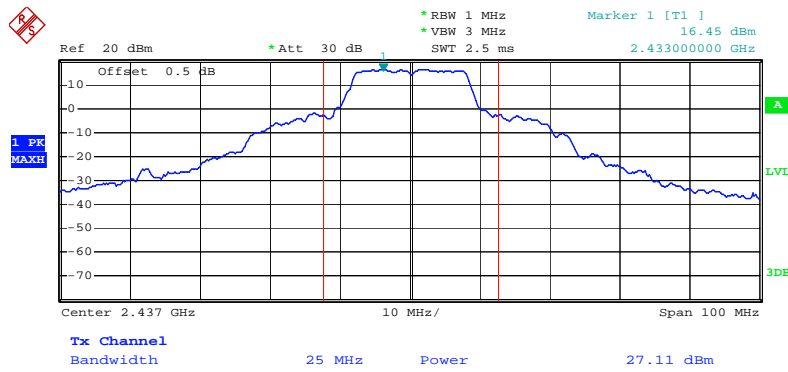
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Conducted Output Power Plot on Configuration IEEE 802.11g Ant. A / 2412 MHz



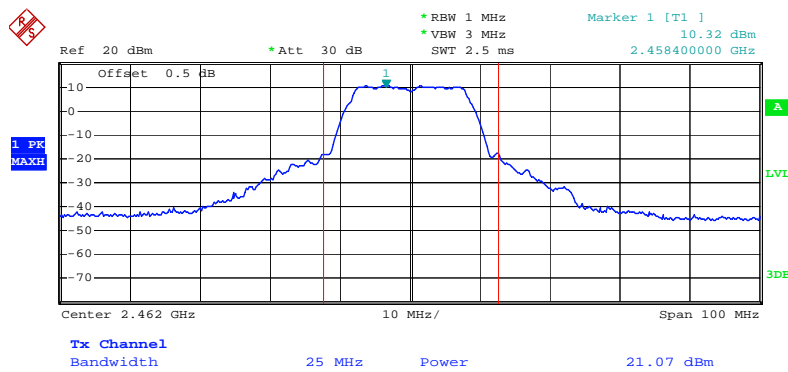
Date: 19.OCT.2008 13:08:54

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



Date: 19.OCT.2008 13:09:50

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



Date: 19.OCT.2008 13:10:57

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

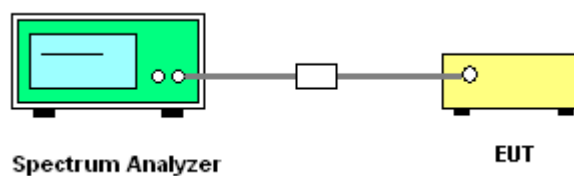
Please refer to section 5 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	30kHz
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.
5. Measuring multiple antennas, the connector is required to link with spectrum analyser through a combiner.

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	26°C	Humidity	62%
Test Engineer	Sam Chen	Configurations	Draft n

Configuration Draft n MCS8 20MHz Ant. A + Ant. C

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-19.45	8.00	Complies
6	2437 MHz	-9.03	8.00	Complies
11	2462 MHz	-13.96	8.00	Complies

Configuration Draft n MCS8 40MHz Ant. A + Ant. C

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-19.68	8.00	Complies
6	2437 MHz	-17.75	8.00	Complies
9	2452 MHz	-18.89	8.00	Complies

Temperature	26°C	Humidity	62%
Test Engineer	Sam Chen	Configurations	802.11b/g

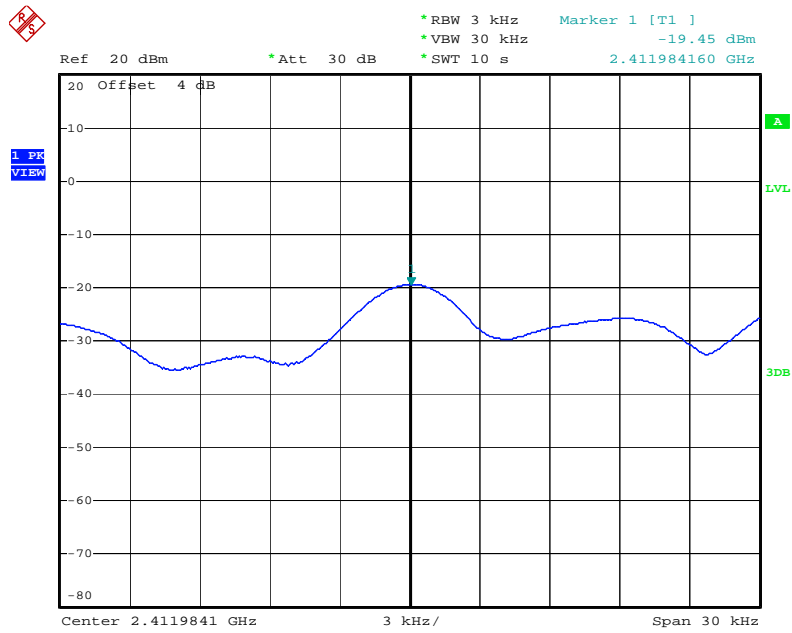
Configuration IEEE 802.11b Ant. A

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-19.66	8.00	Complies
6	2437 MHz	-19.86	8.00	Complies
11	2462 MHz	-20.38	8.00	Complies

Configuration IEEE 802.11g Ant. A

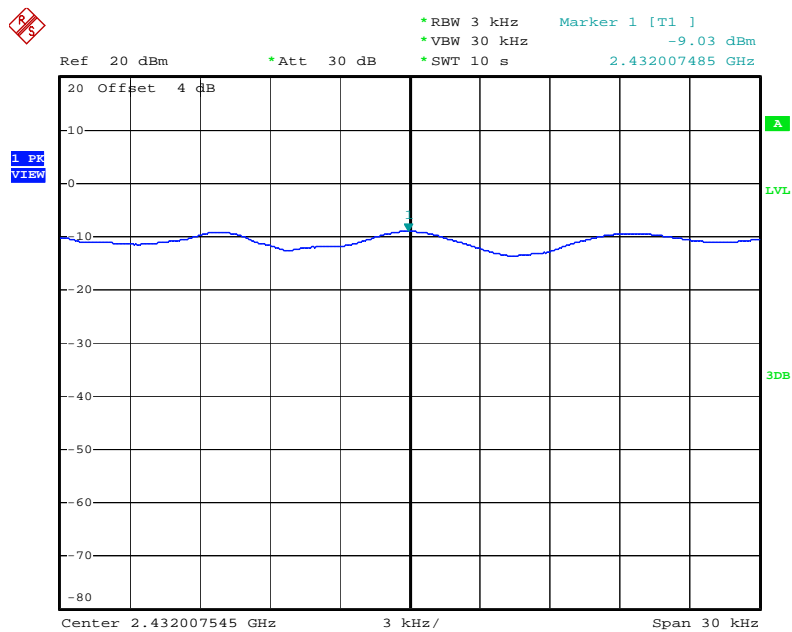
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-15.78	8.00	Complies
6	2437 MHz	-11.58	8.00	Complies
11	2462 MHz	-16.16	8.00	Complies

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. A + Ant. C / 2412 MHz



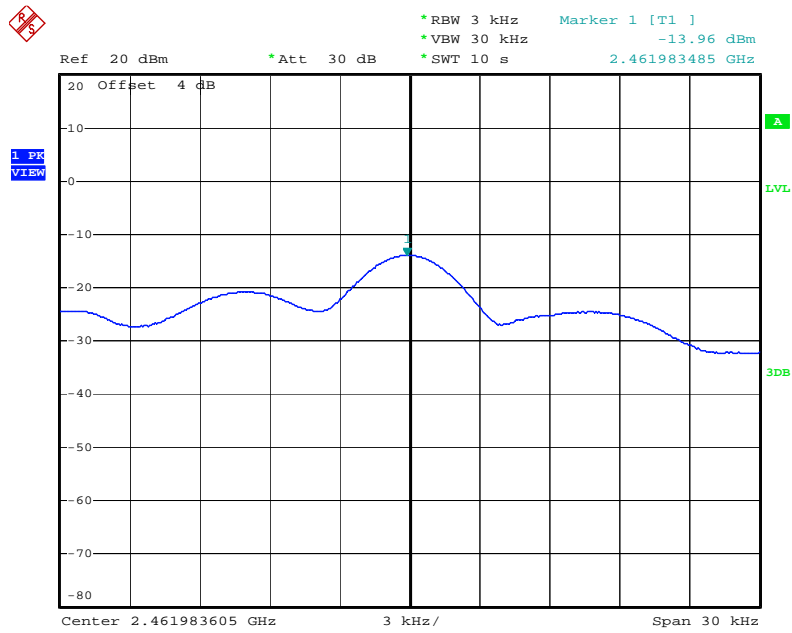
Date: 19.OCT.2008 13:47:06

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. A + Ant. C / 2437 MHz



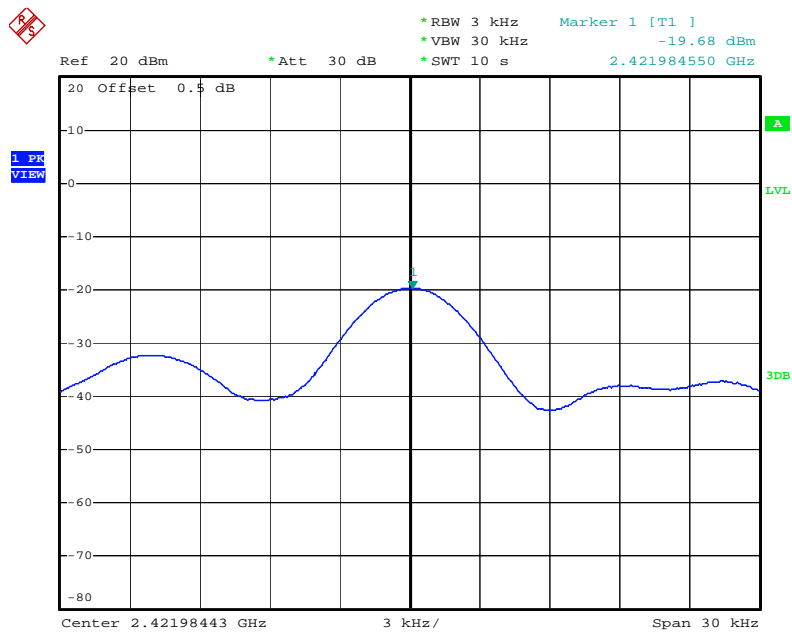
Date: 19.OCT.2008 13:49:47

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. A + Ant. C / 2462 MHz



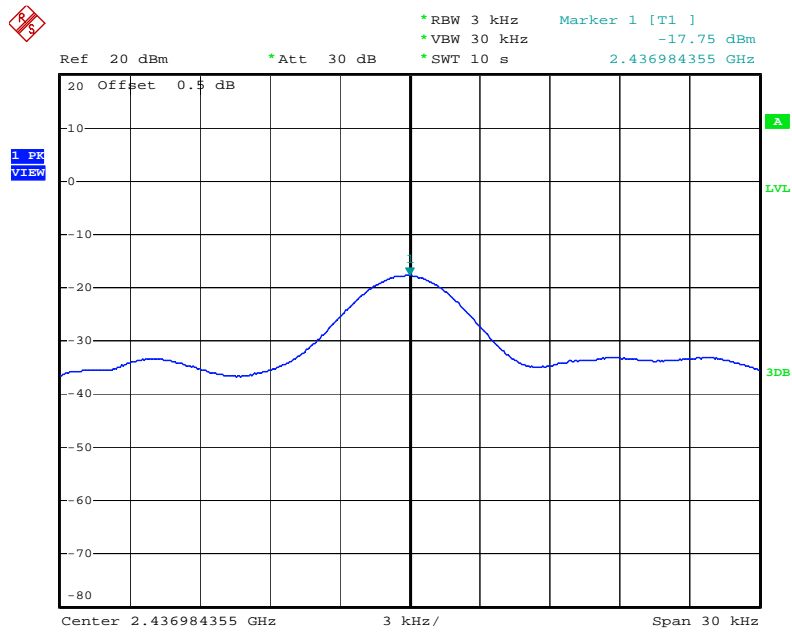
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Power Density Plot on Configuration Drafft n MCS8 40MHz Ant. A + Ant. C / 2422 MHz



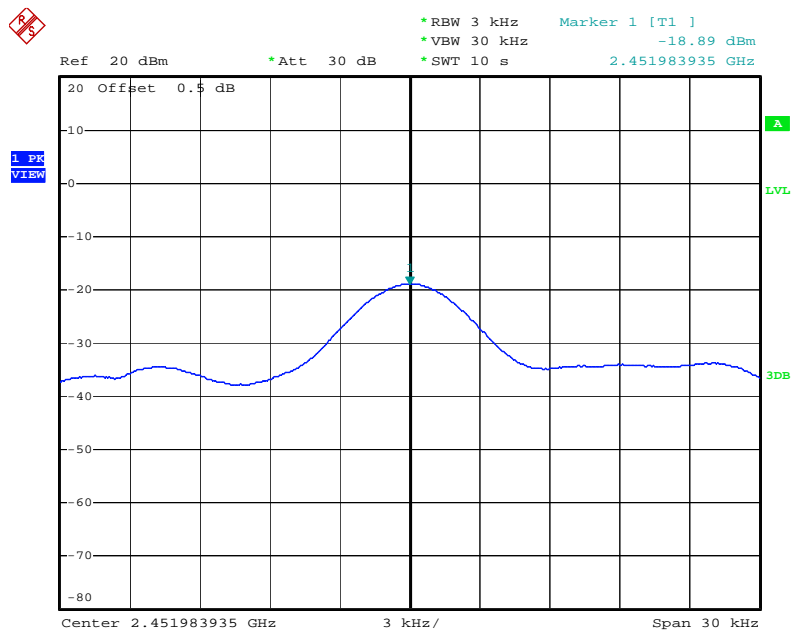
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Power Density Plot on Configuration Drafft n MCS8 40MHz Ant. A + Ant. C / 2437 MHz



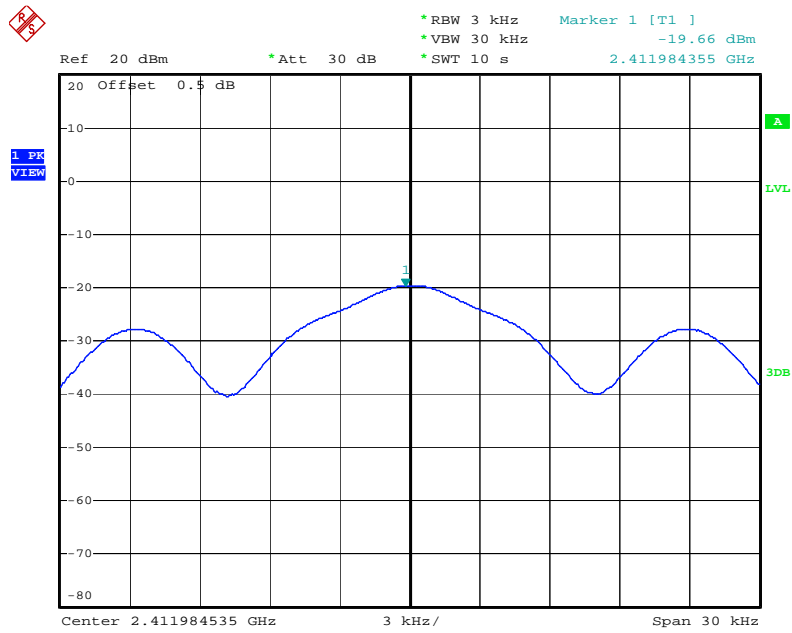
Date: 19.OCT.2008 14:19:30

Power Density Plot on Configuration Drafft n MCS8 40MHz Ant. A + Ant. C / 2452 MHz



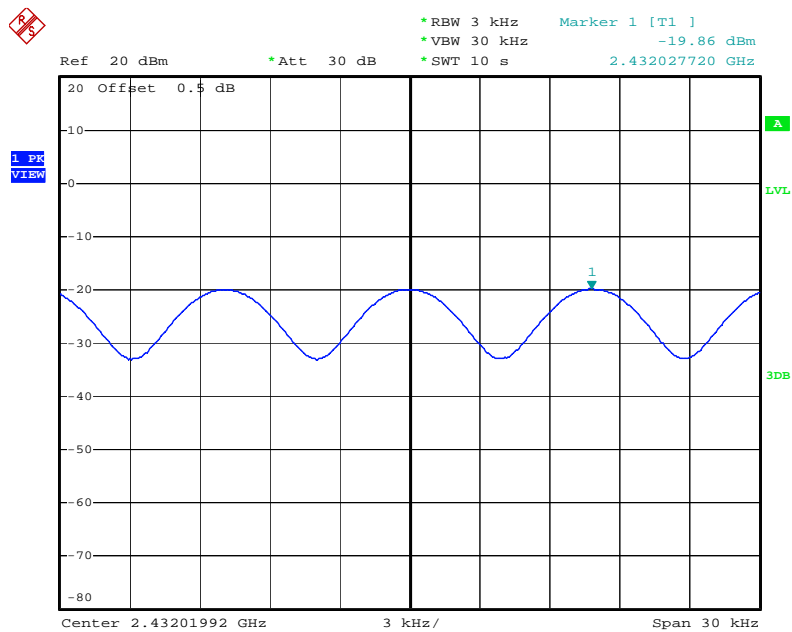
Date: 19.OCT.2008 14:29:45

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



Date: 19.OCT.2008 14:04:49

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



Date: 19.OCT.2008 14:07:05