



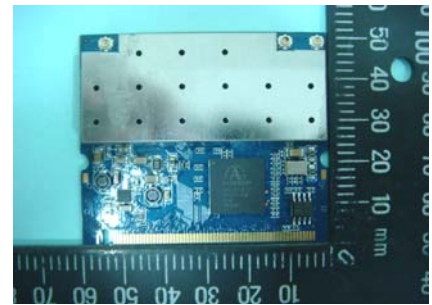
SPORTON International Inc.

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FCC RADIO TEST REPORT

Applicant's company	Wistron NeWeb Corporation
Applicant Address	No.10-1,Li-hsin Road I,Hsinchu Science Park,Hsinchu 300,Taiwan, R.O.C.
FCC ID	NKR-DNMA83
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	WLAN a/b/g/n mini-PCI Module
Brand Name	WNC
Model Name	DNMA-83
Test Rule Part(s)	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	Feb. 28, 2008
Submission Type	Original Equipment



Statement

Test result included is only for the 802.11b/g part and 802.11a (5725 ~ 5850MHz) 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.



Testing Laboratory
1190

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History of This Test Report

Original Issue Date: Feb. 28, 2008

Report No.: FR7D1412AC

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



1. CERTIFICATE OF COMPLIANCE

Product Name : WLAN a/b/g/n mini-PCI Module
Brand Name : WNC
Model Name : DNMA-83
Applicant : Wistron NeWeb Corporation
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.

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	13.16 dB
4.2	15.247(b)(3)	Maximum Peak Conducted Output Power	Complies	2.36 dB
4.3	15.247(e)	Power Spectral Density	Complies	4.64 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	2.20 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.24 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Peak 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

Items	Description
Power Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
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 / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Channel Band Width (99%)	11b: 15.24 MHz ; 11g: 16.48 MHz ; 11a: 17.76 MHz
Conducted Output Power	11b: 24.18 dBm ; 11g: 22.01 dBm ; 11a: 27.64 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)		Three (TX)	
	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

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
A-1	Colubris Networks	XS7-RU	Dipole Antenna	Reversed-SMA	4.09	TX / RX Ant.
A-2	Colubris Networks	XS7-RU	Dipole Antenna	Reversed-SMA	4.09	TX / RX Ant.
A-3	Colubris Networks	XS7-RU	Dipole Antenna	Reversed-SMA	4.09	TX / RX Ant.
B-1	LCU	F1B-294405-32	Dipole Antenna	Reversed-SMA	1.82	TX / RX Ant.
B-2	LCU	F1B-294405-32	Dipole Antenna	Reversed-SMA	1.82	TX / RX Ant.
B-3	LCU	F1B-294405-32	Dipole Antenna	Reversed-SMA	1.82	TX / RX Ant.
C-1	Centurion	WTS2450-RPSMA	Dipole Antenna	Reversed-SMA	2.1	TX / RX Ant.
C-2	Centurion	WTS2450-RPSMA	Dipole Antenna	Reversed-SMA	2.1	TX / RX Ant.
C-3	Centurion	WTS2450-RPSMA	Dipole Antenna	Reversed-SMA	2.1	TX / RX Ant.
D-1	Centurion	NanoBlade	Emdeded Antenna	Reversed-SMA	3.8	TX / RX Ant.
D-2	Centurion	NanoBlade	Emdeded Antenna	Reversed-SMA	3.8	TX / RX Ant.
D-3	Centurion	NanoBlade	Emdeded Antenna	Reversed-SMA	3.8	TX / RX Ant.

Note: The EUT has 12 antennas.

Due to Ant. A ~ Ant. C is the same type antenna, only the higher gain antenna "Ant. A" was tested.

Both Ant. A and Ant. D were tested and recorded in the report.

For 5GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
A-1	Colubris Networks	XS7-RU	Dipole Antenna	Reversed-SMA	1.23	TX / RX Ant.
A-2	Colubris Networks	XS7-RU	Dipole Antenna	Reversed-SMA	1.23	TX / RX Ant.
A-3	Colubris Networks	XS7-RU	Dipole Antenna	Reversed-SMA	1.23	TX / RX Ant.
B-1	LCU	F1B-294405-32	Dipole Antenna	Reversed-SMA	4.28	TX / RX Ant.
B-2	LCU	F1B-294405-32	Dipole Antenna	Reversed-SMA	4.28	TX / RX Ant.
B-3	LCU	F1B-294405-32	Dipole Antenna	Reversed-SMA	4.28	TX / RX Ant.
C-1	Centurion	WTS2450-RPSMA	Dipole Antenna	Reversed-SMA	3.4	TX / RX Ant.
C-2	Centurion	WTS2450-RPSMA	Dipole Antenna	Reversed-SMA	3.4	TX / RX Ant.
C-3	Centurion	WTS2450-RPSMA	Dipole Antenna	Reversed-SMA	3.4	TX / RX Ant.
D-1	Centurion	NanoBlade	Emdeded Antenna	Reversed-SMA	5.1	TX / RX Ant.
D-2	Centurion	NanoBlade	Emdeded Antenna	Reversed-SMA	5.1	TX / RX Ant.
D-3	Centurion	NanoBlade	Emdeded Antenna	Reversed-SMA	5.1	TX / RX Ant.

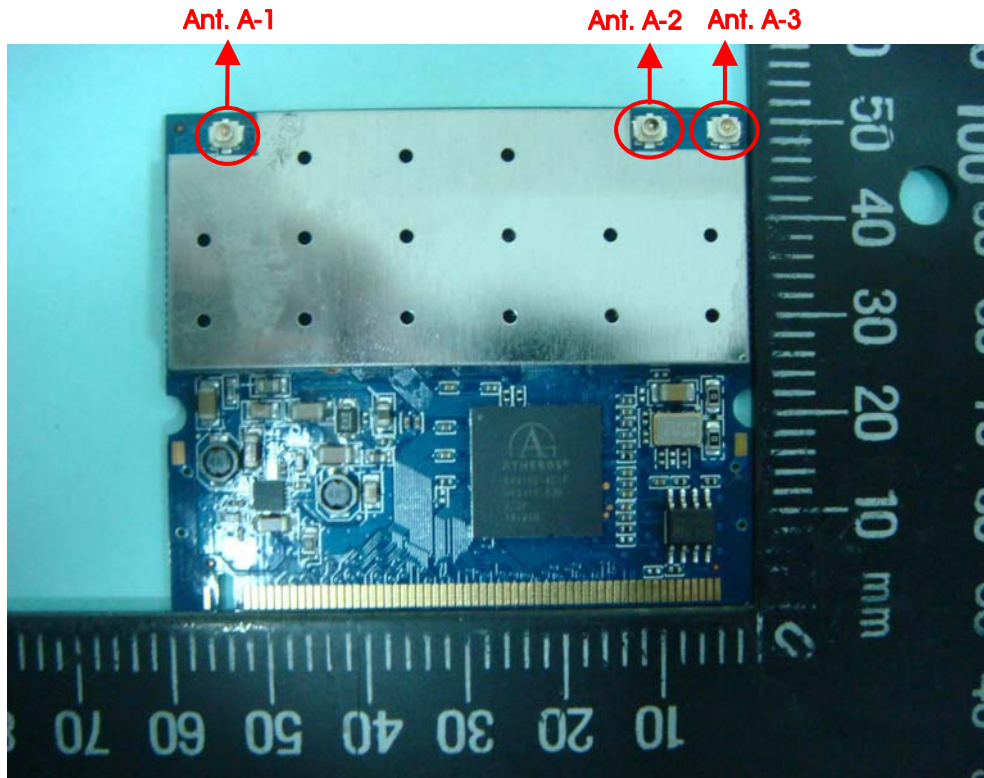
Note: The EUT has 12 antennas.

Due to Ant. A ~ Ant. C is the same type antenna, only the higher gain antenna “Ant. B” was tested.
Both Ant. B and Ant. D were tested and recorded in the report.

Port 1: Ant. A-1 (2.4GHz) / Ant. B-1 (5GHz) / Ant. D-1

Port 2: Ant. A-2 (2.4GHz) / Ant. B-2 (5GHz) / Ant. D-2

Port 3: Ant. A-3 (2.4GHz) / Ant. B-3 (5GHz) / Ant. D-3



3.4. Table for Carrier Frequencies

Frequency Allocation for 802.11b/g

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		

Frequency Allocation for 802.11a

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5725~5850 MHz (USA/Canada/Taiwan)	149	5745 MHz		
	153	5765 MHz		
	157	5785 MHz		
	161	5805 MHz		
	165	5825 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	Auto	-	-
Max. Peak Conducted Output Power Power Spectral Density 6dB Spectrum Bandwidth	11b/CCK	11 Mbps	1/6/11	D-1/D-2/D-3/ D-1+D-2+D-3 A-1/A-2/A-3/ A-1+A-2+A-3
	11g/BPSK	6 Mbps	1/6/11	D-1/D-2/D-3/ D-1+D-2+D-3 A-1/A-2/A-3/ A-1+A-2+A-3
	11a/BPSK	6 Mbps	149/157/165	D-1/D-2/D-3/ D-1+D-2+D-3 B-1/B-2/B-3/ B-1+B-2+B-3/
Radiated Emissions Below 1GHz	11g/BPSK	Auto	-	-
Radiated Emissions Above 1GHz	11b/CCK	11 Mbps	1/6/11	A/D
	11g/BPSK	6 Mbps	1/6/11	A/D
	11a/BPSK	6 Mbps	149/157/165	B/D
Band Edge Emissions	11b/CCK	11 Mbps	1/11	A/D
	11g/BPSK	6 Mbps	1/11	A/D
	11a/BPSK	6 Mbps	149/165	B/D

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 IEEE 802.11b/g Ant. A

Test Software Version	ART		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	16	19	16
IEEE 802.11g	13.5	15.5	12.5

Power Parameters of IEEE 802.11b/g Ant. D

Test Software Version	ART		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	17.5	19	16.5
IEEE 802.11g	13.5	15.5	12.5

For 5GHz Band

Power Parameters of IEEE 802.11a Ant. B

Test Software Version	ART		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	20	20	20

Power Parameters of IEEE 802.11a Ant. D

Test Software Version	ART		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	21.5	21.5	21.5

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 printer, then the printer prints them on the paper.
- d. The NB sends " H " messages to the modem.
- e. Repeat the steps from b to d.

At the same time, the following programs were executed:

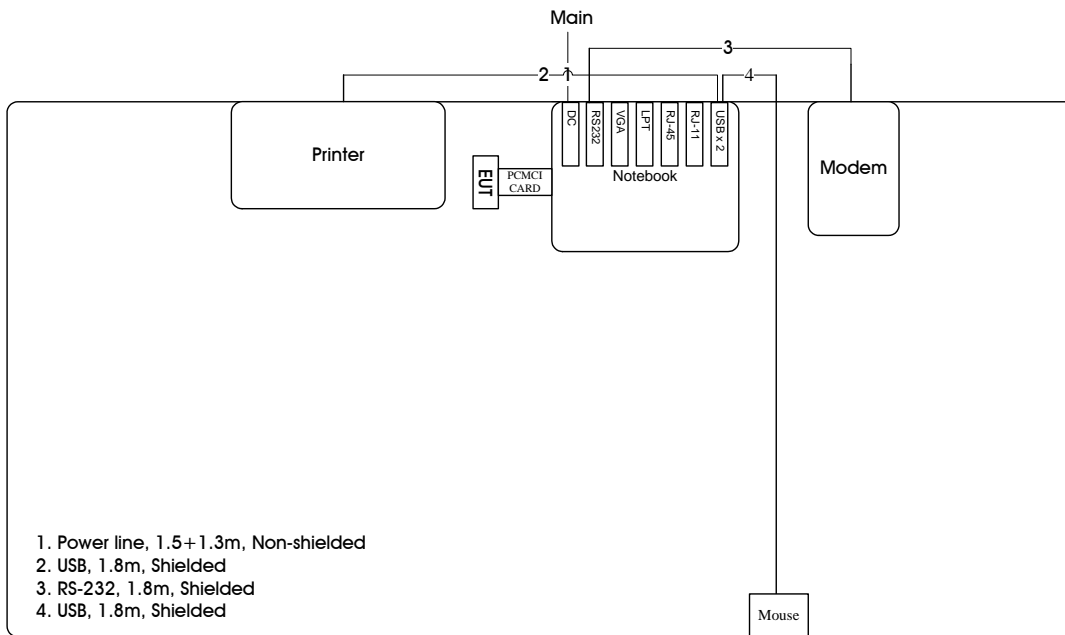
Executed "ping.exe" to link with the remote workstation to receive and transmit signal by LAN and WLAN.

3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration

Test Configuration: 9KHz~1GHz

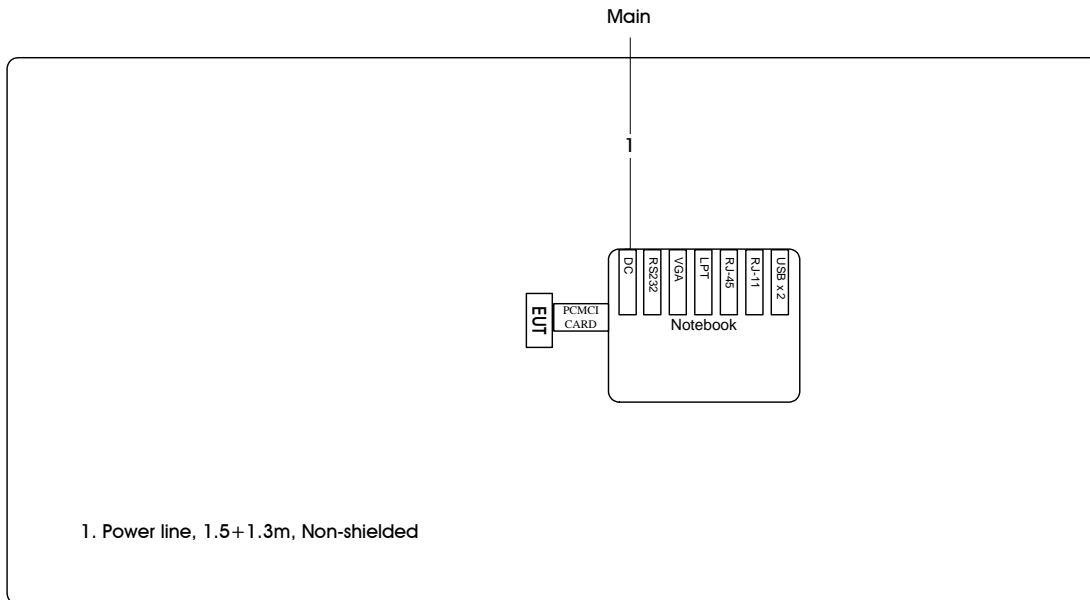
Test Mode: Ant. A / Ant. B / Ant. D



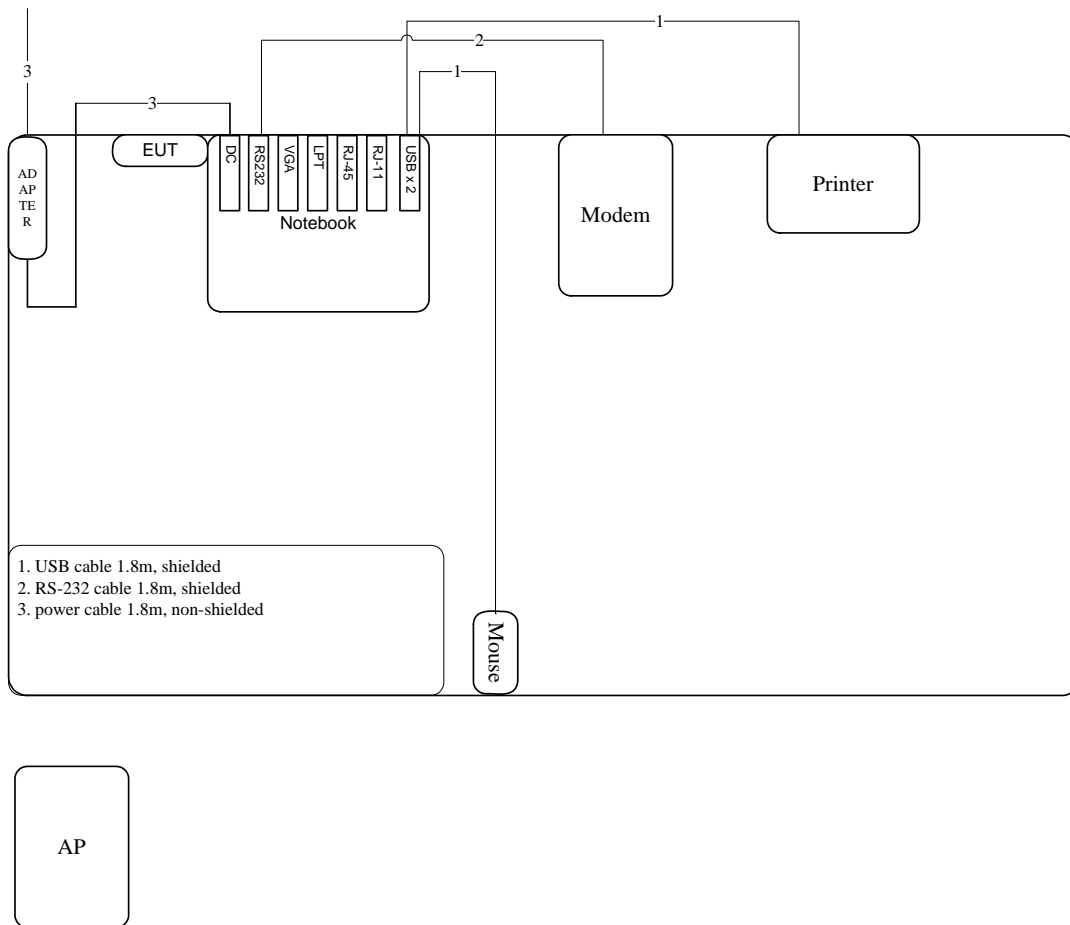
AP

Test Configuration: above 1GHz

Test Mode: Ant. A / Ant. B / Ant. D



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

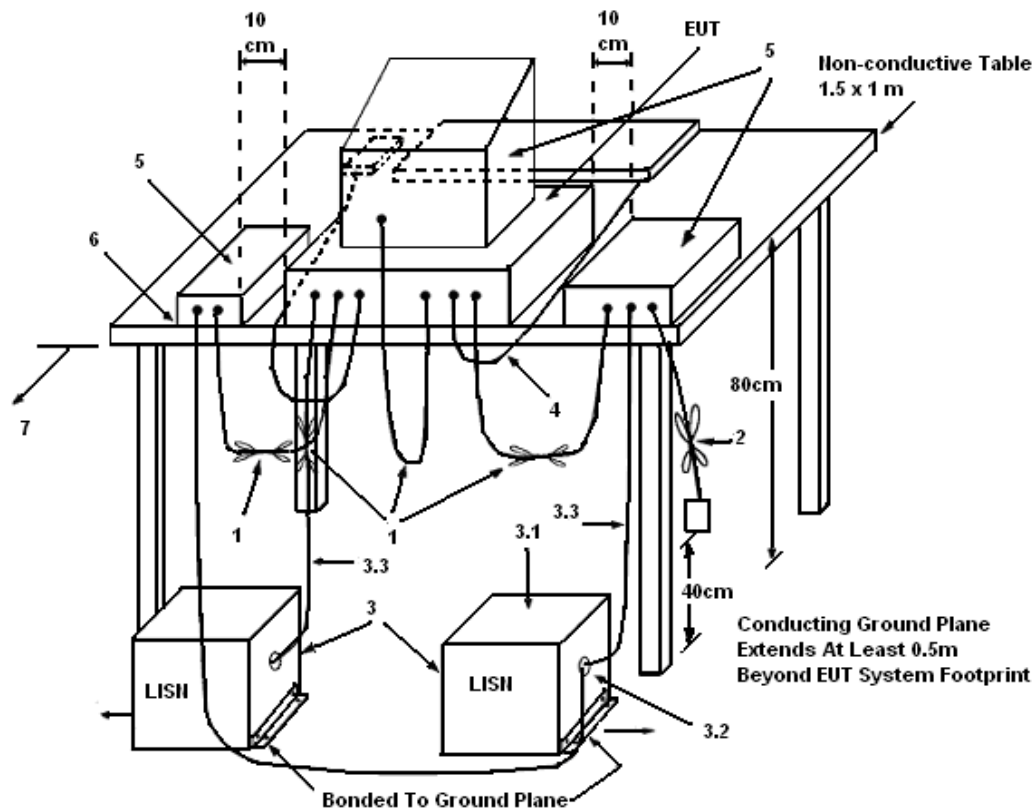
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

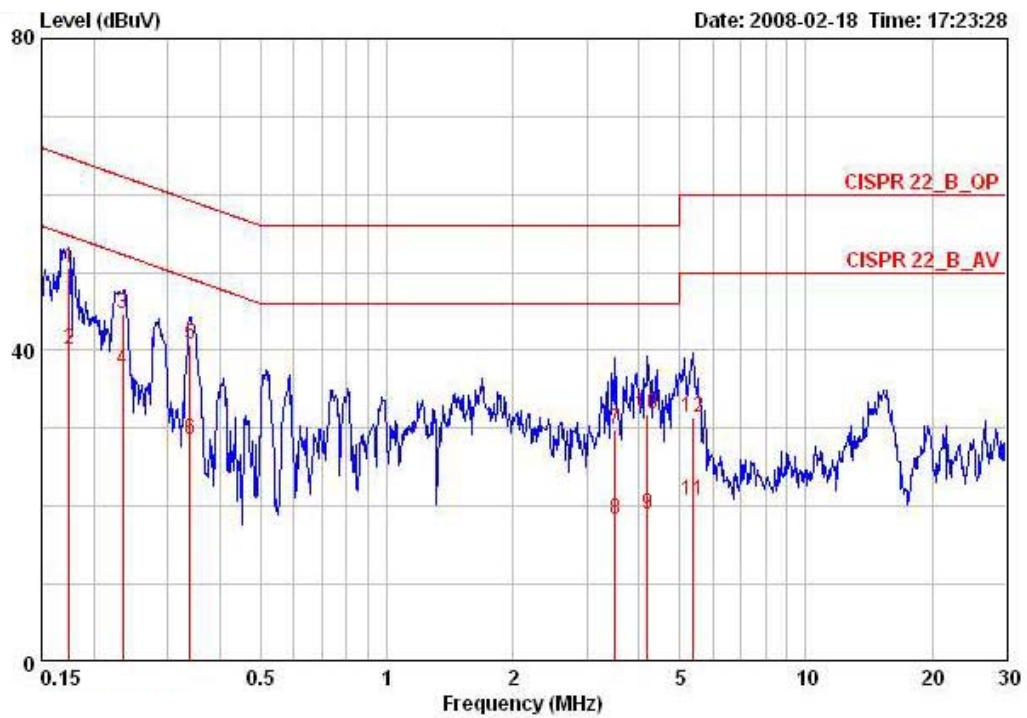
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

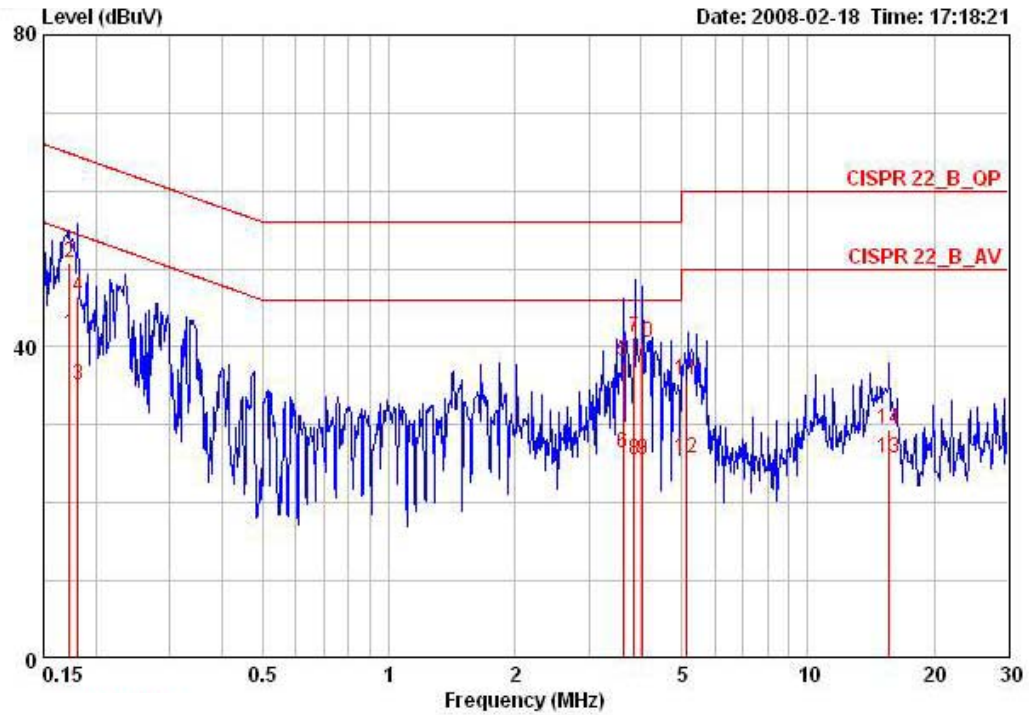
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	20°C	Humidity	61%
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	0.17491	50.53	-14.19	64.72	50.18	0.15	0.20	QP	LINE
2	0.17491	40.11	-14.61	54.72	39.76	0.15	0.20	AVERAGE	LINE
3	0.23409	44.71	-17.59	62.30	44.41	0.10	0.20	QP	LINE
4	0.23409	37.49	-14.81	52.30	37.19	0.10	0.20	AVERAGE	LINE
5	0.33920	40.71	-18.51	59.22	40.41	0.10	0.20	QP	LINE
6	0.33920	28.64	-20.58	49.22	28.34	0.10	0.20	AVERAGE	LINE
7	3.509	29.77	-26.23	56.00	29.47	0.00	0.30	QP	LINE
8	3.509	18.21	-27.79	46.00	17.91	0.00	0.30	AVERAGE	LINE
9	4.180	18.93	-27.07	46.00	18.63	0.00	0.30	AVERAGE	LINE
10	4.180	31.72	-24.28	56.00	31.42	0.00	0.30	QP	LINE
11	5.390	20.71	-29.29	50.00	20.39	0.02	0.30	AVERAGE	LINE
12	5.390	31.43	-28.57	60.00	31.11	0.02	0.30	QP	LINE

Temperature	20°C	Humidity	61%
Test Engineer	Andy Tsai	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.17307	41.65	-13.16	54.81	41.20	0.25	0.20	AVERAGE	NEUTRAL
2	0.17307	50.83	-13.98	64.81	50.38	0.25	0.20	QP	NEUTRAL
3	0.18152	35.08	-19.34	54.42	34.63	0.25	0.20	AVERAGE	NEUTRAL
4	0.18152	46.39	-18.03	64.42	45.94	0.25	0.20	QP	NEUTRAL
5	3.615	38.23	-17.77	56.00	37.83	0.10	0.30	QP	NEUTRAL
6	3.615	26.47	-19.53	46.00	26.07	0.10	0.30	AVERAGE	NEUTRAL
7	3.854	41.18	-14.82	56.00	40.78	0.10	0.30	QP	NEUTRAL
8	3.854	25.51	-20.49	46.00	25.11	0.10	0.30	AVERAGE	NEUTRAL
9	4.027	25.40	-20.60	46.00	25.00	0.10	0.30	AVERAGE	NEUTRAL
10	4.027	40.51	-15.49	56.00	40.11	0.10	0.30	QP	NEUTRAL
11	5.153	35.68	-24.32	60.00	35.28	0.10	0.30	QP	NEUTRAL
12	5.153	25.79	-24.21	50.00	25.39	0.10	0.30	AVERAGE	NEUTRAL
13	15.639	25.69	-24.31	50.00	25.19	0.10	0.40	AVERAGE	NEUTRAL
14	15.639	29.51	-30.49	60.00	29.01	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. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

4.2.2. Measuring Instruments and Setting

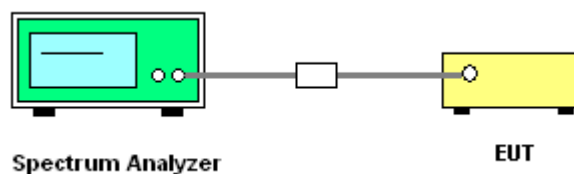
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	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 Measurement of Digital Transmission Systems Operating under Section 15.247 March 23, 2005.
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	23°C	Humidity	61%
Test Engineer	Sam Lee	Configurations	802.11a/b/g

Configuration IEEE 802.11b Ant. A-1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	16.26	30.00	Complies
6	2437 MHz	18.90	30.00	Complies
11	2462 MHz	15.94	30.00	Complies

Configuration IEEE 802.11b Ant. A-2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	16.49	30.00	Complies
6	2437 MHz	19.99	30.00	Complies
11	2462 MHz	17.35	30.00	Complies

Configuration IEEE 802.11b Ant. A-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	16.40	30.00	Complies
6	2437 MHz	19.25	30.00	Complies
11	2462 MHz	16.30	30.00	Complies

Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	21.16	30.00	Complies
6	2437 MHz	24.18	30.00	Complies
11	2462 MHz	21.34	30.00	Complies

Configuration IEEE 802.11b Ant. D-1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	17.47	30.00	Complies
6	2437 MHz	18.86	30.00	Complies
11	2462 MHz	16.06	30.00	Complies

Configuration IEEE 802.11b Ant. D-2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	17.95	30.00	Complies
6	2437 MHz	19.99	30.00	Complies
11	2462 MHz	17.56	30.00	Complies

Configuration IEEE 802.11b Ant. D-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	17.65	30.00	Complies
6	2437 MHz	19.20	30.00	Complies
11	2462 MHz	16.73	30.00	Complies

Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	22.47	30.00	Complies
6	2437 MHz	24.15	30.00	Complies
11	2462 MHz	21.60	30.00	Complies

Configuration IEEE 802.11g Ant. A-1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	15.38	30.00	Complies
6	2437 MHz	16.67	30.00	Complies
11	2462 MHz	13.85	30.00	Complies

Configuration IEEE 802.11g Ant. A-2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	15.58	30.00	Complies
6	2437 MHz	17.87	30.00	Complies
11	2462 MHz	14.86	30.00	Complies

Configuration IEEE 802.11g Ant. A-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	15.18	30.00	Complies
6	2437 MHz	17.09	30.00	Complies
11	2462 MHz	14.17	30.00	Complies

Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	20.15	30.00	Complies
6	2437 MHz	22.01	30.00	Complies
11	2462 MHz	19.09	30.00	Complies

Configuration IEEE 802.11g Ant. D-1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	15.07	30.00	Complies
6	2437 MHz	16.63	30.00	Complies
11	2462 MHz	13.67	30.00	Complies

Configuration IEEE 802.11g Ant. D-2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	15.37	30.00	Complies
6	2437 MHz	17.72	30.00	Complies
11	2462 MHz	15.09	30.00	Complies

Configuration IEEE 802.11g Ant. D-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	14.91	30.00	Complies
6	2437 MHz	17.04	30.00	Complies
11	2462 MHz	14.39	30.00	Complies

Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	19.89	30.00	Complies
6	2437 MHz	21.92	30.00	Complies
11	2462 MHz	19.19	30.00	Complies

Configuration IEEE 802.11a Ant. B-1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	18.86	30.00	Complies
157	5785 MHz	23.16	30.00	Complies
165	5825 MHz	19.37	30.00	Complies

Configuration IEEE 802.11a Ant. B-2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	23.49	30.00	Complies
157	5785 MHz	23.22	30.00	Complies
165	5825 MHz	22.95	30.00	Complies

Configuration IEEE 802.11a Ant. B-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	18.39	30.00	Complies
157	5785 MHz	19.31	30.00	Complies
165	5825 MHz	22.84	30.00	Complies

Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	25.67	30.00	Complies
157	5785 MHz	27.01	30.00	Complies
165	5825 MHz	26.78	30.00	Complies

Configuration IEEE 802.11a Ant. D-1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	19.32	30.00	Complies
157	5785 MHz	22.93	30.00	Complies
165	5825 MHz	22.92	30.00	Complies

Configuration IEEE 802.11a Ant. D-2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	24.05	30.00	Complies
157	5785 MHz	23.04	30.00	Complies
165	5825 MHz	22.91	30.00	Complies

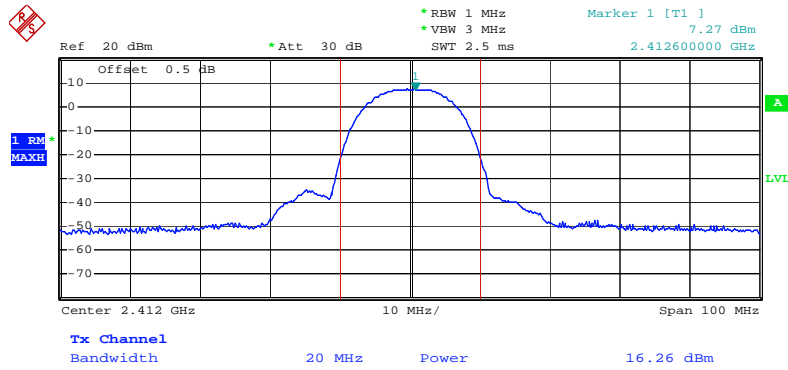
Configuration IEEE 802.11a Ant. D-3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	20.80	30.00	Complies
157	5785 MHz	19.83	30.00	Complies
165	5825 MHz	22.76	30.00	Complies

Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3

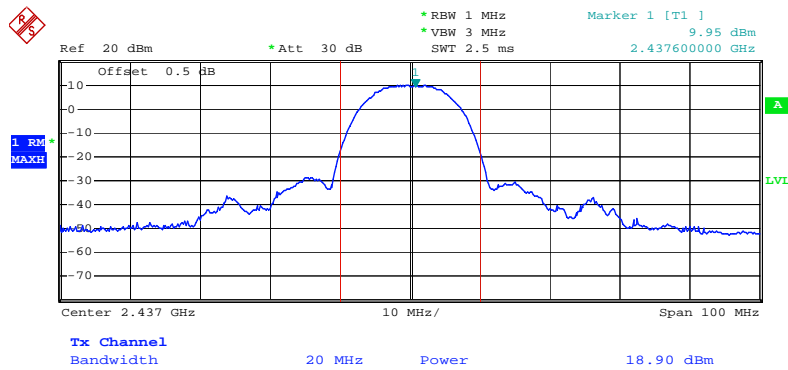
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	26.63	30.00	Complies
157	5785 MHz	26.94	30.00	Complies
165	5825 MHz	27.64	30.00	Complies

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-1 / 2412 MHz



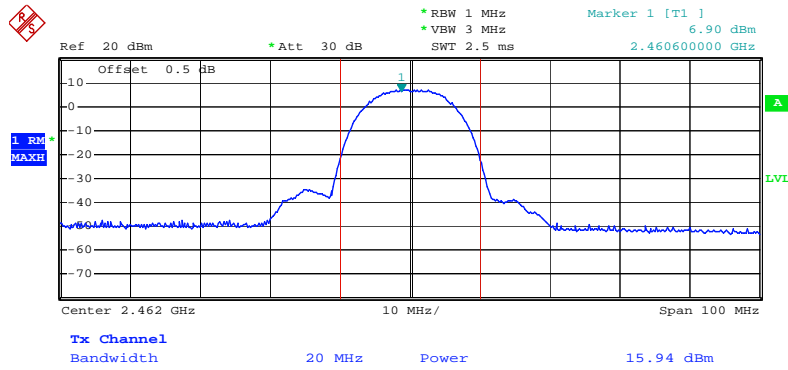
Date: 14.FEB.2008 03:04:54

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-1 / 2437 MHz



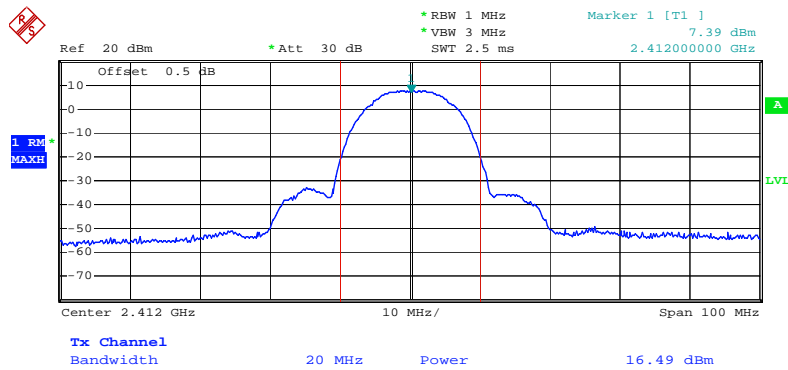
Date: 14.FEB.2008 03:08:34

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-1 / 2462 MHz



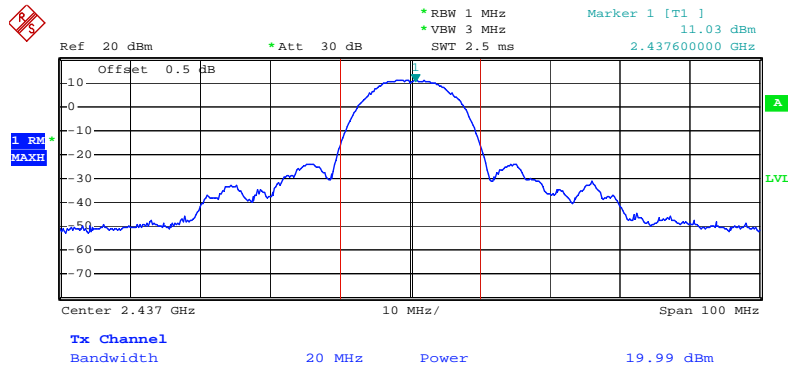
Date: 14.FEB.2008 03:14:36

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-2 / 2412 MHz



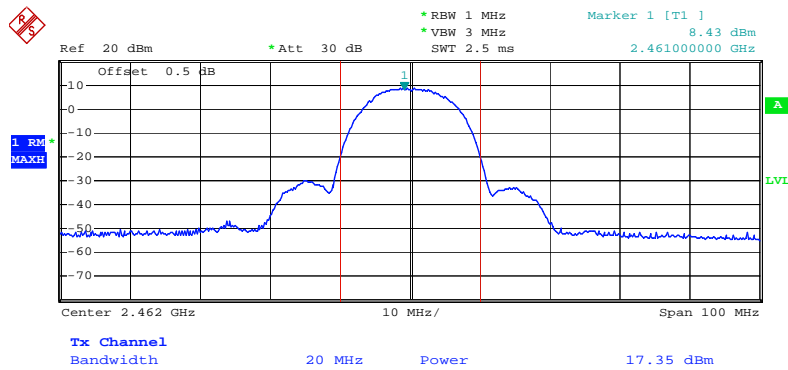
Date: 14.FEB.2008 03:02:21

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-2 / 2437 MHz



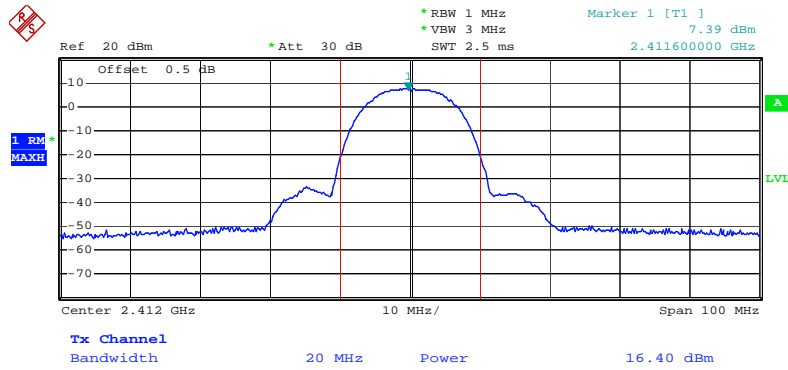
Date: 14.FEB.2008 03:09:01

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-2 / 2462 MHz



Date: 14.FEB.2008 03:18:58

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-3 / 2412 MHz



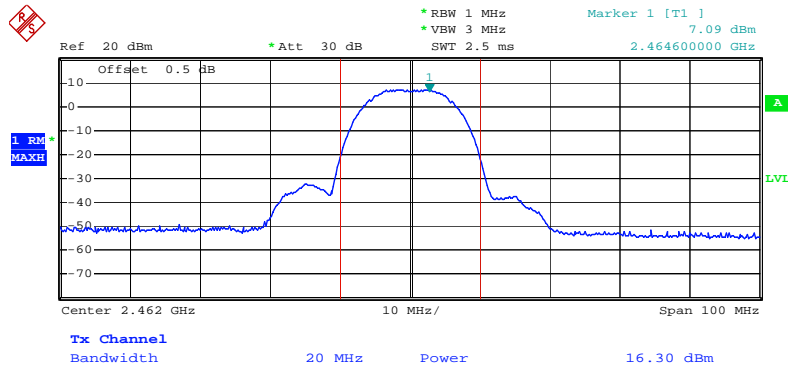
Date: 14.FEB.2008 02:57:35

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-3 / 2437 MHz



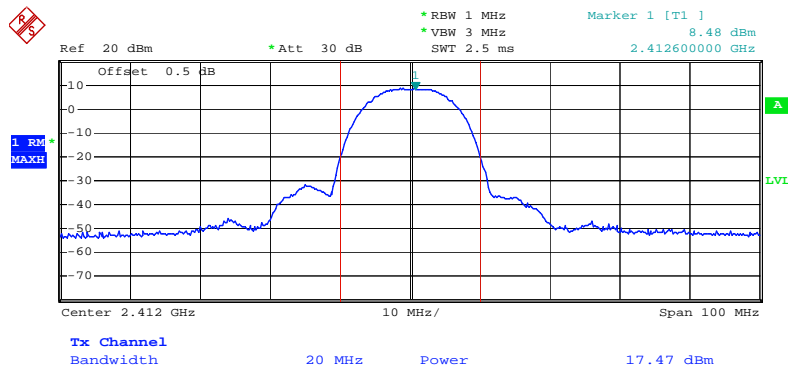
Date: 14.FEB.2008 03:09:26

Channel Output Power Plot on Configuration IEEE 802.11b Ant. A-3 / 2462 MHz



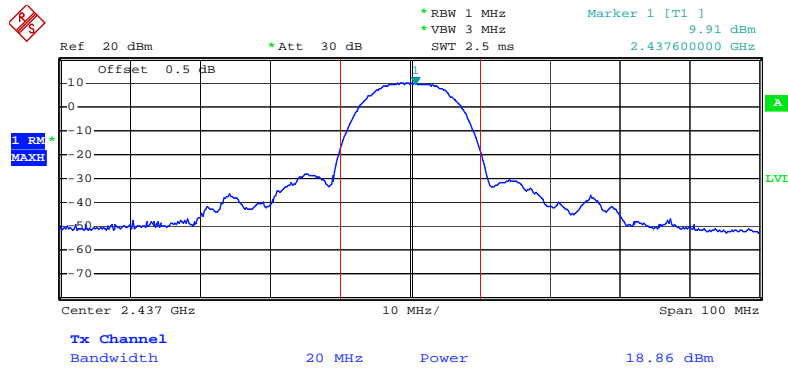
Date: 14.FEB.2008 03:19:45

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-1 / 2412 MHz



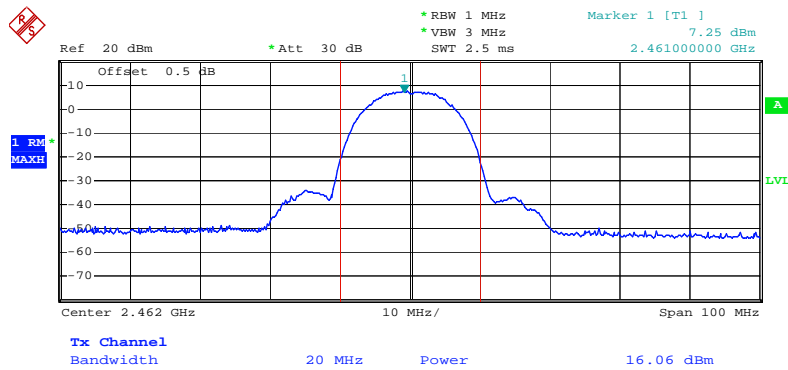
Date: 14.FEB.2008 04:03:38

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-1 / 2437 MHz



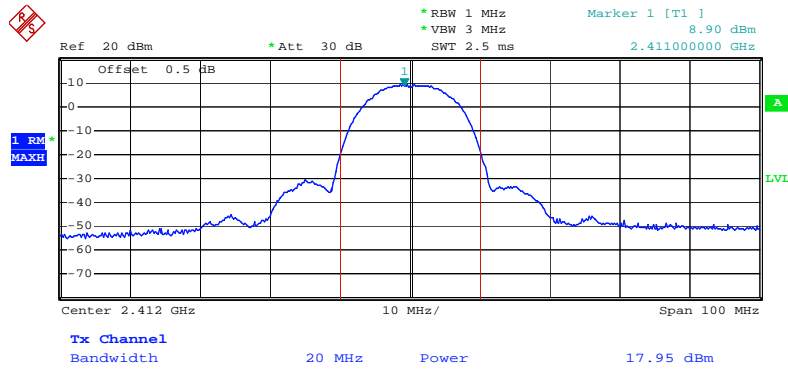
Date: 14.FEB.2008 04:06:58

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-1 / 2462 MHz



Date: 14.FEB.2008 04:07:50

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-2 / 2412 MHz



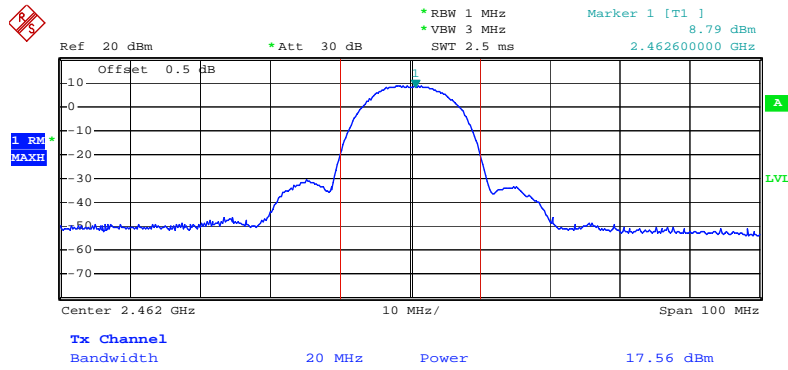
Date: 14.FEB.2008 04:04:03

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-2 / 2437 MHz



Date: 14.FEB.2008 04:06:25

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-2 / 2462 MHz



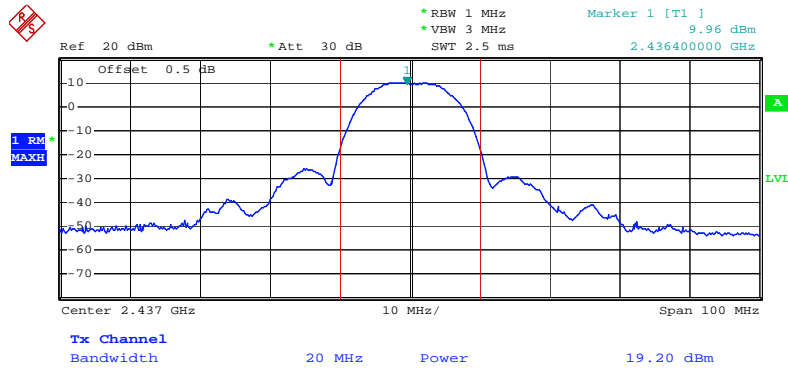
Date: 14.FEB.2008 04:08:26

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-3 / 2412 MHz



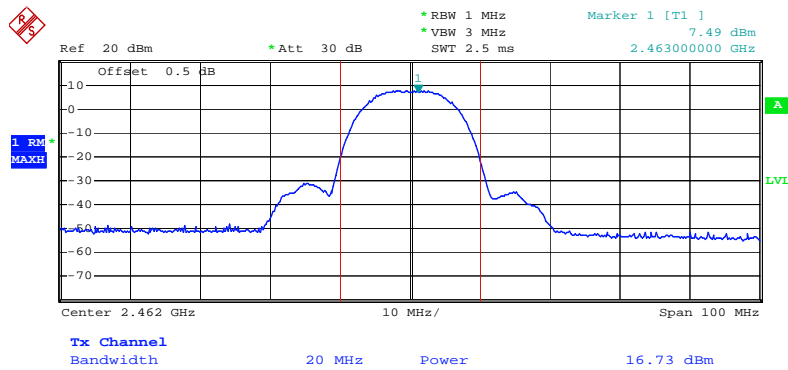
Date: 14.FEB.2008 04:04:35

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-3 / 2437 MHz



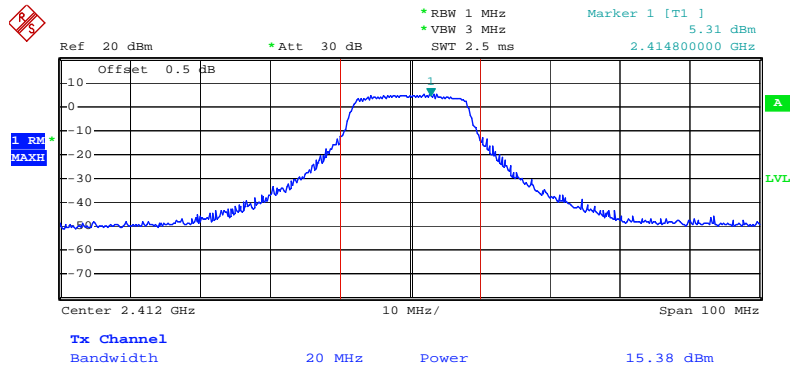
Date: 14.FEB.2008 04:05:49

Channel Output Power Plot on Configuration IEEE 802.11b Ant. D-3 / 2462 MHz



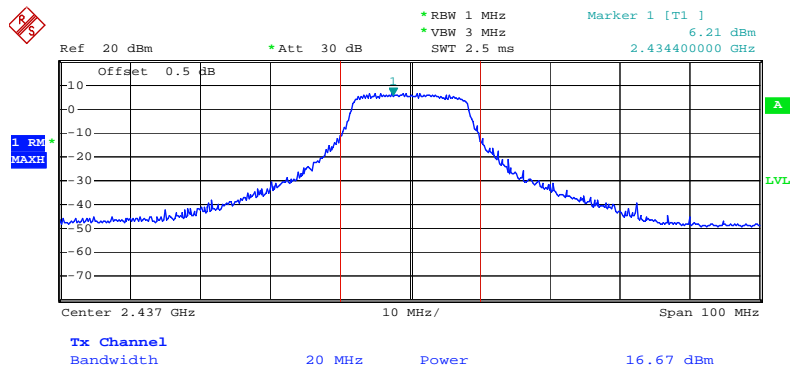
Date: 14.FEB.2008 04:09:09

Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-1 / 2412 MHz



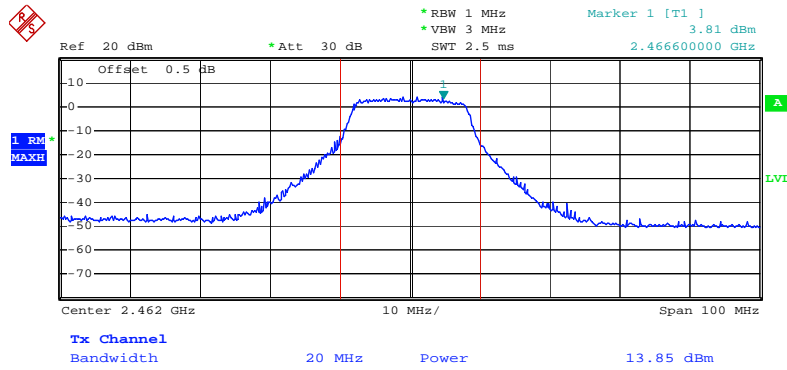
Date: 14.FEB.2008 03:26:05

Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-1 / 2437 MHz



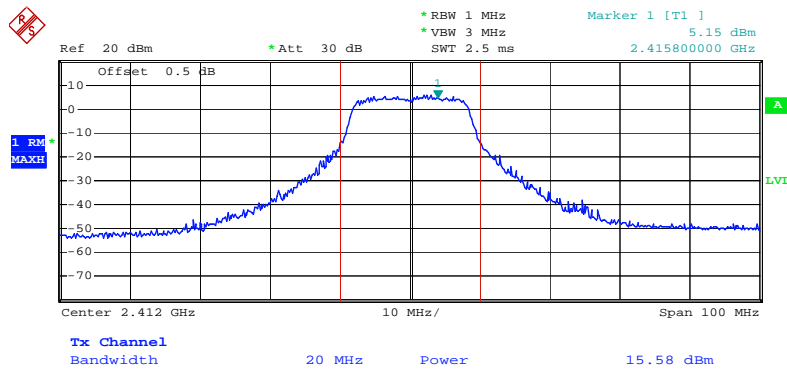
Date: 14.FEB.2008 03:27:55

Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-1 / 2462 MHz



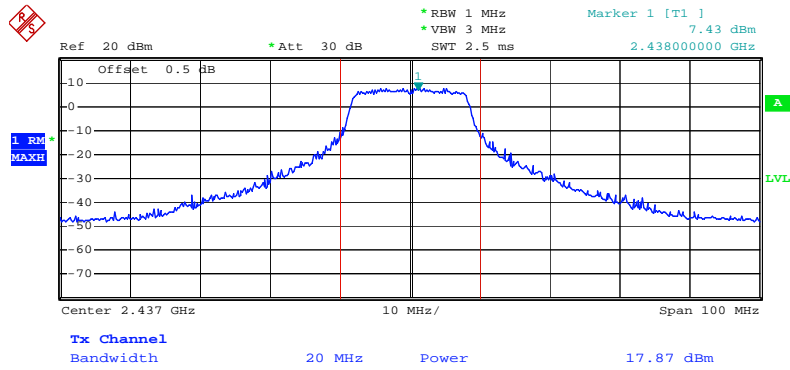
Date: 14.FEB.2008 03:31:24

Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-2 / 2412 MHz



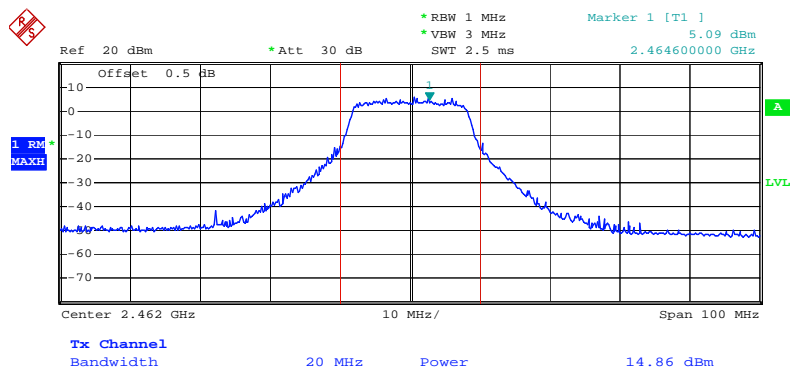
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Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-2 / 2437 MHz



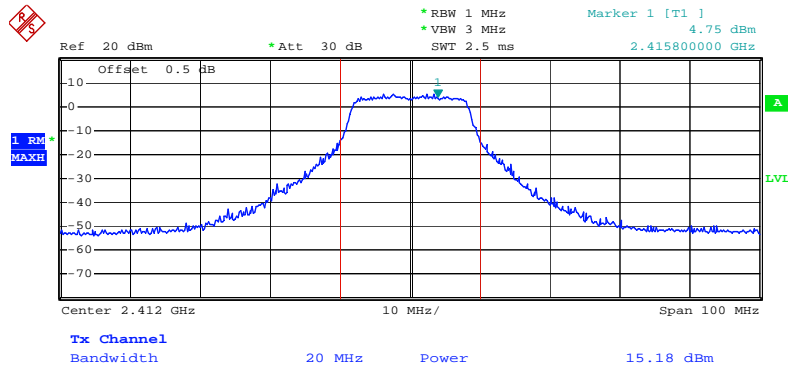
Date: 14.FEB.2008 03:28:31

Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-2 / 2462 MHz



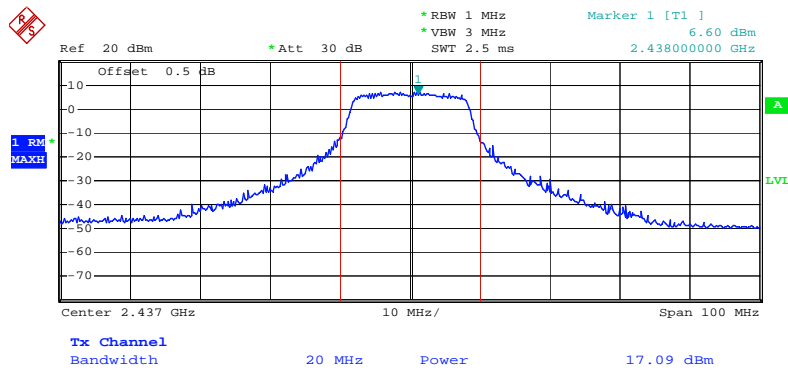
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Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-3 / 2412 MHz



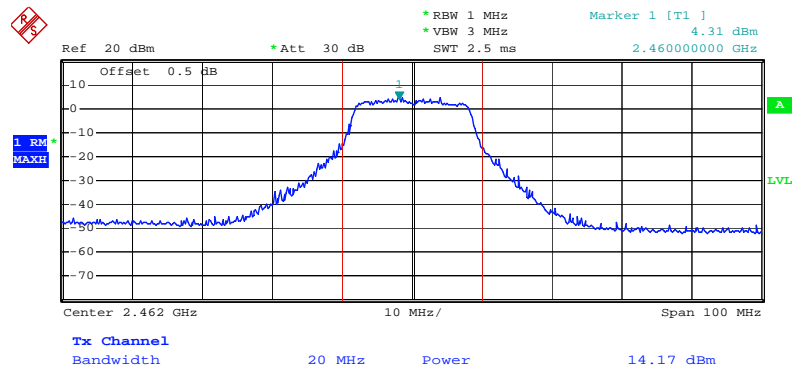
Date: 14.FEB.2008 03:23:51

Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-3 / 2437 MHz



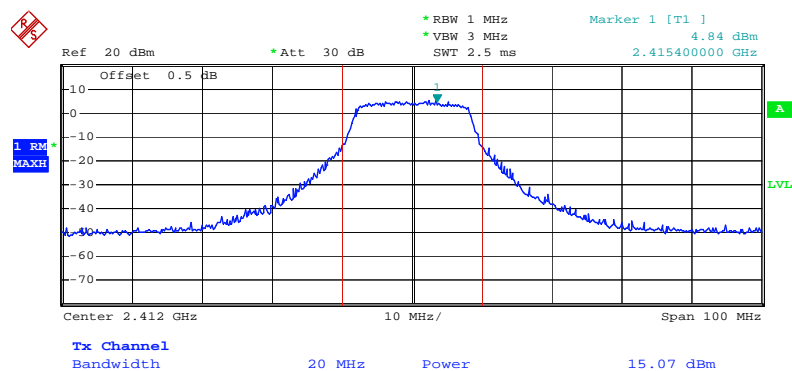
Date: 14.FEB.2008 03:29:07

Channel Output Power Plot on Configuration IEEE 802.11g Ant. A-3 / 2462 MHz



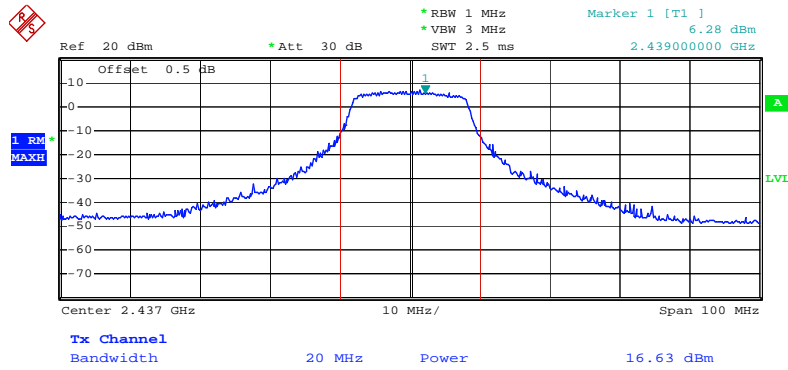
Date: 14.FEB.2008 03:32:26

Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-1 / 2412 MHz



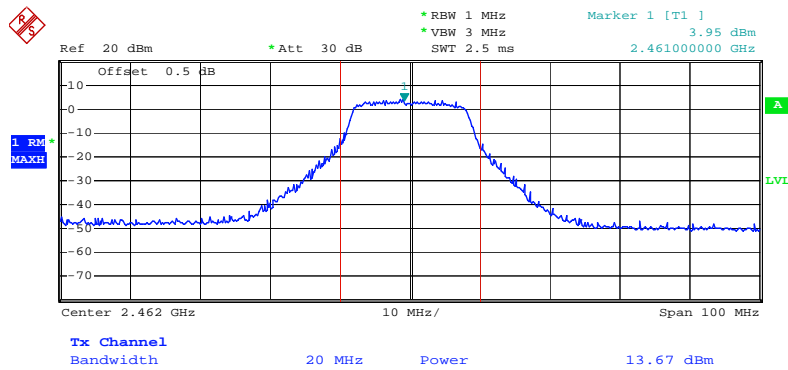
Date: 14.FEB.2008 04:22:40

Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-1 / 2437 MHz



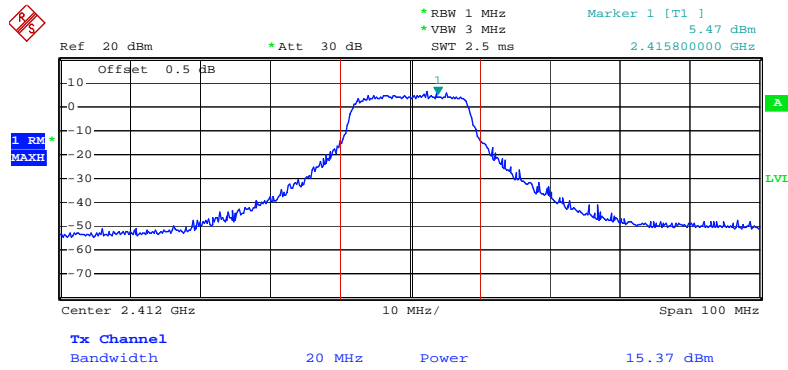
Date: 14.FEB.2008 04:17:59

Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-1 / 2462 MHz



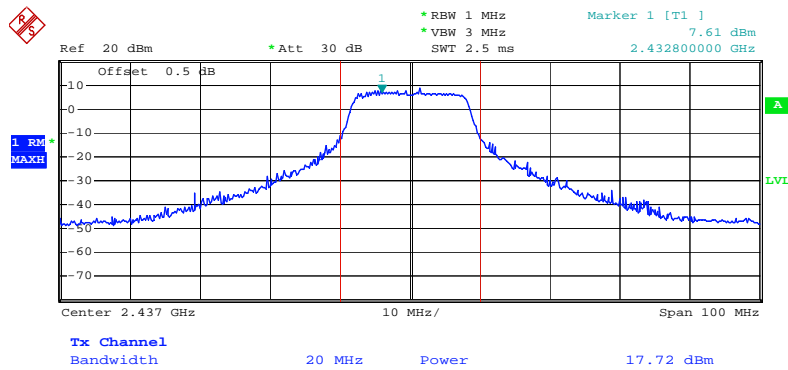
Date: 14.FEB.2008 04:15:14

Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-2 / 2412 MHz



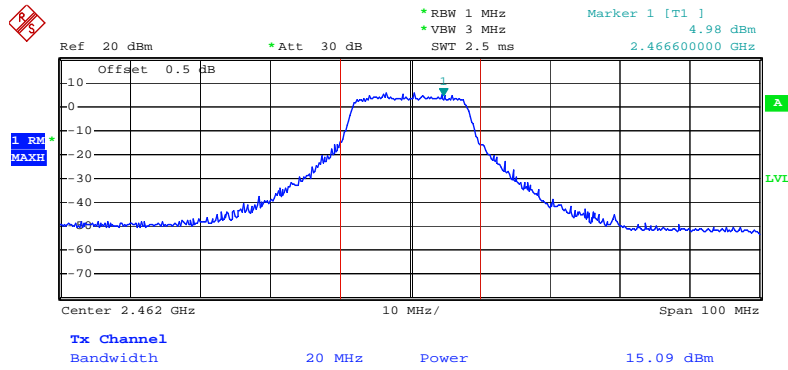
Date: 14.FEB.2008 04:22:07

Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-2 / 2437 MHz



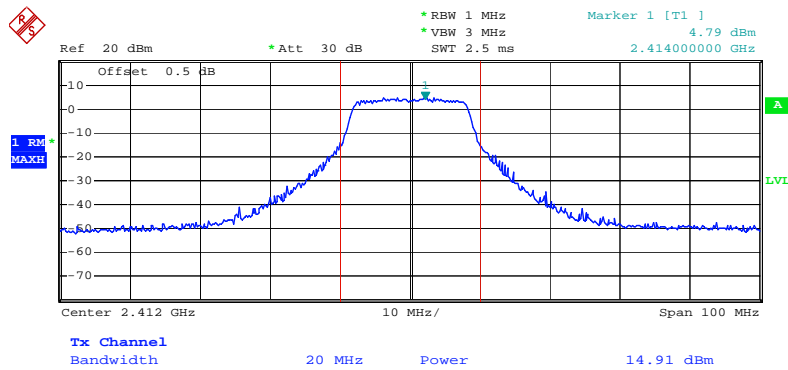
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Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-2 / 2462 MHz



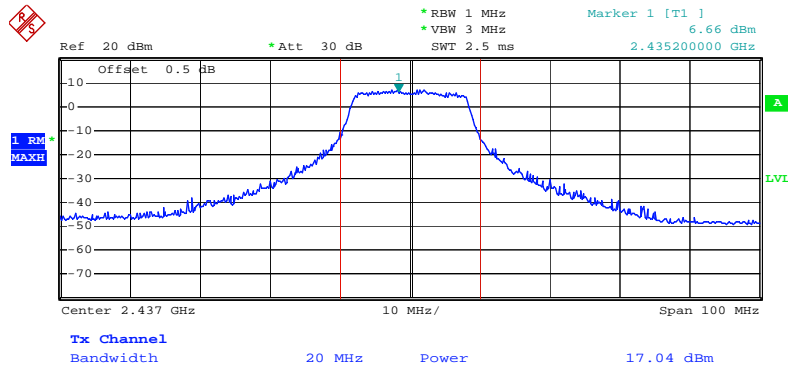
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Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-3 / 2412 MHz



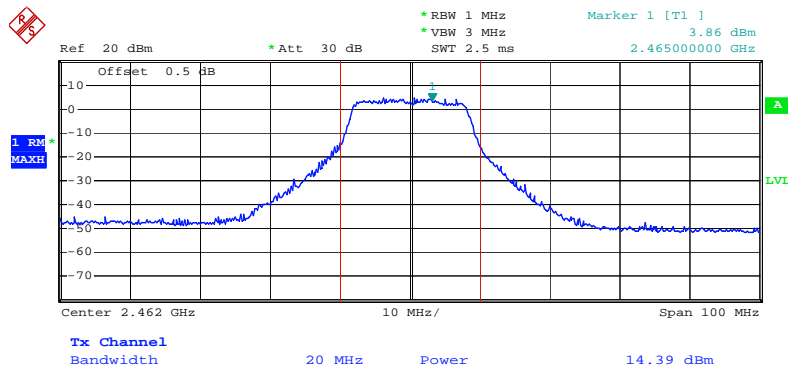
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Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-3 / 2437 MHz



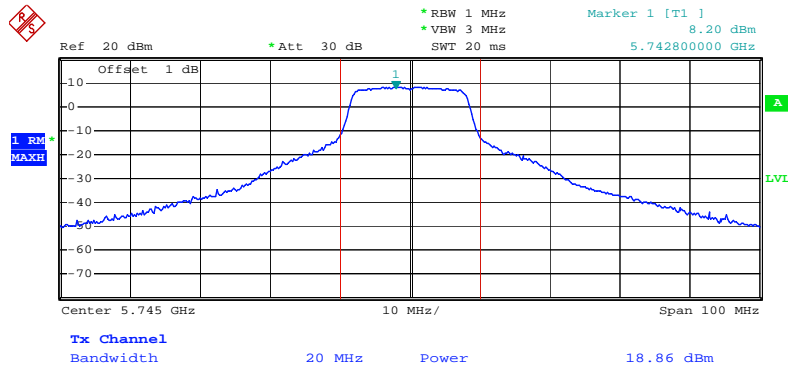
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Channel Output Power Plot on Configuration IEEE 802.11g Ant. D-3 / 2462 MHz



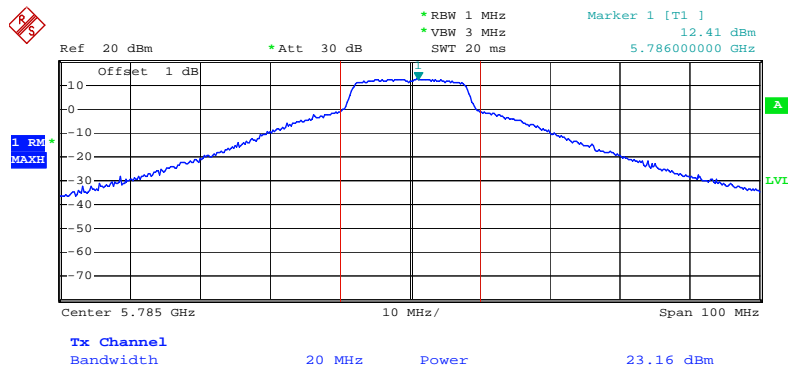
Date: 14.FEB.2008 04:13:41

Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-1 / 5745 MHz



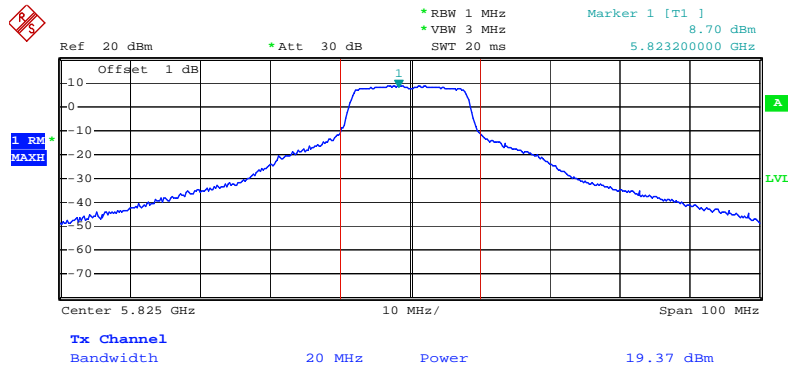
Date: 15.FEB.2008 08:03:07

Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-1 / 5785 MHz



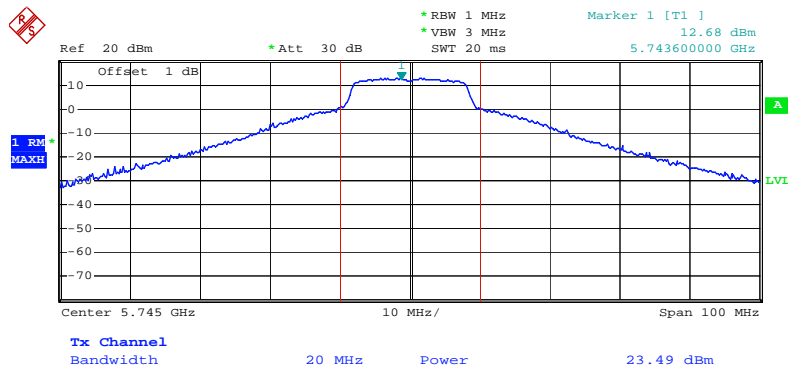
Date: 15.FEB.2008 08:01:51

Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-1 / 5825 MHz



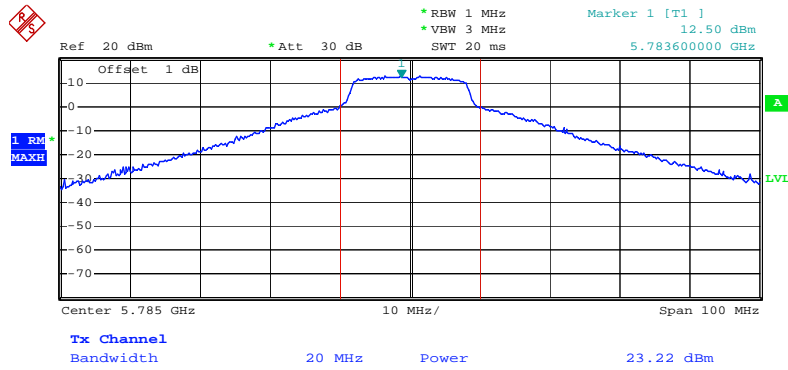
Date: 15.FEB.2008 07:59:58

Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-2 / 5745 MHz



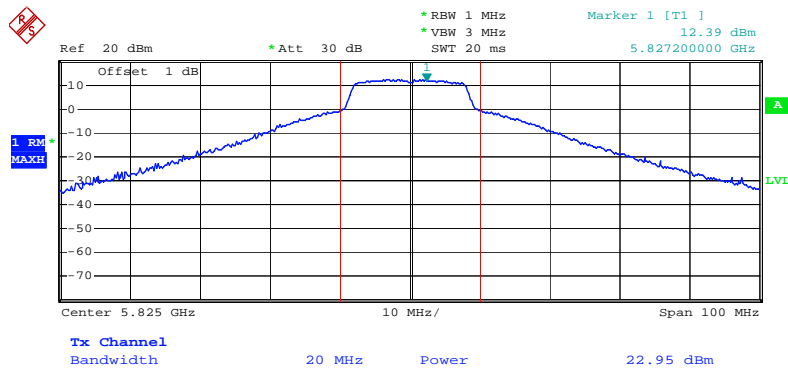
Date: 15.FEB.2008 08:03:23

Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-2 / 5785 MHz



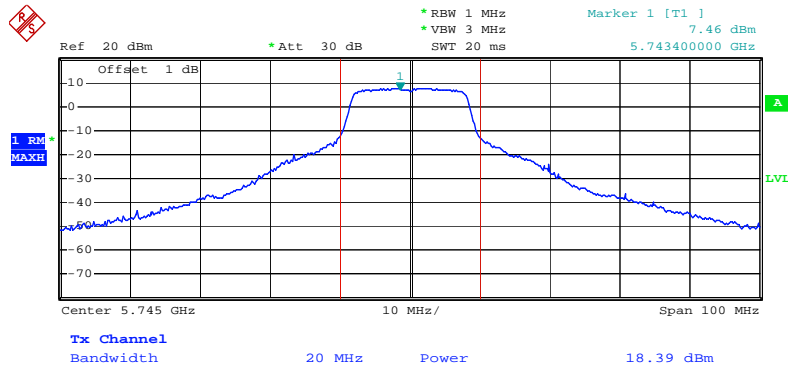
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Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-2 / 5825 MHz



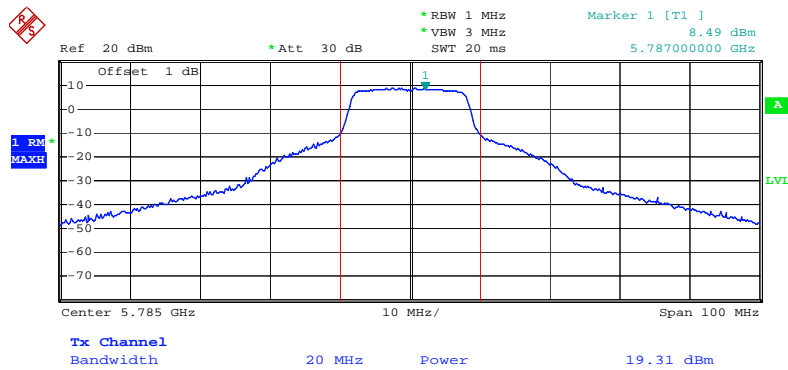
Date: 15.FEB.2008 08:00:21

Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-3 / 5745 MHz



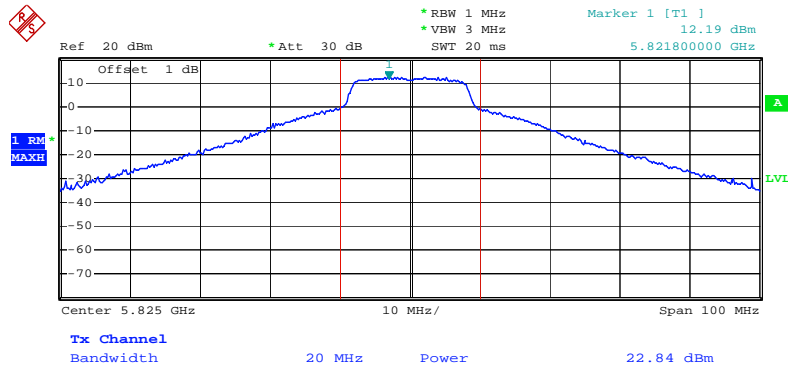
Date: 15.FEB.2008 08:03:42

Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-3 / 5785 MHz



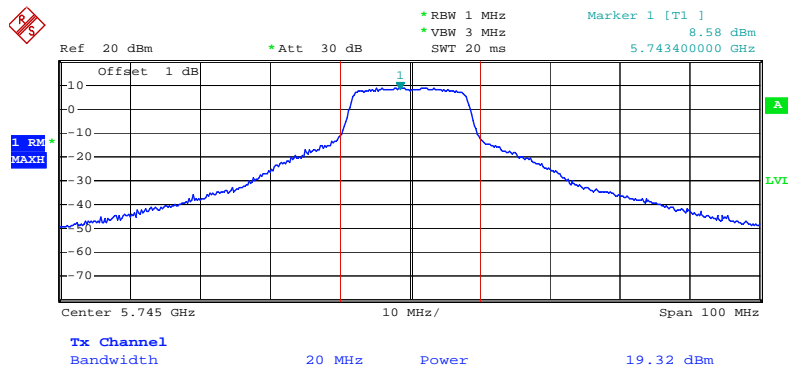
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Channel Output Power Plot on Configuration IEEE 802.11a Ant. B-3 / 5825 MHz



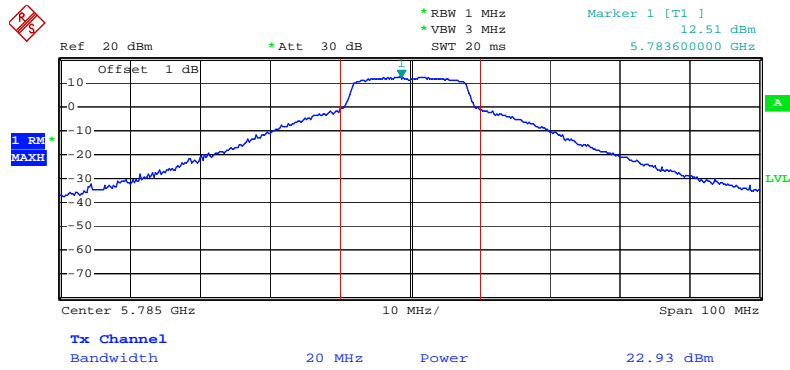
Date: 15.FEB.2008 08:00:44

Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-1 / 5745 MHz



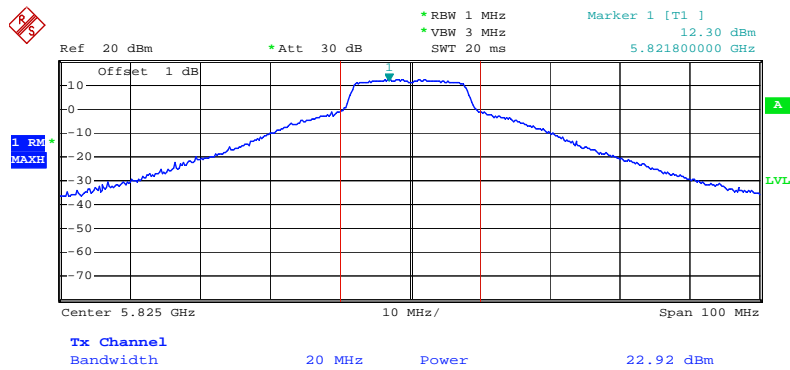
Date: 15.FEB.2008 09:49:07

Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-1 / 5785 MHz



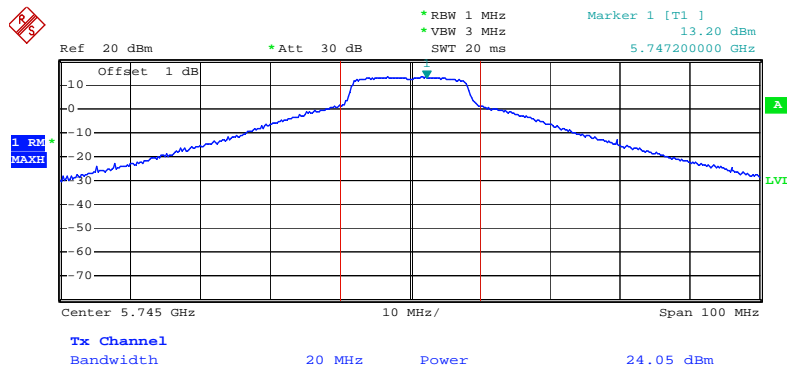
Date: 15.FEB.2008 09:50:58

Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-1 / 5825 MHz



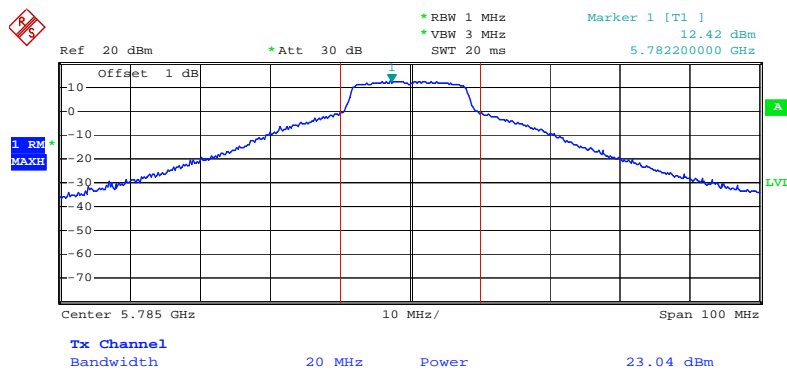
Date: 15.FEB.2008 09:51:30

Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-2 / 5745 MHz



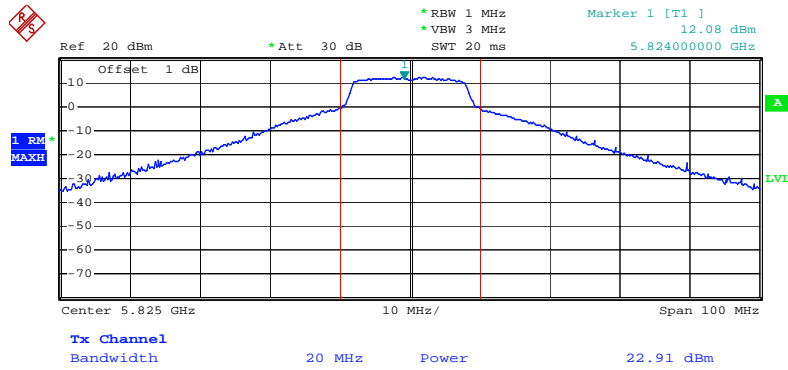
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Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-2 / 5785 MHz



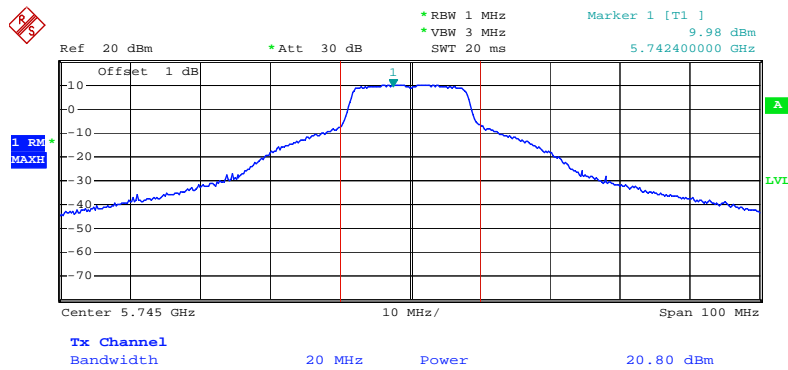
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Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-2 / 5825 MHz



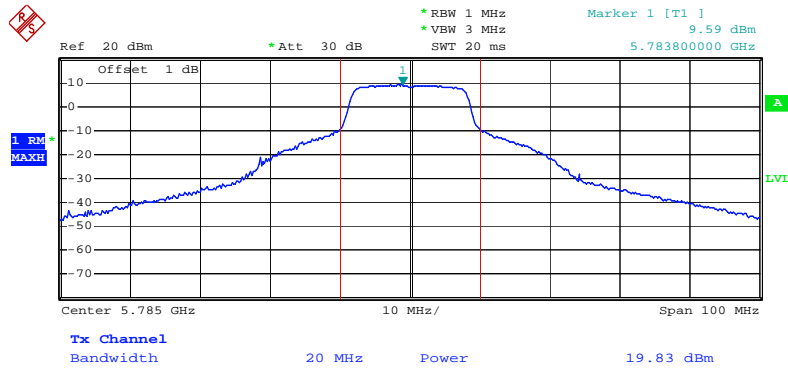
Date: 15.FEB.2008 09:51:49

Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-3 / 5745 MHz



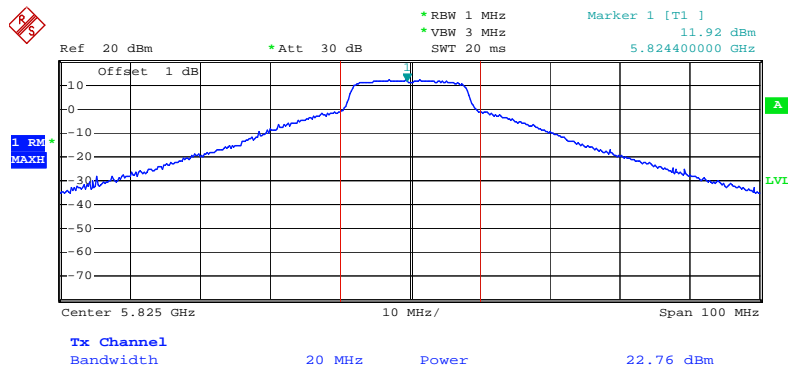
Date: 15.FEB.2008 09:50:05

Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-3 / 5785 MHz



Date: 15.FEB.2008 09:50:26

Channel Output Power Plot on Configuration IEEE 802.11a Ant. D-3 / 5825 MHz



Date: 15.FEB.2008 09:52:06

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 8dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

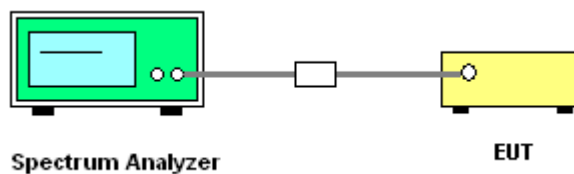
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	23°C	Humidity	61%
Test Engineer	Sam Lee	Configurations	802.11a/b/g

Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
1	2412 MHz	-0.47	8.00	Complies
6	2437 MHz	2.18	8.00	Complies
11	2462 MHz	-0.53	8.00	Complies

Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
1	2412 MHz	0.24	8.00	Complies
6	2437 MHz	2.10	8.00	Complies
11	2462 MHz	0.46	8.00	Complies

Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
1	2412 MHz	0.39	8.00	Complies
6	2437 MHz	3.36	8.00	Complies
11	2462 MHz	-6.27	8.00	Complies

Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
1	2412 MHz	1.60	8.00	Complies
6	2437 MHz	3.07	8.00	Complies
11	2462 MHz	0.16	8.00	Complies

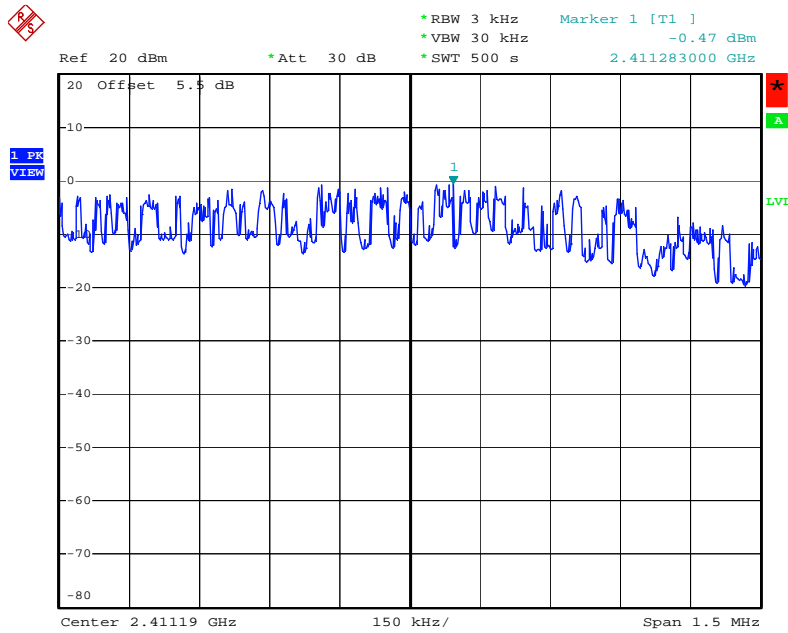
Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3

Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
149	5745 MHz	-9.23	8.00	Complies
157	5785 MHz	-7.78	8.00	Complies
165	5825 MHz	-3.24	8.00	Complies

Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3

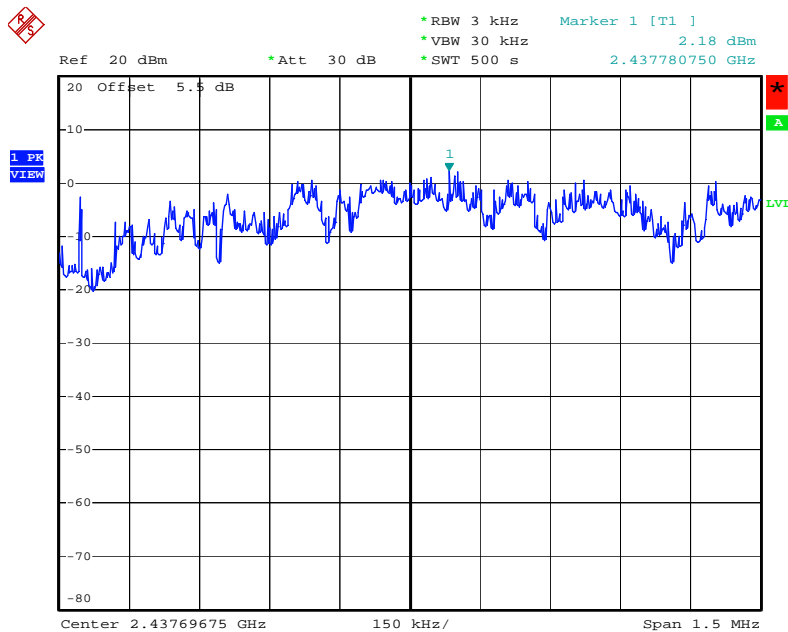
Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm)	Result
149	5745 MHz	-4.49	8.00	Complies
157	5785 MHz	-2.85	8.00	Complies
165	5825 MHz	-2.59	8.00	Complies

Power Density Plot on Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3 / 2412 MHz



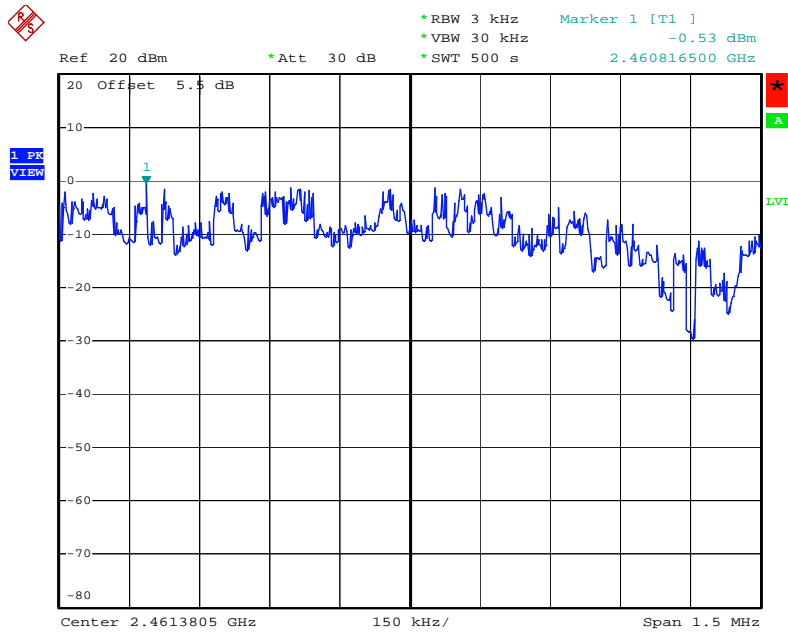
Date: 14.FEB.2008 06:36:29

Power Density Plot on Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3 / 2437 MHz



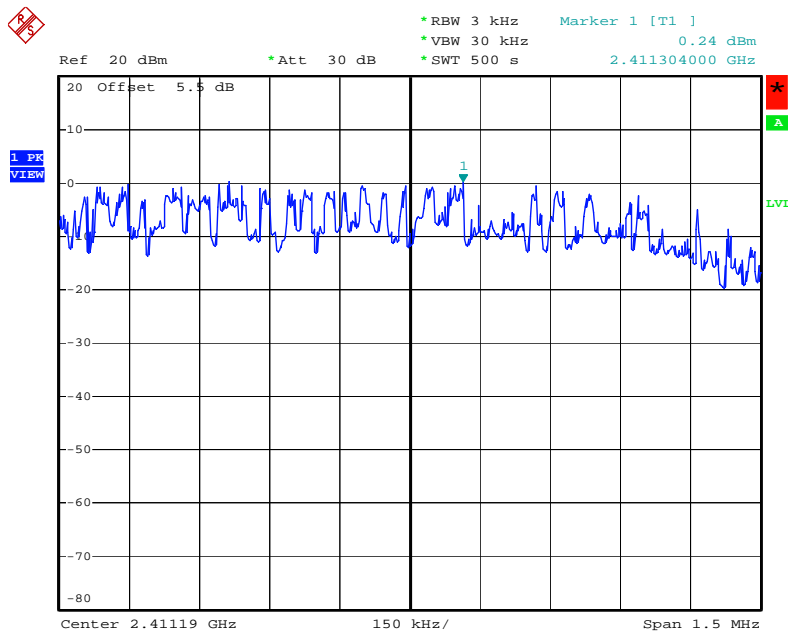
Date: 14.FEB.2008 06:37:34

Power Density Plot on Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3 / 2462 MHz



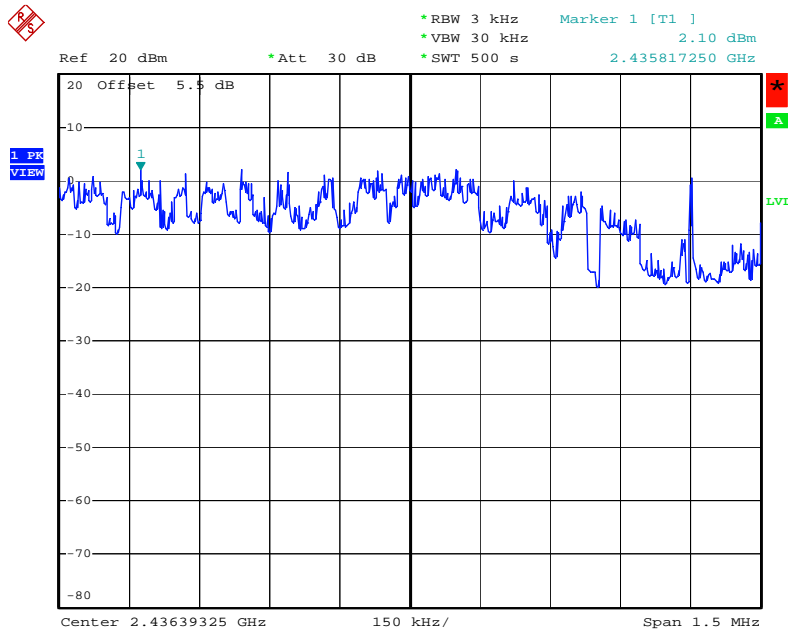
Date: 14.FEB.2008 06:38:43

Power Density Plot on Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3 / 2412 MHz



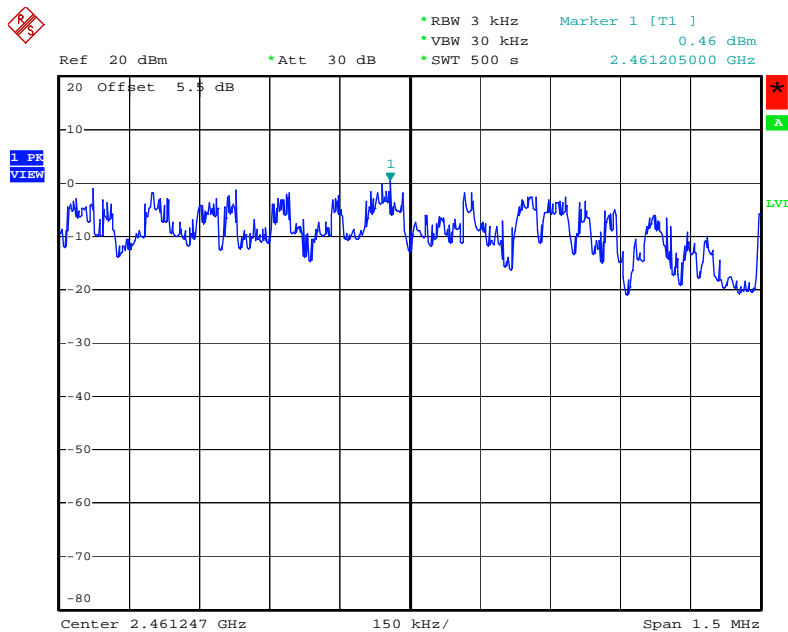
Date: 14.FEB.2008 07:24:18

Power Density Plot on Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3 / 2437 MHz



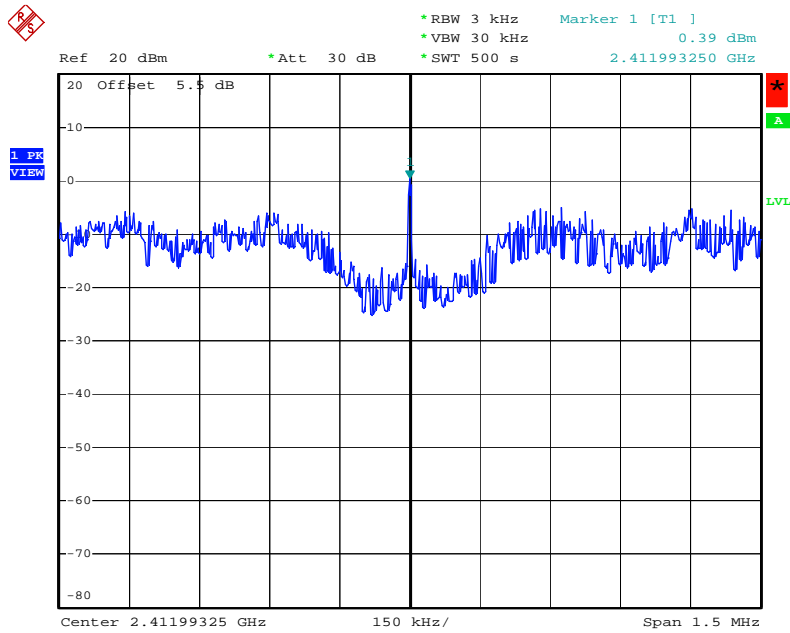
Date: 14.FEB.2008 07:25:21

Power Density Plot on Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3 / 2462 MHz



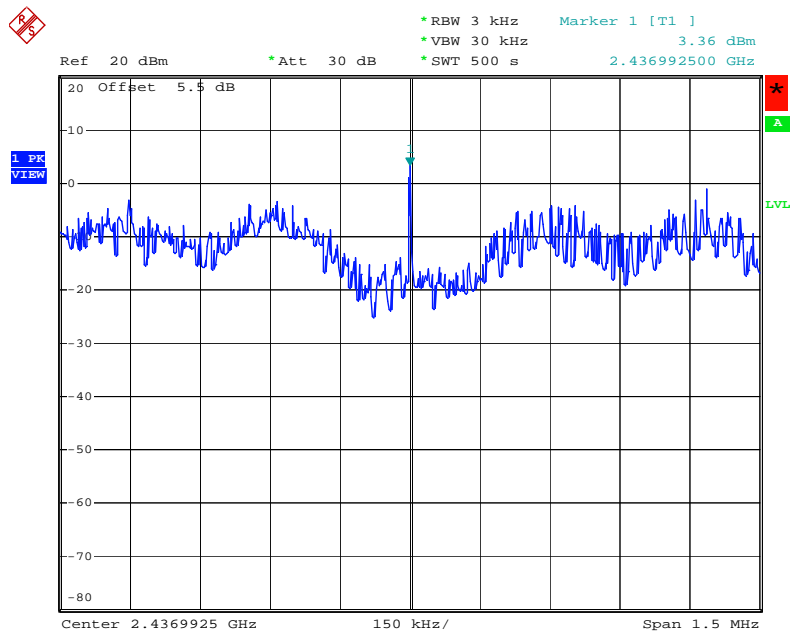
Date: 14.FEB.2008 07:26:05

Power Density Plot on Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3 / 2412 MHz



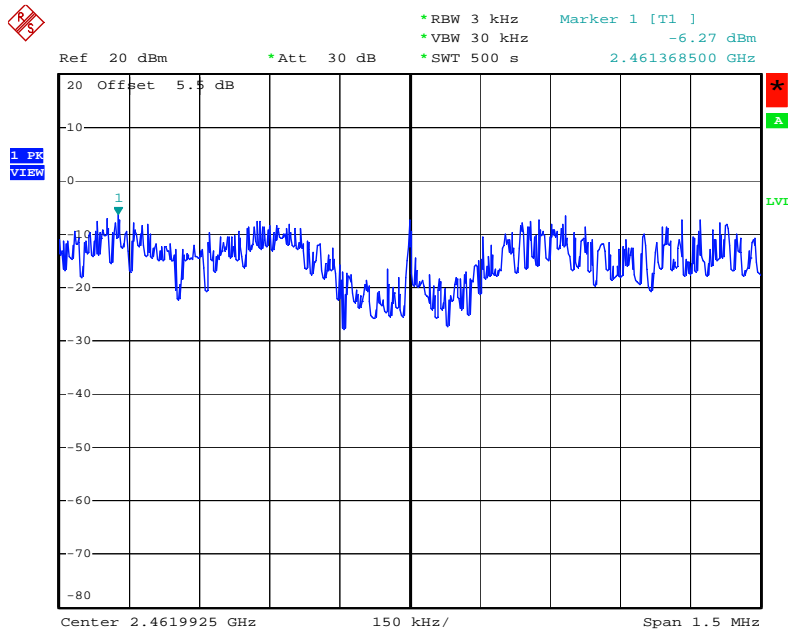
Date: 14.FEB.2008 06:42:19

Power Density Plot on Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3 / 2437 MHz



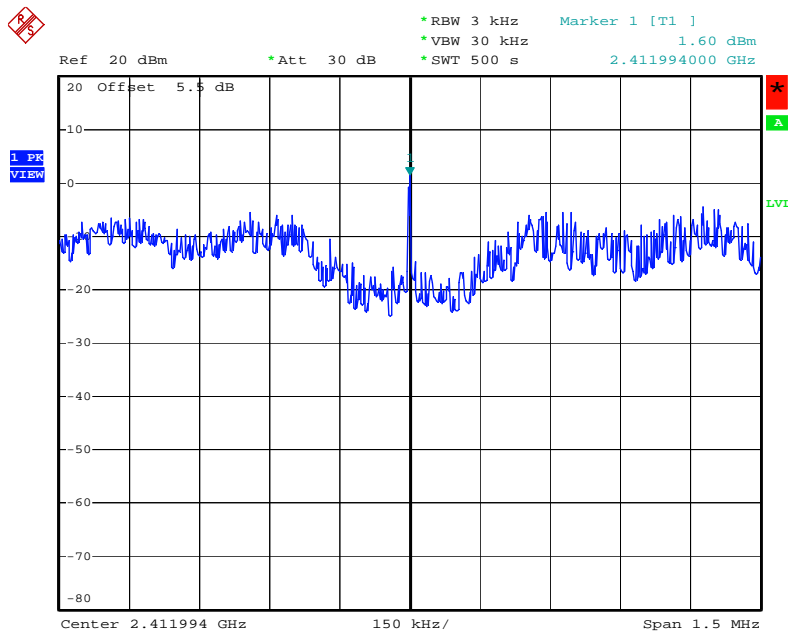
Date: 15.FEB.2008 04:03:54

Power Density Plot on Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3 / 2462 MHz



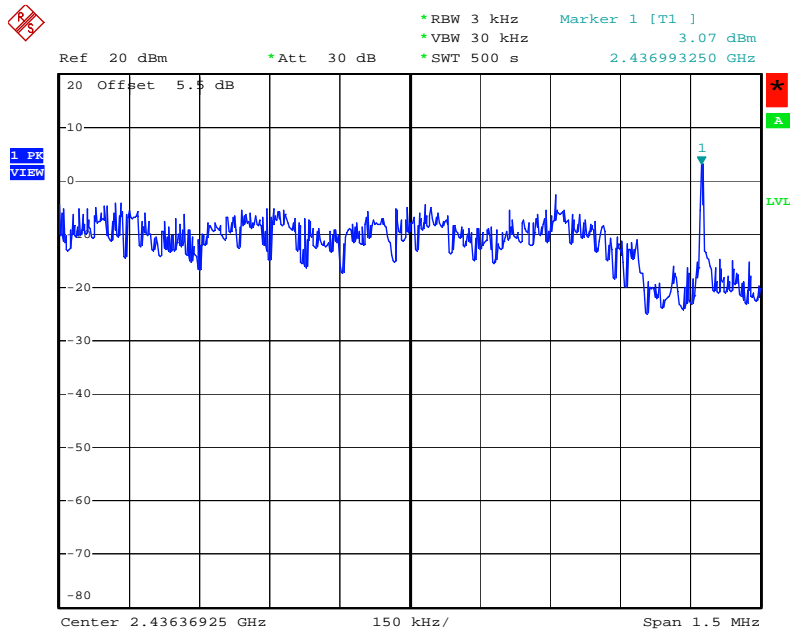
Date: 14.FEB.2008 06:40:03

Power Density Plot on Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3 / 2412 MHz



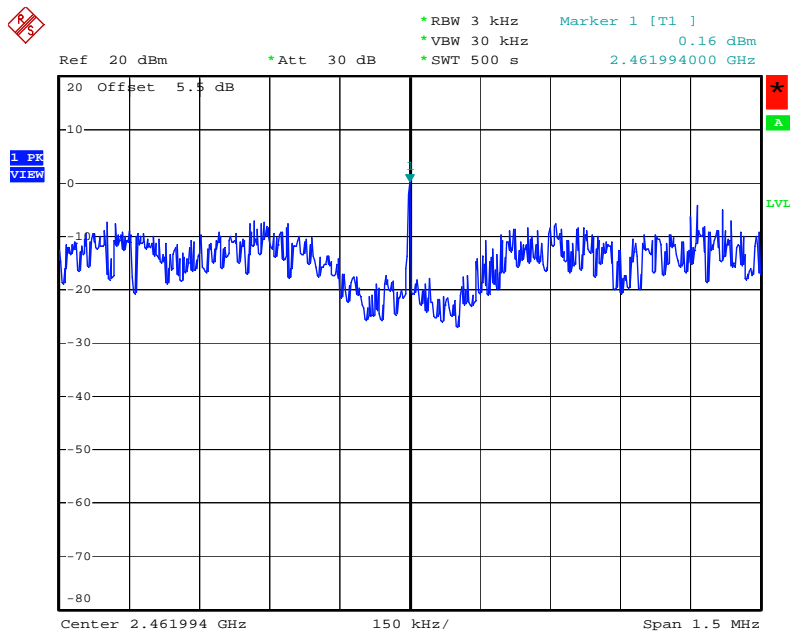
Date: 14.FEB.2008 07:28:59

Power Density Plot on Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3 / 2437 MHz



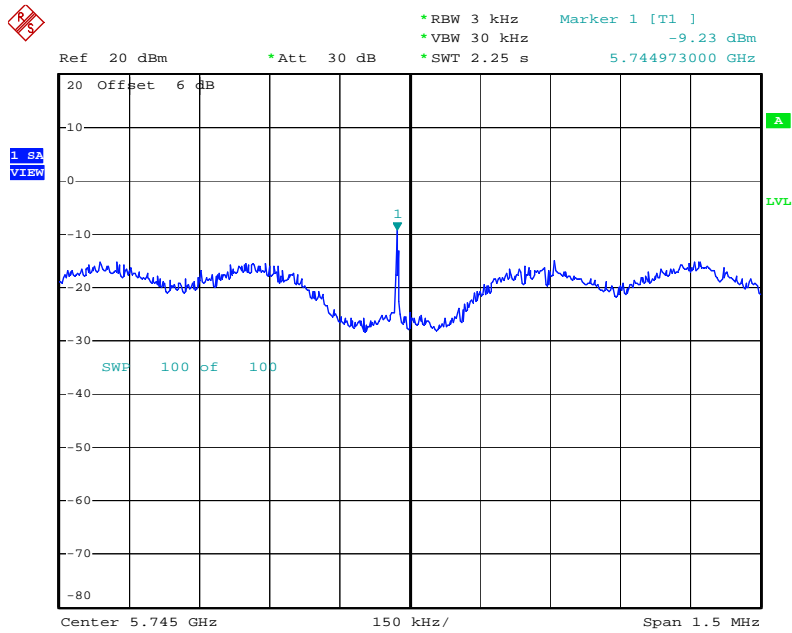
Date: 14.FEB.2008 07:28:01

Power Density Plot on Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3 / 2462 MHz



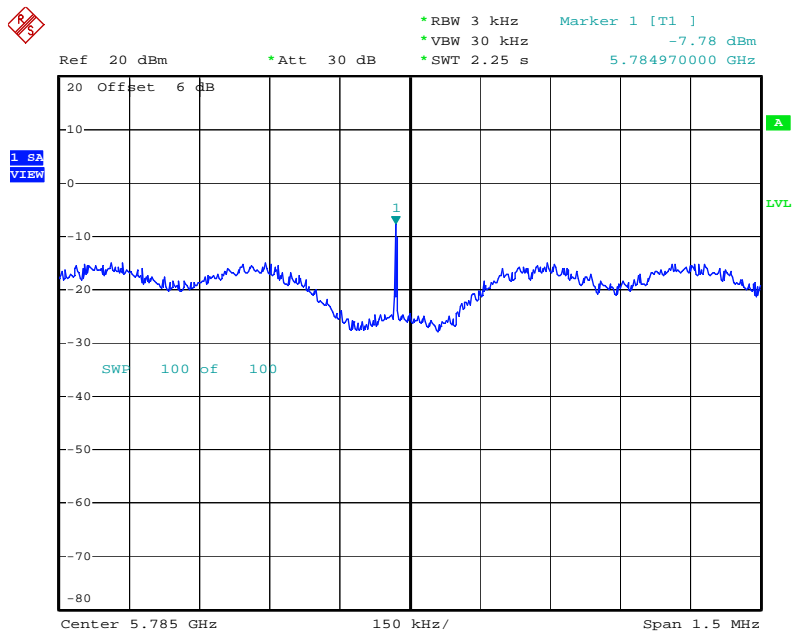
Date: 14.FEB.2008 07:27:08

Power Density Plot on Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3 / 5745 MHz



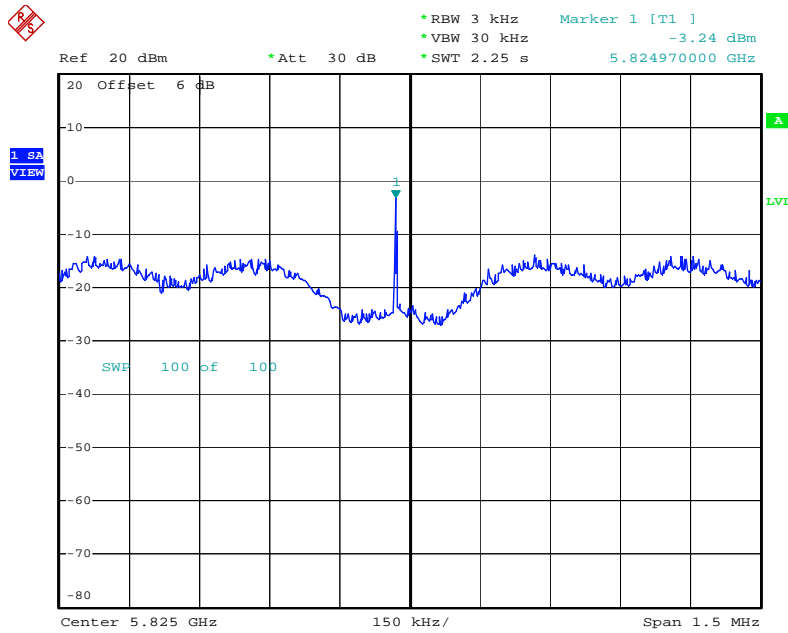
Date: 15.FEB.2008 08:39:43

Power Density Plot on Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3 / 5785 MHz



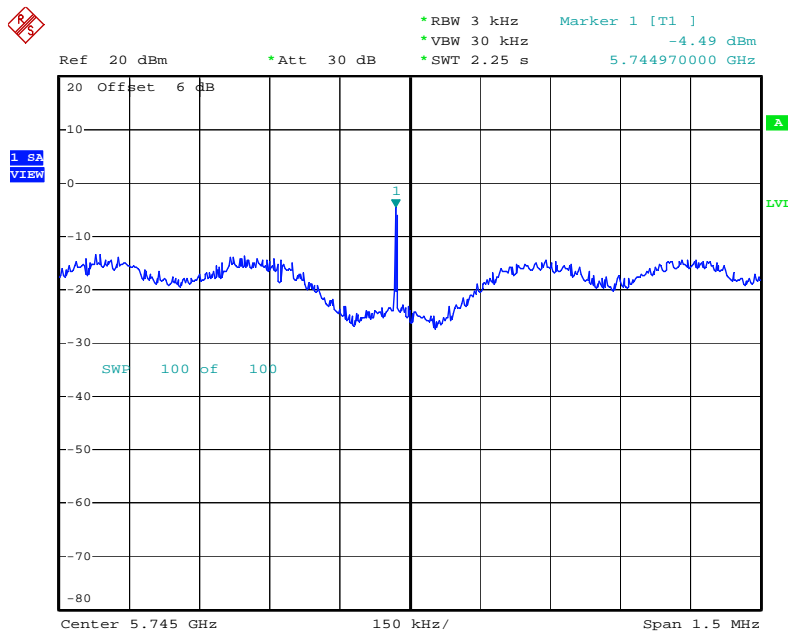
Date: 15.FEB.2008 08:44:33

Power Density Plot on Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3 / 5825 MHz



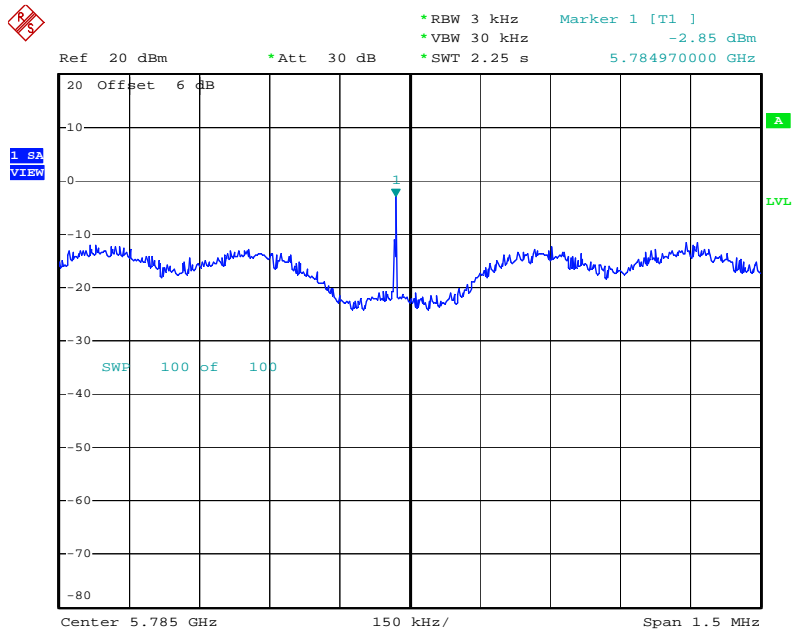
Date: 15.FEB.2008 08:49:01

Power Density Plot on Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3 / 5745 MHz



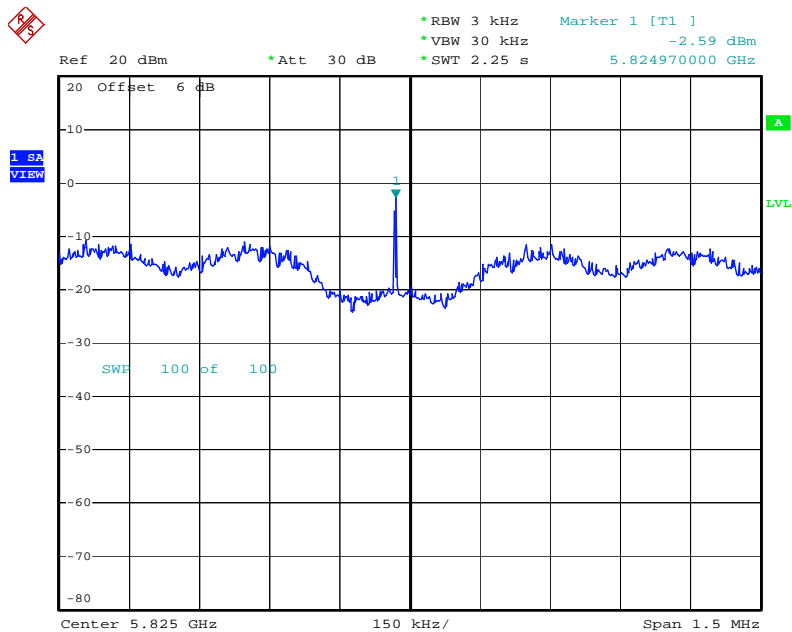
Date: 15.FEB.2008 11:17:09

Power Density Plot on Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3 / 5785 MHz



Date: 15.FEB.2008 11:11:58

Power Density Plot on Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3 / 5825 MHz



Date: 15.FEB.2008 11:07:22

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

4.4.2. Measuring Instruments and Setting

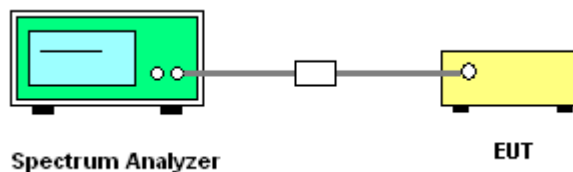
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. Measuring multiple antennas, the connector is required to link with spectrum analyser 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	23°C	Humidity	61%
Test Engineer	Sam Lee	Configurations	802.11a/b/g

Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.12	15.12	500	Complies
6	2437 MHz	12.04	15.20	500	Complies
11	2462 MHz	10.04	15.24	500	Complies

Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.12	15.16	500	Complies
6	2437 MHz	10.08	15.16	500	Complies
11	2462 MHz	10.04	15.20	500	Complies

Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.36	16.48	500	Complies
6	2437 MHz	16.36	16.44	500	Complies
11	2462 MHz	16.08	16.44	500	Complies

Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.40	16.48	500	Complies
6	2437 MHz	16.40	16.44	500	Complies
11	2462 MHz	16.36	16.44	500	Complies

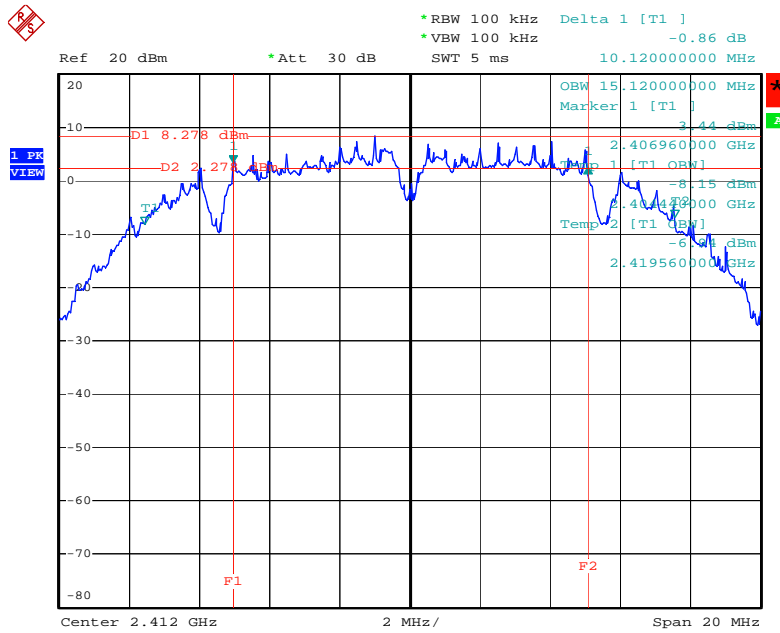
Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	16.32	16.40	500	Complies
157	5785 MHz	15.08	16.40	500	Complies
165	5825 MHz	16.32	16.44	500	Complies

Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3

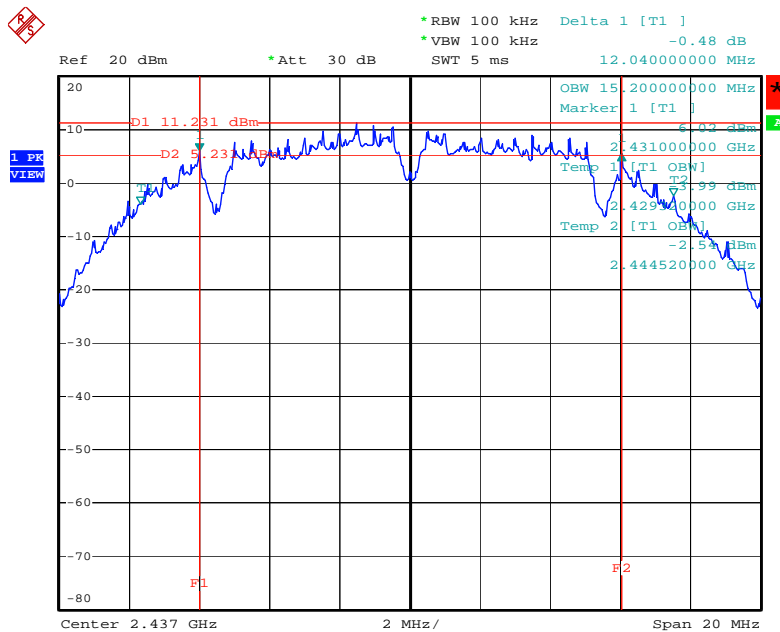
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	15.12	16.40	500	Complies
157	5785 MHz	16.32	16.72	500	Complies
165	5825 MHz	16.04	17.76	500	Complies

6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3 / 2412 MHz



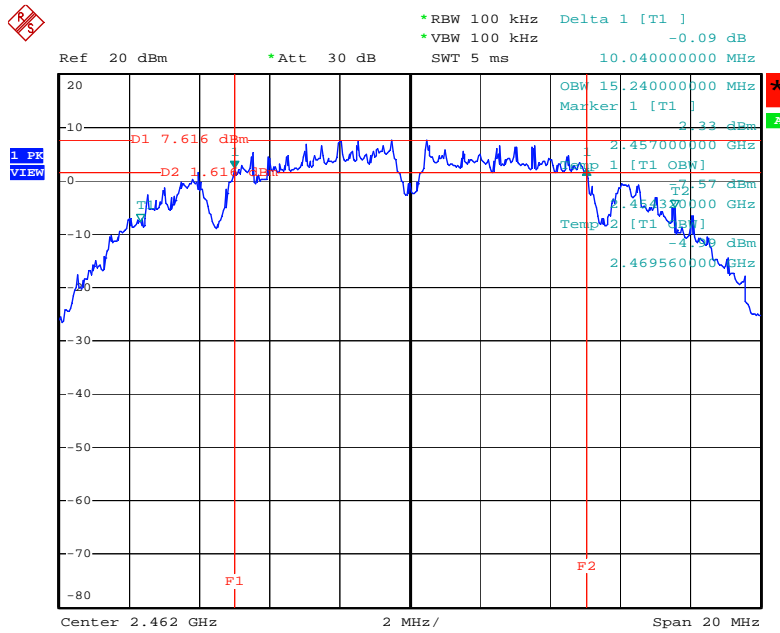
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6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3 / 2437 MHz



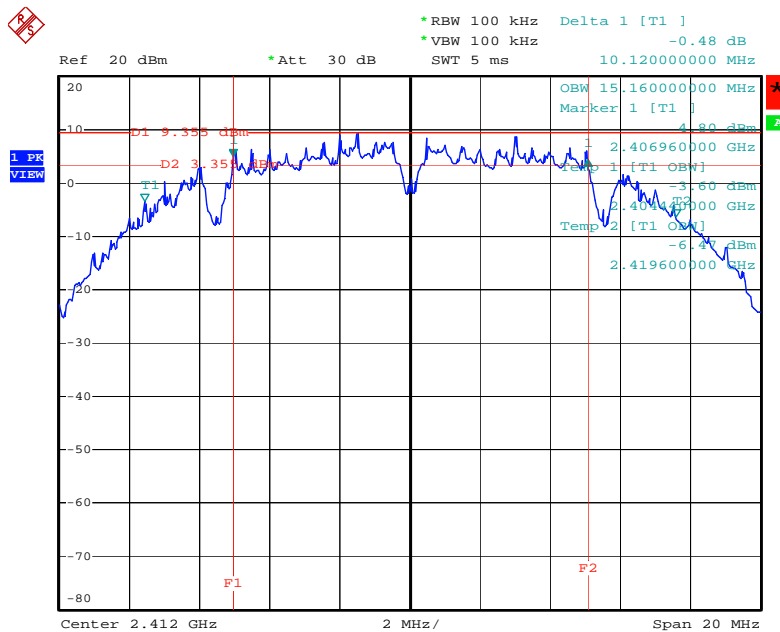
Date: 14.FEB.2008 06:37:18

6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. A-1 + Ant. A-2 + Ant. A-3 / 2462 MHz



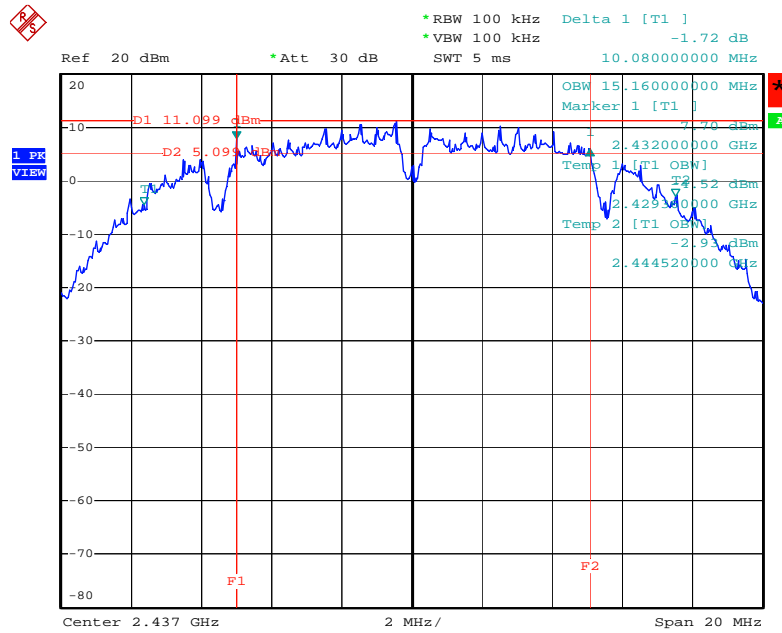
Date: 14.FEB.2008 06:38:27

6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3 / 2412 MHz



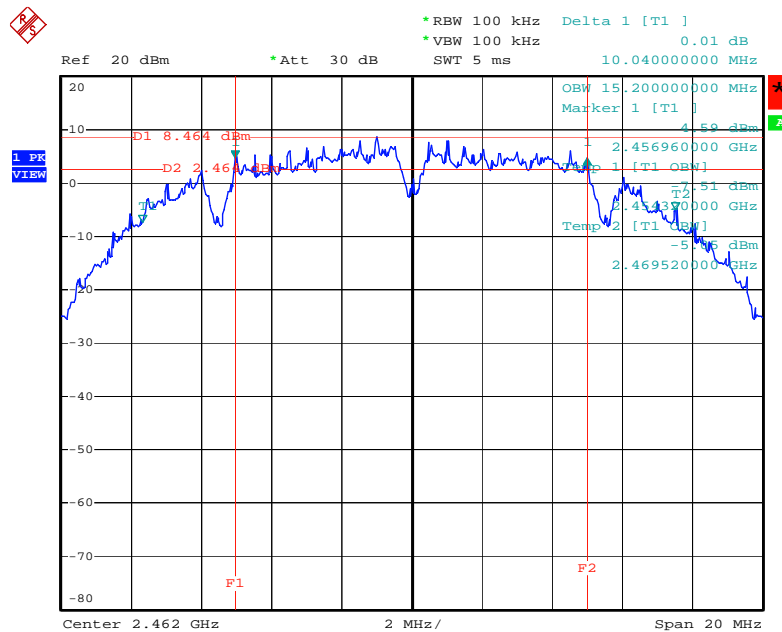
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6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3 / 2437 MHz



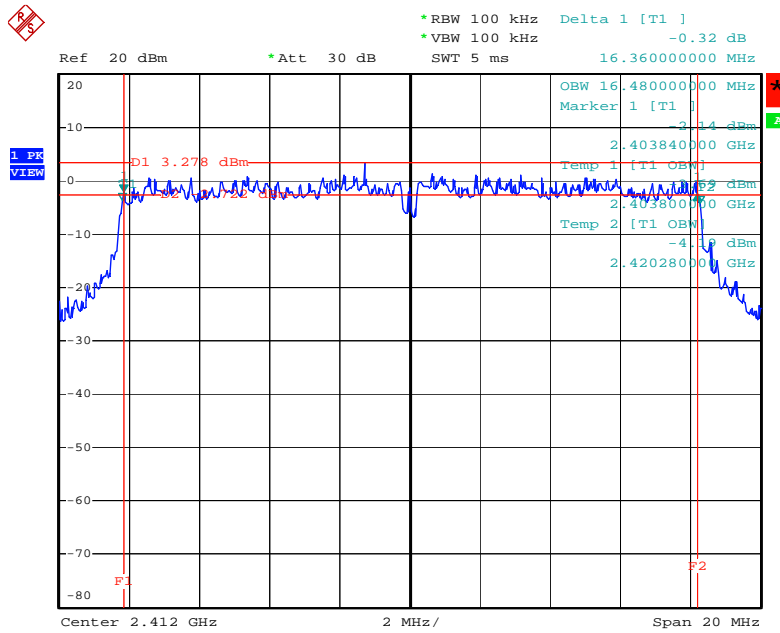
Date: 14.FEB.2008 07:25:04

6 dB Bandwidth Plot on Configuration IEEE 802.11b Ant. D-1 + Ant. D-2 + Ant. D-3 / 2462 MHz



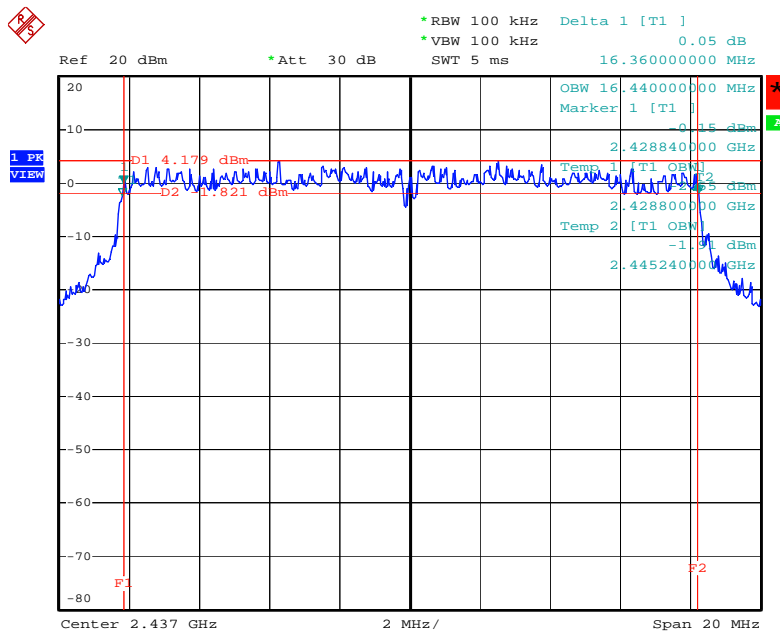
Date: 14.FEB.2008 07:25:49

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3 / 2412 MHz



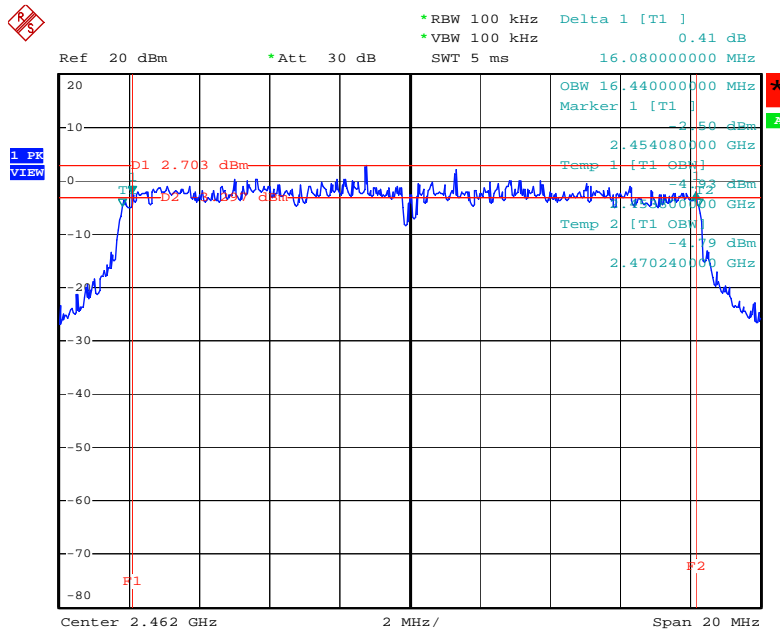
Date: 14.FEB.2008 06:41:53

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3 / 2437 MHz



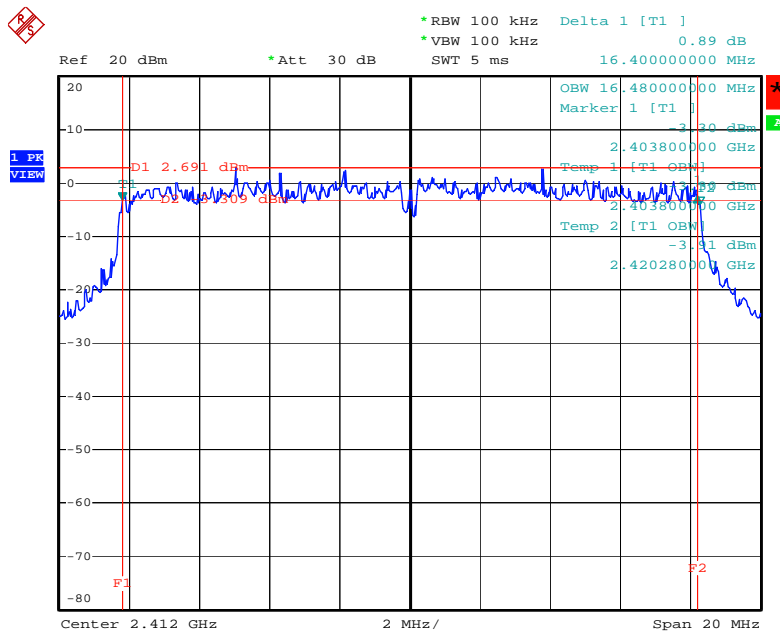
Date: 14.FEB.2008 06:40:49

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. A-1 + Ant. A-2 + Ant. A-3 / 2462 MHz



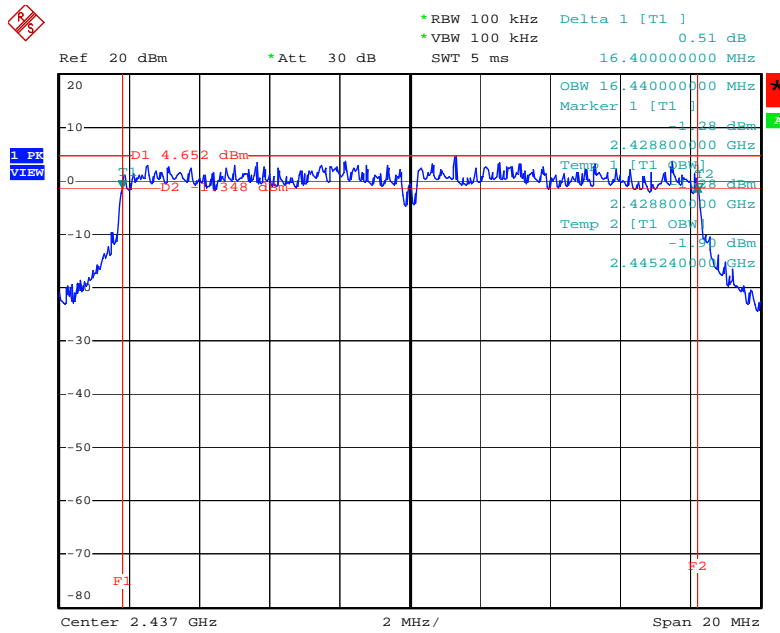
Date: 14.FEB.2008 06:39:48

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3 / 2412 MHz



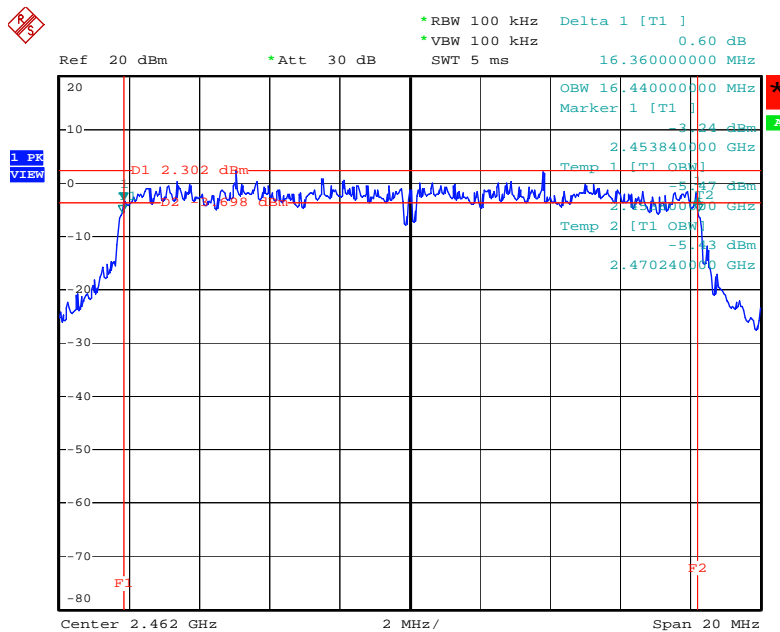
Date: 14.FEB.2008 07:28:33

6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3 / 2437 MHz



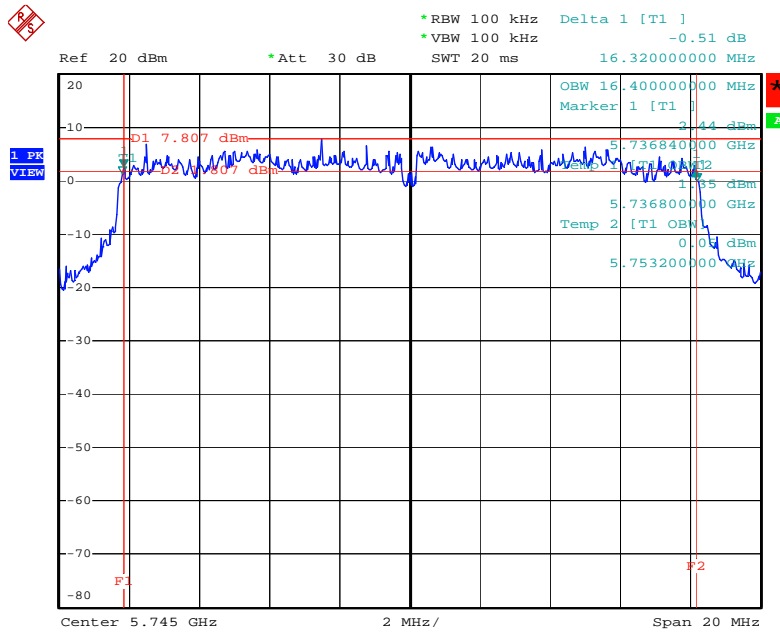
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6 dB Bandwidth Plot on Configuration IEEE 802.11g Ant. D-1 + Ant. D-2 + Ant. D-3 / 2462 MHz



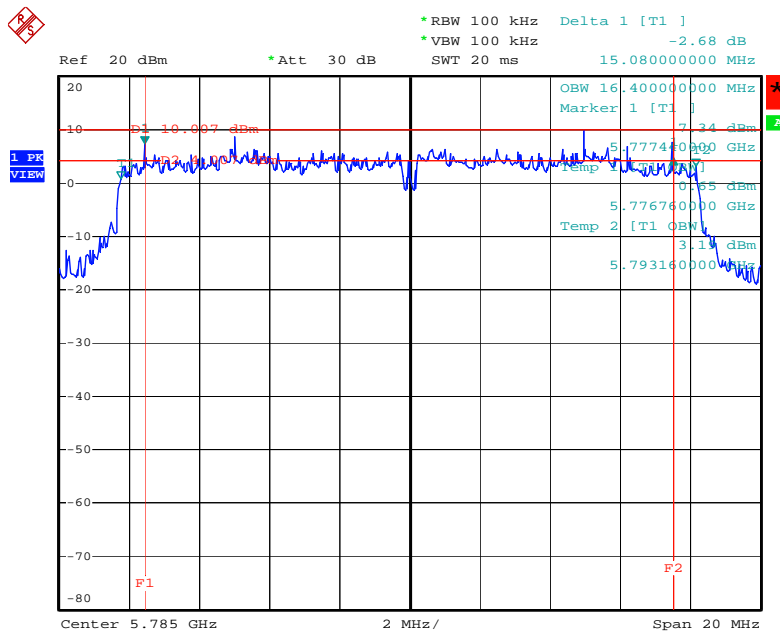
Date: 14.FEB.2008 07:26:53

6 dB Bandwidth Plot on Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3 / 5745 MHz



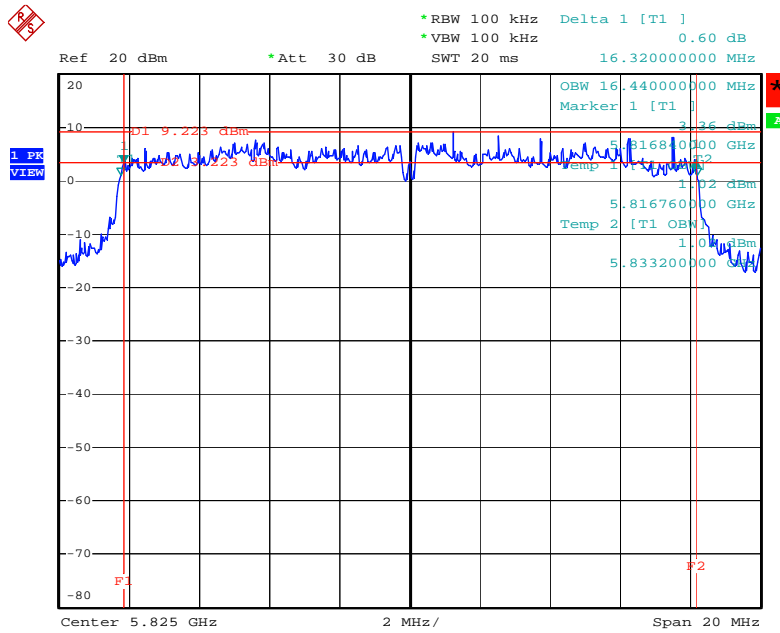
Date: 15.FEB.2008 08:35:53

6 dB Bandwidth Plot on Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3 / 5785 MHz



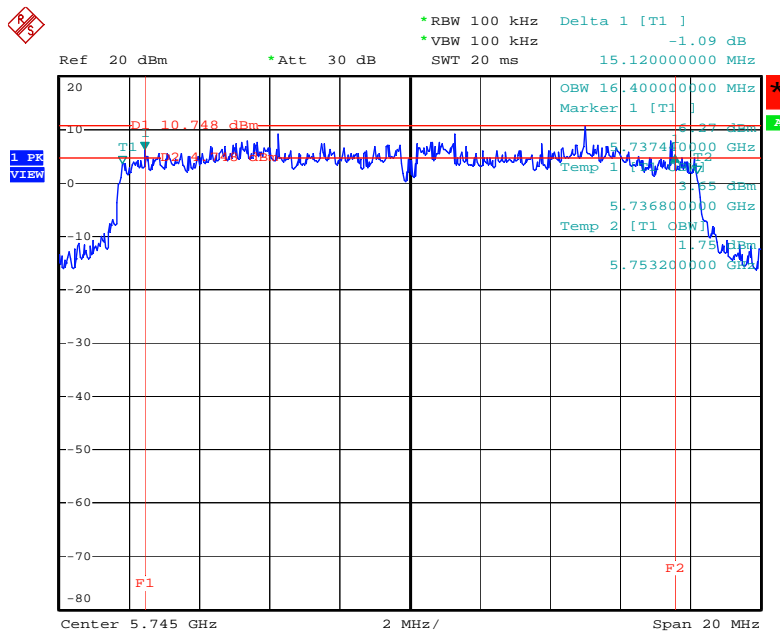
Date: 15.FEB.2008 08:40:43

6 dB Bandwidth Plot on Configuration IEEE 802.11a Ant. B-1 + Ant. B-2 + Ant. B-3 / 5825 MHz



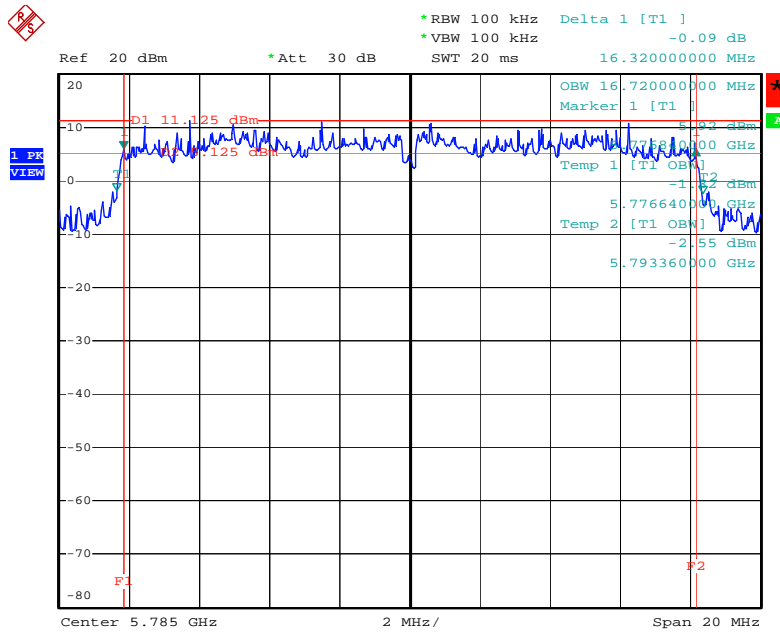
Date: 15.FEB.2008 08:45:11

6 dB Bandwidth Plot on Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3 / 5745 MHz



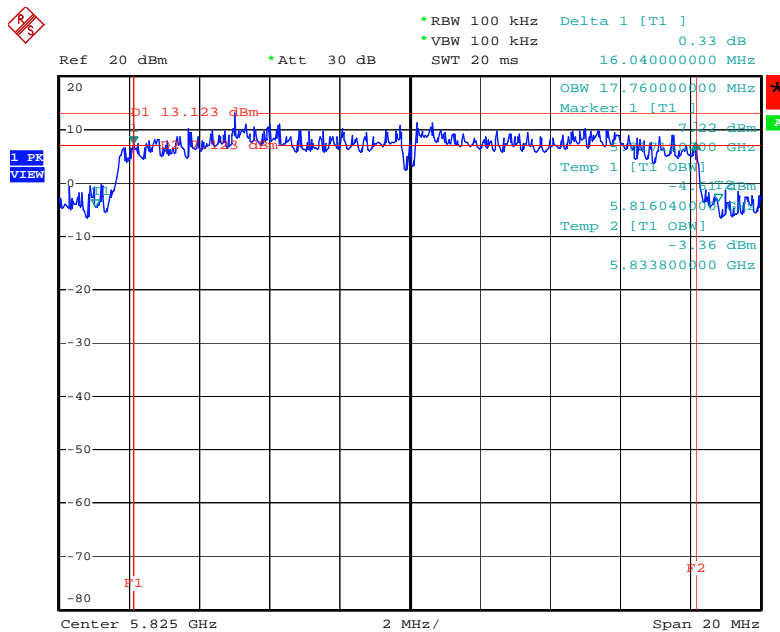
Date: 15.FEB.2008 11:13:18

6 dB Bandwidth Plot on Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3 / 5785 MHz



Date: 15.FEB.2008 11:08:09

6 dB Bandwidth Plot on Configuration IEEE 802.11a Ant. D-1 + Ant. D-2 + Ant. D-3 / 5825 MHz



Date: 15.FEB.2008 11:03:32

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)	100KHz / 100KHz for peak

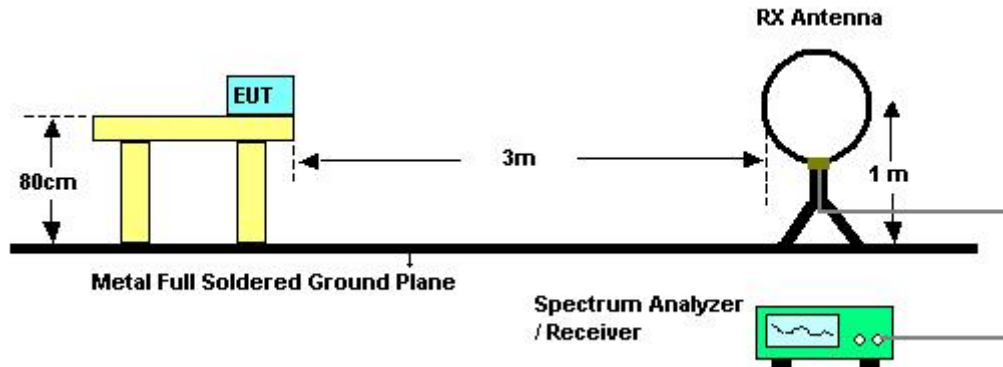
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.5.3. Test Procedures

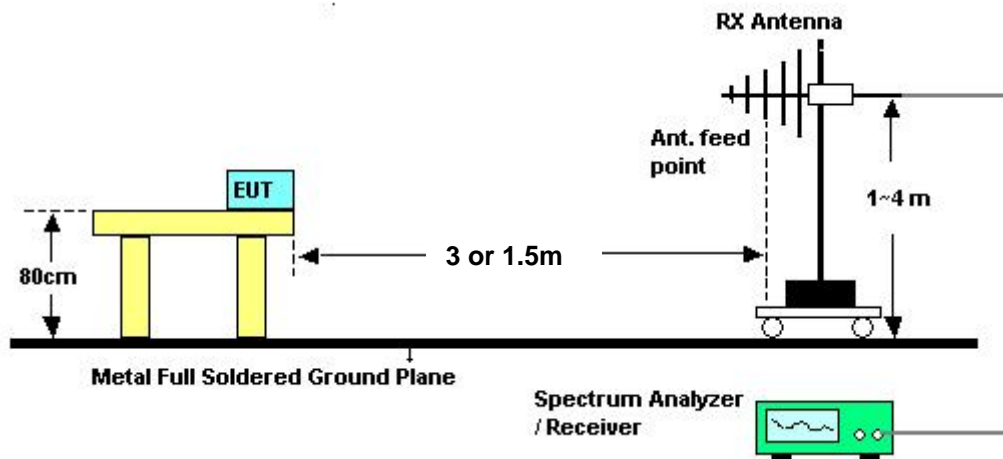
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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°C	Humidity	56%
Test Engineer	Roy Huang		

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

Note:

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

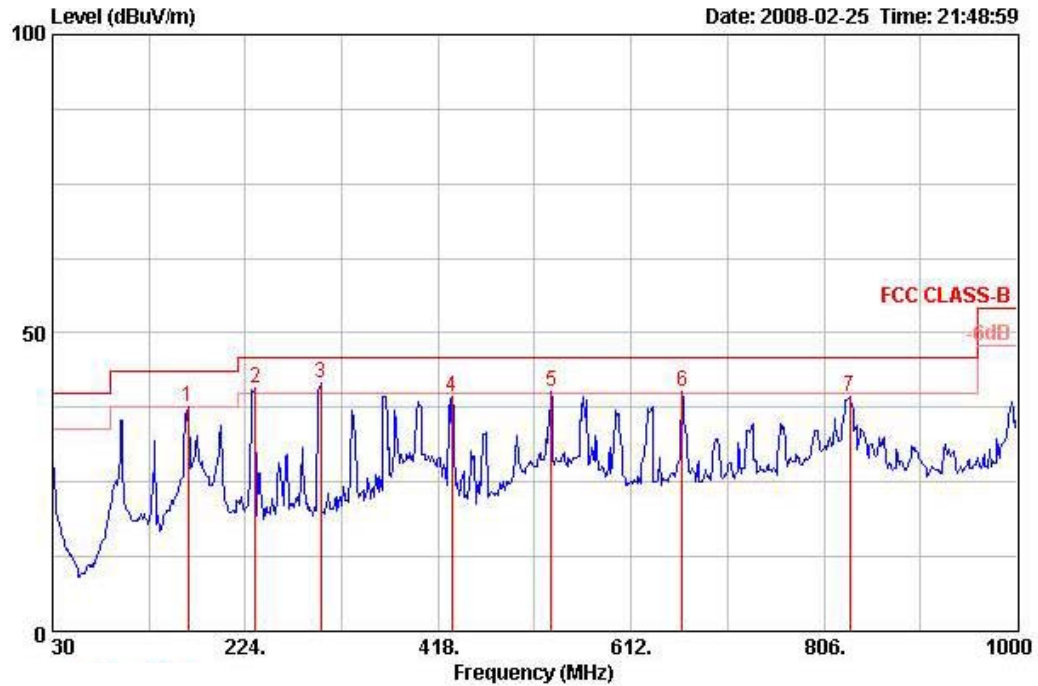
Distance extrapolation factor = $40 \log(\text{specific distance} / \text{test distance})$ (dB);

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

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

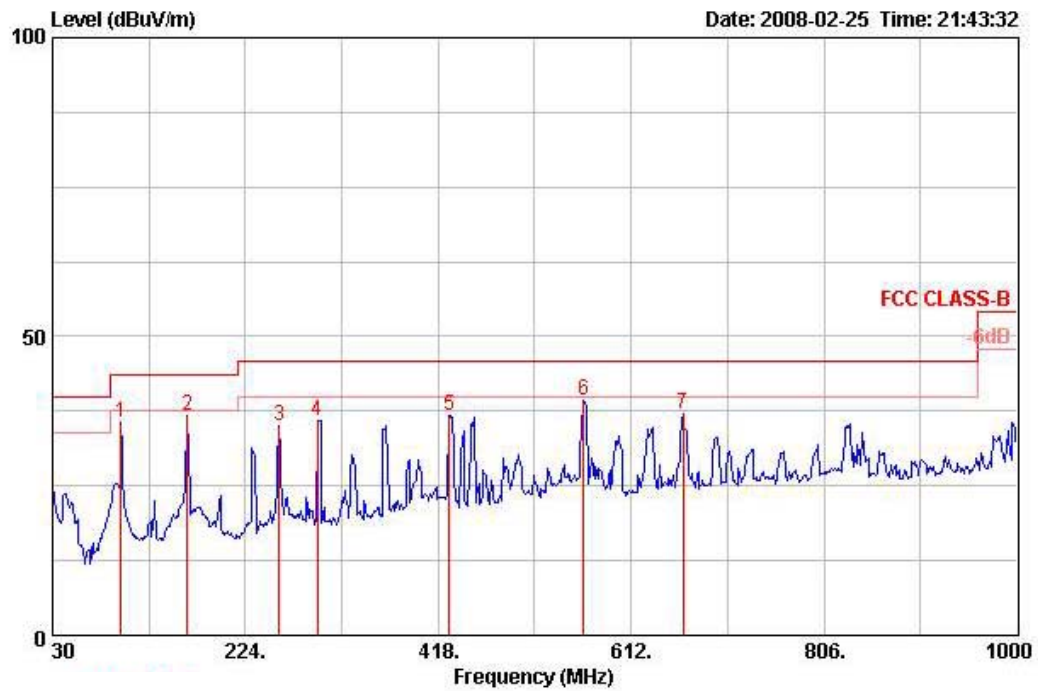
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	Ant. A

Horizontal



	Freq	Level	Over	Limit	Read	Antenna	Preamp	Cable	Table	Ant
	MHz	dBuV/m	Limit	Line	Level	Factor	Factor	Loss	Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB	dB	deg	cm
1 @	166.770	37.61	-5.89	43.50	54.55	8.79	27.27	1.53	0	100
2 @	233.700	40.69	-5.31	46.00	55.85	10.04	27.03	1.83	0	100
3 @	299.660	41.55	-4.45	46.00	53.45	12.90	26.90	2.10	152	255
4 @	431.580	39.35	-6.65	46.00	48.24	16.38	27.76	2.49	0	100
5 @	531.490	40.13	-5.87	46.00	47.60	17.87	28.10	2.76	0	100
6 @	663.410	40.06	-5.94	46.00	45.75	18.90	28.04	3.45	0	100
7 @	832.190	39.45	-6.55	46.00	43.02	20.60	27.54	3.36	0	100

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	98.870	35.66	-7.84	43.50	51.98	10.10	27.61	1.18	Peak	0	400	VERTICAL
2	165.800	36.84	-6.66	43.50	53.76	8.82	27.27	1.53	Peak	0	400	VERTICAL
3	257.950	34.94	-11.06	46.00	47.51	12.48	26.98	1.93	Peak	0	400	VERTICAL
4	296.750	35.89	-10.11	46.00	47.87	12.84	26.91	2.09	Peak	0	400	VERTICAL
5	428.670	36.88	-9.12	46.00	45.73	16.42	27.75	2.47	Peak	0	400	VERTICAL
6	564.470	39.30	-6.70	46.00	45.97	18.60	28.10	2.83	Peak	0	400	VERTICAL
7	664.380	36.90	-9.10	46.00	42.61	18.89	28.04	3.44	Peak	0	400	VERTICAL

Note:

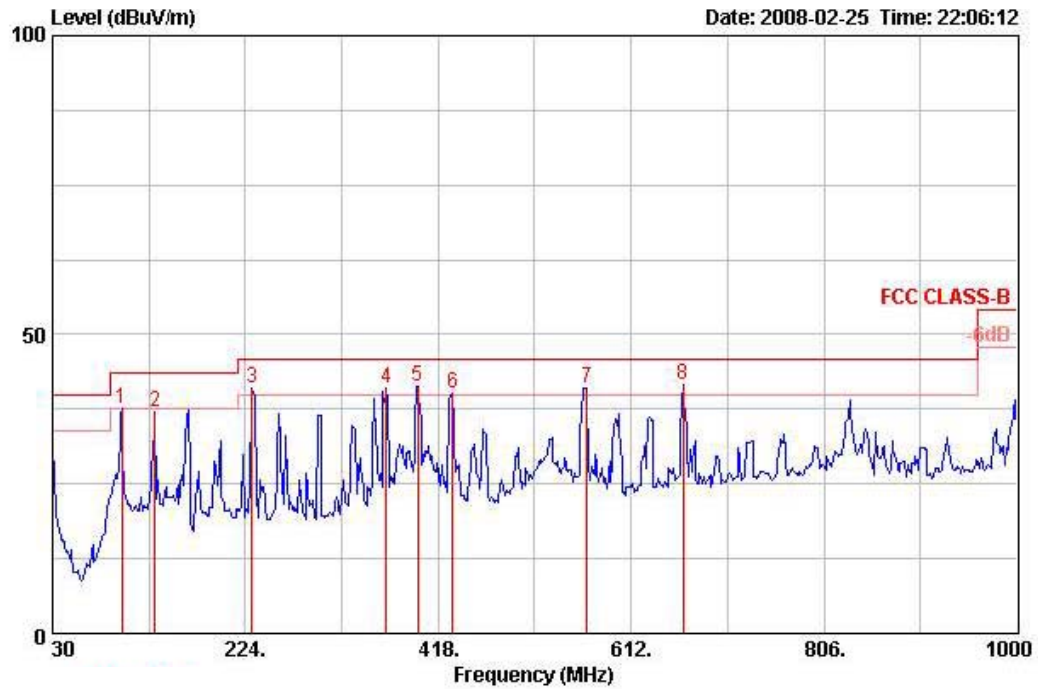
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

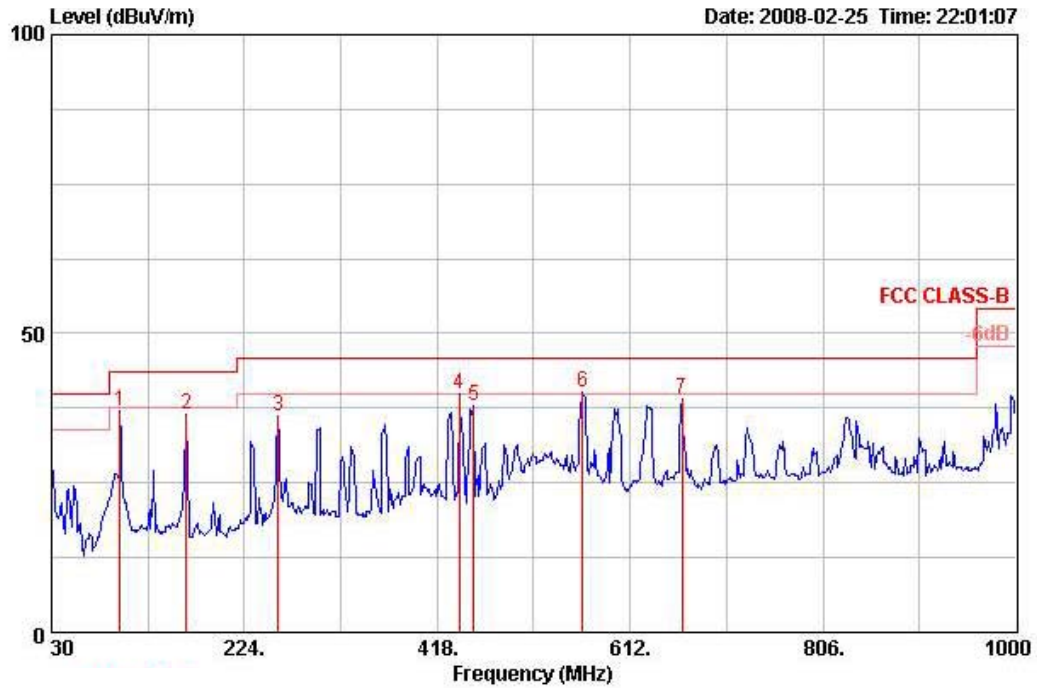
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	Ant. D

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	99.840	37.65	-5.85	43.50	53.80	10.25	27.60	1.20	Peak	0	100	HORIZONTAL
2	132.820	37.17	-6.33	43.50	51.91	11.37	27.43	1.33	Peak	0	100	HORIZONTAL
3	230.790	40.93	-5.07	46.00	56.43	9.71	27.04	1.82	Peak	0	100	HORIZONTAL
4	365.620	41.04	-4.96	46.00	51.59	14.58	27.36	2.23	Peak	0	100	HORIZONTAL
5	397.630	41.28	-4.72	46.00	50.78	15.79	27.58	2.30	Peak	0	100	HORIZONTAL
6	432.550	40.05	-5.95	46.00	48.94	16.37	27.76	2.50	Peak	0	100	HORIZONTAL
7	567.380	41.16	-4.84	46.00	47.80	18.62	28.10	2.83	Peak	0	100	HORIZONTAL
8	664.380	41.69	-4.31	46.00	47.39	18.89	28.04	3.44	Peak	339	158	HORIZONTAL

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	98.870	37.05	-6.45	43.50	53.37	10.10	27.61	1.18	Peak	0	400	VERTICAL
2	165.800	36.55	-6.95	43.50	53.47	8.82	27.27	1.53	Peak	0	400	VERTICAL
3	257.950	36.23	-9.77	46.00	48.80	12.48	26.98	1.93	Peak	0	400	VERTICAL
4	440.310	40.03	-5.97	46.00	48.99	16.30	27.80	2.54	Peak	0	400	VERTICAL
5	454.860	37.80	-8.20	46.00	46.76	16.30	27.87	2.61	Peak	0	400	VERTICAL
6	564.470	40.05	-5.95	46.00	46.73	18.60	28.10	2.83	Peak	0	400	VERTICAL
7	664.380	39.00	-7.00	46.00	44.71	18.89	28.04	3.44	Peak	0	400	VERTICAL

Note:

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

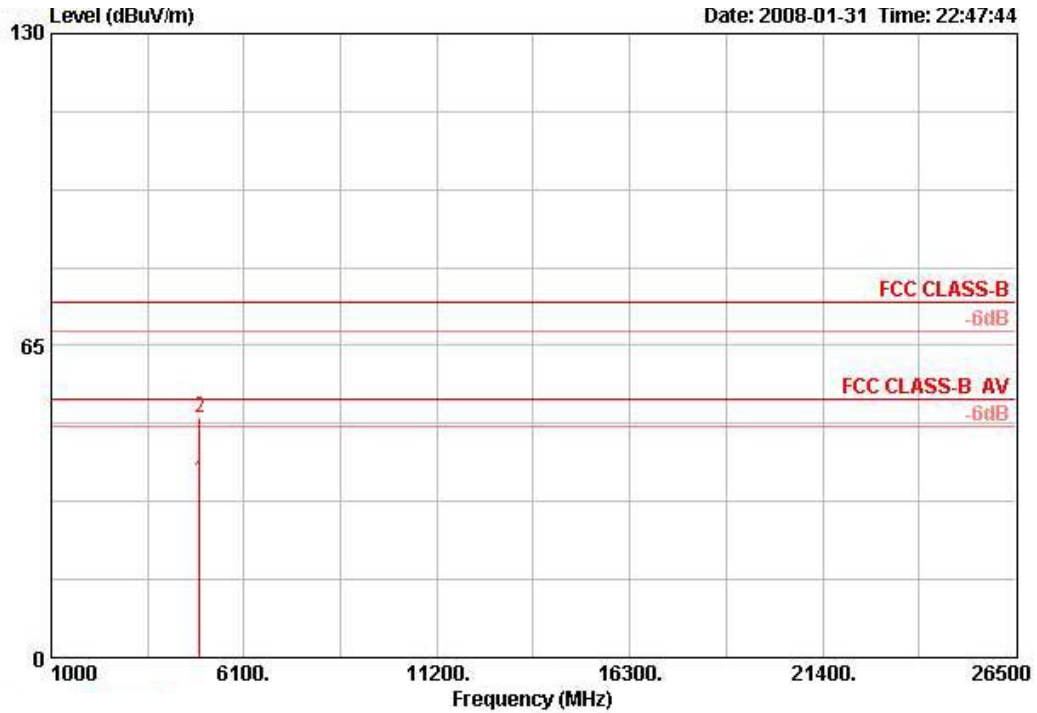
Emission level (dBUV/m) = 20 log Emission level (uV/m).

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

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

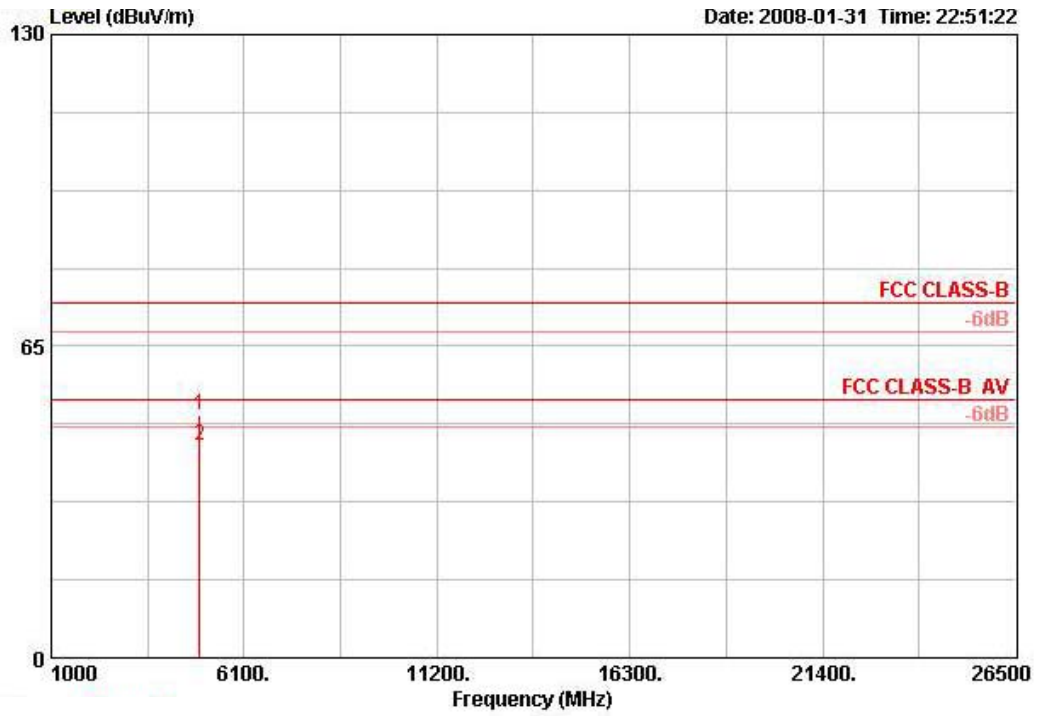
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	802.11b CH 1 / Ant. A

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4923.920	36.97	-17.03	54.00	30.62	33.58	8.01	35.24	AVERAGE	100	314	HORIZONTAL
2 @	4925.520	49.81	-24.19	74.00	43.47	33.58	8.01	35.24	PEAK	100	314	HORIZONTAL

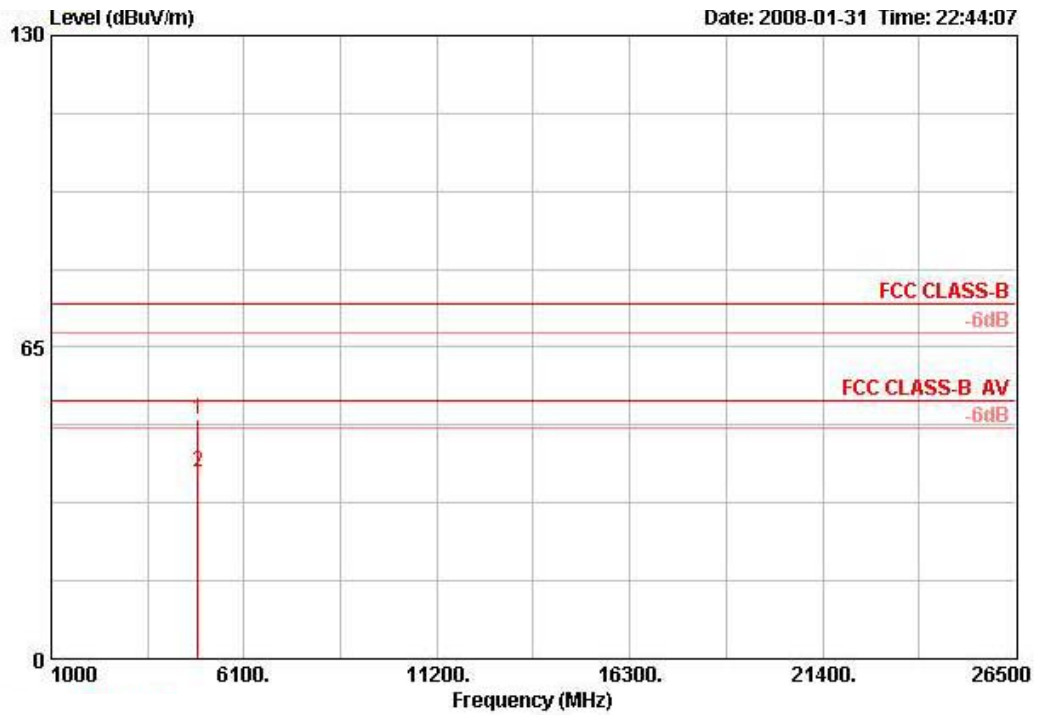
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4924.060	50.61	-23.39	74.00	44.26	33.58	8.01	35.24	PEAK	100	158	VERTICAL
2 @	4924.080	44.40	-9.60	54.00	38.05	33.58	8.01	35.24	AVERAGE	100	158	VERTICAL

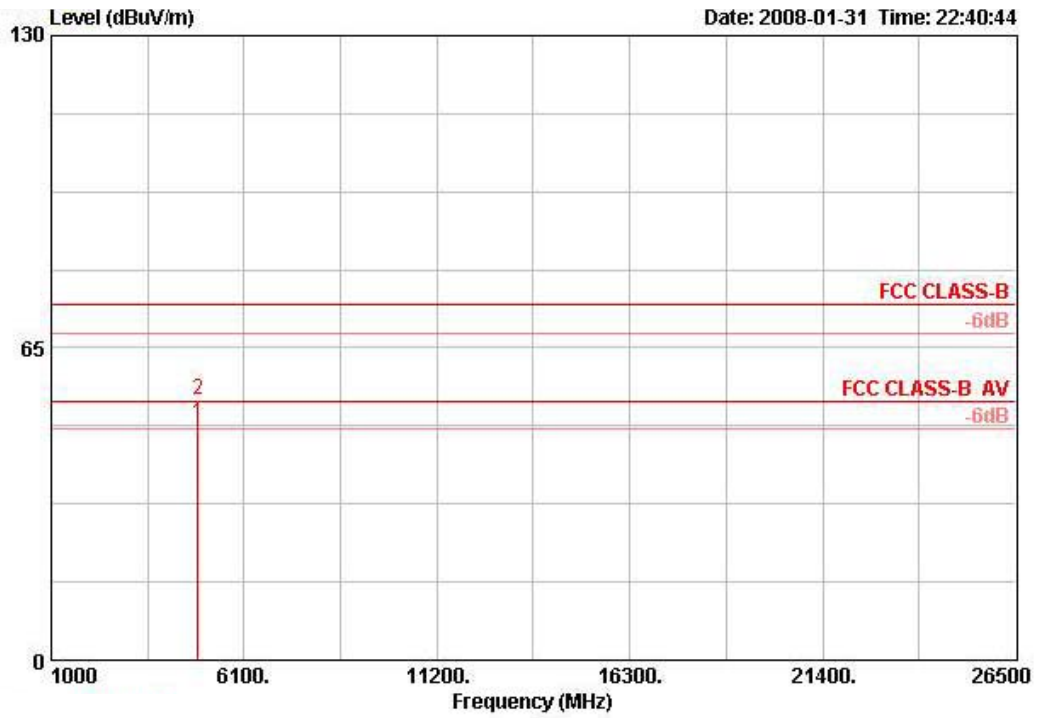
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	802.11b CH 6 / Ant. A

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4873.600	49.90	-24.10	74.00	43.70	33.48	7.96	35.25	PEAK	100	49	HORIZONTAL
2	4873.900	38.99	-15.01	54.00	32.79	33.48	7.96	35.25	AVERAGE	100	49	HORIZONTAL

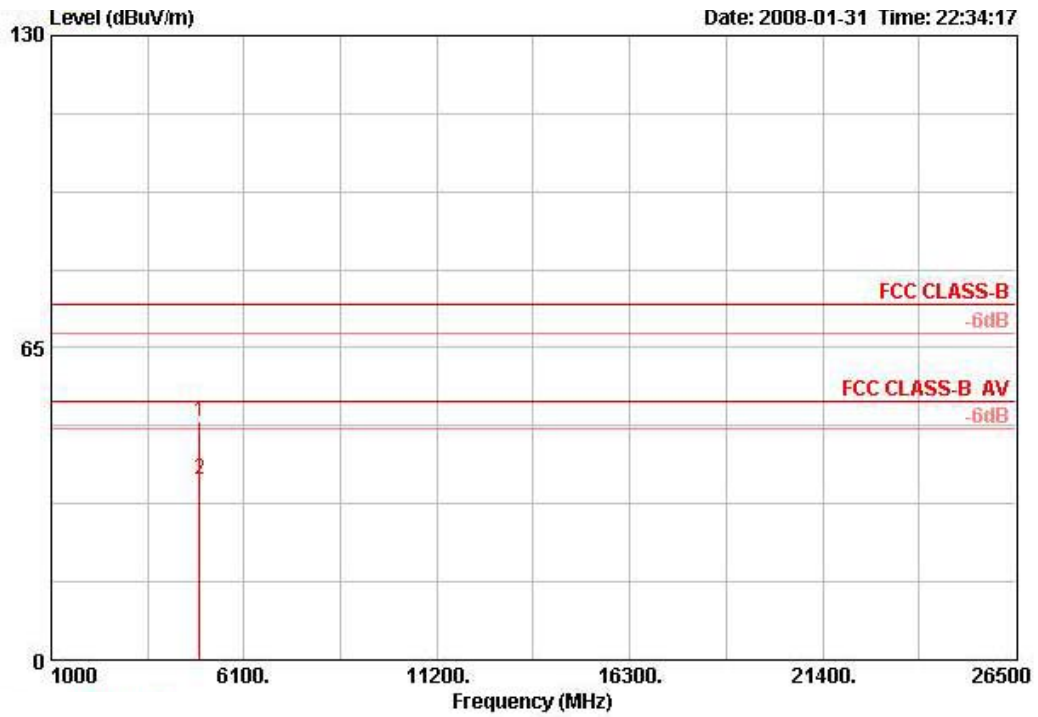
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4874.000	49.09	-4.91	54.00	42.89	33.48	7.96	35.25	AVERAGE	118	194	VERTICAL
2 @	4874.100	54.14	-19.86	74.00	47.94	33.48	7.96	35.25	PEAK	118	194	VERTICAL

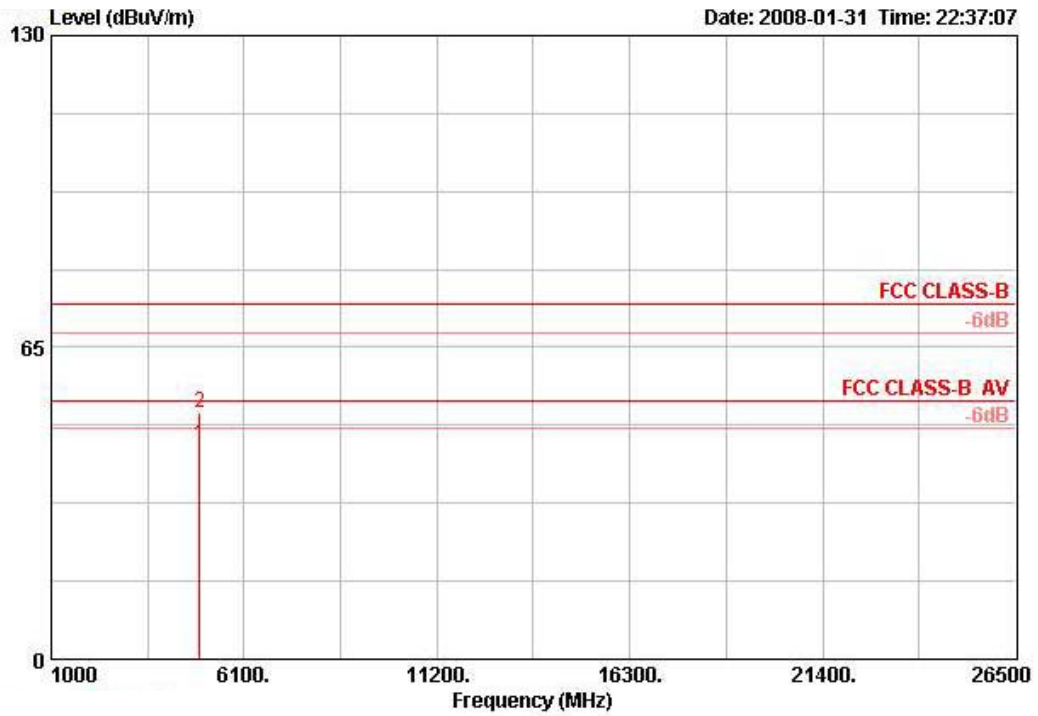
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	802.11b CH 11 / Ant. A

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4923.080	49.72	-24.28	74.00	43.37	33.58	8.01	35.24	PEAK	100	312	HORIZONTAL
2 @	4923.940	37.58	-16.42	54.00	31.24	33.58	8.01	35.24	AVERAGE	100	312	HORIZONTAL

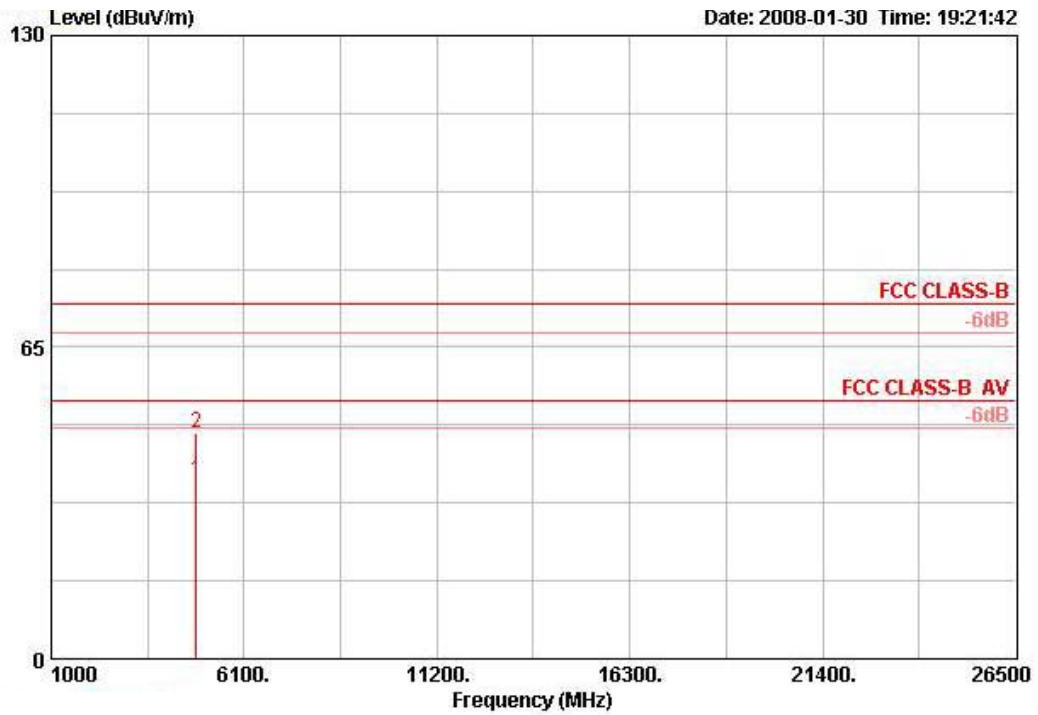
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4924.040	44.69	-9.31	54.00	38.34	33.58	8.01	35.24	AVERAGE	100	172	VERTICAL
2 @	4924.160	51.23	-22.77	74.00	44.88	33.58	8.01	35.24	PEAK	100	172	VERTICAL

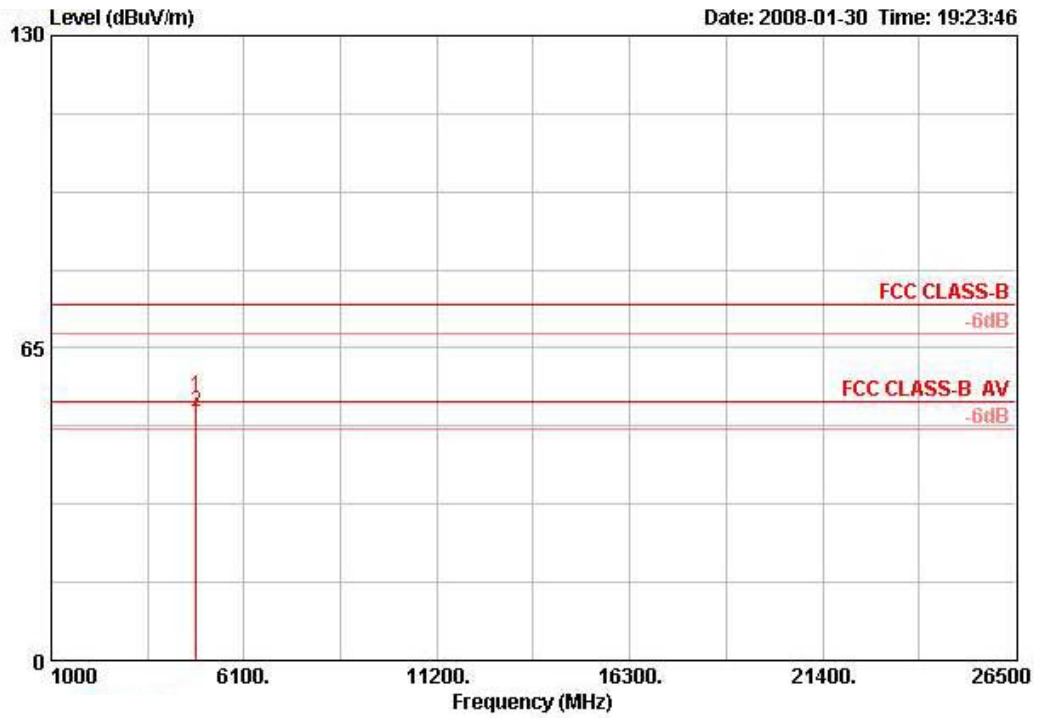
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	802.11b CH 1 / Ant. D

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4823.960	37.04	-16.96	54.00	30.98	33.39	7.91	35.25	AVERAGE	108	314	HORIZONTAL
2	4824.080	47.22	-26.78	74.00	41.16	33.39	7.91	35.25	PEAK	108	314	HORIZONTAL

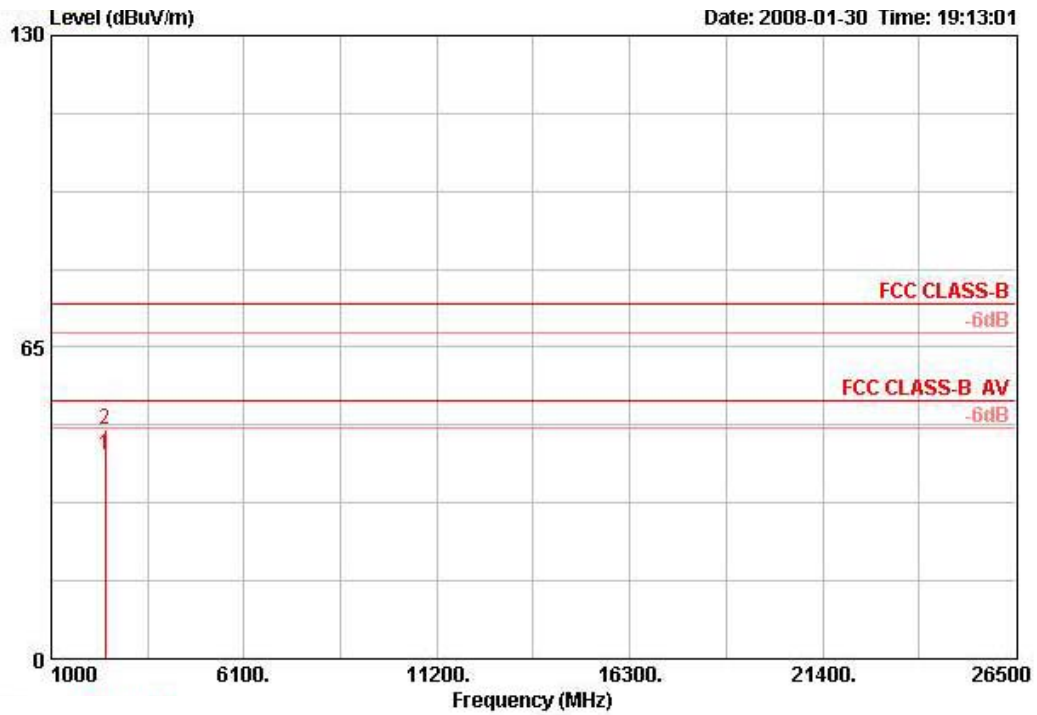
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4823.920	54.94	-19.06	74.00	48.88	33.39	7.91	35.25	PEAK	108	18	VERTICAL
2 @	4823.960	51.80	-2.20	54.00	45.74	33.39	7.91	35.25	AVERAGE	108	18	VERTICAL

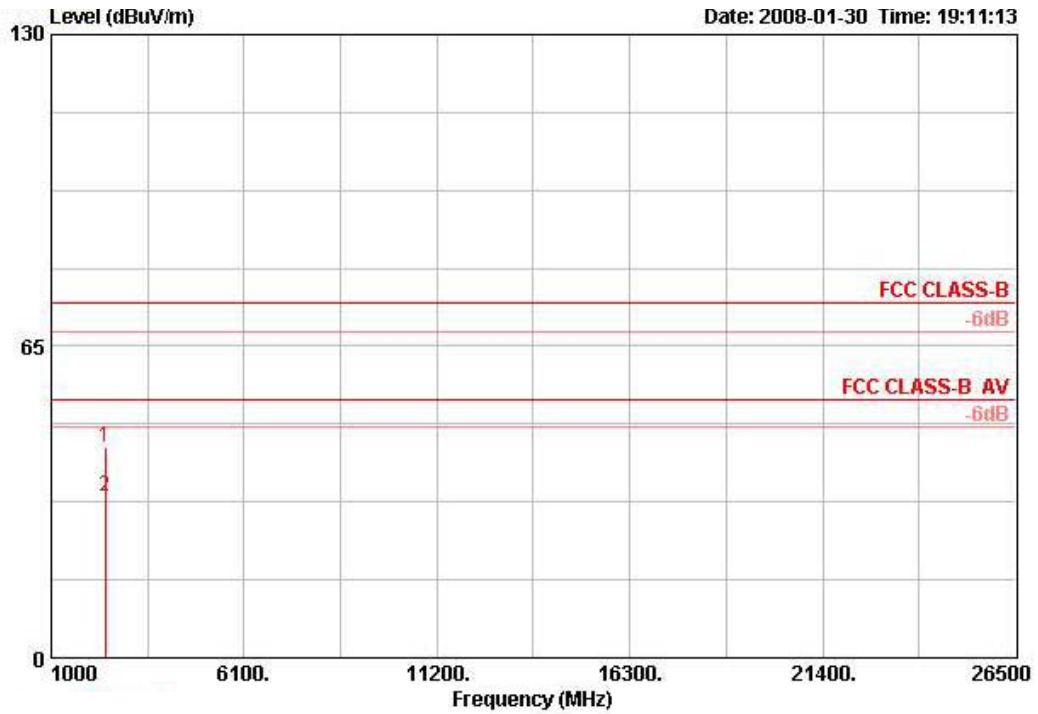
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	802.11b CH 6 / Ant. D

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	2435.200	42.56	-11.44	54.00	43.54	28.13	5.87	34.99	AVERAGE	100	0	HORIZONTAL
2	2435.600	47.84	-26.16	74.00	48.83	28.13	5.87	34.99	PEAK	100	0	HORIZONTAL

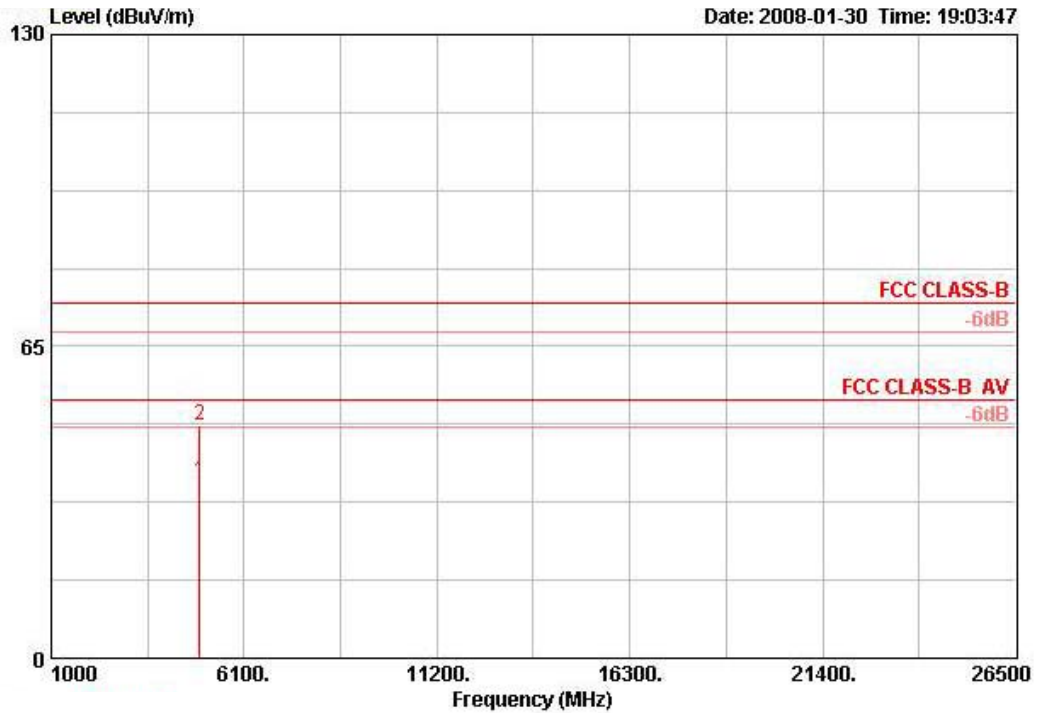
Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	2435.640	43.82	-10.18	54.00	44.80	28.13	5.87	34.99	AVERAGE	100	360	VERTICAL
2	2435.960	33.79	-40.21	74.00	34.77	28.13	5.87	34.99	PEAK	100	360	VERTICAL

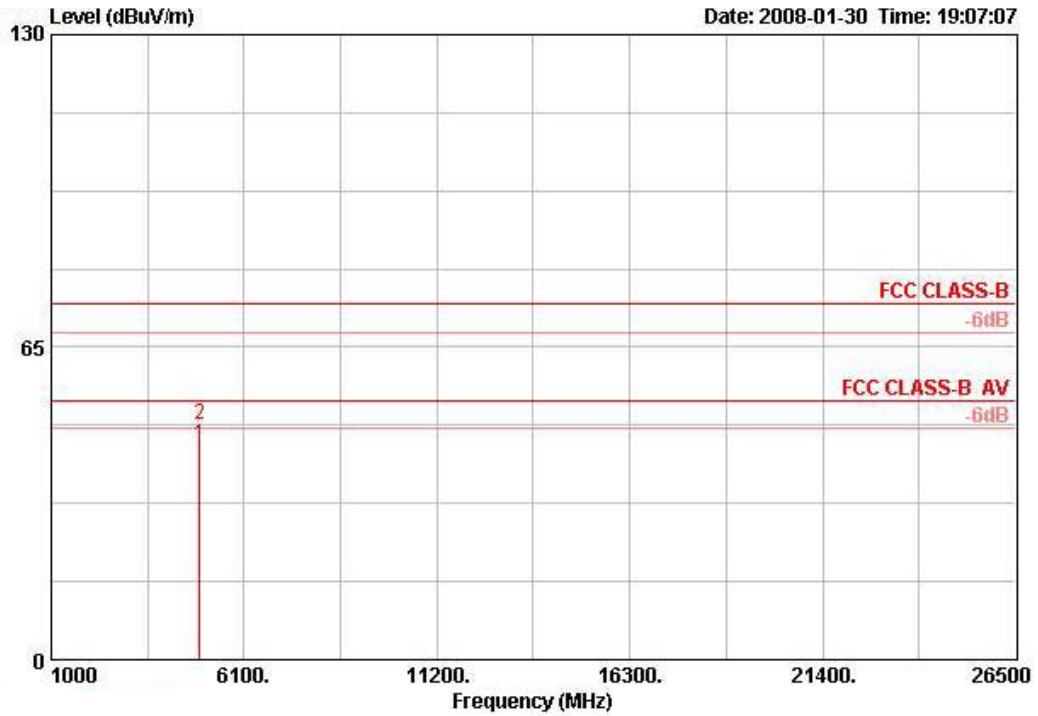
Temperature	26°C	Humidity	56%
Test Engineer	Roy Huang	Configurations	802.11b CH 11 / Ant. D

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4924.060	36.85	-17.15	54.00	30.51	33.58	8.01	35.24	AVERAGE	100	23	HORIZONTAL
2	4927.100	48.66	-25.34	74.00	42.31	33.58	8.01	35.24	PEAK	100	23	HORIZONTAL

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg	
1 @	4923.930	44.63	-9.37	54.00	38.28	33.58	8.01	35.24	AVERAGE	100	327	VERTICAL
2	4924.090	49.02	-24.98	74.00	42.68	33.58	8.01	35.24	PEAK	100	327	VERTICAL