Test Report of FCC CFR 47 Part 15 Subpart C and Industry Canada RSS-210 Issue 7

On Behalf of

Haier International (HK) Limited

FCC ID:	**YGF-X22P**
IC ID:	**9021A-X220P**
Product Description:	**Notebook**
Model No.:	**X220P**
Brand Name:	Haier

Prepared for:	**Haier International (HK) Limited** Room 1908,Harbour Centre,25 Harbour Road,Wanchai,Hong Kong.
Prepared by:	**Bontek Compliance Testing Laboratory Ltd** 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China Tel: 86-755-86337020 Fax: 86-755-86337028
Report No.:	BCT10ER-0663E-1
Issue Date:	May 28, 2010,
Test Date:	May 01~ 20, 2010

Test by:	**Reviewed By:**
Kendy Wang	Tony Wu

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	**Haier International (HK) Limited**
Address of applicant:	Room 1908,Harbour Centre,25 Harbour Road,Wanchai,Hong Kong.
Manufacturer:	**Timespad (Shanghai) Computer Technology Co., Ltd.**
Address of manufacturer:	RM8B,8F,JingSong Building,TaiRan 4 Road,Futian,ShenZhen

General Description of E.U.T

Items	Description
EUT Description:	**Notebook**
Trade Name:	Haier
Model No.:	**X220P**
Frequency Band:	IEEE 802.11b/g, IEEE 802.11n HT20 (DTS Band) : 2412MHz～2462MHz, IEEE 802.11n HT40 (DTS Band) : 2422MHz～2452MHz
Transmit Power:	IEEE 802.11b Mode : 16.81dBm (DTS Band) (47.97mW), IEEE 802.11g Mode : 15.74dBm (DTS Band) (37.50mW), IEEE 802.11n HT20 Mode : 15.90dBm (DTS Band) (38.90mW), IEEE 802.11n HT40 Mode : 15.82dBm (DTS Band) (38.20mW)
Channel Spacing:	IEEE 802.11b/g, 802.11n HT20/HT40: 5MHz
Number of Channels:	IEEE 802.11b/g, 802.11n HT20:11 Channels IEEE 802.11n HT40 :7 Channels
Transmit Data Rate:	IEEE802.11b : 11 , 5.5 , 2 , 1 Mbps IEEE802.11g : 54 , 48 , 36 , 24 ,18 , 12 , 9 , 6 Mbps IEEE802.11n HT20 : 130 , 117 , 104 , 78 , 52 , 39 , 26 , 13 Mbps IEEE802.11n HT40 : 270 , 243 , 216 , 162 , 108 , 81 , 54 , 27 Mbps
Type of Modulation:	IEEE 802.11b：DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g：OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20/40：OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type:	Built-in Antenna Manufacture: SPEED (SUZHOU) COMMMUNICATION TECHNOLOGY CO., LTD Model: D10C-WiFi-R and D10C-WiFi-L Gain: 2.0dBi

	Connector: SMA Straight Plug Reverse Printed Antenna (× 1) 1RX Gain: 0dBi
Adapter description:	Product name: SWITCHING POWER SUPPLY Model: Adp40S-1902100 Input: 100-240V 1.5A 50/60Hz Output: 19V 2.1A Output Wire Length: 1.5m with cord Trademark: Great Wall
Notebook Configure:	
CPU	Intel Atom N270 1.6GHz 533MHz
Chipset	Mobile Intel ® i945GME+82801GHM(ICH7-M)
Memory	MECER421PA0103/RAM DDRII 1G 667/800M
HDD	WD1600BEVS-22RSTO
WIFI Module	AW-NE785H
Operation System	Microsoft WIN XP System
LAN Adapter	Realtek RTL8139/810x Family Fast Ethernet
LCD	LTN101NT02-1024*600, touching screen
Camera	Built-in camera, 130W PC-TS02-R580-OV02
Rechargeable Battery	LI-iON 3500mAh
Ports/Sockets	Mini USB/ USB 2.0x2/D-sub(VGA)/RJ-45/Anti-theft key hole

** The test data gathered are from the production sample provided by the manufacturer.*

1.2 Related Submittal(s) / Grant (s) and Test Methodology

The tests were performed based on the Electromagnetic Interference (EMI) tests performed on the EUT. Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2003 and clause 4 of RSS-GEN Issue 2. Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.207, 15.209 and 15.247 rules and RSS-GEN Issue 2 and RSS-210 Issue 7.

1.3 Test Facility

All measurement required was performed at laboratory of Bontek Compliance Testing Laboratory Ltd at 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China.

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 338263

BONTEK COMPLIANCE TESTING LABORATORY LTD. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March, 2008.

IC Registration No.: 7631A

The 3m alternate test site of BONTEK COMPLIANCE TESTING LABORATORY LTD. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on August 2009.

CNAS - Registration No.: L3923

BONTEK COMPLIANCE TESTING LABORATORY LTD. to ISO/IEC 17025:25 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. The acceptance letter from the CNAS is maintained in our files: Registration: L3923,February,2009.

TUV - Registration No.: UA 50145371-0001

BONTEK COMPLIANCE TESTING LABORATORY LTD. An assessment of the laboratory was conducted according to the"Procedures and Conditions for EMC Test Laboratories"with reference to EN ISO/IEC 17025 by a TUV Rheinland auditor. Audit Report NO. 17010783-001

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions: The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003 and Clause 4 of RSS-GEN Issue 2. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is a placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2009 and Clause 4 of RSS-GEN Issue 2.

2.4 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

2.5 List of Measuring Equipments Used

No.	Equipment	Manufacturer	Model No.	Serial No.	Cal date	Cal due date
1	EMI Test Receiver	R&S	ESCI	100687	2009-8-14	2010-8-13
2	EMI Test Receiver	R&S	ESPI	100097	2009-8-14	2010-8-13
3	Spectrum Analyzer	R&S	FSEK 30	835253/002	2009-8-14	2010-8-13
4	Amplifier	HP	8447D	1937A02492	2009-8-14	2010-8-13

5	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07101	2009-8-14	2010-8-13
6	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07102	2009-8-14	2010-8-13
7	Power Clamp	SCHWARZBECK	MDS-21	3812	2009-8-14	2010-8-13
8	Positioning Controller	C&C	CC-C-1F	MF7802113	N/A	N/A
9	`Electrostatic Discharge Simulator	TESEQ	NSG437	125	2009-8-14	2010-8-13
10	Fast Transient Burst Generator	SCHAFFNER	MODULA6150	34572	2009-8-14	2010-8-13
11	Fast Transient Noise Simulator	Noiseken	FNS-105AX	31485	2009-8-14	2010-8-13
12	Color TV Pattern Genenator	PHILIPS	PM5418	TM209947	N/A	N/A
13	Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	608002	2009-8-14	2010-8-13
14	Capacitive Coupling Clamp	TESEQ	CDN8014	25096	2009-8-14	2010-8-13
15	High Field Biconical Antenna	ELECTRO-METRICS	EM-6913	166	2009-8-14	2010-8-13
16	Log Periodic Antenna	ELECTRO-METRICS	EM-6950	811	2009-8-14	2010-8-13
17	Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	304	2009-8-14	2010-8-13
18	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2009-8-14	2010-8-13
19	Horn Antenna	SCHWARZBECK	BBHA9120A	B08000991-0001	2009-8-14	2010-8-13
20	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	D-69250	2009-8-14	2010-8-13
21	10dB attenuator	SCHWARZBECK	MTAIMP-136	R65.90.0001#06	2009-8-14	2010-8-13
22	Electric bridge	Zentech	100 LCR METER	803024	N/A	N/A
23	RF Current Probe	FCC	F-33-4	80	2009-8-14	2010-8-13
24	SIGNAL GENERATOR	HP	8647A	3349A02296	2009-8-14	2010-8-13
25	MICROWAVE AMPLIFIER	HP	8349B	2627A00994	2009-8-14	2010-8-13
26	Triple-Loop Antenna	EVERFINE	LLA-2	607004	2009-8-14	2010-8-13
27	CDN	FRANKONIA	M2+M3	A3027019	2009-10-20	2010-10-19

28	6dB Attenuator	FRANKONIA	75-A-FFN-06	1001698	2009-10-20	2010-10-19
29	EMV-Mess-Systeme GMBH	FRANKONIA	FLL-75	1020A1109	2009-10-20	2010-10-19
30	EM Injection Clamp	FCC	F-203I-13mm	091536	2009-10-20	2010-10-19
31	9KHz-2.4GHz Signal generator	MARCONI INSTRUMENTS	2024	112260/042	2009-10-20	2010-10-19

2.6 Test Accessories:

AUX Description:	Manufacturer	Model No.	Certificate	CABLE
Monitor	Dell	E178Pc	CE, FCC	1.5m Unshielded Power Cord 1.8m shielded data Cable with core
Keyboard	Dell	L100	CE, FCC	1.8m shielded data Cable with core
Mouse	Dell	OCJ339	CE, FCC	1.8m shielded data Cable

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.207 & IC RSS-GEN Clause 7.2.2	AC Power Line Conducted Emission	Pass
FCC §15.247(b) & IC RSS-210 A8.4	Maximum Peak Output Power	Pass
FCC §15.247(e) & IC RSS-210 A8.2 (b)	Power Spectral Density	Pass
FCC §15.247(a) & IC RSS-210 A8.2 (a)	6dB Bandwidth	Pass
FCC §15.247 (d) & IC RSS-210 A8.5	Conducted Spurious Emission	Pass
FCC §15.205 and §15.209 & IC RSS-210 Clause 2.6 (Transmitter) & IC RSS-GEN Clause 6 (Receiver)	Radiated Spurious Emission	Pass
FCC §15.203/15.247(b)/(c) & IC RSS-GEN Clause 7.1.4	Antenna Requirement	Pass

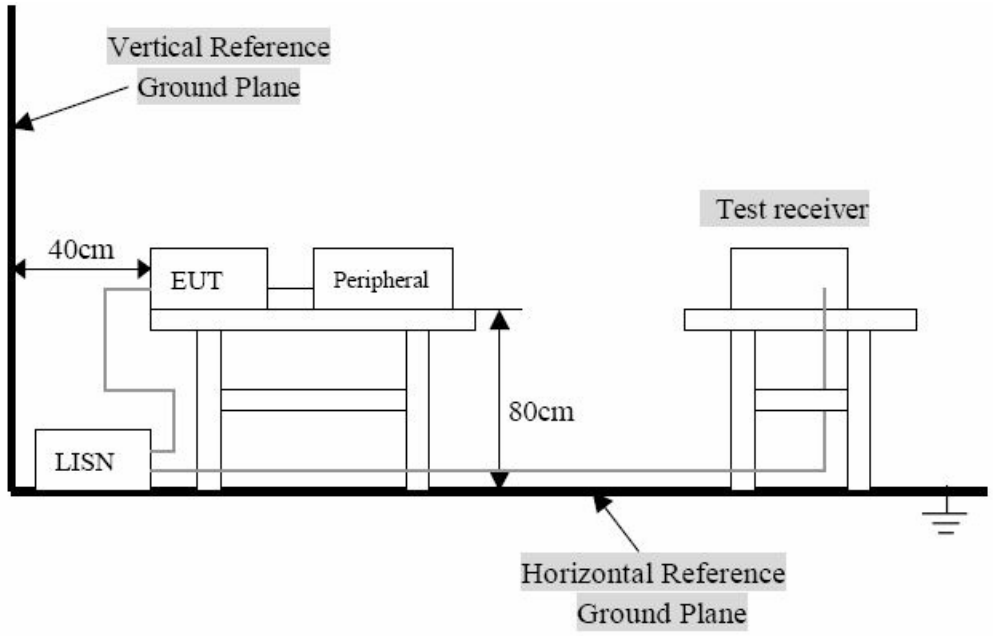
4. TEST OF AC POWER LINE CONDUCTED EMISSION

4.1 Applicable Standard

Refer to FCC §15.207 and IC RSS-GEN Clause 7.2.2.
For a Low-power Radio-frequency Device 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 Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66～56	56～46
0.500～5.000	56	46
5.000～30.00	60	50

4.2 Test Setup Diagram



Remark: The EUT was connected to a 120 VAC/ 60Hz power source.

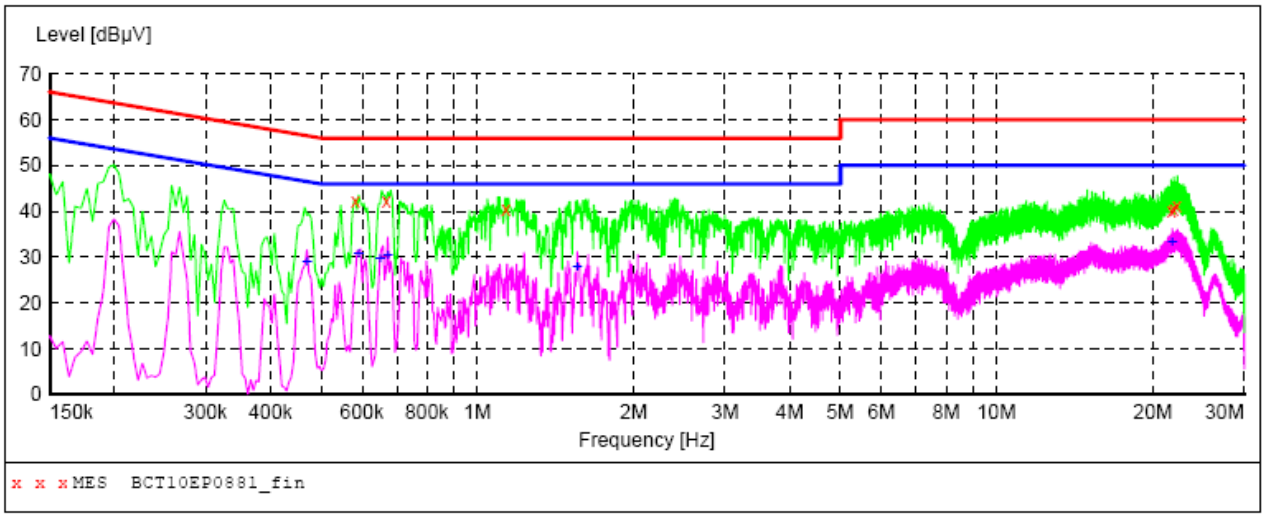
4.3 Test Result

Temperature (℃) : 23~25	EUT: Notebook
Humidity (%RH): 45~58	M/N: X220P
Barometric Pressure (mbar): 950~1000	Operation Condition: Normal operation

Conducted Emission:

EUT: Notebook
Operating Condition: Normal operation
Test Site: Shielded Room
Operator: Andy
Test Specification: AC/DC adapter (AC 120V/60Hz)
Comment: Live Line

SCAN TABLE: "Voltage(150K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "BCT10EP0881_fin"

5/11/2010 21:11

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.582000	42.20	9.9	56	13.8	QP	L1	GND
0.667500	42.30	9.9	56	13.7	QP	L1	GND
1.135500	40.30	9.9	56	15.7	QP	L1	GND
21.700500	40.10	9.7	60	19.9	QP	L1	GND
21.979500	40.50	9.7	60	19.5	QP	L1	GND
22.245000	41.00	9.7	60	19.0	QP	L1	GND

MEASUREMENT RESULT: "BCT10EP0881_fin2"

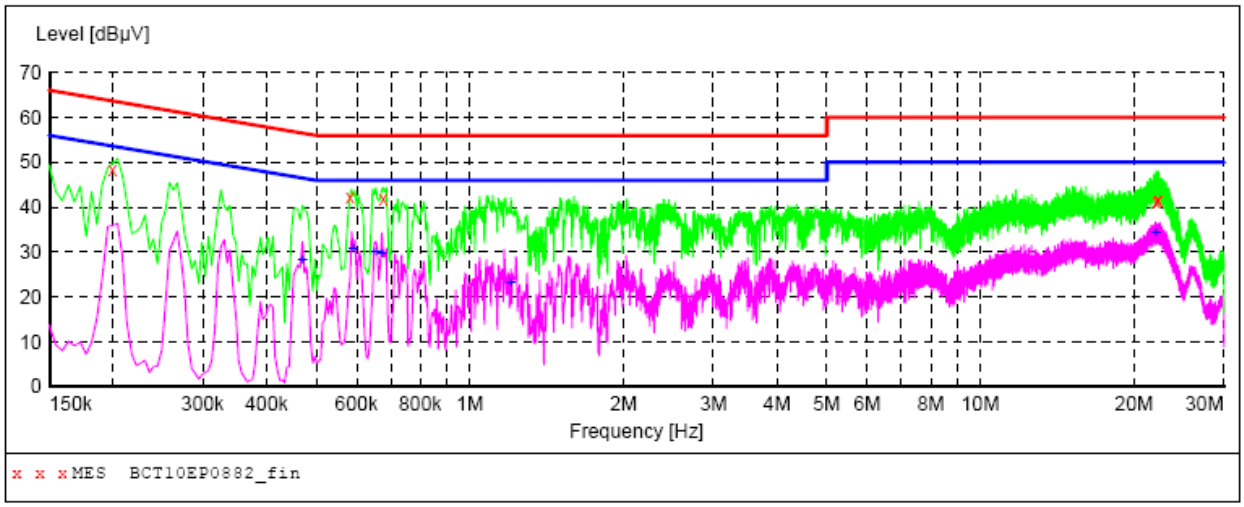
5/11/2010 21:11

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.469500	28.80	9.9	47	17.7	AV	L1	GND
0.591000	30.80	9.9	46	15.2	AV	L1	GND
0.649500	29.80	9.9	46	16.2	AV	L1	GND
0.672000	30.20	9.9	46	15.8	AV	L1	GND
1.558500	27.80	9.9	46	18.2	AV	L1	GND
21.835500	33.30	9.7	50	16.7	AV	L1	GND

Conducted Emission:

EUT: Notebook
Operating Condition: Normal operation
Test Site: Shielded Room
Operator: Andy
Test Specification: AC/DC adapter (AC 120V/60Hz)
Comment: Neutral Line

SCAN TABLE: "Voltage(150K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "BCT10EP0882_fin"

5/11/2010 21:15

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.199500	48.30	9.9	64	15.3	QP	N	GND
0.582000	42.30	9.9	56	13.7	QP	N	GND
0.676500	41.90	9.9	56	14.1	QP	N	GND
22.119000	41.30	9.7	60	18.7	QP	N	GND
22.222500	41.50	9.7	60	18.5	QP	N	GND
22.276500	41.40	9.7	60	18.6	QP	N	GND

MEASUREMENT RESULT: "BCT10EP0882_fin2"

5/11/2010 21:15

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.469500	28.10	9.9	47	18.4	AV	N	GND
0.591000	30.80	9.9	46	15.2	AV	N	GND
0.654000	30.10	9.9	46	15.9	AV	N	GND
0.672000	29.60	9.9	46	16.4	AV	N	GND
1.203000	23.20	9.9	46	22.8	AV	N	GND
22.087500	34.40	9.7	50	15.6	AV	N	GND

5. Test of Maximum Peak Output Power

5.1 Applicable Standard

Refer to FCC §15.247 (b) & IC RSS-210 A8.4

5.2 EUT Setup

Spectrum Analyzer

5.3 Test Equipment List and Details

See section 2.5.

5.4 Test Procedure

Connect the EUT to spectrum analyzer, set the center frequency of the spectrum analyzer to the channel center frequency. Set the RBW to 1MHz and VBW to 3MHz.

Measurement of Digital Transmission Systems Operating under Section 15.247

NOTE: Total peak power calculation formula:
10 log (10^ (Chain A Power / 10) + 10^ (Chain C Power / 10)).

5.5 Test Result

Temperature (℃) : 22~23	EUT: Notebook
Humidity (%RH): 50~54	M/N: X220P
Barometric Pressure (mbar): 950~1000	Operation Condition: Tx Mode

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Peak Power Chain C (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	16.35	30	PASS
Middle	2437	16.62	30	PASS
High	2462	16.81	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Peak Power Chain C (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	15.40	30	PASS
Middle	2437	15.74	30	PASS
High	2462	15.48	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Peak Power Chain A (dBm)	Peak Power Chain C (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	15.33	14.90	30	PASS
Middle	2437	15.90	14.39	30	PASS
High	2462	15.76	14.77	30	PASS

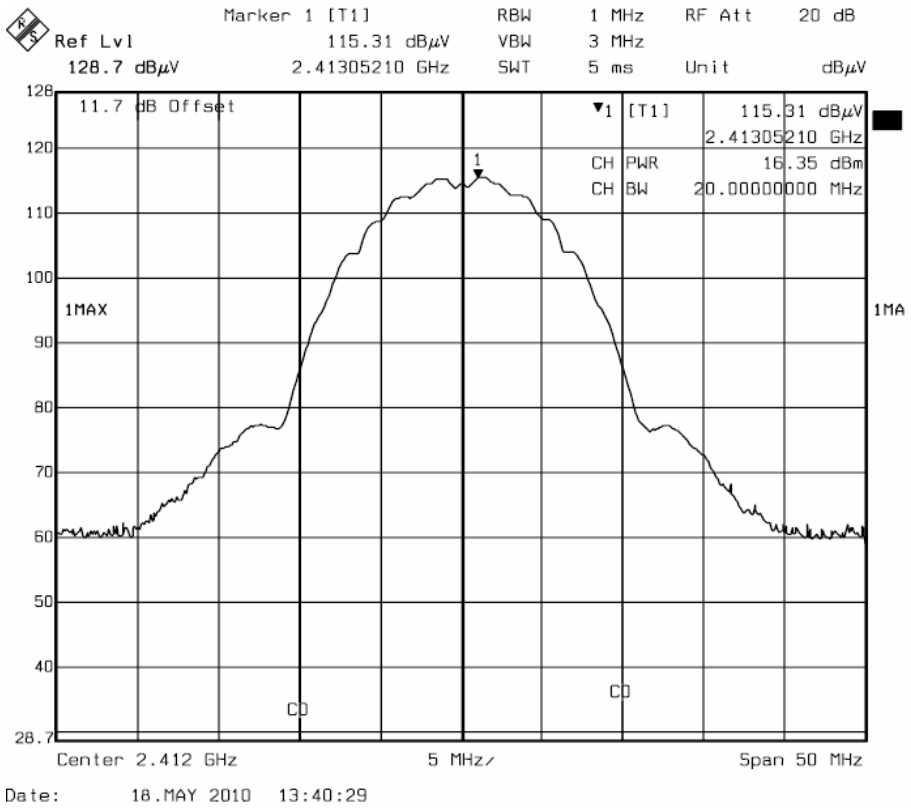
NOTE : 1. At finial test to get the worst-case emission at 13Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 mode

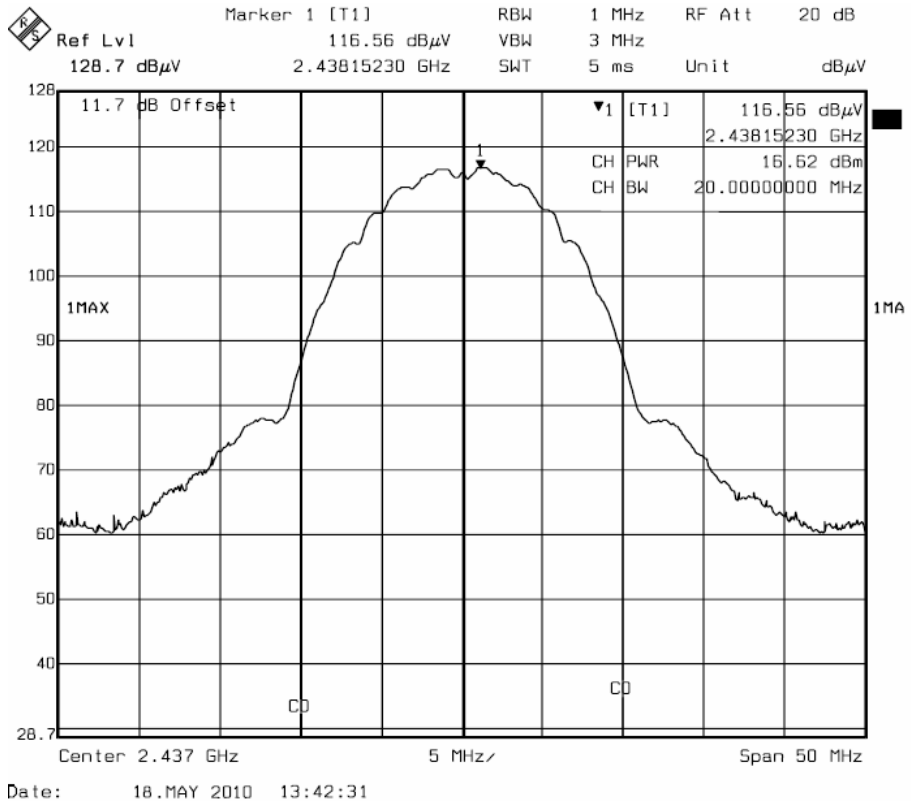
Channel	Channel Frequency (MHz)	Peak Power Chain A (dBm)	Peak Power Chain C (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2422	15.82	14.89	30	PASS
Middle	2437	15.65	14.53	30	PASS
High	2452	15.81	14.12	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 27Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

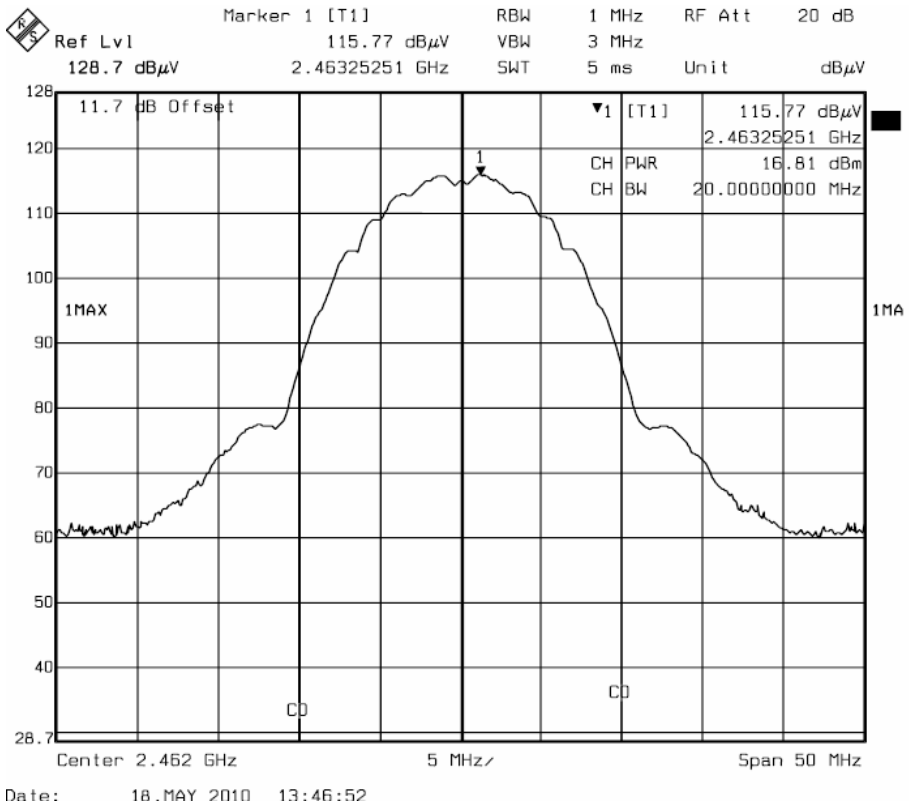
MAXIMUM PEAK OUTPUT POWER (802.11b MODE CH Low)



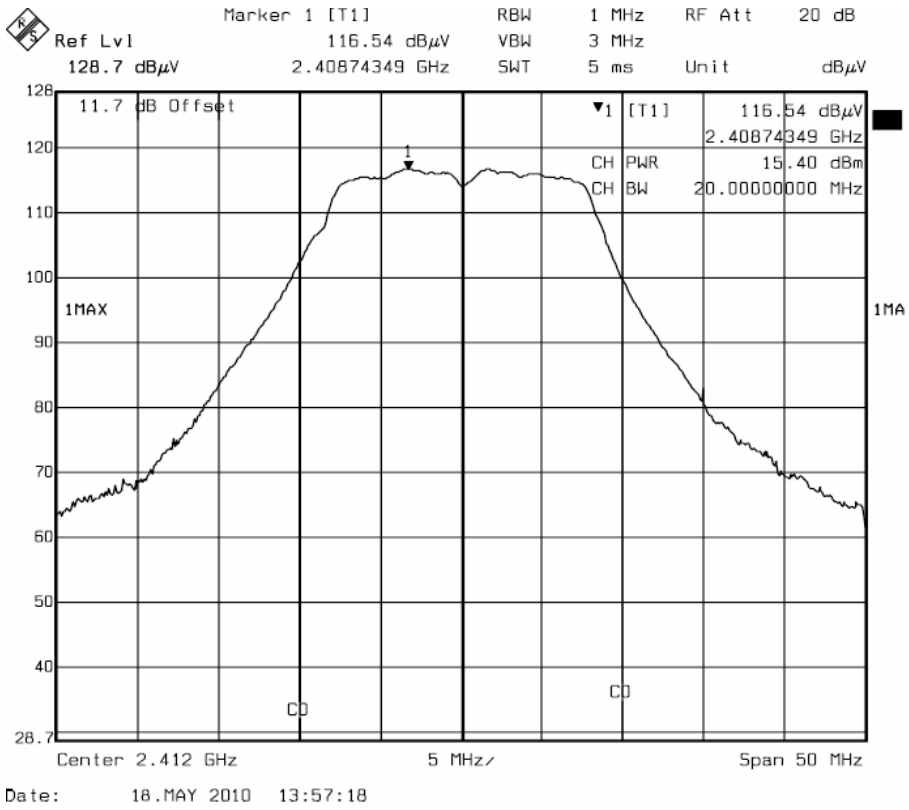
MAXIMUM PEAK OUTPUT POWER (802.11b MODE CH Mid)



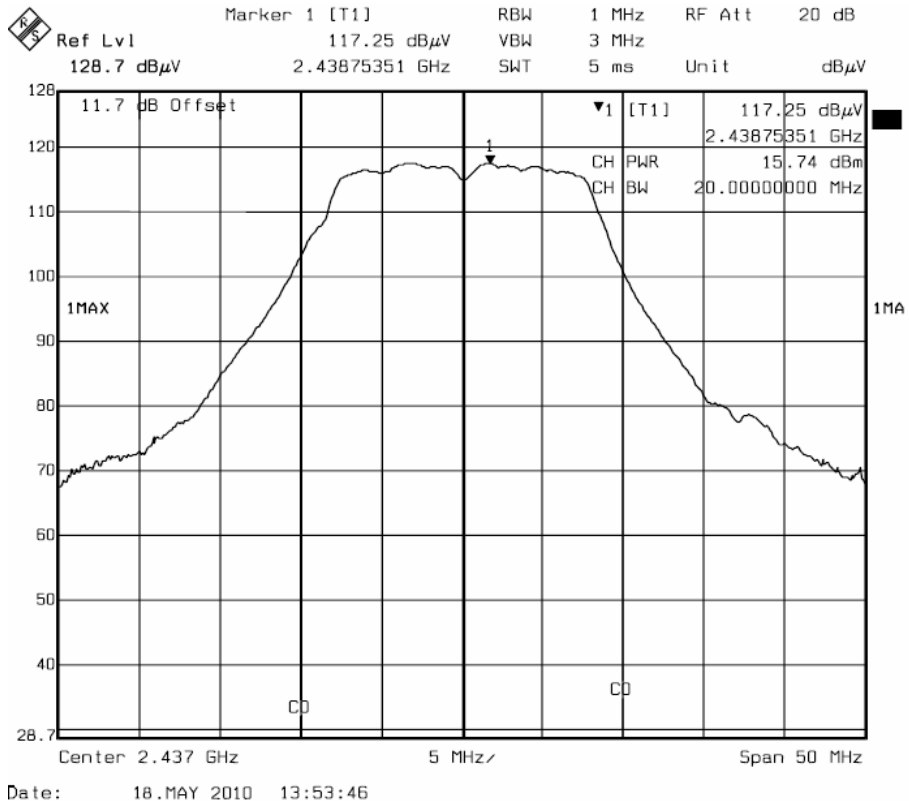
MAXIMUM PEAK OUTPUT POWER (802.11b MODE CH High)



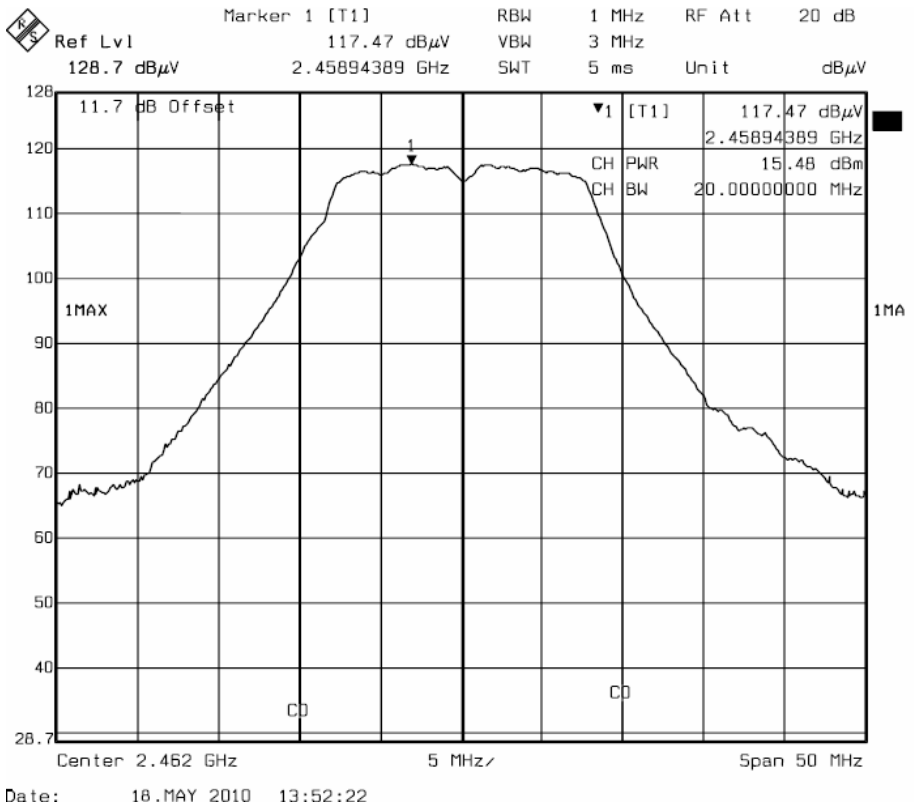
MAXIMUM PEAK OUTPUT POWER (802.11g MODE CH Low)



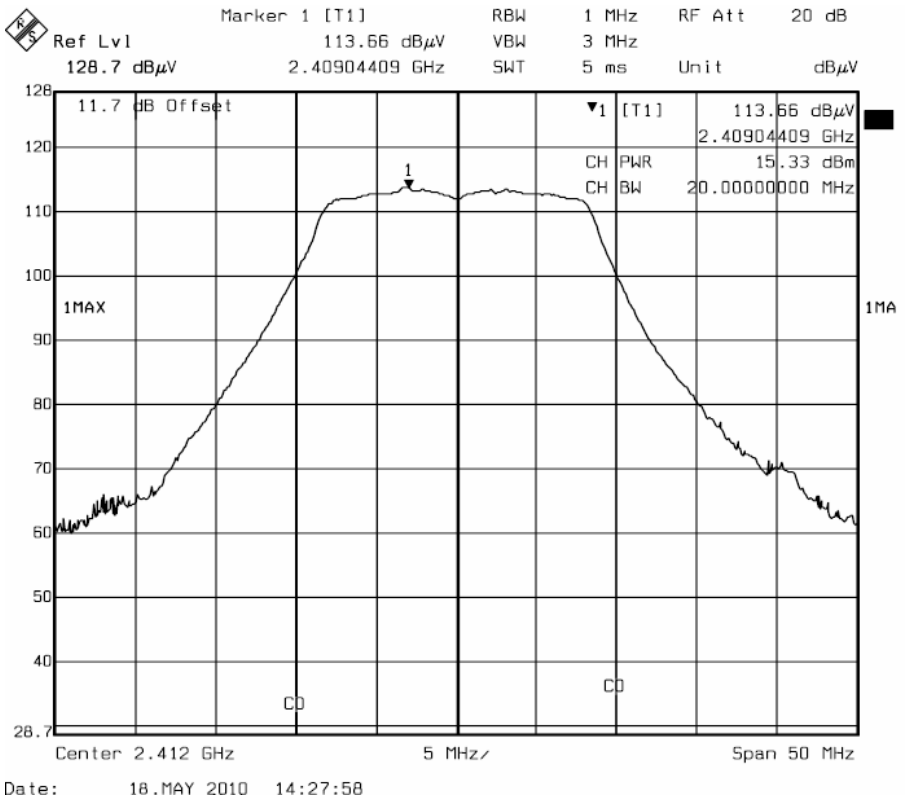
MAXIMUM PEAK OUTPUT POWER (802.11g MODE CH Mid)



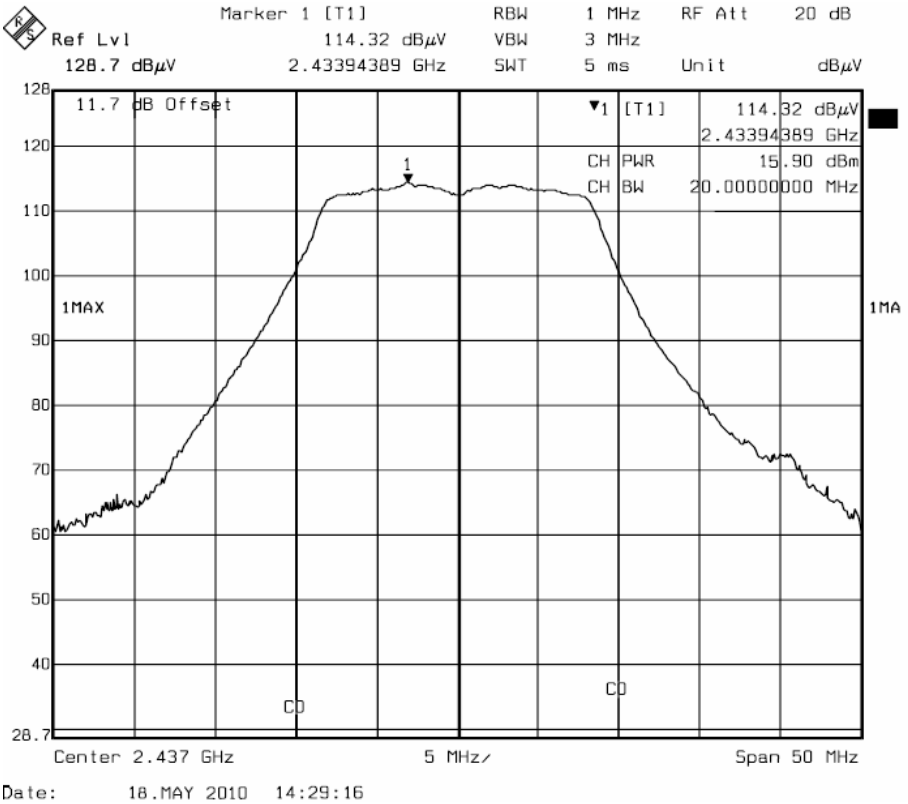
MAXIMUM PEAK OUTPUT POWER (802.11g MODE CH High)



MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE CH Low) Chain A



MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE CH Mid) Chain A



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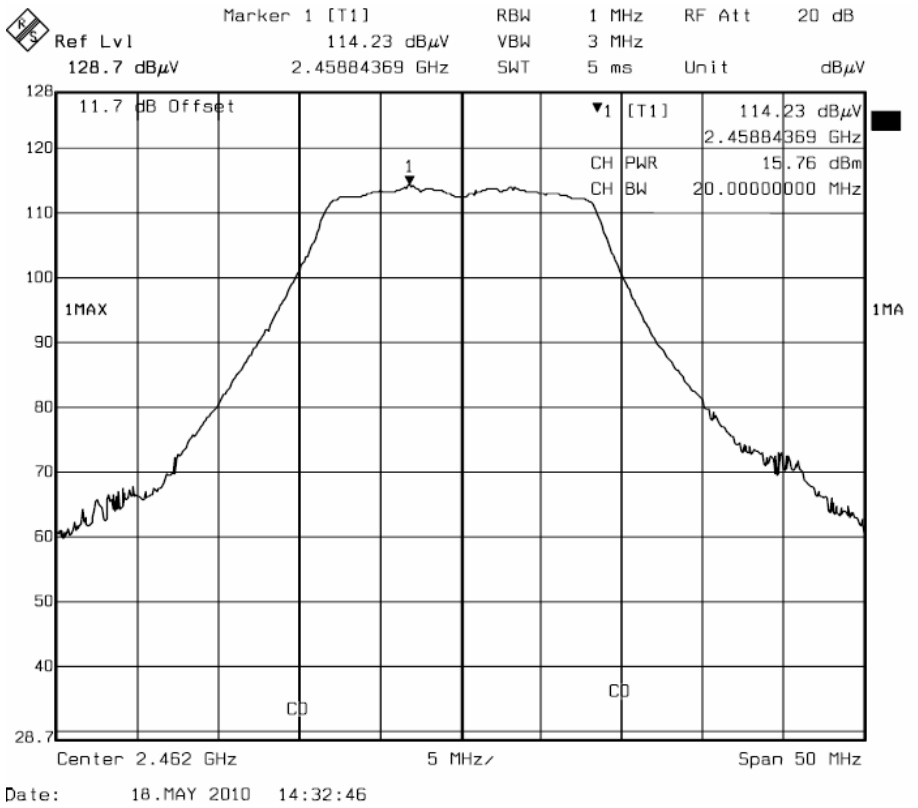
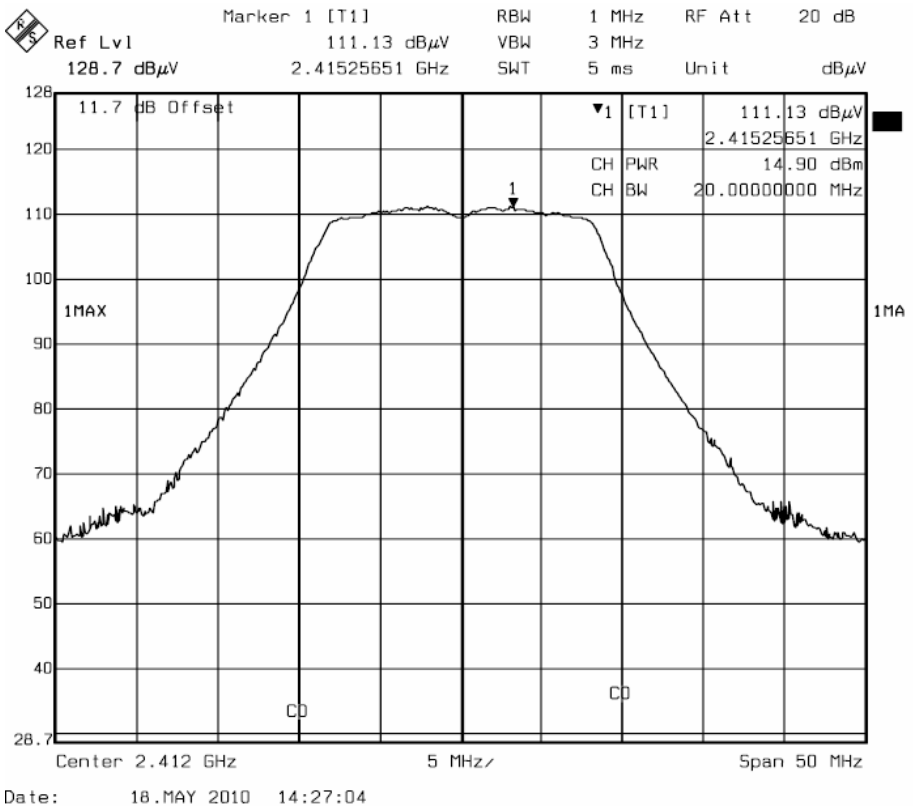
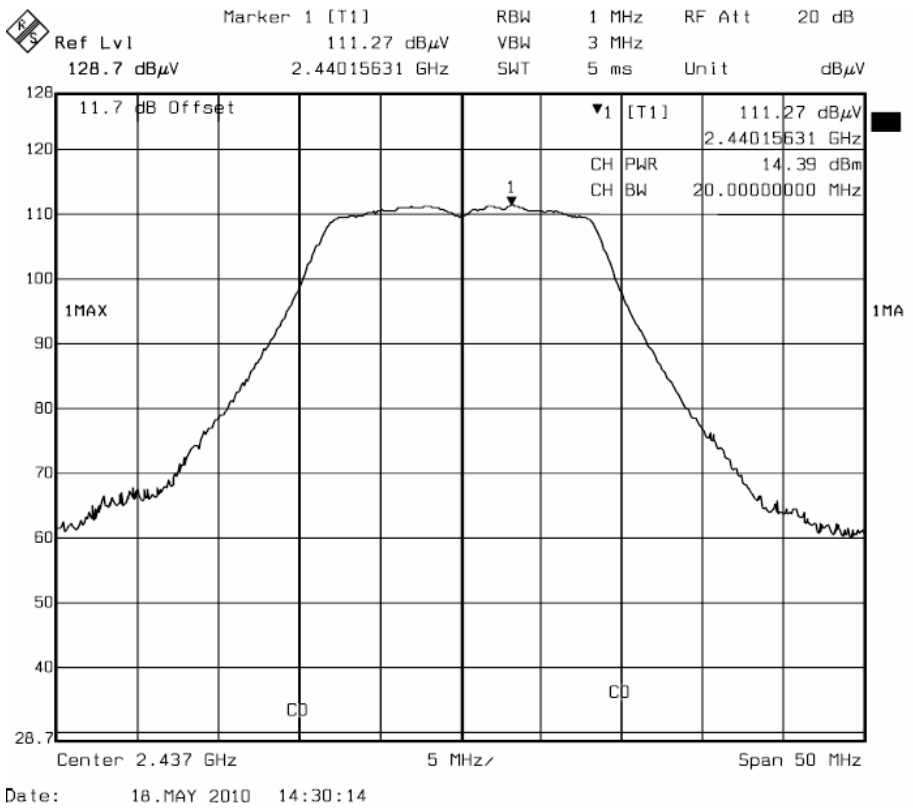


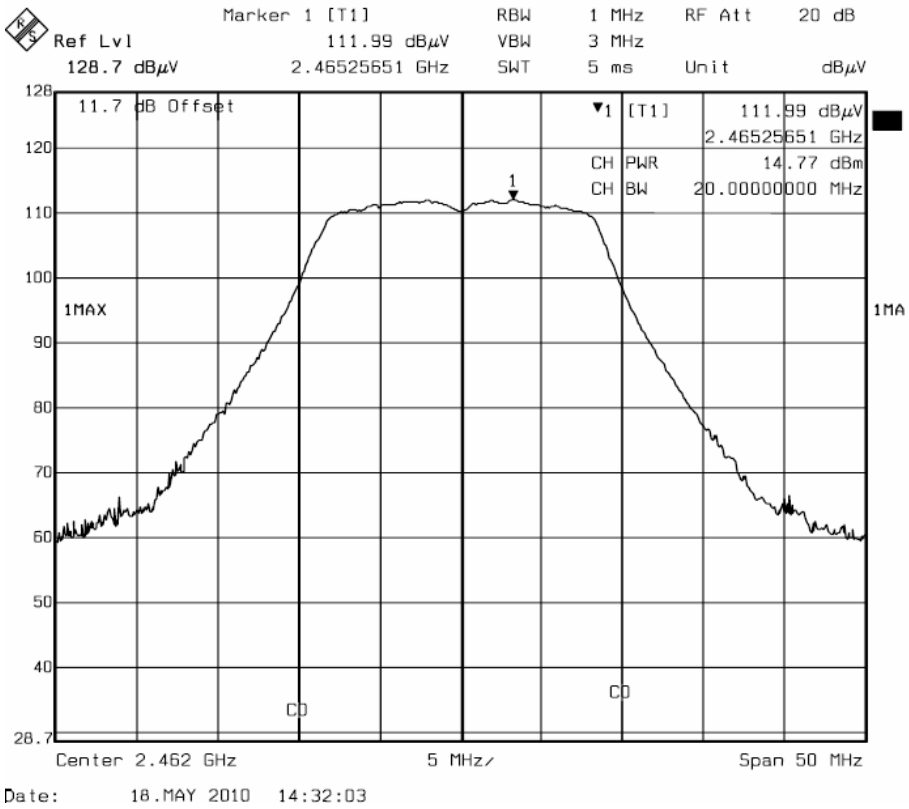
MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE CH Low) Chain C



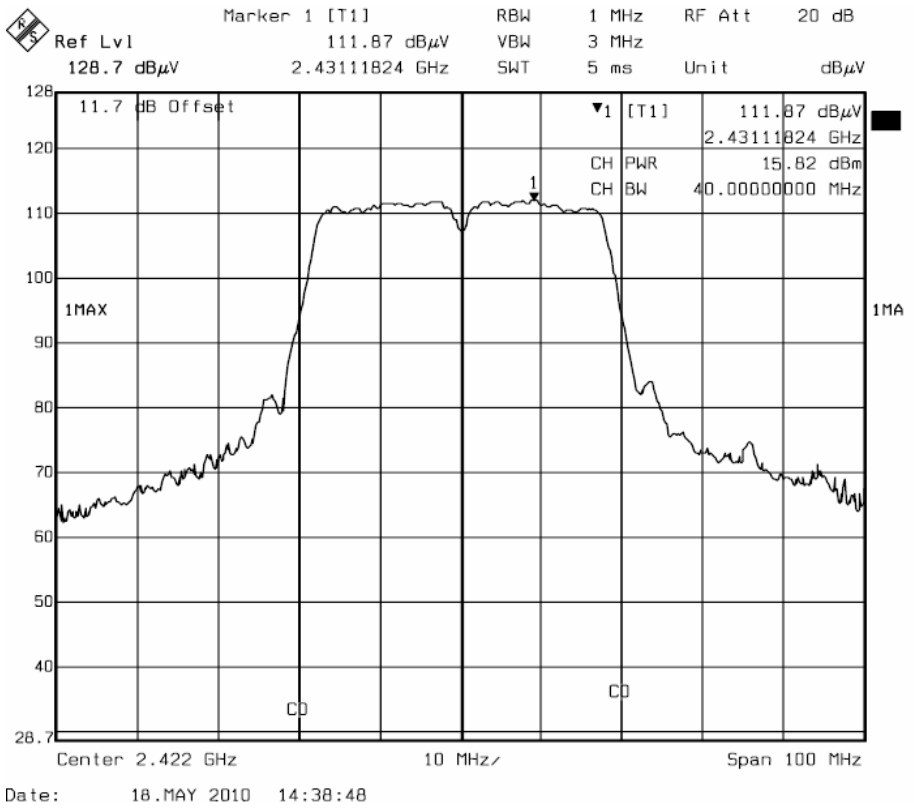
MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE CH Mid) Chain C



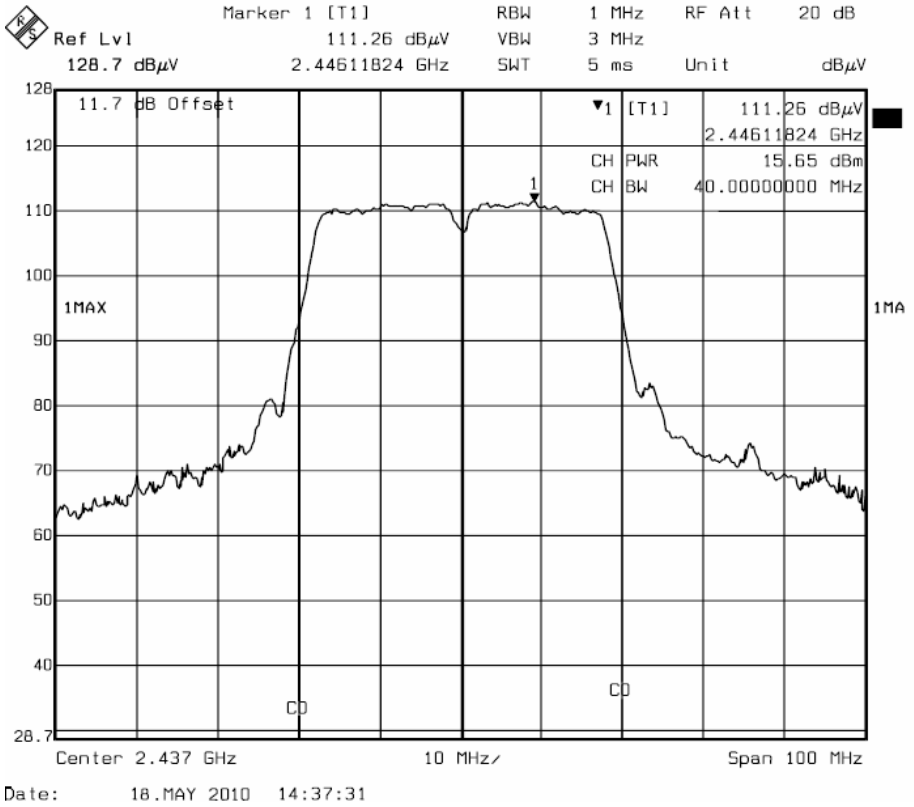
MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE CH High) Chain C



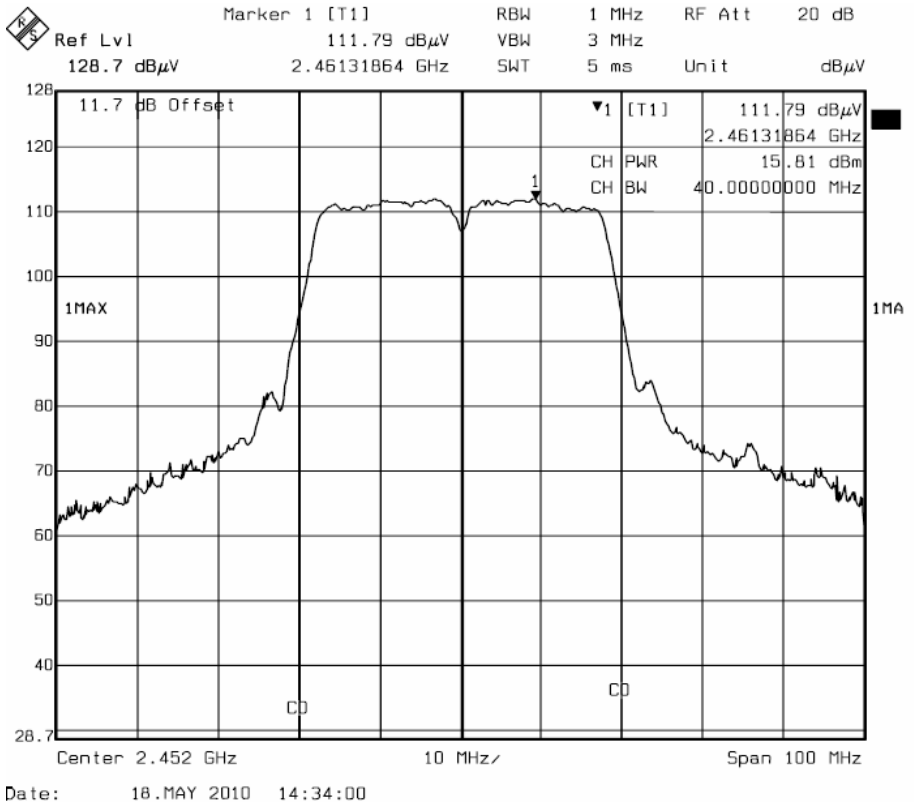
MAXIMUM PEAK OUTPUT POWER (802.11n HT40 MODE CH Low) Chain C



MAXIMUM PEAK OUTPUT POWER (802.11n HT40 MODE CH Mid) Chain C



MAXIMUM PEAK OUTPUT POWER (802.11n HT40 MODE CH High) Chain C



6. Test of Peak Power Spectral Density

6.1 Applicable Standard

Refer to FCC §15.247 (e) and IC RSS-210 A8.2 (b).

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.2 EUT Setup

Spectrum Analyzer

6.3 Test Equipment List and Details

See section 2.5.

6.4 Test Procedure

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=3KHz and VBW ≧RBW, set sweep time=span / 3KHz.
The power spectral density was measured and recorded. The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

NOTE: Total peak power calculation formula:
10 log (10^ (Chain A Power / 10) + 10^ (Chain C Power / 10)).

6.5 Test Result

Temperature (℃) : 22~23	EUT: Notebook
Humidity (%RH): 50~54	M/N: X220P
Barometric Pressure (mbar): 950~1000	Operation Condition: Tx Mode

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW Chain C (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-16.29	8	PASS
Middle	2437	-15.14	8	PASS
High	2462	-15.75	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW Chain C (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-17.61	8	PASS
Middle	2437	-16.28	8	PASS
High	2462	-16.45	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW Chain A (dBm)	Final RF Power Level in 3KHz BW Chain C (dBm)	PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-19.71	-22.34	-17.82	8	PASS
Middle	2437	-19.77	-21.17	-17.40	8	PASS
High	2462	-18.90	-20.45	-16.60	8	PASS

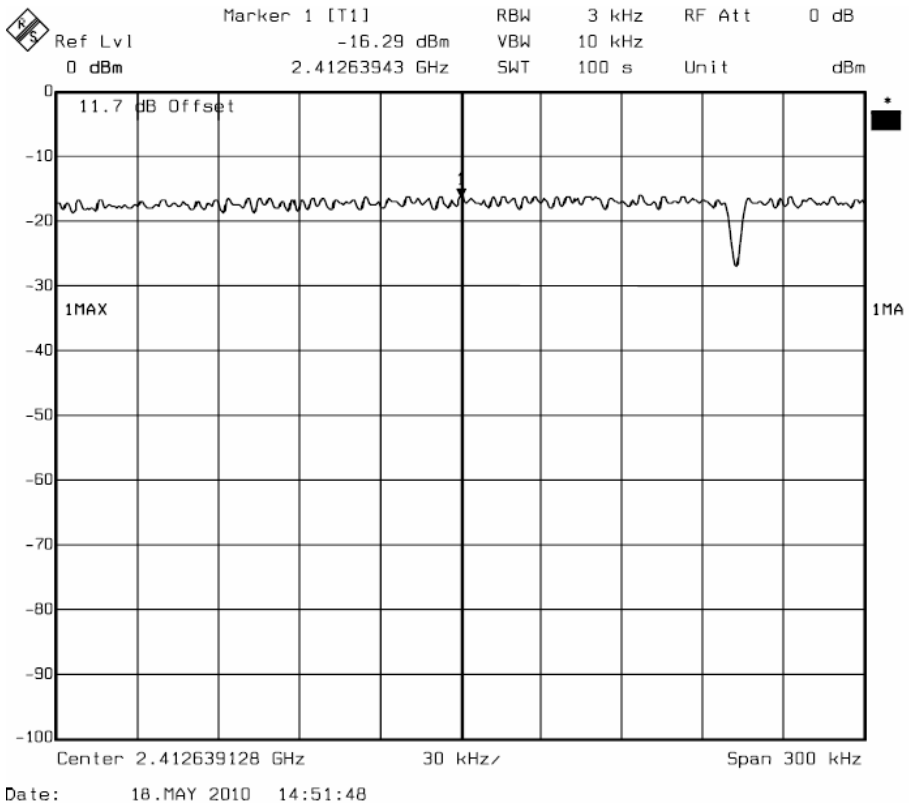
NOTE : 1. At finial test to get the worst-case emission at 13Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 mode

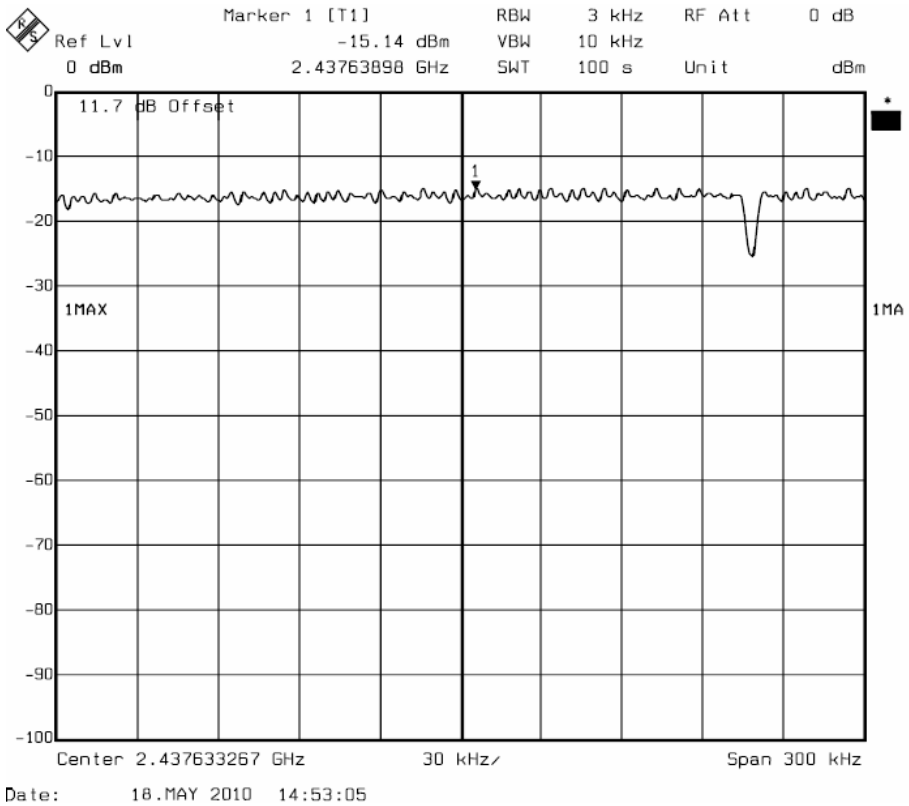
Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW Chain A (dBm)	Final RF Power Level in 3KHz BW Chain C (dBm)	PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2422	-21.65	-23.98	-19.65	8	PASS
Middle	2437	-21.96	-24.54	-20.05	8	PASS
High	2452	-21.44	-23.71	-19.42	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 27Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

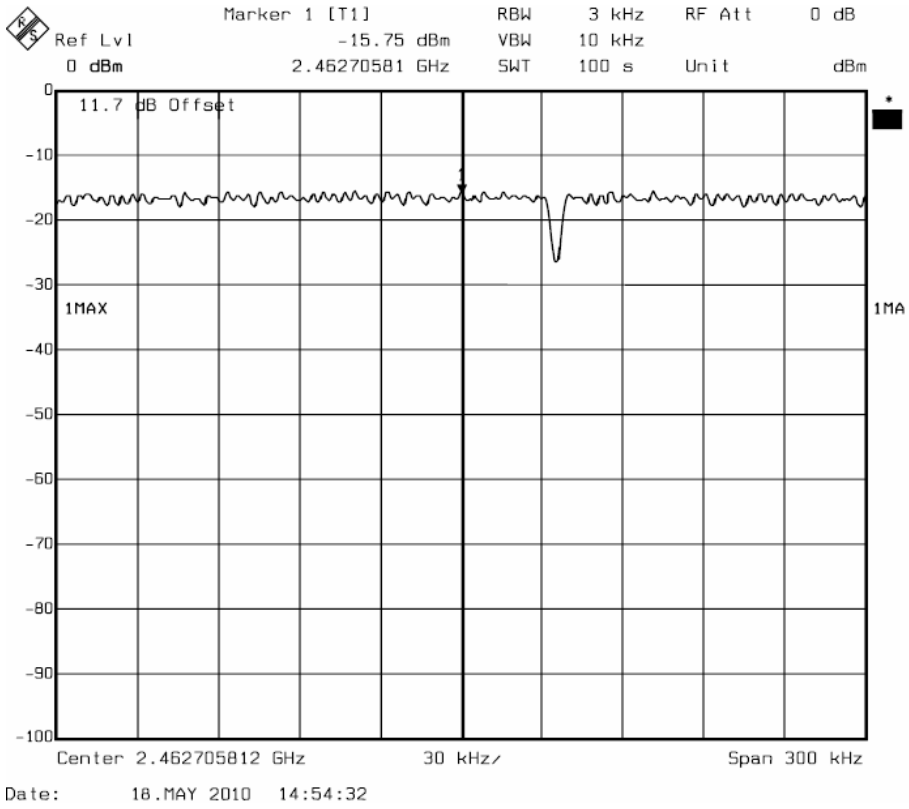
POWER SPECTRAL DENSITY (802.11b MODE CH Low)



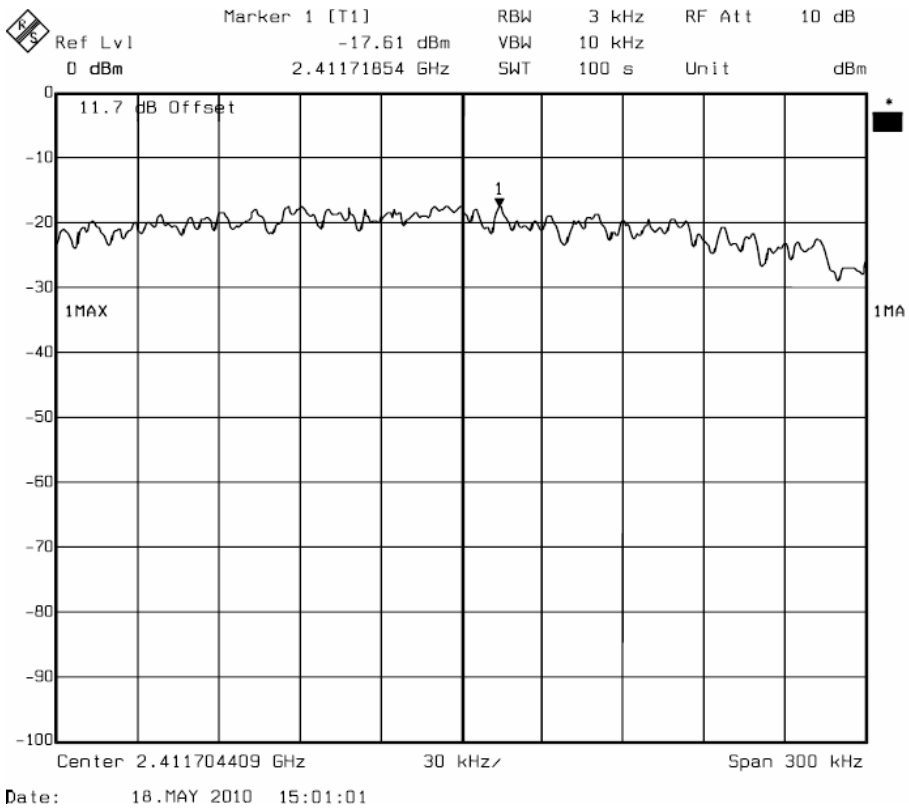
POWER SPECTRAL DENSITY (802.11b MODE CH Mid)



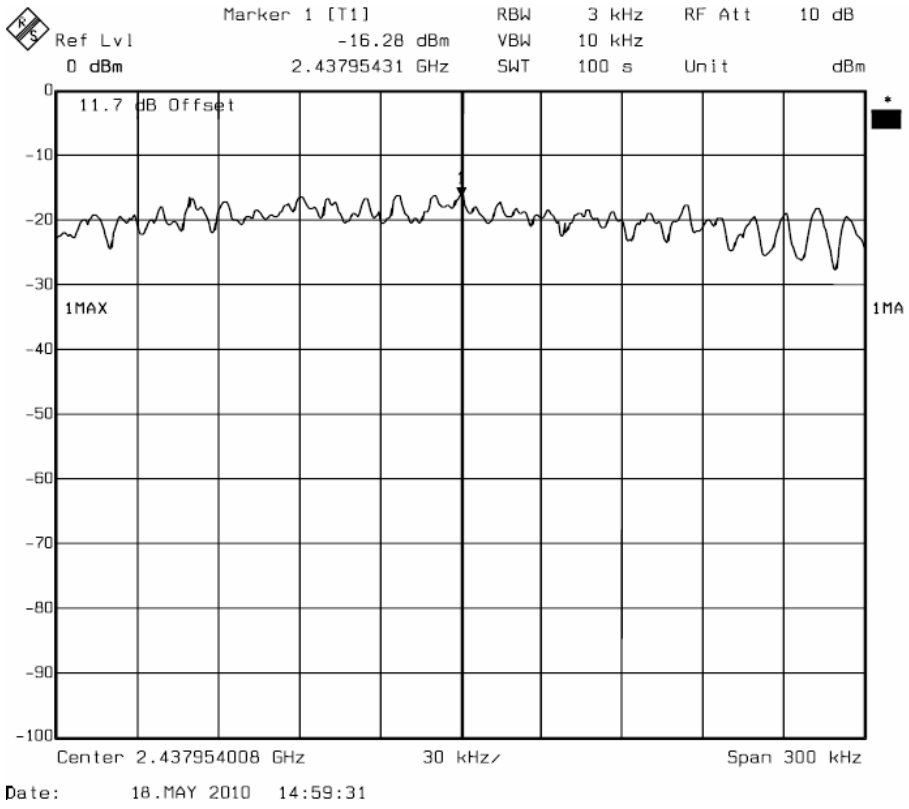
POWER SPECTRAL DENSITY (802.11b MODE CH High)



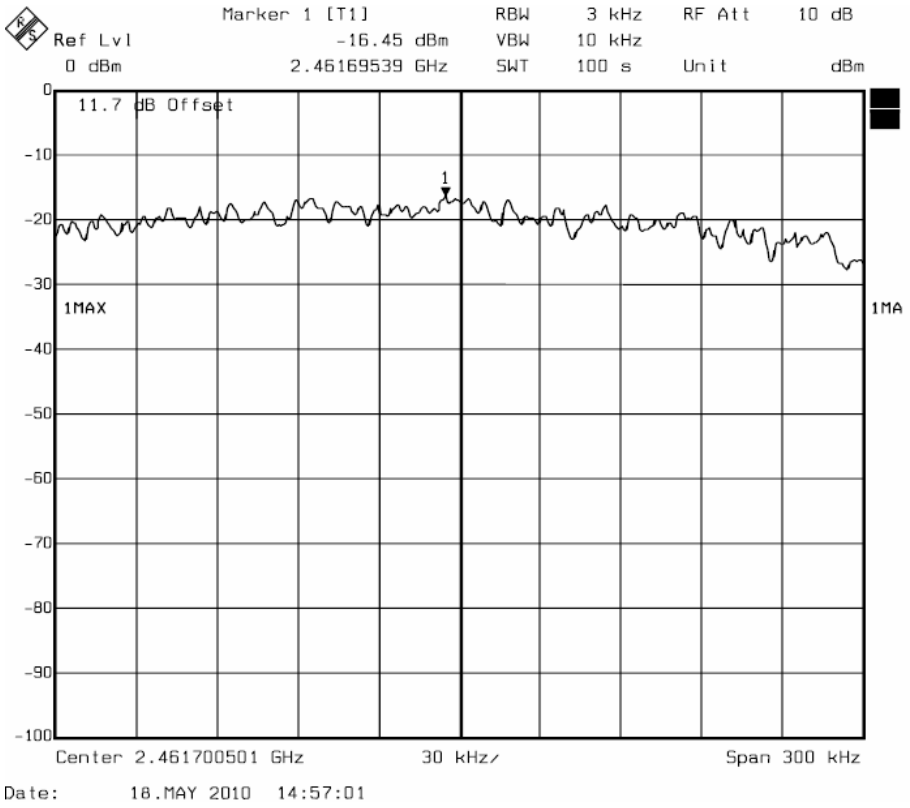
POWER SPECTRAL DENSITY (802.11g MODE CH Low)



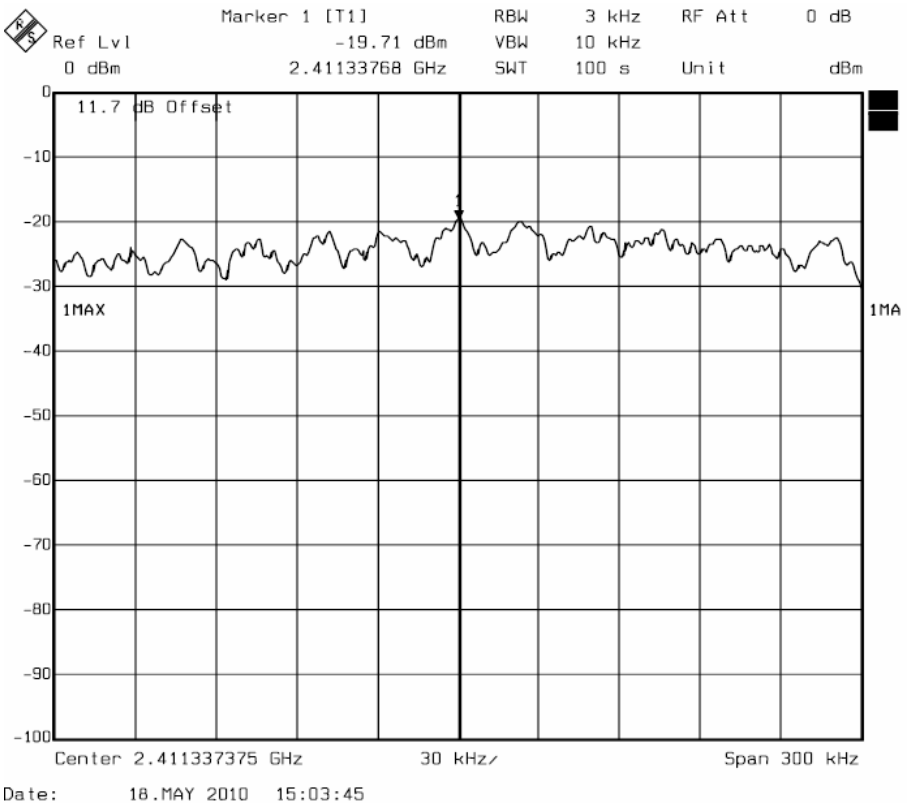
POWER SPECTRAL DENSITY (802.11g MODE CH Mid)



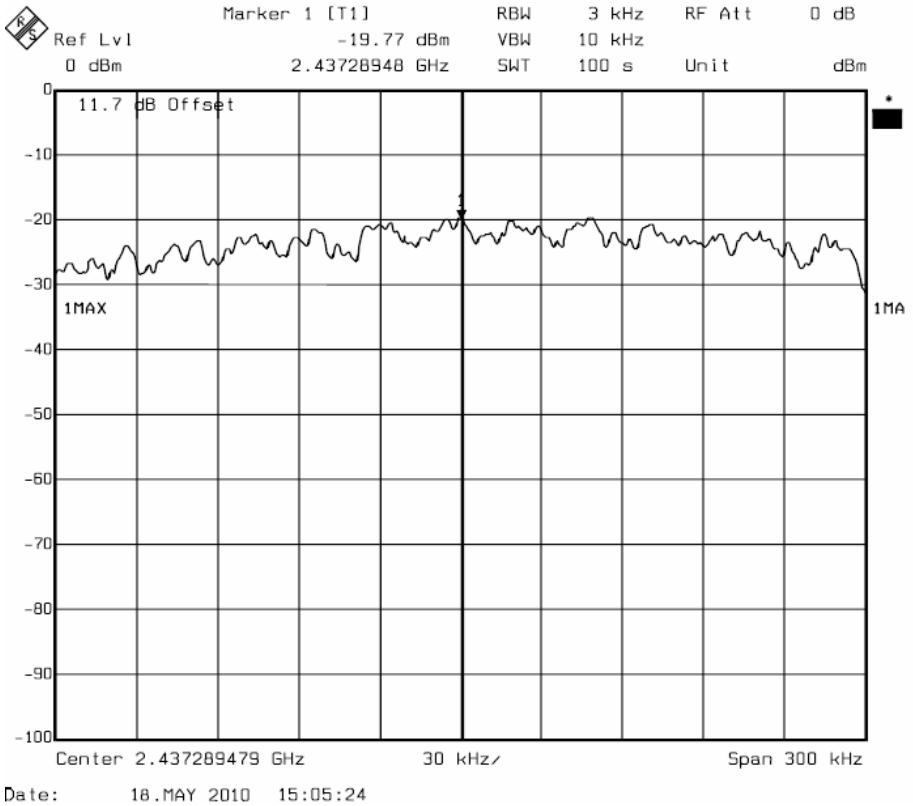
POWER SPECTRAL DENSITY (802.11g MODE CH High)



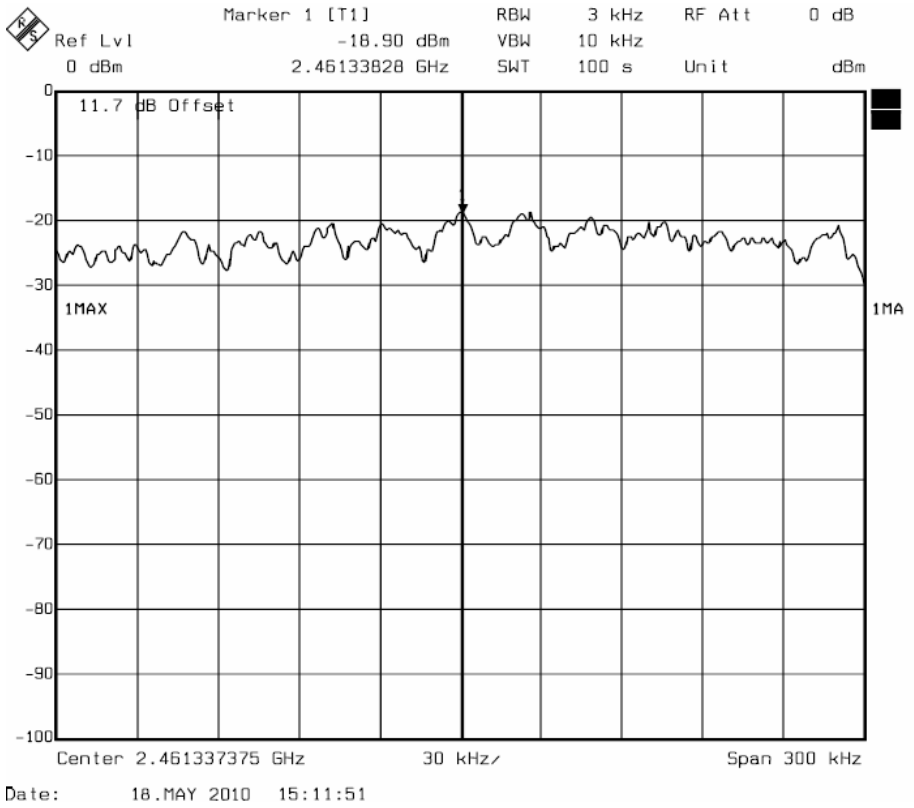
POWER SPECTRAL DENSITY (802.11n HT20 MODE CH Low) Chain A



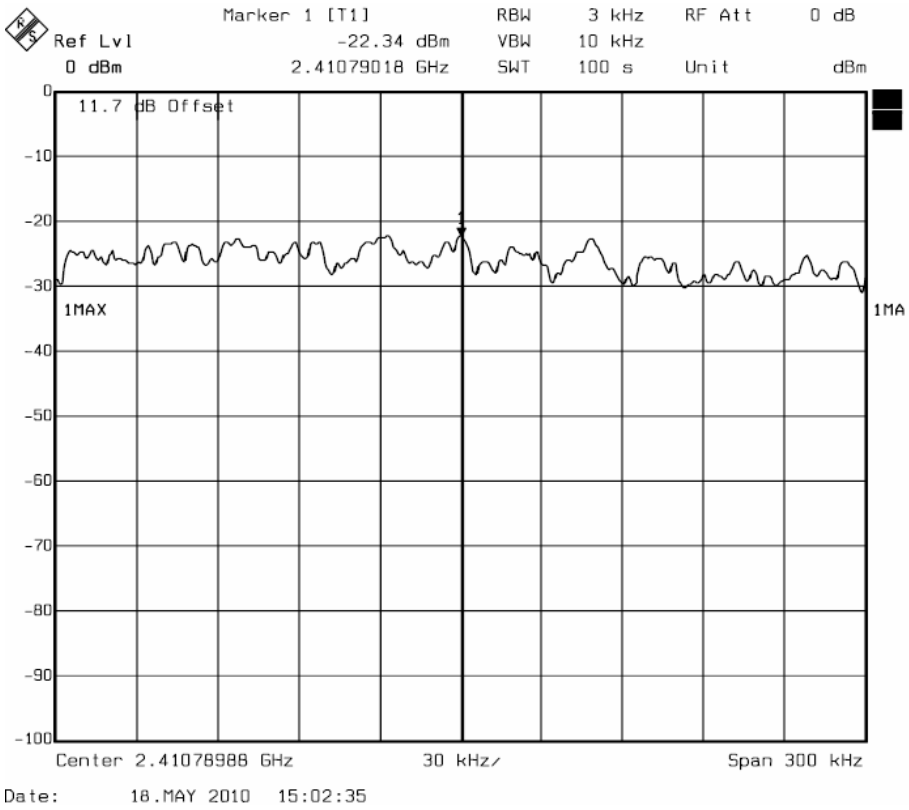
POWER SPECTRAL DENSITY (802.11n HT20 MODE CH Mid) Chain A



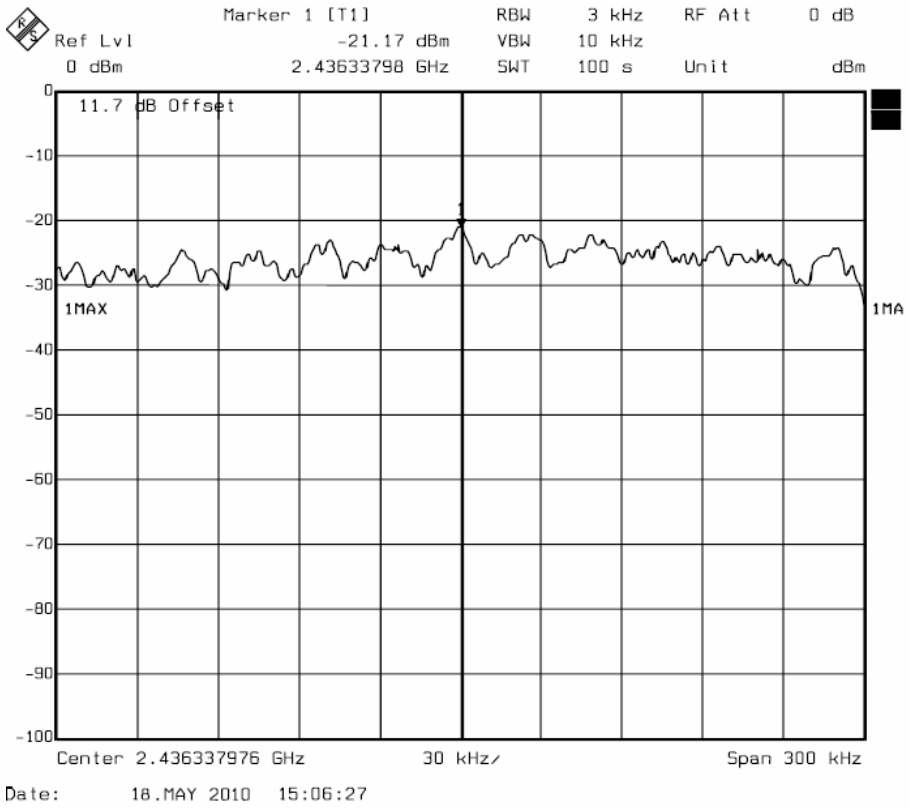
POWER SPECTRAL DENSITY (802.11n HT20 MODE CH High) Chain A



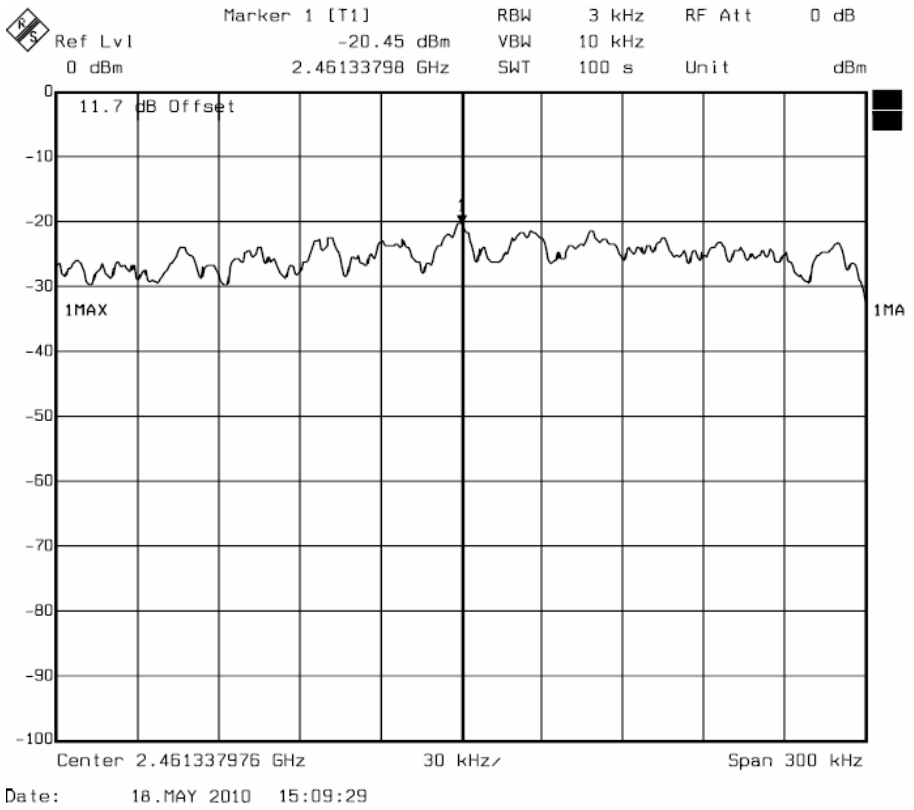
POWER SPECTRAL DENSITY (802.11n HT20 MODE CH Low) Chain C



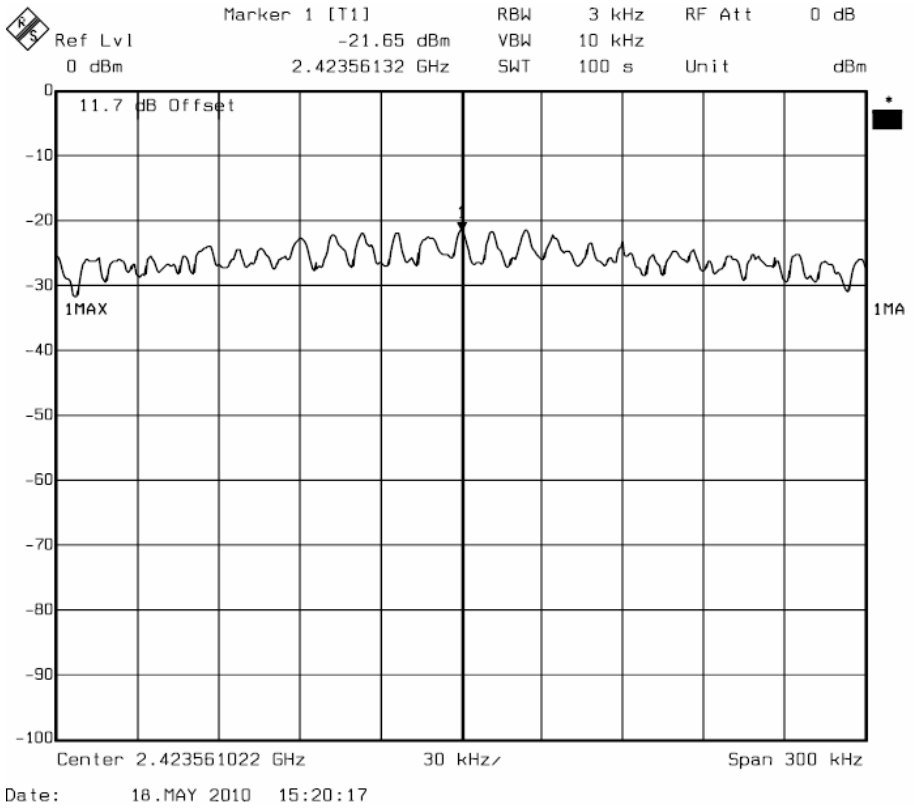
POWER SPECTRAL DENSITY (802.11n HT20 MODE CH Mid) Chain C



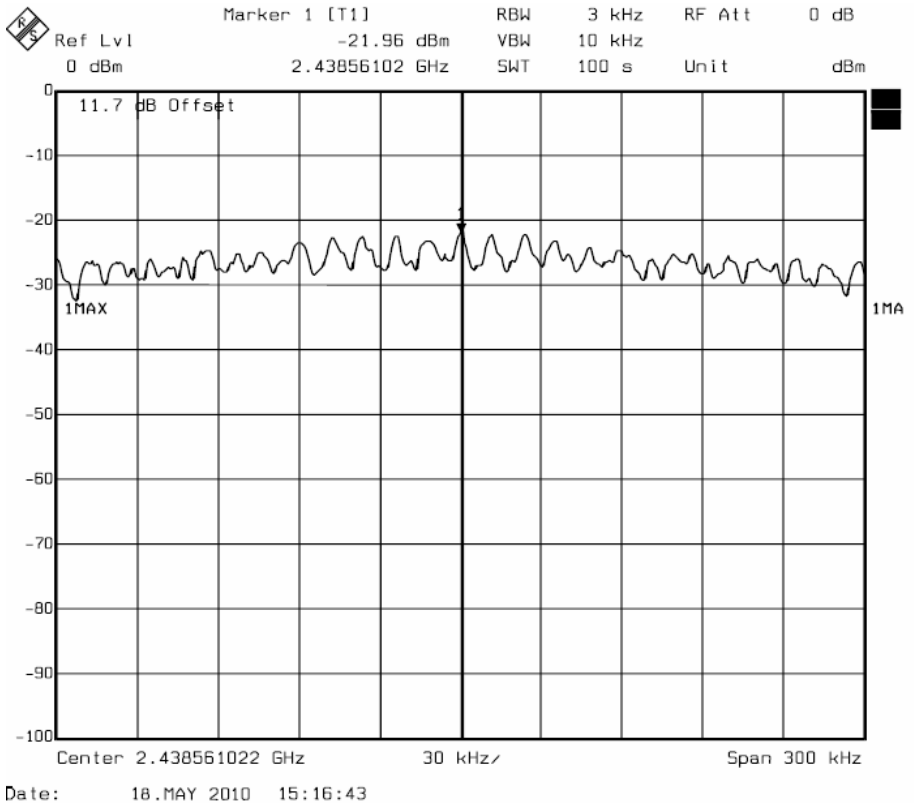
POWER SPECTRAL DENSITY (802.11n HT20 MODE CH High) Chain C



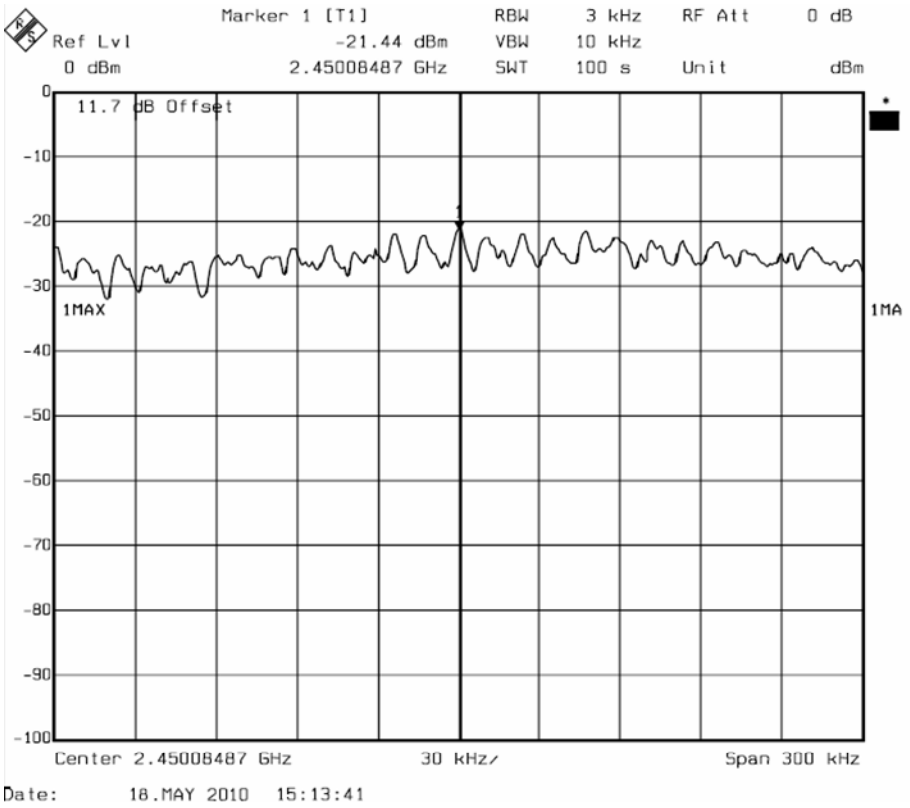
POWER SPECTRAL DENSITY (802.11n HT40 MODE CH Low) Chain A



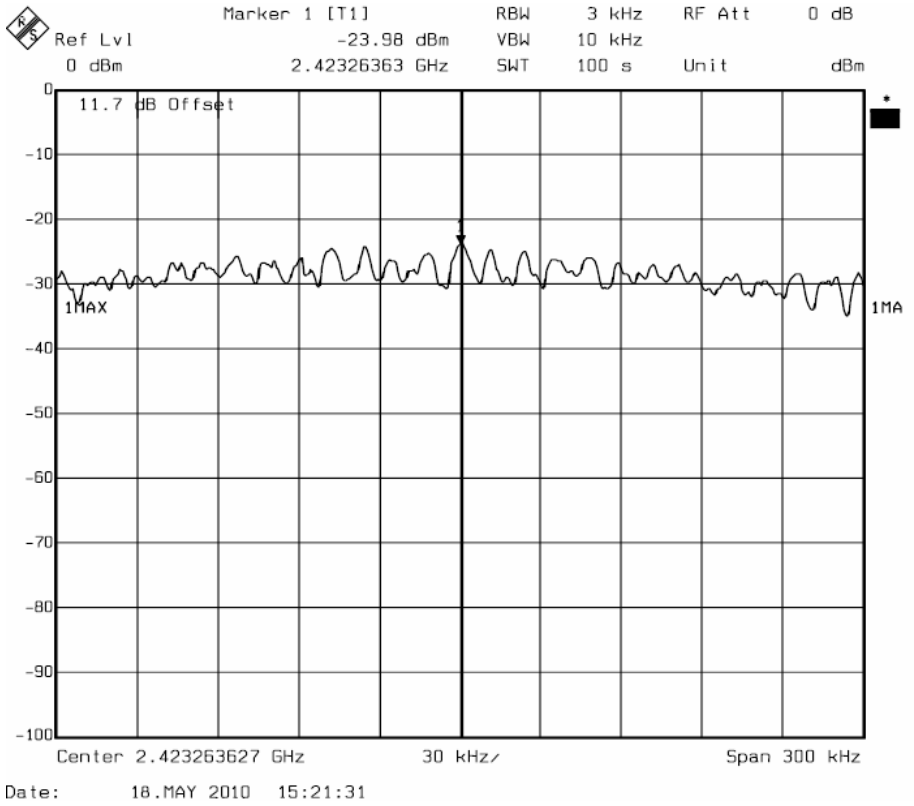
POWER SPECTRAL DENSITY (802.11n HT40 MODE CH Mid) Chain A



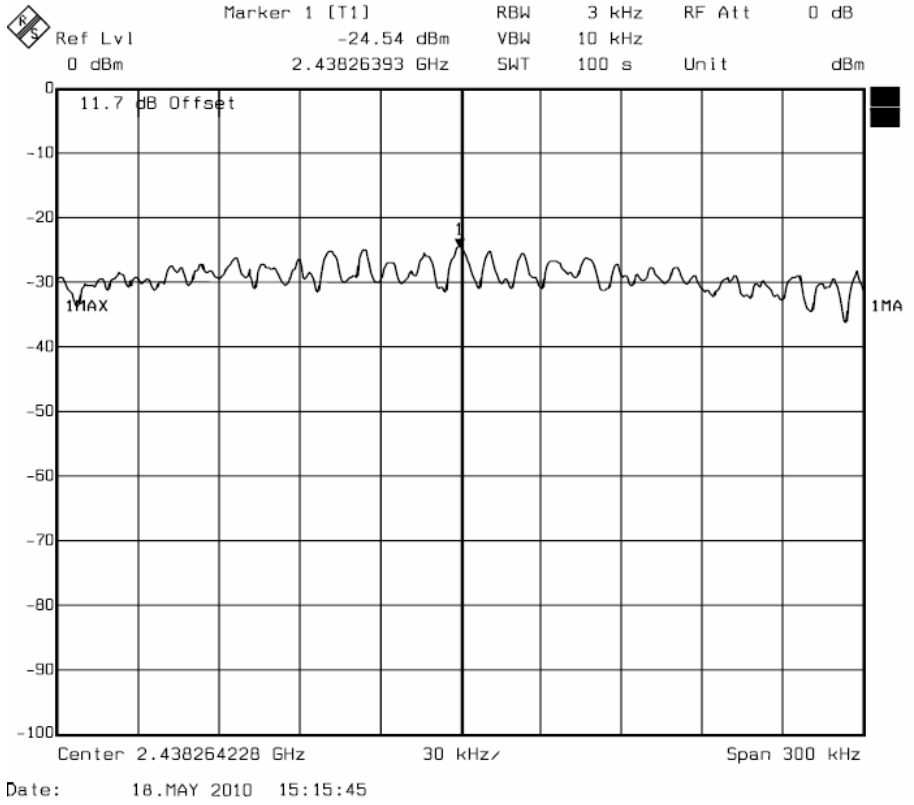
POWER SPECTRAL DENSITY (802.11n HT40 MODE CH High) Chain A



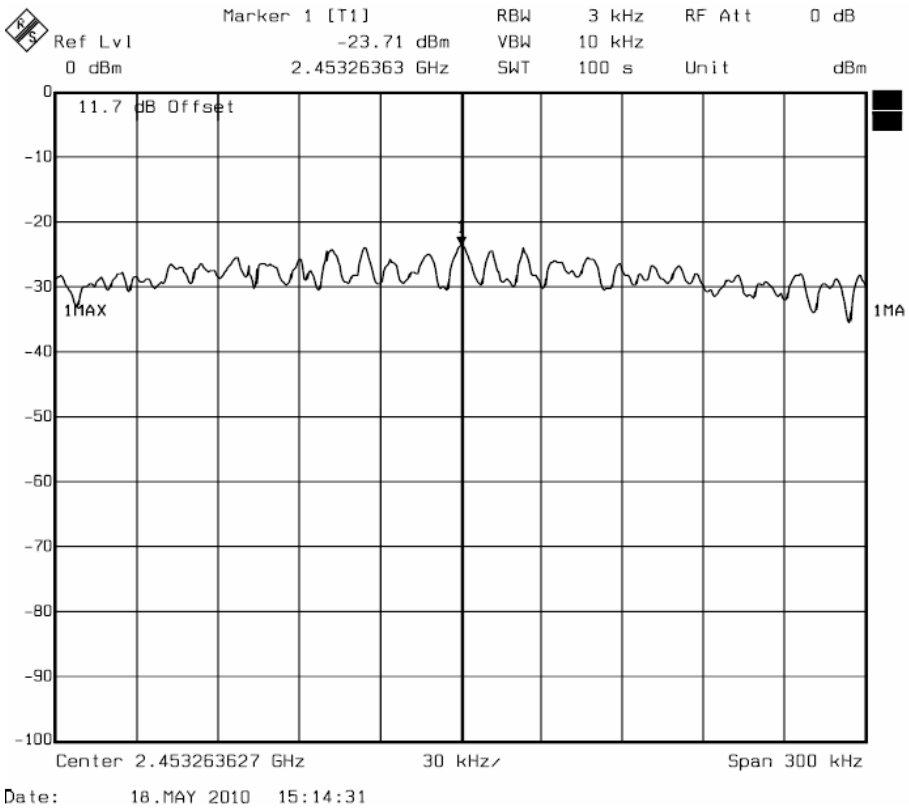
POWER SPECTRAL DENSITY (802.11n HT40 MODE CH Low) Chain C



POWER SPECTRAL DENSITY (802.11n HT40 MODE CH Mid) Chain C



POWER SPECTRAL DENSITY (802.11n HT40 MODE CH High) Chain C



7. Test of 6dB Bandwidth

7.1 Applicable Standard

Refer to FCC §15.247 (a) (2) and IC RSS-210 A8.2 (a).

The minimum 6 dB bandwidth shall be at least 500 kHz.

7.2 EUT Setup

Spectrum Analyzer

7.3 Test Equipment List and Details

See section 2.5.

7.4 Test Procedure

The transmitter output was connected to a spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 100 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

7.5 Test Result

Temperature (℃) : 22~23	EUT: Notebook
Humidity (%RH): 50~54	M/N: X220P
Barometric Pressure (mbar): 950~1000	Operation Condition: Tx Mode

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz) Chain C	Minimum Limit (kHz)	Pass / Fail
Low	2412	10220	500	PASS
Middle	2437	10235	500	PASS
High	2462	10213	500	PASS

NOTE : 1. At finial test to get the worst-case emission at11Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz) Chain C	Minimum Limit (kHz)	Pass / Fail
Low	2412	16630	500	PASS
Middle	2437	16628	500	PASS
High	2462	16633	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth Chain A (kHz)	6dB Bandwidth Chain C (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17829	17835	500	PASS
Middle	2437	17826	17833	500	PASS
High	2462	17831	17834	500	PASS

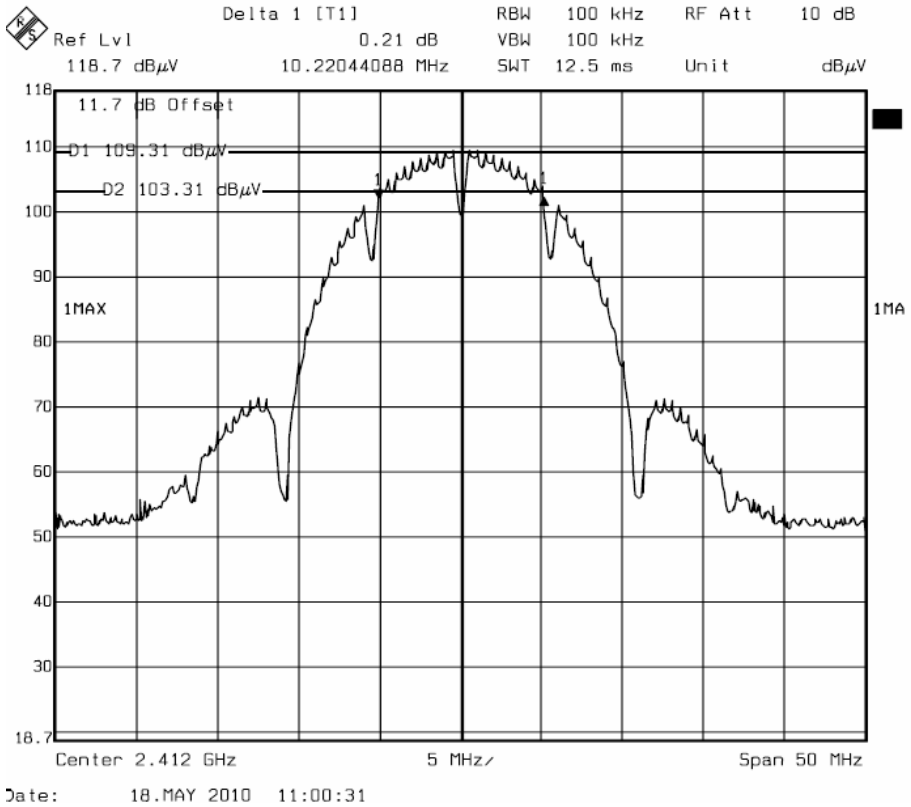
NOTE : 1. At finial test to get the worst-case emission at 13Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT40 mode

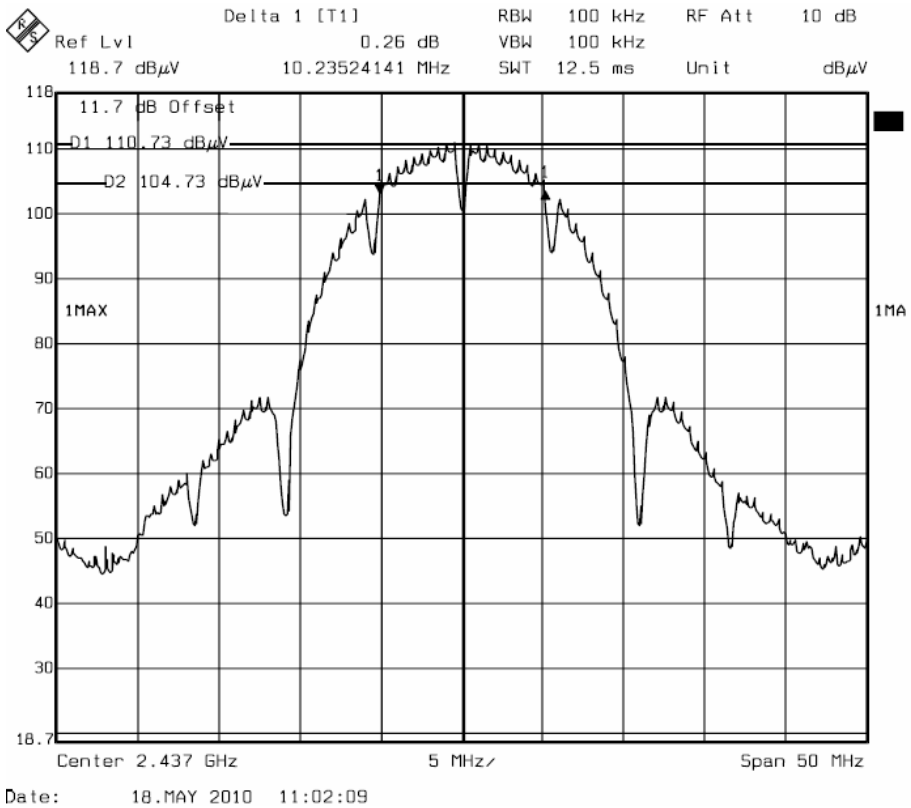
Channel	Channel Frequency (MHz)	6dB Bandwidth Chain A (kHz)	6dB Bandwidth Chain C (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2422	37046	37065	500	PASS
Middle	2437	37052	37053	500	PASS
High	2452	37074	37065	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 27Mbps.
2. The cable assembly insertion loss of 11.7dB (including 10 dB pad and 1.7 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

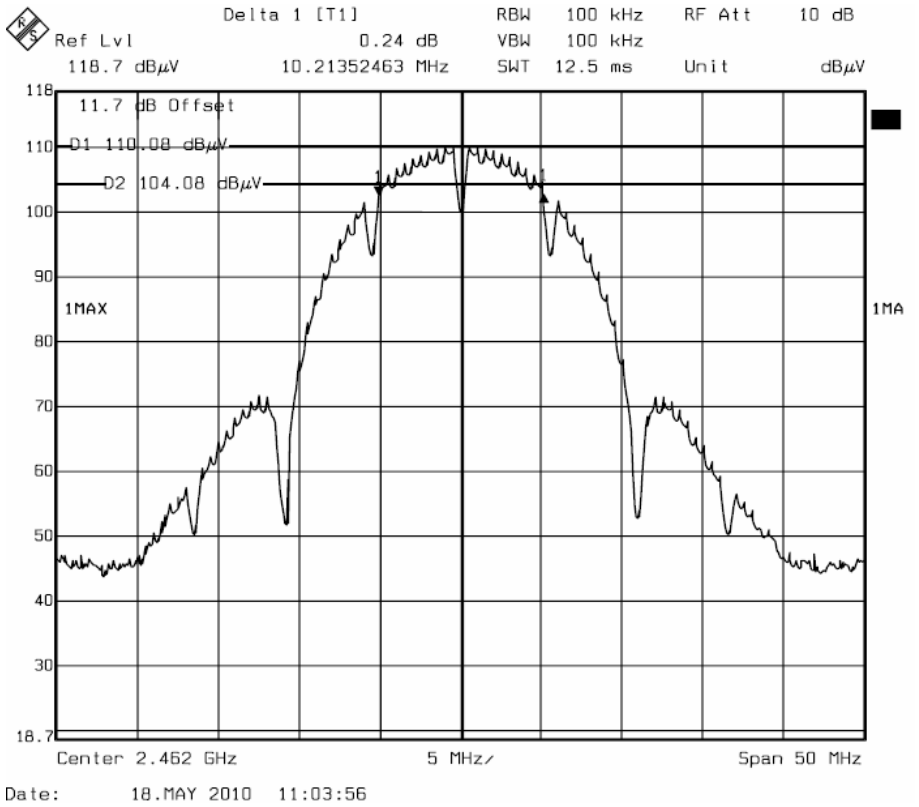
6dB BANDWIDTH (802.11b MODE CH Low)



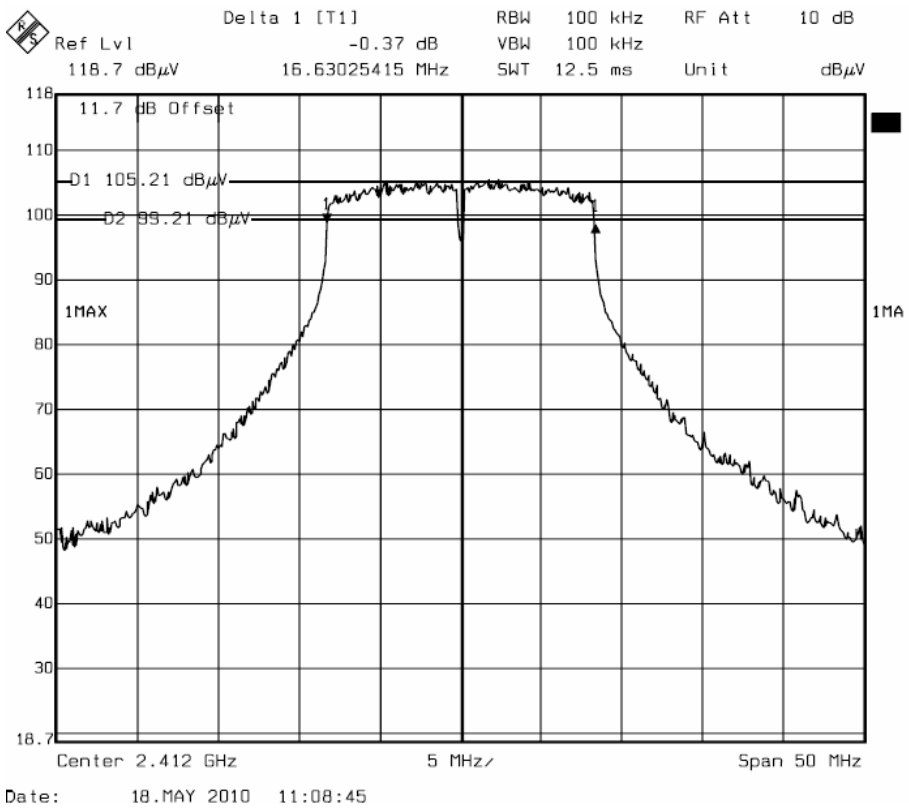
6dB BANDWIDTH (802.11b MODE CH Mid)



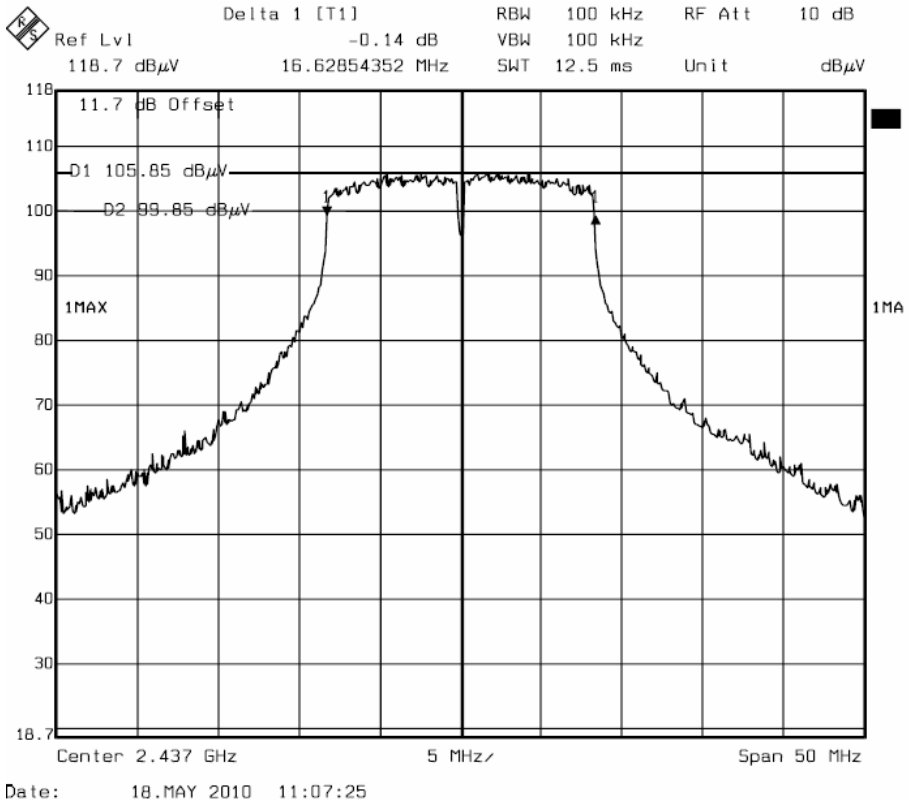
6dB BANDWIDTH (802.11b MODE CH High)



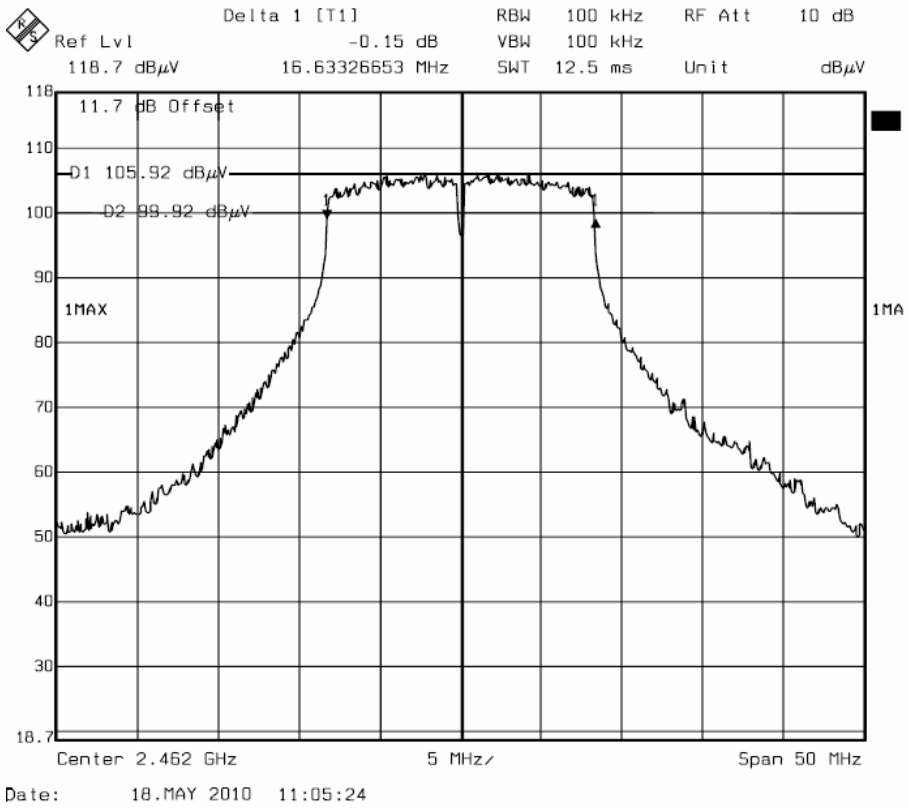
6dB BANDWIDTH (802.11g MODE CH Low)



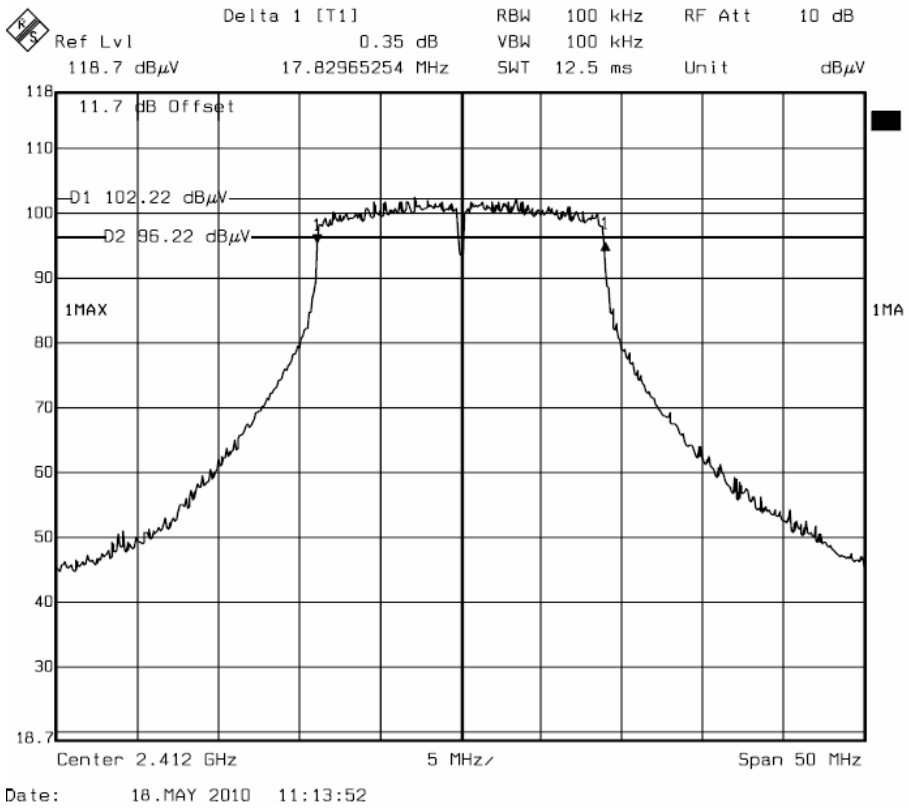
6dB BANDWIDTH (802.11g MODE CH Mid)



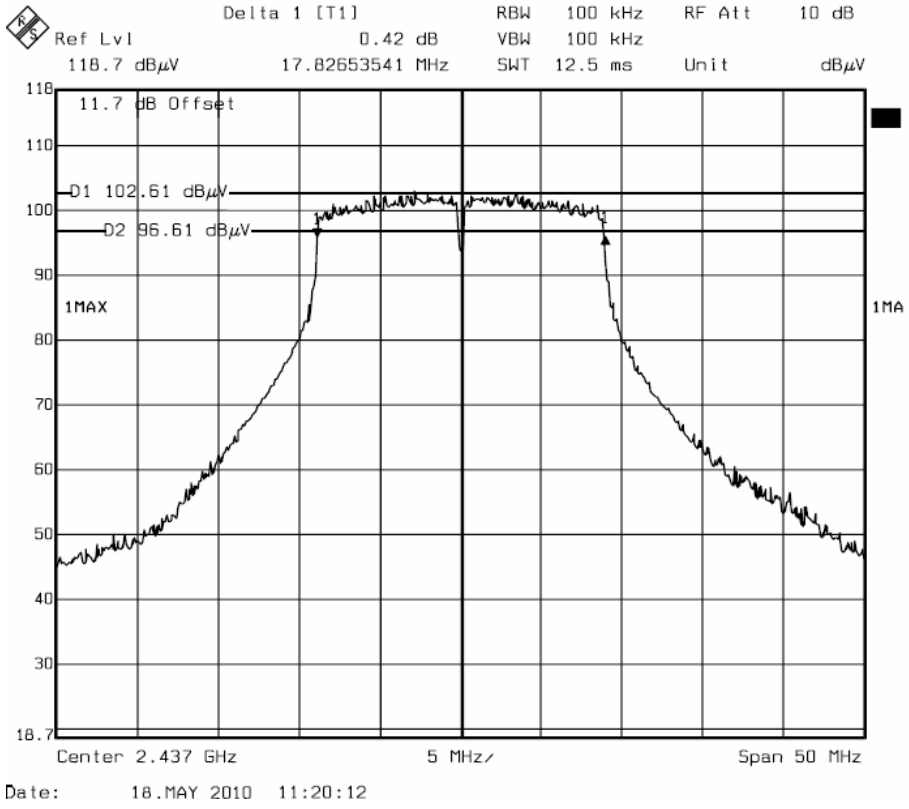
6dB BANDWIDTH (802.11g MODE CH High)



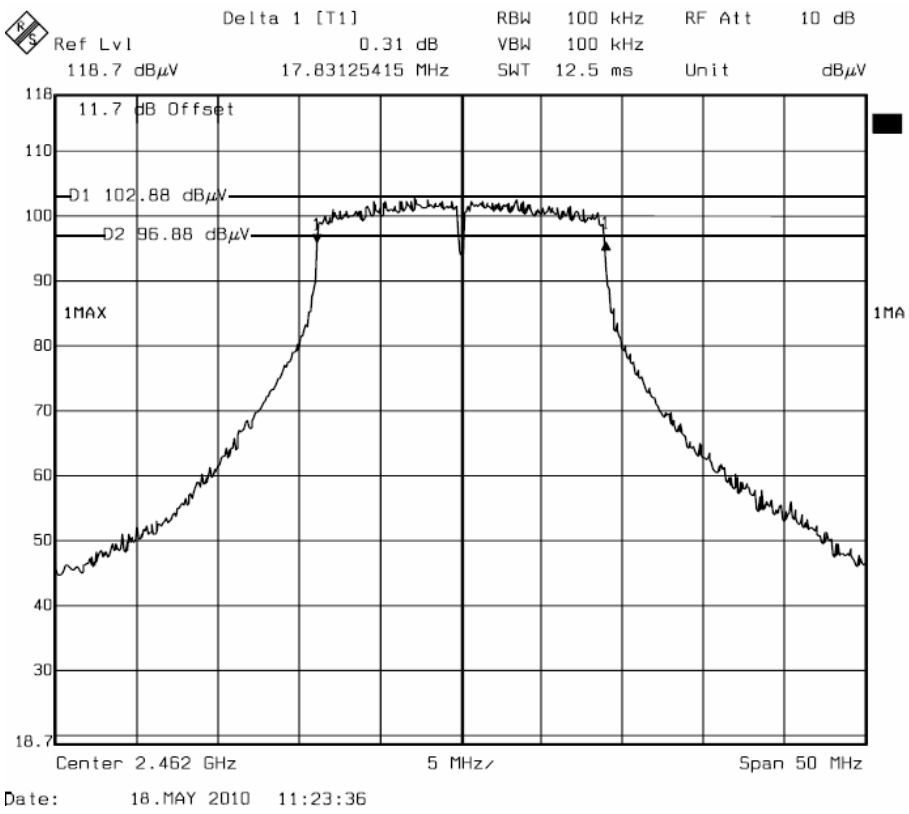
6dB BANDWIDTH (802.11n HT20 MODE CH Low) Chain A



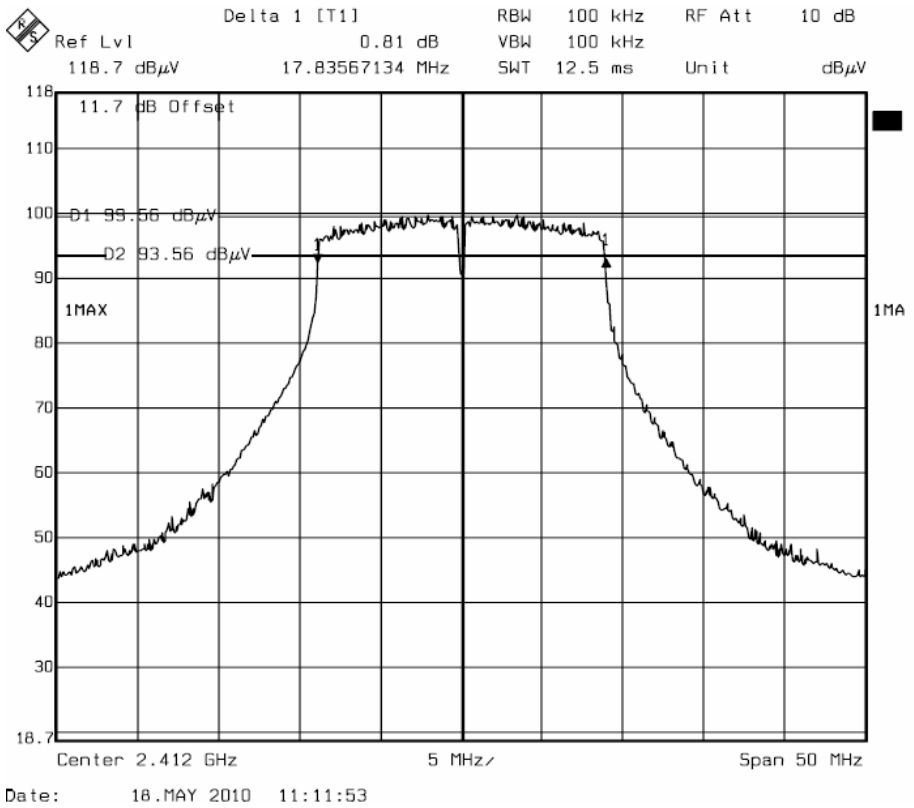
6dB BANDWIDTH (802.11n HT20 MODE CH Mid) Chain A



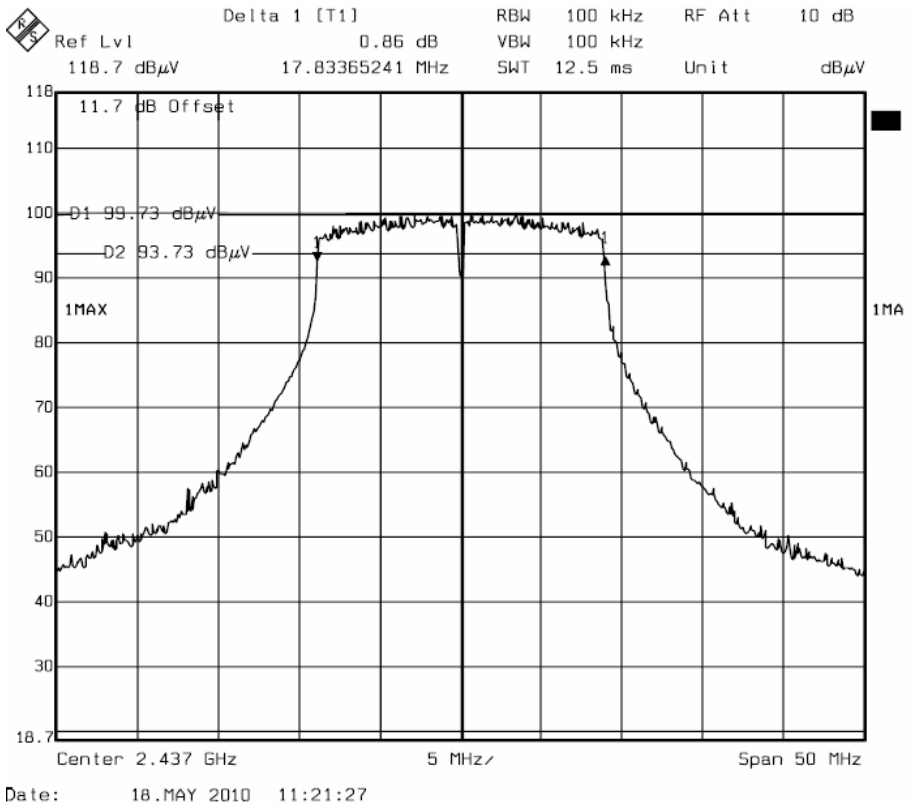
6dB BANDWIDTH (802.11n HT20 MODE CH High) Chain A



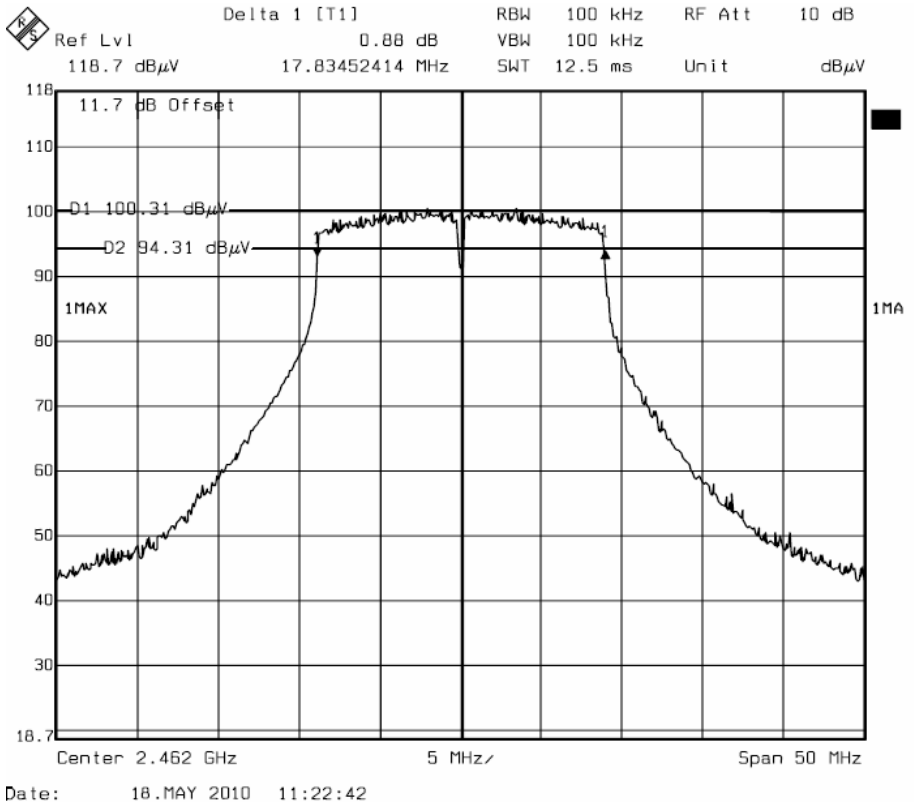
6dB BANDWIDTH (802.11n HT20 MODE CH Low) Chain C



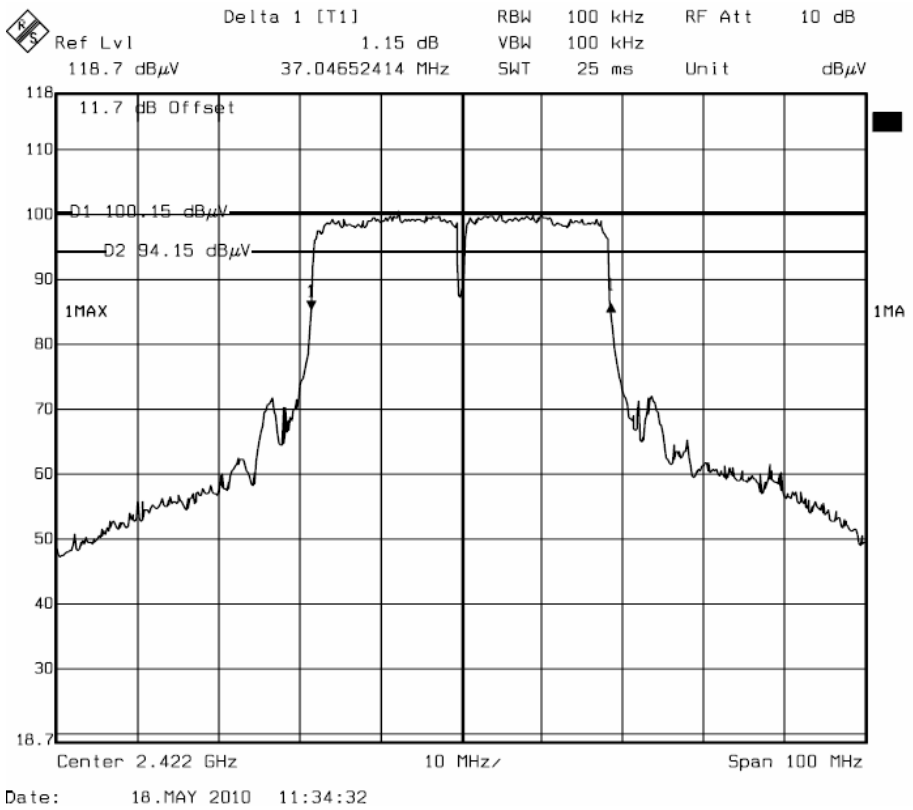
6dB BANDWIDTH (802.11n HT20 MODE CH Mid) Chain C



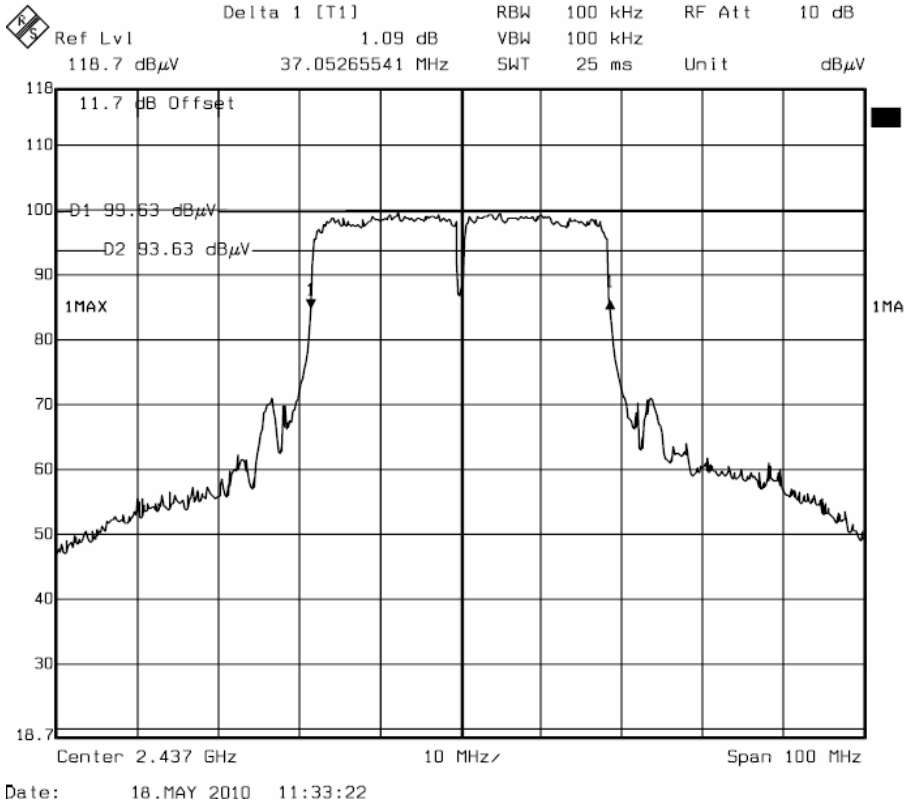
6dB BANDWIDTH (802.11n HT20 MODE CH High) Chain C



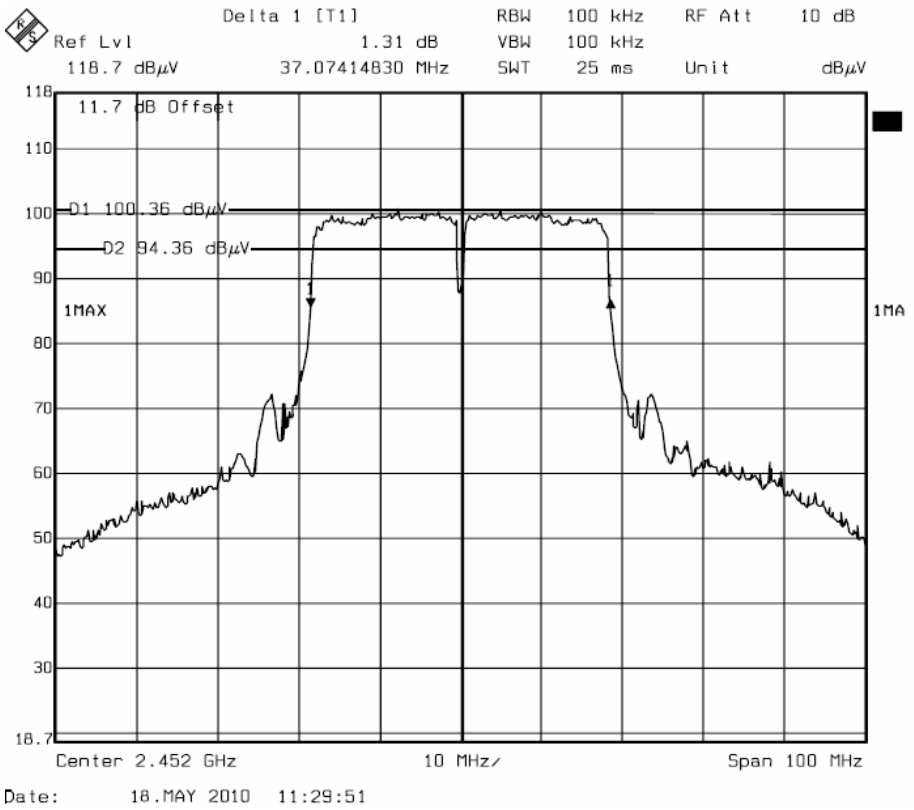
6dB BANDWIDTH (802.11n HT40 MODE CH Low) Chain A



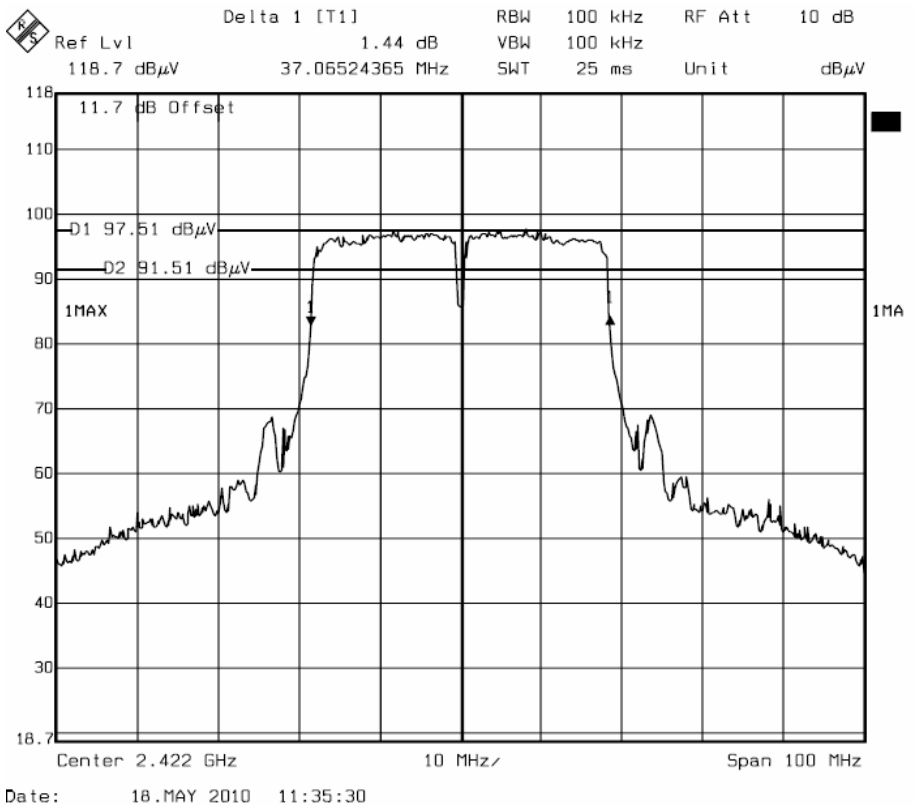
6dB BANDWIDTH (802.11n HT40 MODE CH Mid) Chain A



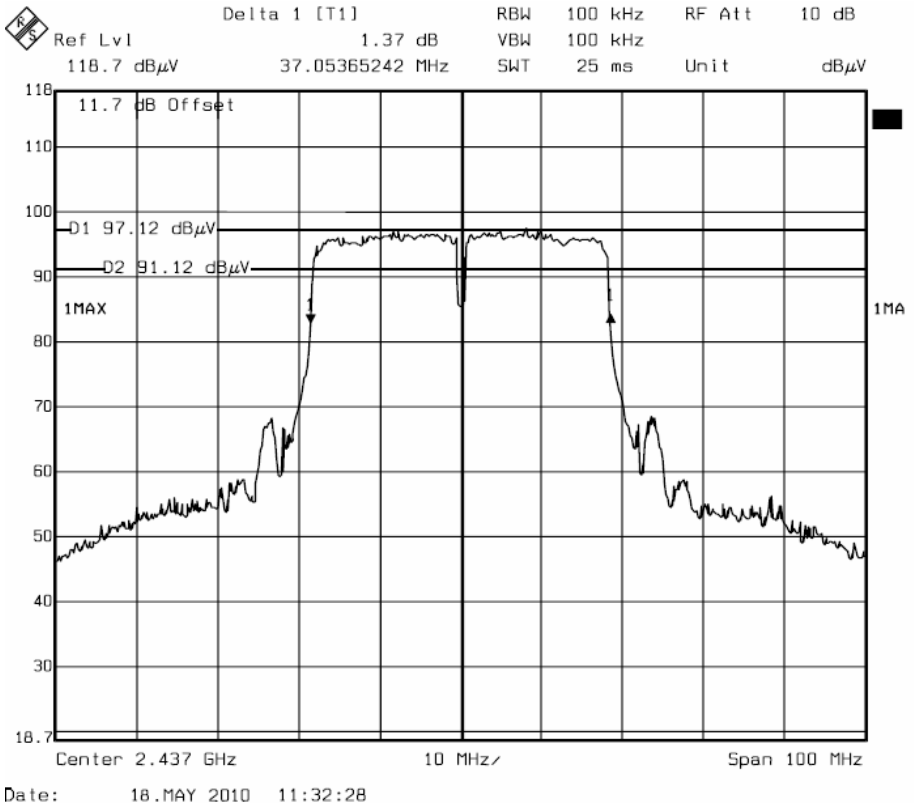
6dB BANDWIDTH (802.11n HT40 MODE CH High) Chain A



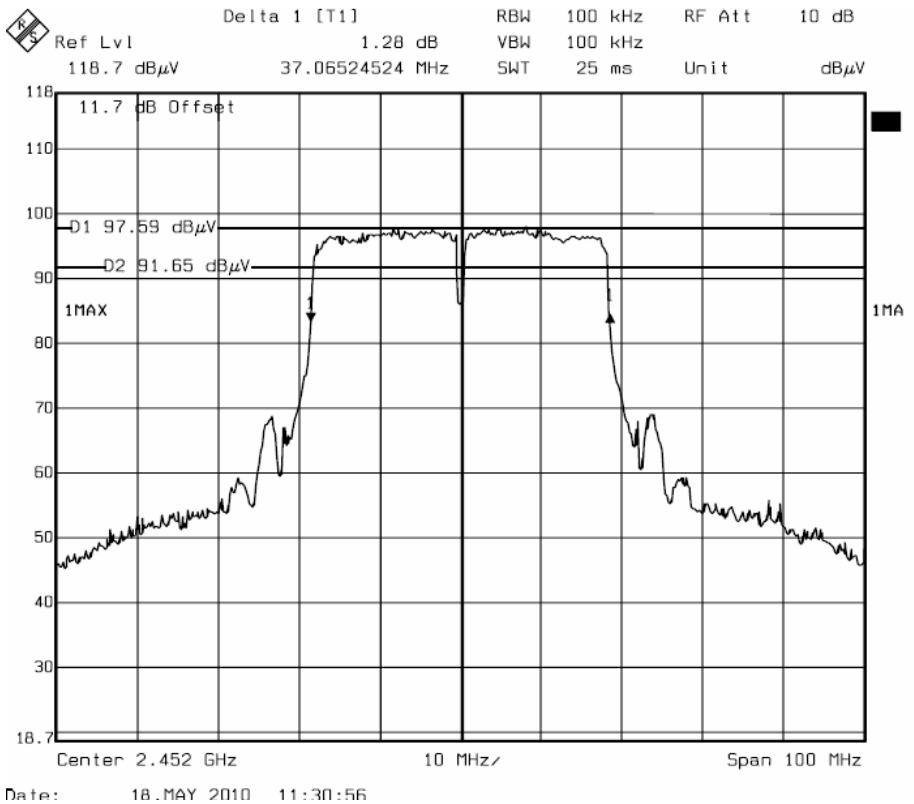
6dB BANDWIDTH (802.11n HT40 MODE CH Low) Chain C



6dB BANDWIDTH (802.11n HT40 MODE CH Mid) Chain C



6dB BANDWIDTH (802.11n HT40 MODE CH High) Chain C



8. Test of Conducted Spurious Emission

8.1 Applicable Standard

Refer to FCC §15.247 (d) and IC RSS-210 A8.5.

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

8.2 EUT Setup

Spectrum Analyzer

8.3 Test Equipment List and Details

See section 2.5.

8.4 Test Procedure

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

8.5 Test Result

Temperature (℃) : 22~23	EUT: Notebook
Humidity (%RH): 50~54	M/N: X220P
Barometric Pressure (mbar): 950~1000	Operation Condition: TX Mode

IEEE 802.11b mode

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2412.6535	11.7	97.49	109.19	N/A	N/A	
1197.014	11.7	40.58	52.28	89.19	-36.91	PASS
4910.2404	11.7	42.91	54.61	89.19	-34.58	PASS
6979.038	11.7	46.45	58.15	89.19	-31.04	PASS

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2437.1524	11.7	98.78	110.48	N/A	N/A	
1462.2444	11.7	41.28	52.98	90.48	-37.50	PASS
4857.1943	11.7	44.06	55.76	90.48	-34.72	PASS
6819.8998	11.7	45.76	57.46	90.48	-33.02	PASS

CH High

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2462.5352	11.7	97.74	109.44	N/A	N/A	
1303.1062	11.7	40.93	52.63	89.44	-36.81	PASS
5493.7474	11.7	44.02	55.72	89.44	-33.72	PASS
6766.8537	11.7	45.39	57.09	89.44	-32.35	PASS

IEEE 802.11g mode

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2412.6352	11.7	93.04	104.74	N/A	N/A	
1409.7984	11.7	40.47	52.17	84.74	-32.57	PASS
5865.0701	11.7	44.22	55.92	84.74	-28.82	PASS
6713.8076	11.7	45.37	57.07	84.74	-27.67	PASS

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2436.9525	11.7	93.81	105.51	N/A	N/A	
1674.4288	11.7	41.44	53.14	85.51	-32.37	PASS
5546.7935	11.7	43.12	54.82	85.51	-30.69	PASS
6766.8537	11.7	45.53	57.23	85.51	-28.28	PASS

CH High

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2461.5352	11.7	92.89	104.59	N/A	N/A	
1780.521	11.7	41.29	52.99	84.59	-31.60	PASS
6501.6232	11.7	45.57	57.27	84.59	-27.32	PASS
6979.038	11.7	45.45	57.15	84.59	-27.44	PASS

IEEE 802.11n HT20 mode Chain A

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2411.8565	11.7	89.64	101.34	N/A	N/A	
1462.2444	11.7	42.12	53.82	81.34	-27.52	PASS
5440.7014	11.7	43.81	55.51	81.34	-25.83	PASS
6925.9919	11.7	46.22	57.92	81.34	-23.42	PASS

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2437.5246	11.7	89.92	101.62	N/A	N/A	
1674.4288	11.7	41.33	53.03	81.62	-28.59	PASS
5546.7935	11.7	42.93	54.63	81.62	-26.99	PASS
6713.8076	11.7	45.86	57.56	81.62	-24.06	PASS

CH High

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2462.5385	11.7	89.32	101.02	N/A	N/A	
1886.6132	11.7	40.59	52.29	81.02	-28.73	PASS
5546.7935	11.7	43.14	54.84	81.02	-26.18	PASS
6925.9919	11.7	46.11	57.81	81.02	-23.21	PASS

IEEE 802.11 n HT20 mode Chain C

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2411.8565	11.7	87.38	99.08	N/A	N/A	
1462.2444	11.7	42.12	53.82	79.08	-25.26	PASS
5440.7014	11.7	43.81	55.51	79.08	-23.57	PASS
6660.7615	11.7	45.93	57.63	79.08	-21.45	PASS

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2437.5246	11.7	87.12	98.82	N/A	N/A	
984.8296	11.7	41.07	52.77	78.82	-26.05	PASS
6289.4388	11.7	44.05	55.75	78.82	-23.07	PASS
6872.9458	11.7	45.73	57.43	78.82	-21.39	PASS

CH High

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2462.5385	11.7	87.09	98.79	N/A	N/A	
1621.3827	11.7	41.45	53.15	78.79	-25.64	PASS
5652.8857	11.7	43.49	55.19	78.79	-23.60	PASS
6925.9919	11.7	46.04	57.74	78.79	-21.05	PASS

IEEE 802.11n HT40 mode Chain A

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2422.8563	11.7	86.88	98.58	N/A	N/A	
1780.521	11.7	41.73	53.43	78.58	-25.15	PASS
6012.7248	11.7	44.55	56.25	78.58	-22.33	PASS
6861.4623	11.7	46.00	57.7	78.58	-20.88	PASS

CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2437.5263	11.7	87.00	98.7	N/A	N/A	
1037.8757	11.7	41.52	53.22	78.70	-25.48	PASS
4963.2865	11.7	43.22	54.92	78.70	-23.78	PASS
6660.7615	11.7	45.72	57.42	78.70	-21.28	PASS

CH High

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2452.6535	11.7	87.28	98.98	N/A	N/A	
1727.4749	11.7	41.01	52.71	78.98	-26.27	PASS
5599.8396	11.7	45.15	56.85	78.98	-22.13	PASS
6779.038	11.7	45.82	57.52	78.98	-21.46	PASS

IEEE 802.11n HT40 mode Chain C

CH Low

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2422.8563	11.7	85.22	96.92	N/A	N/A	
1833.5671	11.7	40.51	52.21	76.92	-24.71	PASS
5535.31	11.7	43.60	55.3	76.92	-21.62	PASS
6649.2779	11.7	45.94	57.64	76.92	-19.28	PASS

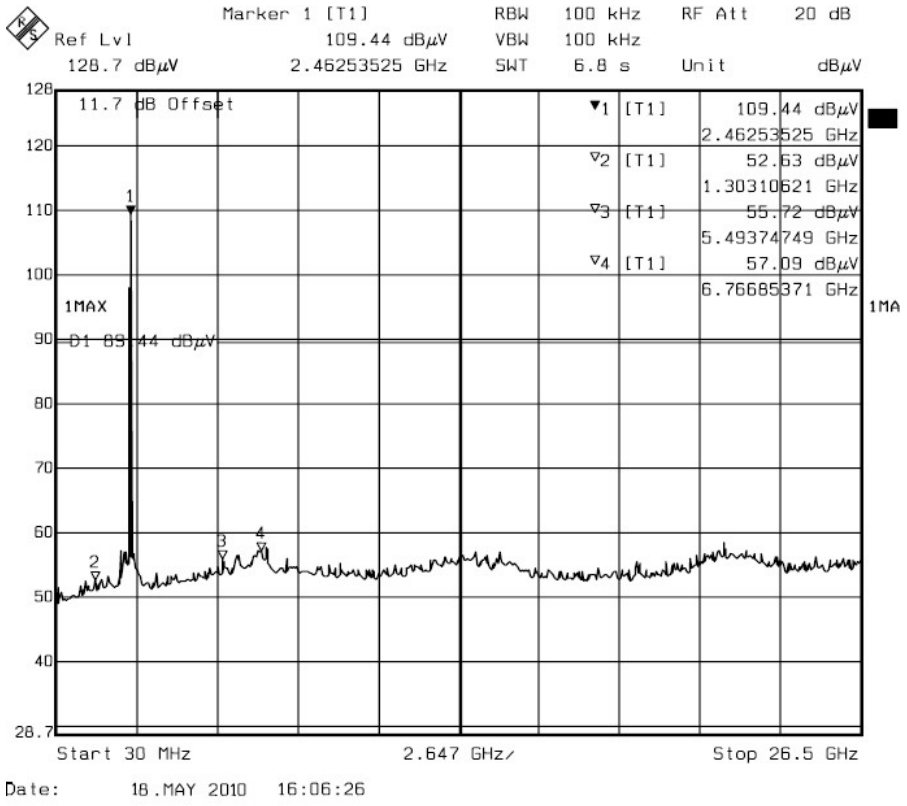
CH Mid

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2437.5263	11.7	85.25	96.95	N/A	N/A	
1727.4749	11.7	41.60	53.3	76.95	-23.65	PASS
6024.2084	11.7	43.83	55.53	76.95	-21.42	PASS
6660.7615	11.7	46.19	57.89	76.95	-19.06	PASS

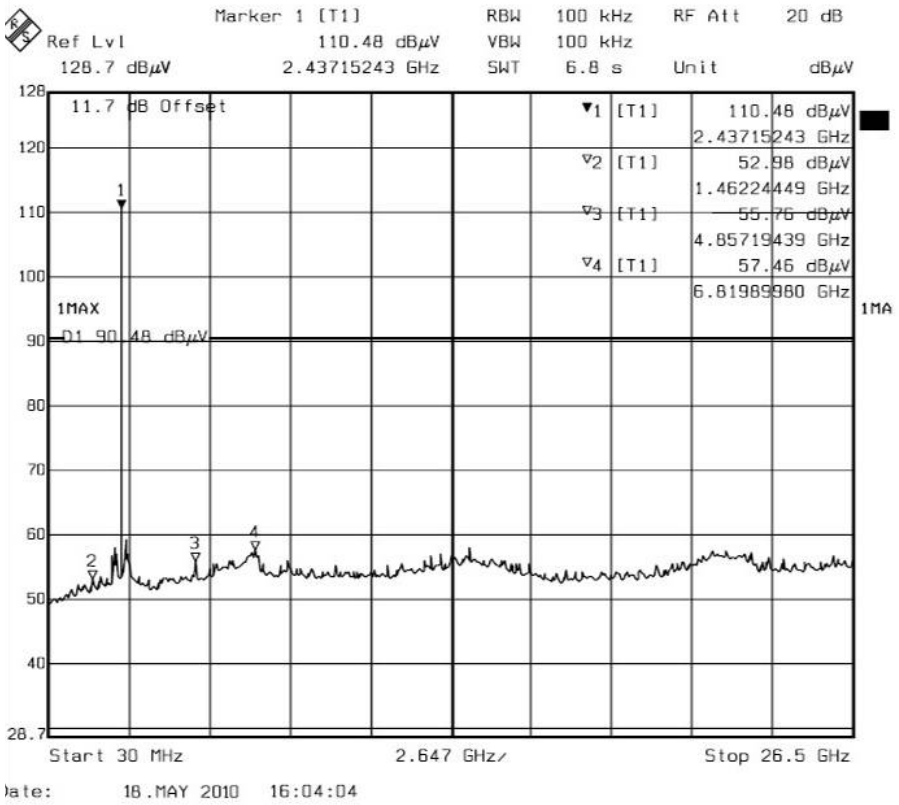
CH High

Frequency (MHz)	Offset (dB)	Reading (dBµV)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Pass/Fail
2452.6535	11.7	84.62	96.32	N/A	N/A	
1780.521	11.7	41.53	53.23	76.32	-23.09	PASS
6660.7615	11.7	45.42	57.12	76.32	-19.20	PASS
6979.038	11.7	46.37	58.07	76.32	-18.25	PASS

CH Low (30MHz~26.5GHz) (802.11b MODE)



CH Mid (30MHz~26.5GHz) (802.11b MODE)



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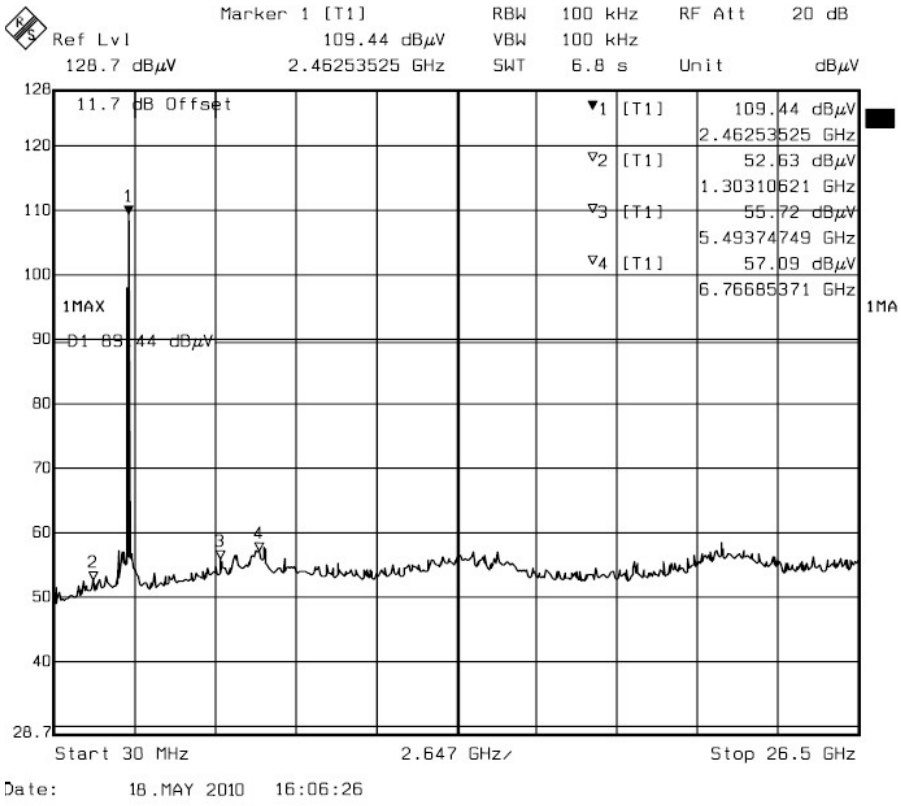
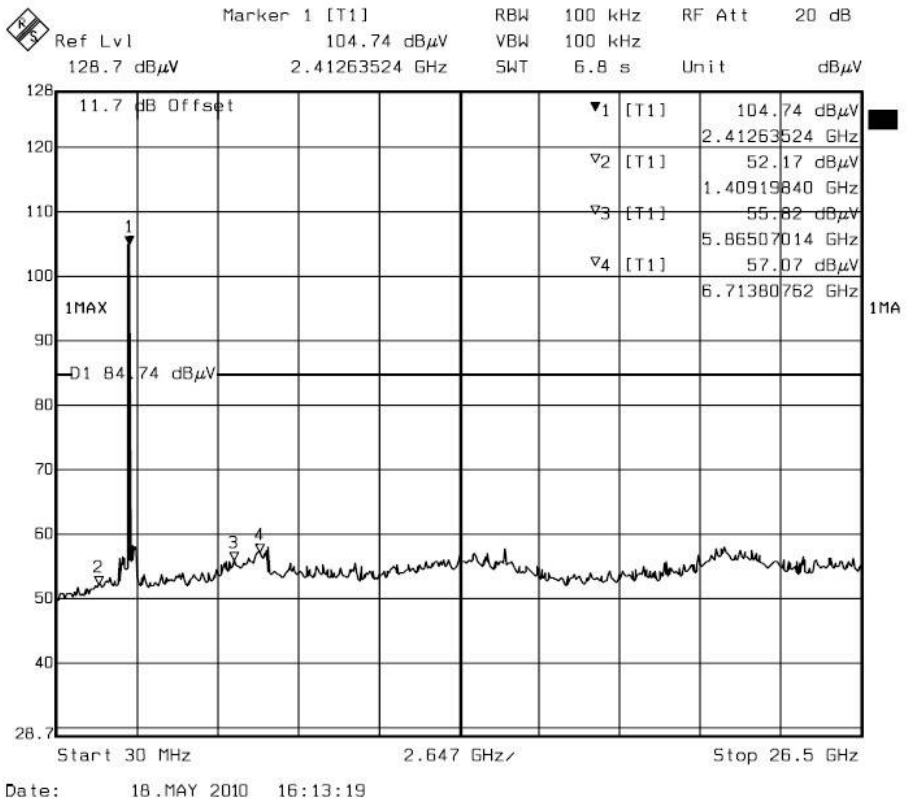
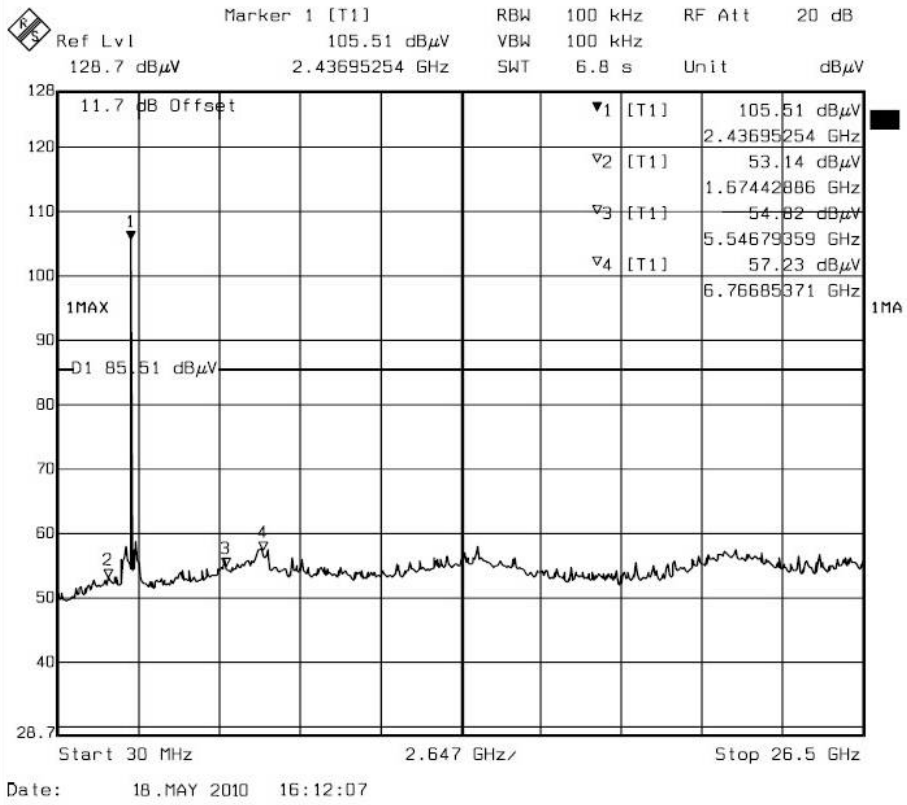


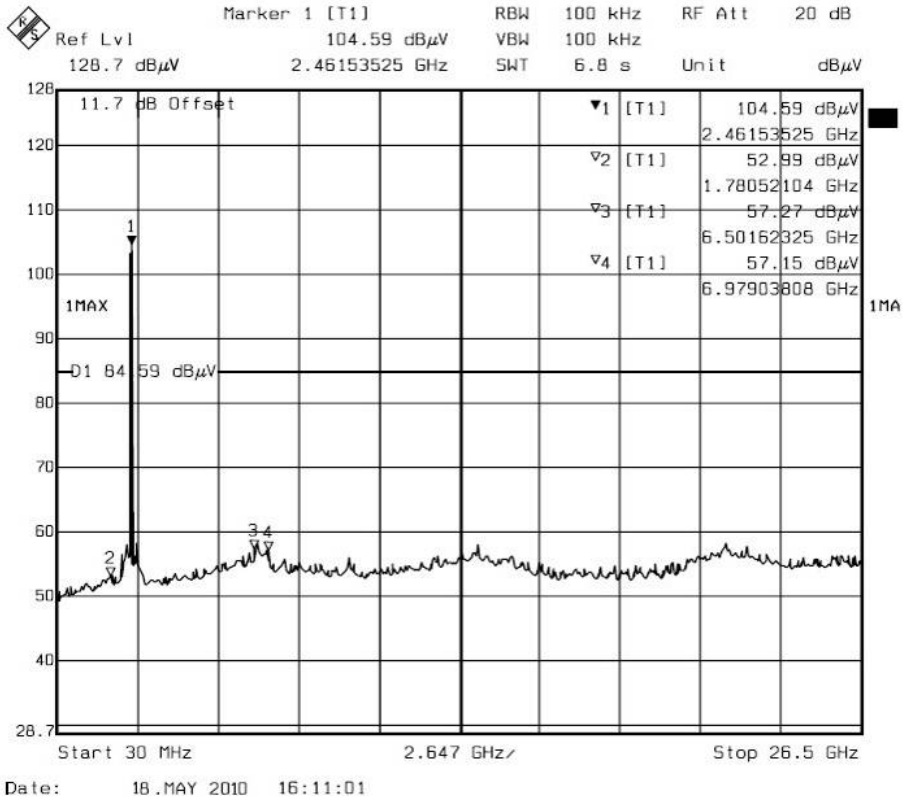
CH Low (30MHz~26.5GHz) (802.11g MODE)



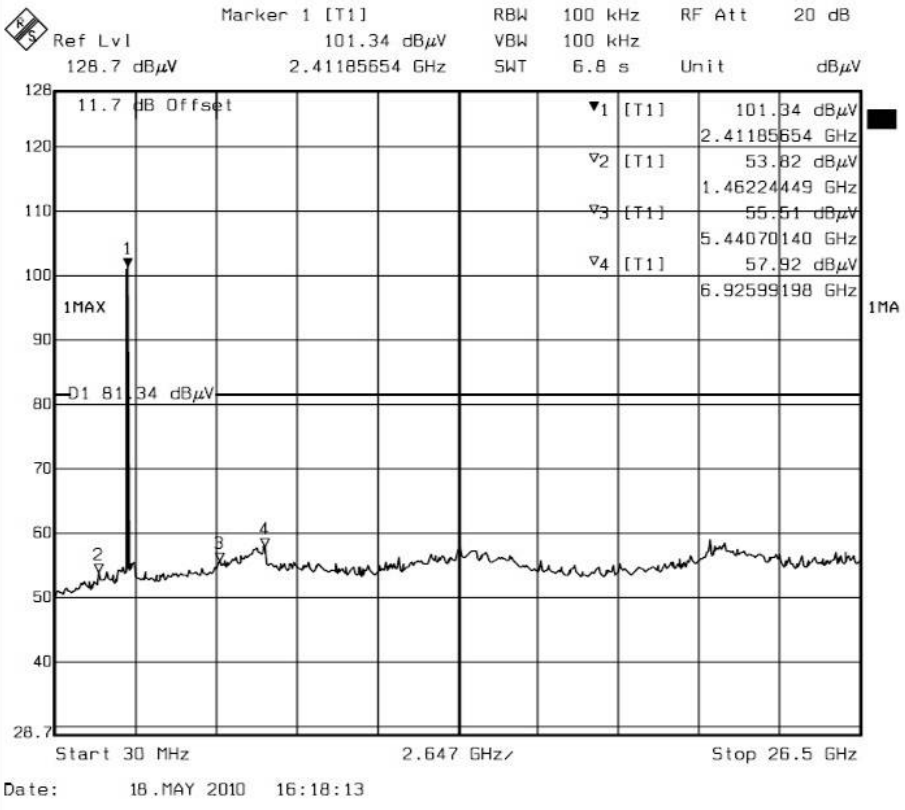
CH Mid (30MHz~26.5GHz) (802.11g MODE)



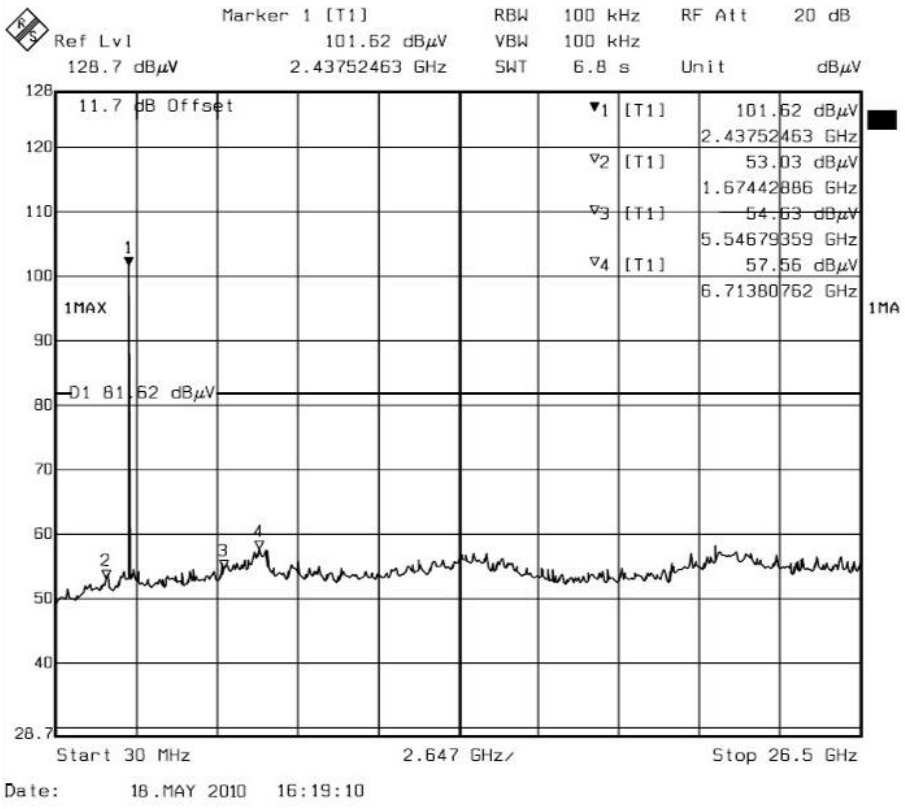
CH High (30MHz~26.5GHz) (802.11g MODE)



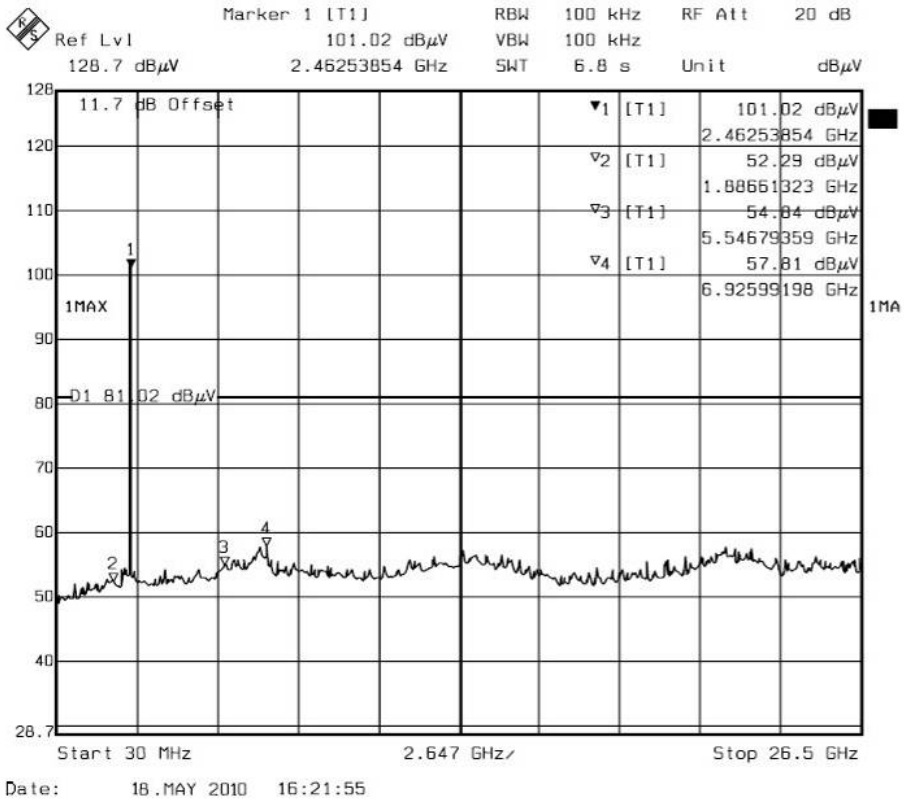
CH Low (30MHz~26.5GHz) (802.11n HT20 MODE) – Chain A



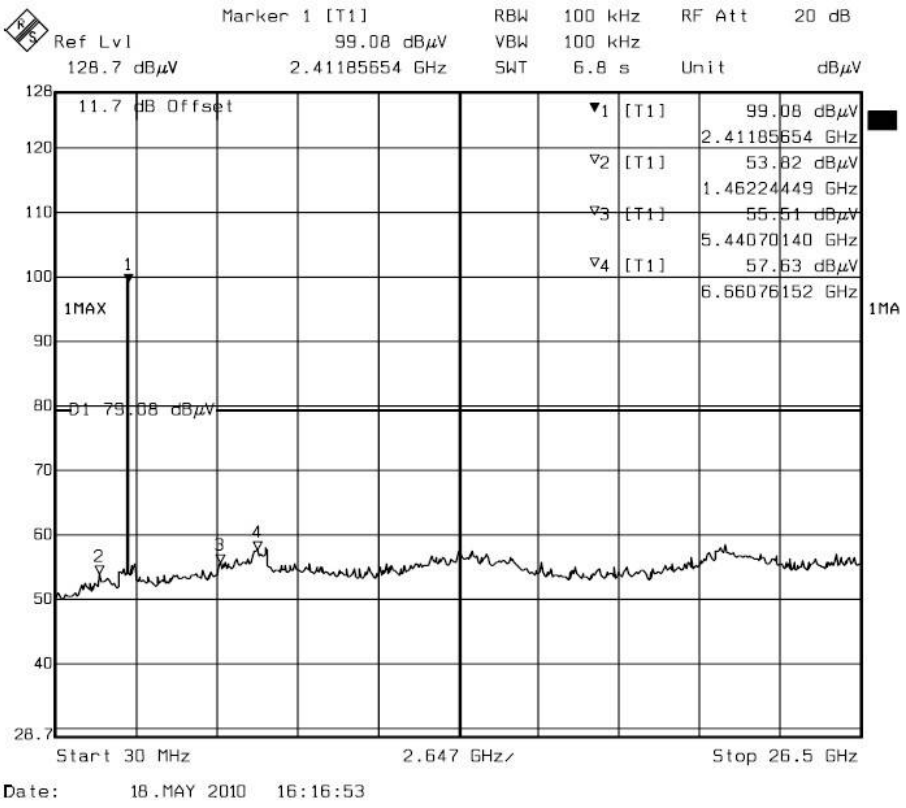
CH Mid (30MHz~26.5GHz) (802.11n HT20 MODE) – Chain A



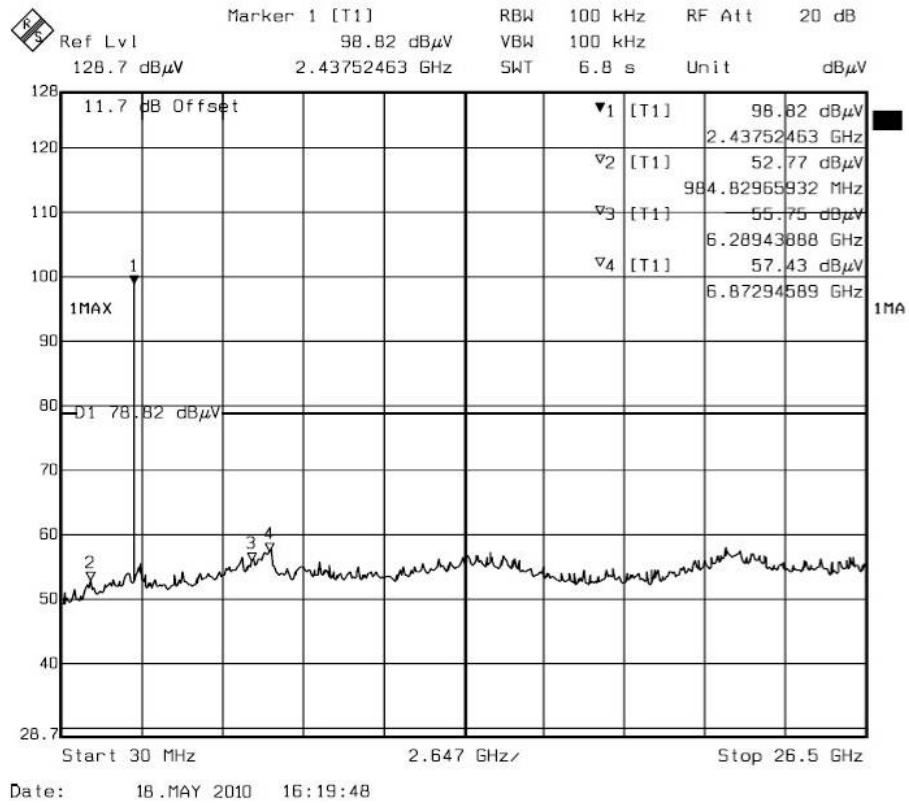
CH High (30MHz~26.5GHz) (802.11n HT20 MODE) – Chain A



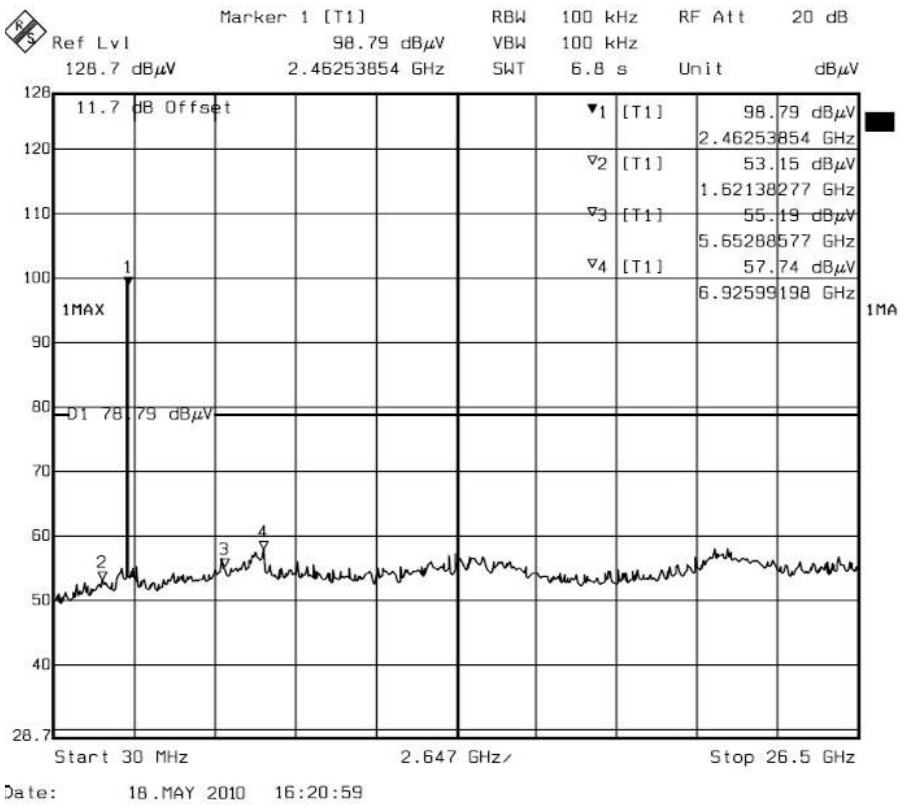
CH Low (30MHz~26.5GHz) (802.11n HT20 MODE) – Chain C



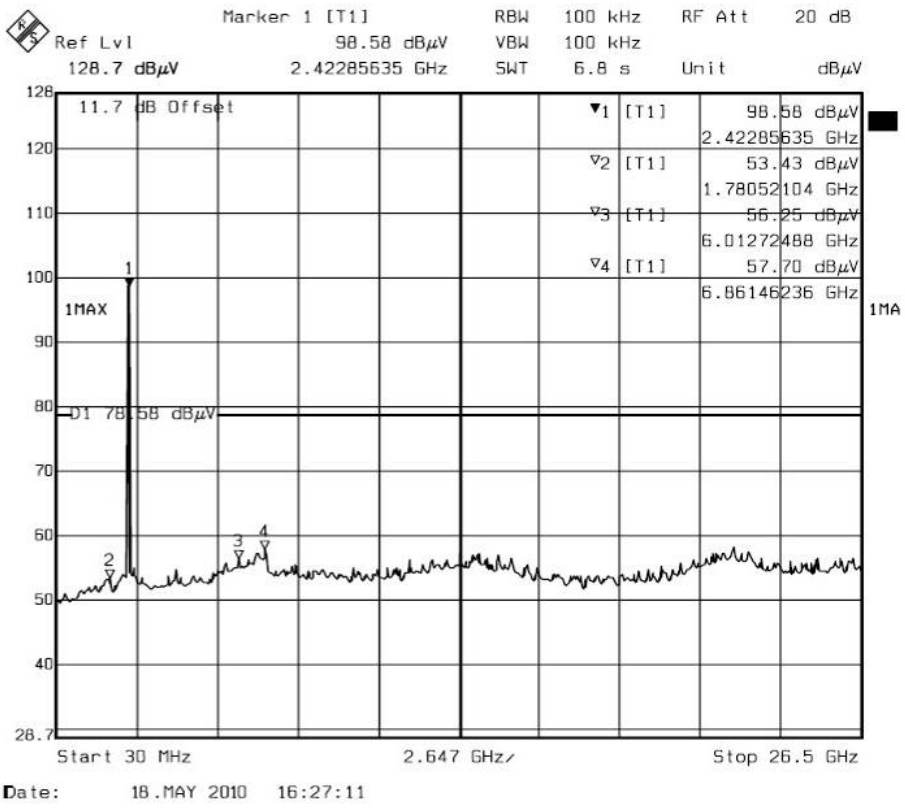
CH Mid (30MHz~26.5GHz) (802.11n HT20 MODE) – Chain C



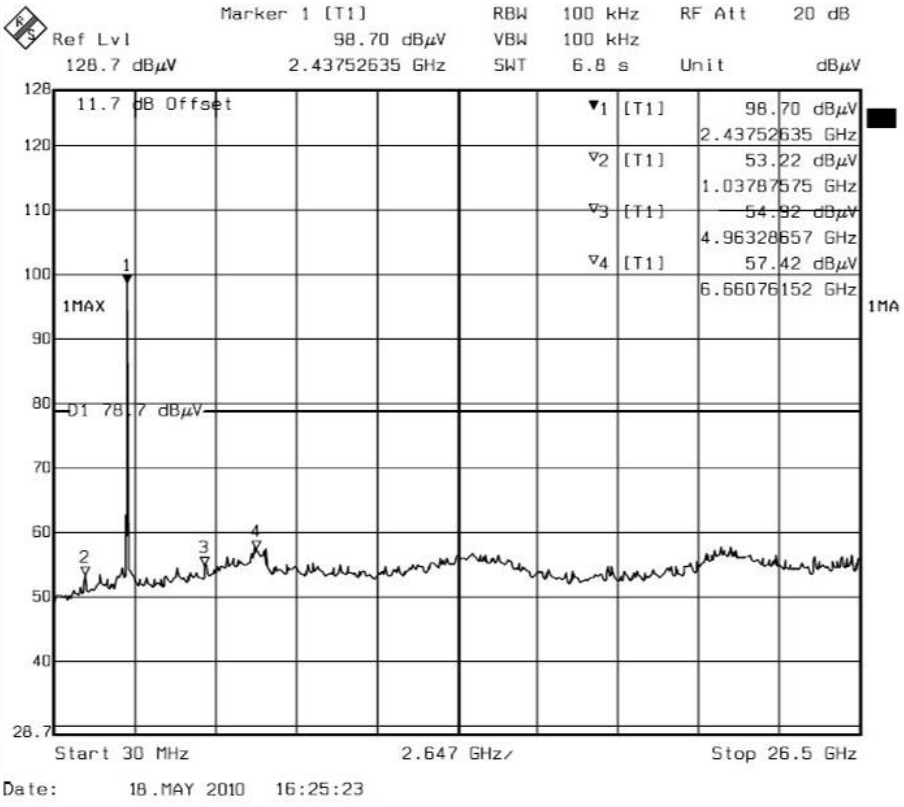
CH High (30MHz~26.5GHz) (802.11n HT20 MODE) – Chain C



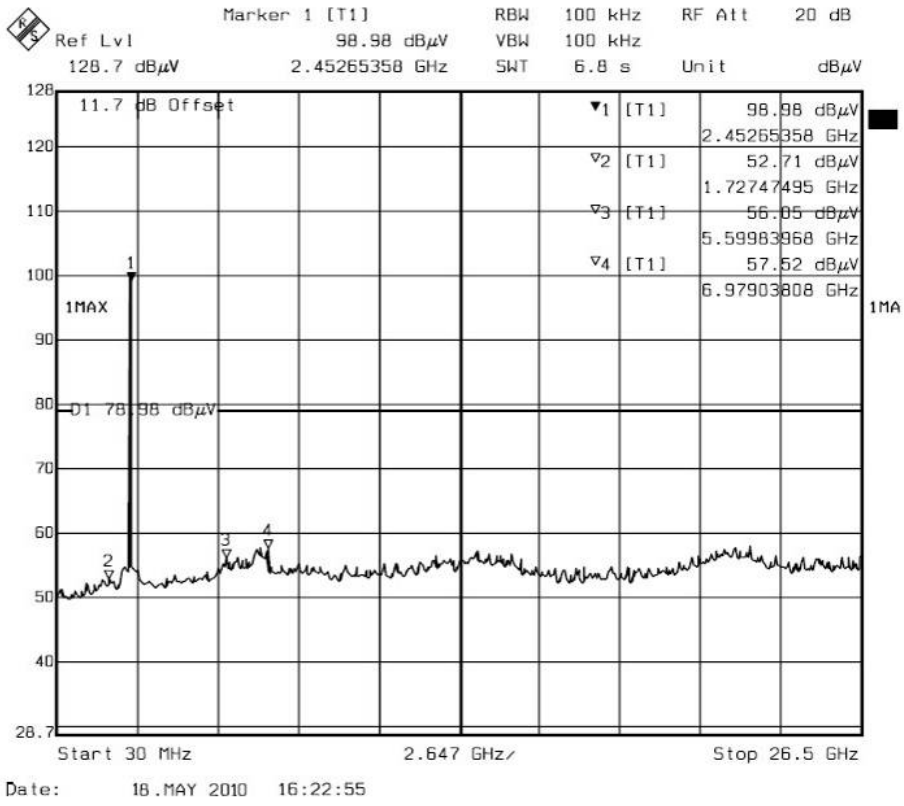
CH Low (30MHz~26.5GHz) (802.11n HT40 MODE) – Chain A



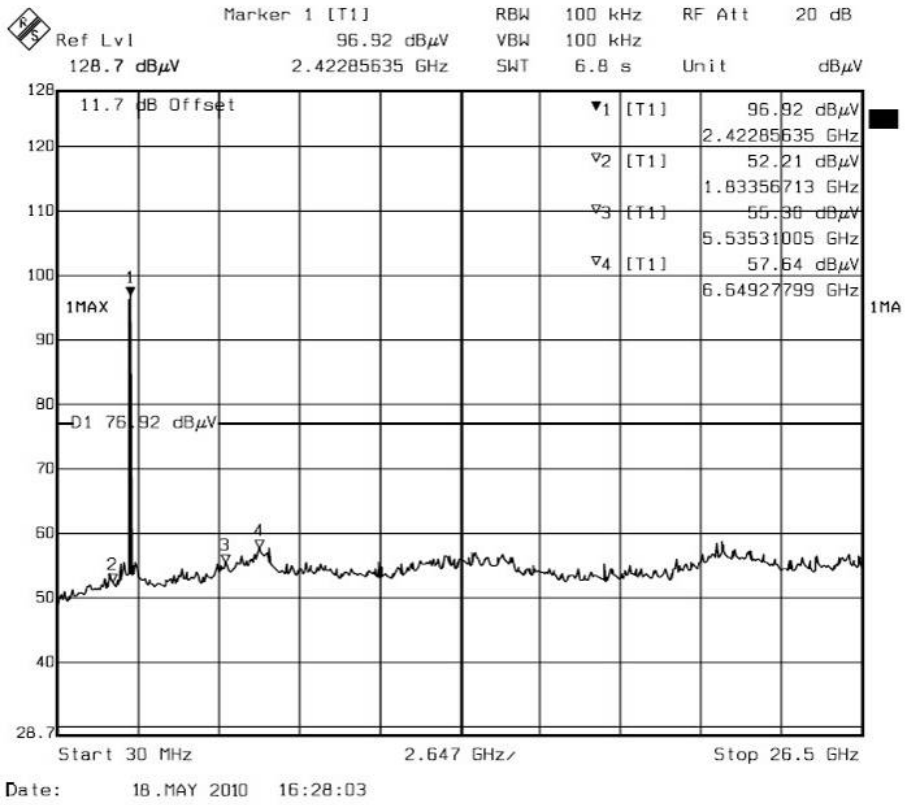
CH Mid (30MHz~26.5GHz) (802.11n HT40 MODE) – Chain A



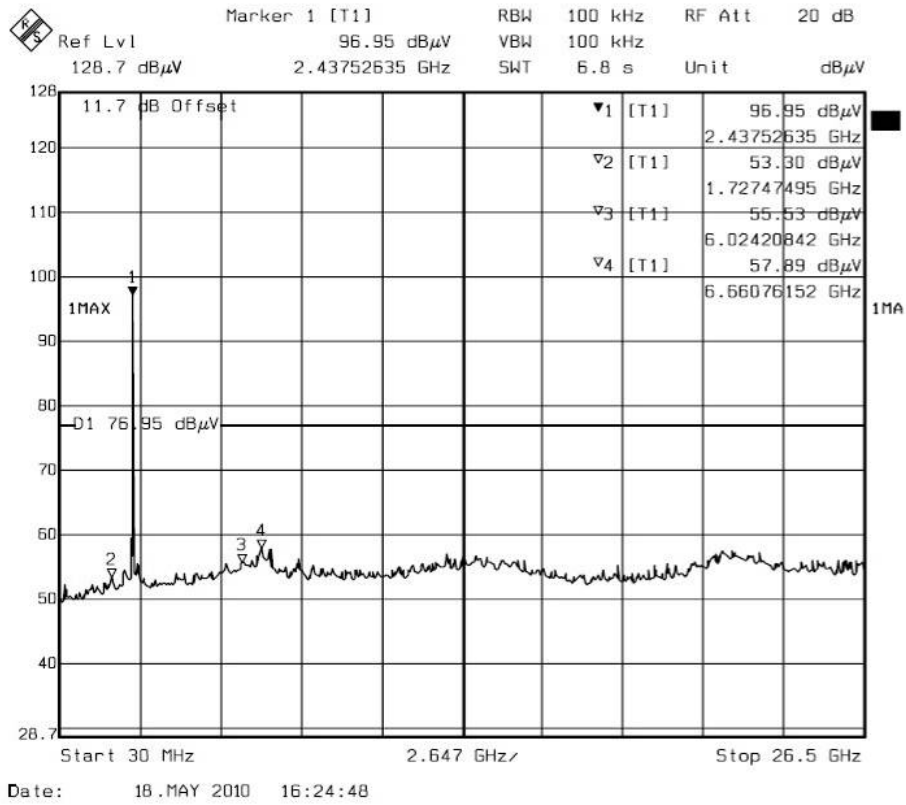
CH High (30MHz~26.5GHz) (802.11n HT40 MODE) – Chain A



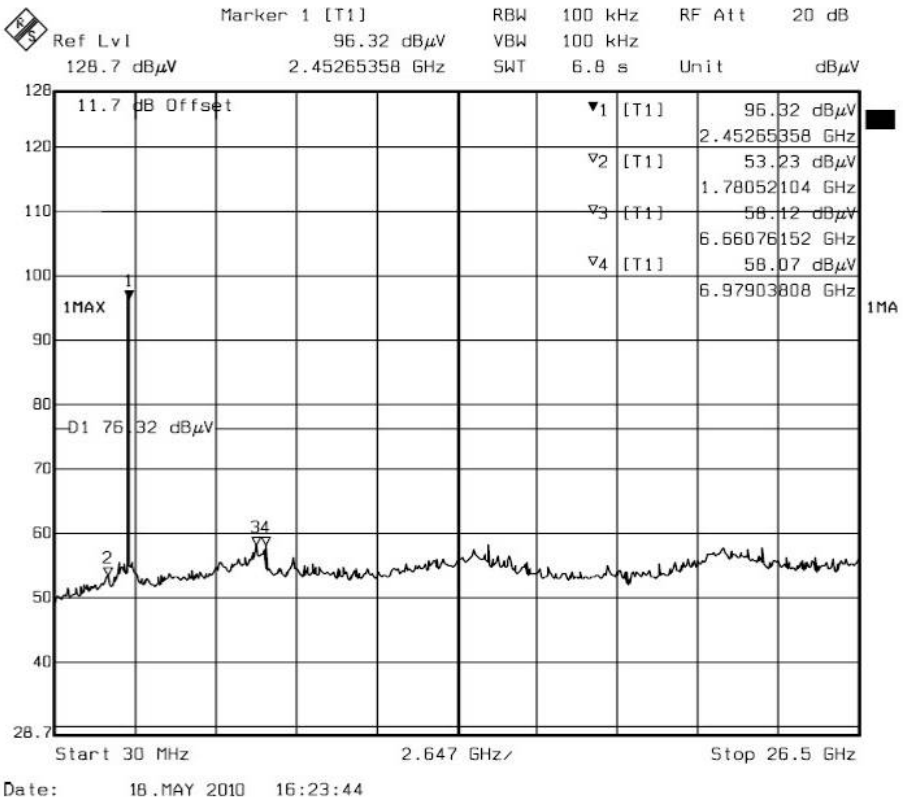
CH Low (30MHz~26.5GHz) (802.11n HT40 MODE) – Chain C



CH Mid (30MHz~26.5GHz) (802.11n HT40 MODE) – Chain C



CH High (30MHz~26.5GHz) (802.11n HT40 MODE) – Chain C



9. Test of Radiated Spurious Emission

9.1 Radiated Spurious Emission

9.1.1 Limits

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

15.209 (b) In the emission table above, the tighter limit applies at the band edges.

9.1.2 EUT Setup

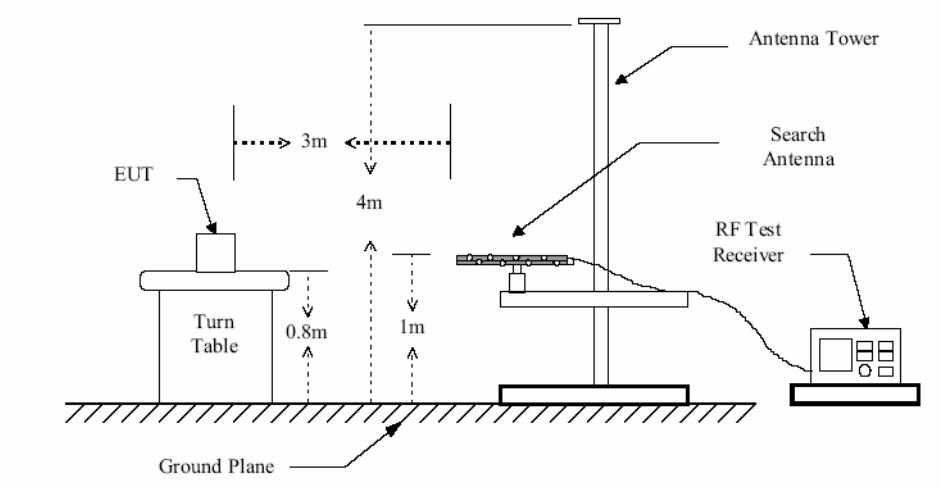


Figure 1 : Frequencies measured below 1 GHz configuration

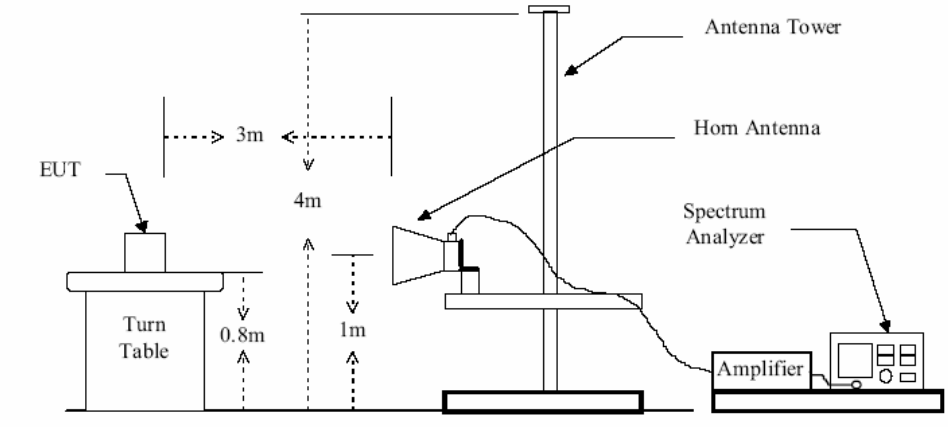


Figure 2 : Frequencies measured above 1 GHz configuration

9.1.3 Test Procedure

a).The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b). White measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. White measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna.

c).The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.

d).For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

e).The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f). If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE：

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

9.1.4 Test Result

Temperature (℃) : 22~23	EUT: Notebook
Humidity (%RH): 50~54	M/N: X220P
Barometric Pressure (mbar): 950~1000	Operation Condition: Normal operation & TX Mode

WORST-CASE RADIATED EMISSION BELOW 1 GHz

Normal operating Mode:

Horizontal

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBµV)	(dB/M)	(dB)	(dBµV/M)	(dBµV/M)	(dB)	PK/QP
84.32	26.40	7.97	1.18	36.56	40.00	-3.44	QP
160.01	16.50	12.60	1.59	30.69	43.50	-12.81	QP
402.48	14.50	14.44	2.72	36.66	46.00	-9.34	QP
652.74	14.50	18.00	3.05	35.55	46.00	-10.45	QP
726.46	9.60	20.84	3.84	34.28	46.00	-11.72	QP
823.46	10.30	21.80	4.14	36.24	46.00	-9.76	QP
N/A	----	----	----	**----**	----	----	----

Vertical

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBµV)	(dB/M)	(dB)	(dBµV/M)	(dBµV/M)	(dB)	PK/QP
142.52	21.40	7.89	1.01	30.30	40.00	-9.70	QP
191.02	16.10	12.60	1.59	30.29	43.50	-13.21	QP
216.24	25.70	12.20	2.02	39.92	46.00	-6.08	QP
239.52	22.80	14.44	2.72	39.96	46.00	-6.04	QP
503.36	16.50	18.00	3.05	37.55	46.00	-8.45	QP
749.74	13.20	21.80	4.14	39.14	46.00	-6.86	QP
N/A	----	----	----	----	----	----	----

REMARK: Emission level (dBµV/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBµV).

TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

IEEE 802.11b TX (CH Low)

Horizontal

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4824.15	51.24	32.81	3.71	41.34	0.69	47.12	74.00	-26.88	P
*	4824.15	39.25	32.81	3.71	41.34	0.69	35.13	54.00	-18.87	A
	7236.35	49.85	38.83	4.93	41.42	1.44	53.62	74.00	-20.38	P
	7236.35	37.49	38.83	4.93	41.42	1.44	41.26	54.00	-12.74	A
	9645.85	48.75	38.75	5.74	38.43	0.61	55.42	74.00	-18.58	P
	9645.85	37.69	38.75	5.74	38.43	0.61	44.36	54.00	-9.64	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4823.85	53.62	32.81	3.70	41.34	0.69	49.49	74.00	-24.51	P
*	4823.85	42.00	32.81	3.70	41.34	0.69	37.87	54.00	-16.13	A
	7236.18	51.42	38.83	4.93	41.42	1.44	55.19	74.00	-18.81	P
	7236.18	39.85	38.83	4.93	41.42	1.44	43.62	54.00	-10.38	A
	9647.94	50.24	38.75	5.74	38.43	0.61	56.92	74.00	-17.08	P
	9647.94	39.68	38.75	5.74	38.43	0.61	46.36	54.00	-7.64	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11b TX (CH Middle)

Horizontal

					Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4876.53	51.28	32.93	3.73	41.41	0.71	47.24	74.00	-26.76	P
*	4876.53	41.96	32.93	3.73	41.41	0.71	37.92	54.00	-16.08	A
*	7309.41	50.24	38.93	4.96	41.32	1.59	54.40	74.00	-19.60	P
*	7309.41	39.42	38.93	4.96	41.32	1.59	43.58	54.00	-10.42	A
	9747.83	49.85	38.85	5.75	38.24	0.55	56.76	74.00	-17.24	P
	9747.83	38.65	38.85	5.75	38.24	0.55	45.56	54.00	-8.44	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11b mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4876.92	53.64	32.93	3.73	41.42	0.71	49.60	74.00	-24.40	P
*	4876.92	43.84	32.93	3.73	41.42	0.71	39.80	54.00	-14.20	A
*	7309.25	51.51	38.93	4.96	41.32	1.59	55.67	74.00	-18.33	P
*	7309.25	40.93	38.93	4.96	41.32	1.59	45.09	54.00	-8.91	A
	9748.35	52.14	38.85	5.75	38.24	0.55	59.05	74.00	-14.95	P
	9748.35	40.57	38.85	5.75	38.24	0.55	47.48	54.00	-6.52	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11b TX (CH High)

Horizontal

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4923.85	52.46	33.03	3.76	41.49	0.73	48.50	74.00	-25.50	P
*	4923.85	42.11	33.03	3.76	41.49	0.73	38.15	54.00	-15.85	A
*	7385.69	51.24	39.04	4.99	41.21	1.76	55.82	74.00	-18.18	P
*	7385.69	39.51	39.04	4.99	41.21	1.76	44.09	54.00	-9.91	A
	9848.15	50.24	38.95	5.76	38.06	0.49	57.39	74.00	-16.61	P
	9848.15	38.96	38.95	5.76	38.06	0.49	46.10	54.00	-7.90	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4924.03	53.84	33.03	3.76	41.49	0.73	49.88	74.00	-24.12	P
*	4924.03	43.45	33.03	3.76	41.49	0.73	39.49	54.00	-14.51	A
*	7386.08	52.41	39.04	4.99	41.21	1.76	56.99	74.00	-17.01	P
*	7386.08	40.57	39.04	4.99	41.21	1.76	45.15	54.00	-8.85	A
	9847.35	52.11	38.95	5.76	38.06	0.49	59.25	74.00	-14.75	P
	9847.35	41.35	38.95	5.76	38.06	0.49	48.49	54.00	-5.51	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11g TX (CH Low)

Horizontal

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4824.23	52.12	32.81	3.71	41.34	0.69	48.00	74.00	-26.00	P
*	4824.23	42.11	32.81	3.71	41.34	0.69	37.99	54.00	-16.01	A
	7236.00	51.24	38.83	4.93	41.42	1.44	55.01	74.00	-18.99	P
	7236.00	40.35	38.83	4.93	41.42	1.44	44.12	54.00	-9.88	A
	9642.15	50.22	38.74	5.74	38.44	0.61	56.88	74.00	-17.12	P
	9642.15	38.95	38.74	5.74	38.44	0.61	45.61	54.00	-8.39	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4824.00	54.24	32.81	3.70	41.34	0.69	50.11	74.00	-23.89	P
*	4824.00	43.97	32.81	3.70	41.34	0.69	39.84	54.00	-14.16	A
	7236.39	51.62	38.83	4.93	41.42	1.44	55.39	74.00	-18.61	P
	7236.39	41.52	38.83	4.93	41.42	1.44	45.29	54.00	-8.71	A
	9641.57	52.21	38.74	5.74	38.44	0.62	58.87	74.00	-15.13	P
	9641.57	41.25	38.74	5.74	38.44	0.62	47.91	54.00	-6.09	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11g TX (CH Middle)

Horizontal

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4871.16	50.24	32.92	3.73	41.41	0.71	46.19	74.00	-27.81	P
*	4871.16	41.35	32.92	3.73	41.41	0.71	37.30	54.00	-16.70	A
*	7318.25	49.85	38.95	4.96	41.31	1.61	54.06	74.00	-19.94	P
*	7318.25	40.22	38.95	4.96	41.31	1.61	44.43	54.00	-9.57	A
	9748.35	50.24	38.85	5.75	38.24	0.55	57.15	74.00	-16.85	P
	9748.35	39.58	38.85	5.75	38.24	0.55	46.49	54.00	-7.51	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4871.56	53.62	32.92	3.73	41.41	0.71	49.57	74.00	-24.43	P
*	4871.56	44.17	32.92	3.73	41.41	0.71	40.12	54.00	-13.88	A
*	7317.24	51.24	38.94	4.96	41.31	1.61	55.45	74.00	-18.55	P
*	7317.24	42.33	38.94	4.96	41.31	1.61	46.54	54.00	-7.46	A
	9747.26	52.34	38.85	5.75	38.25	0.55	59.25	74.00	-14.75	P
	9747.26	41.52	38.85	5.75	38.25	0.55	48.43	54.00	-5.57	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11g TX (CH High)

Horizontal

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4924.35	51.24	33.03	3.76	41.49	0.73	**47.28**	**74.00**	**-26.72**	P
*	4924.35	40.26	33.03	3.76	41.49	0.73	**36.30**	**54.00**	**-17.70**	A
*	7384.86	49.87	39.04	4.99	41.21	1.75	**54.44**	**74.00**	**-19.56**	P
*	7384.86	38.65	39.04	4.99	41.21	1.75	**43.22**	**54.00**	**-10.78**	A
	9847.56	50.14	38.95	5.76	38.06	0.49	**57.28**	**74.00**	**-16.72**	P
	9847.56	39.85	38.95	5.76	38.06	0.49	**46.99**	**54.00**	**-7.01**	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4923.85	53.22	33.03	3.76	41.49	0.73	49.26	74.00	-24.74	P
*	4923.85	42.61	33.03	3.76	41.49	0.73	38.65	54.00	-15.35	A
*	7385.94	51.33	39.04	4.99	41.21	1.76	55.91	74.00	-18.09	P
*	7385.94	40.25	39.04	4.99	41.21	1.76	44.83	54.00	-9.17	A
	9847.59	52.64	38.95	5.76	38.06	0.49	59.78	74.00	-14.22	P
	9847.59	41.24	38.95	5.76	38.06	0.49	48.38	54.00	-5.62	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT20 TX (CH Low)

Horizontal

	TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4824.35	50.24	32.81	3.71	41.34	0.69	46.12	74.00	-27.88	P
*	4824.35	38.95	32.81	3.71	41.34	0.69	34.83	54.00	-19.17	A
	7235.86	51.22	38.83	4.93	41.43	1.43	54.99	74.00	-19.01	P
	7235.86	38.97	38.83	4.93	41.43	1.43	42.74	54.00	-11.26	A
	9648.35	50.22	38.75	5.74	38.43	0.61	56.90	74.00	-17.10	P
	9648.35	38.64	38.75	5.74	38.43	0.61	45.32	54.00	-8.68	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4823.59	52.64	32.81	3.70	41.34	0.69	48.51	74.00	-25.49	P
*	4823.59	41.25	32.81	3.70	41.34	0.69	37.12	54.00	-16.88	A
	7236.24	53.26	38.83	4.93	41.42	1.44	57.03	74.00	-16.97	P
	7236.24	41.25	38.83	4.93	41.42	1.44	45.02	54.00	-8.98	A
	9647.15	52.14	38.75	5.74	38.43	0.61	58.81	74.00	-15.19	P
	9647.15	40.36	38.75	5.74	38.43	0.61	47.03	54.00	-6.97	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT20 TX (CH Middle)

Horizontal

	TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4872.69	50.24	32.92	3.73	41.41	0.71	46.19	74.00	-27.81	P
*	4872.69	40.36	32.92	3.73	41.41	0.71	36.31	54.00	-17.69	A
*	7311.54	49.87	38.94	4.96	41.32	1.60	54.05	74.00	-19.95	P
*	7311.54	38.65	38.94	4.96	41.32	1.60	42.83	54.00	-11.17	A
	9748.27	50.24	38.85	5.75	38.24	0.55	57.15	74.00	-16.85	P
	9748.27	39.85	38.85	5.75	38.24	0.55	46.76	54.00	-7.24	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4873.26	52.14	32.92	3.73	41.41	0.71	48.09	74.00	-25.91	P
*	4873.26	42.33	32.92	3.73	41.41	0.71	38.28	54.00	-15.72	A
*	7312.25	51.84	38.94	4.96	41.32	1.60	56.02	74.00	-17.98	P
*	7312.25	40.25	38.94	4.96	41.32	1.60	44.43	54.00	-9.57	A
	9748.65	51.68	38.85	5.75	38.24	0.55	58.59	74.00	-15.41	P
	9748.65	41.25	38.85	5.75	38.24	0.55	48.16	54.00	-5.84	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT20 TX (CH High)

Horizontal

	TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4923.85	51.14	33.03	3.76	41.49	0.73	47.18	74.00	-26.82	P
*	4923.85	40.35	33.03	3.76	41.49	0.73	36.39	54.00	-17.61	A
*	7386.54	50.28	39.04	4.99	41.21	1.76	54.86	74.00	-19.14	P
*	7386.54	39.48	39.04	4.99	41.21	1.76	44.06	54.00	-9.94	A
	9849.33	49.87	38.95	5.76	38.06	0.49	57.02	74.00	-16.98	P
	9849.33	39.65	38.95	5.76	38.06	0.49	46.80	54.00	-7.20	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4923.16	53.26	33.03	3.76	41.48	0.73	49.30	74.00	-24.70	P
*	4923.16	42.17	33.03	3.76	41.48	0.73	38.21	54.00	-15.79	A
*	7385.46	52.86	39.04	4.99	41.21	1.75	57.43	74.00	-16.57	P
*	7385.46	41.33	39.04	4.99	41.21	1.75	45.90	54.00	-8.10	A
	9849.17	52.34	38.95	5.76	38.06	0.49	59.49	74.00	-14.51	P
	9849.17	42.65	38.95	5.76	38.06	0.49	49.80	54.00	-4.20	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT40 TX (CH Low)

Horizontal

	TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4843.16	50.24	32.85	3.72	41.36	0.70	46.15	74.00	-27.85	P
*	4843.16	39.86	32.85	3.72	41.36	0.70	35.77	54.00	-18.23	A
*	7264.86	49.87	38.87	4.94	41.38	1.50	53.79	74.00	-20.21	P
*	7264.86	38.56	38.87	4.94	41.38	1.50	42.48	54.00	-11.52	A
	9687.35	50.24	38.79	5.75	38.36	0.59	57.01	74.00	-16.99	P
	9687.35	38.97	38.79	5.75	38.36	0.59	45.74	54.00	-8.26	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4844.65	52.64	32.86	3.72	41.37	0.70	48.55	74.00	-25.45	P
*	4844.65	41.35	32.86	3.72	41.37	0.70	37.26	54.00	-16.74	A
*	7265.14	51.24	38.87	4.94	41.38	1.50	55.17	74.00	-18.83	P
*	7265.14	40.33	38.87	4.94	41.38	1.50	44.26	54.00	-9.74	A
	9686.35	53.26	38.79	5.75	38.36	0.59	60.03	74.00	-13.97	P
	9686.35	41.57	38.79	5.75	38.36	0.59	48.34	54.00	-5.66	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT40 TX (CH Middle)

Horizontal

	TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4873.26	51.24	32.92	3.73	41.41	0.71	47.19	74.00	-26.81	P
*	4873.26	38.59	32.92	3.73	41.41	0.71	34.54	54.00	-19.46	A
*	7312.19	50.24	38.94	4.96	41.32	1.60	54.42	74.00	-19.58	P
*	7312.19	40.16	38.94	4.96	41.32	1.60	44.34	54.00	-9.66	A
	9747.85	49.87	38.85	5.75	38.24	0.55	56.78	74.00	-17.22	P
	9747.85	38.97	38.85	5.75	38.24	0.55	45.88	54.00	-8.12	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4874.59	53.26	32.92	3.73	41.41	0.71	49.22	74.00	-24.78	P
*	4874.59	41.14	32.92	3.73	41.41	0.71	37.10	54.00	-16.90	A
*	7312.24	52.87	38.94	4.96	41.32	1.60	57.05	74.00	-16.95	P
*	7312.24	42.33	38.94	4.96	41.32	1.60	46.51	54.00	-7.49	A
	9747.16	51.24	38.85	5.75	38.25	0.55	58.15	74.00	-15.85	P
	9747.16	40.16	38.85	5.75	38.25	0.55	47.07	54.00	-6.93	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit

IEEE 802.11n HT40 TX (CH High)

Horizontal

	TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4903.26	50.14	32.99	3.75	41.45	0.72	46.14	74.00	-27.86	P
*	4903.26	39.87	32.99	3.75	41.45	0.72	35.87	54.00	-18.13	A
*	7354.89	51.24	39.00	4.98	41.26	1.69	55.65	74.00	-18.35	P
*	7354.89	38.59	39.00	4.98	41.26	1.69	43.00	54.00	-11.00	A
	9808.35	50.24	38.91	5.76	38.13	0.51	57.29	74.00	-16.71	P
	9808.35	39.87	38.91	5.76	38.13	0.51	46.92	54.00	-7.08	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
*	4904.15	52.47	32.99	3.75	41.46	0.72	48.47	74.00	-25.53	P
*	4904.15	41.24	32.99	3.75	41.46	0.72	37.24	54.00	-16.76	A
*	7353.65	53.25	39.00	4.98	41.26	1.69	57.65	74.00	-16.35	P
*	7353.65	40.15	39.00	4.98	41.26	1.69	44.55	54.00	-9.45	A
	9808.15	52.14	38.91	5.76	38.13	0.52	59.19	74.00	-14.81	P
	9808.15	41.25	38.91	5.76	38.13	0.52	48.30	54.00	-5.70	A
	N/A	----	----	----	----	----	----	----	----	P
	N/A	----	----	----	----	----	----	----	----	A

REMARK:

1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3. The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4. The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit

9.2 RESTRICTED BAND EDGES

TEST RESULT

IEEE 802.11b mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	H	2390	58.54	74	-15.46	Peak
	H	2390	46.33	54	-7.67	Average
	V	2390	59.81	74	-14.19	Peak
LOW	V	2390	46.61	54	-7.39	Average
	H	2483.5	58.54	74	-15.46	Peak
	H	2483.5	46.25	54	-7.75	Average
	V	2483.5	58.49	74	-15.51	Peak
HIGH	V	2483.5	46.48	54	-7.52	Average

IEEE 802.11g mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	H	2390	60.42	74	-13.58	Peak
	H	2390	46.61	54	-7.39	Average
	V	2390	63.81	74	-10.19	Peak
LOW	V	2390	49.07	54	-4.93	Average
	H	2483.5	63.46	74	-10.54	Peak
	H	2483.5	48.35	54	-5.65	Average
	V	2483.5	67.72	74	-6.28	Peak
HIGH	V	2483.5	51.36	54	-2.64	Average

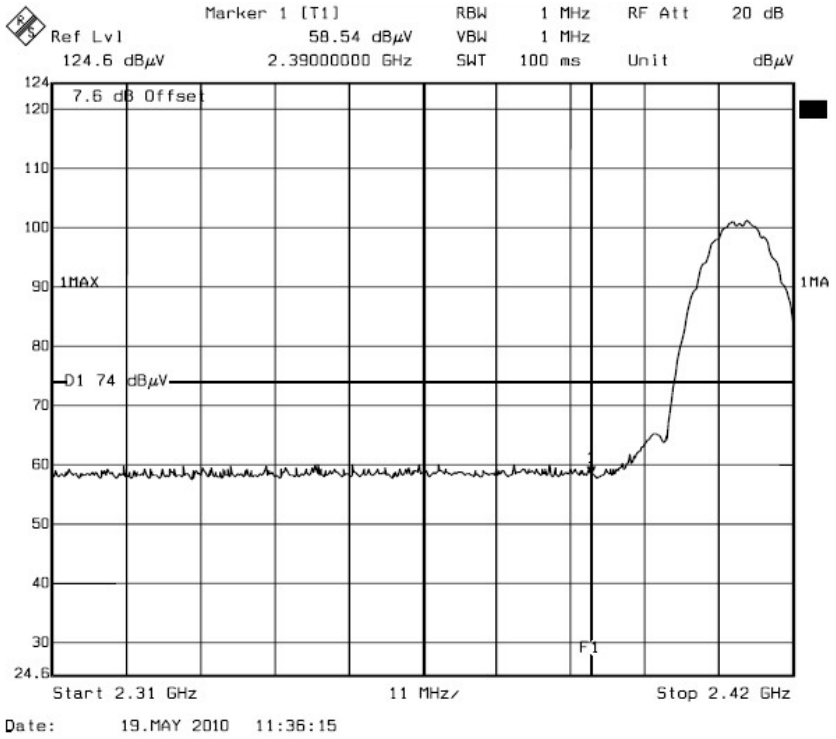
IEEE 802.11n HT20 mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	H	2390	58.49	74	-15.51	Peak
	H	2390	46.28	54	-7.72	Average
	V	2390	64.65	74	-9.35	Peak
LOW	V	2390	47.97	54	-6.03	Average
	H	2483.5	58.03	74	-15.97	Peak
	H	2483.5	46.09	54	-7.91	Average
	V	2483.5	63.72	74	-10.28	Peak
HIGH	V	2483.5	48.04	54	-5.96	Average

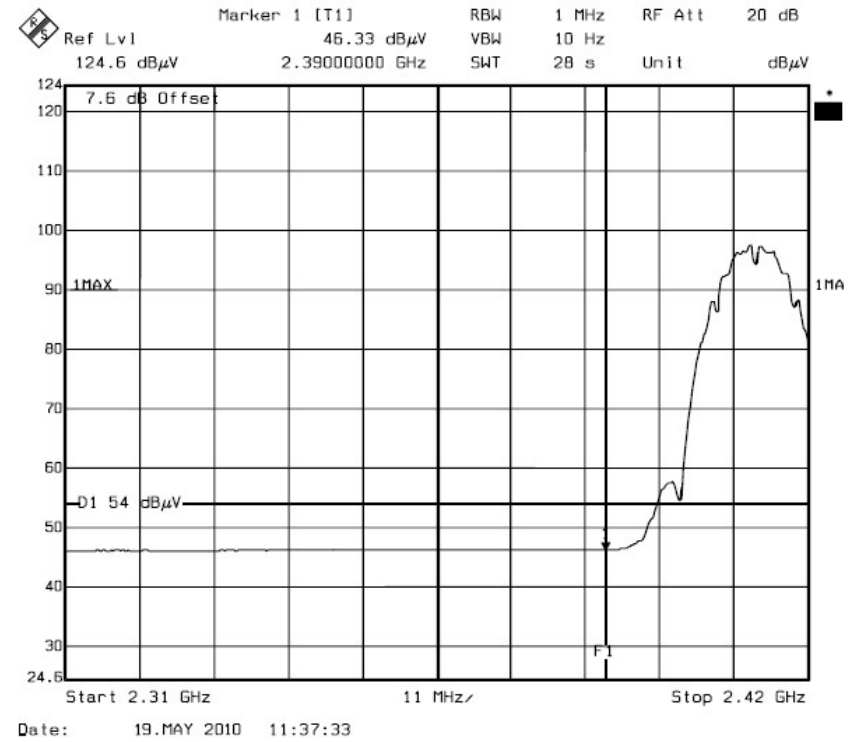
IEEE 802.11n HT40 mode

Channel	Polarity	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	H	2390	60.71	74	-13.29	Peak
	H	2390	47.61	54	-6.39	Average
	V	2390	66.71	74	-7.29	Peak
LOW	V	2390	52.35	54	-1.65	Average
	H	2483.5	61.95	74	-12.05	Peak
	H	2483.5	48.66	54	-5.34	Average
	V	2483.5	67.75	74	-6.25	Peak
HIGH	V	2483.5	53.13	54	-0.87	Average

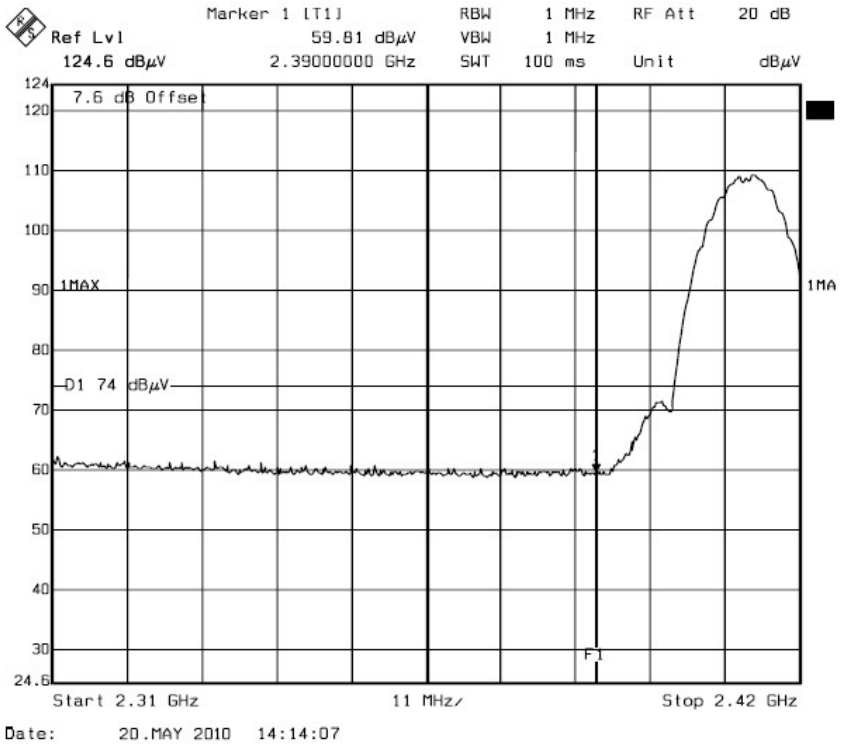
CH Low (802.11b MODE–Horizontal–Peak)



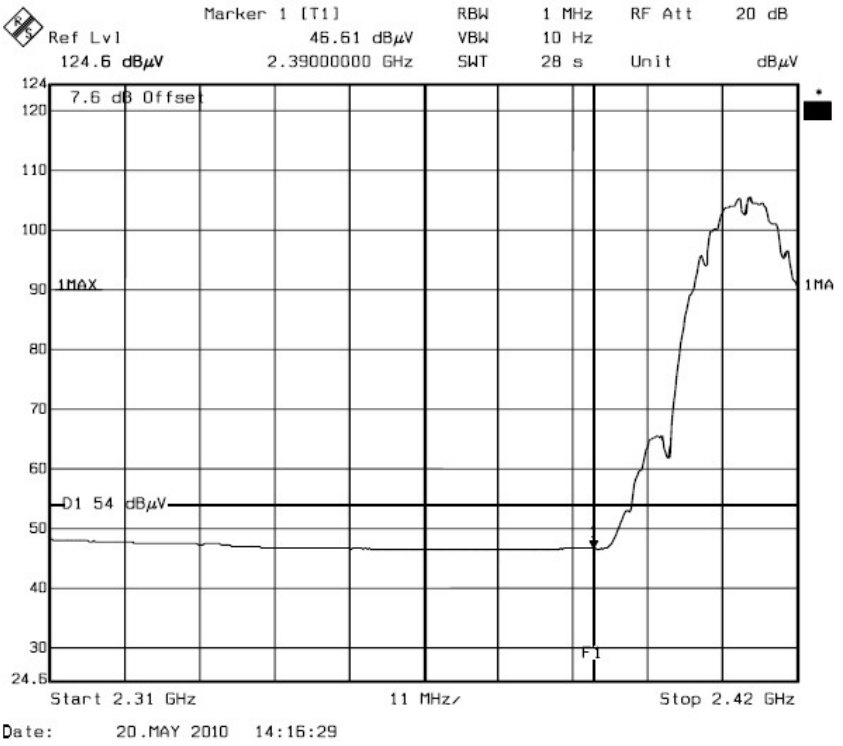
CH Low (802.11b MODE–Horizontal–Average)



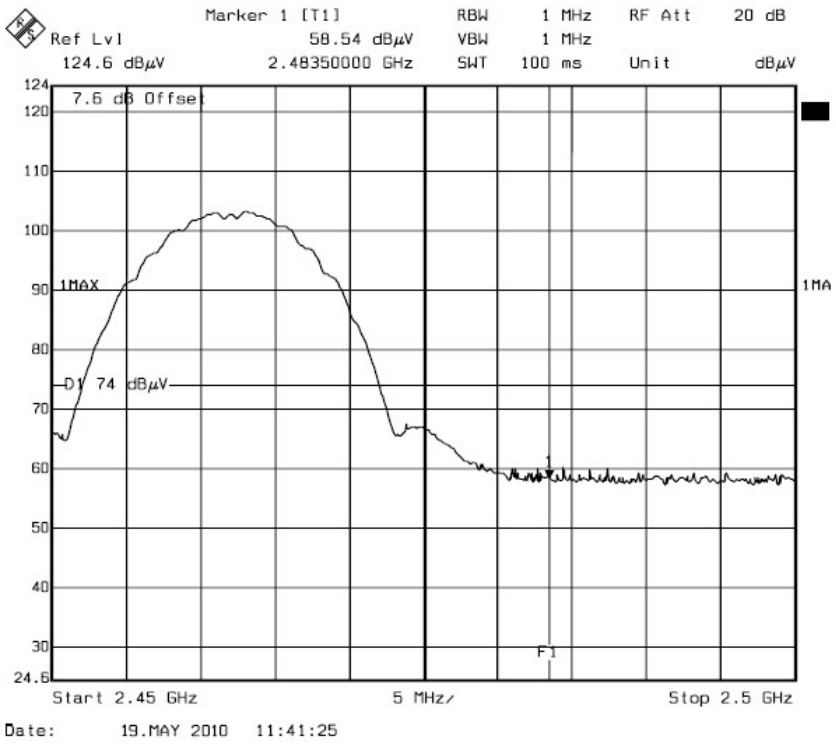
CH Low (802.11b MODE–Vertical–Peak)



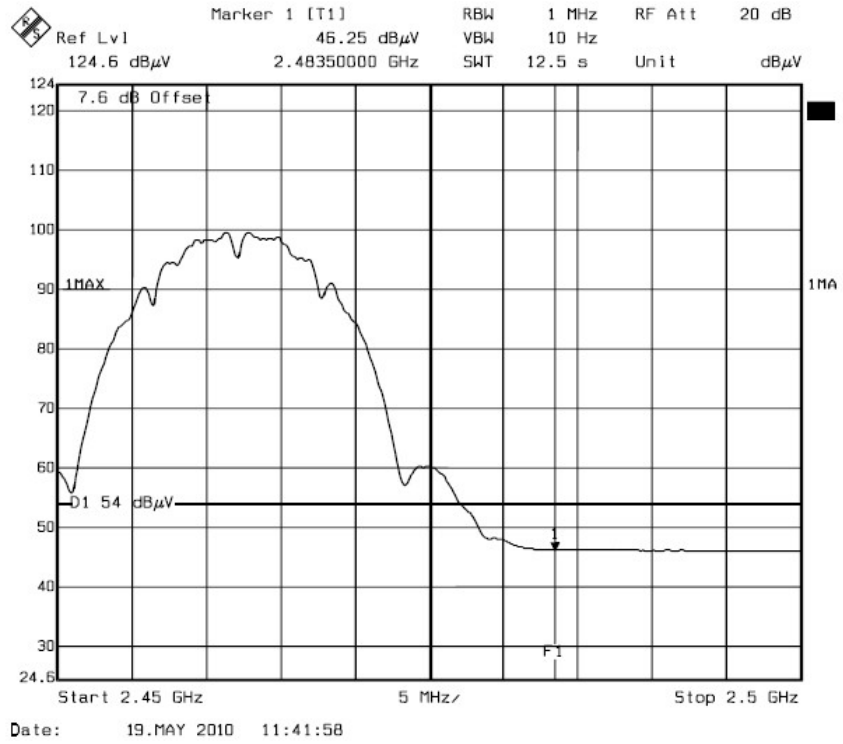
CH Low (802.11b MODE–Vertical–Average)



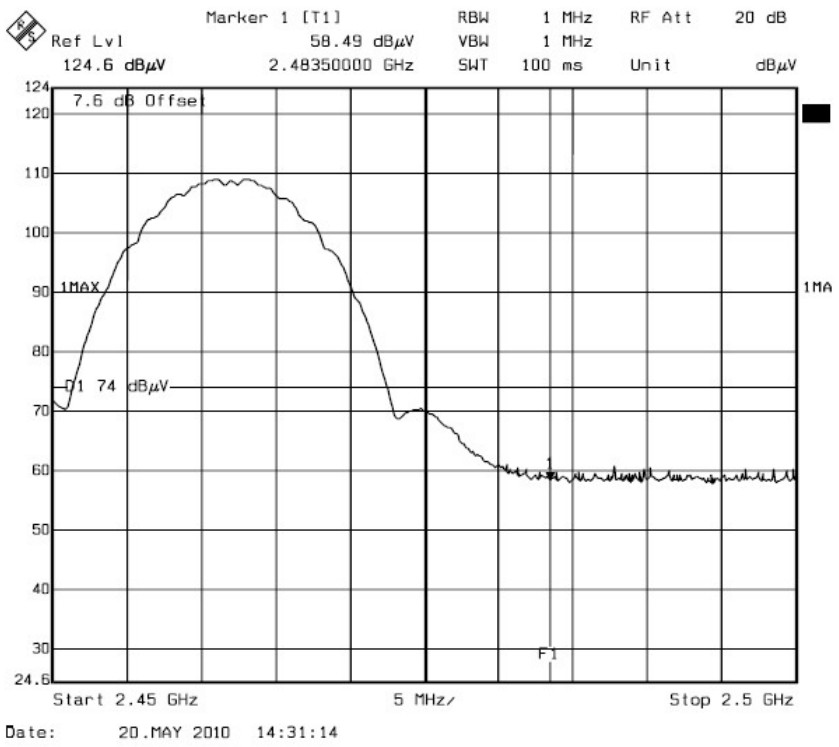
CH High (802.11b MODE–Horizontal–Peak)



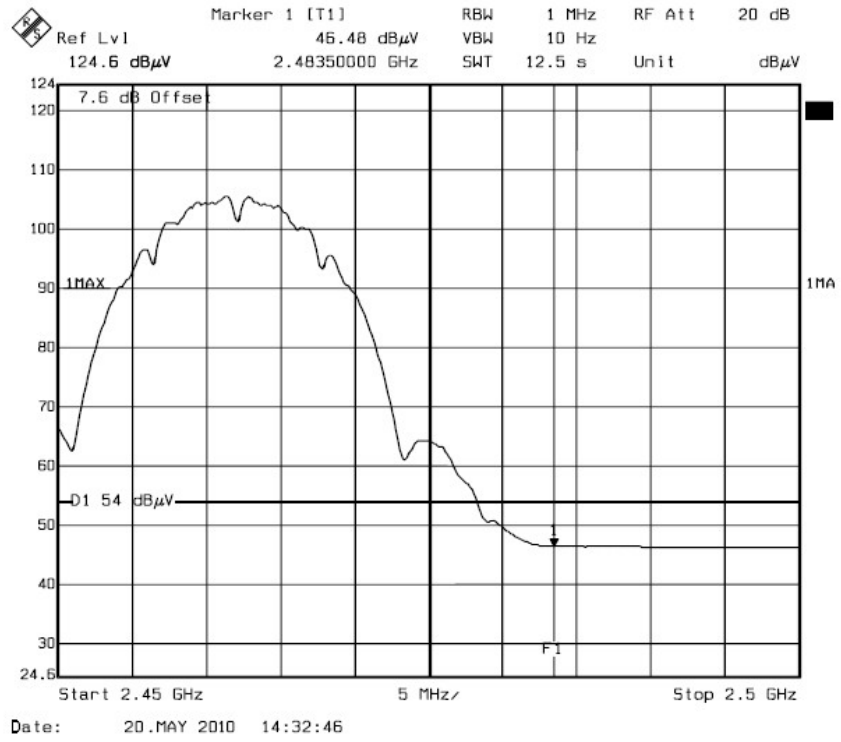
CH High (802.11b MODE–Horizontal–Average)



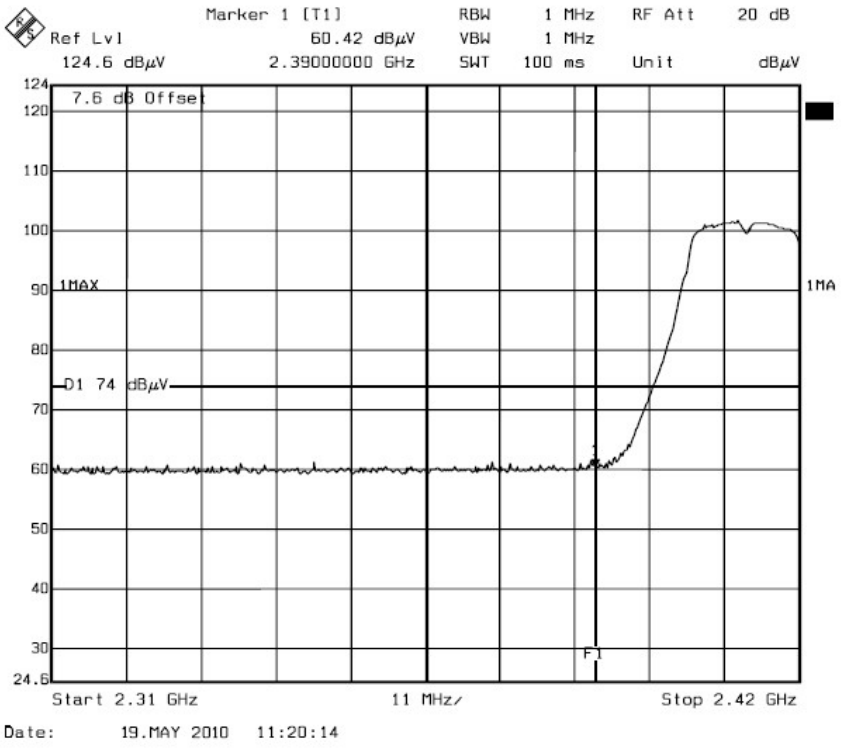
CH High (802.11b MODE–Vertical–Peak)



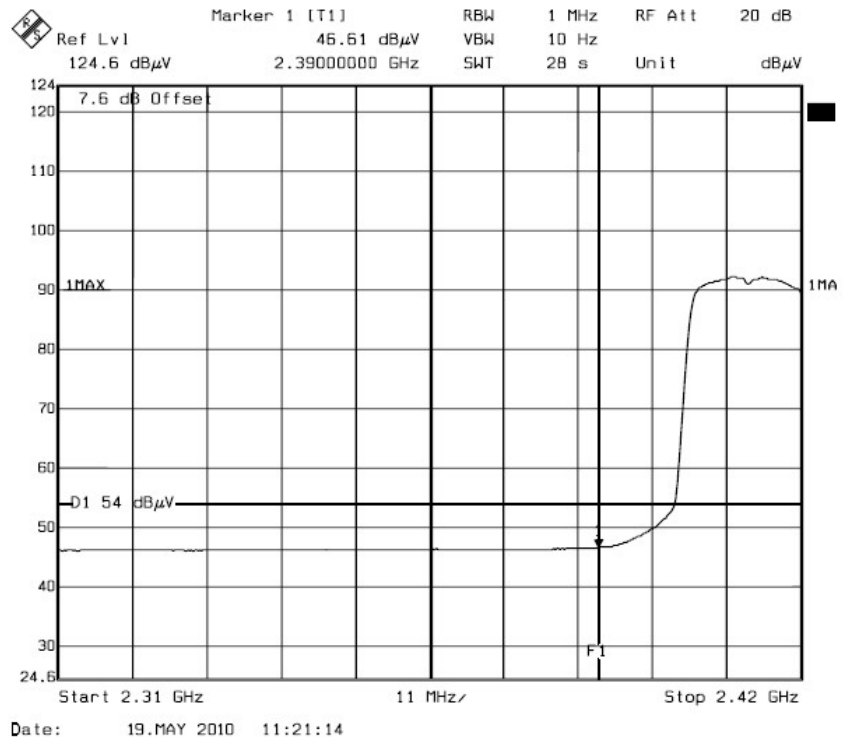
CH High (802.11b MODE–Vertical–Average)



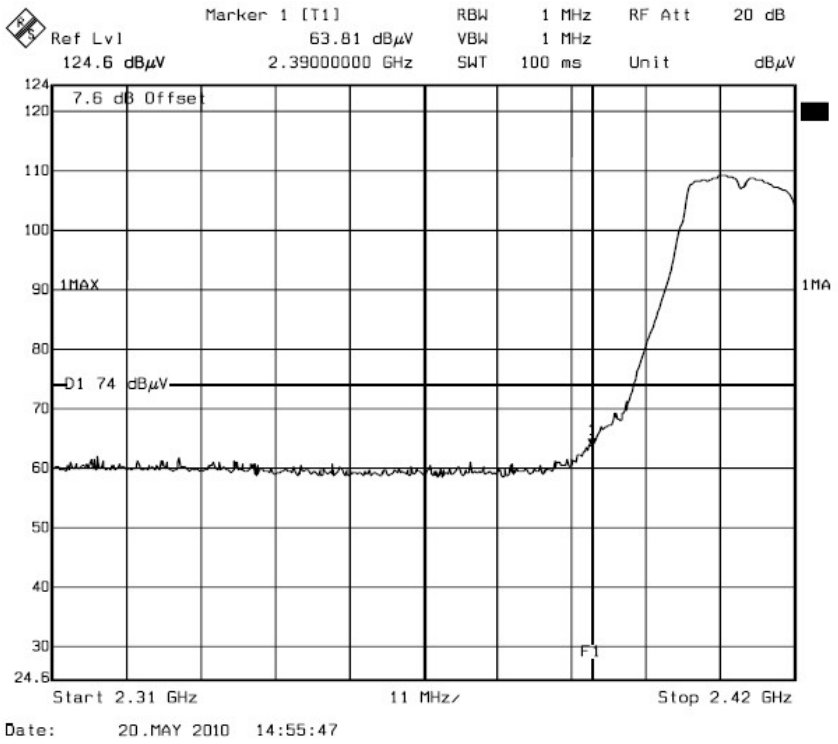
CH Low (802.11g MODE–Horizontal–Peak)



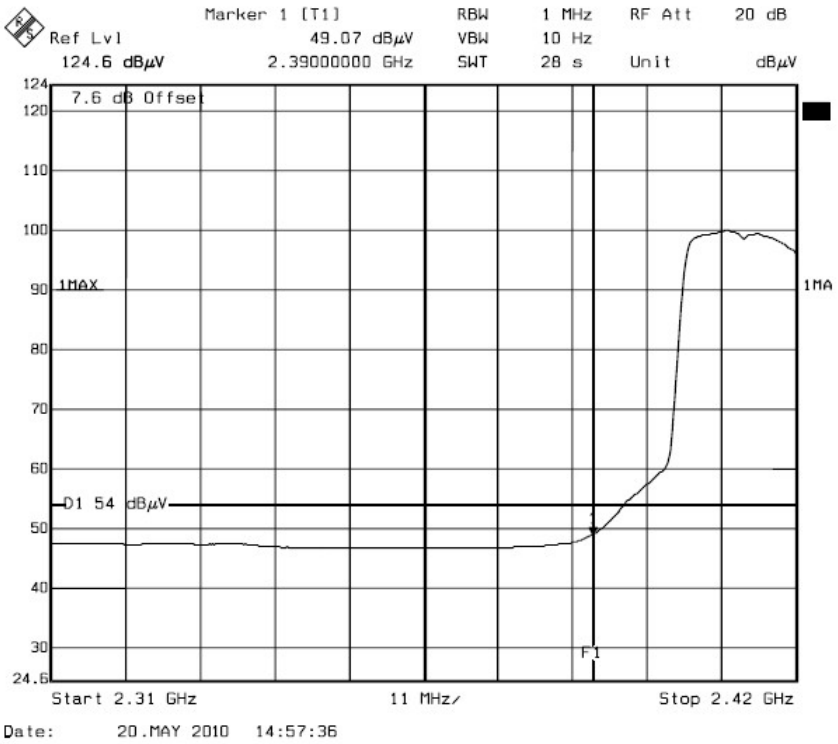
CH Low (802.11g MODE–Horizontal–Average)



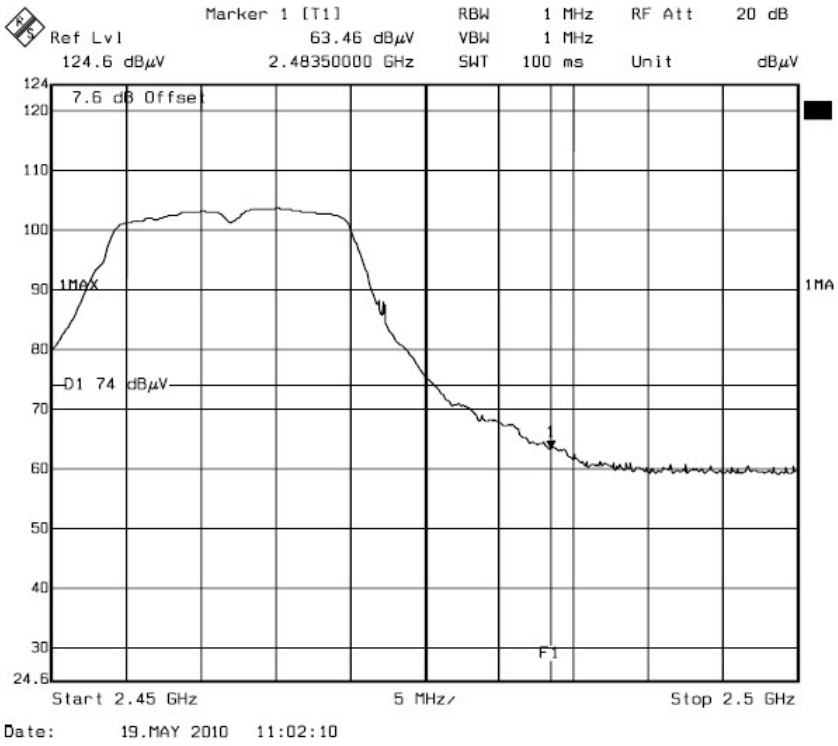
CH Low (802.11g MODE–Vertical–Peak)



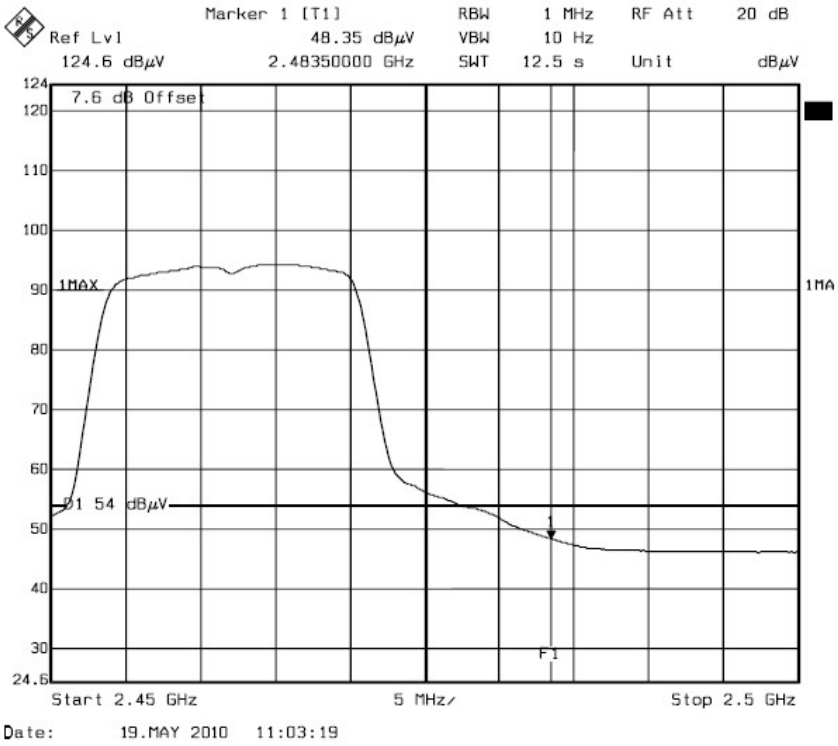
CH Low (802.11g MODE–Vertical–Average)



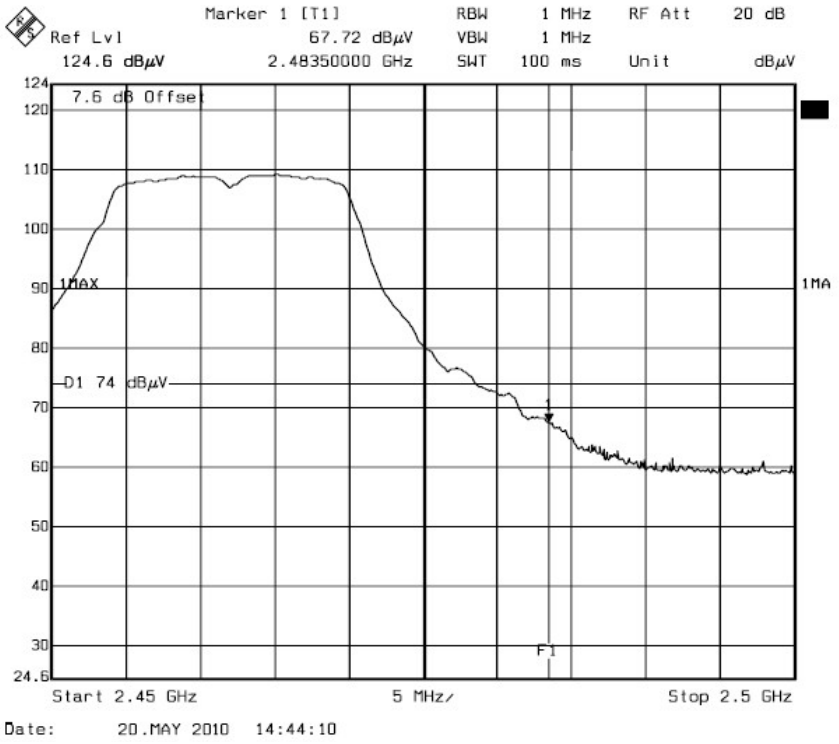
CH High (802.11g MODE–Horizontal–Peak)



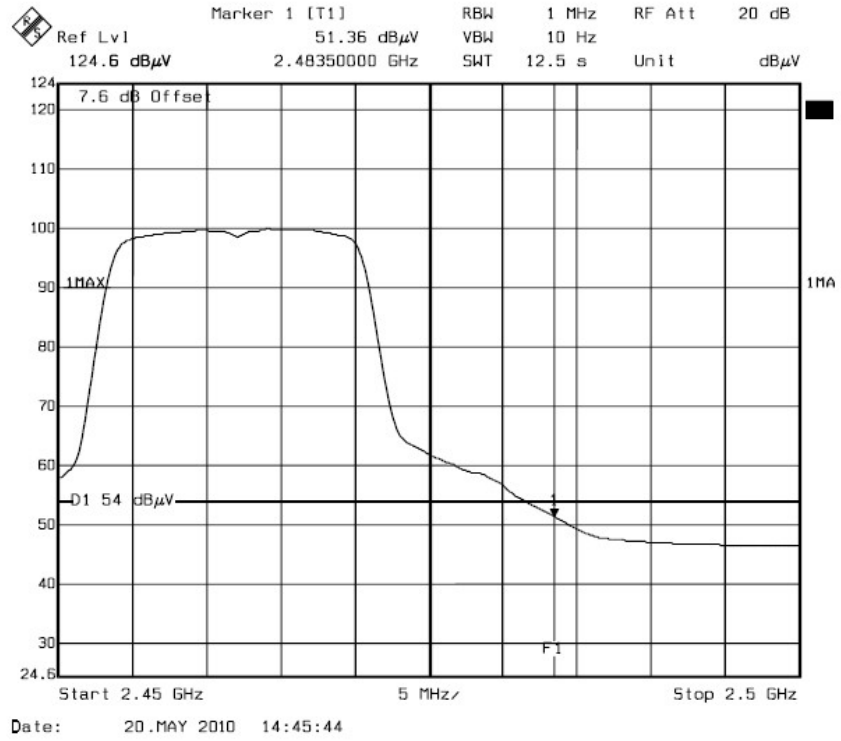
CH High (802.11g MODE–Horizontal–Average)



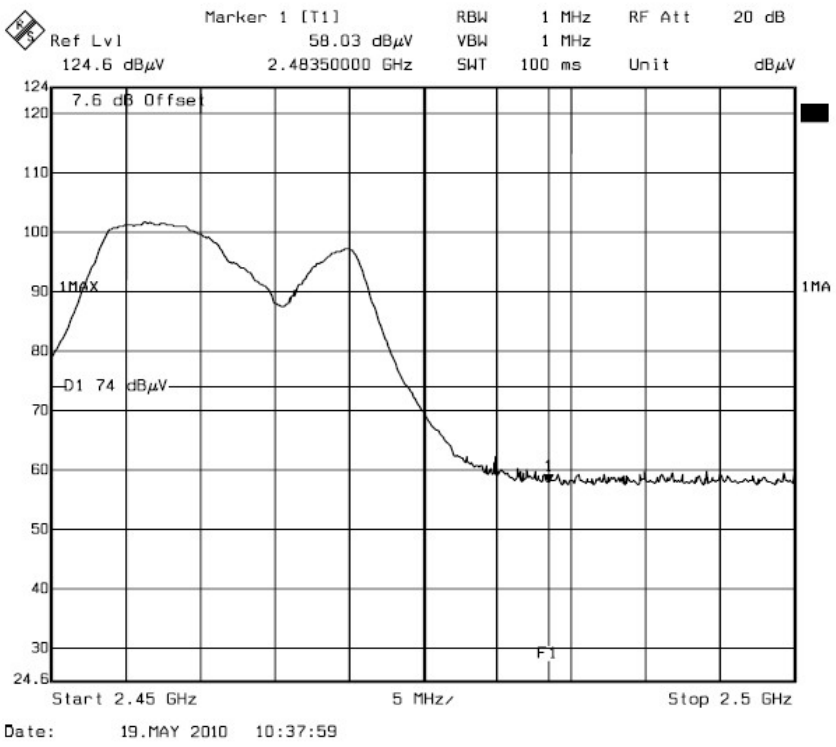
CH High (802.11g MODE–Vertical–Peak)



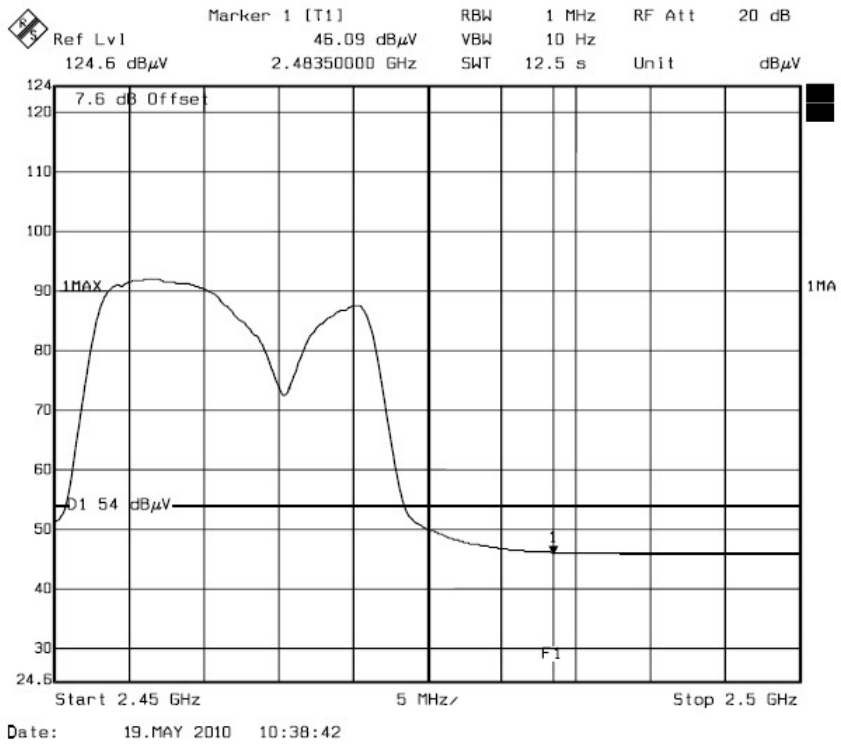
CH High (802.11g MODE–Vertical–Average)



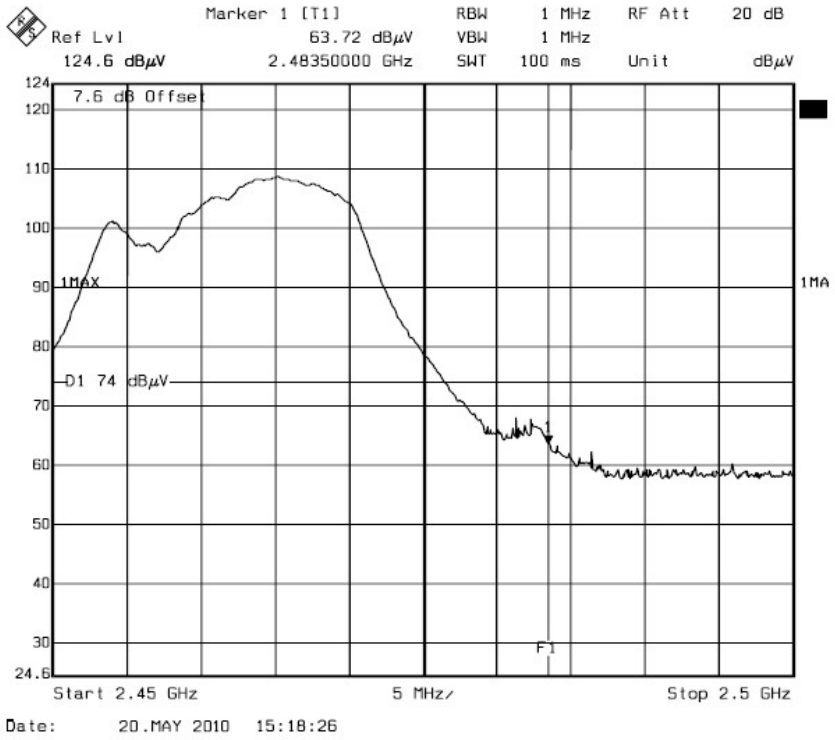
CH Low (802.11n HT20 MODE–Horizontal–Peak)



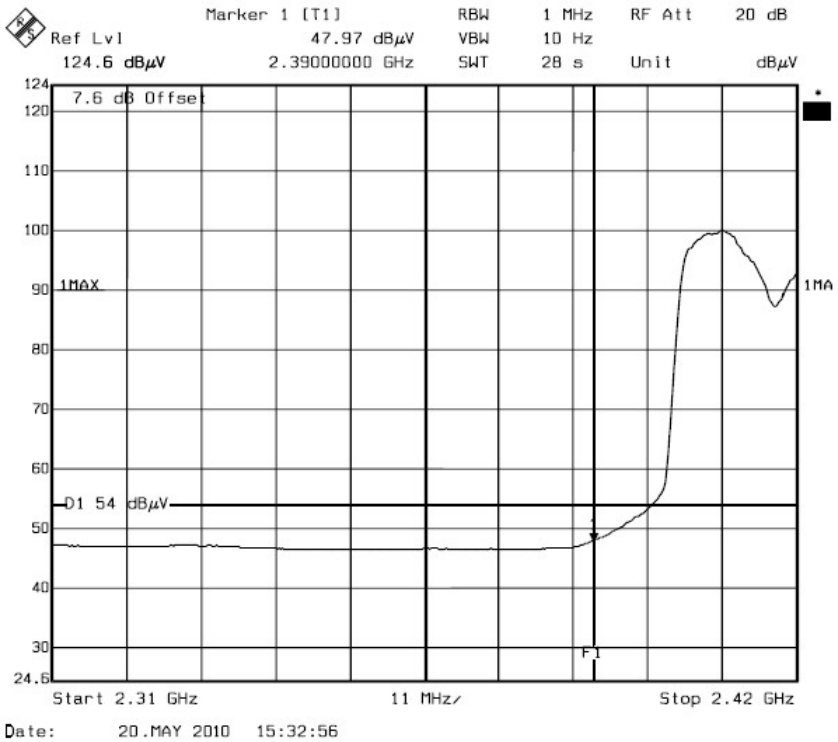
CH Low (802.11n HT20 MODE–Horizontal–Average)



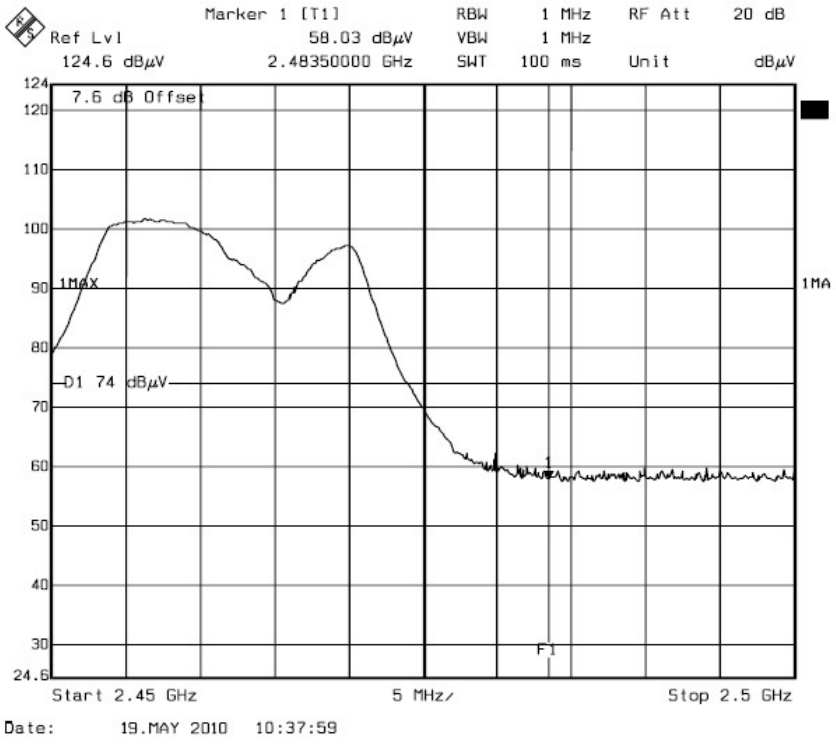
CH Low (802.11n HT20 MODE–Vertical–Peak)



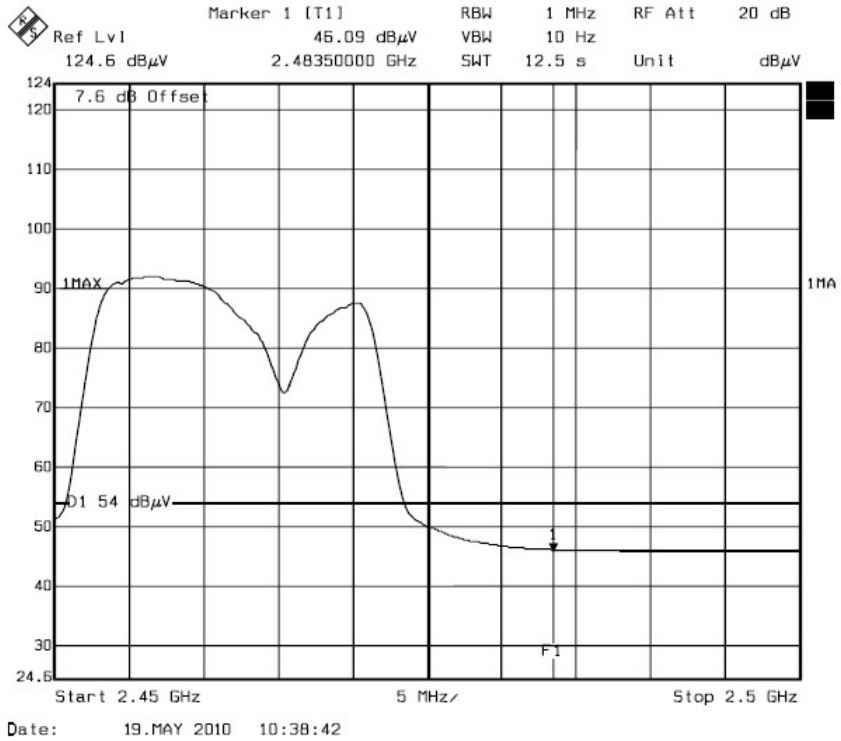
CH Low (802.11n HT20 MODE–Vertical–Average)



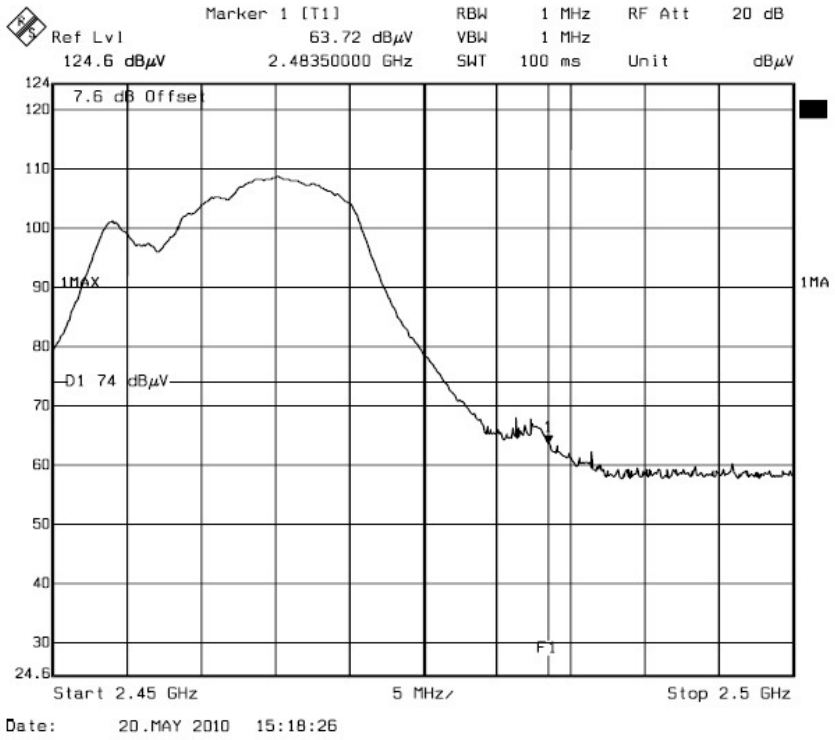
CH High (802.11n HT20 MODE–Horizontal–Peak)



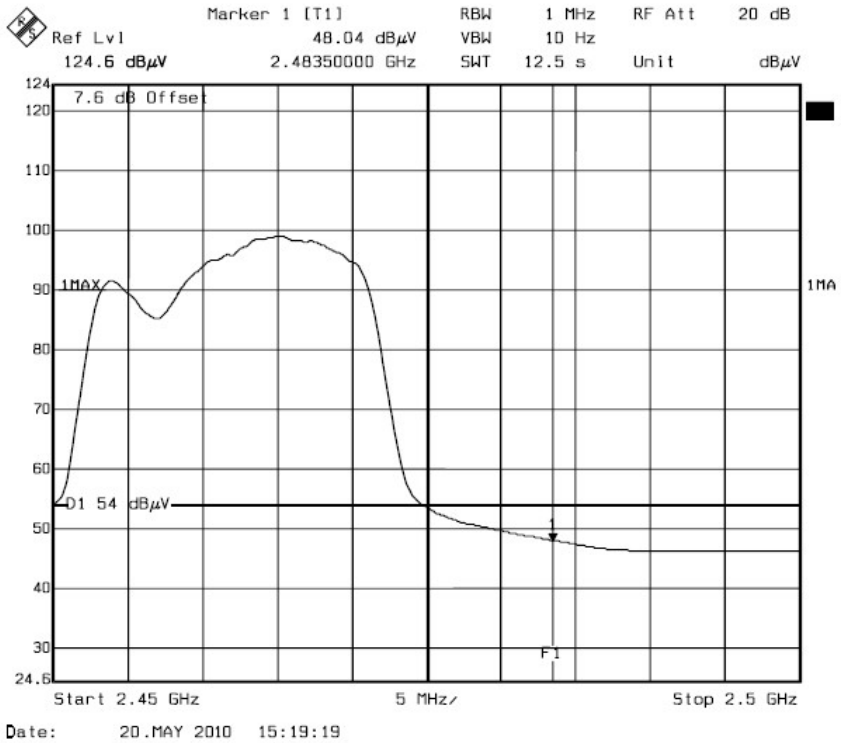
CH High (802.11n HT20 MODE–Horizontal–Average)



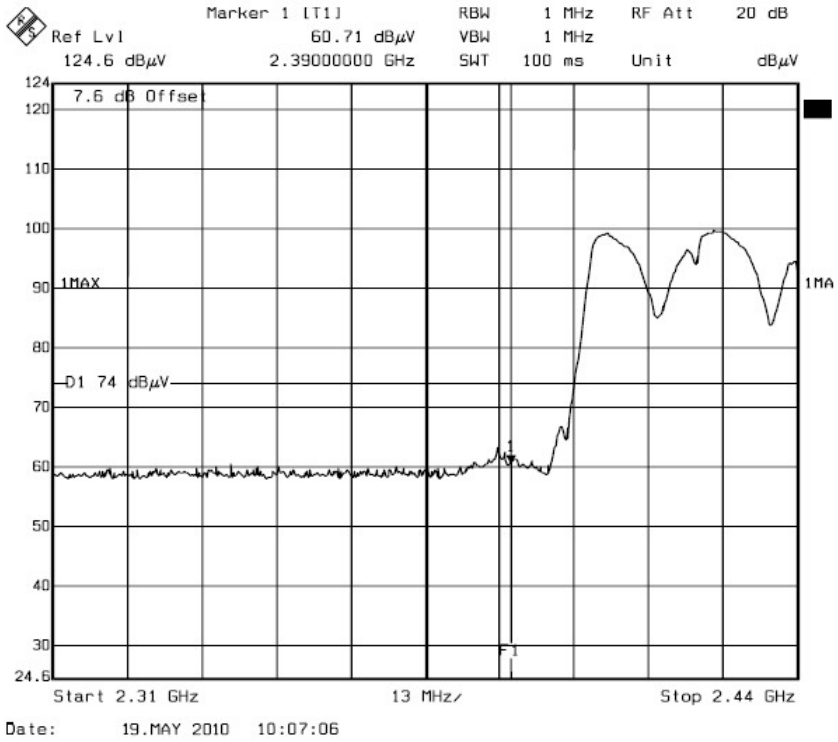
CH High (802.11n HT20 MODE–Vertical–Peak)



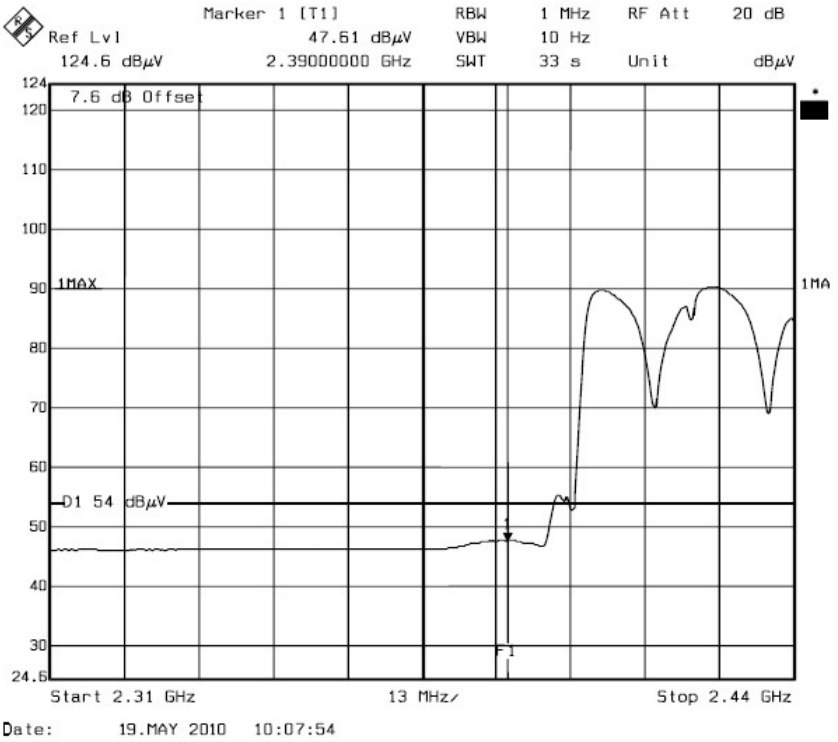
CH High (802.11n HT20 MODE–Vertical–Average)



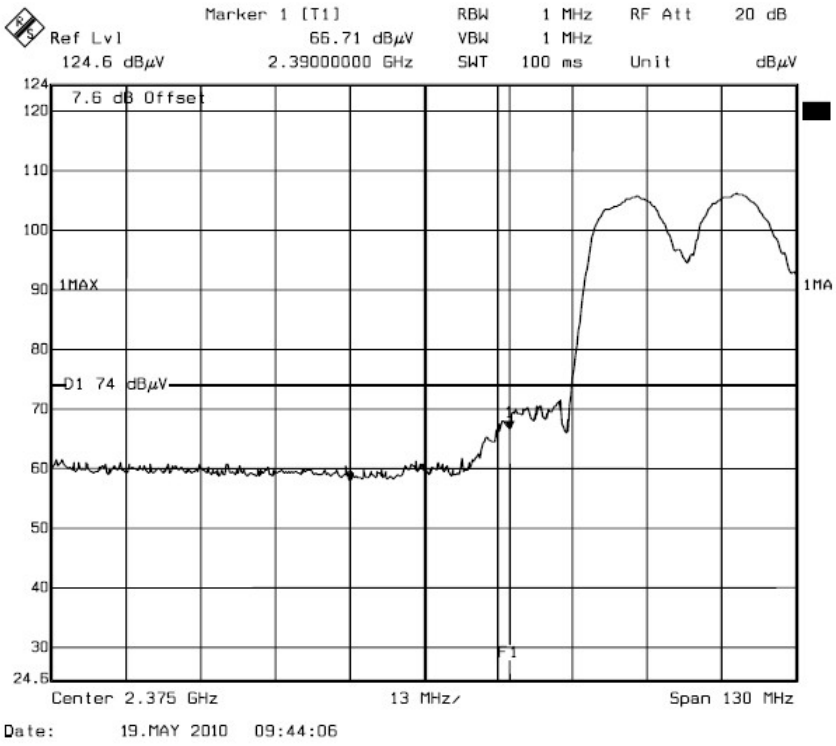
CH Low (802.11n HT40 MODE–Horizontal–Peak)



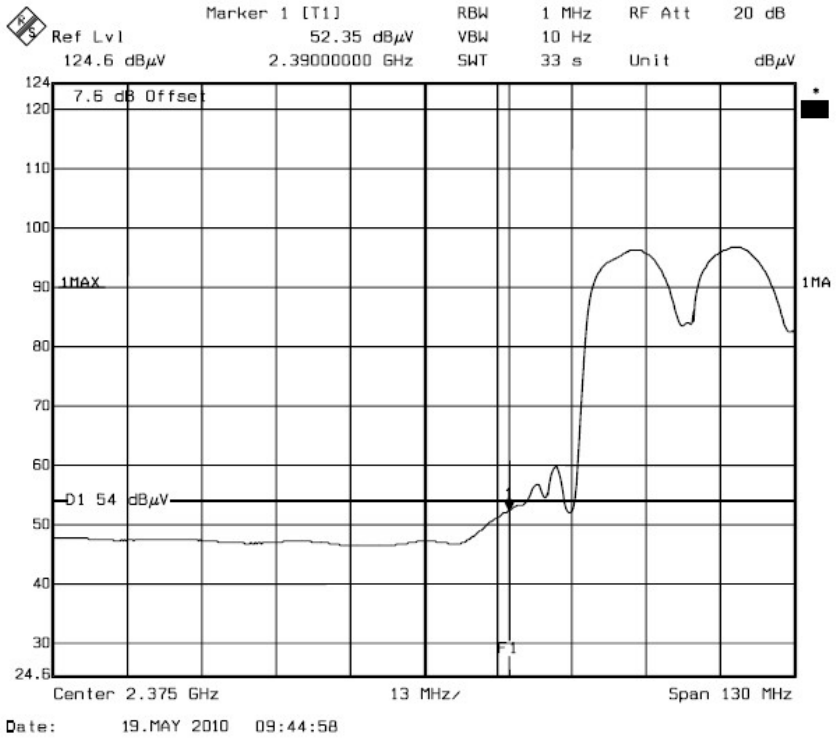
CH Low (802.11n HT40 MODE–Horizontal–Average)



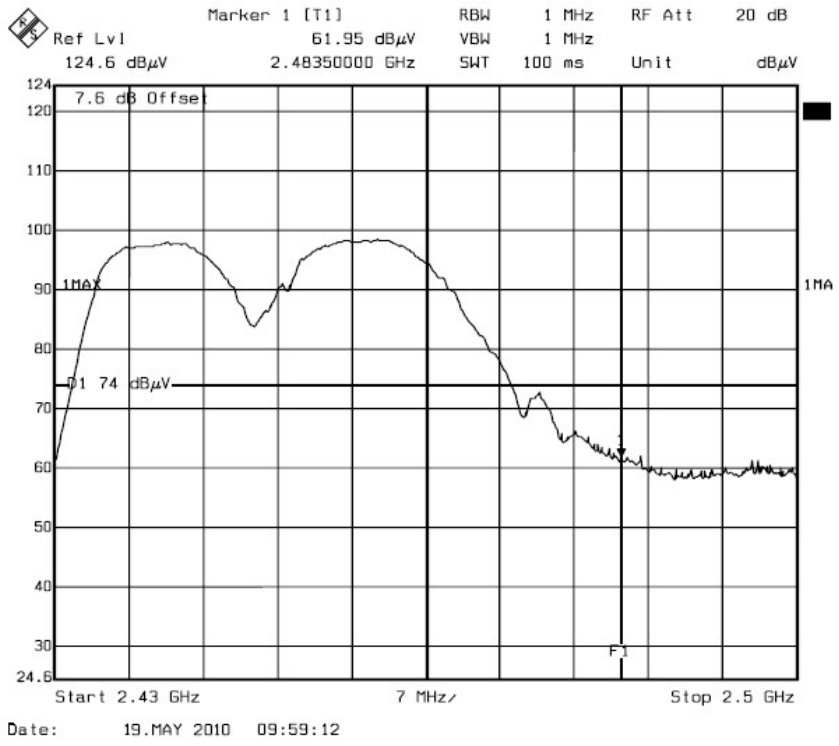
CH Low (802.11n HT40 MODE–Vertical–Peak)



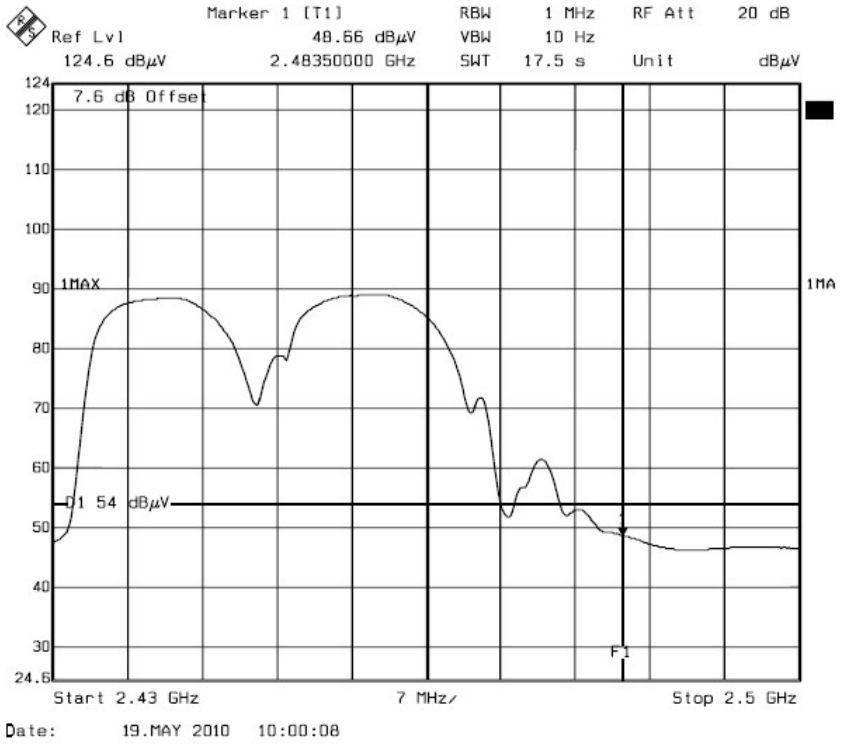
CH Low (802.11n HT40 MODE–Vertical–Average)



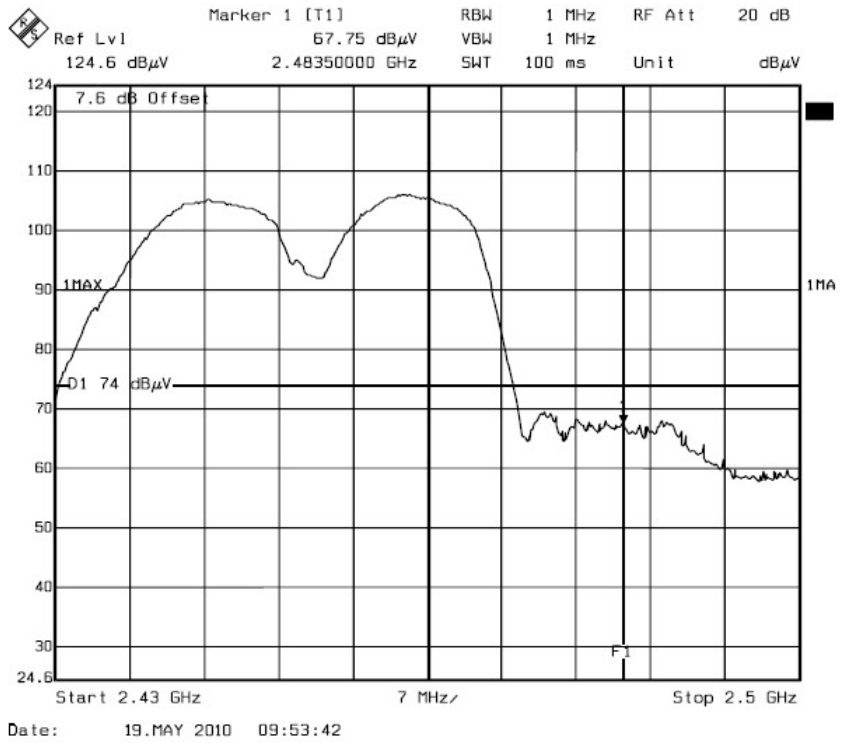
CH High (802.11n HT40 MODE–Horizontal–Peak)



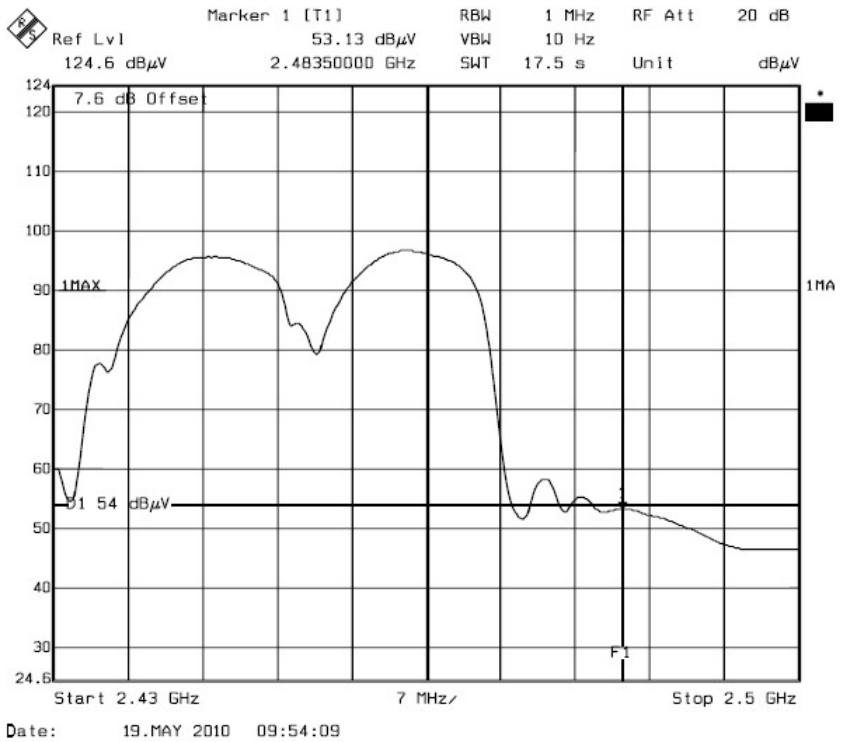
CH High (802.11n HT40 MODE–Horizontal–Average)



CH High (802.11n HT40 MODE–Vertical–Peak)



CH High (802.11n HT40 MODE–Vertical–Average)



10. ANTENNA REQUIREMENT

10.1 Standard Applicable

Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Section 15.247(b)/(c):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

10.2 Antenna Connected Construction

Built-in Antenna

Manufacture: SPEED (SUZHOU) COMMMUNICATION TECHNOLOGY CO., LTD

Model: D10C-WiFi-R and D10C-WiFi-L

Gain: 2.0dBi

Connector: SMA Straight Plug Reverse

Printed Antenna (× 1) 1RX

Gain: 0dBi