

FCC RADIO TEST REPORT

Applicant's company	AirMagnet Inc.
Applicant Address	830 E Arques Ave., Sunnyvale, Ca. 94085
FCC ID	RD7-C1060
Manufacturer's company	Wistron NeWeb Corporation
Manufacturer Address	No.10-1, Li-hsin Road I, Hsinchu Science Park, Hsinchu 300, Taiwan, R.O.C.

Product Name	802.11a/b/g/n Wireless PC Card
Brand Name	AirMagnet
Model Name	C1060
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Nov. 29, 2007
Final Test Date	Dec. 26, 2007
Submission Type	Original Equipment



Statement

Test result included is only for the Draft n 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: Jan. 14, 2008

Report No.: FR7D1410AD

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



1. CERTIFICATE OF COMPLIANCE

Product Name : 802.11 a/b/g/n Wireless PC Card
Brand Name : AirMagnet
Model Name : C1060
Applicant : AirMagnet 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 Nov. 29, 2007 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', 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	15.46 dB
4.2	15.247(b)(3)	Maximum Peak Conducted Output Power	Complies	2.3 dB
4.3	15.247(e)	Power Spectral Density	Complies	14.90 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	2.70 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.31 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	$\pm 2.3\text{dB}$	Confidence levels of 95%
Maximum Peak Conducted Output Power	$\pm 0.8\text{dB}$	Confidence levels of 95%
Power Spectral Density	$\pm 0.5\text{dB}$	Confidence levels of 95%
6dB Spectrum Bandwidth	$\pm 8.5 \times 10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	$\pm 0.8\text{dB}$	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	$\pm 1.9\text{dB}$	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	$\pm 1.9\text{dB}$	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	$\pm 1.9\text{dB}$	Confidence levels of 95%
Temperature	$\pm 0.7^{\circ}\text{C}$	Confidence levels of 95%
Humidity	$\pm 3.2\%$	Confidence levels of 95%
DC / AC Power Source	$\pm 1.4\%$	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (2TX, 3RX)
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 / 5725 ~ 5850MHz
Channel Number	For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth For 5GHz Band: 3 for 20MHz bandwidth ; 2 for 40MHz bandwidth
Channel Band Width (99%)	For 2.4GHz Band: MCS8 (20MHz) : 17.59 MHz ; MCS8 (40MHz) : 36.28 MHz For 5GHz Band: MCS8 (20MHz) : 17.59 MHz ; MCS8 (40MHz) : 36.21 MHz
Conducted Output Power	For 2.4GHz Band: MCS8 (20MHz) : 26.43 dBm ; MCS8 (40MHz) : 22.66 dBm For 5GHz Band: MCS8 (20MHz) : 26.68 dBm ; MCS8 (40MHz) : 27.70 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

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

Draft n spec

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	$\frac{1}{2}$	1	52	108	26	54	6.5	13.5
1	1	QPSK	$\frac{1}{2}$	2	104	216	52	108	13.0	27.0
2	1	QPSK	$\frac{3}{4}$	2	104	216	78	162	19.5	40.5
3	1	16-QAM	$\frac{1}{2}$	4	208	432	104	216	26.0	54.0
4	1	16-QAM	$\frac{3}{4}$	4	208	432	156	324	39.0	81.0
5	1	64-QAM	$\frac{2}{3}$	6	312	648	208	432	52.0	108.0
6	1	64-QAM	$\frac{3}{4}$	6	312	648	234	486	58.5	121.5
7	1	64-QAM	$\frac{5}{6}$	6	312	648	260	540	65.0	135.0
8	2	BPSK	$\frac{1}{2}$	1	104	216	52	108	13.0	27.0
9	2	QPSK	$\frac{1}{2}$	2	208	432	104	216	26.0	54.0
10	2	QPSK	$\frac{3}{4}$	2	208	432	156	324	39.0	81.0
11	2	16-QAM	$\frac{1}{2}$	4	416	864	208	432	52.0	108.0
12	2	16-QAM	$\frac{3}{4}$	4	416	864	312	648	78.0	162.0
13	2	64-QAM	$\frac{2}{3}$	6	624	1296	416	864	104.0	216.0
14	2	64-QAM	$\frac{3}{4}$	6	624	1296	468	972	117.0	243.0
15	2	64-QAM	$\frac{5}{6}$	6	624	1296	520	1080	130.0	270.0

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

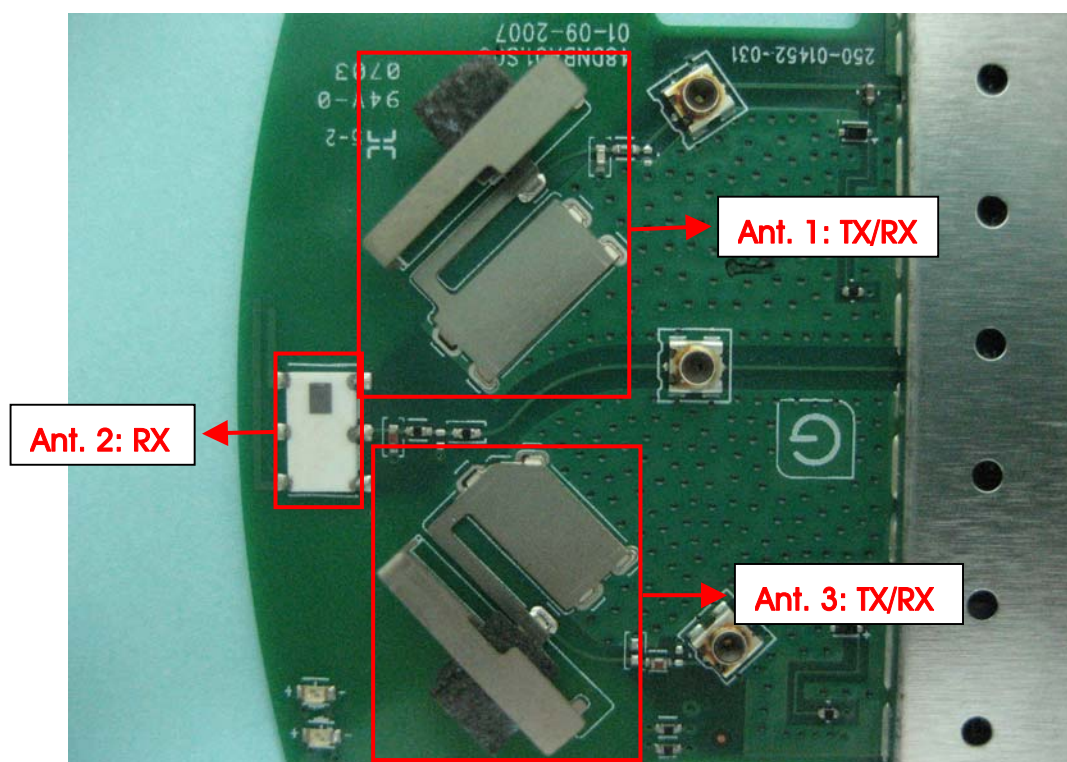
3.3. Table for Filed Antenna

For 2.4GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
1	WNC	DNBA-81	PIFA Antenna	NA	2.28	TX / RX Ant.
2	WNC	DNBA-81	Chip Antenna	NA	0.40	RX Ant.
3	WNC	DNBA-81	PIFA Antenna	NA	2.28	TX / RX Ant.

For 5GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
1	WNC	DNBA-81	PIFA Antenna	NA	4.52	TX / RX Ant.
2	WNC	DNBA-81	Chip Antenna	NA	3.68	RX Ant.
3	WNC	DNBA-81	PIFA Antenna	NA	4.52	TX / RX Ant.



3.4. Table for Carrier Frequencies

There are two bandwidth systems for draft n.

For 2.4GHz Band

Frequency Allocation for 802.11b/g

For 20MHz bandwidth systems, use Channel 1~Channel 13.

For 40MHz bandwidth systems, use Channel 3~Channel 11.

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		

For 5GHz Band

Frequency Allocation for 802.11a

For 20MHz bandwidth systems, use Channel 149, 157, 165.

For 40MHz bandwidth systems, use Channel 151, 159.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5725~5850 MHz	149	5745 MHz	161	5805 MHz
	151	5755 MHz	165	5825 MHz
	153	5765 MHz		
	157	5785 MHz		
	159	5795 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.

For 2.4GHz Band

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Maximum Peak Conducted Output Power	MCS8/20MHz	13 Mbps	1/6/11	1/ 3 / 1+3
	MCS8/40MHz	27 Mbps	3/6/9	1/ 3 / 1+3
Power Spectral Density 6dB Spectrum Bandwidth	MCS8/20MHz	13 Mbps	1/6/11	1+3
	MCS8/40MHz	27 Mbps	3/6/9	1+3
Radiated Emissions 9kHz~1GHz	Normal Link	Auto	-	-
Radiated Emissions 1GHz~10 th Harmonic	MCS8/20MHz	13 Mbps	1/6/11	1+3
	MCS8/40MHz	27 Mbps	3/6/9	1+3
Band Edge Emissions	MCS8/20MHz	13 Mbps	1/11	1+3
	MCS8/40MHz	27 Mbps	3/9	1+3

For 5GHz Band

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Maximum Peak Conducted Output Power	MCS8/20MHz	13 Mbps	149/157/165	1 / 3 / 1+3
	MCS8/40MHz	27 Mbps	151/159	1 / 3 / 1+3
Power Spectral Density 6dB Spectrum Bandwidth	MCS8/20MHz	13 Mbps	149/157/165	1+3
	MCS8/40MHz	27 Mbps	151/159	1+3
Radiated Emissions 9kHz~1GHz	Normal Link	Auto	-	-
Radiated Emissions 1GHz~10 th Harmonic	MCS8/20MHz	13 Mbps	149/157/165	1+3
	MCS8/40MHz	27 Mbps	151/159	1+3
Band Edge Emissions	MCS8/20MHz	13 Mbps	149/165	1+3
	MCS8/40MHz	27 Mbps	151/159	1+3

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	D400	E2K24GBRL
Modem	ACEEX	DM1414	IFAXDM1414
Mouse	QSKY	Lx-619B	DoC
Printer	EPSON	LQ-300+	DoC
AP	PLANEX	GW-AP54SGX	DoC

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.

For 2.4GHz Band

Power Parameters of Draft n MCS8 20MHz

Test Software Version	ART		
Frequency	2412 MHz	2437 MHz	2462 MHz
Draft n	14	15	14

Power Parameters of Draft n MCS8 40MHz

Test Software Version	ART		
Frequency	2422 MHz	2437 MHz	2452 MHz
Draft n	10.5	11	11

For 5GHz Band

Power Parameters of Draft n MCS8 20MHz

Test Software Version	ART		
Frequency	5745 MHz	5785 MHz	5825 MHz
Draft n	15	15	15

Power Parameters of Draft n MCS8 40MHz

Test Software Version	ART	
Frequency	5755 MHz	5795 MHz
Draft n	17	17

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 :

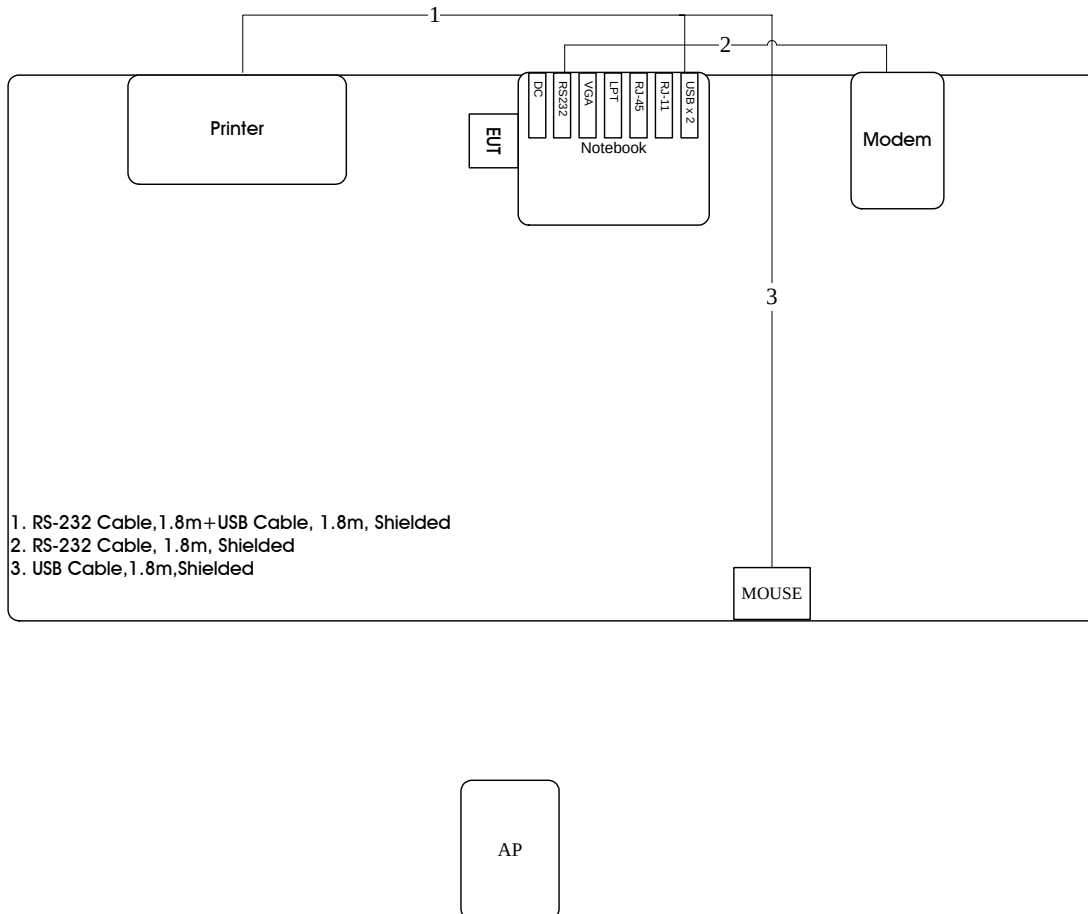
- Turn on the power of all equipment.
- The NB reads the test program from the SD Card and runs it.
- The NB sends " H " messages to the panel, and the panel displays " H " patterns on the screen.
- The NB sends " H " messages to the printer, then the printer prints them on the paper.
- The NB sends " H " messages to the modem.
- Repeat the steps from b to e.

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

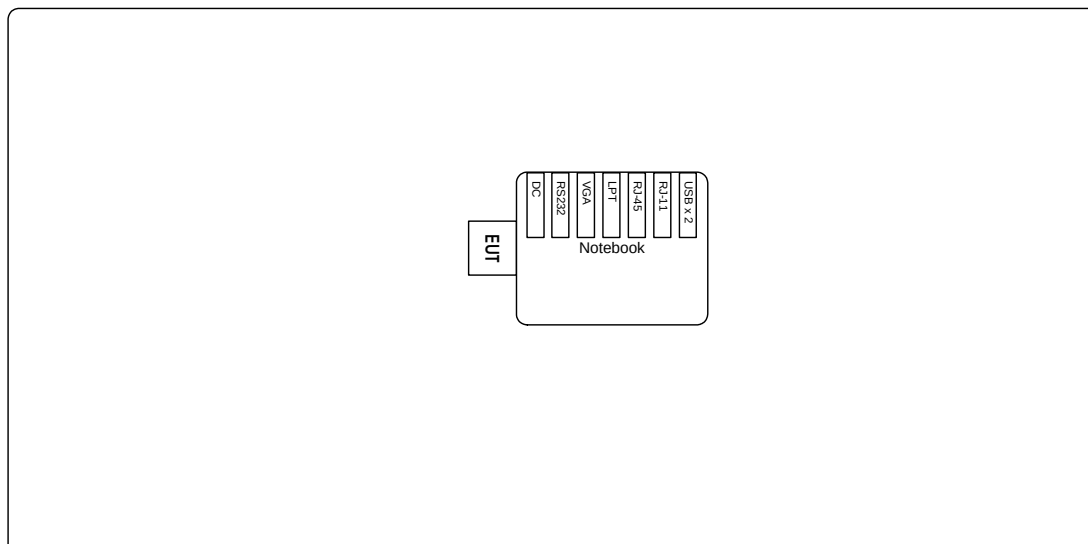
3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration

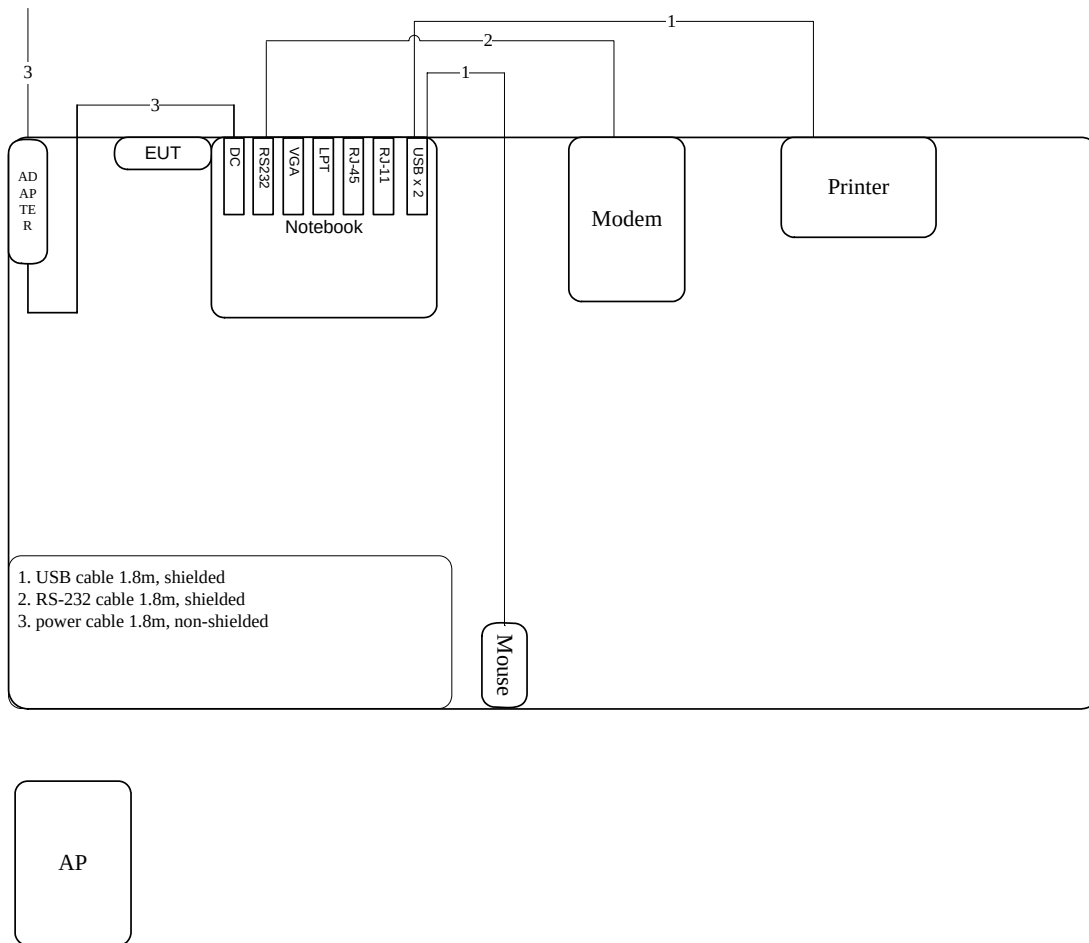
Test Configuration: 9KHz~1GHz



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.

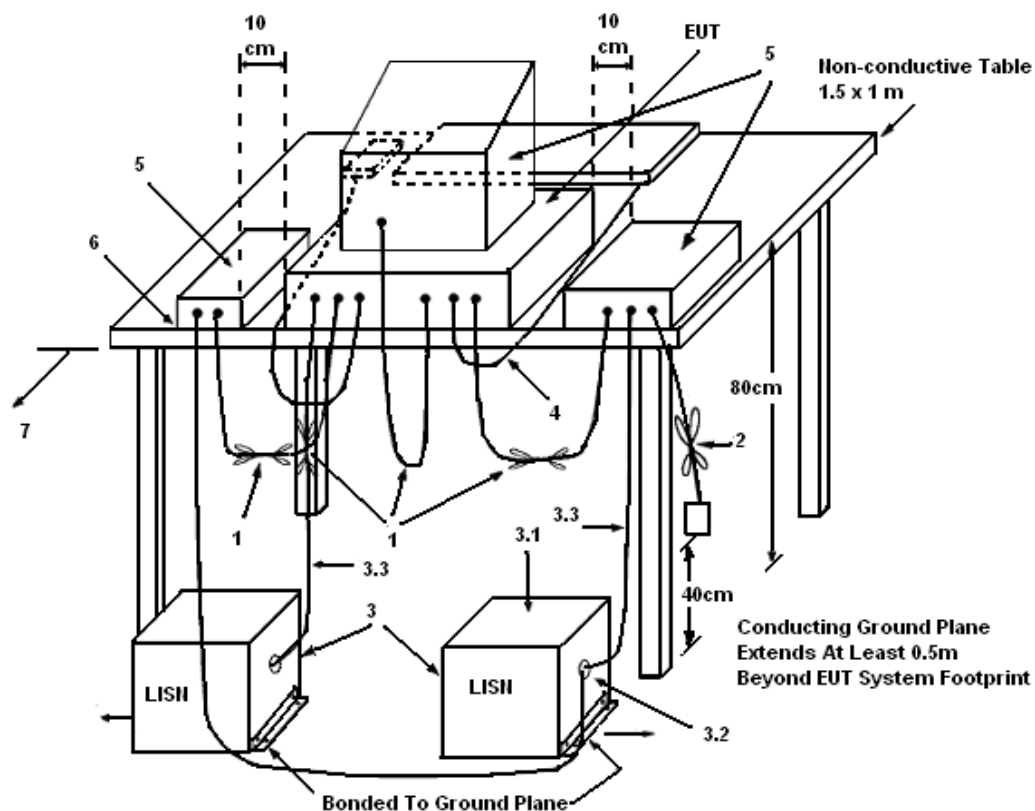
Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

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 $50\ \Omega$. 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

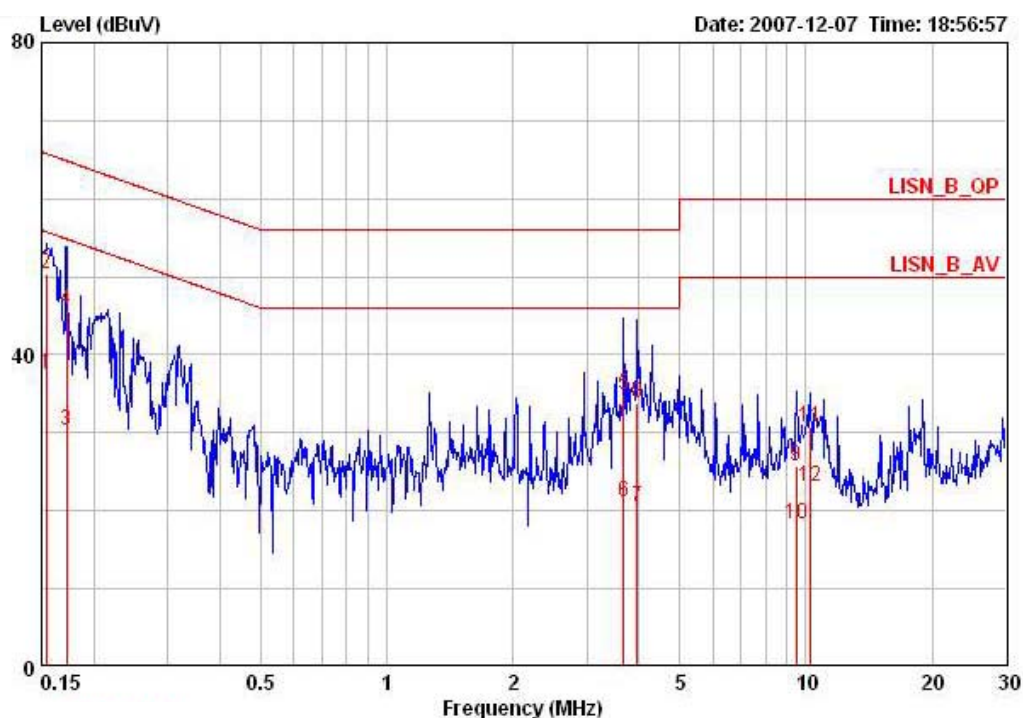
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

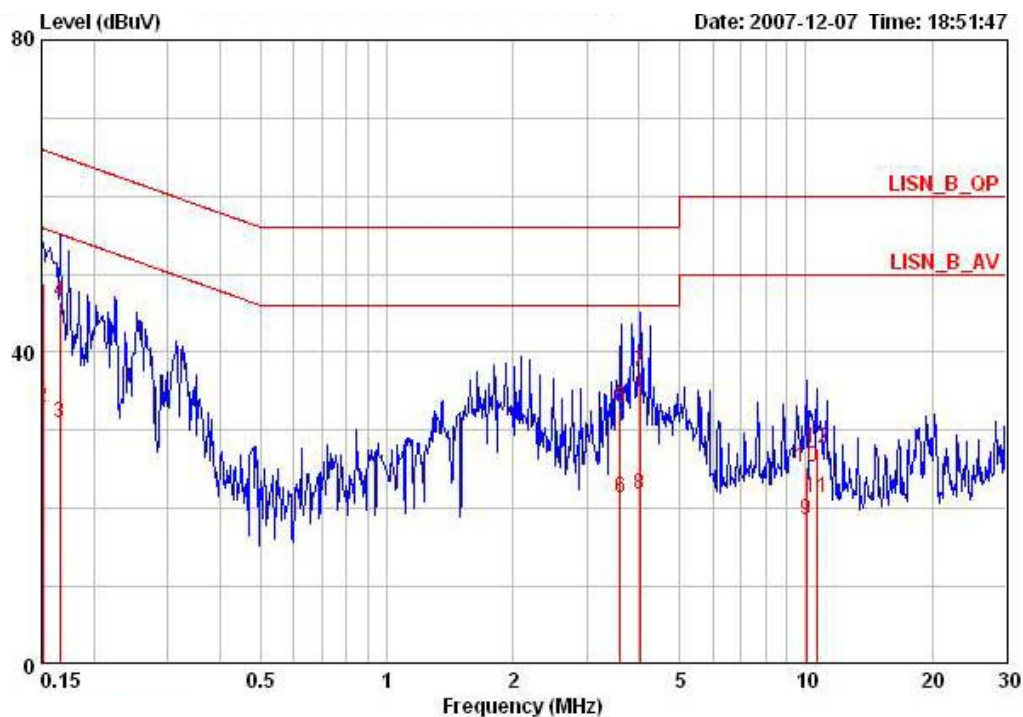
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	47%
Test Engineer	Andy Tsai	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15403	37.55	-18.23	55.78	37.15	0.20	0.20	AVERAGE	LINE
2	0.15403	50.32	-15.46	65.78	49.92	0.20	0.20	QP	LINE
3	0.17215	30.35	-24.51	54.86	30.00	0.15	0.20	AVERAGE	LINE
4	0.17215	45.68	-19.18	64.86	45.33	0.15	0.20	QP	LINE
5	3.671	34.80	-21.20	56.00	34.50	0.00	0.30	QP	LINE
6	3.671	21.05	-24.95	46.00	20.75	0.00	0.30	AVERAGE	LINE
7	3.964	20.39	-25.61	46.00	20.09	0.00	0.30	AVERAGE	LINE
8	3.964	33.88	-22.12	56.00	33.58	0.00	0.30	QP	LINE
9	9.502	25.76	-34.24	60.00	25.37	0.09	0.30	QP	LINE
10	9.502	18.37	-31.63	50.00	17.98	0.09	0.30	AVERAGE	LINE
11	10.288	30.70	-29.30	60.00	30.24	0.10	0.36	QP	LINE
12	10.288	23.10	-26.90	50.00	22.64	0.10	0.36	AVERAGE	LINE

Temperature	23°C	Humidity	47%
Test Engineer	Andy Tsai	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15080	48.79	-17.17	65.96	48.29	0.30	0.20	QP	NEUTRAL
2	0.15080	33.01	-22.95	55.96	32.51	0.30	0.20	AVERAGE	NEUTRAL
3	0.16589	30.89	-24.27	55.16	30.44	0.25	0.20	AVERAGE	NEUTRAL
4	0.16589	46.37	-18.79	65.16	45.92	0.25	0.20	QP	NEUTRAL
5	3.613	32.97	-23.03	56.00	32.57	0.10	0.30	QP	NEUTRAL
6	3.613	21.44	-24.56	46.00	21.04	0.10	0.30	AVERAGE	NEUTRAL
7	4.006	37.41	-18.59	56.00	37.01	0.10	0.30	QP	NEUTRAL
8	4.006	21.76	-24.24	46.00	21.36	0.10	0.30	AVERAGE	NEUTRAL
9	10.019	18.54	-31.46	50.00	18.14	0.10	0.30	AVERAGE	NEUTRAL
10	10.019	25.33	-34.67	60.00	24.93	0.10	0.30	QP	NEUTRAL
11	10.612	21.41	-28.59	50.00	20.91	0.10	0.40	AVERAGE	NEUTRAL
12	10.612	27.78	-32.22	60.00	27.28	0.10	0.40	QP	NEUTRAL

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Peak 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

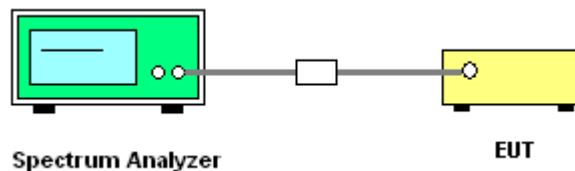
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 kHz
Detector	Sample
Trace	Average 100 traces.
Sweep Time	20ms

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with method #1 of FCC Public Notice DA-02-2138.
3. 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 Peak Output Power

Temperature	26°C	Humidity	60%
Test Engineer	Sam Chen	Configurations	Draft n

For 2.4GHz Band

Configuration Draft n MCS8 20MHz Ant. 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	22.30	30.00	Complies
6	2437 MHz	23.14	30.00	Complies
11	2462 MHz	22.28	30.00	Complies

Configuration Draft n MCS8 20MHz Ant. 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	22.66	30.00	Complies
6	2437 MHz	23.68	30.00	Complies
11	2462 MHz	22.35	30.00	Complies

Configuration Draft n MCS8 20MHz Ant. 1 + Ant. 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	25.49	30.00	Complies
6	2437 MHz	26.43	30.00	Complies
11	2462 MHz	25.33	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. A

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	18.82	30.00	Complies
6	2437 MHz	19.25	30.00	Complies
9	2452 MHz	19.65	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. B

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	19.40	30.00	Complies
6	2437 MHz	20.01	30.00	Complies
9	2452 MHz	19.41	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. 1 + Ant. 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	22.13	30.00	Complies
6	2437 MHz	22.66	30.00	Complies
9	2452 MHz	22.54	30.00	Complies

For 5GHz Band

Configuration Draft n MCS8 20MHz Ant. 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	23.72	30.00	Complies
157	5785 MHz	23.39	30.00	Complies
165	5825 MHz	22.90	30.00	Complies

Configuration Draft n MCS8 20MHz Ant. 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	23.61	30.00	Complies
157	5785 MHz	23.40	30.00	Complies
165	5825 MHz	22.85	30.00	Complies

Configuration Draft n MCS8 20MHz Ant. 1 +Ant. 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	26.68	30.00	Complies
157	5785 MHz	26.41	30.00	Complies
165	5825 MHz	25.89	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	23.61	30.00	Complies
159	5795 MHz	23.40	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	25.56	30.00	Complies
159	5795 MHz	25.31	30.00	Complies

Configuration Draft n MCS8 40MHz Ant. 1 +Ant. 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	27.70	30.00	Complies
159	5795 MHz	27.47	30.00	Complies

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

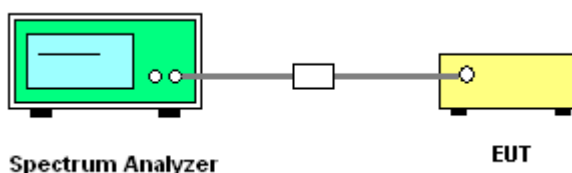
Please refer to section 5 of equipments list in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	1.5MHz
RB	3 kHz
VB	30 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	500s

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	60%
Test Engineer	Sam Chen	Configurations	Draft n

For 2.4GHz Band

Configuration Draft n MCS8 20MHz Ant. 1 + Ant. 3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
1	2412 MHz	-9.70	8.00	Complies
6	2437 MHz	-8.70	8.00	Complies
11	2462 MHz	-8.44	8.00	Complies

Configuration Draft n MCS8 40MHz Ant. 1 + Ant. 3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
3	2422 MHz	-16.48	8.00	Complies
6	2437 MHz	-15.48	8.00	Complies
9	2452 MHz	-16.73	8.00	Complies

For 5GHz Band

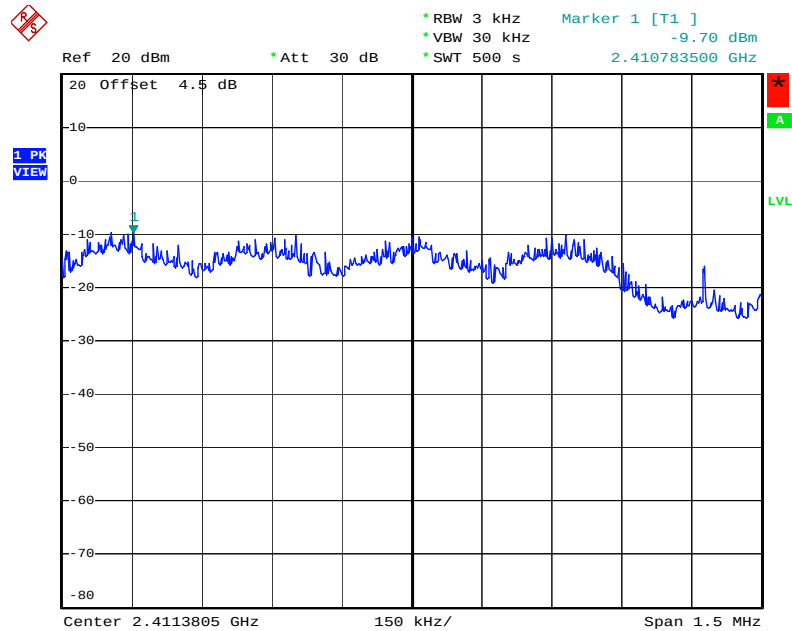
Configuration Draft n MCS8 20MHz Ant. 1 + Ant. 3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
149	5745 MHz	-7.77	8.00	Complies
157	5785 MHz	-7.64	8.00	Complies
165	5827 MHz	-9.47	8.00	Complies

Configuration Draft n MCS8 40MHz Ant. 1 + Ant. 3

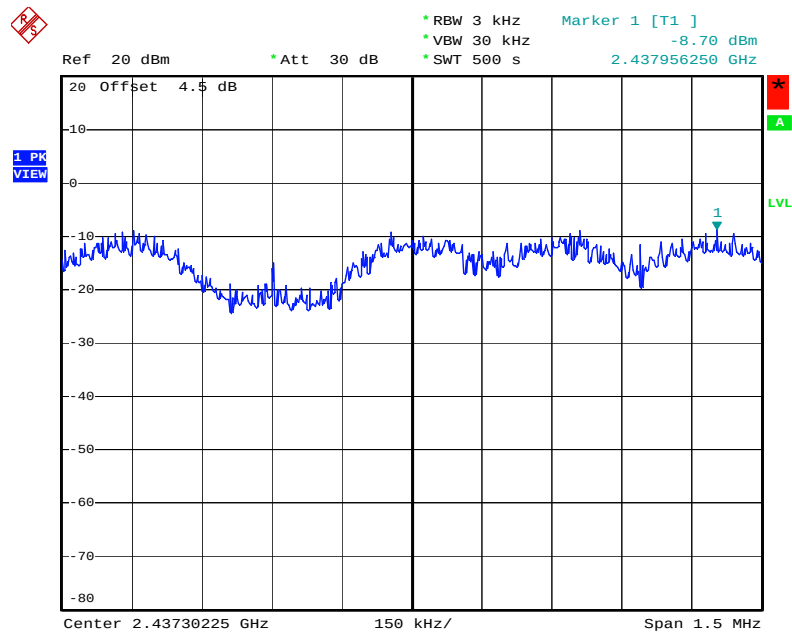
Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
151	5755 MHz	-7.24	8.00	Complies
159	5795 MHz	-6.90	8.00	Complies

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. 1 + Ant. 3 / 2412 MHz



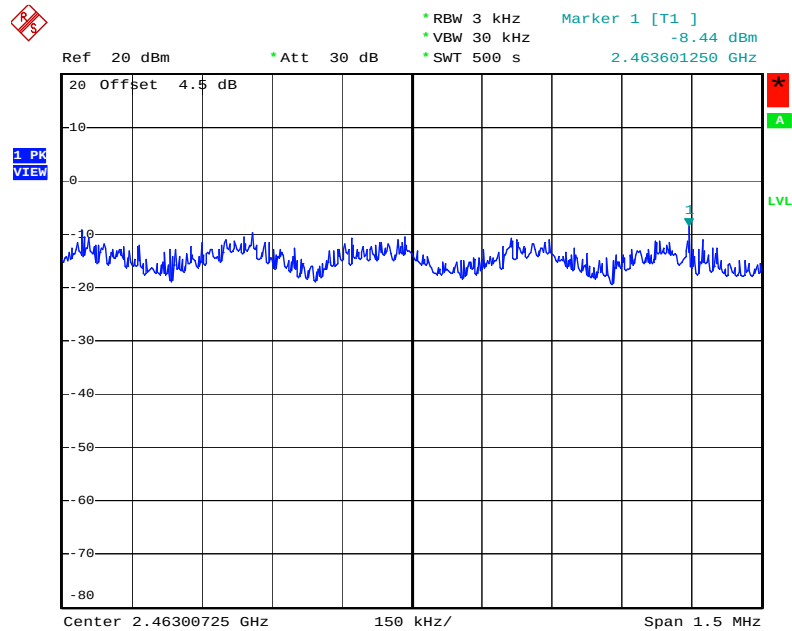
Date: 26.DEC.2007 08:19:31

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. 1 + Ant. 3 / 2437 MHz



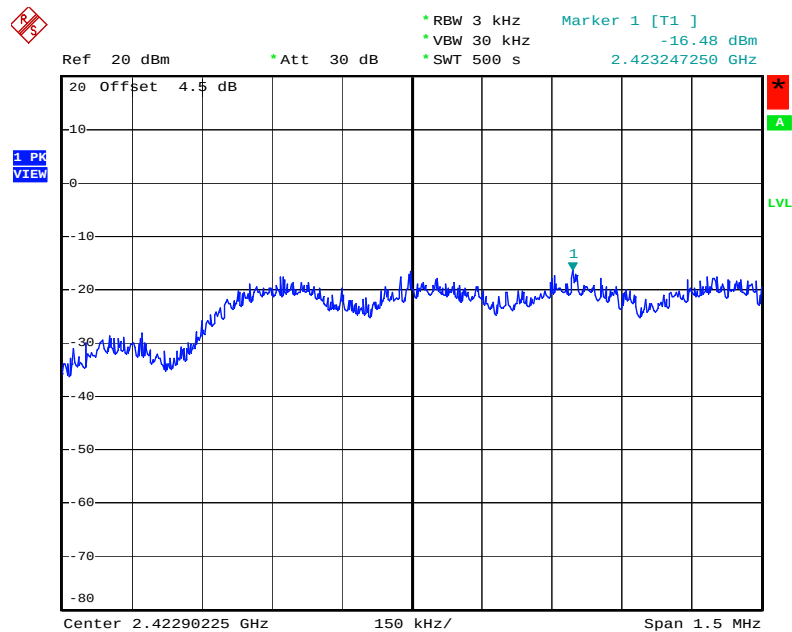
Date: 26.DEC.2007 08:20:22

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. 1 + Ant. 3 / 2462 MHz



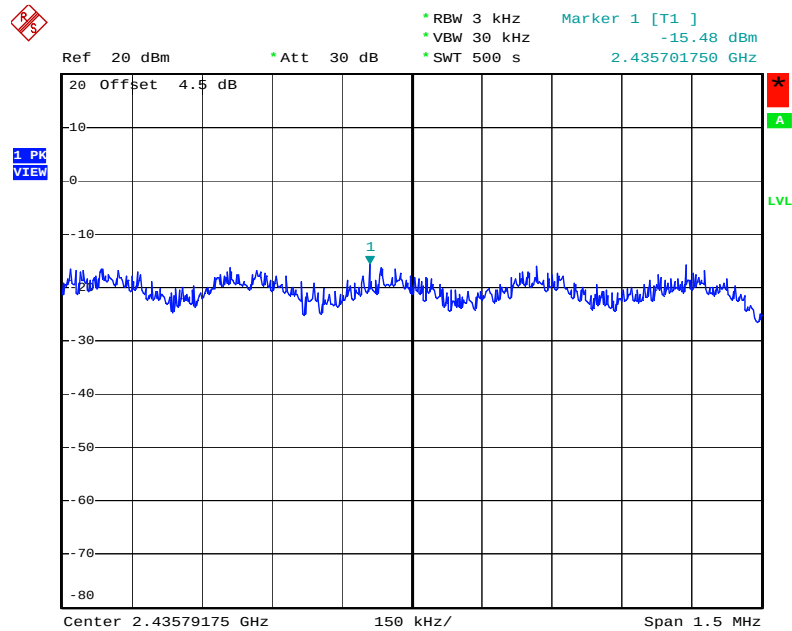
Date: 26.DEC.2007 08:21:34

Power Density Plot on Configuration Drafft n MCS8 40MHz Ant. 1 + Ant. 3 / 2422 MHz



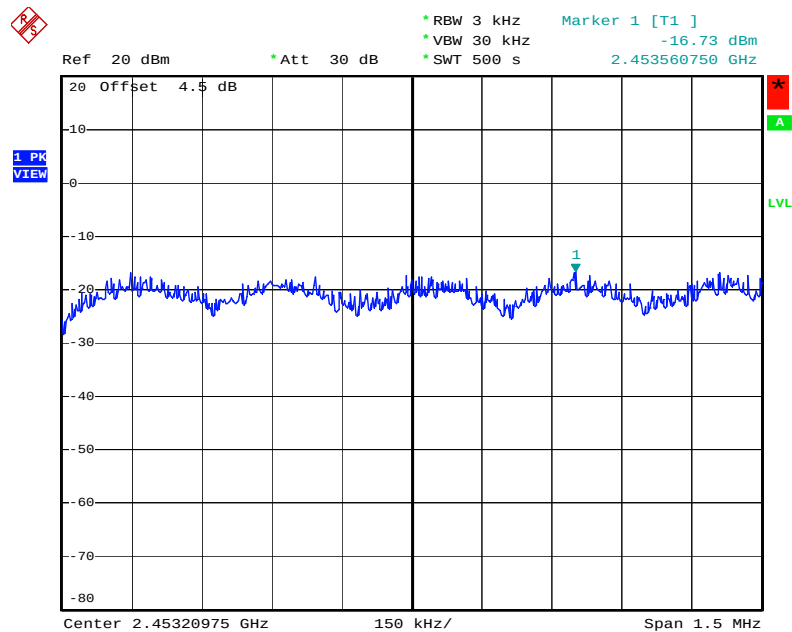
Date: 26.DEC.2007 08:27:01

Power Density Plot on Configuration Drafft n MCS8 40MHz Ant. 1 + Ant. 3 / 2437 MHz



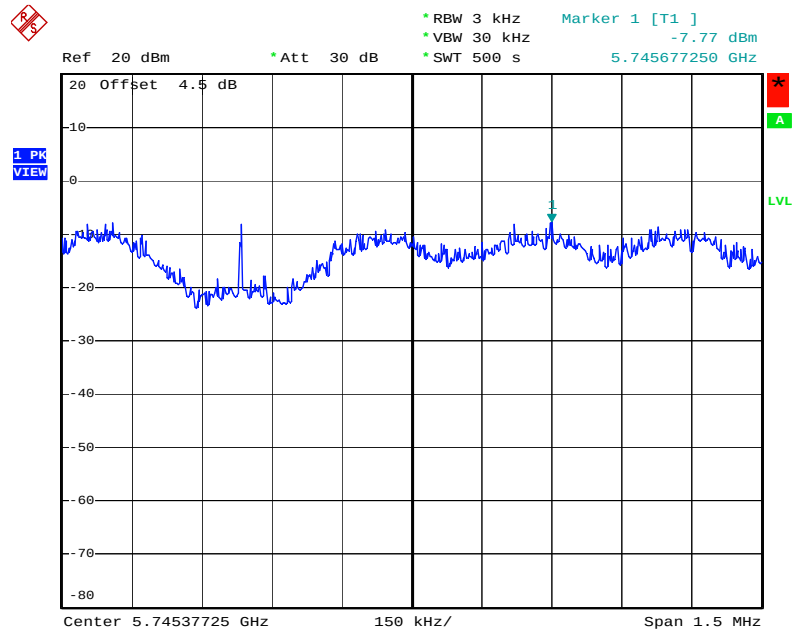
Date: 26.DEC.2007 08:25:41

Power Density Plot on Configuration Drafft n MCS8 40MHz Ant. 1 + Ant. 3 / 2452 MHz



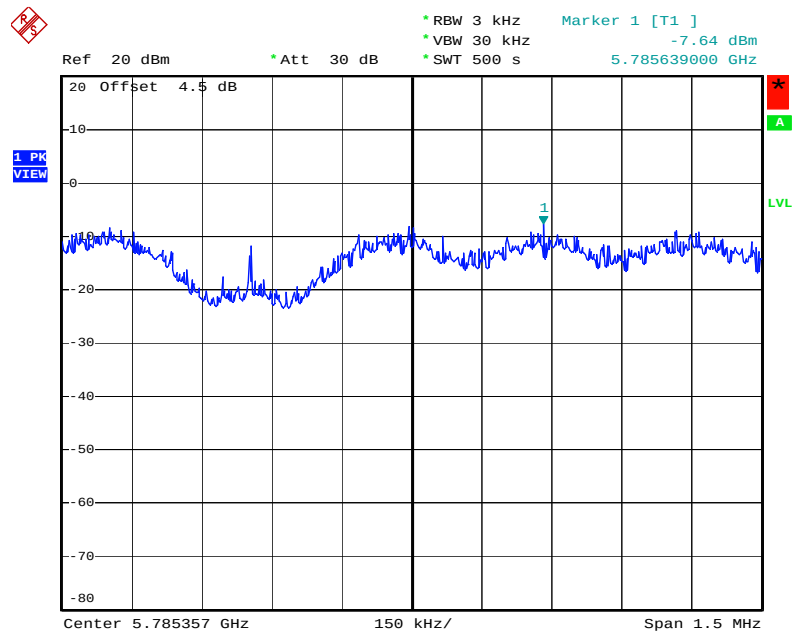
Date: 26.DEC.2007 08:23:06

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. 1 +Ant. 3 / 5745 MHz



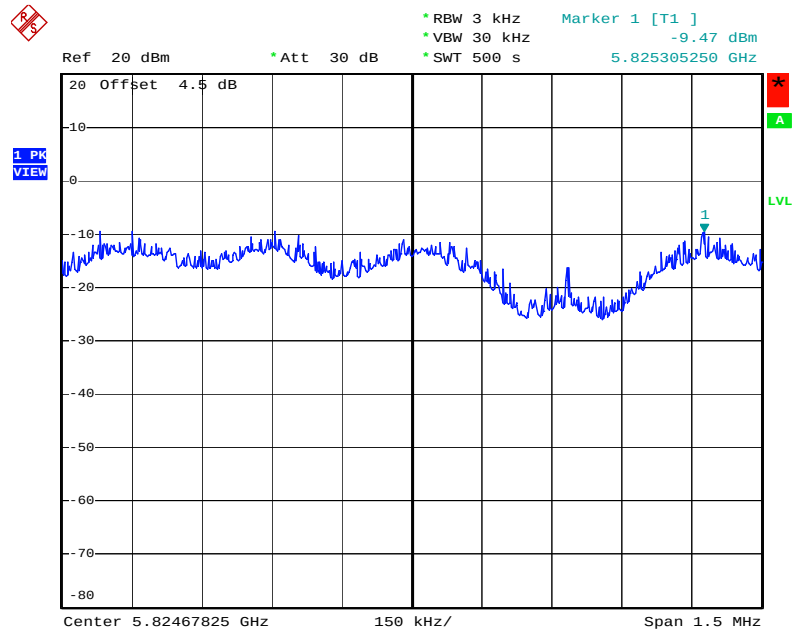
Date: 26.DEC.2007 08:36:54

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. 1 +Ant. 3 / 5785 MHz



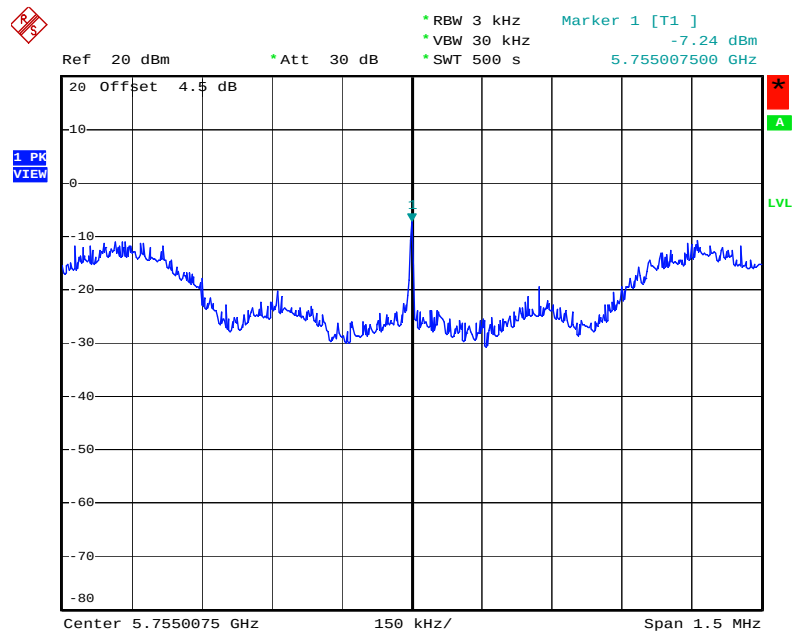
Date: 26.DEC.2007 08:35:38

Power Density Plot on Configuration Drafft n MCS8 20MHz Ant. 1 +Ant. 3 / 5825 MHz



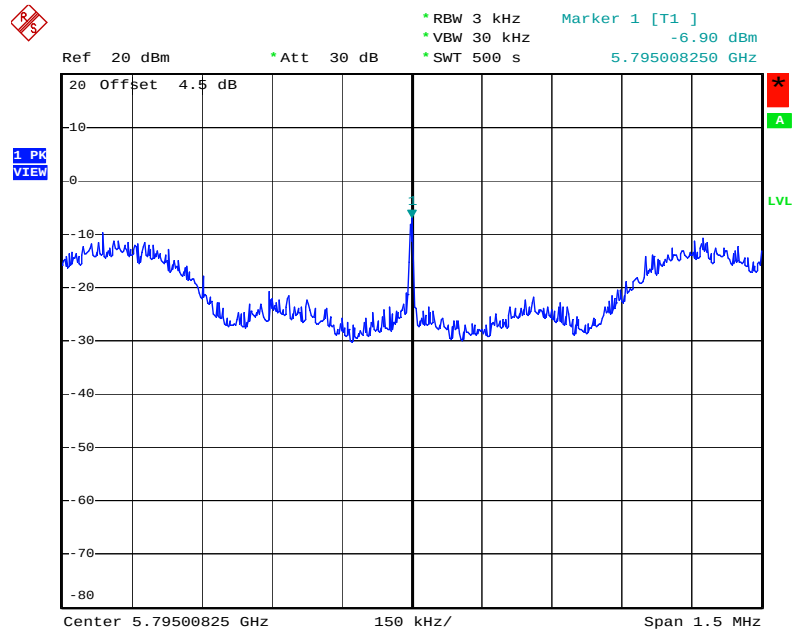
Date: 26.DEC.2007 08:32:54

Power Density Plot on Configuration Drafft n MCS8 40MHz Ant. 1 +Ant. 3 / 5755MHz



Date: 26.DEC.2007 09:02:20

Power Density Plot on Configuration Draft n MCS8 40MHz Ant. 1+Ant. 3 / 5795 MHz



Date: 26.DEC.2007 09:03:24

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

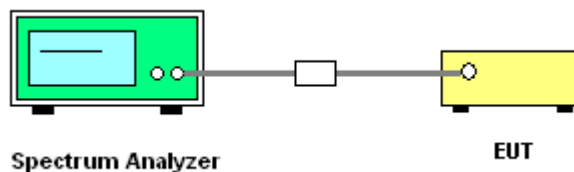
Please refer to section 5 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

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

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
- Measured the spectrum width with power higher than 6dB below carrier.
- Measuring multiple antennas, the connector is required to link with spectrum analyse through a combiner.

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	26°C	Humidity	60%
Test Engineer	Sam Chen	Configurations	Draft n

For 2.4GHz Band

Configuration Draft n MCS8 20MHz Ant. 1 + Ant. 3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	15.67	17.59	500	Complies
6	2437 MHz	15.70	17.59	500	Complies
11	2462 MHz	15.70	17.56	500	Complies

Configuration Draft n MCS8 40MHz Ant. 1 + Ant. 3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	35.76	36.28	500	Complies
6	2437 MHz	35.89	36.21	500	Complies
9	2452 MHz	35.89	36.21	500	Complies

For 5GHz Band

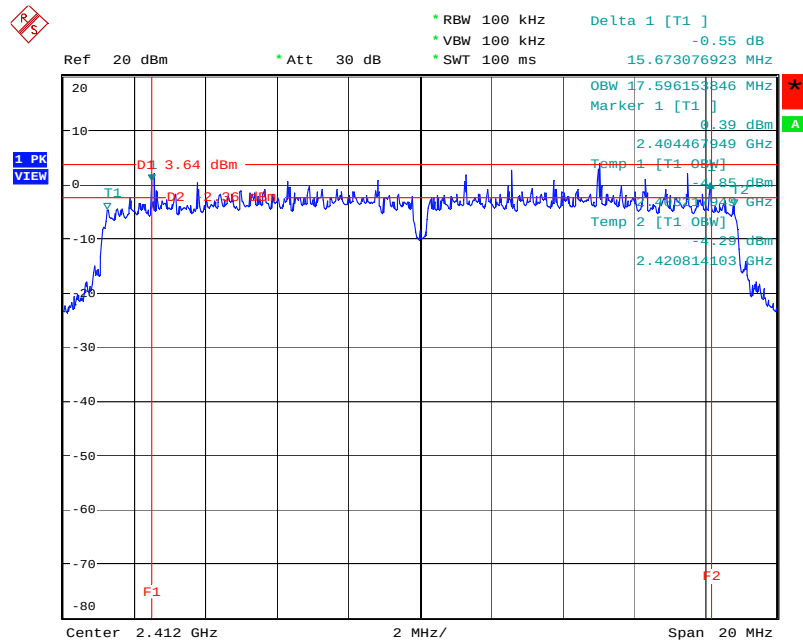
Configuration Draft n MCS8 20MHz Ant. 1 +Ant. 3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	15.73	17.59	500	Complies
157	5785 MHz	15.89	17.59	500	Complies
165	5825 MHz	16.31	17.59	500	Complies

Configuration Draft n MCS8 40MHz Ant. 1 +Ant. 3

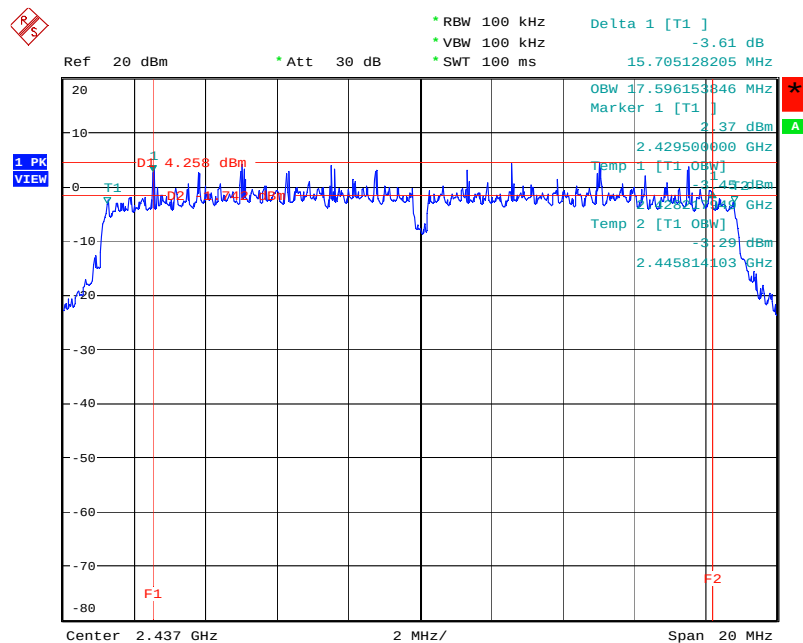
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	35.64	36.21	500	Complies
159	5795 MHz	36.34	36.21	500	Complies

6 dB Bandwidth Plot on Configuration Draft n MCS8 20MHz Ant. 1 + Ant. 3 / 2412 MHz



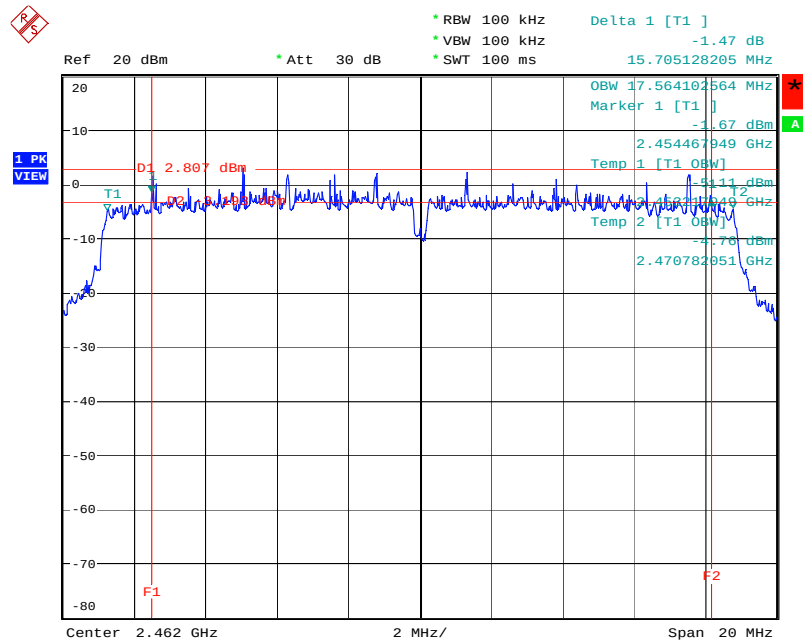
Date: 9.DEC.2007 09:03:27

6 dB Bandwidth Plot on Configuration Draft n MCS8 20MHz Ant. 1 + Ant. 3 / 2437 MHz



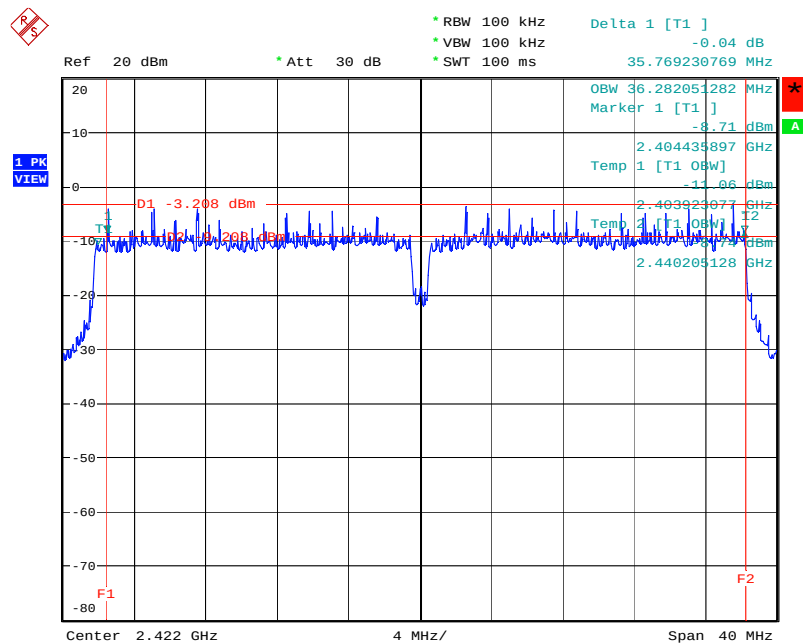
Date: 9.DEC.2007 09:00:05

6 dB Bandwidth Plot on Configuration Draft n MCS8 20MHz Ant. 1 + Ant. 3 / 2462 MHz



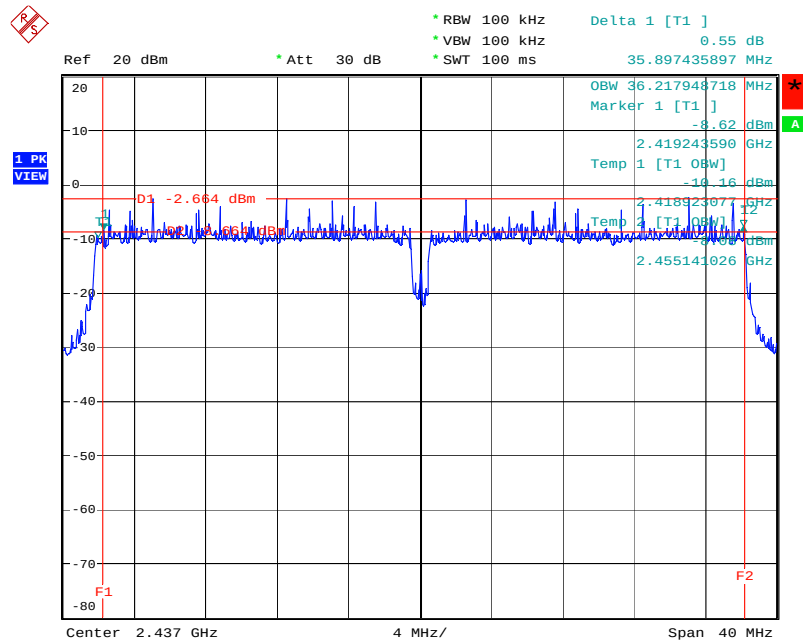
Date: 9.DEC.2007 08:56:13

6 dB Bandwidth Plot on Configuration Draft n MCS8 40MHz Ant. 1 + Ant. 3 / 2422 MHz



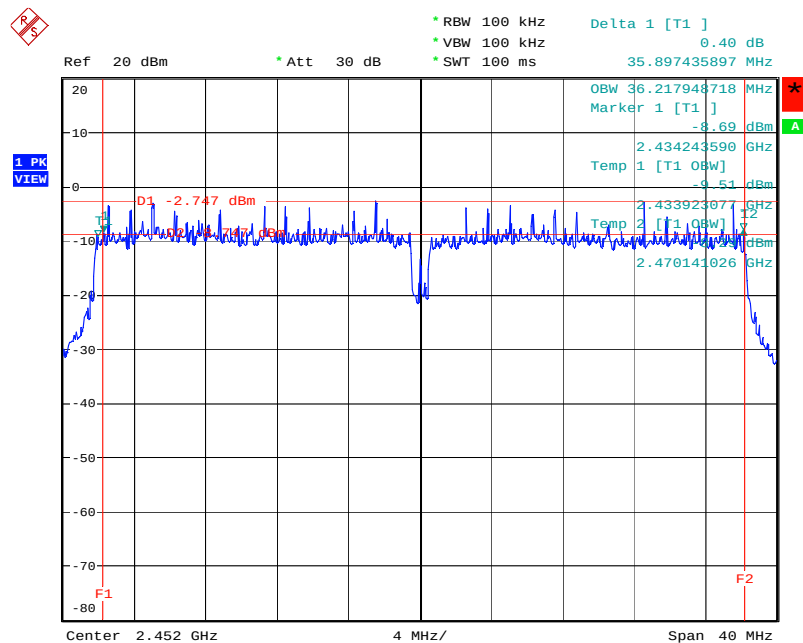
Date: 9.DEC.2007 09:33:49

6 dB Bandwidth Plot on Configuration Draft n MCS8 40MHz Ant. 1 + Ant. 3 / 2437 MHz



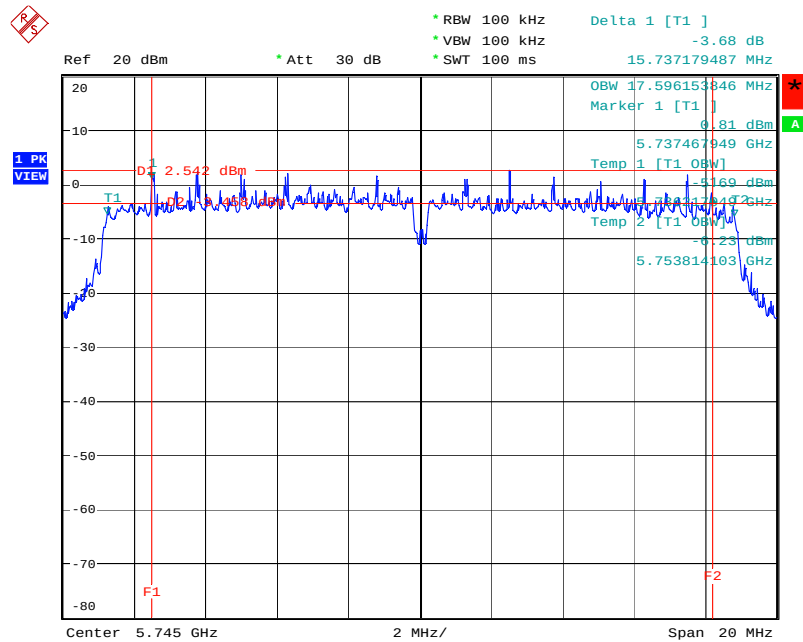
Date: 9.DEC.2007 09:40:10

6 dB Bandwidth Plot on Configuration Draft n MCS8 40MHz Ant. 1 + Ant. 3 / 2452 MHz



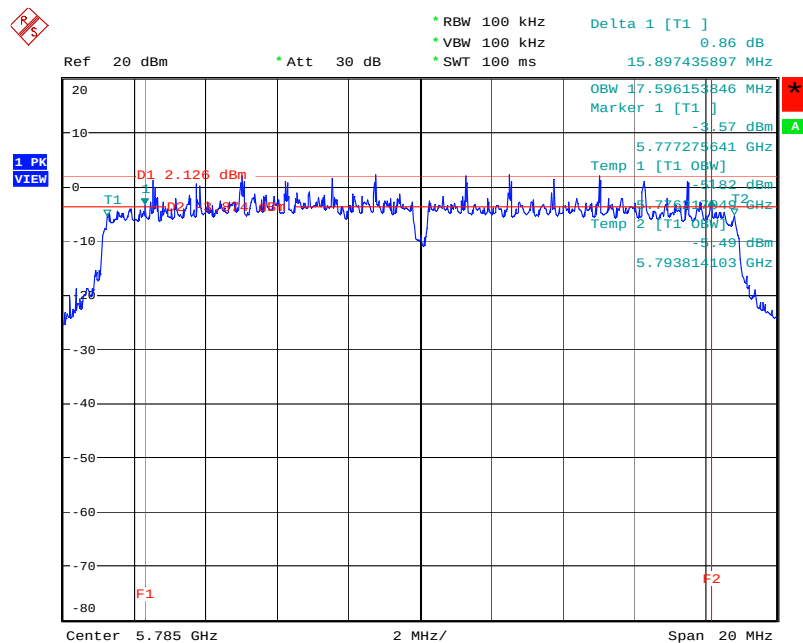
Date: 9.DEC.2007 09:44:26

6 dB Bandwidth Plot on Configuration Draft n MCS8 20MHz Ant. 1 +Ant. 3 / 5745 MHz



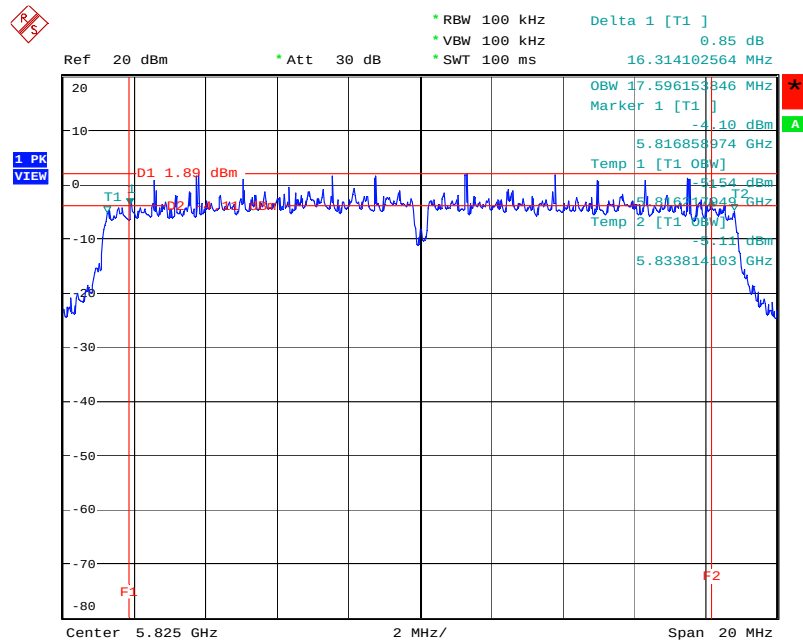
Date: 9.DEC.2007 07:47:16

6 dB Bandwidth Plot on Configuration Draft n MCS8 20MHz Ant. 1 +Ant. 3 / 5785MHz



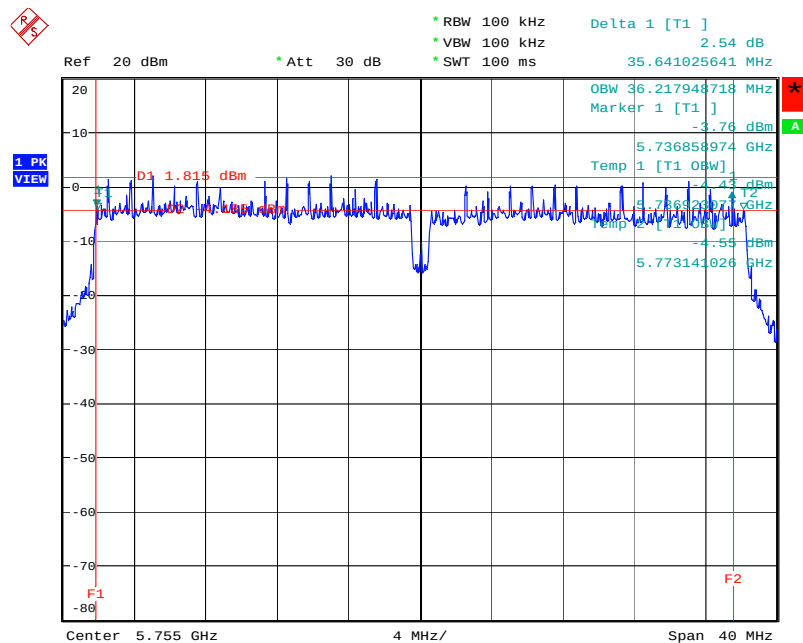
Date: 9.DEC.2007 07:51:58

6 dB Bandwidth Plot on Configuration Draft n MCS8 20MHz Ant. 1 +Ant. 3 / 5825 MHz



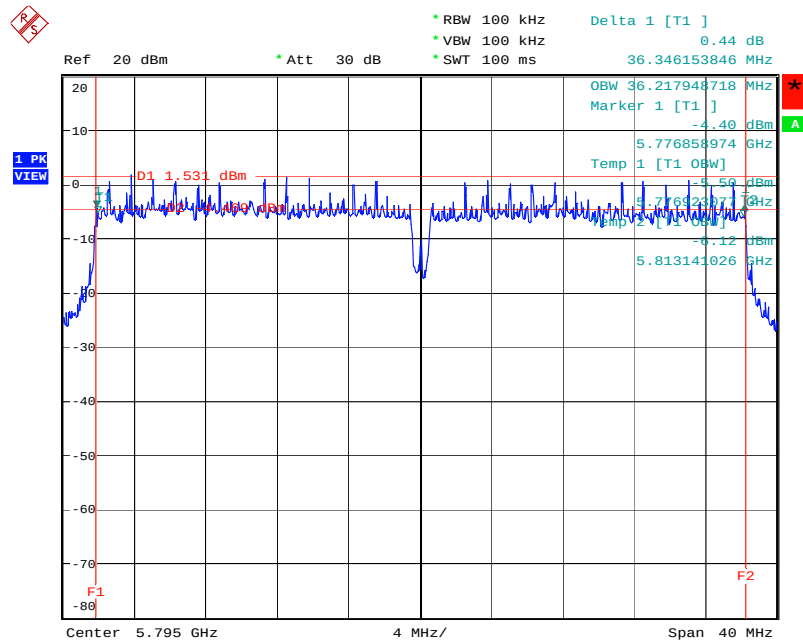
Date: 9.DEC.2007 07:56:14

6 dB Bandwidth Plot on Configuration Draft n MCS8 40MHz Ant. 1 +Ant. 3 / 5755MHz



Date: 9.DEC.2007 07:41:36

6 dB Bandwidth Plot on Configuration Draft n MCS8 40MHz Ant. 1 +Ant. 3 / 5795 MHz



Date: 9.DEC.2007 07:36:14

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

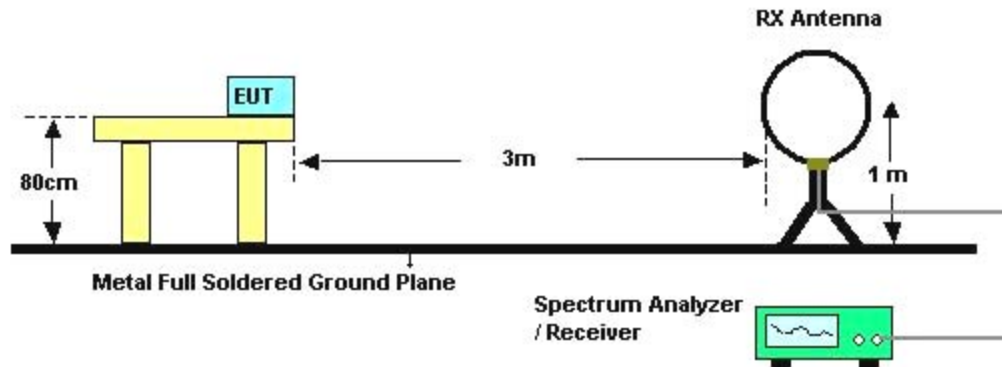
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.5.3. Test Procedures

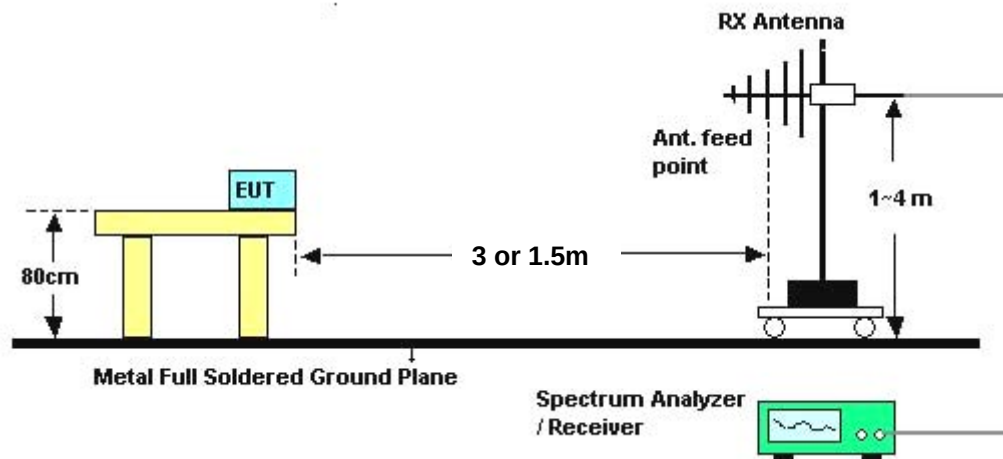
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 from 3m to 1.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (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	26℃	Humidity	60%
Test Engineer	Aric Li	Configurations	Normal

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.

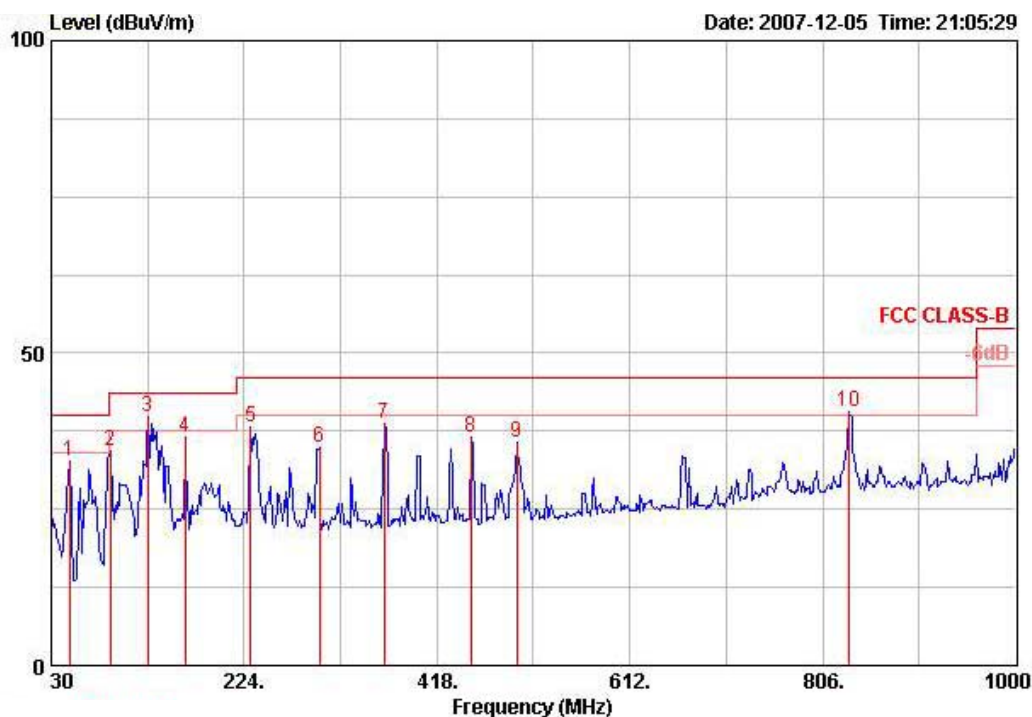
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

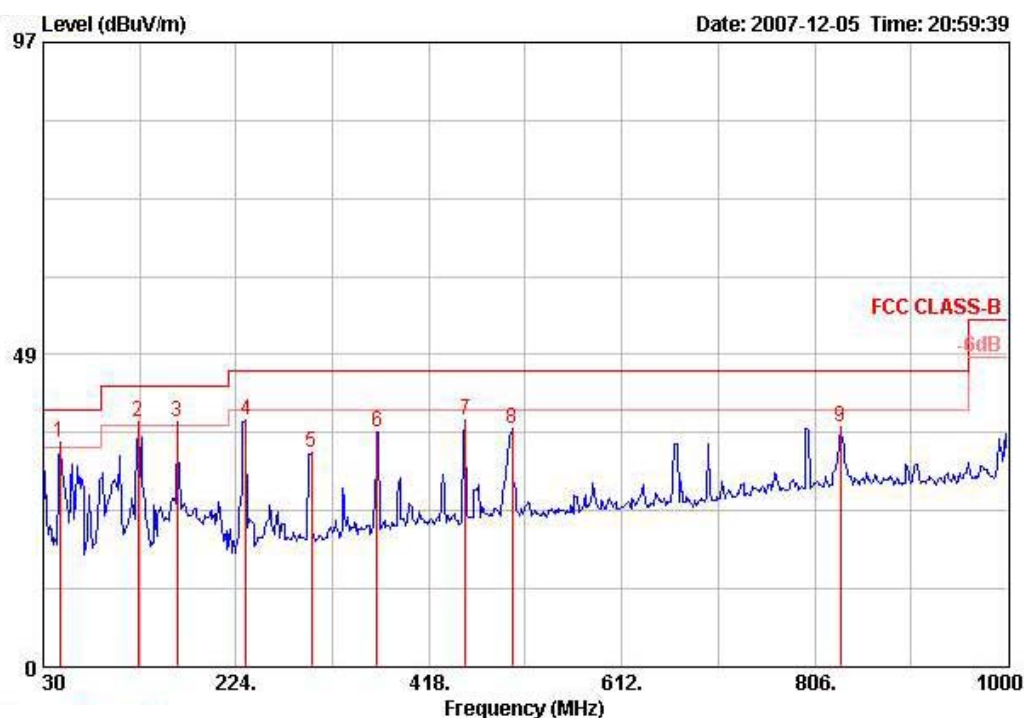
Temperature	26℃	Humidity	60%
Test Engineer	Aric Li	Configurations	Normal Link

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	48.430	32.76	-7.24	40.00	48.80	9.77	0.67	26.47	Peak	100	0	HORIZONTAL
2	89.170	34.29	-9.21	43.50	50.70	9.14	0.57	26.12	Peak	100	0	HORIZONTAL
3 @	127.000	39.67	-3.83	43.50	52.25	12.59	0.75	25.92	Peak	100	0	HORIZONTAL
4	164.830	36.60	-6.90	43.50	51.19	10.35	0.72	25.66	Peak	100	0	HORIZONTAL
5	230.790	38.24	-7.76	46.00	51.21	11.39	1.08	25.44	Peak	100	0	HORIZONTAL
6	299.660	34.80	-11.20	46.00	44.70	13.90	1.14	24.94	Peak	100	0	HORIZONTAL
7	364.650	38.68	-7.32	46.00	46.89	15.65	1.29	25.15	Peak	100	0	HORIZONTAL
8	451.950	36.47	-9.53	46.00	43.77	17.22	1.44	25.96	Peak	100	0	HORIZONTAL
9	498.510	35.70	-10.30	46.00	42.46	17.78	1.80	26.33	Peak	100	0	HORIZONTAL
10 !	832.190	40.49	-5.51	46.00	41.76	21.15	2.52	24.94	Peak	100	0	HORIZONTAL

Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	46.490	34.93	-5.07	40.00	50.18	10.63	0.59	26.48	Peak	400	0	VERTICAL
2 !	125.060	38.06	-5.44	43.50	50.56	12.65	0.79	25.94	Peak	400	0	VERTICAL
3 !	164.830	38.14	-5.36	43.50	52.73	10.35	0.72	25.66	Peak	400	0	VERTICAL
4	233.700	38.30	-7.70	46.00	50.99	11.66	1.09	25.43	Peak	400	0	VERTICAL
5	299.660	33.22	-12.78	46.00	43.12	13.90	1.14	24.94	Peak	400	0	VERTICAL
6	365.620	36.59	-9.41	46.00	44.78	15.68	1.30	25.16	Peak	400	0	VERTICAL
7	454.860	38.38	-7.62	46.00	45.64	17.26	1.46	25.98	Peak	400	0	VERTICAL
8	501.420	37.03	-8.97	46.00	43.75	17.82	1.81	26.35	Peak	400	0	VERTICAL
9	832.190	37.27	-8.73	46.00	38.54	21.15	2.52	24.94	Peak	400	0	VERTICAL

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.