

FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment : **Wireless Access Point BSAP-1840**
Model No. : **BSAP-1840**
Brand Name : **bluesocket**
Filing Type : **New Application**
Applicant : **Bluesocket, Incorporated**
10 North Ave Burlington Massachusetts 01803 United States
FCC ID : **TIH-BSAP1840**
Manufacturer : **DONG GUAN G-COM COMPUTER CO., LTD**
1st Row Yin Shan Rd., Yin Hwu Industrial Area, Qingxi
Town, DongGuan City, Guang Dong, China
Received Date : May 01, 2008
Final Test Date : Aug. 03 2009

Statement

Test result included is only for the 802.11n 2.4G and 5G (5725 ~ 5850MHz) and Monopole Antenna 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.



SPORTON International Inc.

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart C § 15.247

Equipment : Wireless Access Point BSAP-1840
Model No. : BSAP-1840
Brand Name : bluesocket
Applicant : Bluesocket, Incorporated
10 North Ave Burlington Massachusetts
01803 United States

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on May 01, 2008 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.


Wayne Hsu

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1 SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
3.1	15.207	AC Power Line Conducted Emissions	Complies	1.62 dB
3.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	8.54 dB
3.3	15.247(e)	Power Spectral Density	Complies	4.33 dB
3.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
3.5	15.247(d)	Radiated Emissions	Complies	1.31 dB
3.6	15.247(d)	Band Edge Emissions	Complies	1.38 dB
3.7	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	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

2 GENERAL INFORMATION

2.1 Product Details

Only the radio detail of IEEE 802.11n of Monopole Antenna is shown in the table below. For more detailed features description, please refer to the manufacturer’s specifications or user’s manual.

Items	Description
Modulation	See the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	See the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	2.4G- 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth 5G- 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth
Channel Band Width (99%)	2.4G- 1TX-MCS 0 (20MHz) : 17.68 MHz ; MCS 0 (40MHz) : 36.24 MHz 5G- 1TX-MCS 0 (20MHz) : 17.64 MHz ; MCS 0 (40MHz) : 36.24 MHz 2.4G- 2TX- MCS 8 (20MHz) : 17.60 MHz ; MCS 8 (40MHz) : 36.24 MHz 5G- 2TX- MCS 8 (20MHz) : 17.60 MHz ; MCS 8 (40MHz) : 36.24 MHz
Conducted Output Power	2.4G- 1TX-MCS 0 (20MHz) : 18.62 dBm ; MCS 0 (40MHz) : 12.53 dBm 5G- 1TX-MCS 0 (20MHz) : 12.71 dBm ; MCS 0 (40MHz) : 13.77 dBm 2.4G- 2TX- MCS 8 (20MHz) : 21.46 dBm ; MCS 8 (40MHz) : 14.59 dBm 5G- 2TX- MCS 8 (20MHz) : 14.97 dBm ; MCS 8 (40MHz) : 15.67 dBm

2.2 Table for Filed Antenna

Antenna & Bandwidth

Antenna Mode	Single Chain		Two Chain	
	20 MHz	40 MHz	20 MHz	40 MHz
Bandwidth Mode				
802.11b	V	X	X	X
802.11g	V	X	X	X
802.11n(2.4GHz)	V	V	V	V
802.11a (5150~5250MHz)	V	X	X	X
802.11a (5725~5850MHz)	V	X	X	X
802.11n (5150~5250MHz)	V	V	V	V
802.11n (5725~5850MHz)	V	V	V	V

Ant.	Antenna Type	Model Name	Product description	Gain (dBi)	Tx/Rx mode	REMARK
1	Monopole Ant.	TWX-145XRSXX361	2dBi 2.4/5GHz Dual-Band Antenna	2/2	2T3R concurrent	Main Ant. for test
2	Monopole Ant	IWX-145XRSCX-361	2dBi 2.4GHz Single-Band Antenna	2	2T3R concurrent	N/A
3	Monopole Ant	KWX-145XRSDX-361	2dBi 5GHz Single-Band Antenna	2	2T3R concurrent	N/A

Ant.	Antenna Type	Connector	Gain (dBi)		Remark
			2.4G	5G	
1	Monopole Antenna	Reversed-SMA	2	2	TX / RX
2	Monopole Antenna	Reversed-SMA	2	2	TX / RX
3	Monopole Antenna	Reversed-SMA	2	2	RX

Antenna: There are six antennas configuration used in this EUT. (3 Antennas for 2.4GHz band and 3 Antennas for 5GHz band) Three antennas used in the same band have 2T3R concurrent spatial multiplexing MIMO configuration and two of them for signal transceiving and the other antenna for signal receiving whenever in 2.4GHz or 5GHz.

IEEE 802.11n Modulation Scheme

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

2.3 Table for Carrier Frequencies

Frequency Allocation

For 802.11n:

There are two bandwidth systems for IEEE 802.11n.

For 20MHz bandwidth systems, use Channel 149, 153, 157, 161, and 165.

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

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

Frequency Allocation

For 802.11n:

There are two bandwidth systems for IEEE 802.11n.

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

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

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz	-	-

2.4 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 Configuration 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	See the note	Auto	-	-
Maximum Peak Conducted Output Power	MCS 0 (20MHz)	6.5 Mbps	149/157/165	Ant. 1
Power Spectral Density	MCS 0 (40MHz)	13.5 Mbps	151/159	Ant. 1
6dB Spectrum Bandwidth	MCS 8 (20MHz)	13 Mbps	149/157/165	Ant. 1/2 Ant. 1+2
Radiated Emissions 1GHz~10 th Harmonic	MCS 8 (40MHz)	27 Mbps	151/159	Ant. 1/2 Ant. 1+2
Band Edge Emissions	MCS 0 (20MHz)	6.5 Mbps	1/6/11	Ant. 1
	MCS 0 (40MHz)	13.5 Mbps	3/6/9	Ant. 1
	MCS 8 (20MHz)	13 Mbps	1/6/11	Ant. 1/2 Ant. 1+2
	MCS 8 (40MHz)	27 Mbps	3/6/9	Ant. 1/2 Ant. 1+2
Radiated Emissions 9kHz~1GHz	See the note	Auto	-	-

Note: The following modes were tested:

Conducted Emissions

Adapter Mode (DSA-15P-12 US)

Adapter Mode (DSA-20D-12 2)

POE Mode (Power Supply: POE20U-560(G) -R)

In the Radiated (Below 1GHz) because POE Mode is performed the worst test result; it was reported as final data (30MHz~1GHz Chapter 3.5.8).

2.5 Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.
CO04-HY	Conduction	Hwa Ya	643075	IC 4086B-1
TH01-HY	OVEN Room	Hwa Ya	-	-
OS04-LK	OATS	Lin Kou	93596	IC 4086C-1
03CH03-HY	SAC	Hwa Ya	643075	IC 4086B-1

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

2.6 Table for Supporting Units

Support Unit	Brand	Model	FCC ID
P.C. (Remote Workstation)	COMPAQ	Evo D380mx	DoC
Notebook (Remote Workstation)	DELL	D400	DoC
Monitor (Remote Workstation)	COMPAQ	S510	DoC
Keyboard (PS2) (Remote Workstation)	COMPAQ	6511-VA	DoC
Mouse (PS2) (Remote Workstation)	COMPAQ	M-S69	JNZ211443
Switching Power Supply	PHIHONG	POE20U-560(G) -R	-

2.7 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 Single Chain:

Power Parameters of IEEE 802.11n-5G

Test Software Version	ART 0.5 BUILD#25		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n(20MHz)	16	15	15.5
Frequency	5755 MHz	5795 MHz	-
IEEE 802.11n(40MHz)	16.5	15	-

Power Parameters of IEEE 802.11n-2.4G

Test Software Version	ART 0.5 BUILD#25		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n(20MHz)	15	21.5	15.5
Frequency	2422 MHz	2437 MHz	2452 MHz
IEEE 802.11n(40MHz)	12.5	15	11

For Two Chain:

Power Parameters of IEEE 802.11n-5G Ant. 1 & 2

Test Software Version	ART 0.5 BUILD#25		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n(20MHz)	14	14	14
Frequency	5755 MHz	5795 MHz	-
IEEE 802.11n(40MHz)	15	15	-

Power Parameters of IEEE 802.11n-2.4G Ant. 1 & 2

Test Software Version	ART 0.5 BUILD#25		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n(20MHz)	15	20.5	13.5
Frequency	2422 MHz	2437 MHz	2452 MHz
IEEE 802.11n(40MHz)	11.5	14.5	11.5

2.8 EUT Operation during Test

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 NB sends “ H “ messages to the panel, and the panel displays “ H “ patterns on the screen.

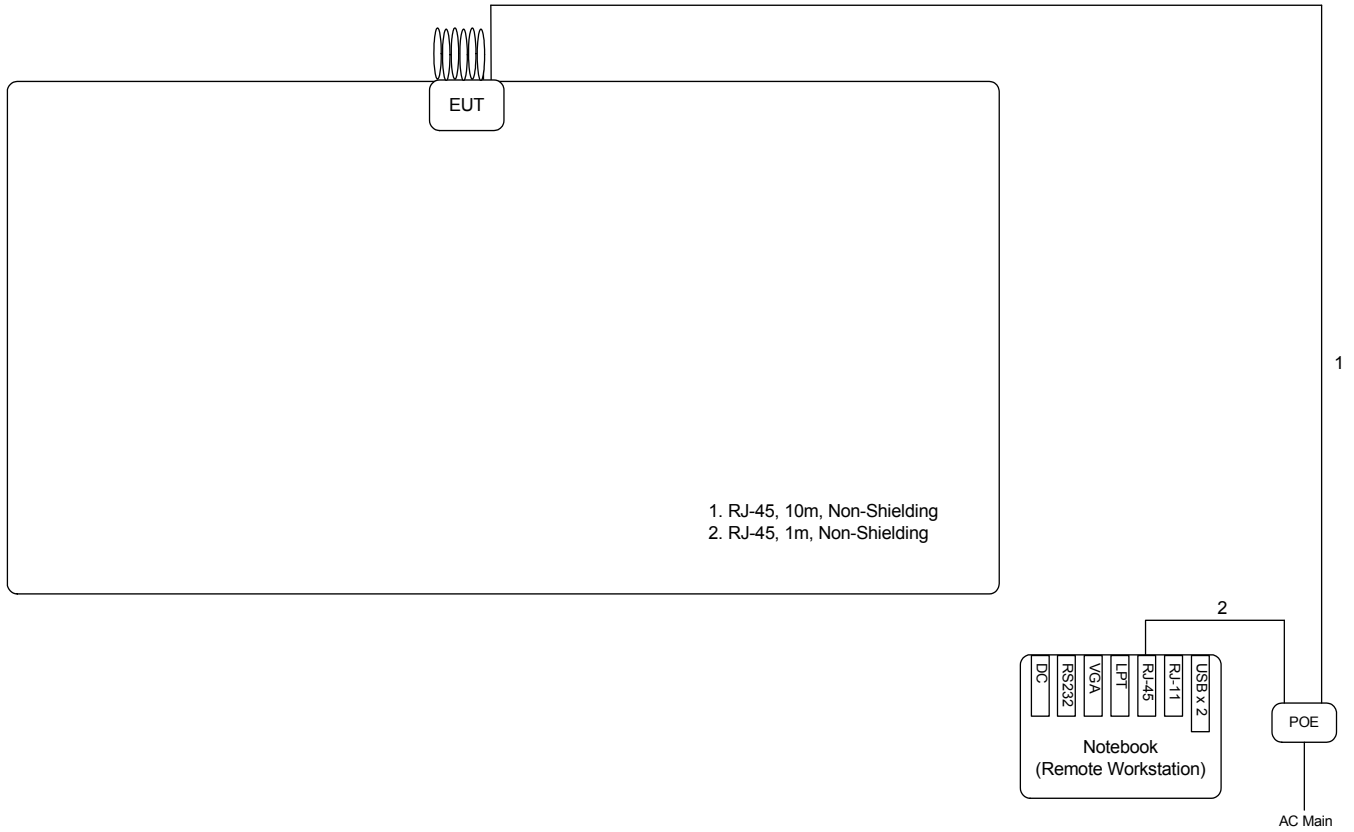
Executed "ping.exe" to link with the remote workstation to receive and transmit data by LAN and WLAN.

Executed “ART 0.5 BUILD#25” to keep transmitting signals at fixed frequency.

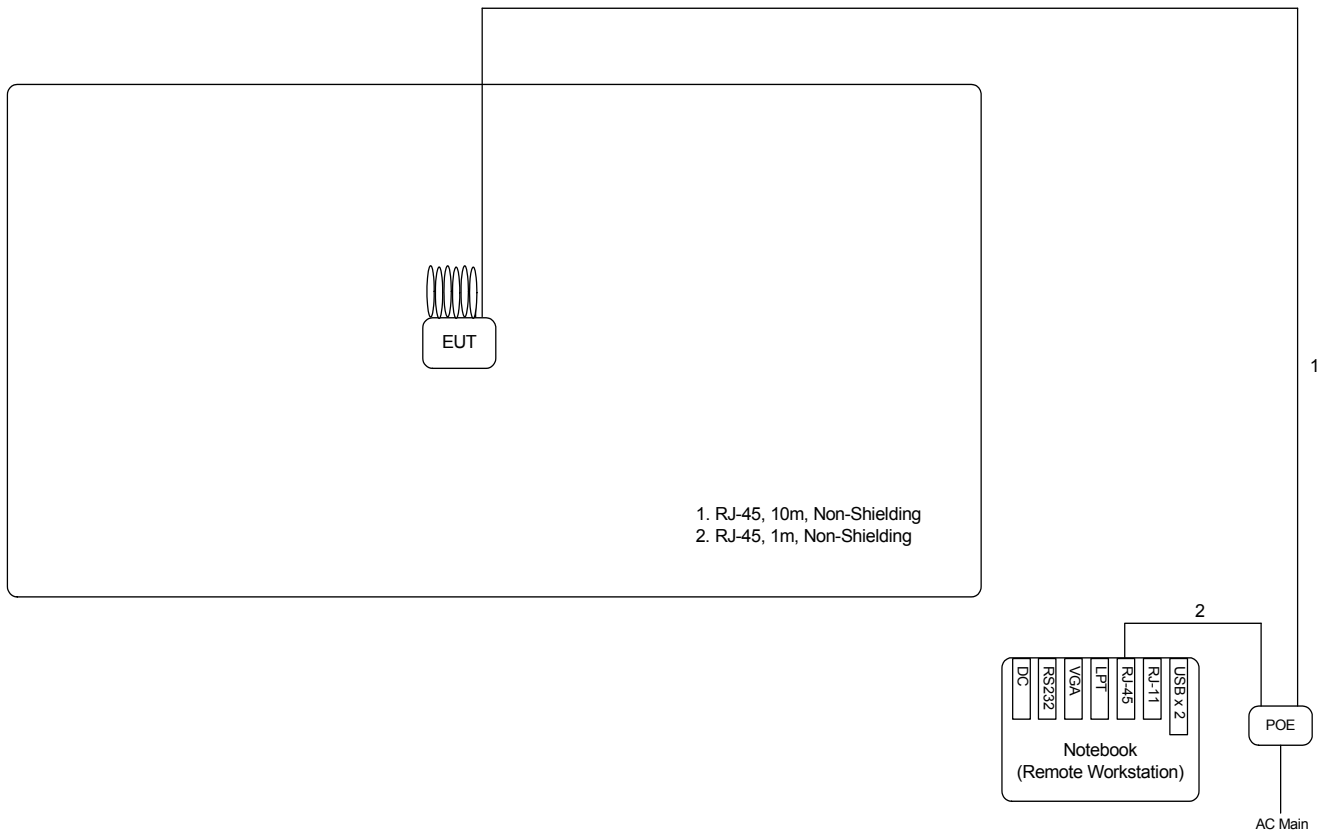
2.9 Test Configuration

2.9.1 Radiation Emissions Test Configuration

For radiated emissions 9kHz~1GHz



For radiated emissions above 1GHz



3 TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 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.

Class B

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

3.1.2 Measuring Instruments and Setting

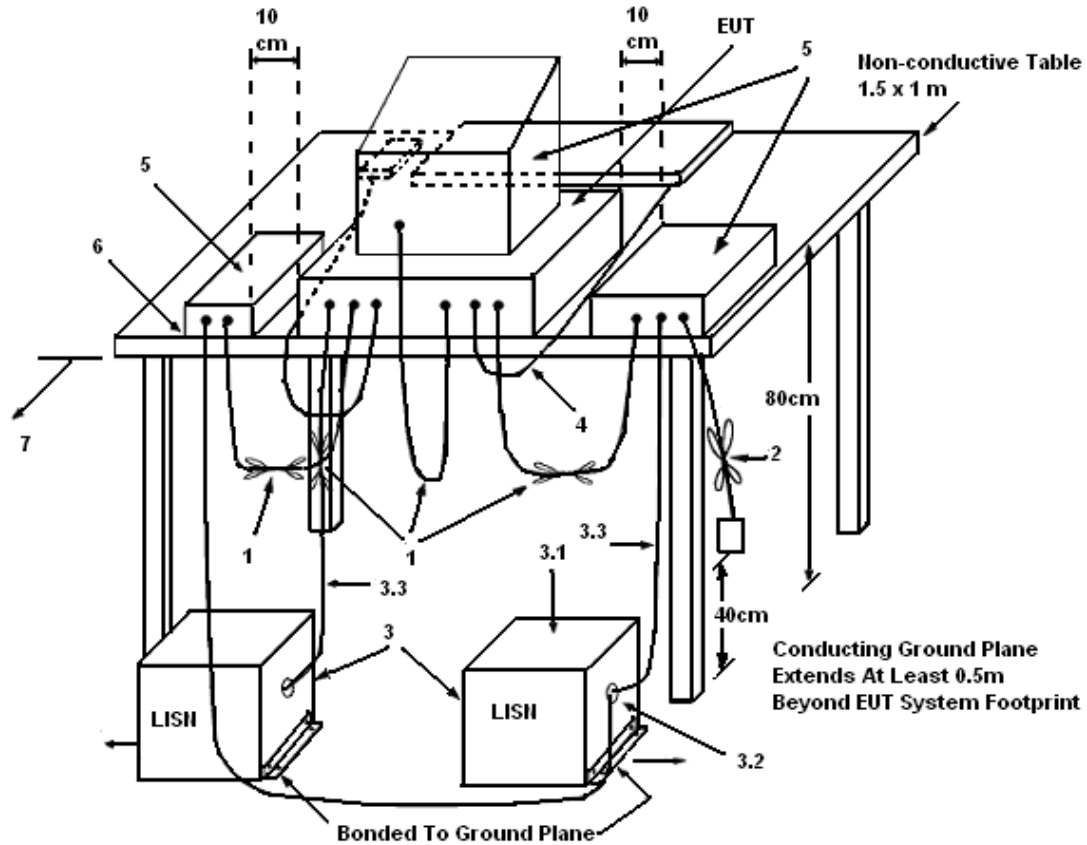
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

3.1.3 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.

3.1.4 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.

3.1.5 Test Deviation

There is no deviation with the original standard.

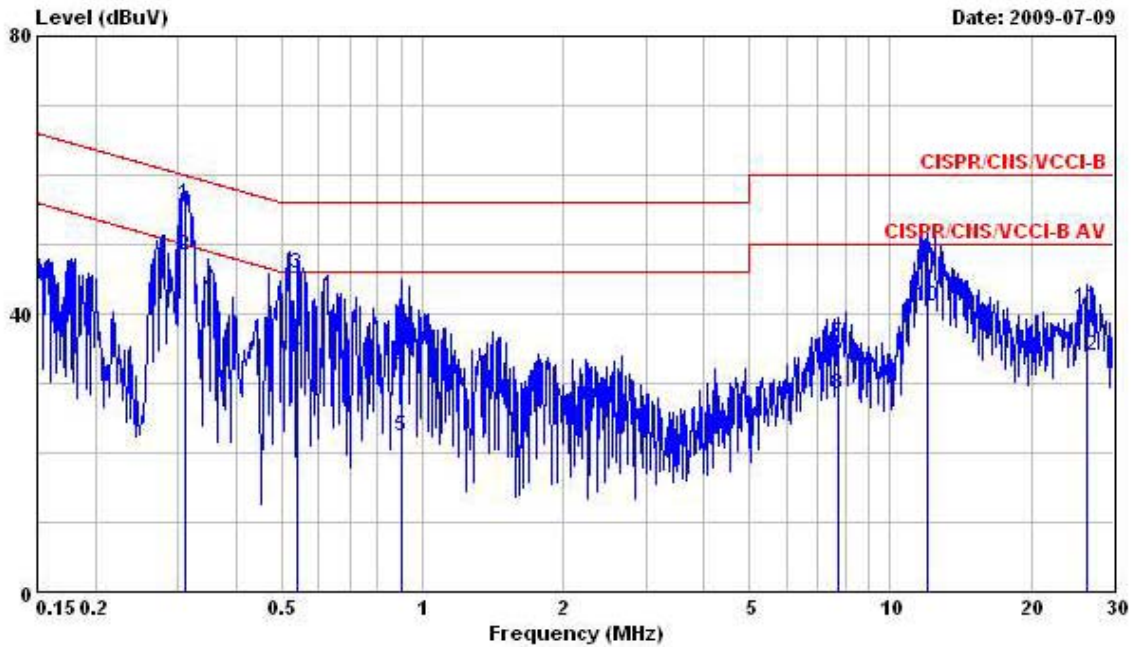
3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

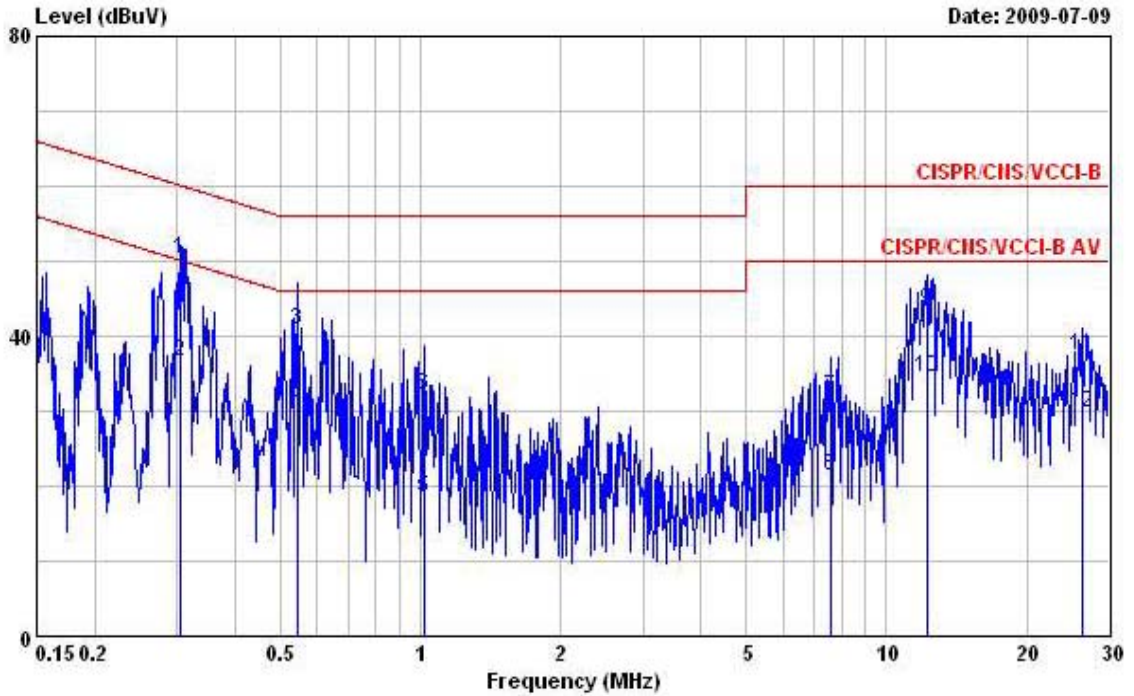
Final Test date	Jul. 09, 2009	Test Site No.	CO04-HY
Temperature	25	Humidity	55%
Test Engineer	Chris	Configuration	Adapter Mode (DSA-15P-12 US)

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.3099790	55.87	-4.10	59.97	55.71	0.09	0.07	QP
2	@0.3099790	48.35	-1.62	49.97	48.19	0.09	0.07	Average
3	@0.5394920	45.72	-10.28	56.00	45.52	0.10	0.10	QP
4	0.5394920	34.19	-11.81	46.00	33.99	0.10	0.10	Average
5	0.8991650	22.31	-23.69	46.00	22.07	0.11	0.13	Average
6	0.8991650	32.74	-23.26	56.00	32.50	0.11	0.13	QP
7	7.730	35.80	-24.20	60.00	35.22	0.24	0.34	QP
8	7.730	28.34	-21.66	50.00	27.76	0.24	0.34	Average
9	12.000	47.54	-12.46	60.00	46.84	0.29	0.41	QP
10	@12.000	40.92	-9.08	50.00	40.22	0.29	0.41	Average
11	26.420	40.71	-19.29	60.00	39.60	0.49	0.62	QP
12	26.420	33.91	-16.09	50.00	32.80	0.49	0.62	Average

Neutral



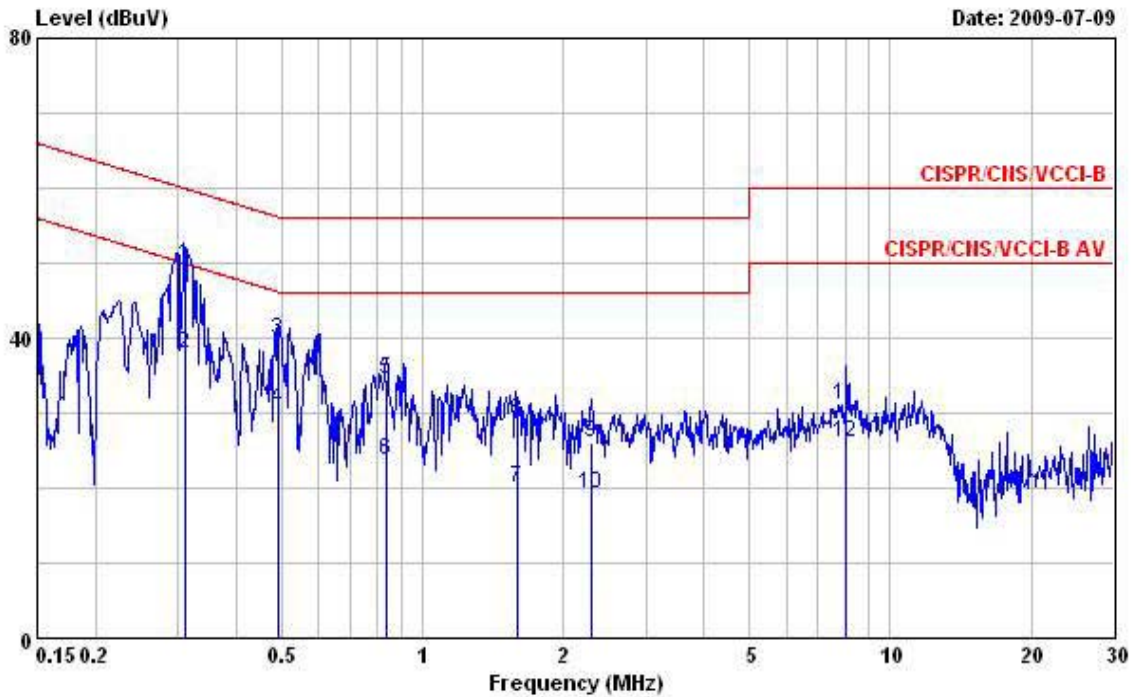
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	@0.3050910	50.23	-9.87	60.10	50.08	0.08	0.07	QP
2	0.3050910	36.58	-13.52	50.10	36.43	0.08	0.07	Average
3	0.5435530	40.81	-15.19	56.00	40.62	0.09	0.10	QP
4	0.5435530	30.61	-15.39	46.00	30.42	0.09	0.10	Average
5	1.020	18.52	-27.48	46.00	18.28	0.10	0.14	Average
6	1.020	32.11	-23.89	56.00	31.87	0.10	0.14	QP
7	7.610	31.96	-28.04	60.00	31.39	0.23	0.34	QP
8	7.610	21.37	-28.63	50.00	20.80	0.23	0.34	Average
9	12.250	43.51	-16.49	60.00	42.79	0.30	0.42	QP
10	12.250	34.39	-15.61	50.00	33.67	0.30	0.42	Average
11	26.280	37.36	-22.64	60.00	36.23	0.51	0.62	QP
12	26.280	29.75	-20.25	50.00	28.62	0.51	0.62	Average

Note:

Level = Read Level + LISN Factor + Cable Loss.

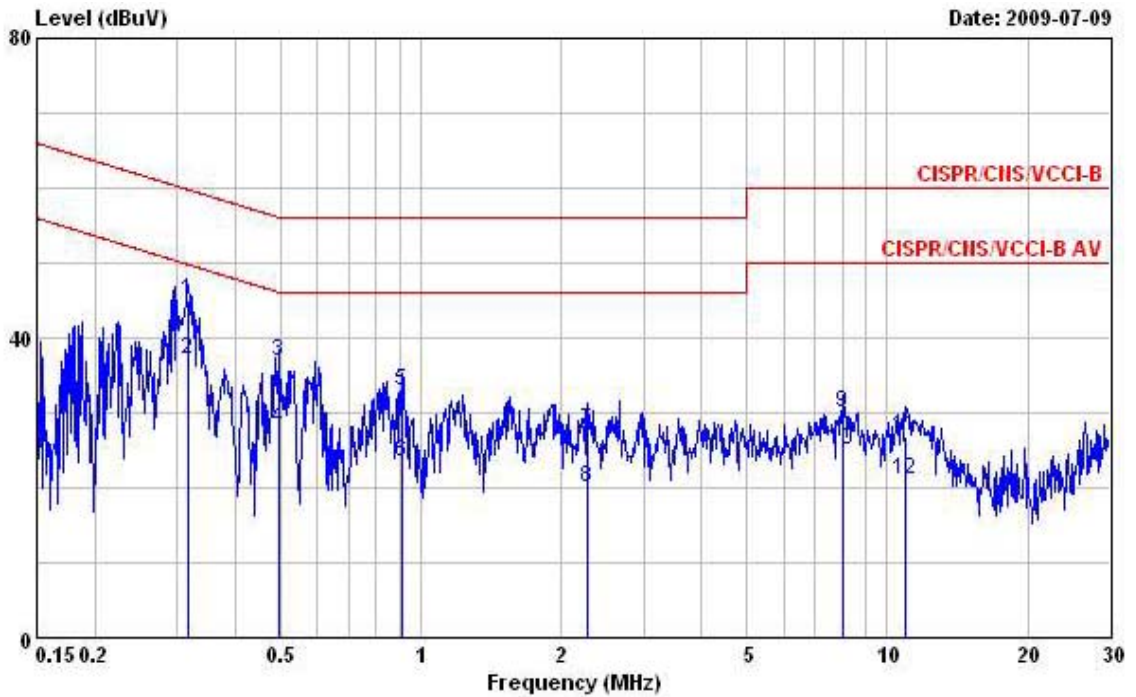
Final Test date	Jul. 09, 2009	Test Site No.	CO04-HY
Temperature	25	Humidity	55%
Test Engineer	Chris	Configuration	Adapter Mode (DSA-20D-12 2)

Line



Line	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.3099790	49.63	-10.34	59.97	49.47	0.09	0.07	QP
2	0.3099790	38.02	-11.95	49.97	37.86	0.09	0.07	Average
3	0.4914980	39.67	-16.47	56.14	39.49	0.09	0.09	QP
4	0.4914980	30.58	-15.56	46.14	30.40	0.09	0.09	Average
5	0.8393170	34.43	-21.57	56.00	34.19	0.11	0.13	QP
6	0.8393170	23.70	-22.30	46.00	23.46	0.11	0.13	Average
7	1.590	19.94	-26.06	46.00	19.65	0.12	0.17	Average
8	1.590	28.97	-27.03	56.00	28.68	0.12	0.17	QP
9	2.300	26.05	-29.95	56.00	25.72	0.14	0.19	QP
10	2.300	19.22	-26.78	46.00	18.89	0.14	0.19	Average
11	8.060	31.09	-28.91	60.00	30.50	0.24	0.35	QP
12	8.060	25.92	-24.08	50.00	25.33	0.24	0.35	Average

Neutral



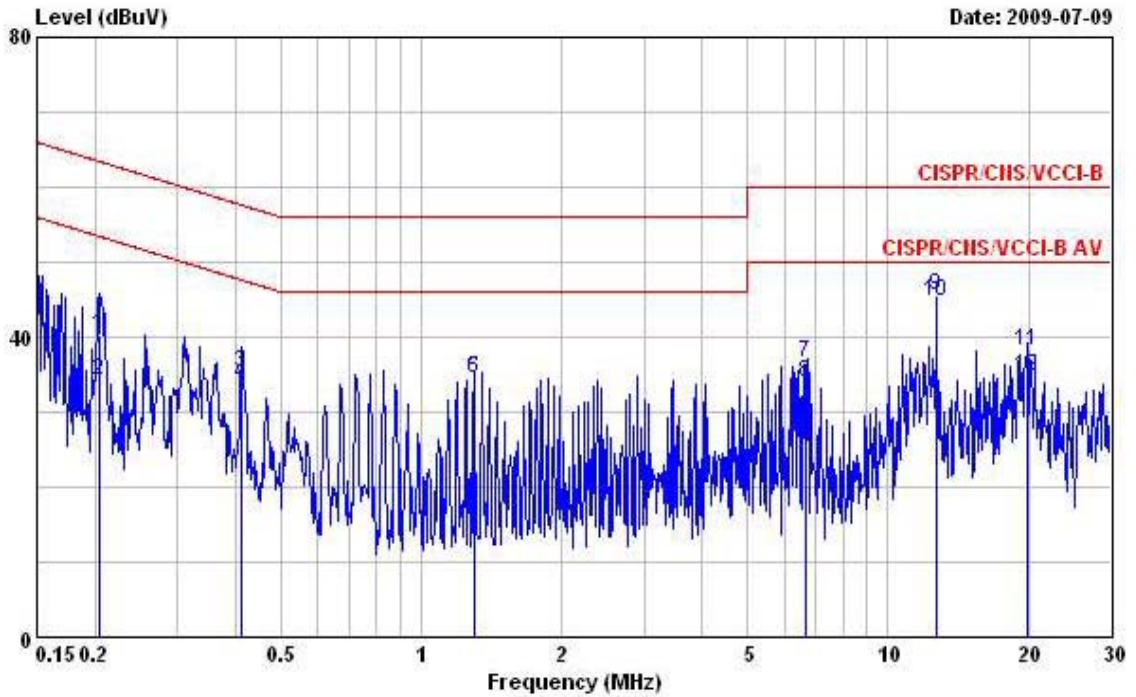
	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.3166190	44.95	-14.85	59.80	44.80	0.08	0.07	QP
2	0.3166190	37.23	-12.57	49.80	37.08	0.08	0.07	Average
3	0.4941090	36.88	-19.22	56.10	36.71	0.08	0.09	QP
4	0.4941090	27.77	-18.33	46.10	27.60	0.08	0.09	Average
5	0.9135710	32.97	-23.03	56.00	32.74	0.10	0.13	QP
6	0.9135710	23.54	-22.46	46.00	23.31	0.10	0.13	Average
7	2.270	27.55	-28.45	56.00	27.24	0.12	0.19	QP
8	2.270	19.96	-26.04	46.00	19.65	0.12	0.19	Average
9	8.060	30.12	-29.88	60.00	29.54	0.23	0.35	QP
10	8.060	25.07	-24.93	50.00	24.49	0.23	0.35	Average
11	10.900	26.94	-33.06	60.00	26.26	0.28	0.40	QP
12	10.900	20.96	-29.04	50.00	20.28	0.28	0.40	Average

Note:

Level = Read Level + LISN Factor + Cable Loss.

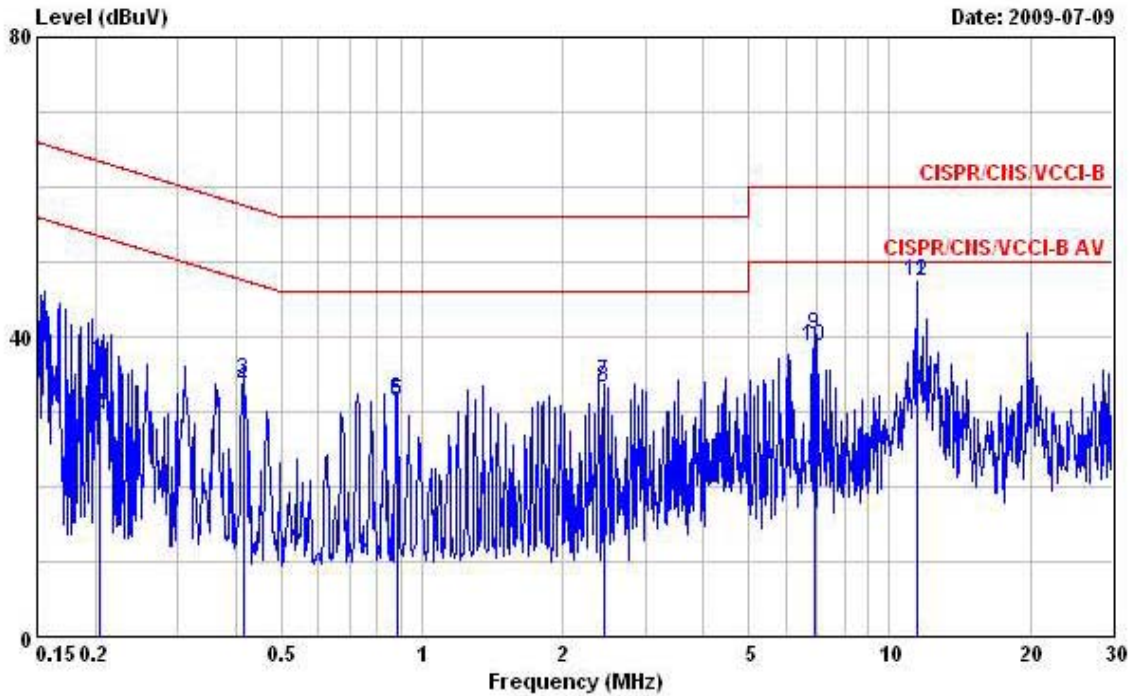
Final Test date	Jul. 09, 2009	Test Site No.	CO04-HY
Temperature	25	Humidity	55%
Test Engineer	Chris	Configuration	POE Mode (Power Supply: POE20U-560(G) -R)

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2050460	40.38	-23.02	63.40	40.24	0.08	0.06	QP
2	0.2050460	34.28	-19.12	53.40	34.14	0.08	0.06	Average
3	0.4126560	35.19	-22.40	57.59	35.02	0.09	0.08	QP
4	0.4126560	33.57	-14.02	47.59	33.40	0.09	0.08	Average
5	1.296	34.43	-21.57	56.00	34.16	0.12	0.15	QP
6	1.296	34.34	-11.66	46.00	34.07	0.12	0.15	Average
7	6.688	36.48	-23.52	60.00	35.94	0.22	0.32	QP
8	6.688	33.87	-16.13	50.00	33.33	0.22	0.32	Average
9	12.709	45.48	-14.52	60.00	44.76	0.30	0.42	QP
10	12.709	44.64	-5.36	50.00	43.92	0.30	0.42	Average
11	19.966	38.16	-21.84	60.00	37.23	0.40	0.53	QP
12	19.966	34.86	-15.14	50.00	33.93	0.40	0.53	Average

Neutral



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.2040370	36.96	-26.48	63.44	36.82	0.08	0.06	QP
2	0.2040370	29.79	-23.65	53.44	29.65	0.08	0.06	Average
3	0.4148480	34.08	-23.47	57.55	33.92	0.08	0.08	QP
4	0.4148480	33.26	-14.29	47.55	33.10	0.08	0.08	Average
5	0.8836060	31.36	-14.64	46.00	31.13	0.10	0.13	Average
6	0.8836060	31.51	-24.49	56.00	31.28	0.10	0.13	QP
7	2.441	33.84	-22.16	56.00	33.52	0.12	0.20	QP
8	2.441	33.18	-12.82	46.00	32.86	0.12	0.20	Average
9	6.905	40.32	-19.68	60.00	39.78	0.22	0.32	QP
10	6.905	38.75	-11.25	50.00	38.21	0.22	0.32	Average
11	11.411	47.25	-12.75	60.00	46.57	0.28	0.40	QP
12	11.411	47.27	-2.73	50.00	46.59	0.28	0.40	Average

Note:

Level = Read Level + LISN Factor + Cable Loss.

3.2 Maximum Conducted Output Power Measurement

3.2.1 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.

3.2.2 Measuring Instruments and Setting

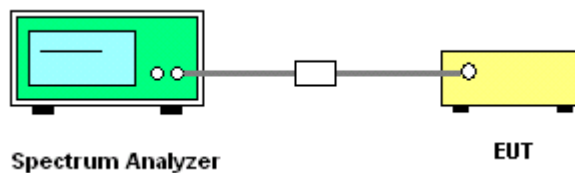
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

3.2.3 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.
3. When measuring maximum conducted output power within multiple antenna systems, add every result of the values by mathematic formula.

3.2.4 Test Setup Layout



3.2.5 Test Deviation

There is no deviation with the original standard.

3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.2.7 Test Result of Maximum Conducted Output Power

Final Test date	May 09, 2008	Test Site No.	TH01-HY
Temperature	27	Humidity	55%
Test Engineer	Sam	Configuration	802.11n

For Single Chain:

Configuration of IEEE 802.11n-5G (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	12.71	30.00	Complies
157	5785 MHz	11.13	30.00	Complies
165	5825 MHz	11.20	30.00	Complies

Configuration of IEEE 802.11n-5G (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	13.77	30.00	Complies
159	5795 MHz	12.53	30.00	Complies

Configuration of IEEE 802.11n-2.4G (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	12.44	30.00	Complies
6	2437 MHz	18.62	30.00	Complies
11	2462 MHz	12.95	30.00	Complies

Configuration of IEEE 802.11n-2.4G (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	9.67	30.00	Complies
6	2437 MHz	12.53	30.00	Complies
9	2452 MHz	8.60	30.00	Complies

For Two Chain:

Configuration of IEEE 802.11n-5G Ant. 1 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	10.73	30.00	Complies
157	5785 MHz	9.71	30.00	Complies
165	5825 MHz	9.88	30.00	Complies

Configuration of IEEE 802.11n-5G Ant. 2 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	12.92	30.00	Complies
157	5785 MHz	12.72	30.00	Complies
165	5825 MHz	12.94	30.00	Complies

Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	14.97	30.00	Complies
157	5785 MHz	14.48	30.00	Complies
165	5825 MHz	14.68	30.00	Complies

Configuration of IEEE 802.11n-5G Ant. 1 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	11.31	30.00	Complies
159	5795 MHz	11.01	30.00	Complies

Configuration of IEEE 802.11n-5G Ant. 2 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	13.69	30.00	Complies
159	5795 MHz	13.73	30.00	Complies

Configuration of IEEE 802.11n-5G Ant. 1 & 2 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	15.67	30.00	Complies
159	5795 MHz	15.59	30.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	12.23	30.00	Complies
6	2437 MHz	18.11	30.00	Complies
11	2462 MHz	11.28	30.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 2 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	12.28	30.00	Complies
6	2437 MHz	18.77	30.00	Complies
11	2462 MHz	11.62	30.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	15.27	30.00	Complies
6	2437 MHz	21.46	30.00	Complies
11	2462 MHz	14.46	30.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	8.31	30.00	Complies
6	2437 MHz	11.25	30.00	Complies
9	2452 MHz	8.64	30.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 2 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	9.02	30.00	Complies
6	2437 MHz	11.88	30.00	Complies
9	2452 MHz	9.12	30.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	11.69	30.00	Complies
6	2437 MHz	14.59	30.00	Complies
9	2452 MHz	11.90	30.00	Complies

3.3 Power Spectral Density Measurement

3.3.1 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.

3.3.2 Measuring Instruments and Setting

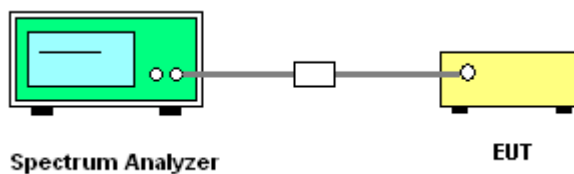
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

3.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
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 connectors are required to link with Spectrum Analyzer through a combiner.

3.3.4 Test Setup Layout



3.3.5 Test Deviation

There is no deviation with the original standard.

3.3.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.3.7 Test Result of Power Spectral Density

Final Test date	Jun. 01, 2008	Test Site No.	TH01-HY
Temperature	27	Humidity	55%
Test Engineer	Sam	Configuration	802.11n

For Single Chain:

Configuration of IEEE 802.11n-5G (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	-10.06	8.00	Complies
157	5785 MHz	-11.44	8.00	Complies
165	5825 MHz	-11.22	8.00	Complies

Configuration of IEEE 802.11n-5G (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	-7.53	8.00	Complies
159	5795 MHz	-10.35	8.00	Complies

Configuration of IEEE 802.11n-2.4G (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-7.84	8.00	Complies
6	2437 MHz	0.14	8.00	Complies
11	2462 MHz	-6.72	8.00	Complies

Configuration of IEEE 802.11n-2.4G (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-14.29	8.00	Complies
6	2437 MHz	-6.18	8.00	Complies
9	2452 MHz	-12.47	8.00	Complies

For Two Chain:

Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	-6.42	8.00	Complies
157	5785 MHz	-9.15	8.00	Complies
165	5825 MHz	-5.38	8.00	Complies

Configuration of IEEE 802.11n-5G Ant. 1 & 2 (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
151	5755 MHz	-6.31	8.00	Complies
159	5795 MHz	-2.98	8.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz)

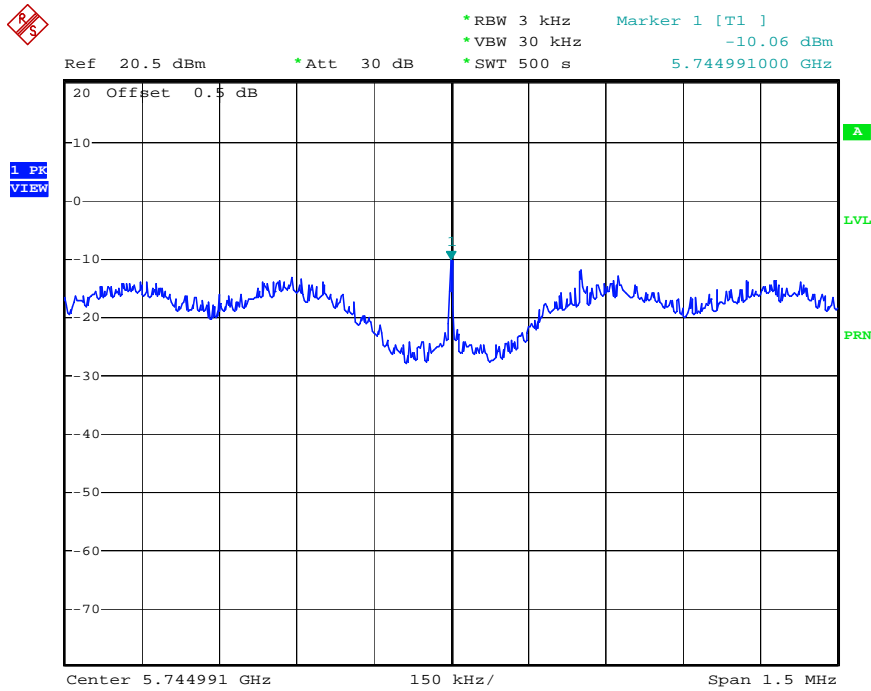
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	-5.04	8.00	Complies
6	2437 MHz	3.67	8.00	Complies
11	2462 MHz	-6.73	8.00	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz)

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	-7.14	8.00	Complies
6	2437 MHz	-1.65	8.00	Complies
9	2452 MHz	-6.12	8.00	Complies

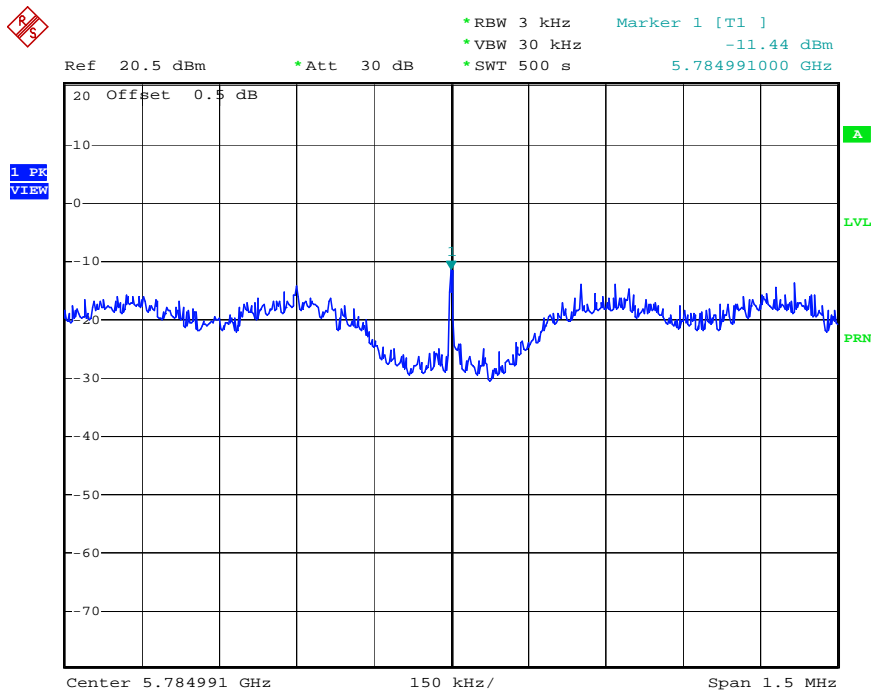
For Single Chain:

Power Density Plot on Configuration of IEEE 802.11n-5G (20MHz) / 5745 MHz



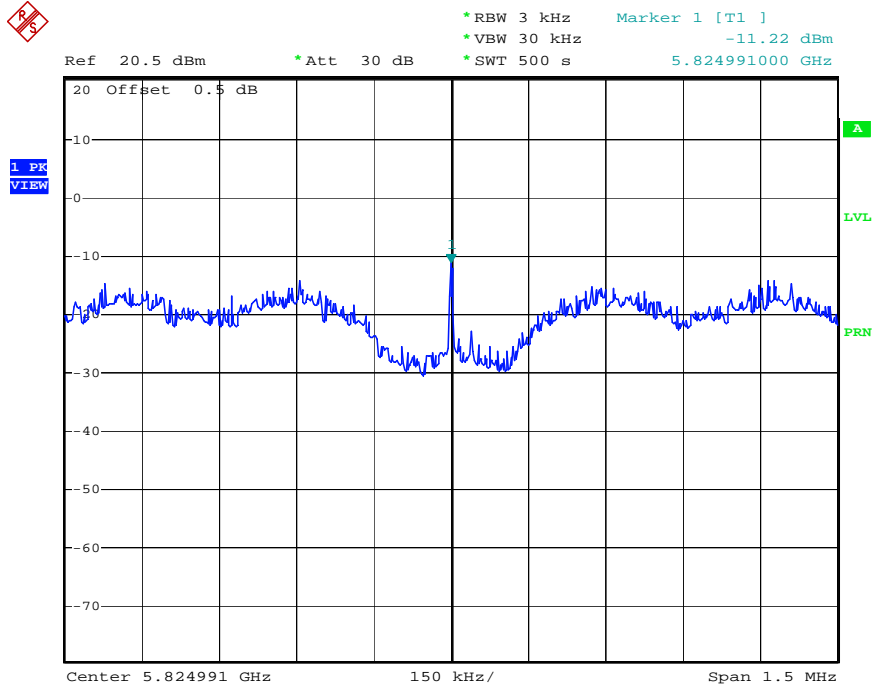
Date: 1.JUN.2008 06:07:58

Power Density Plot on Configuration of IEEE 802.11n-5G (20MHz) / 5785 MHz



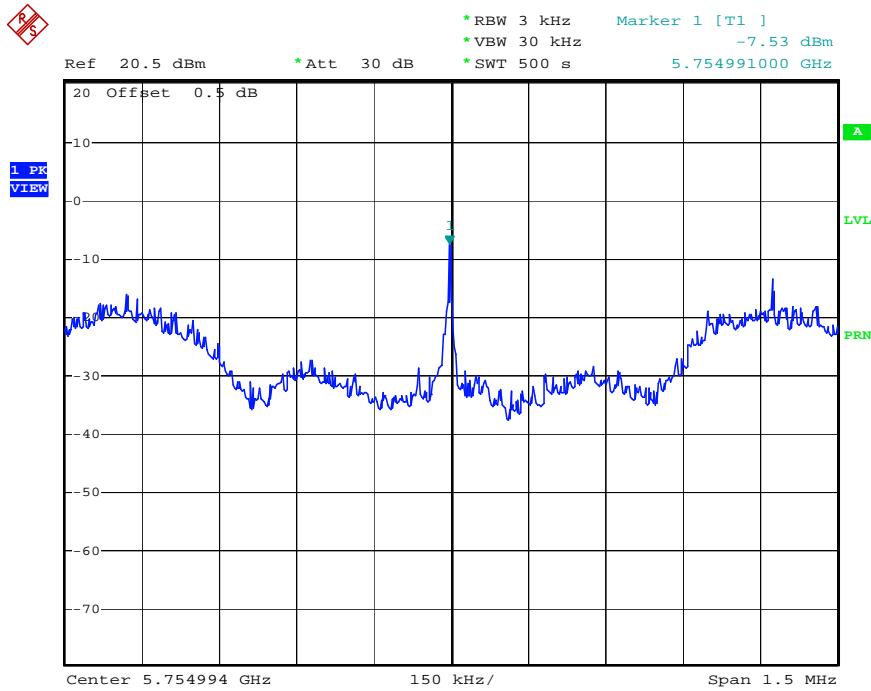
Date: 1.JUN.2008 06:08:50

Power Density Plot on Configuration of IEEE 802.11n-5G (20MHz) / 5825 MHz



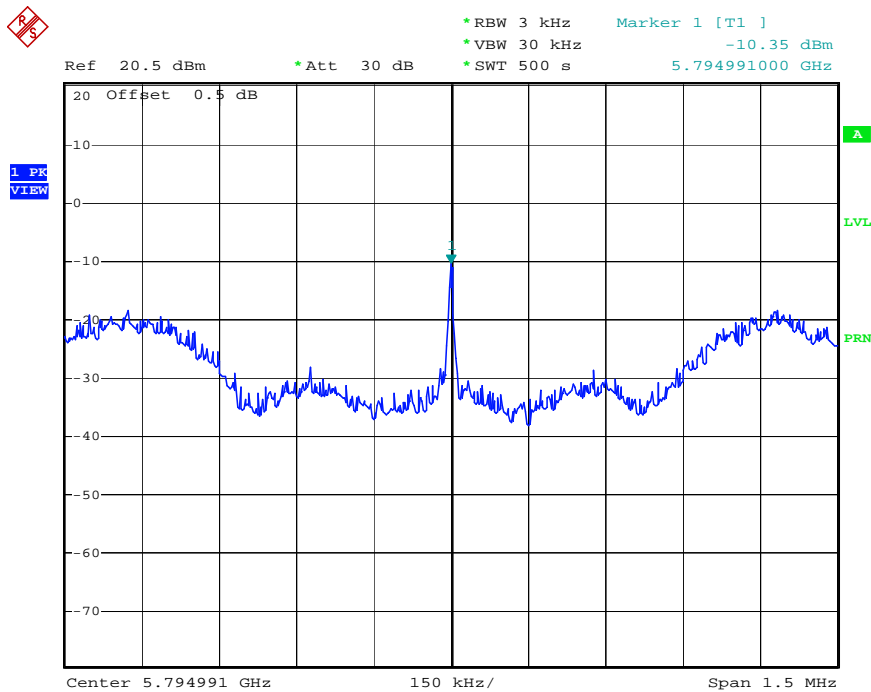
Date: 1.JUN.2008 06:09:27

Power Density Plot on Configuration of IEEE 802.11n-5G (40MHz) / 5755 MHz



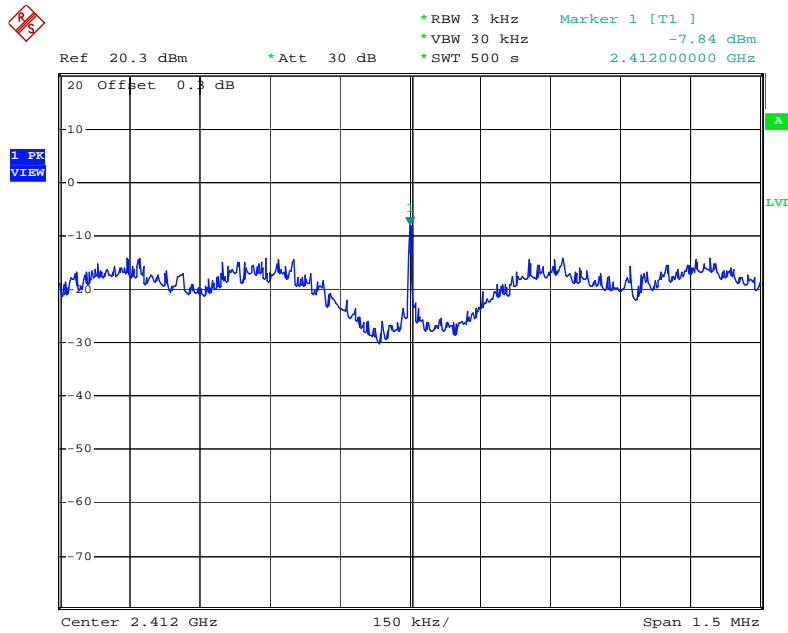
Date: 1.JUN.2008 06:45:58

Power Density Plot on Configuration of IEEE 802.11n-5G (40MHz) / 5795 MHz



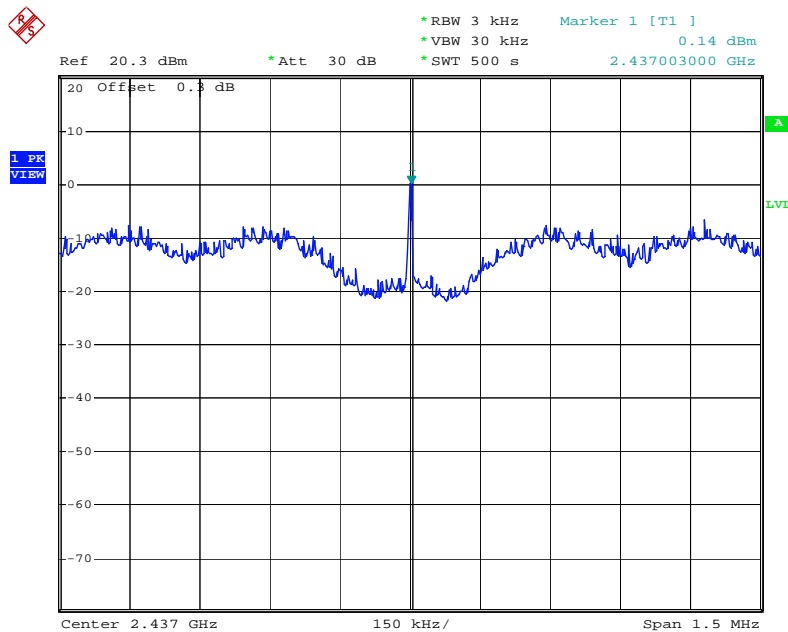
Date: 1.JUN.2008 06:45:08

Power Density Plot on Configuration of IEEE 802.11n-2.4G (20MHz) / 2412 MHz



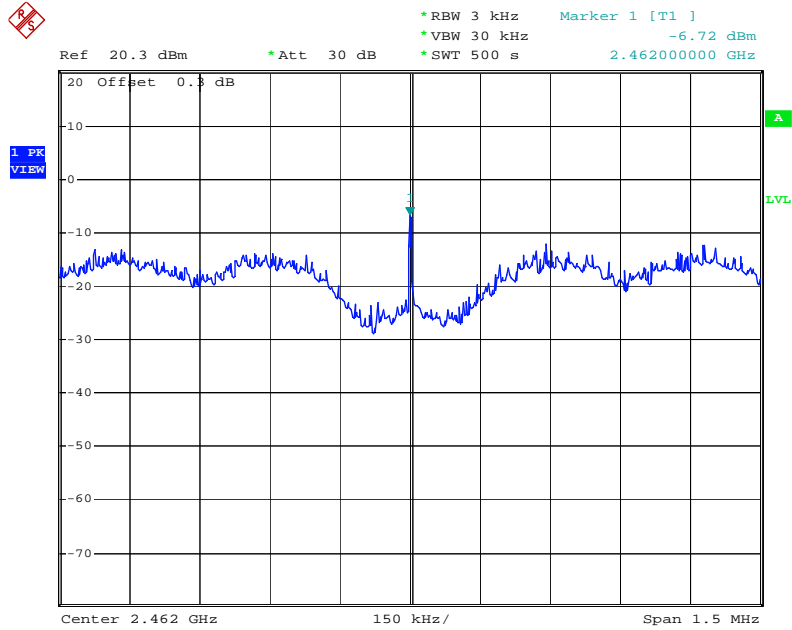
Date: 28.MAY.2008 10:29:13

Power Density Plot on Configuration of IEEE 802.11n-2.4G (20MHz) / 2437 MHz



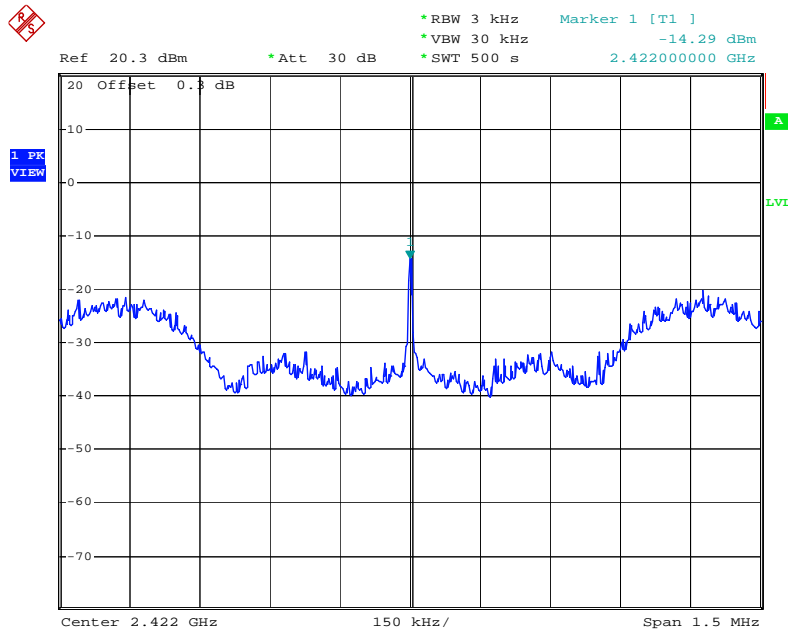
Date: 28.MAY.2008 10:32:45

Power Density Plot on Configuration of IEEE 802.11n-2.4G (20MHz) / 2462 MHz



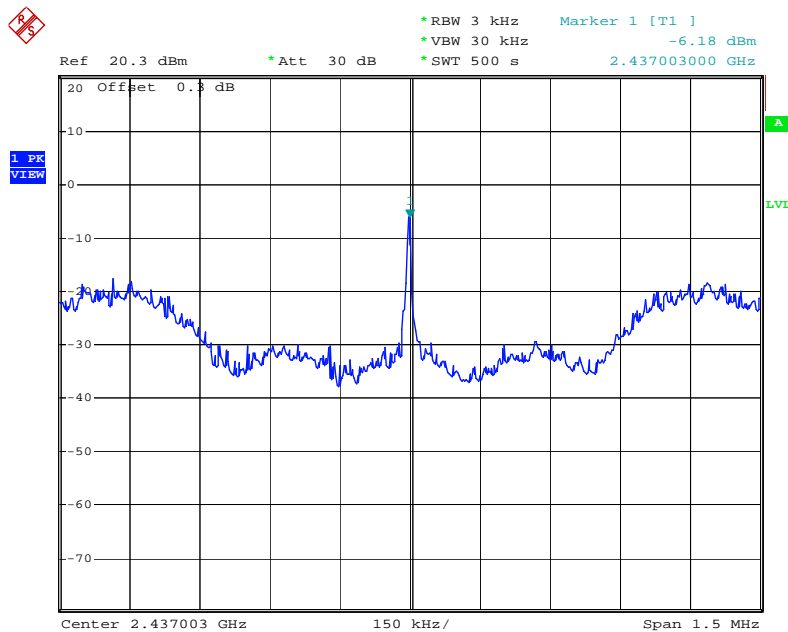
Date: 28.MAY.2008 10:34:06

Power Density Plot on Configuration of IEEE 802.11n-2.4G (40MHz) / 2422 MHz



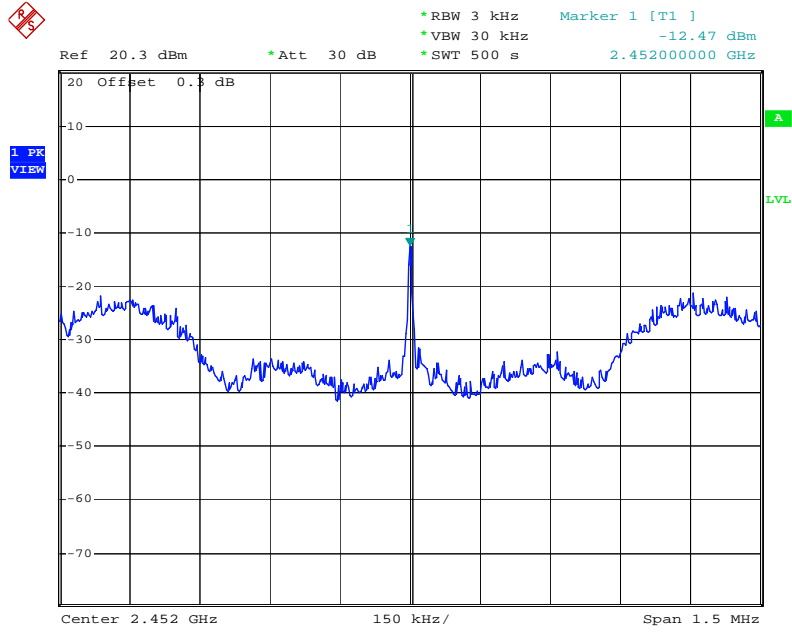
Date: 28.MAY.2008 10:53:29

Power Density Plot on Configuration of IEEE 802.11n-2.4G (40MHz) / 2437 MHz



Date: 28.MAY.2008 10:47:45

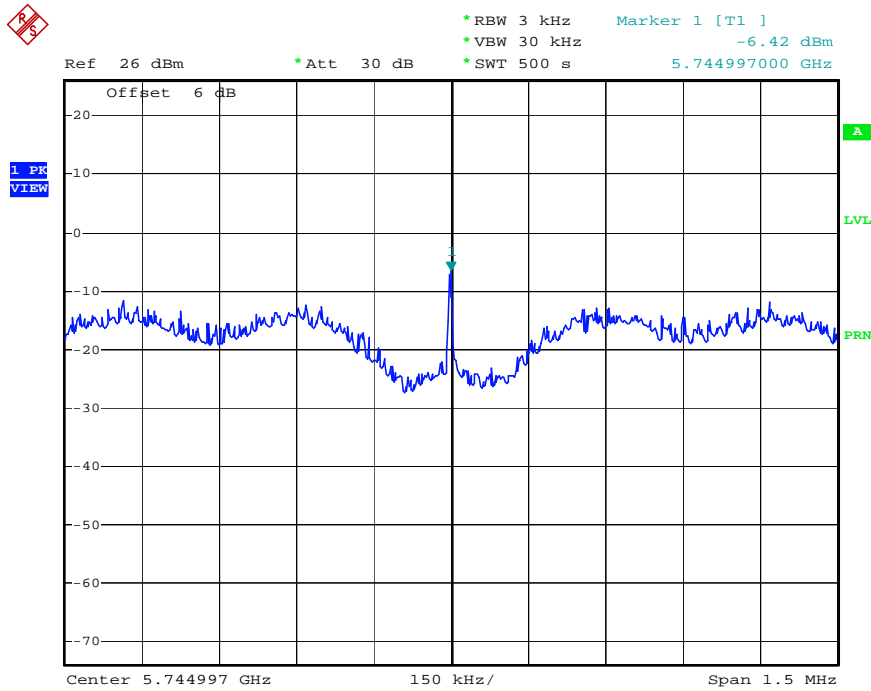
Power Density Plot on Configuration of IEEE 802.11n-2.4G (40MHz) / 2452 MHz



Date: 28.MAY.2008 10:45:37

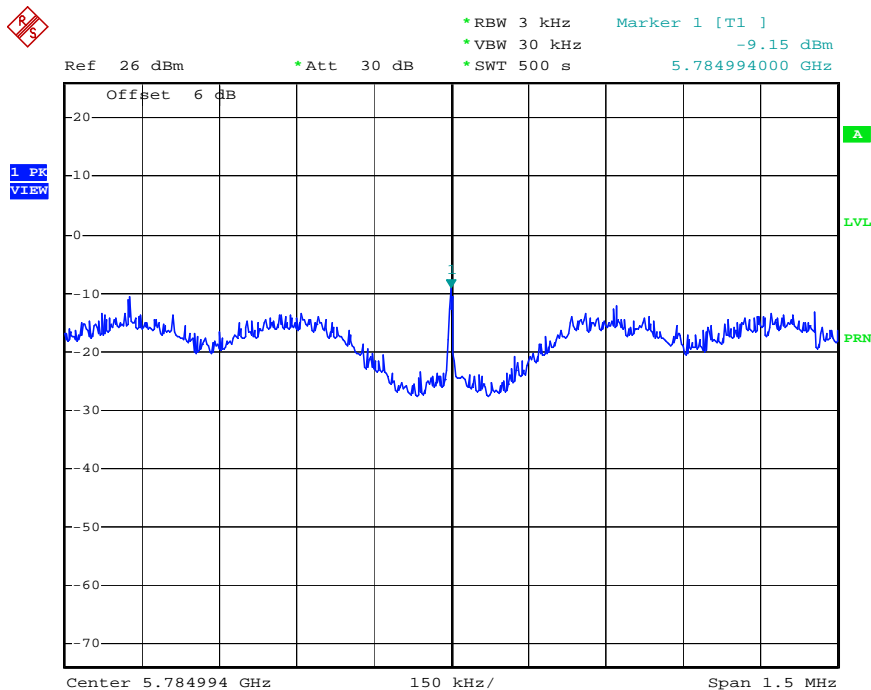
For Two Chain:

Power Density Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz) / 5745 MHz



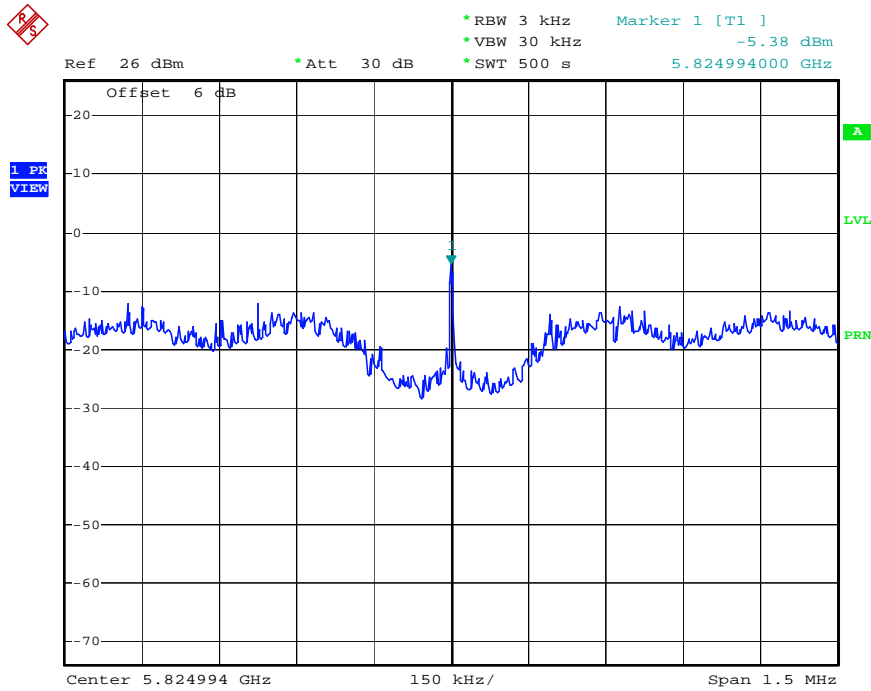
Date: 1.JUN.2008 17:25:05

Power Density Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz) / 5785 MHz



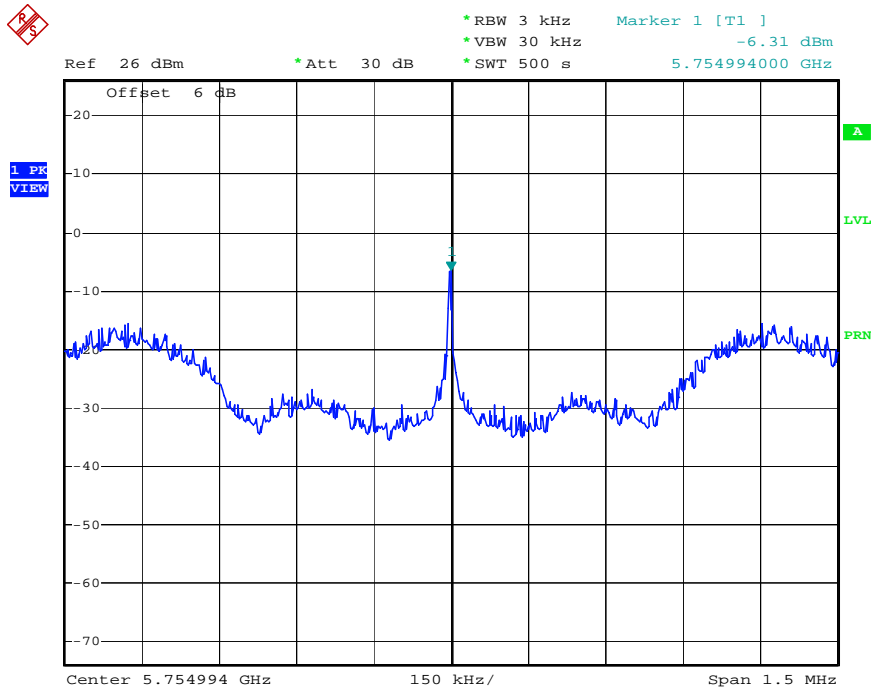
Date: 1.JUN.2008 17:19:27

Power Density Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz) / 5825 MHz



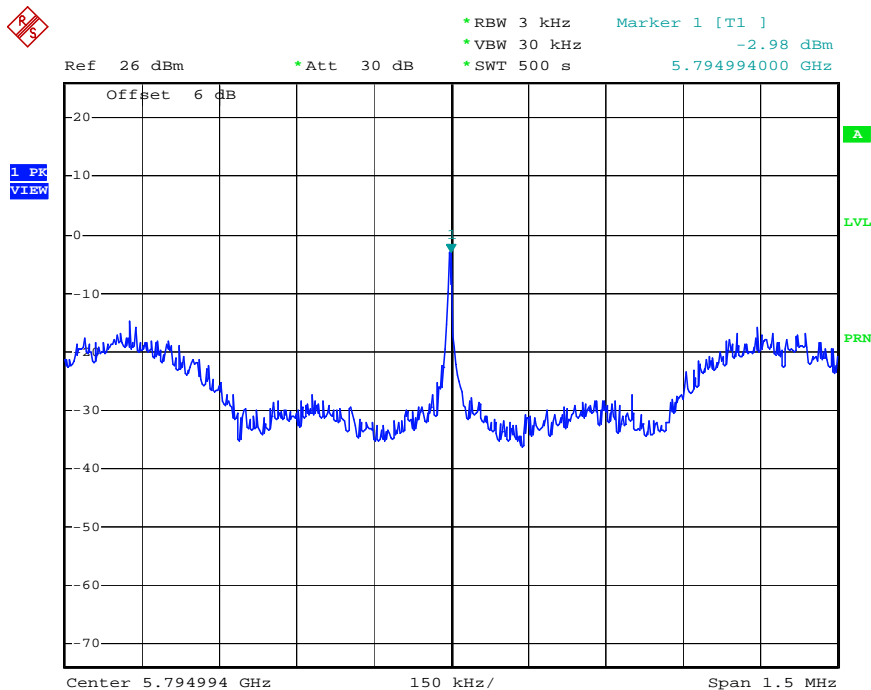
Date: 1.JUN.2008 17:05:30

Power Density Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (40MHz) / 5755 MHz



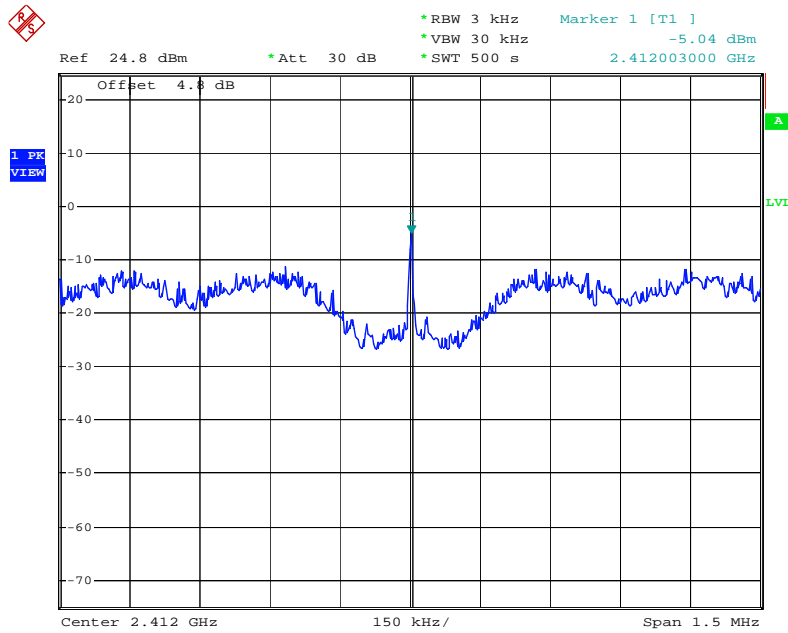
Date: 1.JUN.2008 17:36:16

Power Density Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (40MHz) / 5795 MHz



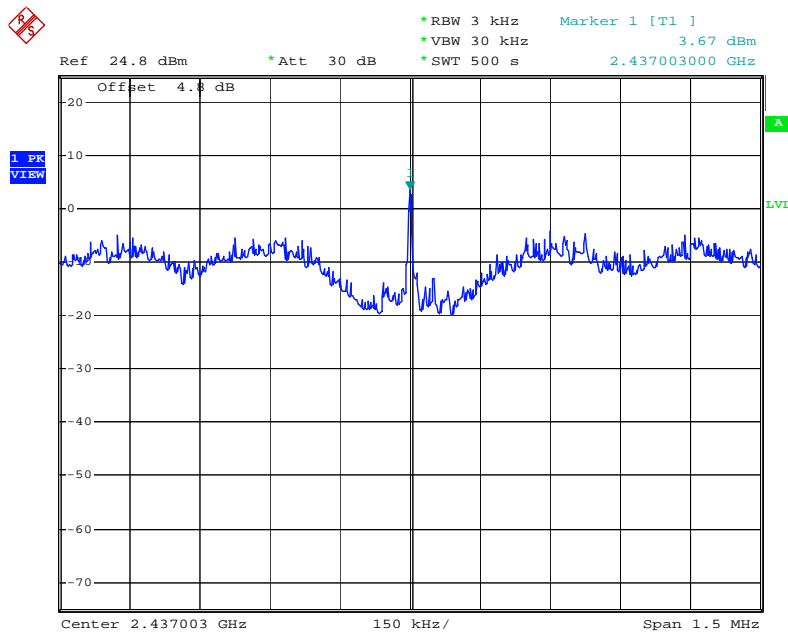
Date: 1.JUN.2008 17:36:49

Power Density Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz) / 2412 MHz



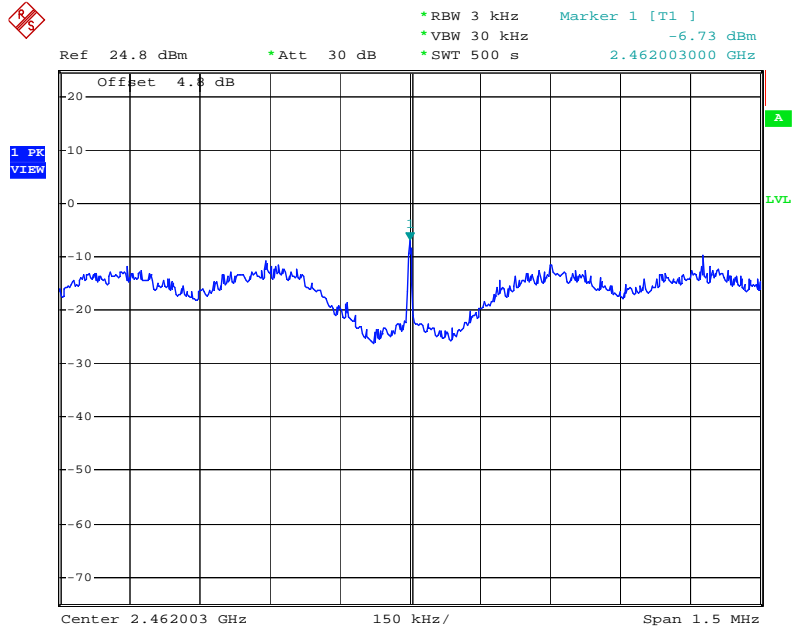
Date: 28.MAY.2008 11:12:27

Power Density Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz) / 2437 MHz



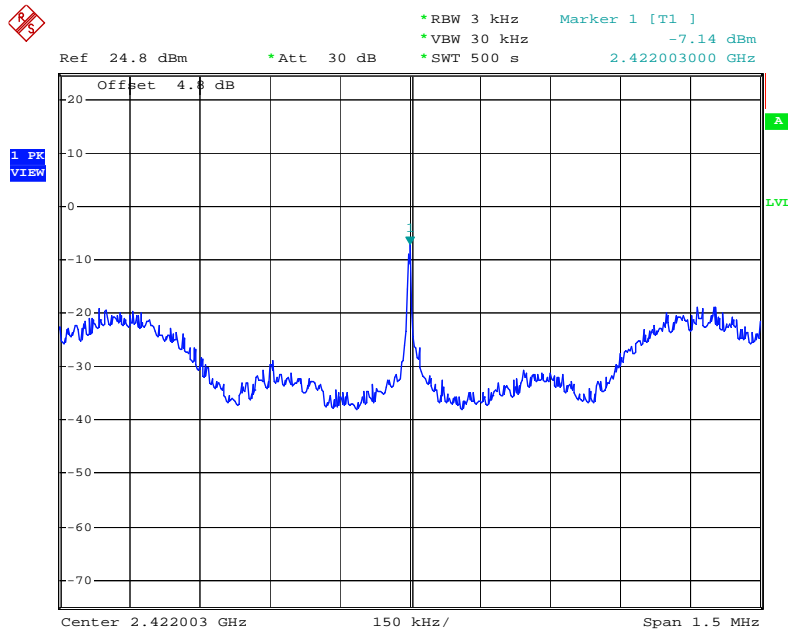
Date: 28.MAY.2008 11:13:46

Power Density Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz) / 2462 MHz



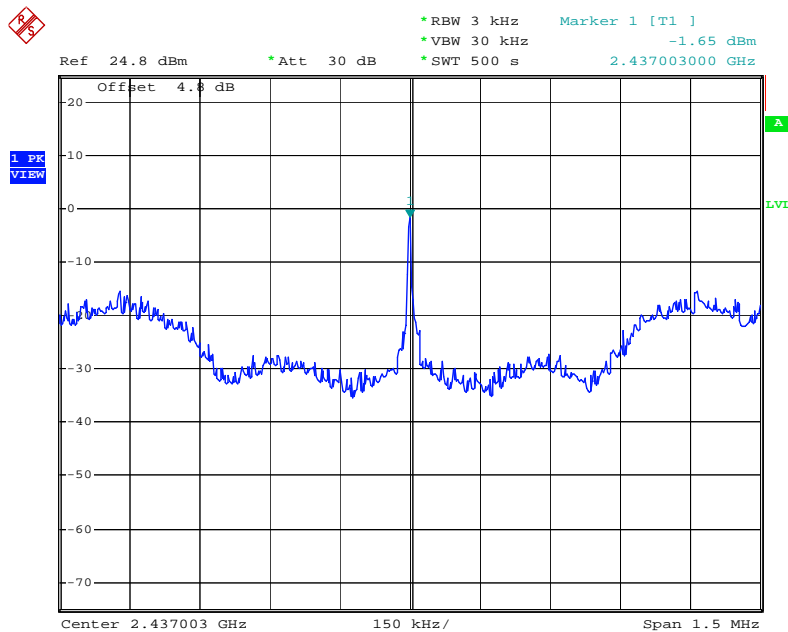
Date: 28.MAY.2008 11:19:55

Power Density Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz) / 2422 MHz



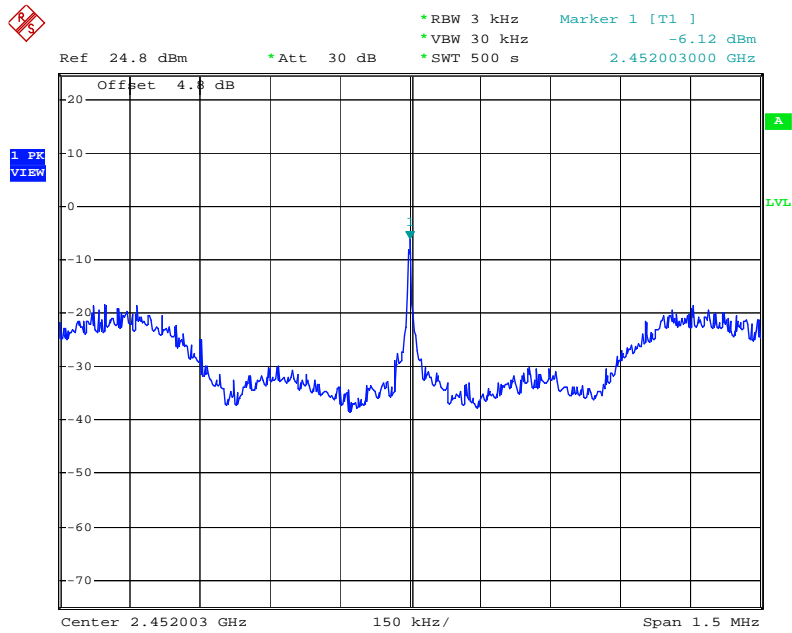
Date: 28.MAY.2008 12:05:17

Power Density Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz) / 2437 MHz



Date: 28.MAY.2008 12:07:19

Power Density Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz) / 2452 MHz



Date: 28.MAY.2008 12:06:12

3.4 6dB Spectrum Bandwidth Measurement

3.4.1 Limit

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

3.4.2 Measuring Instruments and Setting

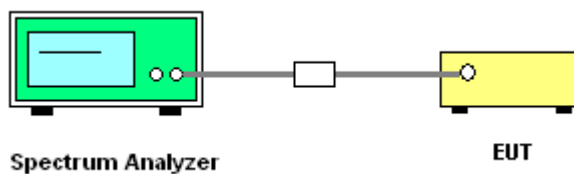
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

3.4.3 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 connectors are required to link with Spectrum Analyzer through a combiner.

3.4.4 Test Setup Layout



3.4.5 Test Deviation

There is no deviation with the original standard.

3.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.4.7 Test Result of 6dB Spectrum Bandwidth

Final Test date	Jun. 01, 2008	Test Site No.	TH01-HY
Temperature	27	Humidity	55%
Test Engineer	Sam	Configuration	802.11n

For Single Chain:

Configuration of IEEE 802.11n-5G (20MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	17.56	17.64	500	Complies
157	5785 MHz	17.56	17.64	500	Complies
165	5825 MHz	17.56	17.64	500	Complies

Configuration of IEEE 802.11n-5G (40MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	36.40	36.24	500	Complies
159	5795 MHz	36.40	36.24	500	Complies

Configuration of IEEE 802.11n-2.4G (20MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.56	17.64	500	Complies
6	2437 MHz	17.56	17.68	500	Complies
11	2462 MHz	17.56	17.60	500	Complies

Configuration of IEEE 802.11n-2.4G (40MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.40	36.24	500	Complies
6	2437 MHz	36.48	36.24	500	Complies
9	2452 MHz	36.40	36.24	500	Complies

For Two Chain:

Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	16.88	17.56	500	Complies
157	5785 MHz	17.08	17.60	500	Complies
165	5825 MHz	17.28	17.60	500	Complies

Configuration of IEEE 802.11n-5G Ant. 1 & 2 (40MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	36.40	36.24	500	Complies
159	5795 MHz	36.32	36.24	500	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz)

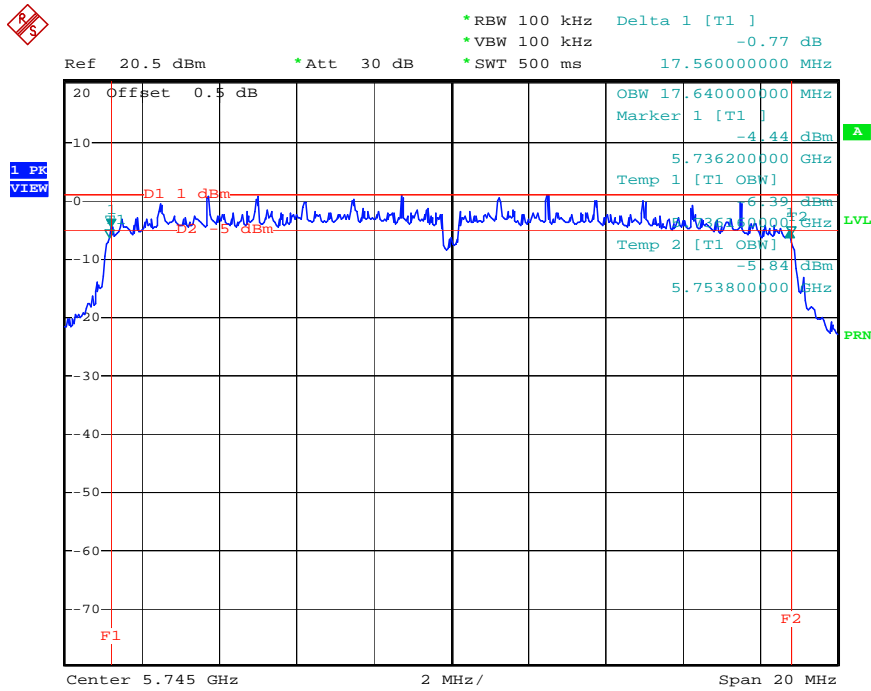
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	15.80	17.56	500	Complies
6	2437 MHz	15.72	17.60	500	Complies
11	2462 MHz	15.76	17.56	500	Complies

Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	35.84	36.16	500	Complies
6	2437 MHz	35.92	36.24	500	Complies
9	2452 MHz	35.76	36.24	500	Complies

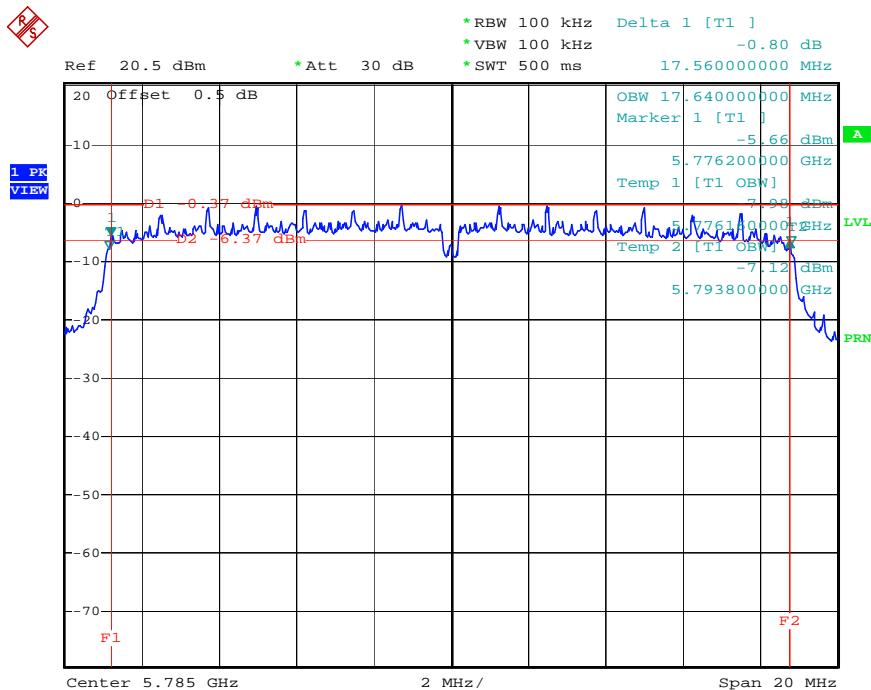
For Single Chain:

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G (20MHz) / 5745 MHz



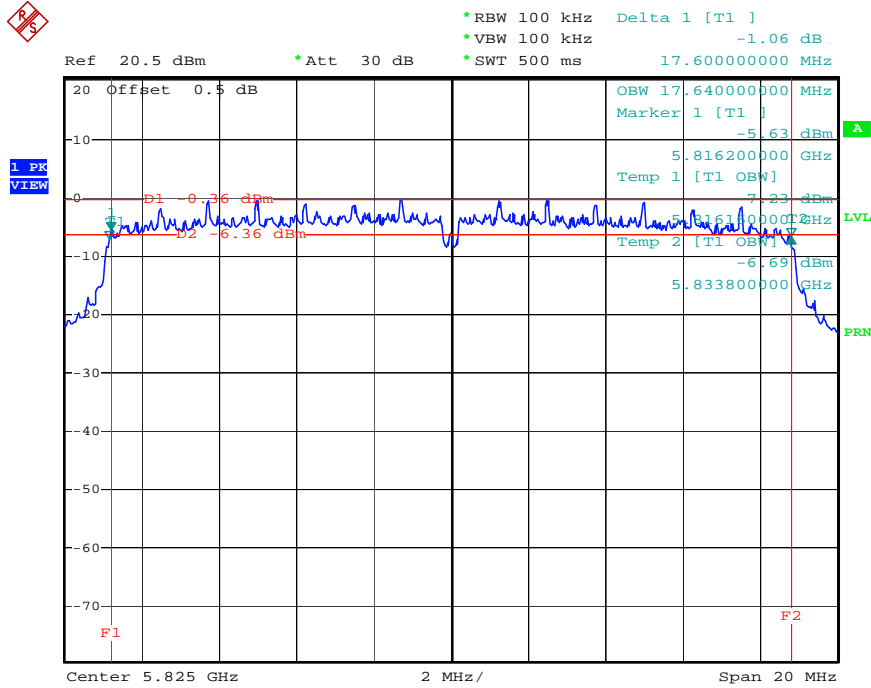
Date: 1.JUN.2008 06:13:40

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G (20MHz) / 5785 MHz



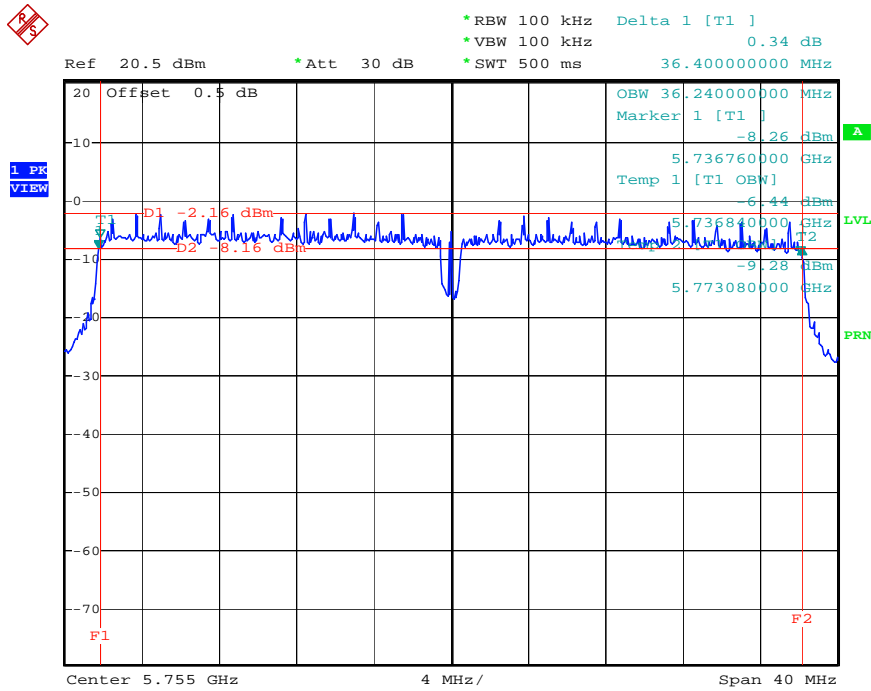
Date: 1.JUN.2008 06:16:56

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G (20MHz) / 5825 MHz



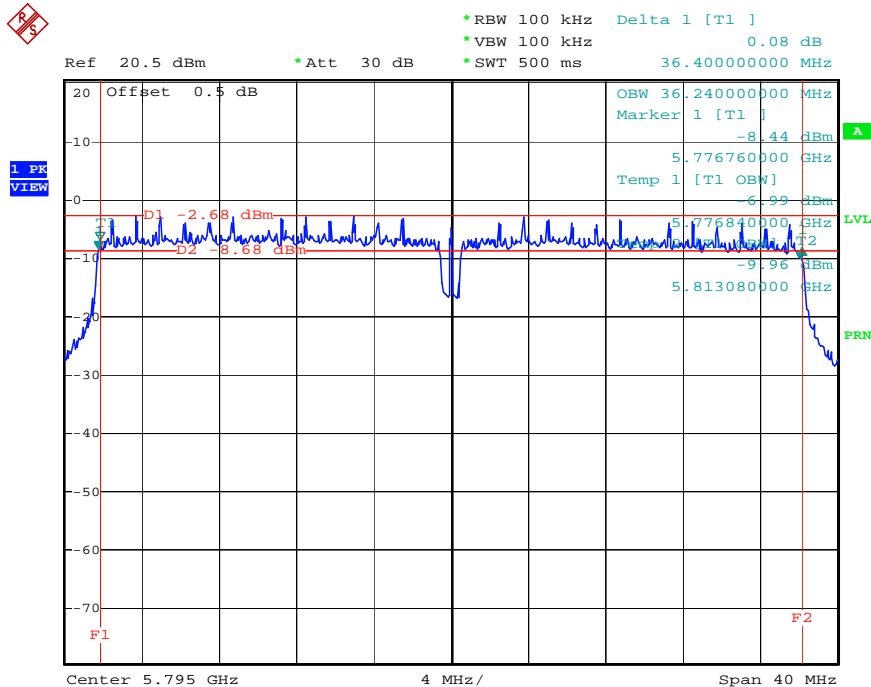
Date: 1 JUN 2008 06:20:42

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G (40MHz) / 5755 MHz



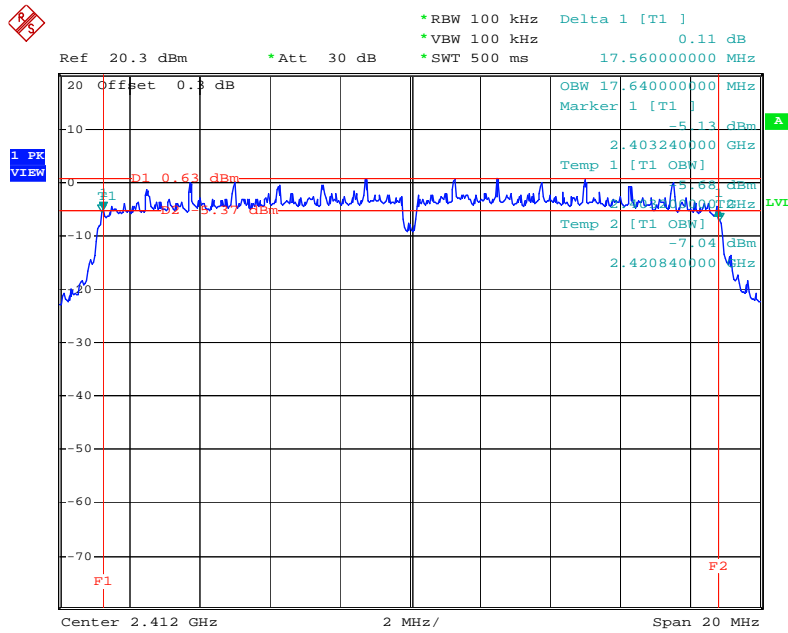
Date: 1.JUN.2008 06:37:58

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G (40MHz) / 5795 MHz



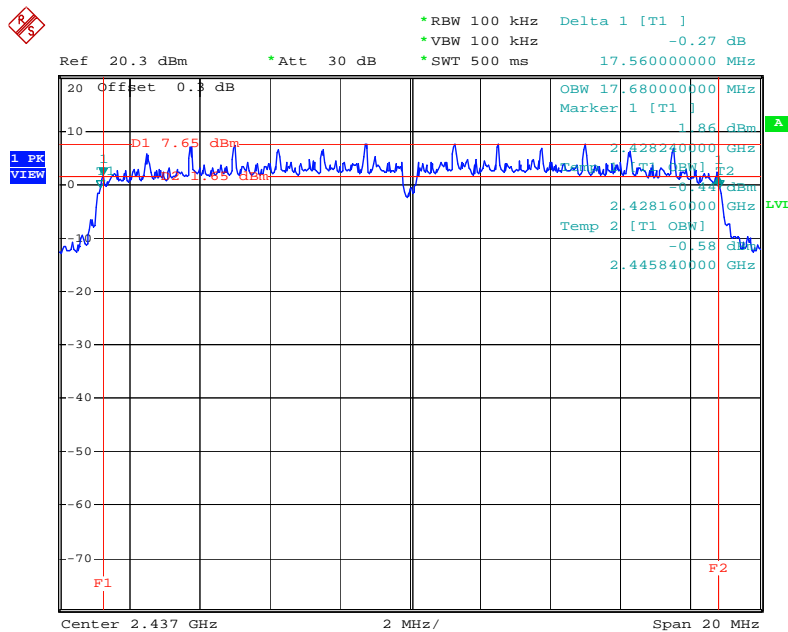
Date: 1.JUN.2008 06:47:12

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G (20MHz) / 2412 MHz



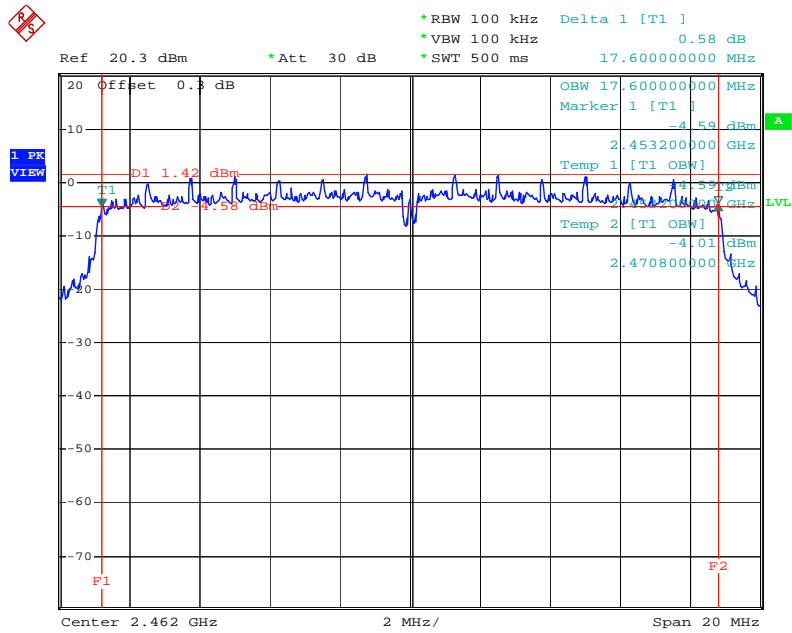
Date: 28.MAY.2008 10:27:11

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G (20MHz) / 2437 MHz



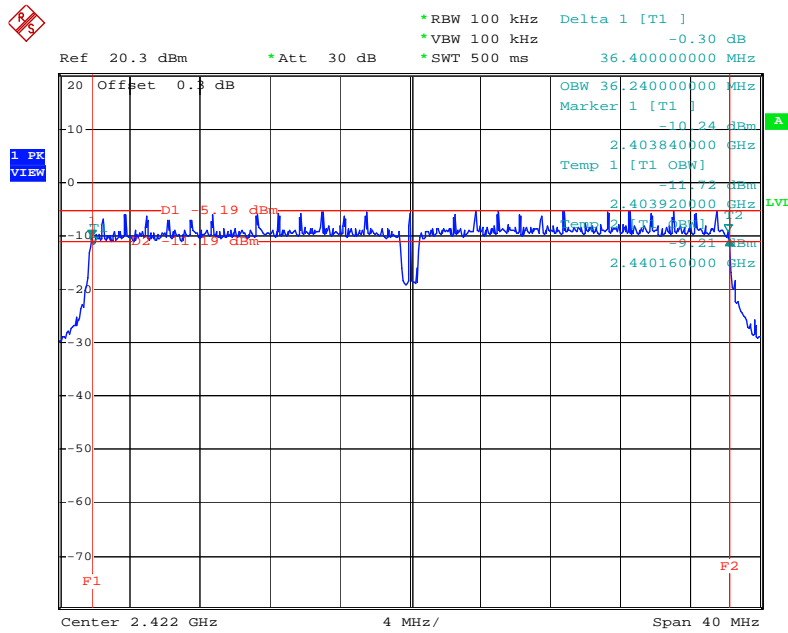
Date: 28.MAY.2008 10:31:42

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G (20MHz) / 2462 MHz



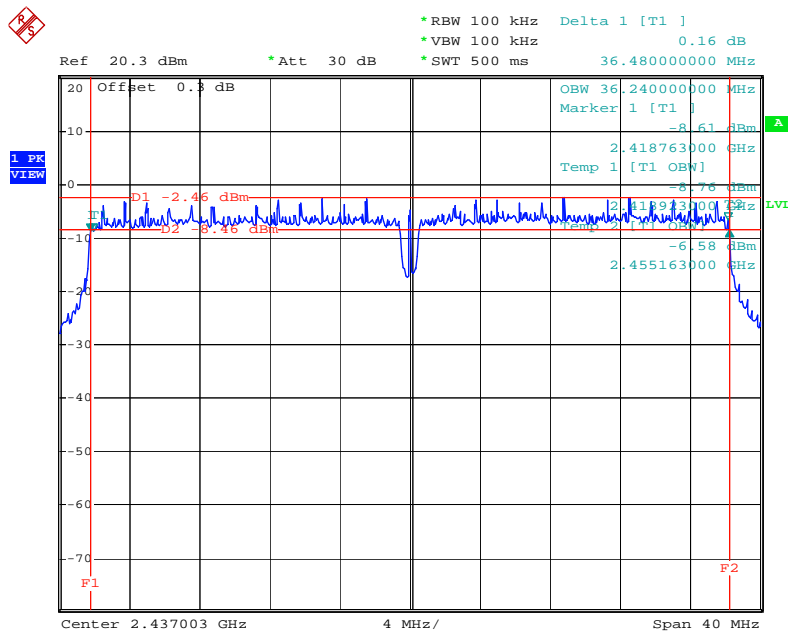
Date: 28.MAY.2008 10:34:54

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G (40MHz) / 2422 MHz



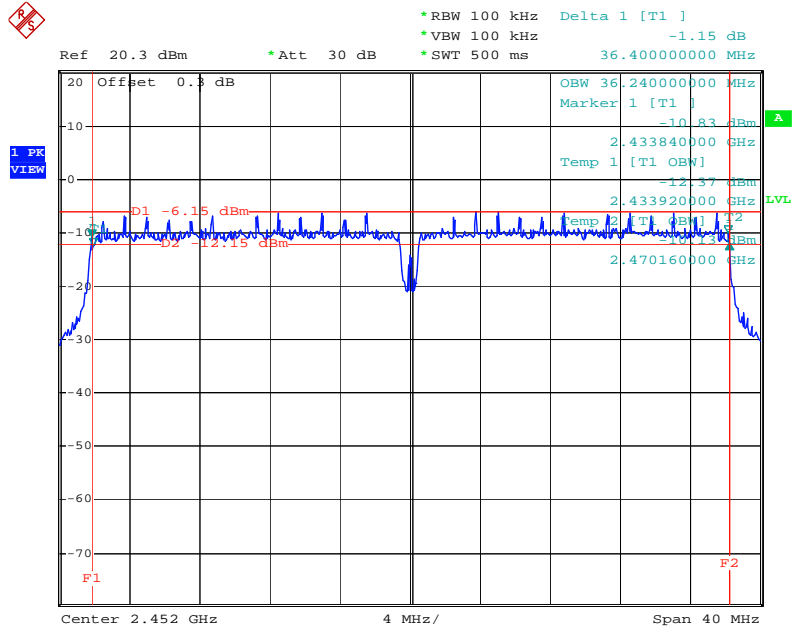
Date: 28.MAY.2008 10:51:06

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G (40MHz) / 2437 MHz



Date: 28.MAY.2008 10:49:05

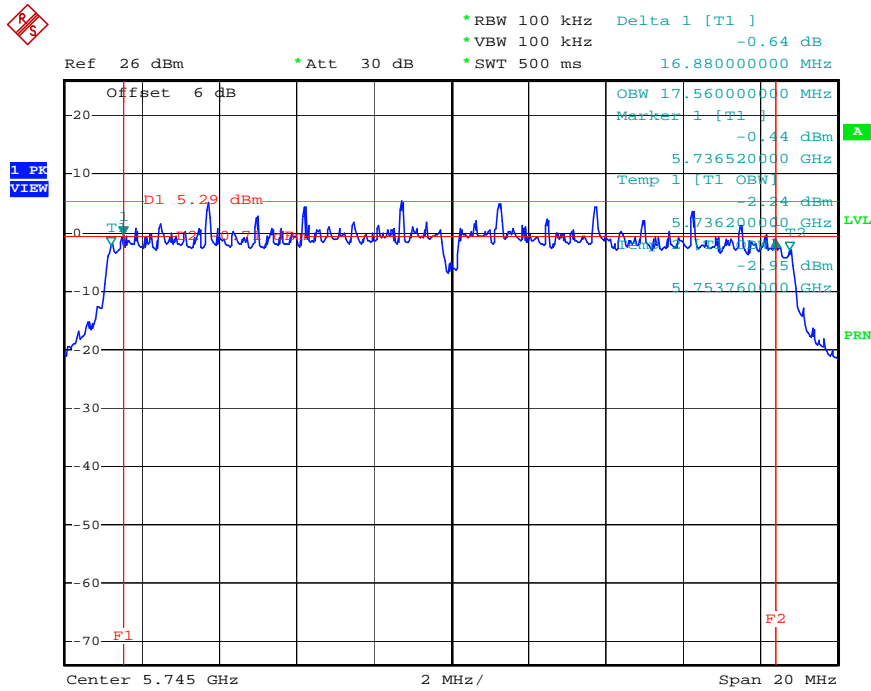
6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G (40MHz) / 2452 MHz



Date: 28.MAY.2008 10:43:29

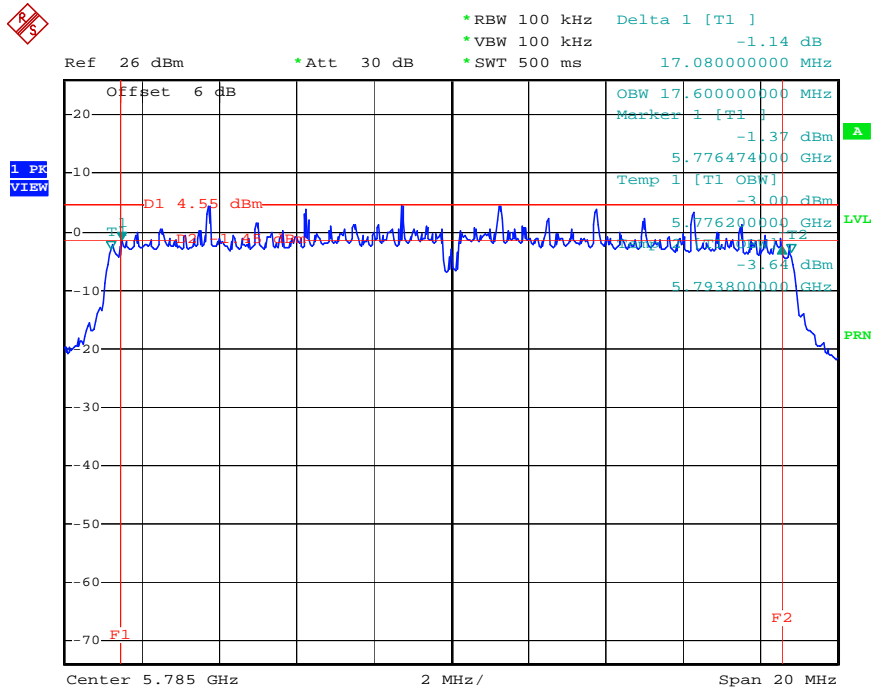
For Two Chain:

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz) / 5745 MHz



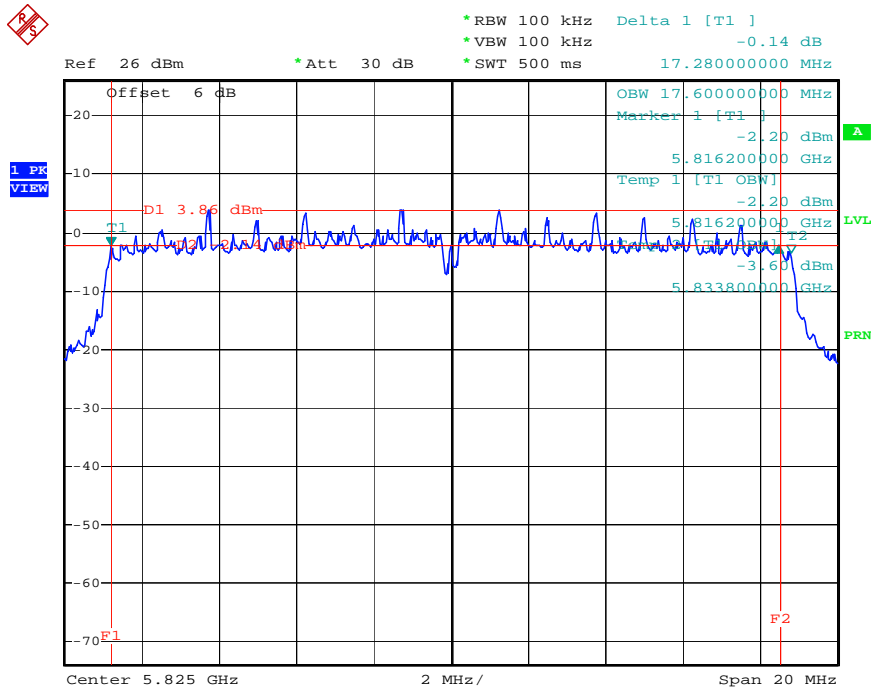
Date: 1.JUN.2008 17:22:16

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz) / 5785 MHz



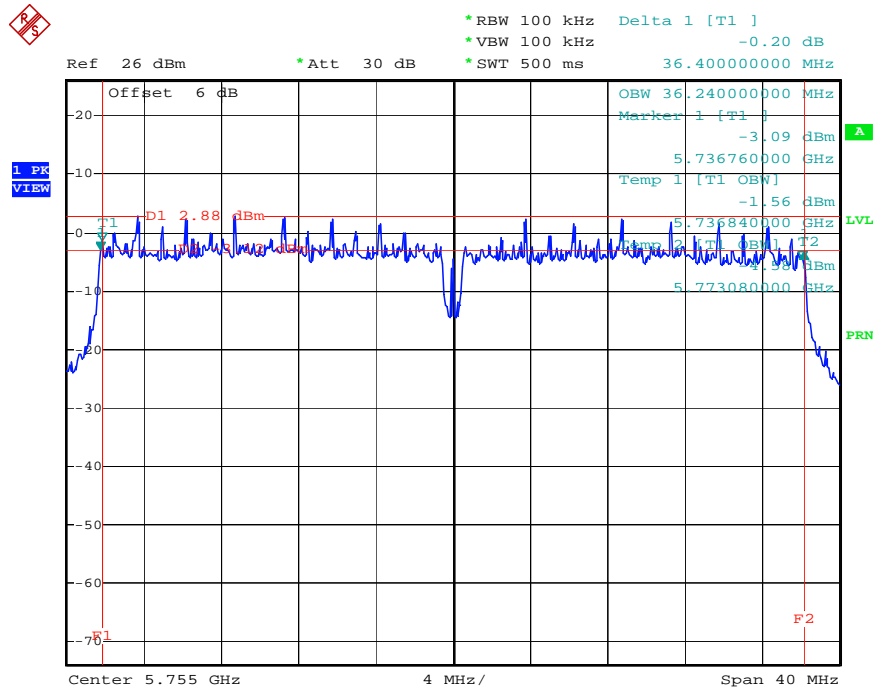
Date: 1.JUN.2008 17:21:07

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (20MHz) / 5825 MHz



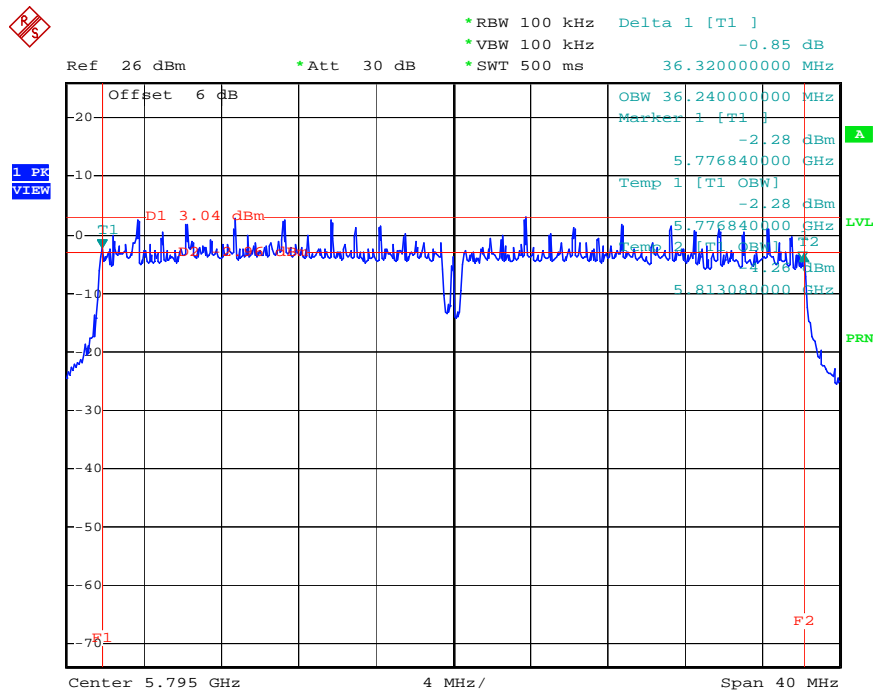
Date: 1.JUN.2008 17:03:21

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (40MHz) / 5755 MHz



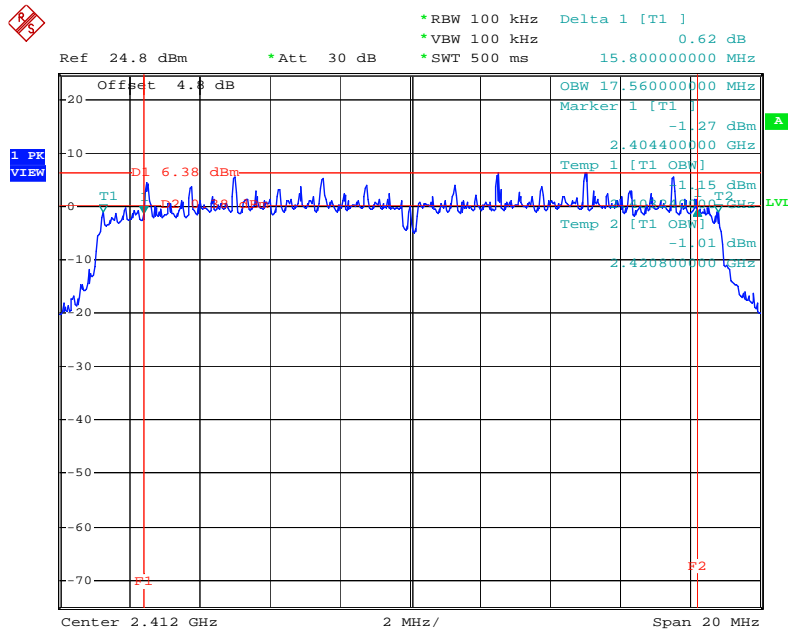
Date: 1.JUN.2008 17:38:07

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-5G Ant. 1 & 2 (40MHz) / 5795 MHz



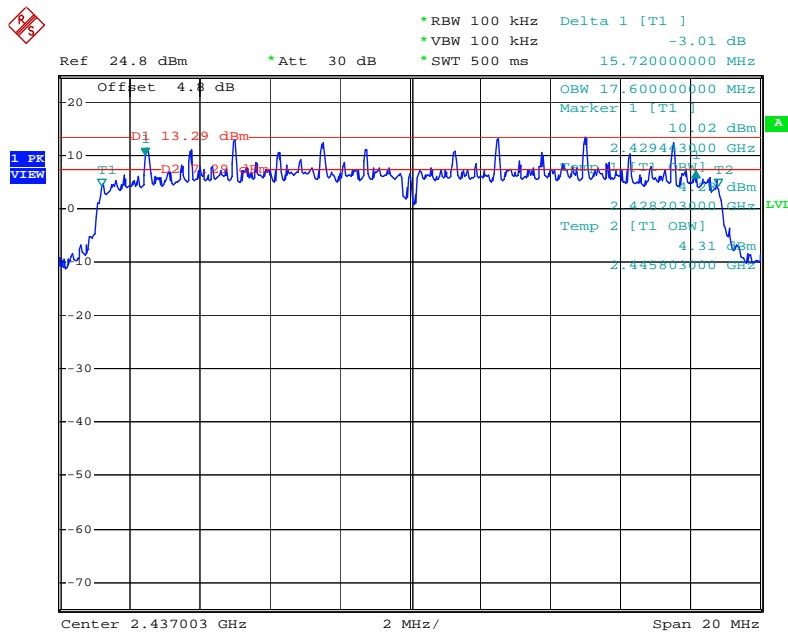
Date: 1.JUN.2008 17:39:07

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz) / 2412 MHz



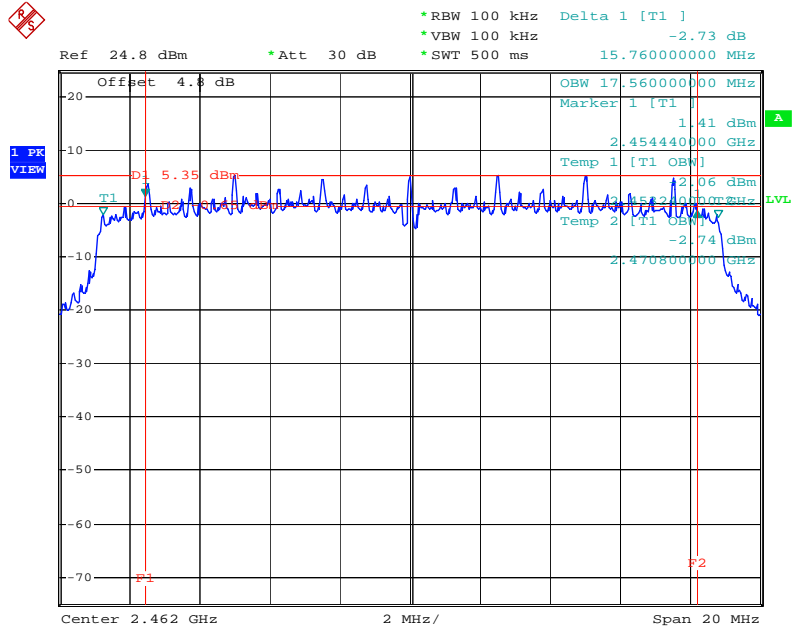
Date: 28.MAY.2008 11:10:36

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz) / 2437 MHz



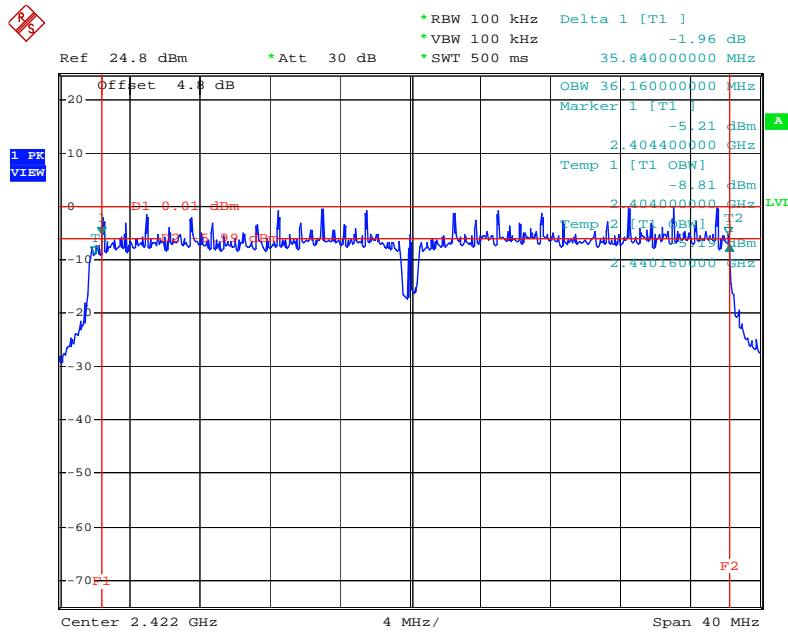
Date: 28.MAY.2008 11:14:44

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (20MHz) / 2462 MHz



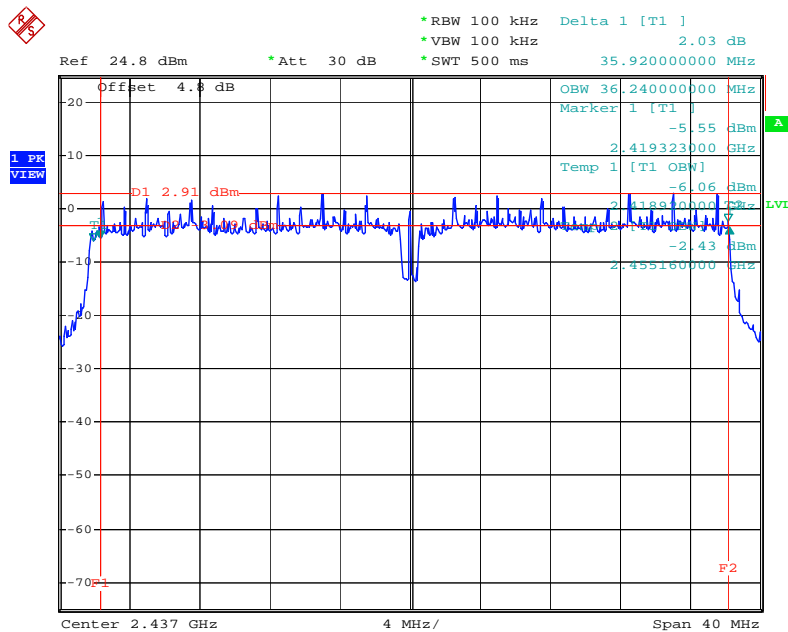
Date: 28.MAY.2008 11:16:51

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz) / 2422 MHz



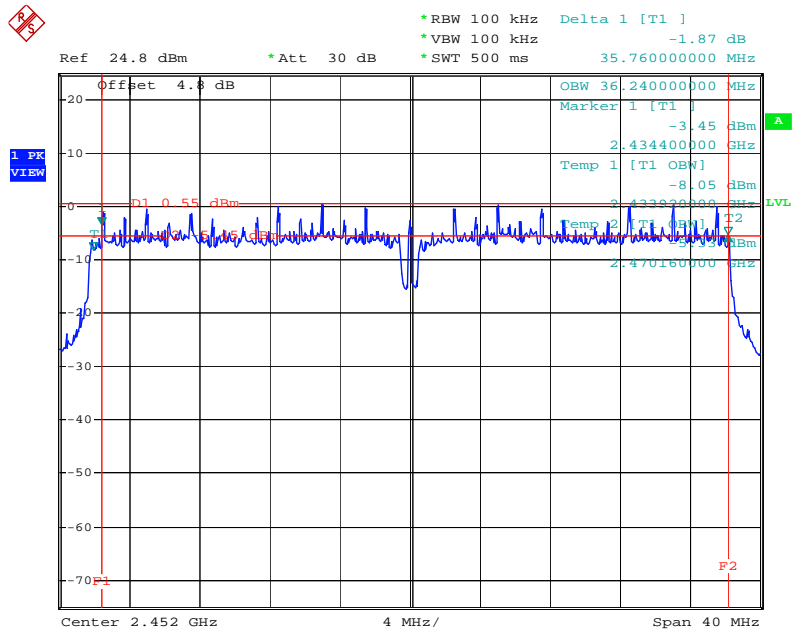
Date: 28.MAY.2008 12:02:10

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz) / 2437 MHz



Date: 28.MAY.2008 12:13:51

6 dB Bandwidth Plot on Configuration of IEEE 802.11n-2.4G Ant. 1 & 2 (40MHz) / 2452 MHz



Date: 28.MAY.2008 12:25:15

3.5 Radiated Emissions Measurement

3.5.1 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

3.5.2 Measuring Instruments and Setting

Please refer to section 4 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

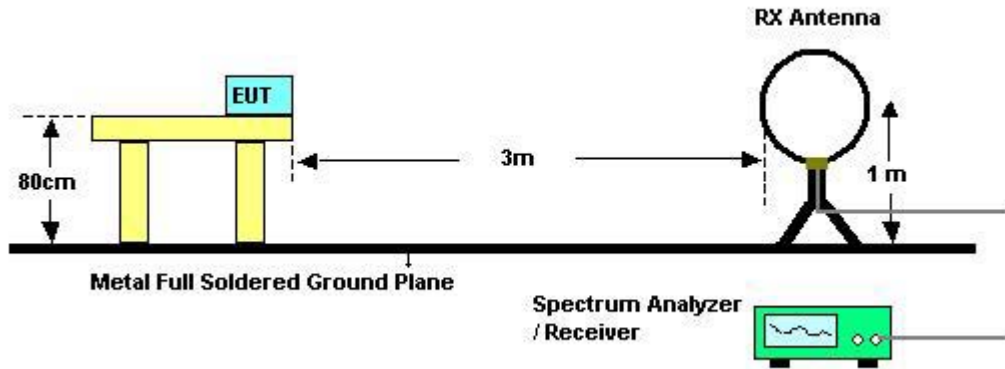
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.5.3 Test Procedures

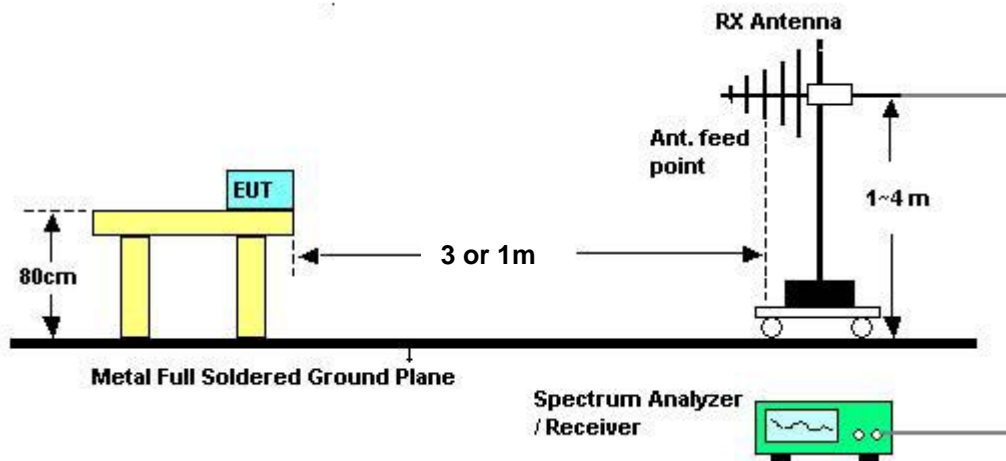
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

3.5.4 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 1m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB);

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

3.5.5 Test Deviation

There is no deviation with the original standard.

3.5.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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

Final Test date	Aug. 03 2009	Test Site No.	OS04-LK
Temperature	26	Humidity	49%
Test Engineer	Benny		

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.

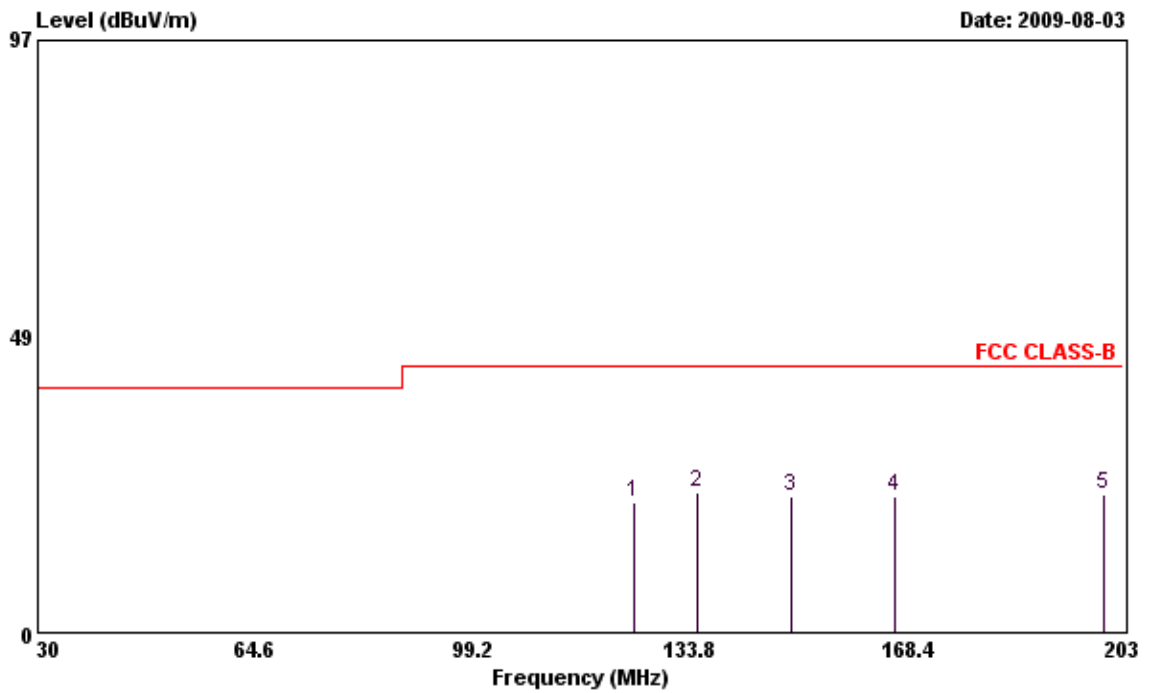
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

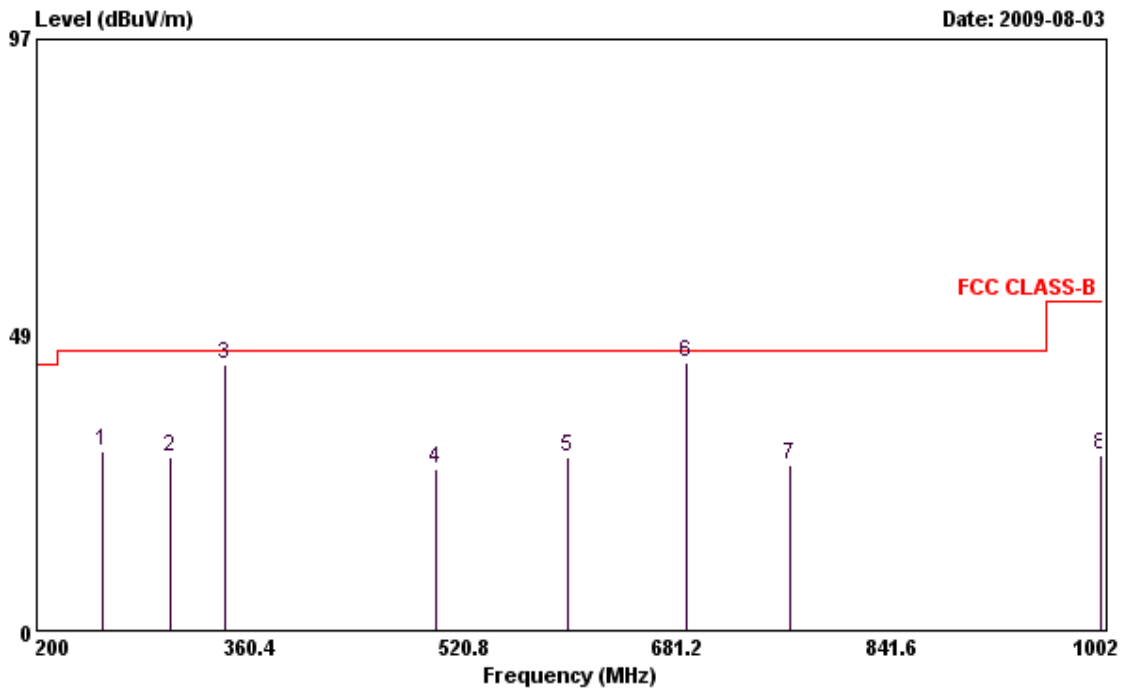
3.5.8 Results of Radiated Emissions (30MHz~1GHz)

Final Test date	Aug. 03 2009	Test Site No.	OS04-LK
Temperature	26	Humidity	49%
Test Engineer	Benny	Configuration	POE Mode (Power Supply: POE20U-560(G) -R) (1Gpbs)

Horizontal

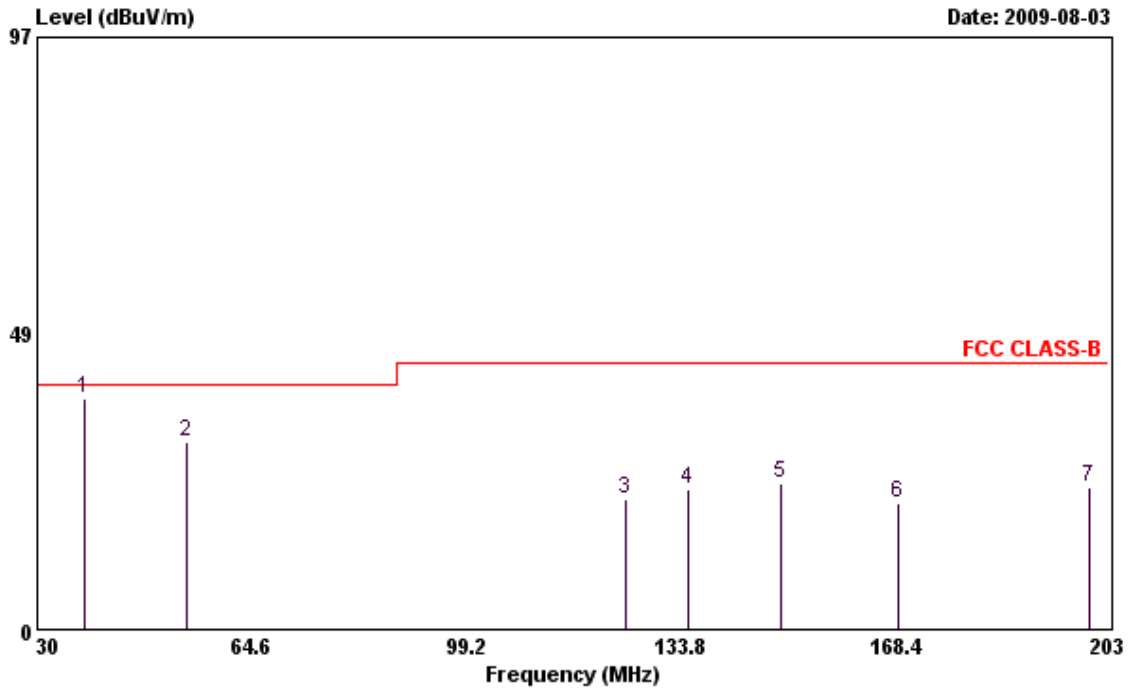


	Freq	Level	Over Limit	Limit Line	ReadAntenna	Cable	Preamp	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB		cm	deg
1	125.000	21.42	-22.08	43.50	34.81	11.41	0.20	25.00 Peak	---	---
2	135.000	22.95	-20.55	43.50	36.47	11.27	0.21	25.00 Peak	---	---
3	150.000	22.39	-21.11	43.50	36.08	11.05	0.26	25.00 Peak	---	---
4	166.670	22.26	-21.24	43.50	37.92	9.04	0.30	25.00 Peak	---	---
5	200.000	22.70	-20.80	43.50	38.41	8.95	0.34	25.00 Peak	---	---

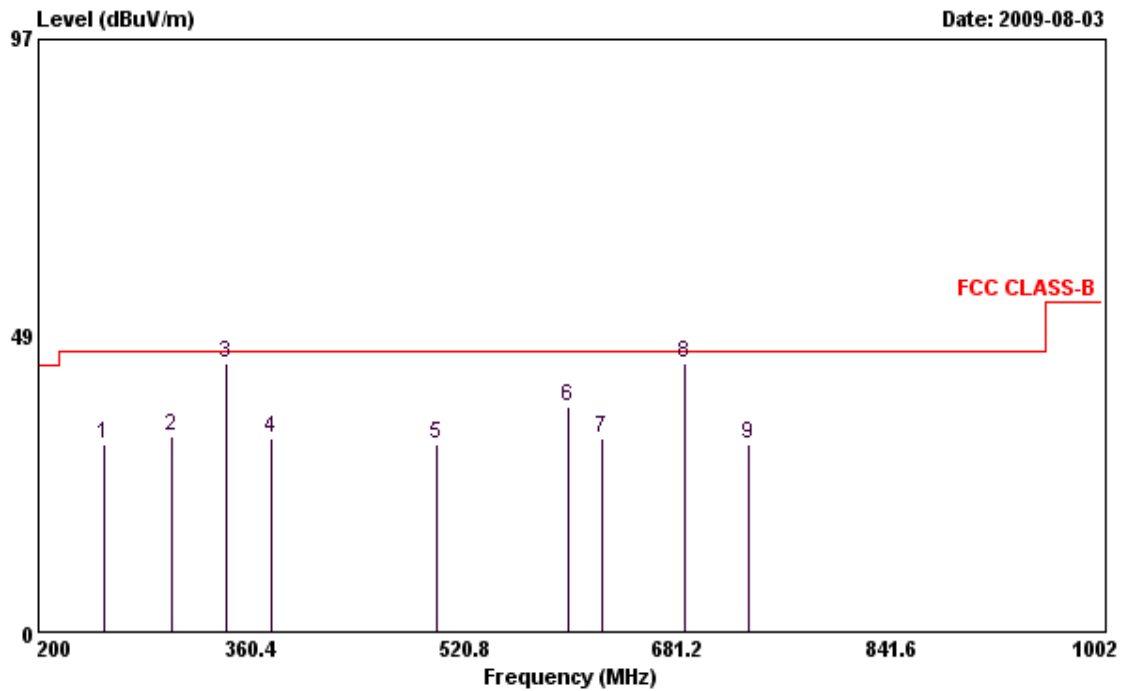


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	250.000	29.41	-16.59	46.00	42.37	11.57	0.47	25.00	Peak	---	---
2	300.000	28.47	-17.53	46.00	40.28	12.61	0.58	25.00	Peak	---	---
3 @	342.000	43.78	-2.22	46.00	54.74	13.43	0.61	25.00	QP	---	---
4	500.000	26.51	-19.49	46.00	34.08	16.43	1.00	25.00	Peak	---	---
5	600.000	28.54	-17.46	46.00	34.72	17.72	1.20	25.10	Peak	---	---
6 @	688.500	43.88	-2.12	46.00	49.38	18.13	1.56	25.19	QP	---	---
7	766.500	27.00	-19.00	46.00	31.51	18.77	1.85	25.13	Peak	---	---
8	1000.000	28.86	-25.14	54.00	31.05	20.44	2.37	25.00	Peak	---	---

Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	37.500	37.96	-2.04	40.00	47.57	15.16	0.11	24.88	QP	---	---
2	54.220	30.86	-9.14	40.00	48.27	7.41	0.12	24.94	Peak	---	---
3	125.000	21.40	-22.10	43.50	34.79	11.41	0.20	25.00	Peak	---	---
4	135.010	23.09	-20.41	43.50	36.61	11.27	0.21	25.00	Peak	---	---
5	150.000	23.94	-19.56	43.50	37.63	11.05	0.26	25.00	Peak	---	---
6	168.920	20.82	-22.68	43.50	36.51	9.01	0.30	25.00	Peak	---	---
7	200.000	23.40	-20.10	43.50	39.11	8.95	0.34	25.00	Peak	---	---



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	250.000	30.79	-15.21	46.00	43.75	11.57	0.47	25.00	Peak	---	---
2	300.000	32.04	-13.96	46.00	43.85	12.61	0.58	25.00	Peak	---	---
3 @	342.000	43.85	-2.15	46.00	54.81	13.43	0.61	25.00	QP	---	---
4	375.000	31.72	-14.28	46.00	41.91	14.08	0.73	25.00	Peak	---	---
5	500.000	30.76	-15.24	46.00	38.33	16.43	1.00	25.00	Peak	---	---
6	600.000	36.70	-9.30	46.00	42.88	17.72	1.20	25.10	Peak	---	---
7	625.000	31.83	-14.17	46.00	37.85	17.84	1.26	25.12	Peak	---	---
8 @	688.000	43.99	-2.01	46.00	49.49	18.13	1.56	25.19	QP	---	---
9	735.000	30.62	-15.38	46.00	35.54	18.50	1.75	25.17	Peak	---	---

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).

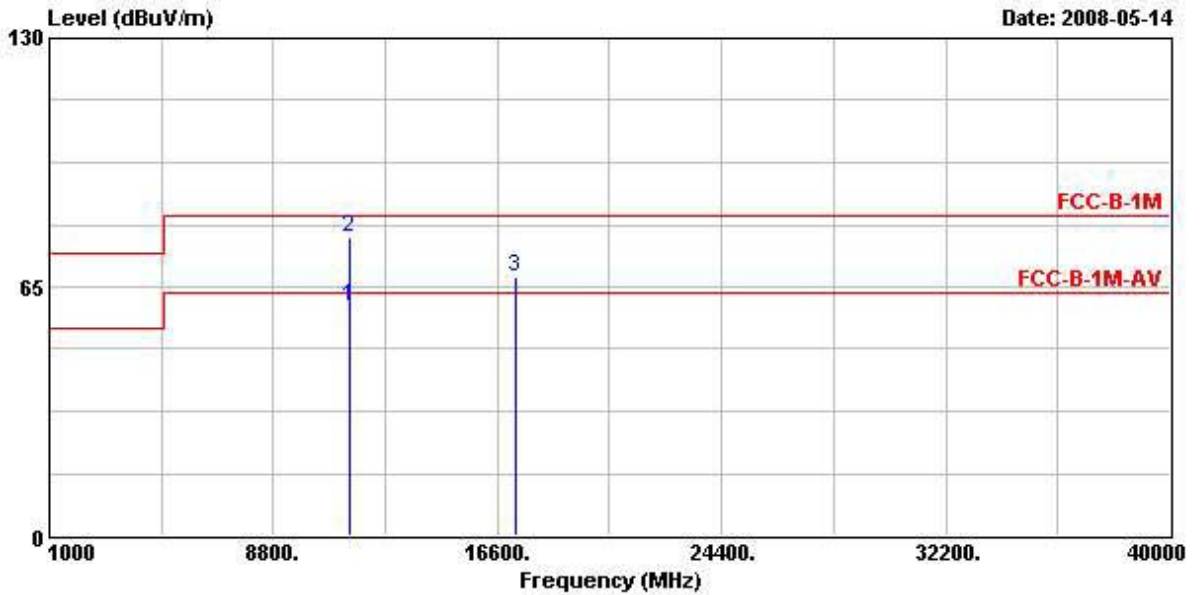
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

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

For Single Chain:

Final Test date	May 14, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	5G 802.11n CH 149 (20MHz)

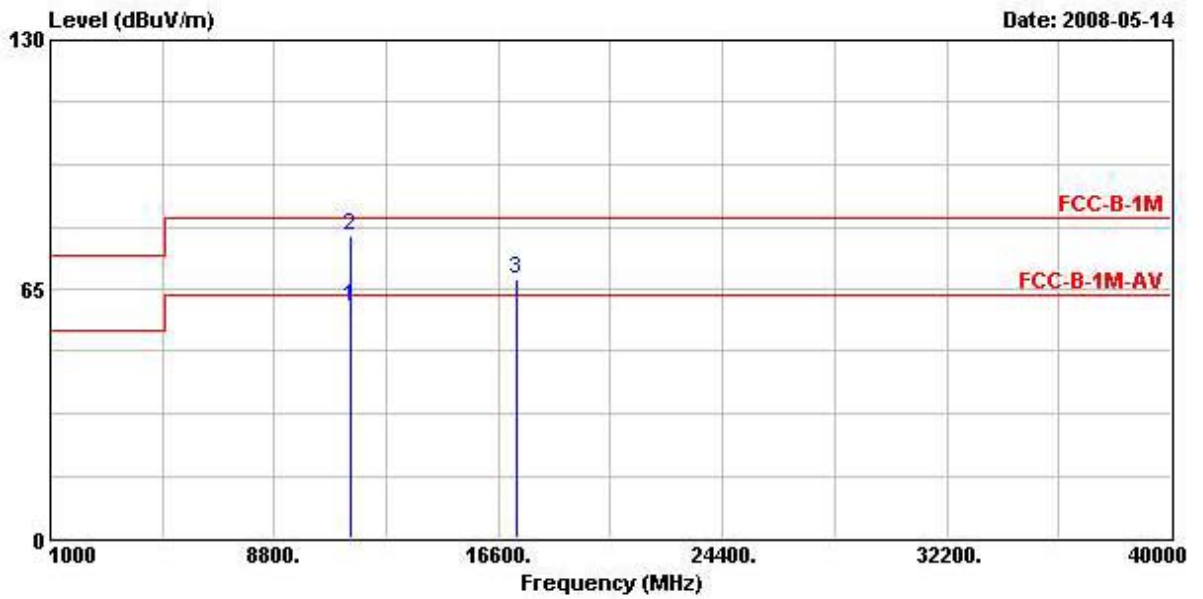
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	
1	11484.400	60.09	-3.45	63.54	45.94	39.68	6.78	32.31	AVERAGE
2	11484.400	78.15	-5.39	83.54	64.01	39.68	6.78	32.31	Peak
3	17235.000	67.43			44.92	43.26	7.80	28.55	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

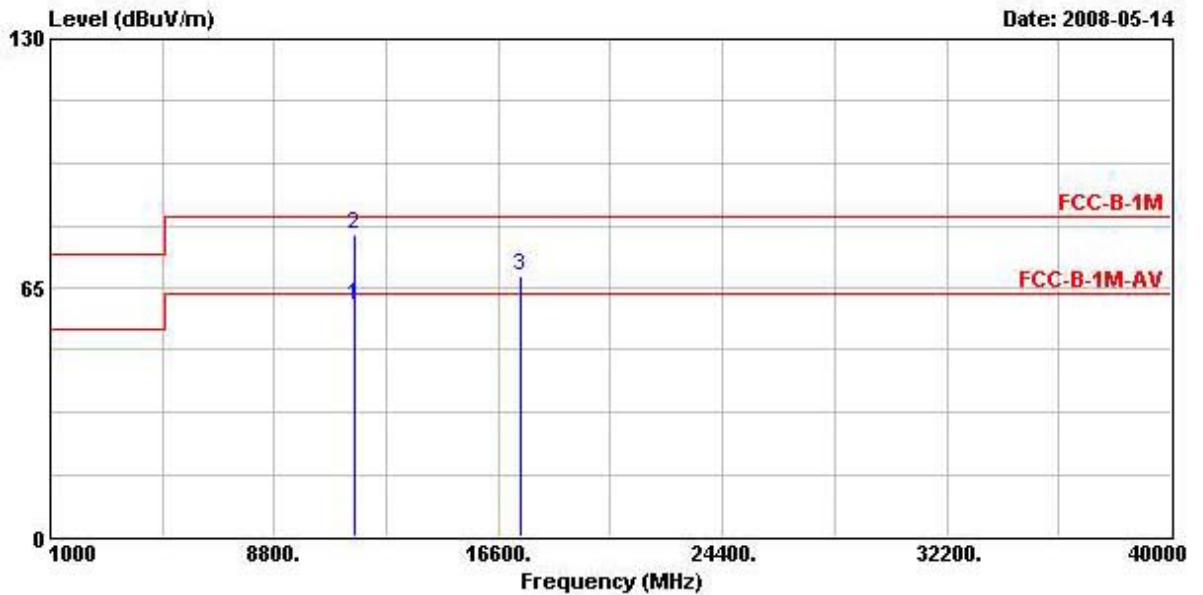


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 @	11488.900	60.45	-3.09	63.54	46.30	39.68	6.78	32.31	AVERAGE
2 @	11488.900	78.72	-4.82	83.54	64.58	39.68	6.78	32.31	Peak
3	17239.000	67.66			45.15	43.26	7.80	28.55	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test date	May 14, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	5G 802.11n CH 157 (20MHz)

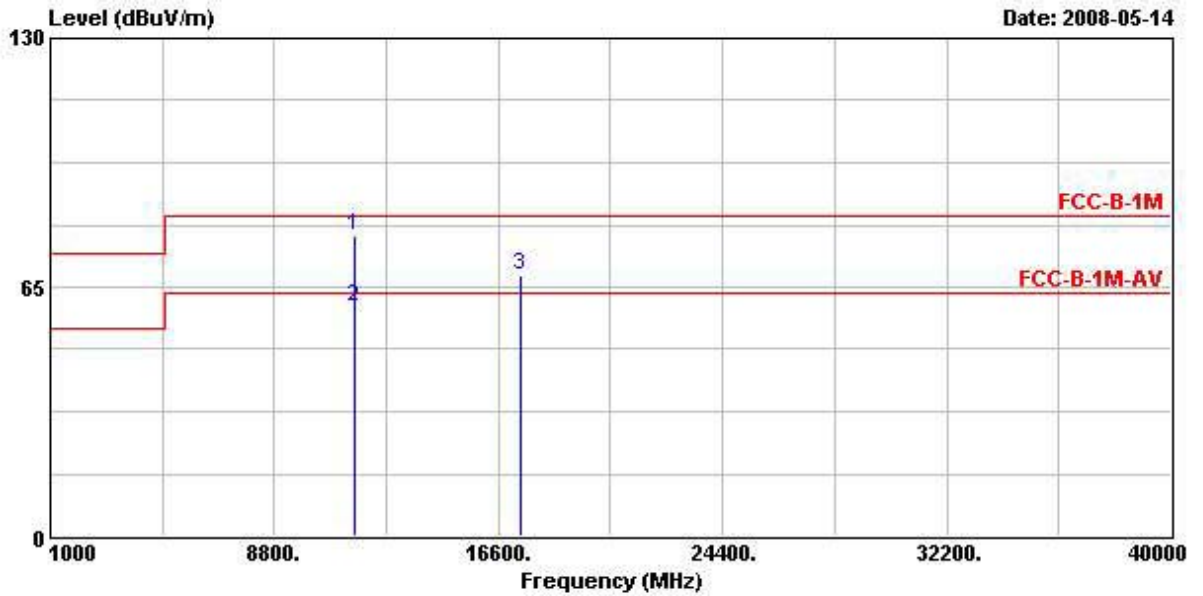
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	11569.600	60.29	-3.25	63.54	46.48	39.63	6.68	32.49	AVERAGE
2	11569.600	79.01	-4.53	83.54	65.20	39.63	6.68	32.49	Peak
3	17355.000	68.12			44.62	44.24	7.82	28.56	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

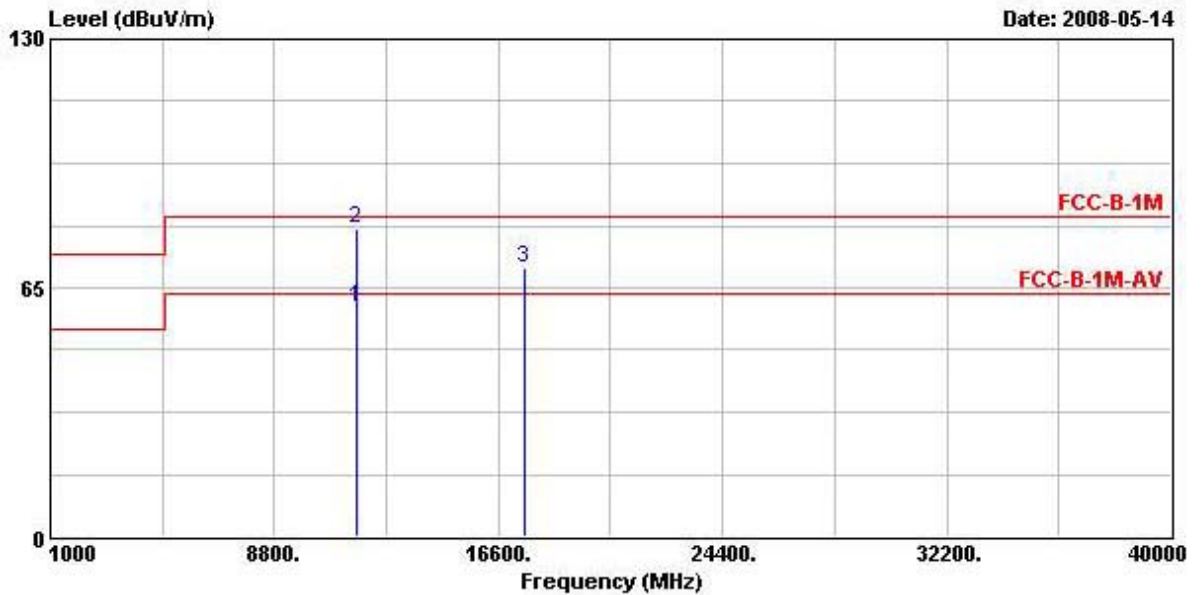


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	11571.100	78.39	-5.15	83.54	64.60	39.63	6.68	32.52	Peak
2	11571.100	59.62	-3.92	63.54	45.83	39.63	6.68	32.52	AVERAGE
3	17351.000	68.33			44.83	44.24	7.82	28.56	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test date	May 14, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	5G 802.11n CH 165 (20MHz)

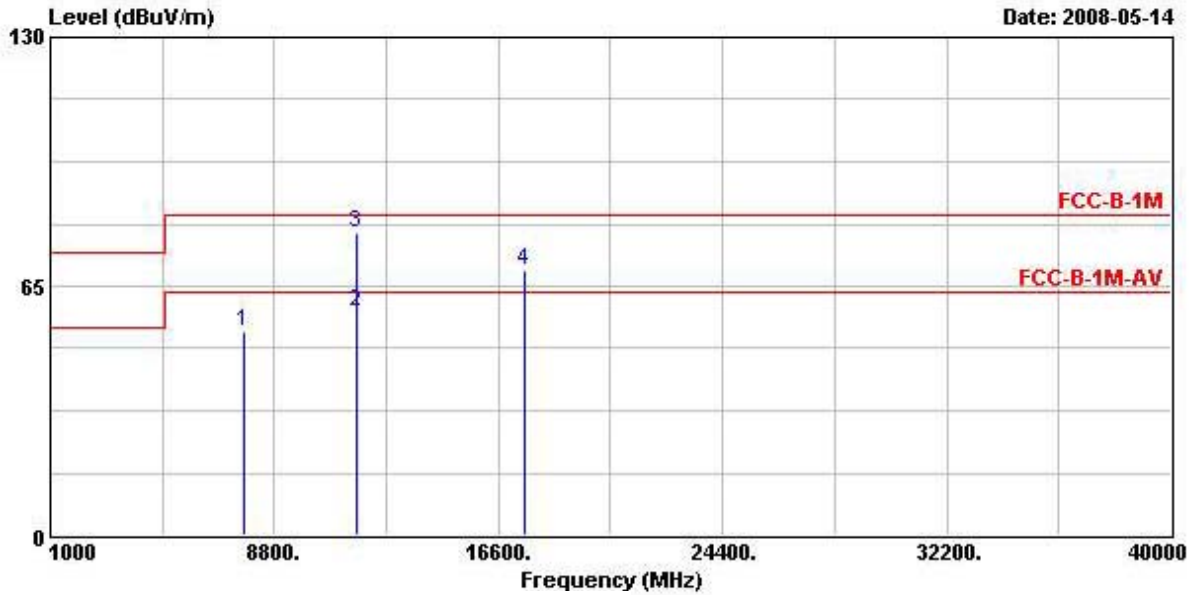
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	
1	11648.500	59.97	-3.57	63.54	46.42	39.56	6.57	32.59	AVERAGE
2	11648.500	80.62	-2.92	83.54	67.08	39.56	6.57	32.59	Peak
3	17475.000	70.09			45.60	45.22	7.84	28.57	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

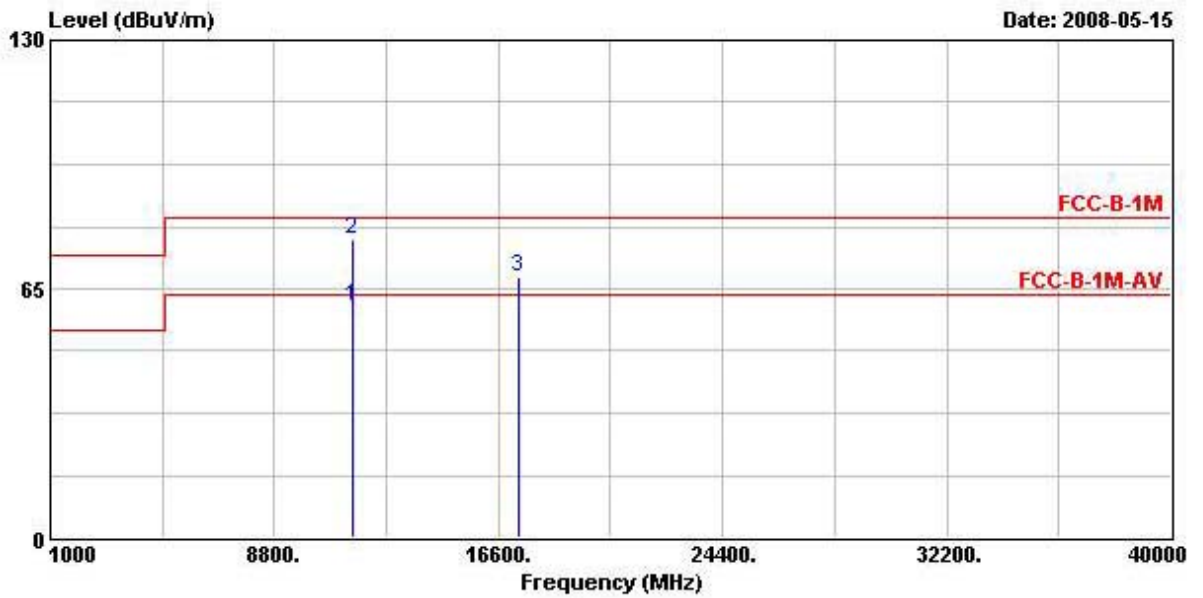


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	7768.000	53.07			43.77	37.57	4.63	32.89	PEAK
2	11651.400	58.39	-5.15	63.54	44.86	39.54	6.57	32.59	AVERAGE
3 @	11651.400	78.97	-4.57	83.54	65.45	39.54	6.57	32.59	Peak
4	17479.000	69.15			44.66	45.22	7.84	28.57	PEAK

Note: An item 1 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test date	May 15, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	5G 802.11n CH 151 (40MHz)

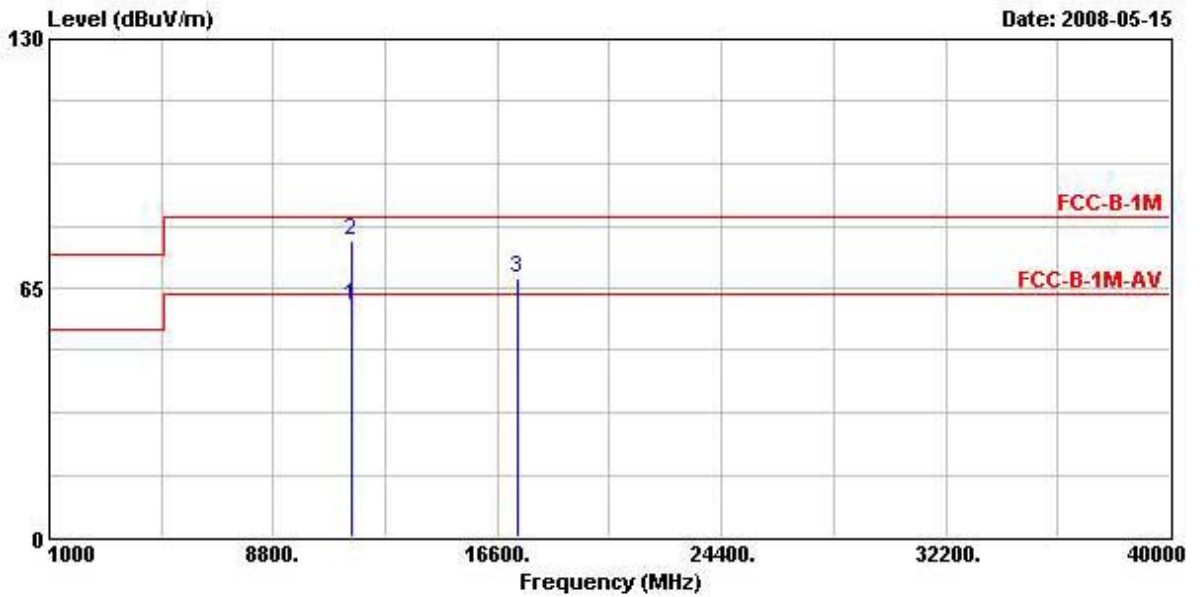
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	
1	11515.400	60.38	-3.16	63.54	46.42	39.68	6.73	32.45	AVERAGE
2	11515.400	77.85	-5.69	83.54	63.88	39.68	6.73	32.45	Peak
3	17269.000	67.85			45.05	43.54	7.81	28.55	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

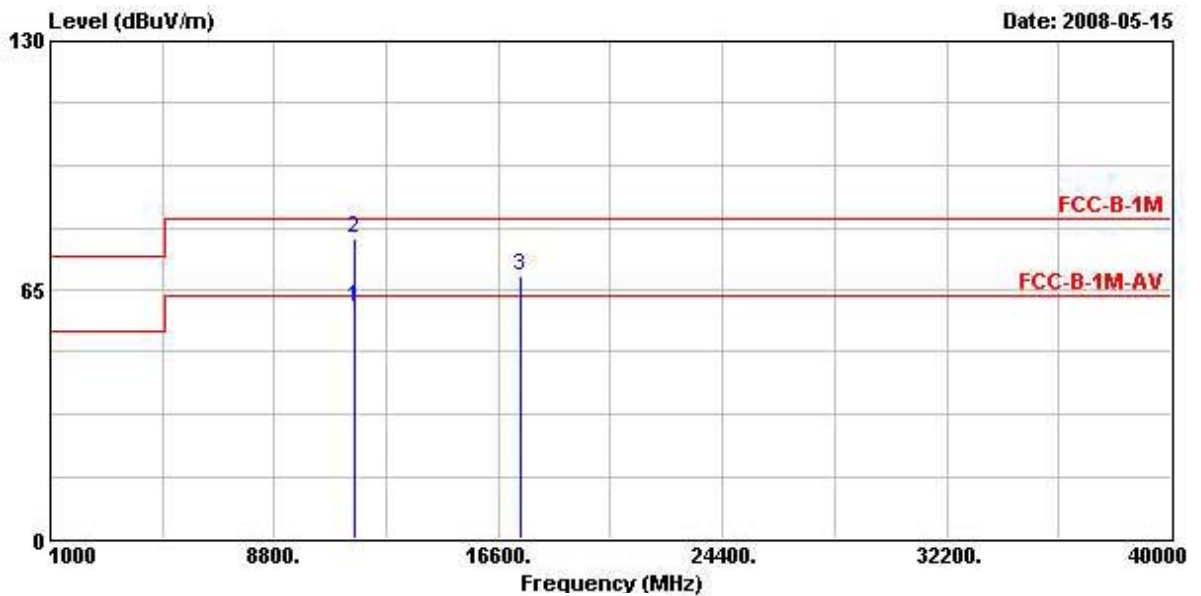


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	11510.600	60.12	-3.42	63.54	46.14	39.70	6.73	32.45	AVERAGE
2	11510.600	77.53	-6.01	83.54	63.55	39.70	6.73	32.45	Peak
3	17269.000	67.35			44.55	43.54	7.81	28.55	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test date	May 15, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	5G 802.11n CH 159 (40MHz)

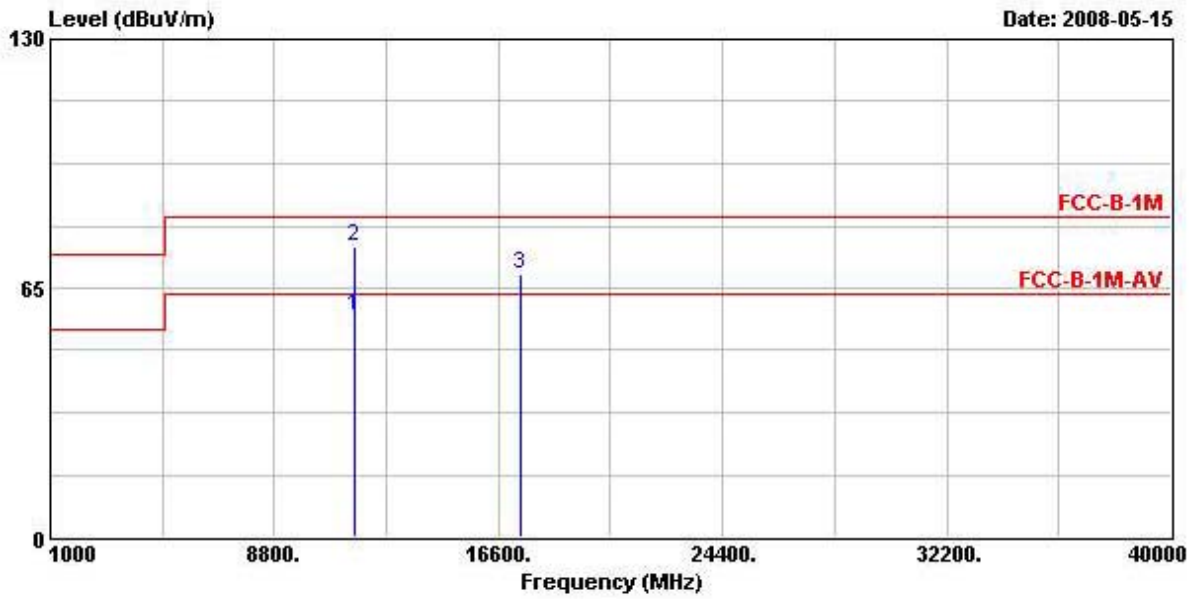
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	
1	11592.000	60.11	-3.43	63.54	46.39	39.61	6.62	32.52	AVERAGE
2	11592.000	78.49	-5.05	83.54	64.77	39.61	6.62	32.52	Peak
3	17381.000	68.51			44.72	44.52	7.83	28.56	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

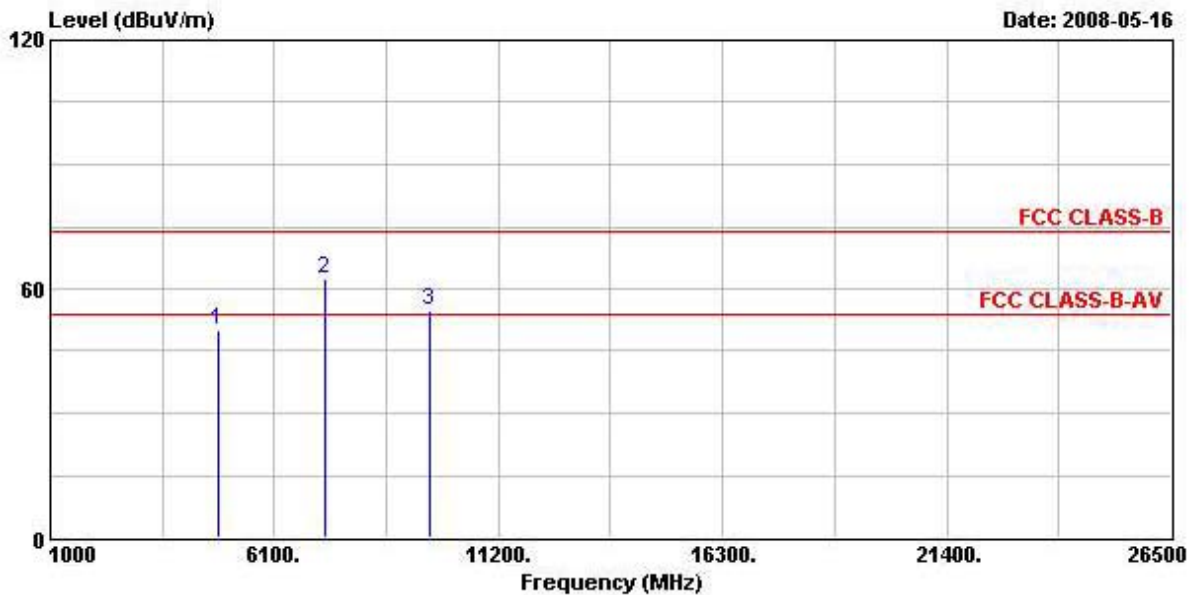


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	11586.600	58.01	-5.53	63.54	44.30	39.61	6.62	32.52	AVERAGE
2	11586.600	76.06	-7.48	83.54	62.34	39.61	6.62	32.52	Peak
3	17385.000	68.87			45.08	44.52	7.83	28.57	PEAK

Note: An item 3 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test date	May 16, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	2.4G 802.11n CH 1 (20MHz)

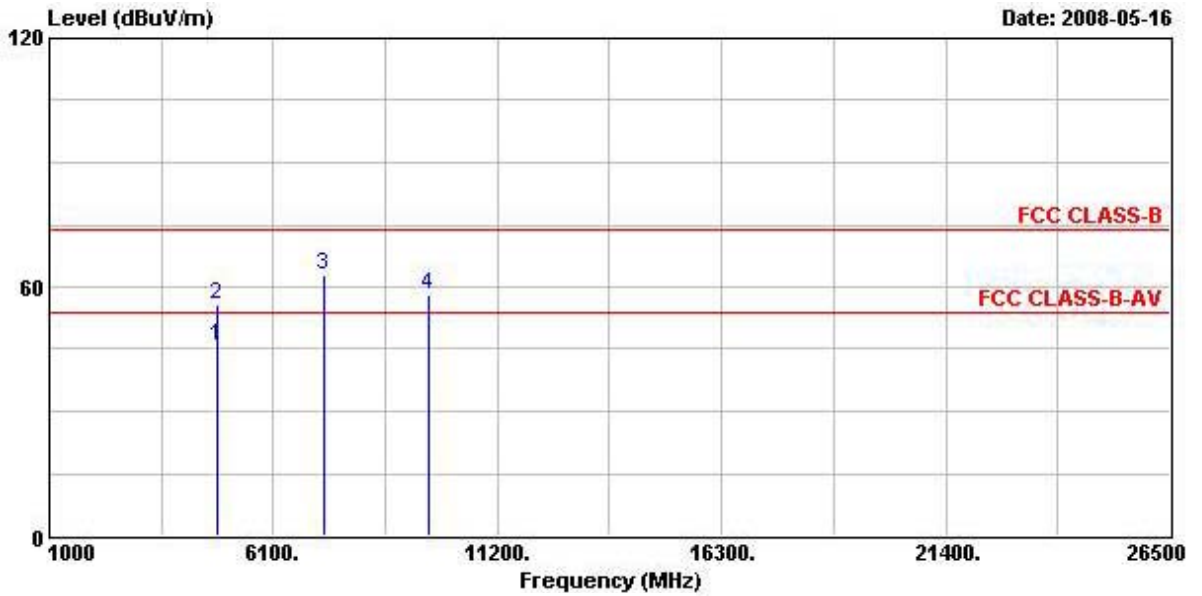
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	
1	4822.300	49.86	-4.14	54.00	45.25	33.06	4.03	32.47	PK
2	7240.800	62.36			55.73	35.78	3.67	32.82	PEAK
3	9654.600	54.98			44.31	38.41	5.21	32.95	PEAK

Note: An item 2 and 3 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

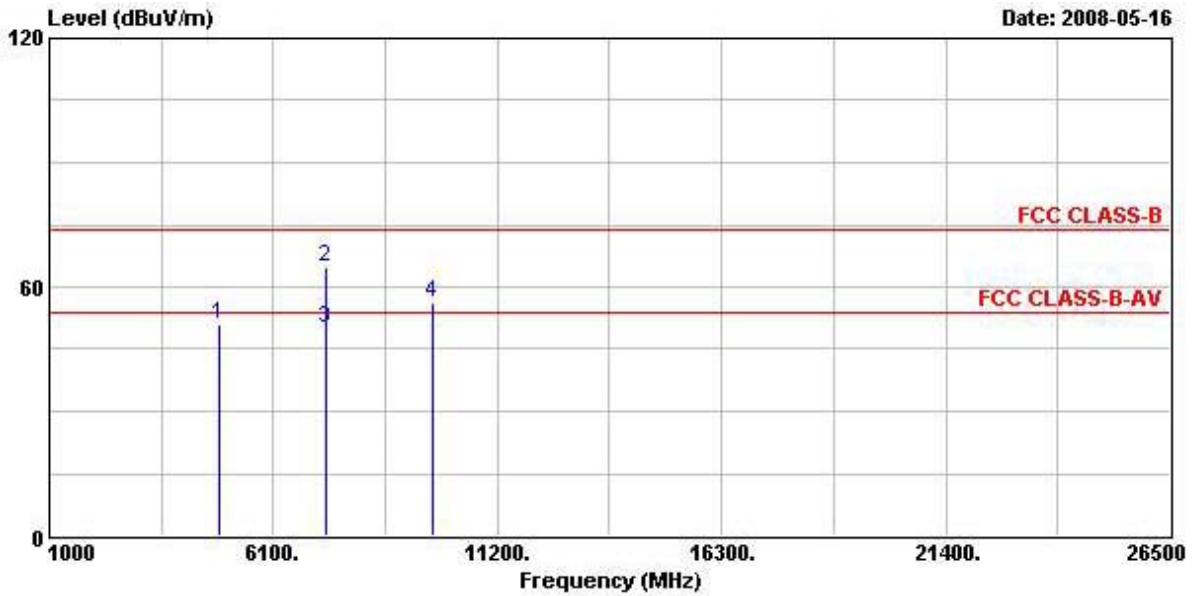


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	
1	4825.900	45.55	-8.45	54.00	40.94	33.06	4.03	32.47	Average
2	4825.900	55.84	-18.16	74.00	51.23	33.06	4.03	32.47	PEAK
3	7234.600	62.66			56.02	35.78	3.67	32.80	PEAK
4	9649.400	58.21			47.54	38.41	5.21	32.95	PEAK

Note: An item 3 and 4 are on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test date	May 16, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	2.4G 802.11n CH 6 (20MHz)

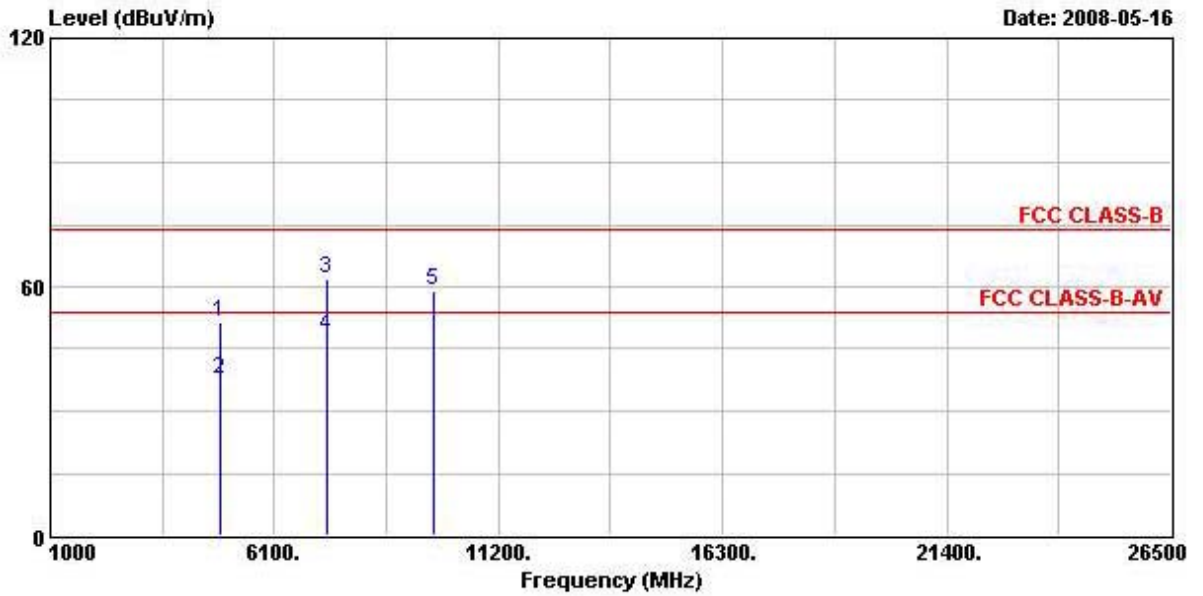
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1 @	4875.900	50.88	-3.12	54.00	46.17	33.16	4.02	32.47	PK
2 @	7313.300	64.73	-9.27	74.00	57.74	35.94	3.91	32.87	PEAK
3 @	7313.300	50.20	-3.80	54.00	43.21	35.94	3.91	32.87	Average
4	9743.800	56.01			45.04	38.58	5.31	32.92	PEAK

Note: An item 4 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical

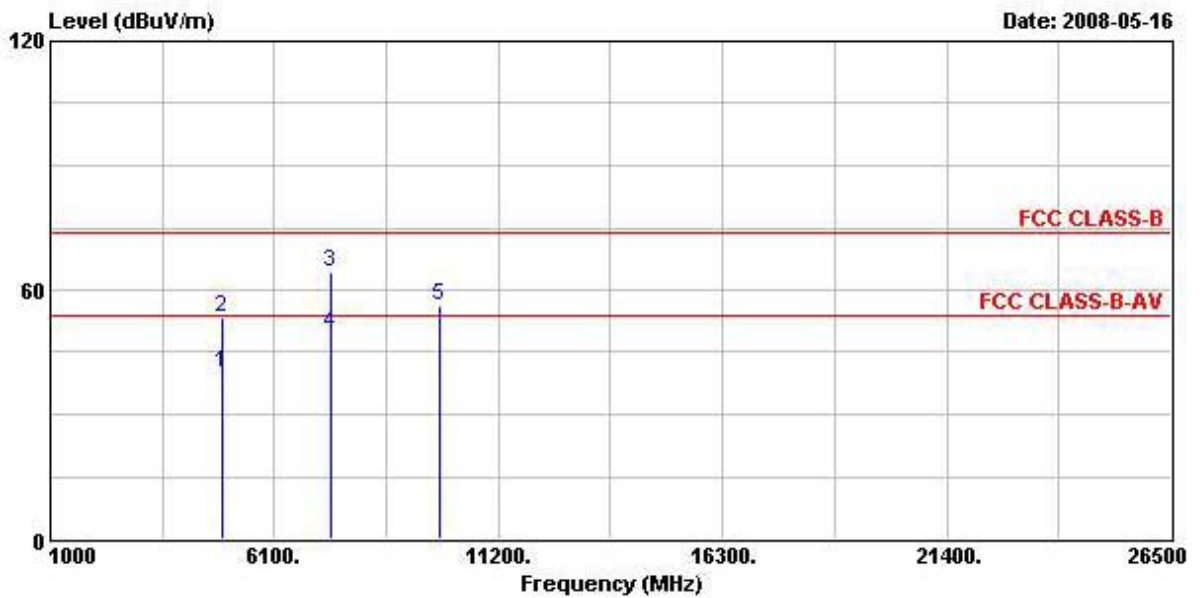


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4875.820	51.22	-22.78	74.00	46.51	33.16	4.02	32.47	PEAK
2	4875.820	37.78	-16.22	54.00	33.06	33.16	4.02	32.47	Average
3	7307.700	62.06	-11.94	74.00	55.05	35.94	3.91	32.85	PEAK
4 @	7307.700	48.15	-5.85	54.00	41.14	35.94	3.91	32.85	Average
5	9739.300	59.13			48.15	38.58	5.31	32.92	PEAK

Note: An item 5 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Final Test date	May 16, 2008	Test Site No.	03CH03-HY
Temperature	26	Humidity	54%
Test Engineer	Duncan	Configuration	2.4G 802.11n CH 11 (20MHz)

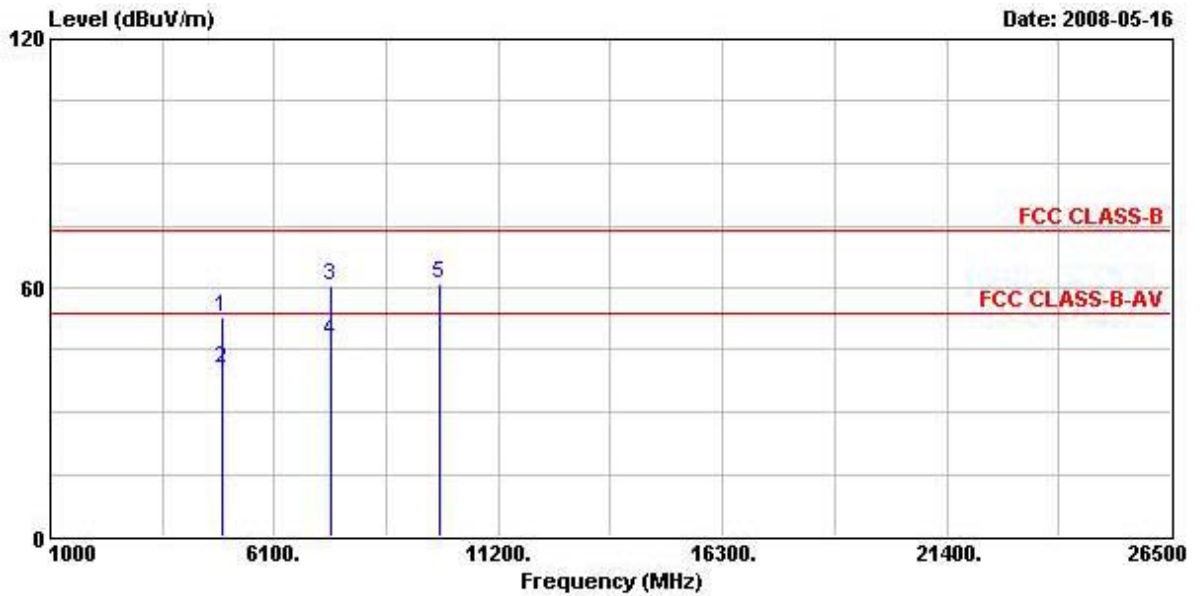
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	
1	4925.000	39.94	-14.06	54.00	35.13	33.26	4.02	32.46	Average
2	4925.000	53.16	-20.84	74.00	48.35	33.26	4.02	32.46	PEAK
3	7381.400	64.22	-9.78	74.00	56.85	36.11	4.16	32.90	PEAK
4	7381.400	49.34	-4.66	54.00	41.97	36.11	4.16	32.90	Average
5	9850.900	56.34			44.94	38.82	5.47	32.89	PEAK

Note: An item 5 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).

Vertical



	Freq	Level	Over Limit	Limit Line	Read Antenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	4922.900	53.03	-20.97	74.00	48.21	33.26	4.02	32.46	PEAK
2	4922.900	40.54	-13.46	54.00	35.73	33.26	4.02	32.46	Average
3	7385.200	60.56	-13.44	74.00	53.15	36.15	4.16	32.90	PEAK
4	7385.200	46.91	-7.09	54.00	39.50	36.15	4.16	32.90	Average
5	9849.600	60.74			49.34	38.82	5.47	32.89	PEAK

Note: An item 5 is on un-restricted band, so the limit is -20dB for the field strength of the fundamental emissions (see section 3.6.7).