

TECHNICAL CONSULTING CO., LTD



**ISO/IEC17025Accredited Lab.**

Report No:  
File reference No:

FCC 1301098  
2013-02-26

Applicant: Damotelis Logistic Ltd

Product: SET TOP BOX

Trademark: ZAAPTV

Model No: HD409N

Test Standards: FCC Part 15 Subpart C, Paragraph 15.247

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4FCC Part 15 Subpart C, Paragraph 15.247 regulations for the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung  
Manager

Dated: Feb 26, 2013

**Results appearing herein relate only to the sample tested  
The technical reports is issued errors and omissions exempt and is subject to withdrawal at**

**SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO., LTD**

5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao, FuTian District, Shenzhen, CHINA.

Tel (755) 83448688

Fax (755) 83442996



## **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

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

### **CNAL-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

### **FCC-Registration No.: 899988**

The 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 No.: 899988.

### **IC- Registration No.: IC5205A-02**

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration IC No.: 5205A-02.

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## Test Report Conclusion

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## 1.0 General Details

### 1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO., LTD  
Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd. CheGongMiao, FuTian District, Shenzhen, CHINA.

Telephone: (755) 83448688

Fax: (755) 83442996

Site on File with the Federal Communications Commission – United States

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-01

For 3m & 10 m OATS

### 1.2 Applicant Details

Applicant: Damotelis Logistic Ltd

Address: Box 33121, CY-5311 Paralimni Famagusta, Republic of Cyprus.

Telephone: +357-2402 2475

Fax: +357-2310 2332

### 1.3 Description of EUT

Manufacturer: Telergy Hong Kong Limited

Address: Room 3A03, Tower B2, Digital Technology Park, Gao Xin Nan 7 Rd, Nanshan District, Shenzhen, China 518057

Telephone: +86-755-33225727

Fax: +86-755-33225726

Factory 1: Pro Broadband (Shen Zhen) Inc.

Address: Unit 99, Tongfucun Industry Area, Shiao, Dalang, Longhua Town, Shenzhen, China

Telephone: +86-755-28078809

Fax: +86-755- 28078889

Factory 2: PANODIC ELECTRIC (SHEN ZHEN) LIMITED

Address: C/D Block, Zhengchangda Ind.Park, Jian'an Road, Tangwei,FuYong, Baoan Dist., ShenZhen, China

Telephone: +86-755-83478999

Fax: +86-755-83479555

Factory 3: Zhuhai Globalsat Technology LTD.

Address: 66 Yongda Road Hongqi Town, Jinwan District, Zhuhai 519090, China

Telephone: +86-756-6801617

Fax: +86-756-3880786

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Product:	SET TOP BOX
Brand Name:	ZAAPTV
Model Number:	HD409N
Additional Model Number:	N/A
Power Adapter	Model No.1: S024WM1200200; Input: 100-240V~, 50/60Hz, 600mA Max; Output: 12V, 2000Ma Model No.2: XA024AM1200200; Input: 100-240V~, 50/60Hz, 0.6A; Output: 12.0V, 2.0A
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)
Frequency range	IEEE 802.11b/g, 802.11n HT20: 2412-2462MHz IEEE 802.11n HT40 : 2422MHz-2452MHz
Channel Spacing	IEEE 802.11b/g/n: 5MHz
Air Data Rate	IEEE 802.11b : 11, 5.5, 2, 1 Mbps IEEE 802.11g : 54, 48, 36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20 : 150, 117, 104, 78, 65, 58.5, 52, 39, 26, 19.5, 13, 6 Mbps IEEE 802.11n HT40 : 150, 117, 104, 78, 65, 58.5, 52, 39, 26, 19.5, 13, 6 Mbps
Frequency Selection	By software
Channel Number	IEEE 802.11b/g ,802.11n HT20 : 11 Channels IEEE 802.11n HT40 : 7 Channels
Antenna:	PCB Antenna with maximum gain 3.3dBi

1.4 Submitted Sample: 2 Samples

1.5 Test Duration

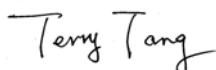
2012-07-20 to 2013-01-28

1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer



The sample tested by

Print Name: Terry Tang

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Test Equipments					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2012-04-21	2013-04-20
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100294	2012-04-21	2013-04-20
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100253	2012-04-21	2013-04-20
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2012-04-21	2013-04-20
ESDV Test Receiver	ROHDE&SCHWARZ	ESDV	100008	2012-04-21	2013-04-20
Impuls-Begrenzer	ROHDE&SCHWARZ	ESH3-Z2	100281	2012-04-21	2013-04-20
System Controller	CT	SC100	-	--	--
Printer	EPSON	PHOTO EX3	CFNH234850	--	--
Computer	IBM	8434	1S8434KCE99BLXL O*	--	--
Loop Antenna	EMCO	6502	00042960	2012-04-21	2013-04-20
ESPI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/013	2012-04-21	2013-04-20
3m OATS	--	--	N/A	2012-04-21	2013-04-20
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170265	2012-04-21	2013-04-20
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2012-04-21	2013-04-20
Power meter	Anritsu	ML2487A	6K00003613	2012-04-21	2013-04-20
Power sensor	Anritsu	MA2491A	32263	2012-04-21	2013-04-20
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2012-04-21	2013-04-20
LISN	AFJ	LS16C	10010947251	2012-04-21	2013-04-20
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2012-04-21	2013-04-20
9*6*6 Anechoic	--	--	N/A	2012-04-21	2013-04-20
EMI Test Receiver	RS	ESCS30	100139	2012-04-21	2013-04-20
LISN	AFJ	LS16C	10010947251	2012-04-21	2013-04-20
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2012-04-21	2013-04-20

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## 2.1 Auxiliary Equipment

Name	Model No.	Serial No.	Manufacturer	Cable	FCC ID/DOC
Monitor	P2450	--	SAMSUNG	Data cable of 1.5m length	FCC DOC
U-disk	U208	--	Netac	--	FCC DOC
Monitor	--	--	LG	Data cable of 1.5m length	FCC DOC

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### 3. DESCRIPTION OF TEST MODES

#### IEEE 802.11b, 802.11g mode and 802.11n HT20

The EUT had been tested under operating condition. There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Mid	2437
High	2462

IEEE 802.11b mode: 11Mbps data rate (worst case) was chosen for full testing. IEEE 802.11g mode: 54Mbps data rate (worst case) was chosen for full testing. IEEE 802.11n HT20 mode: 65Mbps data rate (worst case) was chosen for full testing.

#### IEEE 802.11n HT40

The EUT had been tested under operating condition. There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2422
Mid	2437
High	2452

IEEE 802.11n HT40 mode: 65Mbps data rate (worst case) was chosen for full testing.

The worst-case data rates are determined according to the description above, based on the investigations by measuring the PSD and average power across all the data rates, bandwidths, modulations and spatial stream modes.

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### 3.0 Technical Details

#### 3.1 Summary of test results

The EUT has been tested according to the following specifications:			
Standard	Test Type	Result	Notes
<b>FCC Part 15, Paragraph 15.107 &amp; 15.207</b>	Conducted Emission Test	PASS	Complies
<b>FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit</b>	<b>Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth&gt;500kHz</b>	PASS	Complies
<b>FCC Part 15, Paragraph 15.247(b)</b>	<b>Maximum peak output power Limit: max. 30dBm</b>	PASS	Complies
<b>FCC Part 15, Paragraph 15.109,15.205 &amp; 15.209</b>	<b>Transmitter Radiated Emission Limit: Table 15.209</b>	PASS	Complies
<b>FCC Part 15, Paragraph 15.247(e)</b>	<b>Power Spectral Density Limit: max. 8dBm</b>	PASS	Complies
<b>FCC Part 15, Paragraph 15.247(d)</b>	<b>Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209</b>	PASS	Complies

#### 3.2 Test Standards

**FCC Part 15 Subpart & Subpart C, Paragraph 15.247**

#### 4.0 EUT Modification

**No modification by Shenzhen Timeway Technology Consulting Co., Ltd**

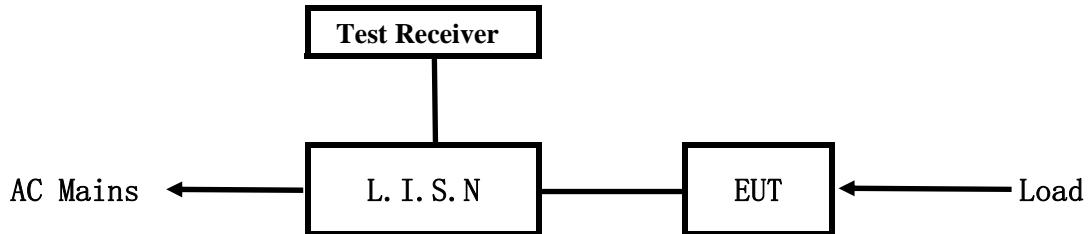
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## 5. Power Line Conducted Emission Test

### 5.1 Schematics of the test



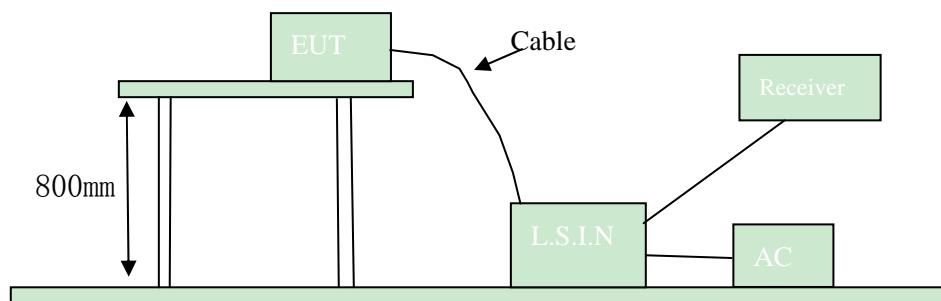
EUT: Equipment Under Test

### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2003.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



### 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

#### A. EUT

Device	Manufacturer	Model	FCC ID
SET TOP BOX	Telergy Hong Kong Limited	HD409N	R67HD409N

#### B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

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### C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
N/A				

#### 5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003.

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

#### 5.5 Power line conducted Emission Limit according to Paragraph 15.207 and 15.107

Frequency (MHz)	Class A Limits (dB $\mu$ V)		Class B Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

Notes: 1. \*Decreasing linearly with logarithm of frequency.  
2. The tighter limit shall apply at the transition frequencies

#### 5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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**A: Conducted Emission on Live Terminal (150kHz to 30MHz)**

**EUT Operating Environment**

Temperature: 25°C      Humidity: 75%RH      Atmospheric Pressure: 101 KPa

**Power Adapter Model No.: S024WM1200200**

**EUT set Condition: Keep Transmitting**

**Equipment Level: Class B**

**Results: Pass**

Please refer to following diagram for individual



Frequency (MHz)	Line	Reading(dBμV)		Limit(dBμV)	
		Quasi-peak	Average	Quasi-peak	Average
0.152	Live	53.70	26.40	65.88	55.88
0.160	Live	49.01	18.01	65.45	55.45
0.406	Live	45.37	23.67	57.71	47.71
0.736	Live	40.02	15.02	56.00	46.00
1.032	Live	39.31	16.21	56.00	46.00
2.144	Live	37.96	13.66	56.00	46.00

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**B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)**

**EUT Operating Environment**

Temperature: 25°C      Humidity: 75%RH      Atmospheric Pressure: 101 KPa

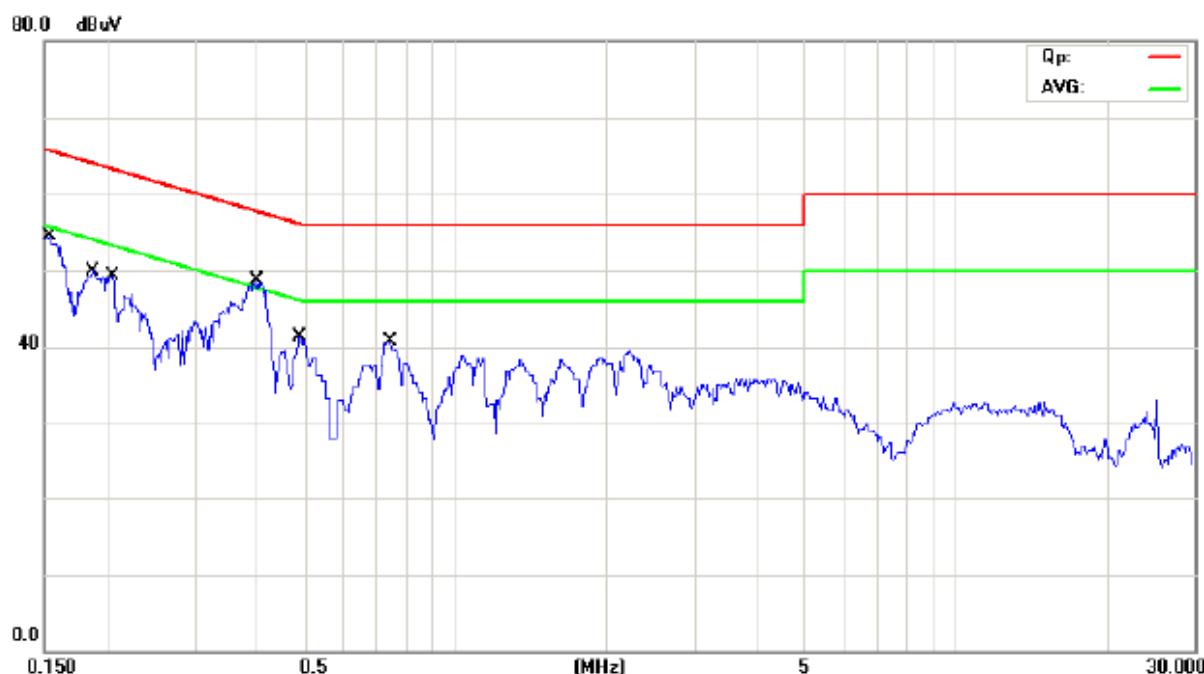
**Power Adapter Model No.: S024WM1200200**

**EUT set Condition: Keep Transmitting**

**Equipment Level: Class B**

**Results: Pass**

Please refer to following diagram for individual



Frequency (MHz)	Line	Reading(dBμV)		Limit(dBμV)	
		Quasi-peak	Average	Quasi-peak	Average
0.150	Neutral	53.40	27.10	65.97	55.97
0.187	Neutral	47.94	24.44	64.15	54.15
0.204	Neutral	42.66	12.66	63.43	53.43
0.400	Neutral	46.96	23.26	57.85	47.85
0.484	Neutral	39.55	16.45	56.27	46.27
0.741	Neutral	39.03	15.43	56.00	46.00

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### C: Conducted Emission on Live Terminal (150kHz to 30MHz)

#### EUT Operating Environment

Temperature: 25°C      Humidity: 75% RH      Atmospheric Pressure: 101 KPa

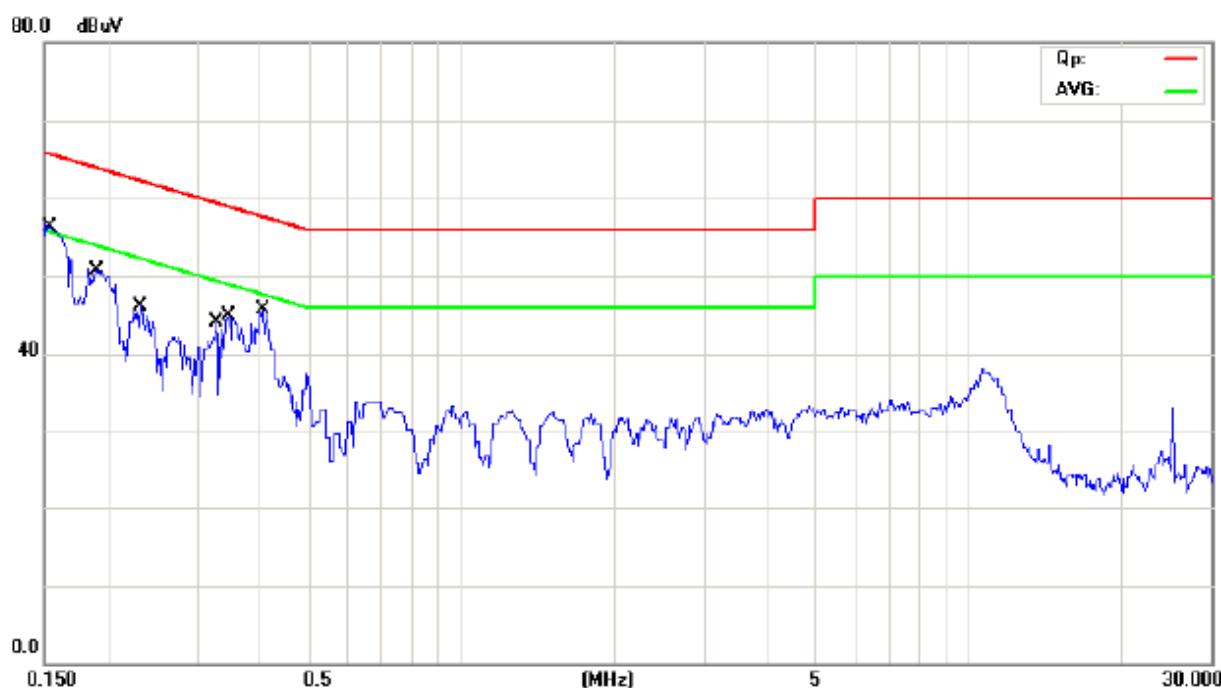
**Power Adapter Model No.: XA024AM1200200**

**EUT set Condition: Keep Transmitting**

**Equipment Level: Class B**

**Results: Pass**

Please refer to following diagram for individual



Frequency (MHz)	Line	Reading(dBμV)		Limit(dBμV)	
		Quasi-peak	Average	Quasi-peak	Average
0.153	Live	55.40	21.20	65.80	55.80
0.190	Live	48.74	16.24	64.03	54.03
0.230	Live	42.78	10.38	62.45	52.45
0.343	Live	41.60	10.70	59.12	49.12
0.400	Live	42.67	15.67	57.85	47.85
0.326	Live	38.69	2.99	59.54	49.54

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**D: Conducted Emission on Neutral Terminal (150kHz to 30MHz)**

**EUT Operating Environment**

Temperature: 25°C      Humidity: 75% RH      Atmospheric Pressure: 101 KPa

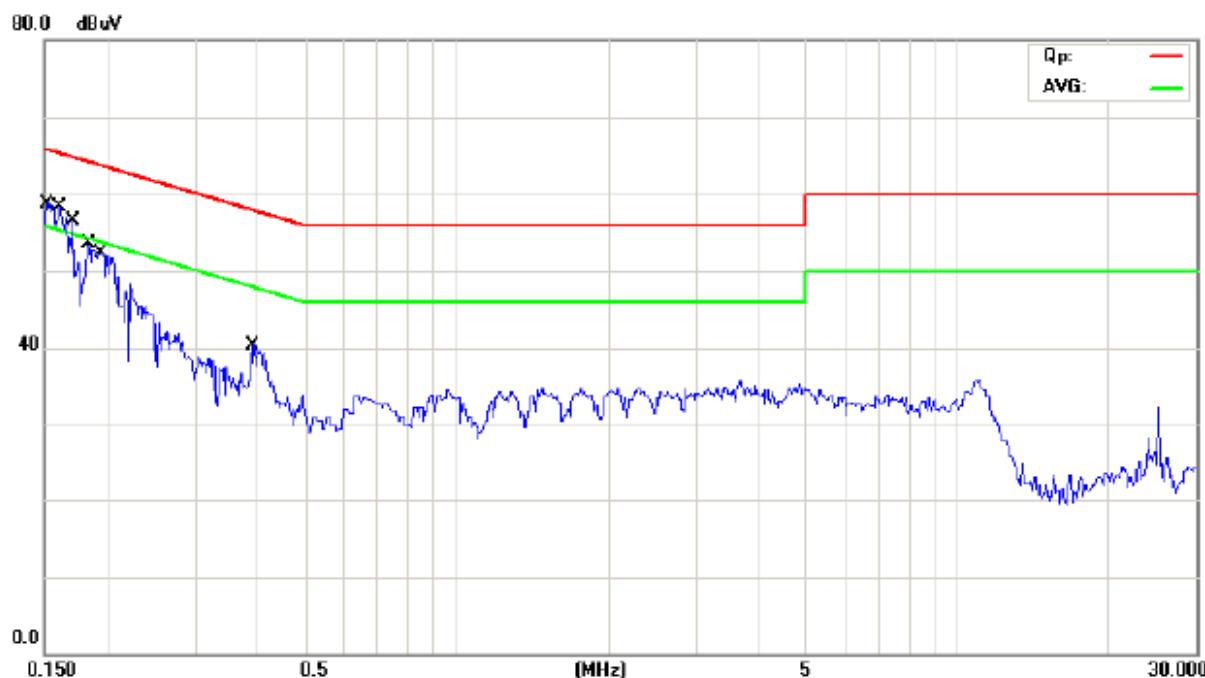
**Power Adapter Model No.: XA024AM1200200**

**EUT set Condition: Keep Transmitting**

**Equipment Level: Class B**

**Results: Pass**

Please refer to following diagram for individual



Frequency (MHz)	Line	Reading(dBμV)		Limit(dBμV)	
		Quasi-peak	Average	Quasi-peak	Average
0.153	Neutral	56.50	26.80	65.84	55.84
0.161	Neutral	55.01	23.91	65.41	55.41
0.169	Neutral	39.82	2.82	64.98	54.98
0.184	Neutral	48.34	7.84	64.27	54.27
0.193	Neutral	50.25	18.85	63.91	53.91
0.390	Neutral	34.75	7.85	58.06	48.06

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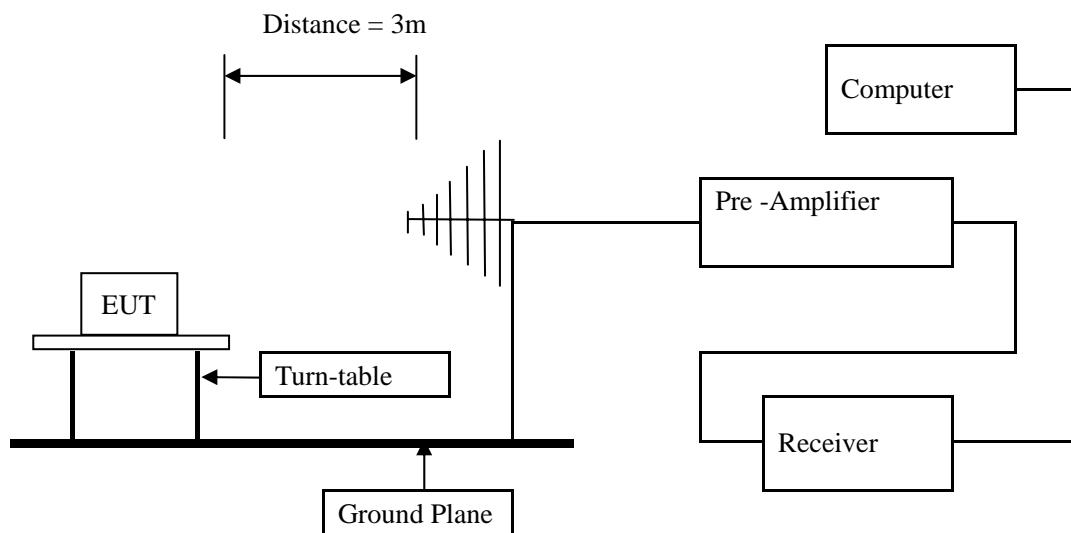
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## 6 Radiated Emission Test

### 6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.
- (3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are Quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
- (6) The antenna polarization : Vertical polarization and Horizontal polarization.

### Block diagram of Test setup



### 6.2 Configuration of The EUT

Same as section 5.3 of this report

### 6.3 EUT Operating Condition

Same as section 5.4 of this report.

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#### 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

#### **Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109**

Frequency Range (MHz)	Distance (m)	Field strength (dB $\mu$ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

1. RF Voltage (dBuV) =  $20 \log \text{RF Voltage (uV)}$
2. In the Above Table, the higher limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
4. Worse case was recorded
5. For radiated emissions test above 1GHz, power supply with model S024WM1200200 was selected to conduct the test, and it was the worse case.

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**Test result**

**General Radiated Emission Data and Harmonics Radiated Emission Data**

**Radiated Emission In Horizontal (30MHz----1000MHz)**

**Power Adapter Model No.: S024WM1200200**

EUT set Condition: Keep Transmitting

**Results:** **Pass**

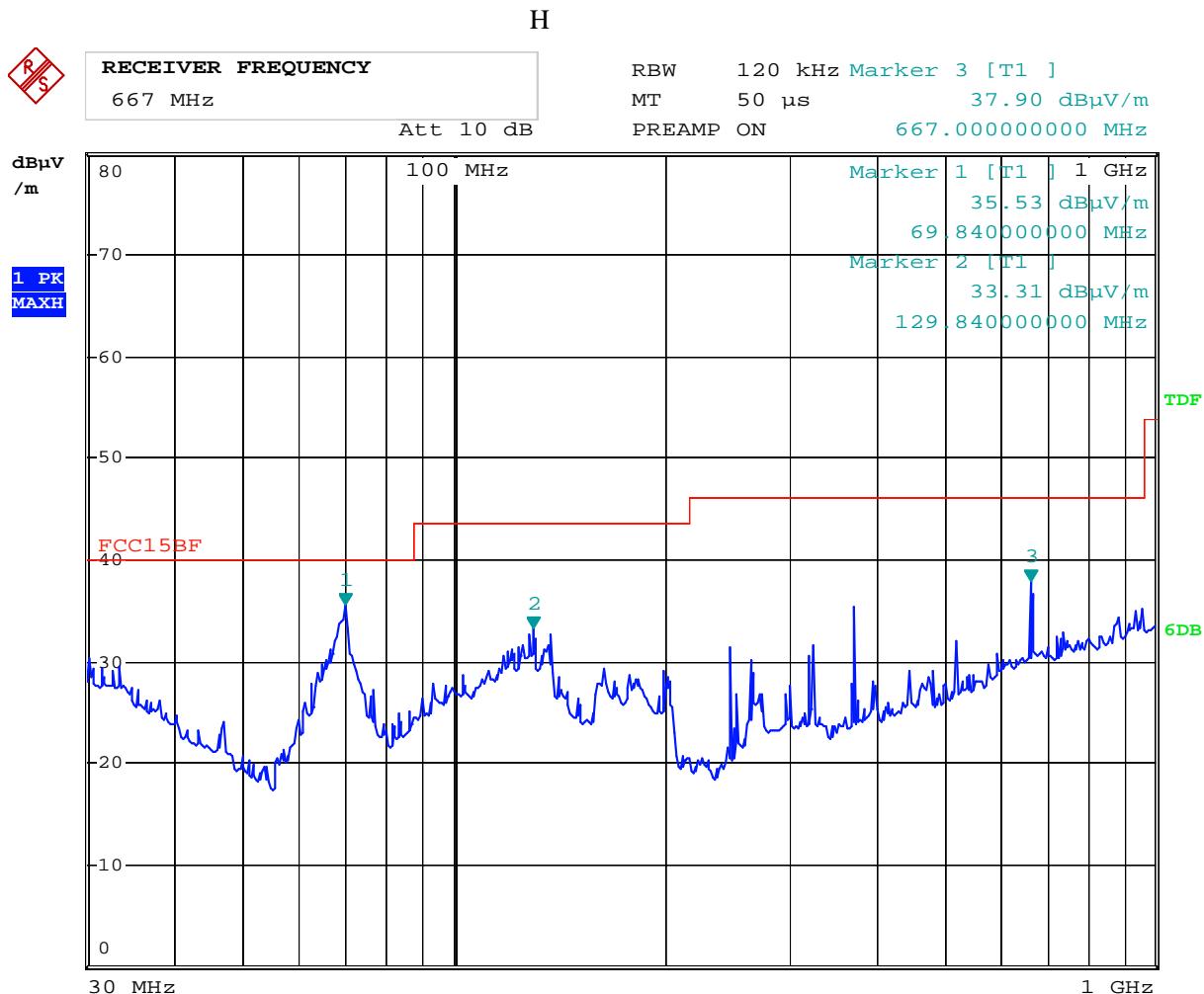
Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
69.840	35.53	H	40.00
129.840	33.31	H	43.50
667.000	37.90	H	46.00
68.800	34.60	V	40.00
74.080	35.20	V	40.00
116.320	35.86	V	43.50

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Test Figure:



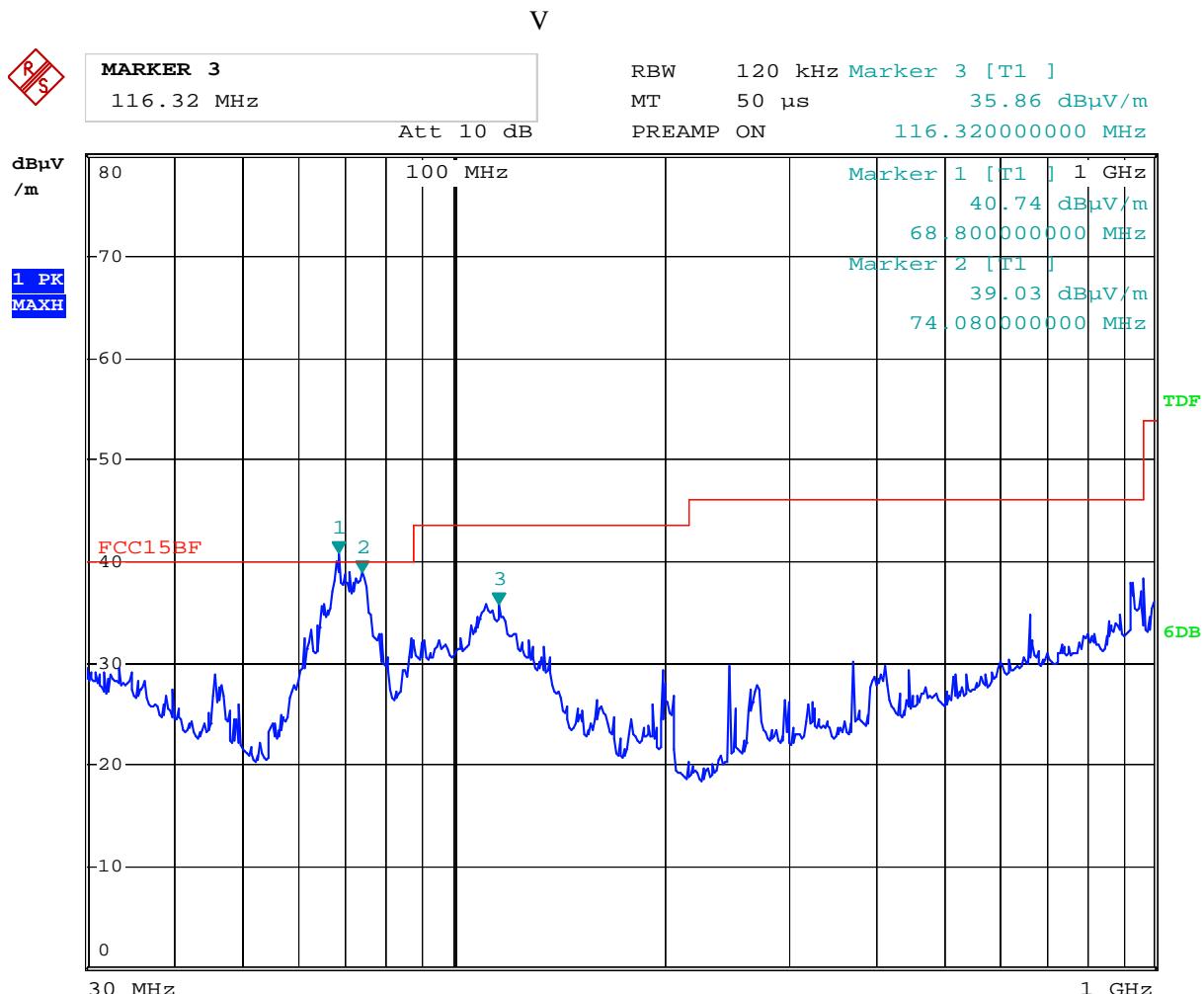
Date: 25.JAN.2013 15:02:01

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Test Figure:



Date: 25.JAN.2013 15:10:56

NOTE: Scanning with PK detector and final reading level with QK detector

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**Test result**

**General Radiated Emission Data and Harmonics Radiated Emission Data**

**Radiated Emission In Horizontal (30MHz----1000MHz)**

**Power Adapter Model No.: XA024AM1200200**

EUT set Condition: Keep Transmitting

**Results:** **Pass**

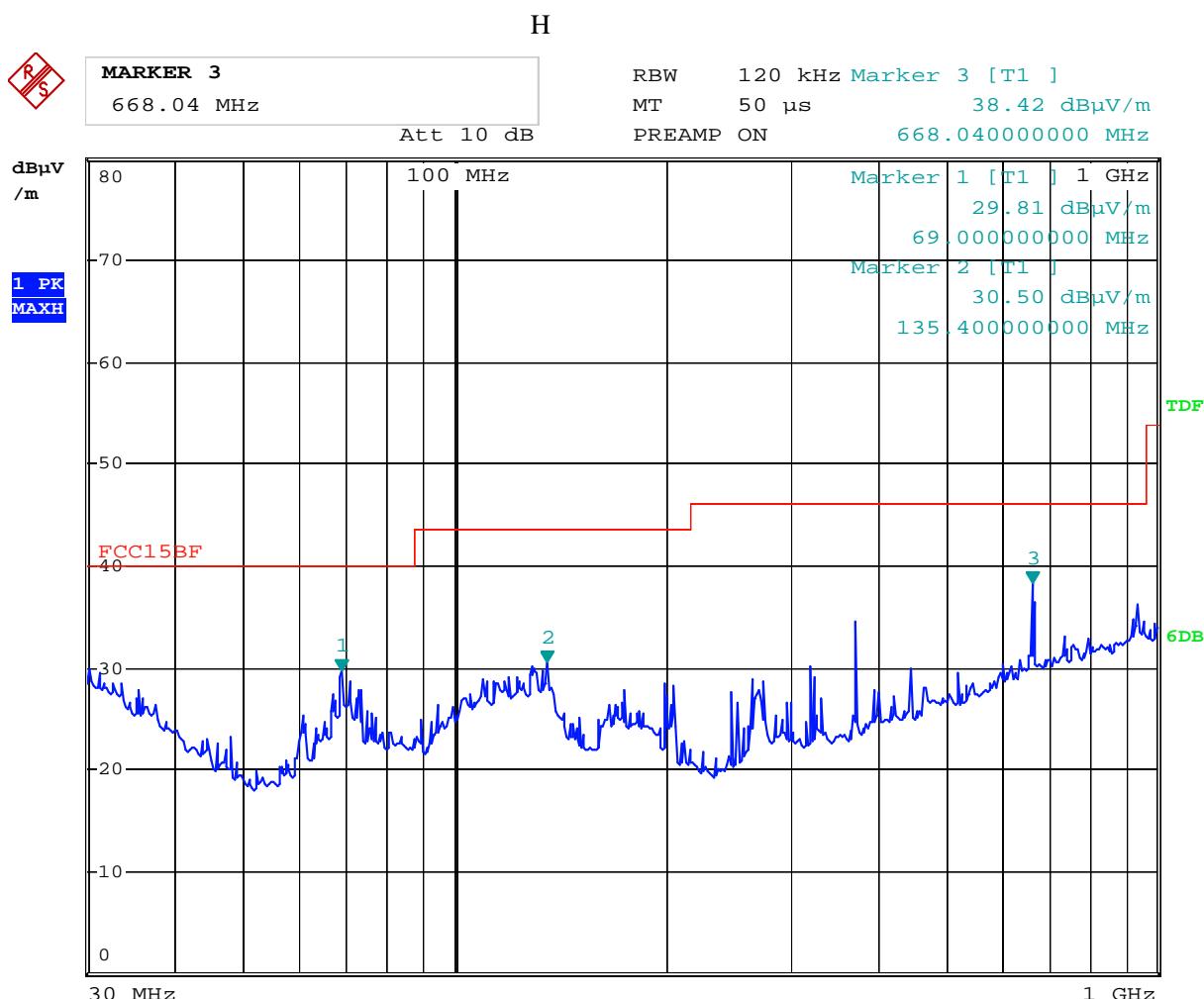
Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
69.000	29.81	H	40.00
135.400	30.50	H	43.50
668.040	38.42	H	46.00
67.960	37.70	V	40.00
74.240	37.36	V	40.00
112.720	36.67	V	43.50

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Test Figure:



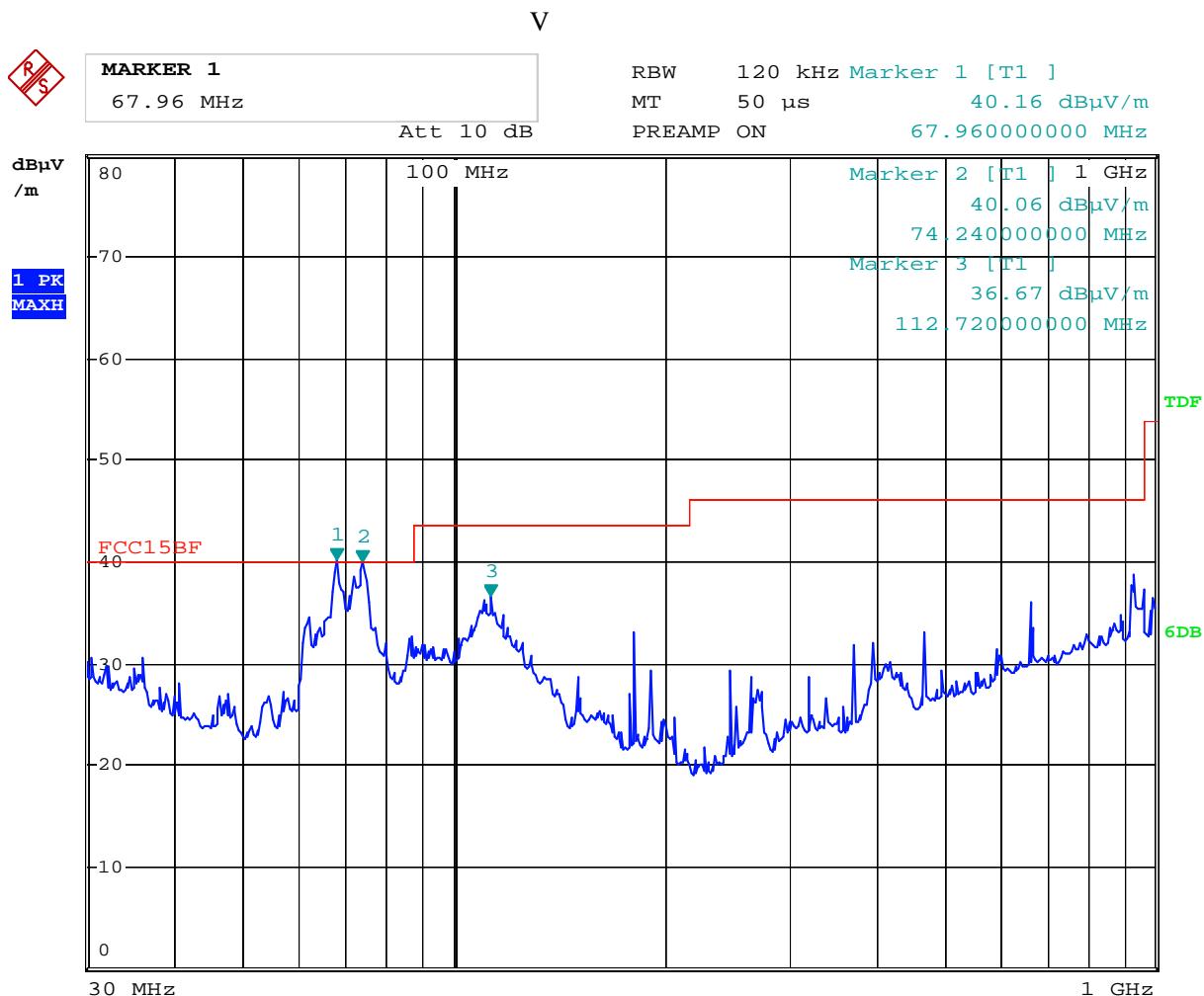
Date: 25.JAN.2013 15:25:22

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Test Figure:



Date: 25.JAN.2013 15:21:33

NOTE: Scanning with PK detector and final reading level with QK detector

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**Operation Mode: Transmitting & Receiving under CH01 for 11b at 11Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2412.00	92.76 (PK)	H	Fundamental Frequency
2412.00	92.76 (PK)	V	
4824.00	47.32 (PK)	H	--
4824.00	-- (PK)	V	
7236.00	--	H/V	74(Peak)/ 54(AV)
9648.00	--	H/V	74(Peak)/ 54(AV)
12060	--	H/V	74(Peak)/ 54(AV)
14472	--	H/V	74(Peak)/ 54(AV)
16884	--	H/V	74(Peak)/ 54(AV)
19296	--	H/V	74(Peak)/ 54(AV)
21708	--	H/V	74(Peak)/ 54(AV)
24120	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11b mode at 11Mbps

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**Operation Mode: Transmitting & Receiving under CH06 for 11b at 11Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2437.00	91.63 (PK)	H	Fundamental Frequency
2437.00	95.15 (PK)	V	
4874.00	41.01 (PK)	H	--
4874.00	47.00 (PK)	V	
7311.00	--	H/V	74(Peak)/ 54(AV)
9748.00	--	H/V	74(Peak)/ 54(AV)
12185	--	H/V	74(Peak)/ 54(AV)
14622	--	H/V	74(Peak)/ 54(AV)
17059	--	H/V	74(Peak)/ 54(AV)
19496	--	H/V	74(Peak)/ 54(AV)
21933	--	H/V	74(Peak)/ 54(AV)
24370	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11b mode at 11Mbps

**Operation Mode: Transmitting & Receiving under CH11 for 11b at 11Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2462.00	92.74 (PK)	H	Fundamental Frequency
2462.00	93.15 (PK)	V	
4924	45.29 (PK)	H	--
4924	-- (PK)	V	
7386	--	H/V	74(Peak)/ 54(AV)
9848	--	H/V	74(Peak)/ 54(AV)
12310	--	H/V	74(Peak)/ 54(AV)
14772	--	H/V	74(Peak)/ 54(AV)
17234	--	H/V	74(Peak)/ 54(AV)
19696	--	H/V	74(Peak)/ 54(AV)
22158	--	H/V	74(Peak)/ 54(AV)
24620	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11b mode at 11Mbps

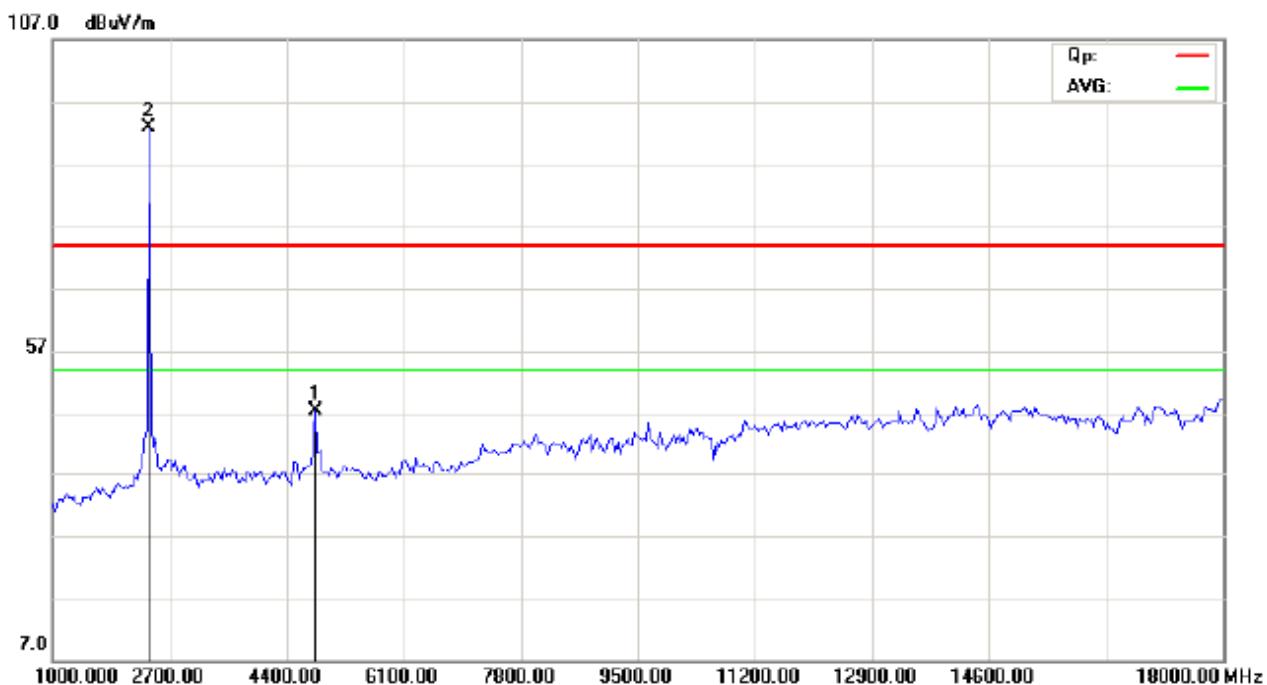
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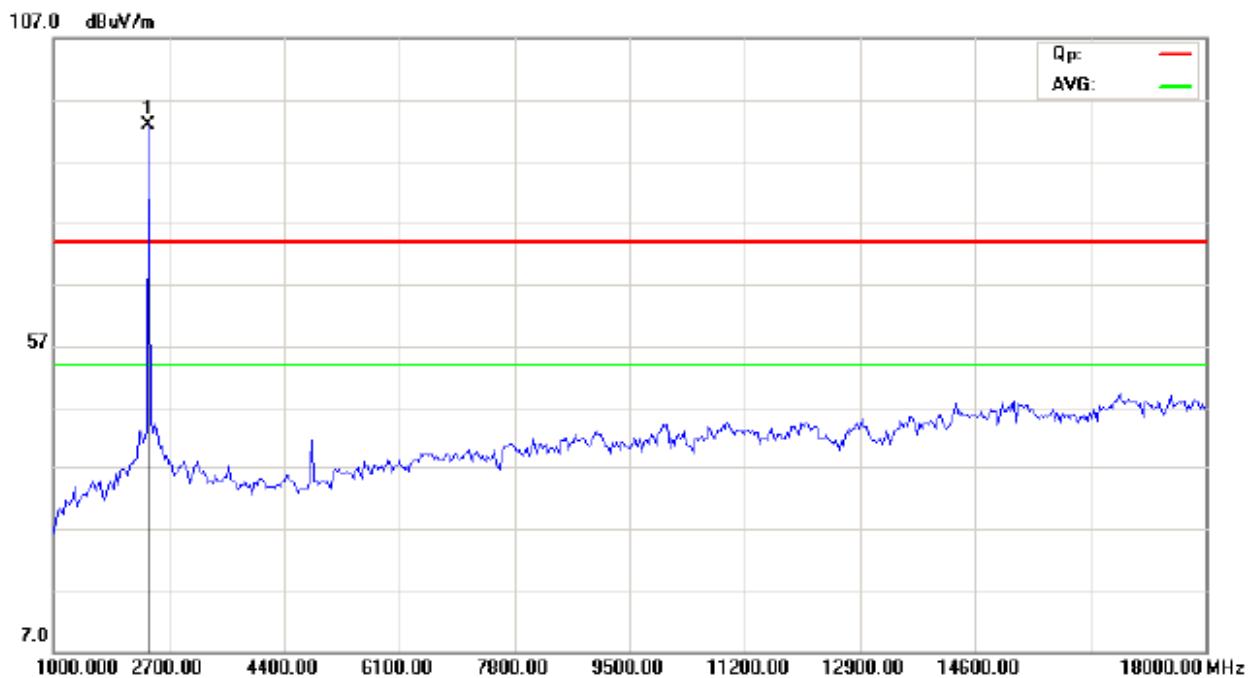
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Please refer to the following test plots for details:

**CH01 at 11Mbps: Horizontal**



**CH01 at 11Mbps: Vertical**

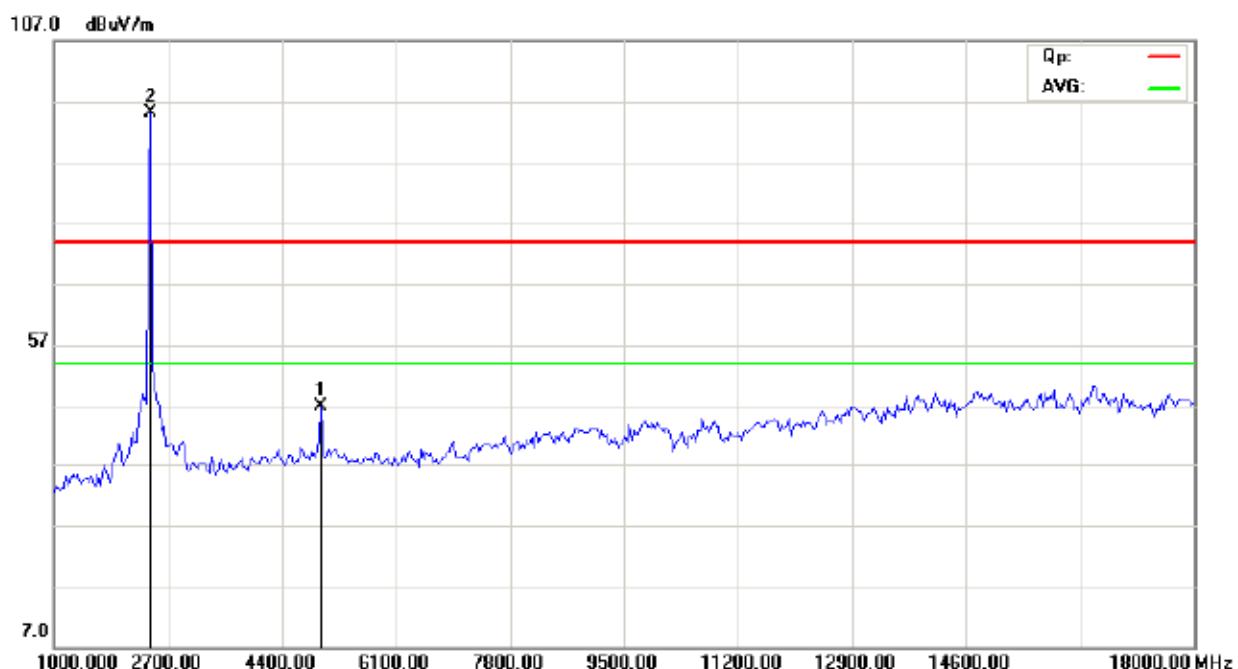


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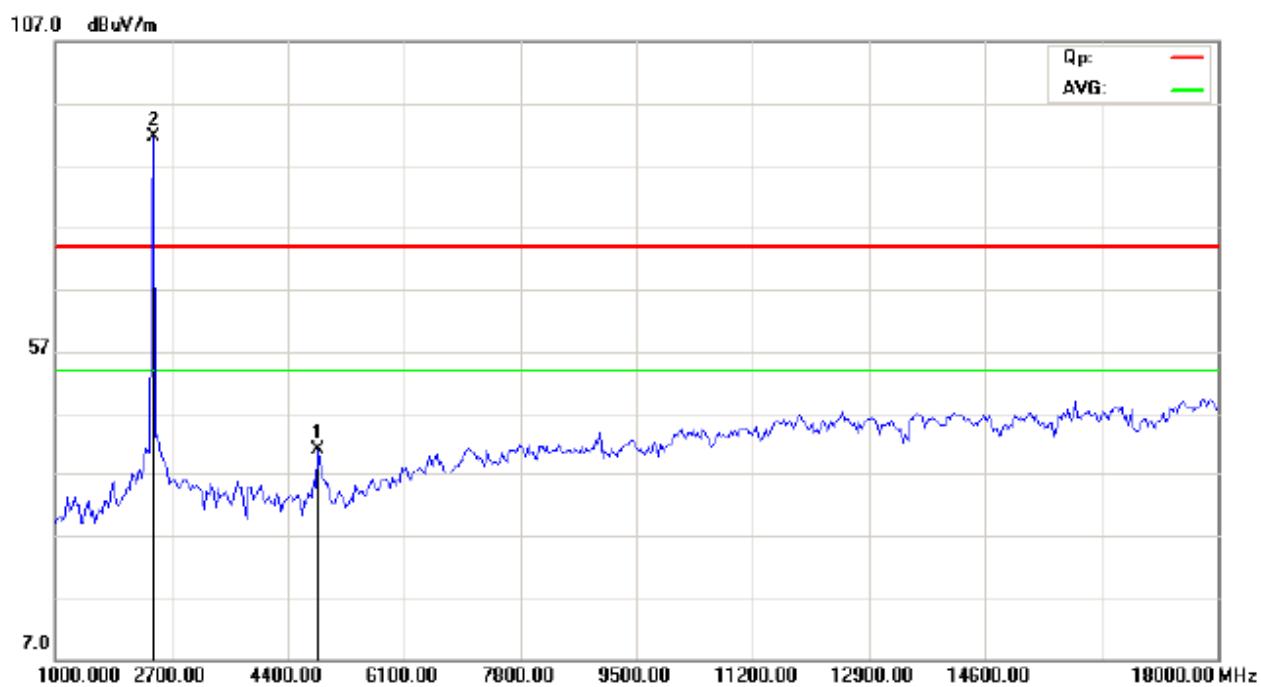
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### CH06 at 11Mbps: Vertical



### CH06 at 11Mbps: Horizontal

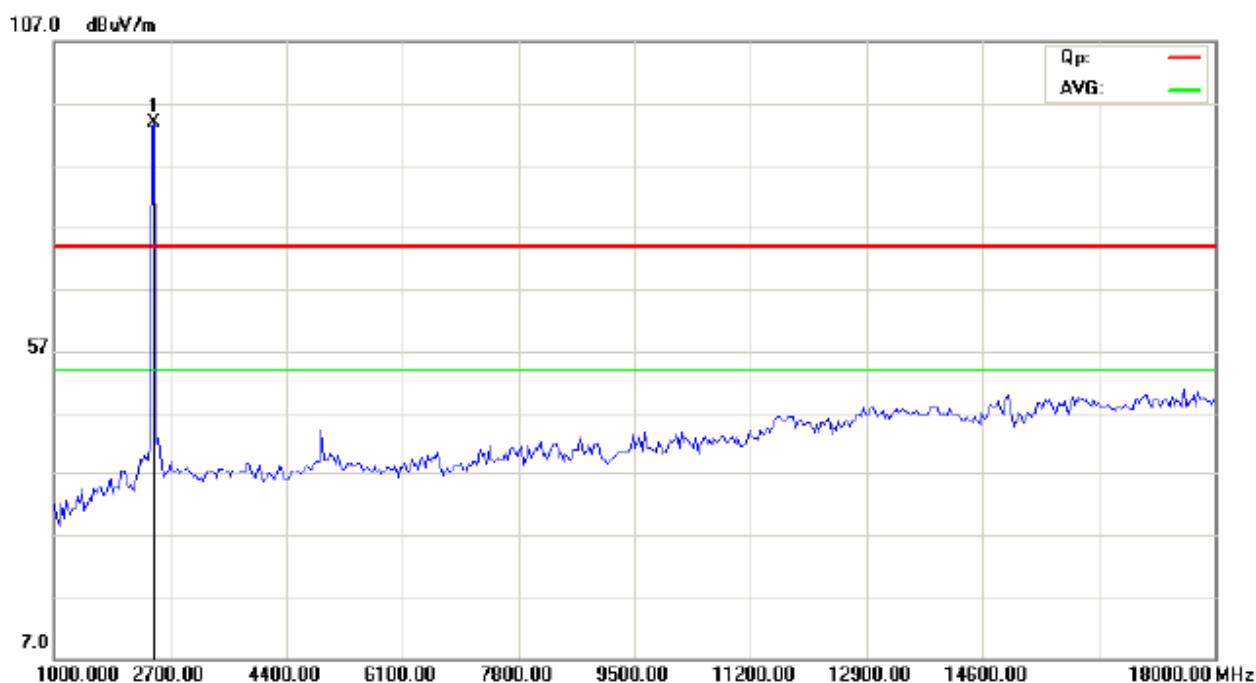


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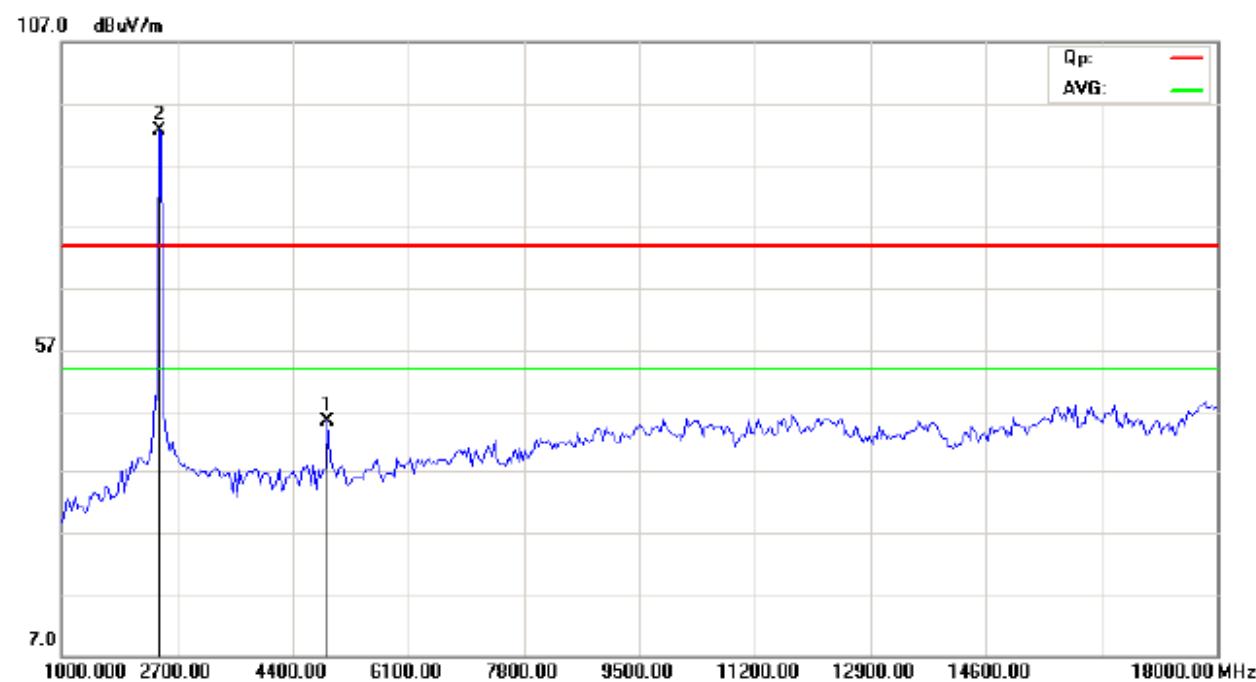
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### CH11 at 11Mbps: Vertical



### CH11 at 11Mbps: Horizontal



Note: For radiated Emissions from 18-25GHz, it is only the floor noise.

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**Operation Mode: Transmitting & Receiving under CH01 for 11g at 54 Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2412.00	92.89 (PK)	H	Fundamental Frequency
2412.00	93.19 (PK)	V	
4824.00	46.28 (PK)	H	--
4824.00	44.89 (PK)	V	
7236.00	--	H/V	74(Peak)/ 54(AV)
9648.00	--	H/V	74(Peak)/ 54(AV)
12060	--	H/V	74(Peak)/ 54(AV)
14472	--	H/V	74(Peak)/ 54(AV)
16684	--	H/V	74(Peak)/ 54(AV)
19296	--	H/V	74(Peak)/ 54(AV)
21708	--	H/V	74(Peak)/ 54(AV)
24120	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11g mode 54Mbps

**Operation Mode: Transmitting & Receiving under CH06 for 11g at 54 Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2437.00	91.47 (PK)	H	Fundamental Frequency
2437.00	93.44 (PK)	V	
4874.00	44.97 (PK)	H	--
4874.00	-- (PK)	V	
7311.00	--	H/V	74(Peak)/ 54(AV)
9748.00	--	H/V	74(Peak)/ 54(AV)
12185	--	H/V	74(Peak)/ 54(AV)
14622	--	H/V	74(Peak)/ 54(AV)
17059	--	H/V	74(Peak)/ 54(AV)
19496	--	H/V	74(Peak)/ 54(AV)
21933	--	H/V	74(Peak)/ 54(AV)
24370	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11g mode 54Mbps

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**Operation Mode: Transmitting & Receiving under CH11 for 11g at 54 Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2462.00	92.43 (PK)	H	Fundamental Frequency
2462.00	92.36 (PK)	V	
4924	46.58 (PK)	H	--
4924	45.64 (PK)	V	
7386	--	H/V	74(Peak)/ 54(AV)
9848	--	H/V	74(Peak)/ 54(AV)
12310	--	H/V	74(Peak)/ 54(AV)
14772	--	H/V	74(Peak)/ 54(AV)
17234	--	H/V	74(Peak)/ 54(AV)
19696	--	H/V	74(Peak)/ 54(AV)
22158	--	H/V	74(Peak)/ 54(AV)
24620	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11g mode 54Mbps

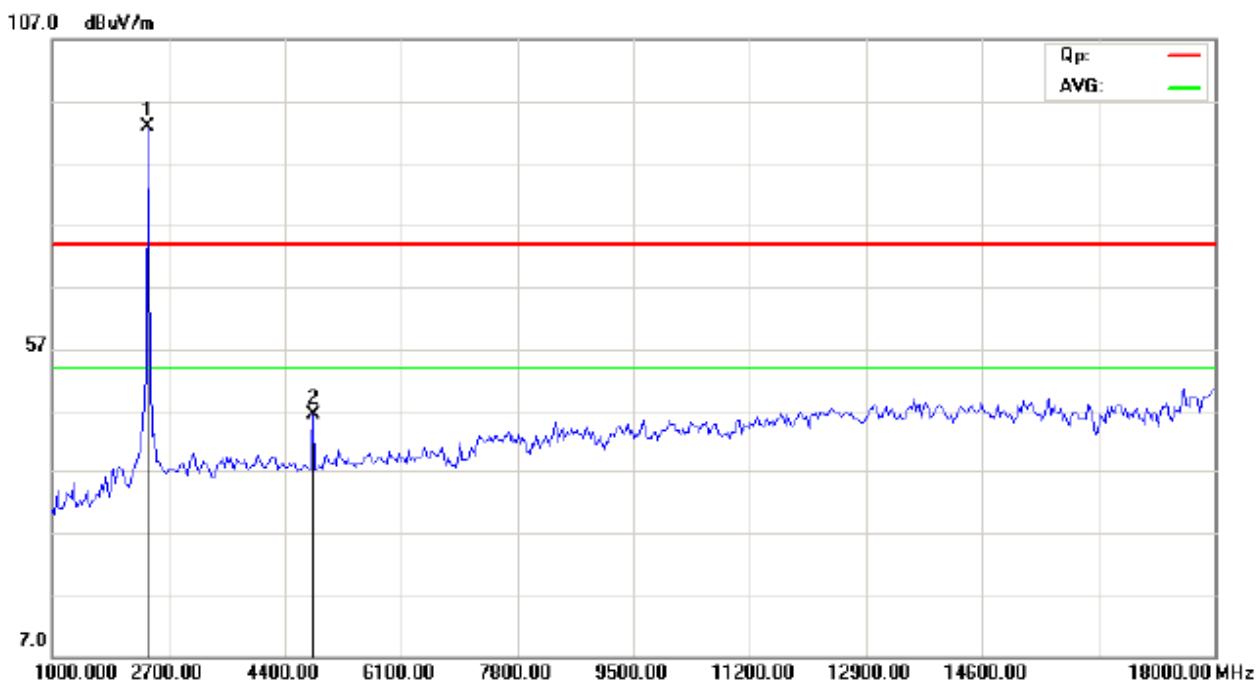
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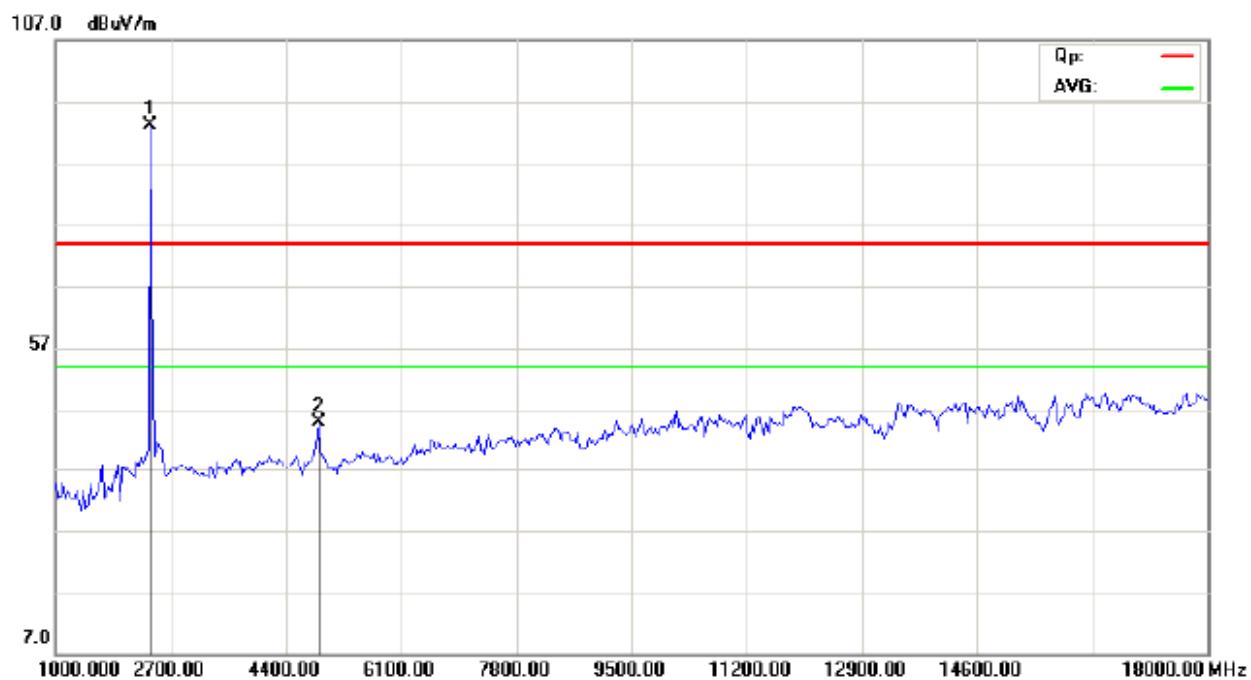
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Please refer to the following test plots for details:

**CH01 at 54Mbps: Horizontal**



**CH01 at 54Mbps: Vertical**

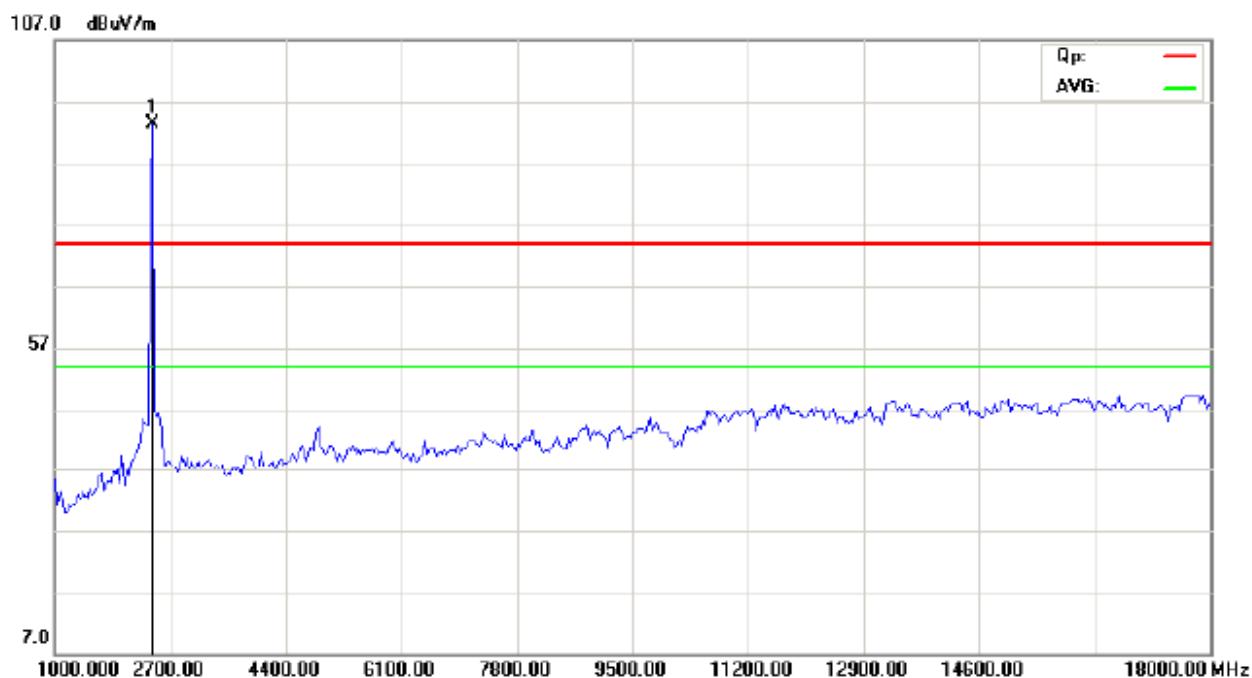


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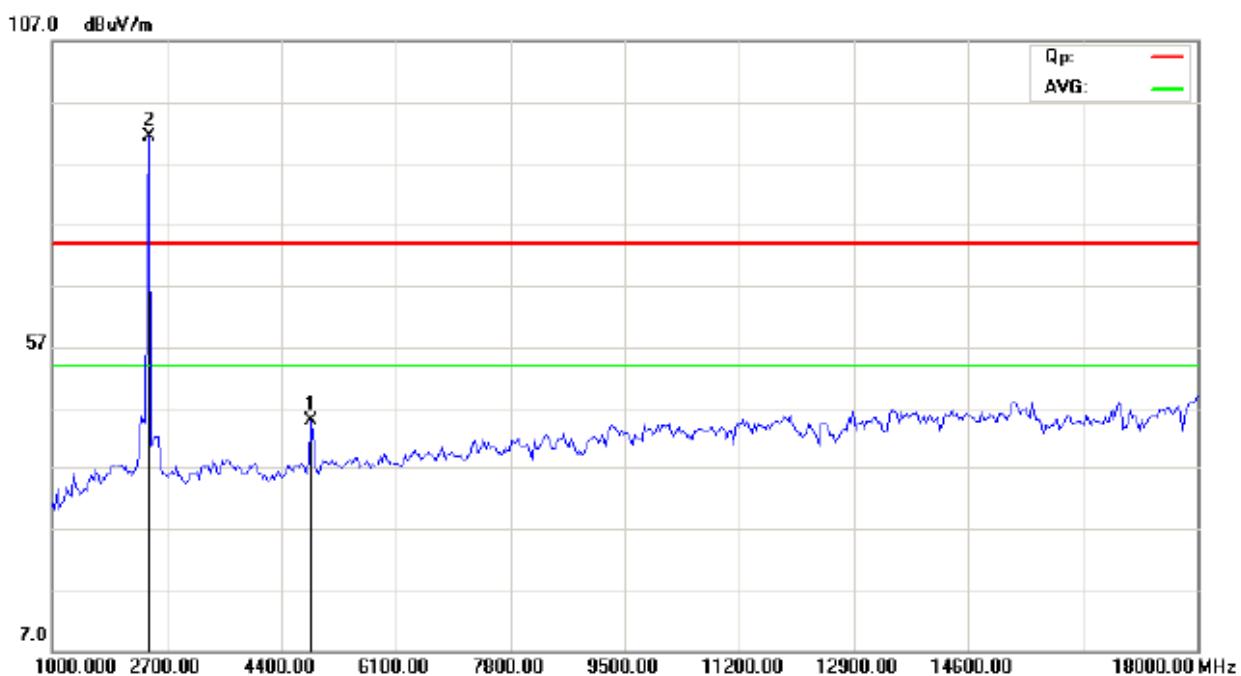
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**CH06 at 54Mbps: Vertical**



**CH06 at 54Mbps: Horizontal**

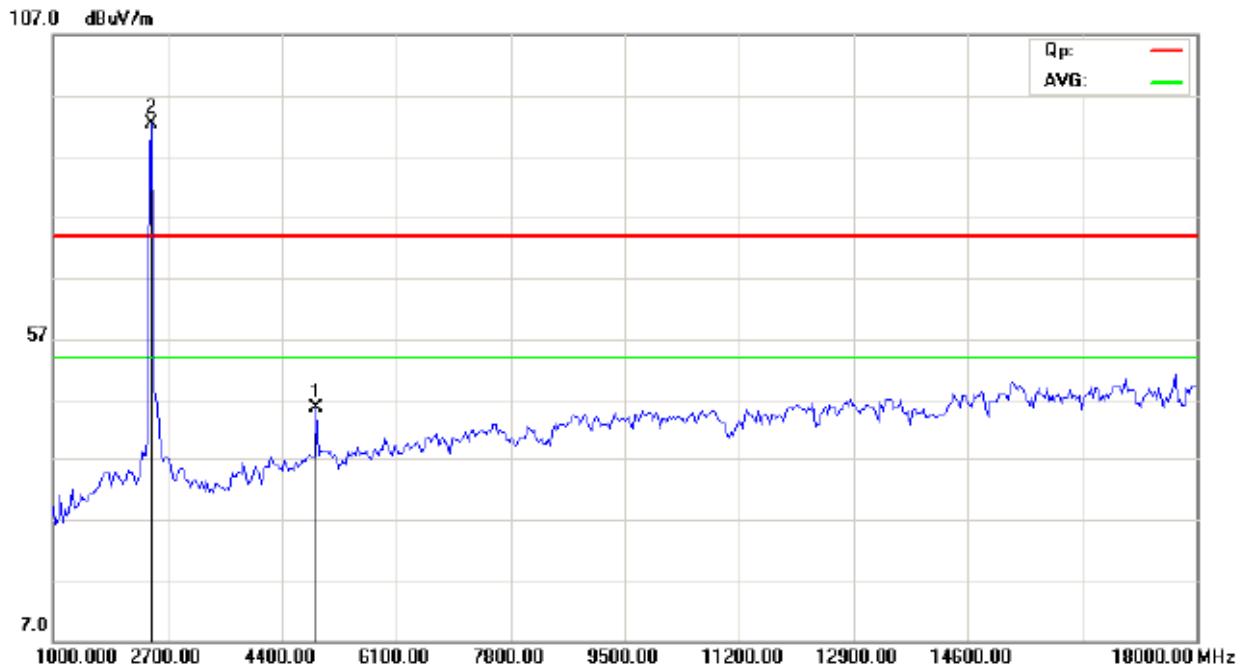


The report refers only to the sample tested and does not apply to the bulk.

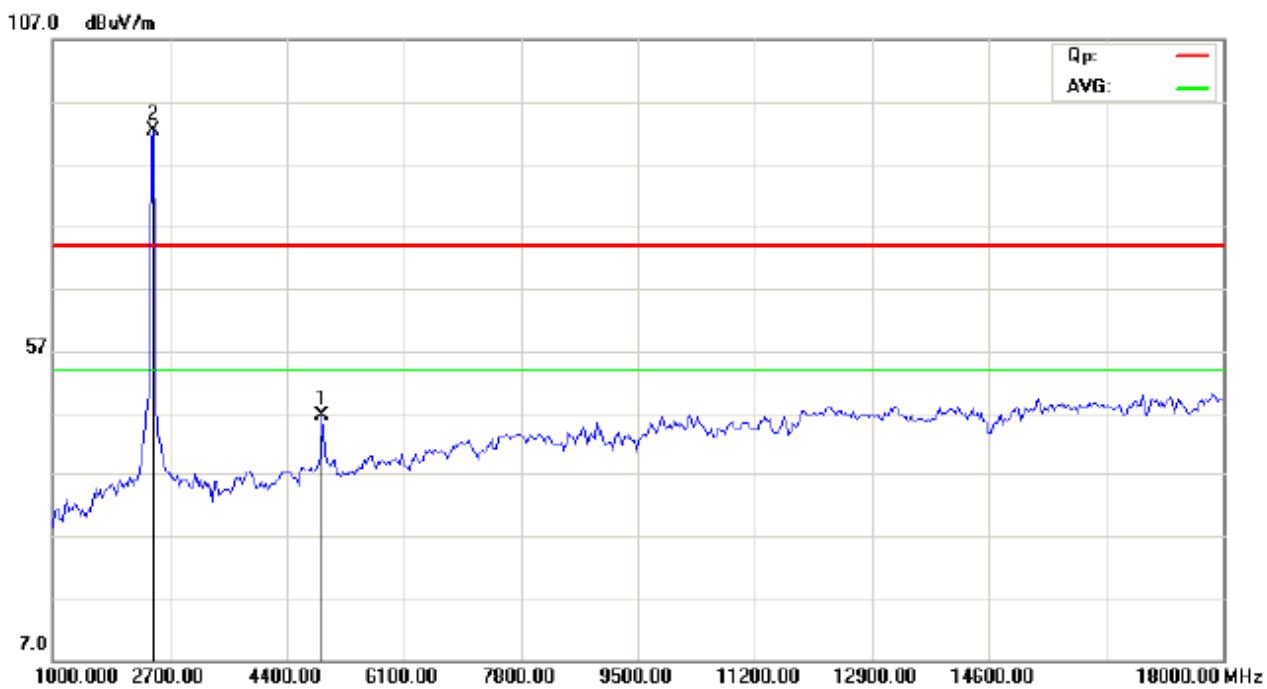
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### CH11 at 54Mbps: Vertical



### CH11 at 54 Mbps: Horizontal



Note: For radiated Emissions from 18-25GHz, it is only the floor noise.

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**Operation Mode: Transmitting & Receiving under CH01 for 11n HT20 at 65Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2412.00	89.36 (PK)	H	Fundamental Frequency
2412.00	90.92 (PK)	V	
4824.00	-- (PK)	H	74(Peak)/ 54(AV)
4824.00	45.60 (PK)	V	74(Peak)/ 54(AV)
7236.00	--	H/V	74(Peak)/ 54(AV)
9648.00	--	H/V	74(Peak)/ 54(AV)
12060	--	H/V	74(Peak)/ 54(AV)
14472	--	H/V	74(Peak)/ 54(AV)
16684	--	H/V	74(Peak)/ 54(AV)
19296	--	H/V	74(Peak)/ 54(AV)
21708	--	H/V	74(Peak)/ 54(AV)
24120	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11n HT20 at 65Mbps

**Operation Mode: Transmitting & Receiving under CH06 for 11n HT20 at 65Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2437.00	90.55 (PK)	H	Fundamental Frequency
2437.00	92.01 (PK)	V	
4874.00	43.54 (PK)	H	74(Peak)/ 54(AV)
4874.00	42.38 (PK)	V	74(Peak)/ 54(AV)
7311.00	--	H/V	74(Peak)/ 54(AV)
9748.00	--	H/V	74(Peak)/ 54(AV)
12185	--	H/V	74(Peak)/ 54(AV)
14622	--	H/V	74(Peak)/ 54(AV)
17059	--	H/V	74(Peak)/ 54(AV)
19496	--	H/V	74(Peak)/ 54(AV)
21933	--	H/V	74(Peak)/ 54(AV)
24370	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11n HT20 at 65Mbps

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**Operation Mode: Transmitting & Receiving under CH11 for 11n HT20 at 65Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2462.00	92.12 (PK)	H	Fundamental Frequency
2462.00	90.31 (PK)	V	
4924	46.19 (PK)	H	74(Peak)/ 54(AV)
4924	-- (PK)	V	74(Peak)/ 54(AV)
7386	--	H/V	74(Peak)/ 54(AV)
9848	--	H/V	74(Peak)/ 54(AV)
12310	--	H/V	74(Peak)/ 54(AV)
14772	--	H/V	74(Peak)/ 54(AV)
17234	--	H/V	74(Peak)/ 54(AV)
19696	--	H/V	74(Peak)/ 54(AV)
22158	--	H/V	74(Peak)/ 54(AV)
24620	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11n HT20 at 65bps

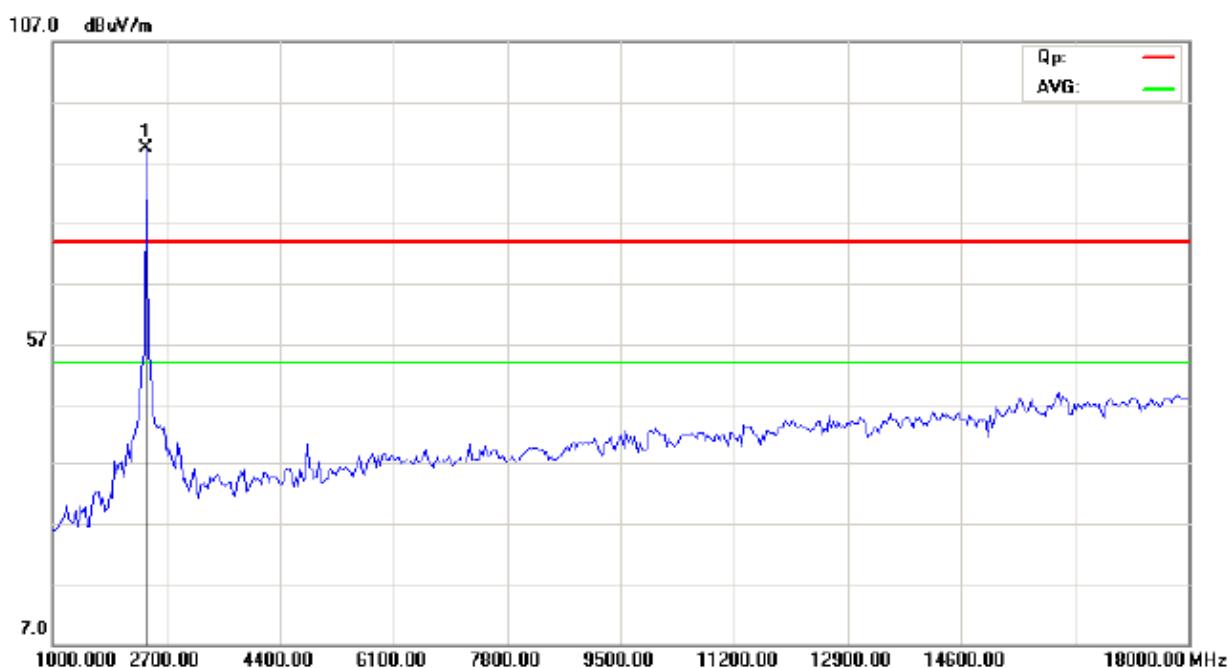
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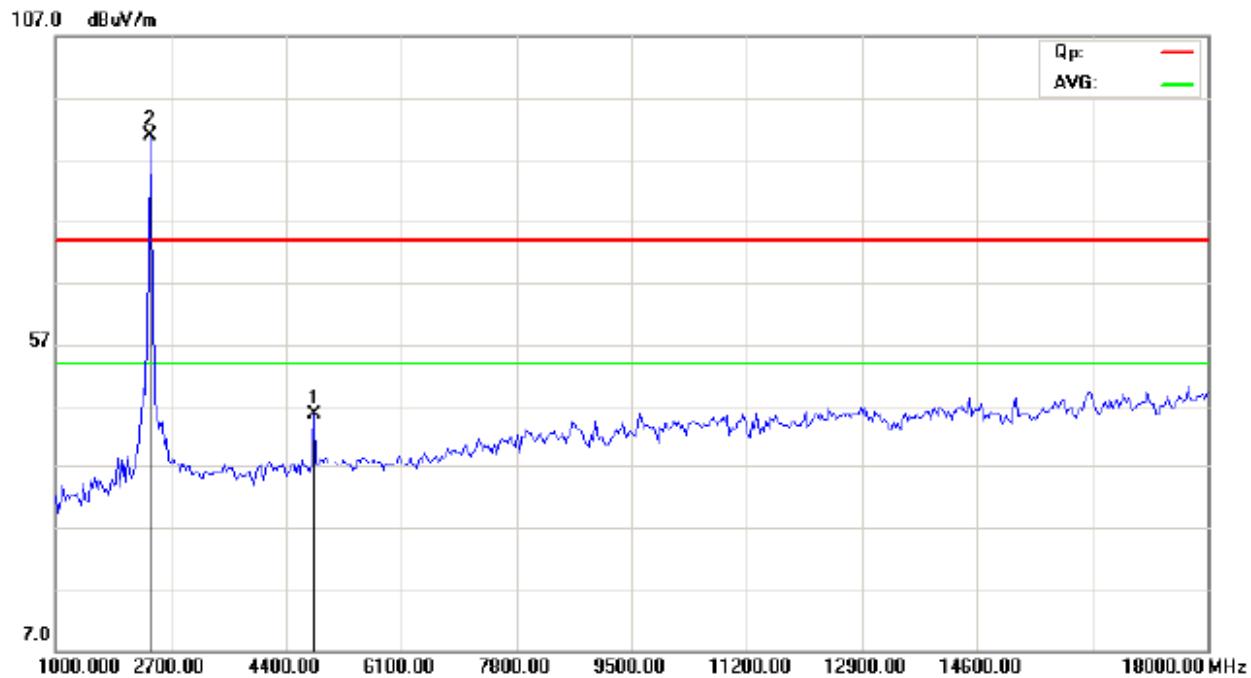
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Please refer to the following test plots for details:

**CH01 at 11n HT20: Horizontal**



**CH01 at 11n HT20: Vertical**

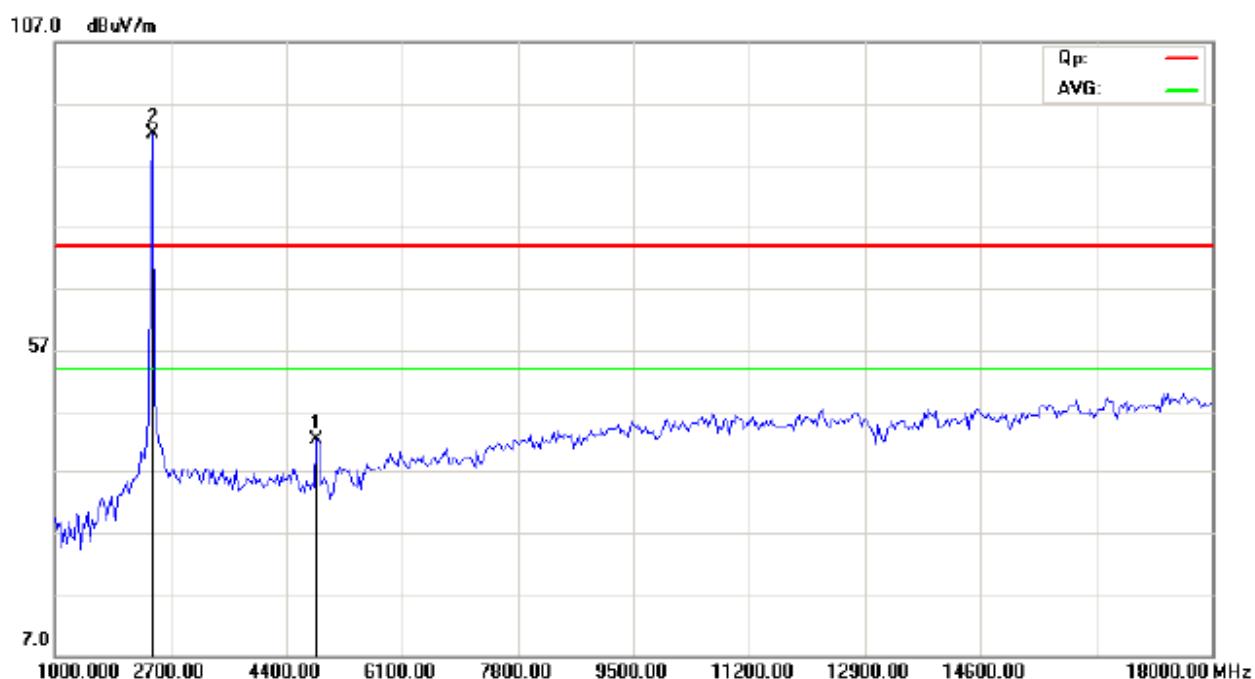


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### CH06 at 11n HT20: Vertical



### CH06 at 11n HT20: Horizontal

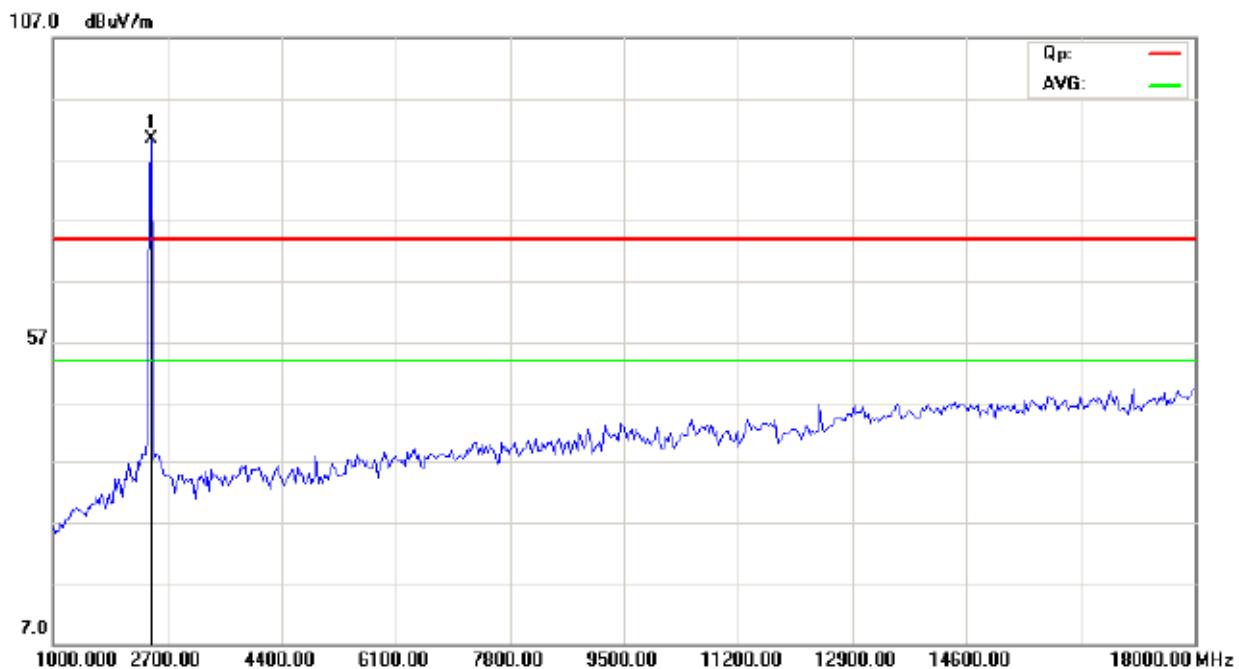


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### CH11 at 11n HT20: Vertical



### CH11 at 11n HT20: Horizontal



Note: For radiated Emissions from 18-25GHz, it is only the floor noise.

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**Operation Mode: Transmitting & Receiving under CH01 for 11n HT40 at 65Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2422.00	90.01 (PK)	H	Fundamental Frequency
2422.00	88.94 (PK)	V	
4844.00	44.01 (PK)	H	--
4844.00	48.77 (PK)	V	
7266.00	--	H/V	74(Peak)/ 54(AV)
9688.00	--	H/V	74(Peak)/ 54(AV)
12110	--	H/V	74(Peak)/ 54(AV)
14532	--	H/V	74(Peak)/ 54(AV)
16954	--	H/V	74(Peak)/ 54(AV)
19376	--	H/V	74(Peak)/ 54(AV)
21798	--	H/V	74(Peak)/ 54(AV)
24220	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11n HT40 at 65bps

**Operation Mode: Transmitting & Receiving under CH06 for 11n HT40 at 65Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2437.00	89.22 (PK)	H	Fundamental Frequency
2437.00	90.65 (PK)	V	
4874.00	44.68 (PK)	H	--
4874.00	-- (PK)	V	
7311.00	--	H/V	74(Peak)/ 54(AV)
9748.00	--	H/V	74(Peak)/ 54(AV)
12185	--	H/V	74(Peak)/ 54(AV)
14622	--	H/V	74(Peak)/ 54(AV)
17059	--	H/V	74(Peak)/ 54(AV)
19496	--	H/V	74(Peak)/ 54(AV)
21933	--	H/V	74(Peak)/ 54(AV)
24370	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11n HT40 at 65bps

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**Operation Mode: Transmitting & Receiving under CH11 for 11n HT40 at 65Mbps**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
2452.00	90.60 (PK)	H	Fundamental Frequency
2452.00	90.56 (PK)	V	
4904	-- (PK)	H	--
4904	44.58 (PK)	V	
7356	--	H/V	74(Peak)/ 54(AV)
9808	--	H/V	74(Peak)/ 54(AV)
12260	--	H/V	74(Peak)/ 54(AV)
14712	--	H/V	74(Peak)/ 54(AV)
17164	--	H/V	74(Peak)/ 54(AV)
19616	--	H/V	74(Peak)/ 54(AV)
22068	--	H/V	74(Peak)/ 54(AV)
24520	--	H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark “--” means that the emissions level is too low to be measured

3. For 802.11n HT40 at 65bps

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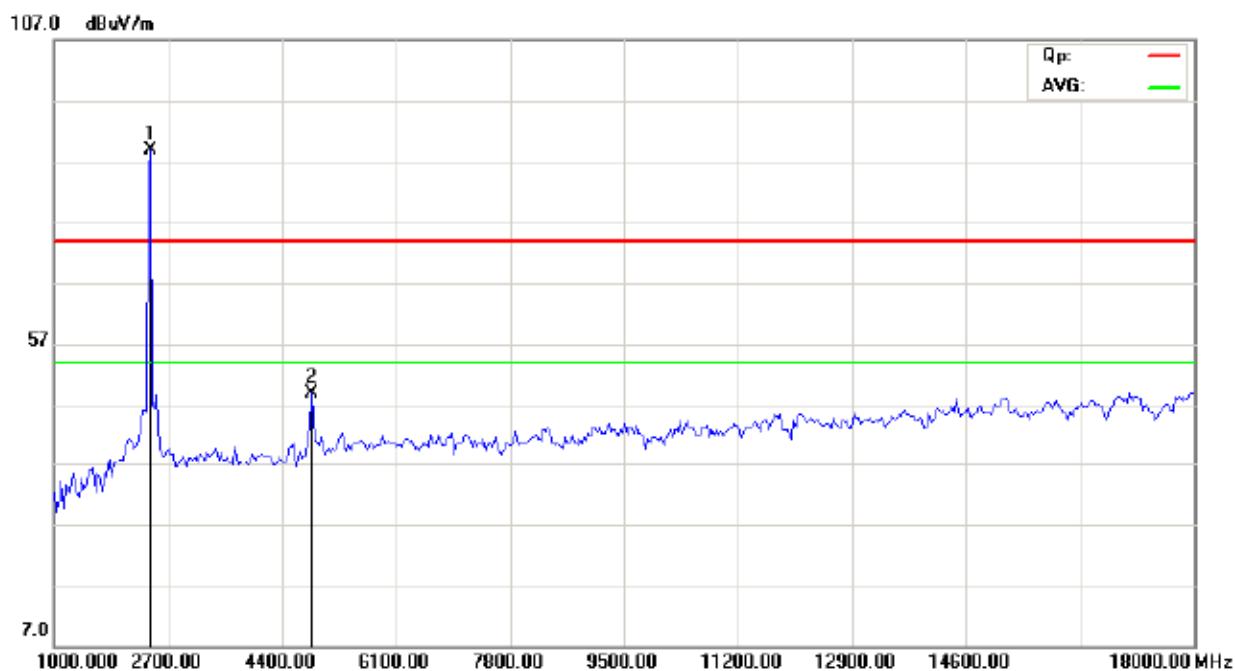
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Please refer to the following test plots for details:

**CH01 at 11n HT40: Horizontal**



**CH01 at 11n HT40: Vertical**

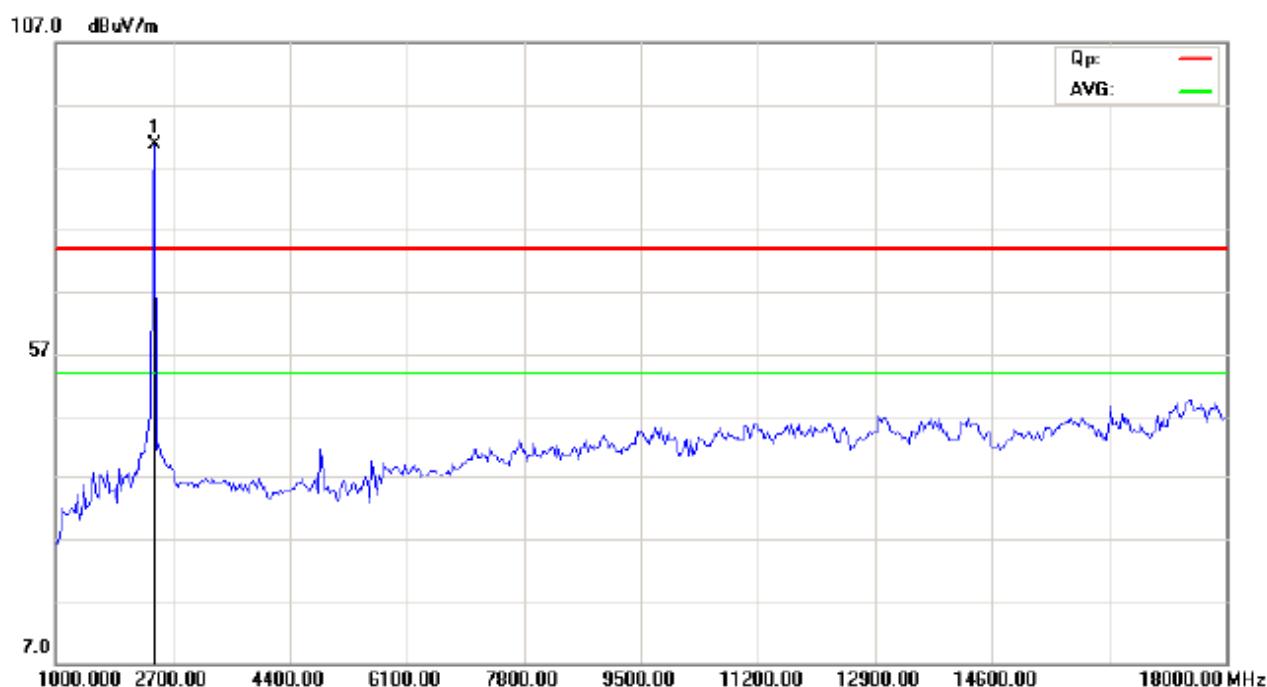


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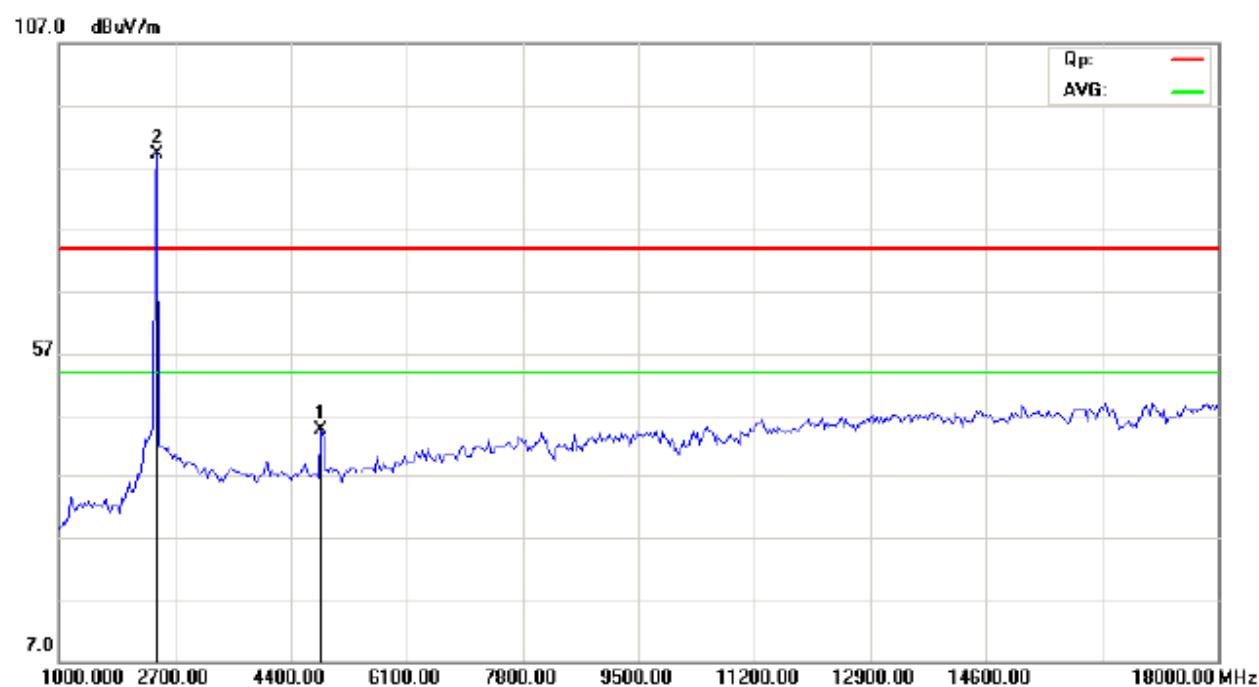
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### CH04 at 11n HT40: Vertical



### CH04 at 11n HT40: Horizontal

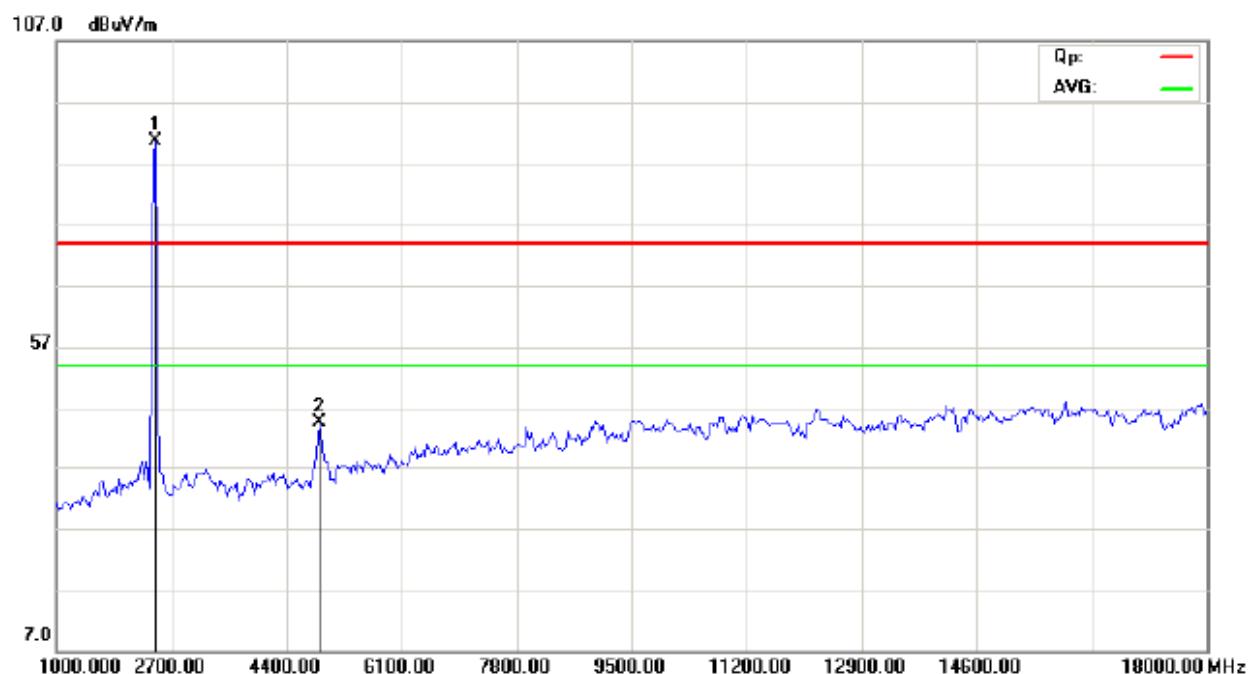


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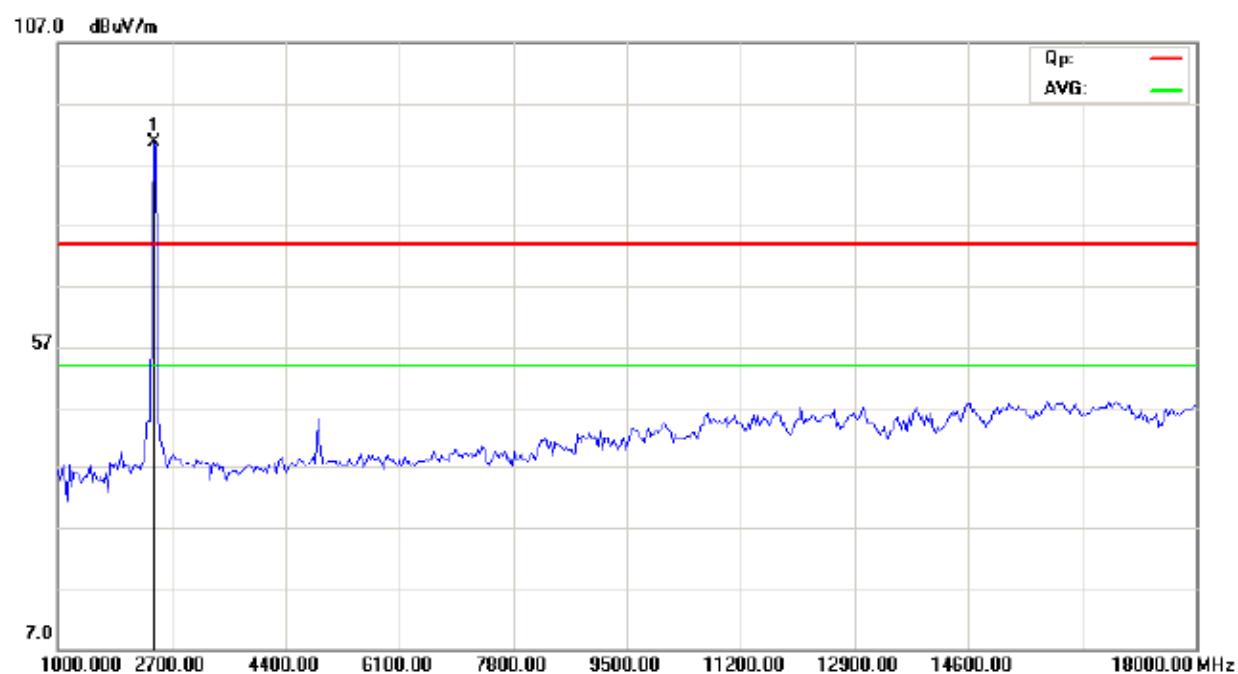
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### CH07 at 11n HT40: Vertical



### CH07 at 11n HT40: Horizontal



Note: For radiated Emissions from 18-25GHz, it is only the floor noise.

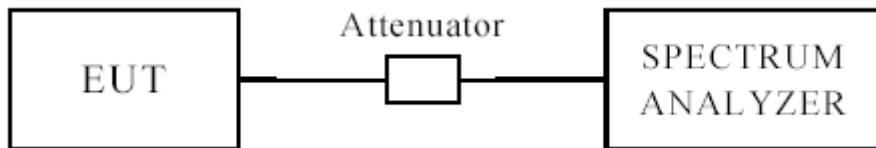
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## 7.0 6dB Bandwidth Measurement

### 7.1 Test Setup



### 7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500kHz

### 7.3 Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 7.4 Test Result

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EUT		SET TOP BOX		Model	HD409N
Mode		802.11b		Input Voltage	AC 120V
Temperature		24 deg. C.		Humid Pity	56% RH
Channel	Channel Frequency (MHz)	Data Transfer Rate (Mbps)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/ Fail
1	2412	1	10.02	0.5	Pass
6	2437	1	10.02	0.5	Pass
11	2462	1	10.02	0.5	Pass
1	2412	11	10.08	0.5	Pass
6	2437	11	10.08	0.5	Pass
11	2462	11	10.08	0.5	Pass

EUT		SET TOP BOX		Model	HD409N
Mode		802.11g		Input Voltage	AC 120V
Temperature		24 deg. C.		Humid Pity	56% RH
Channel	Channel Frequency (MHz)	Data Transfer Rate (Mbps)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/ Fail
1	2412	54	16.62	0.5	Pass
6	2437	54	16.68	0.5	Pass
11	2462	54	16.62	0.5	Pass

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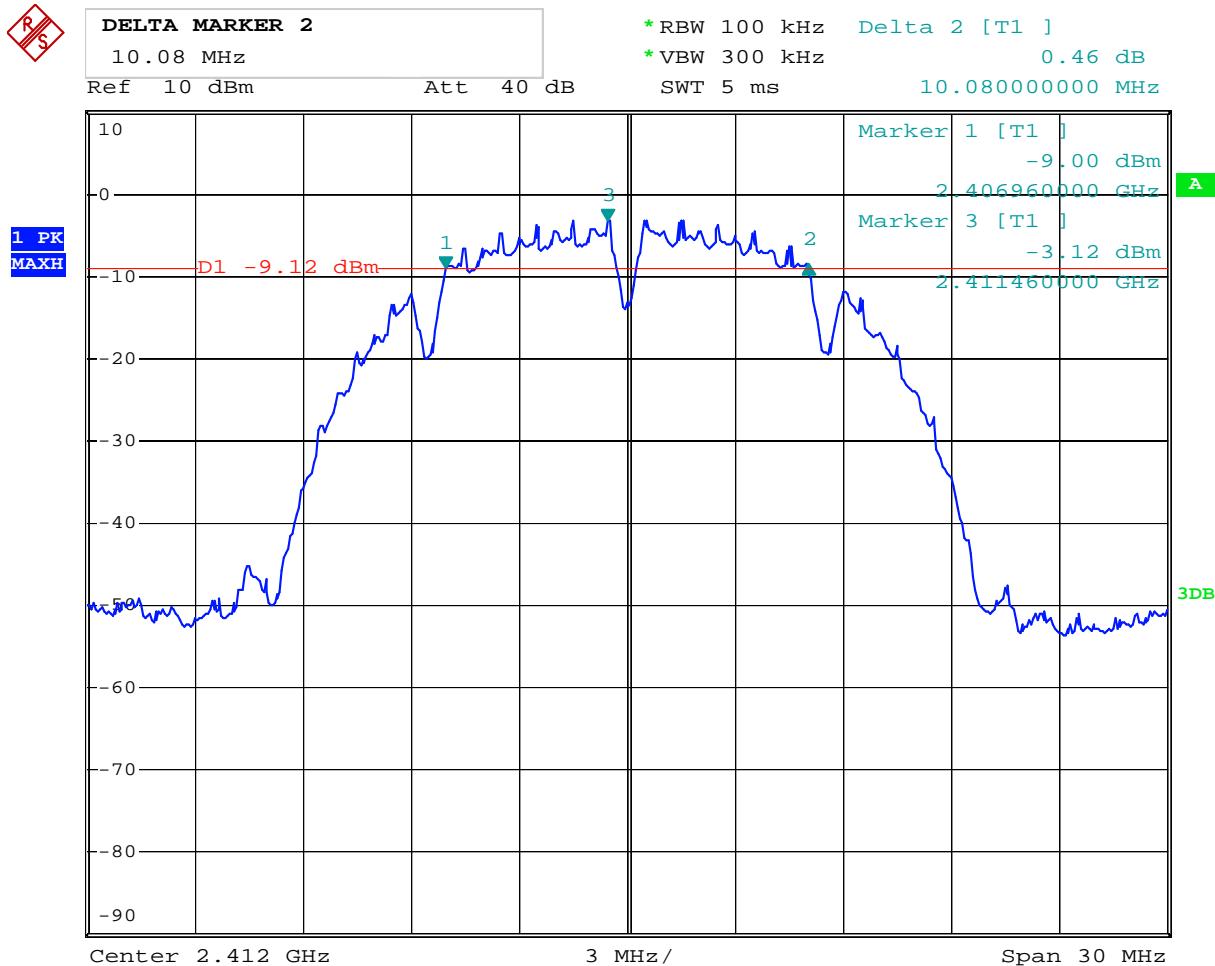
EUT		SET TOP BOX		Model	HD409N	
Mode		802.11n		Input Voltage	AC 120V	
Temperature		24 deg. C.		Humid Pity	56% RH	
Channel	Channel Frequency (MHz)	Data Transfer Rate (Mbps)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass/ Fail	
1	2412	HT20	17.76	0.5	Pass	
6	2437	HT20	17.76	0.5	Pass	
11	2462	HT20	17.76	0.5	Pass	
1	2422	HT40	36.50	0.5	Pass	
4	2437	HT40	36.53	0.5	Pass	
7	2452	HT40	36.50	0.5	Pass	

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### 1. 802.11b at 1Mbps of CH01



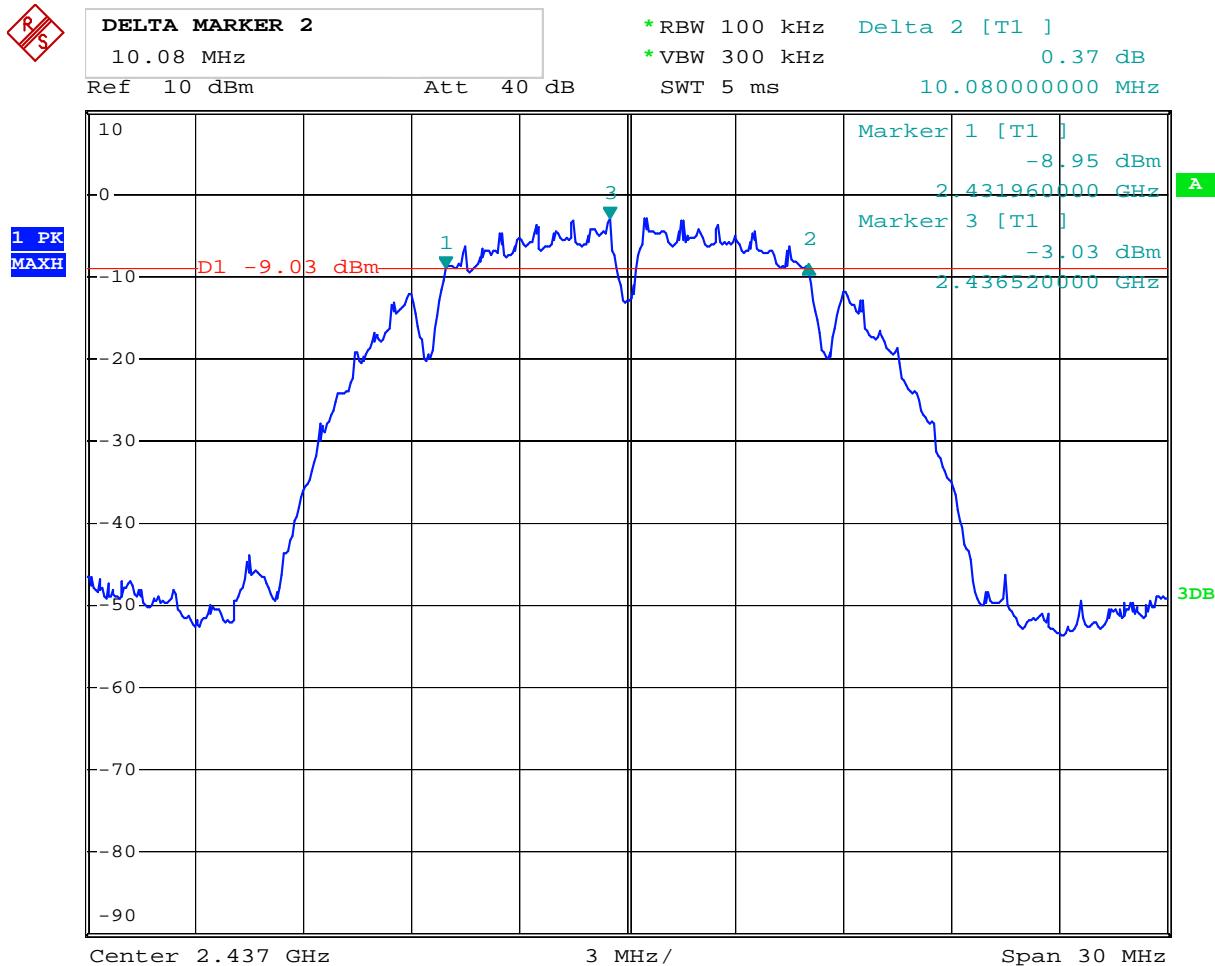
Date: 20.NOV.2012 08:35:52

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## 2. 802.11b at 1Mbps of CH06



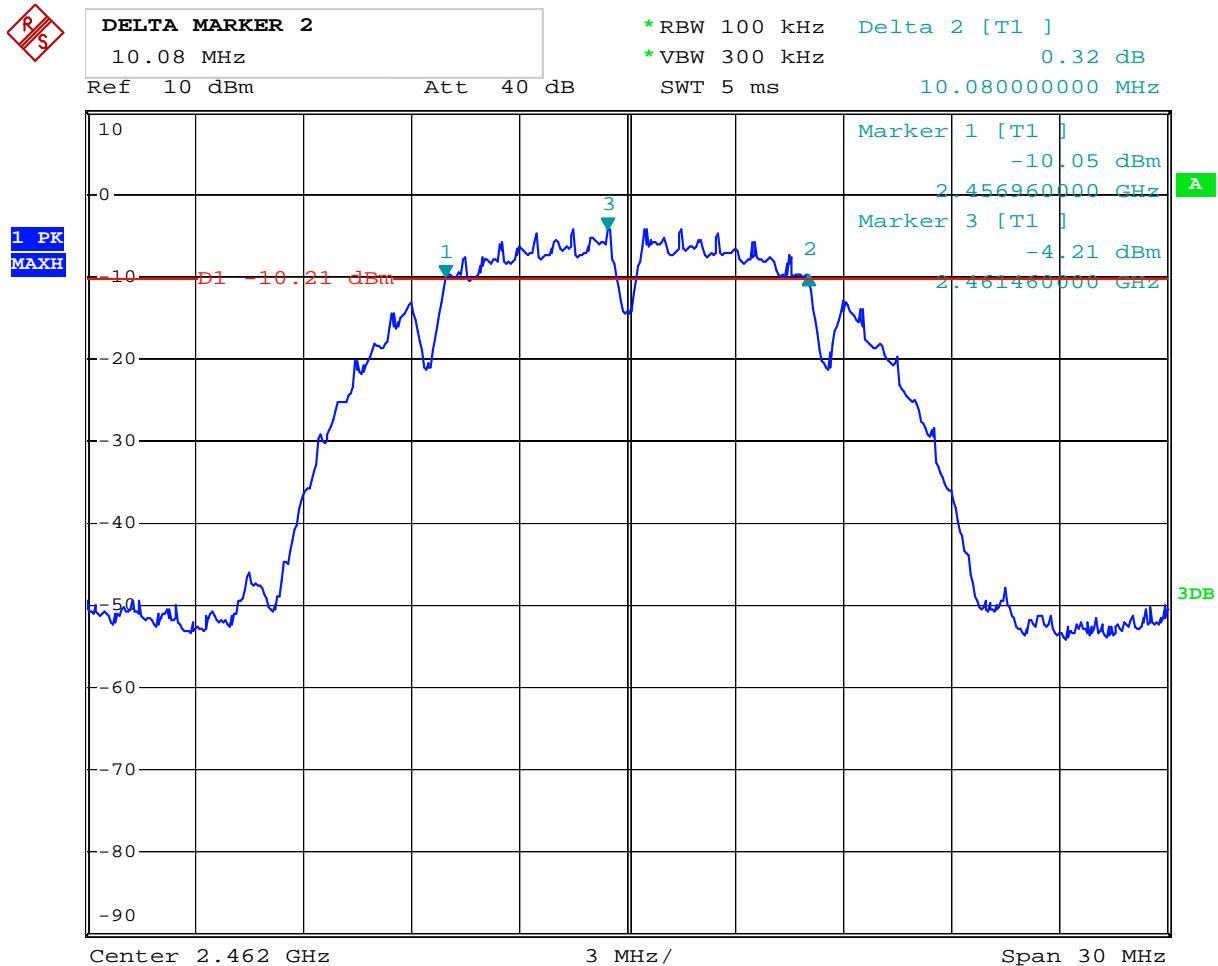
Date: 20.NOV.2012 08:37:47

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### 3. 802.11b at 1Mbps of CH11



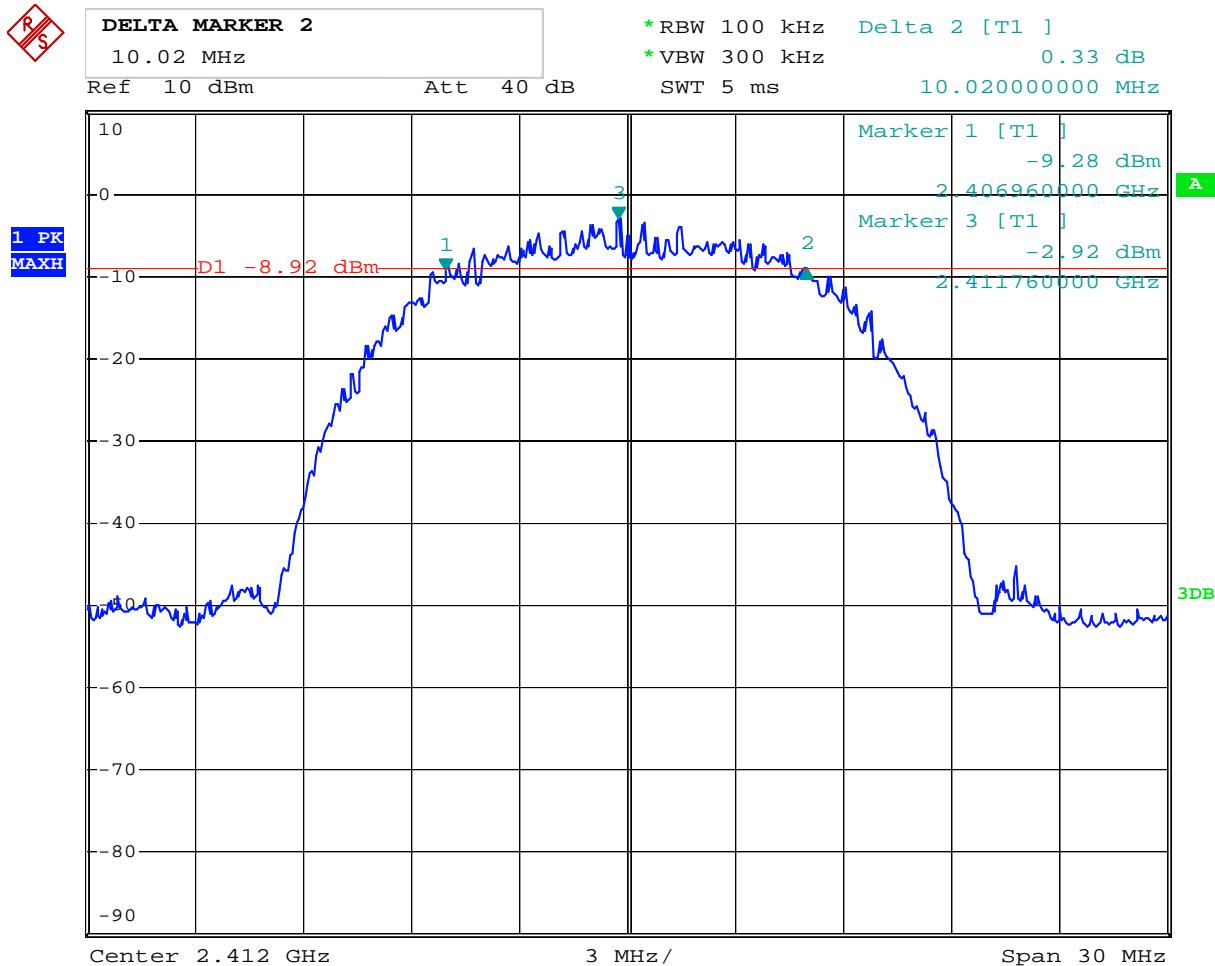
Date: 20.NOV.2012 08:39:16

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#### 4. 802.11b at 11Mbps of CH01



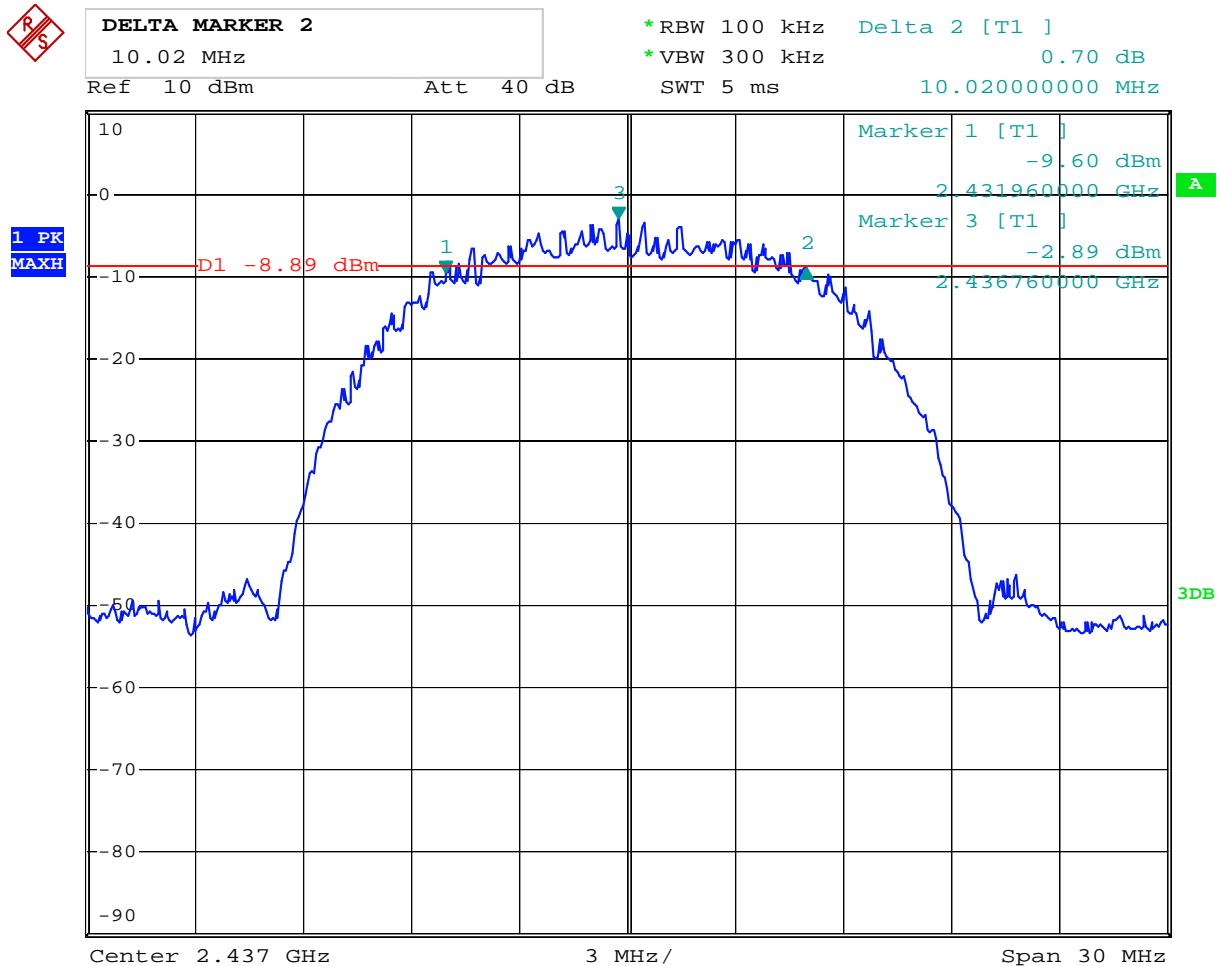
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## 5. 802.11b at 11Mbps of CH06



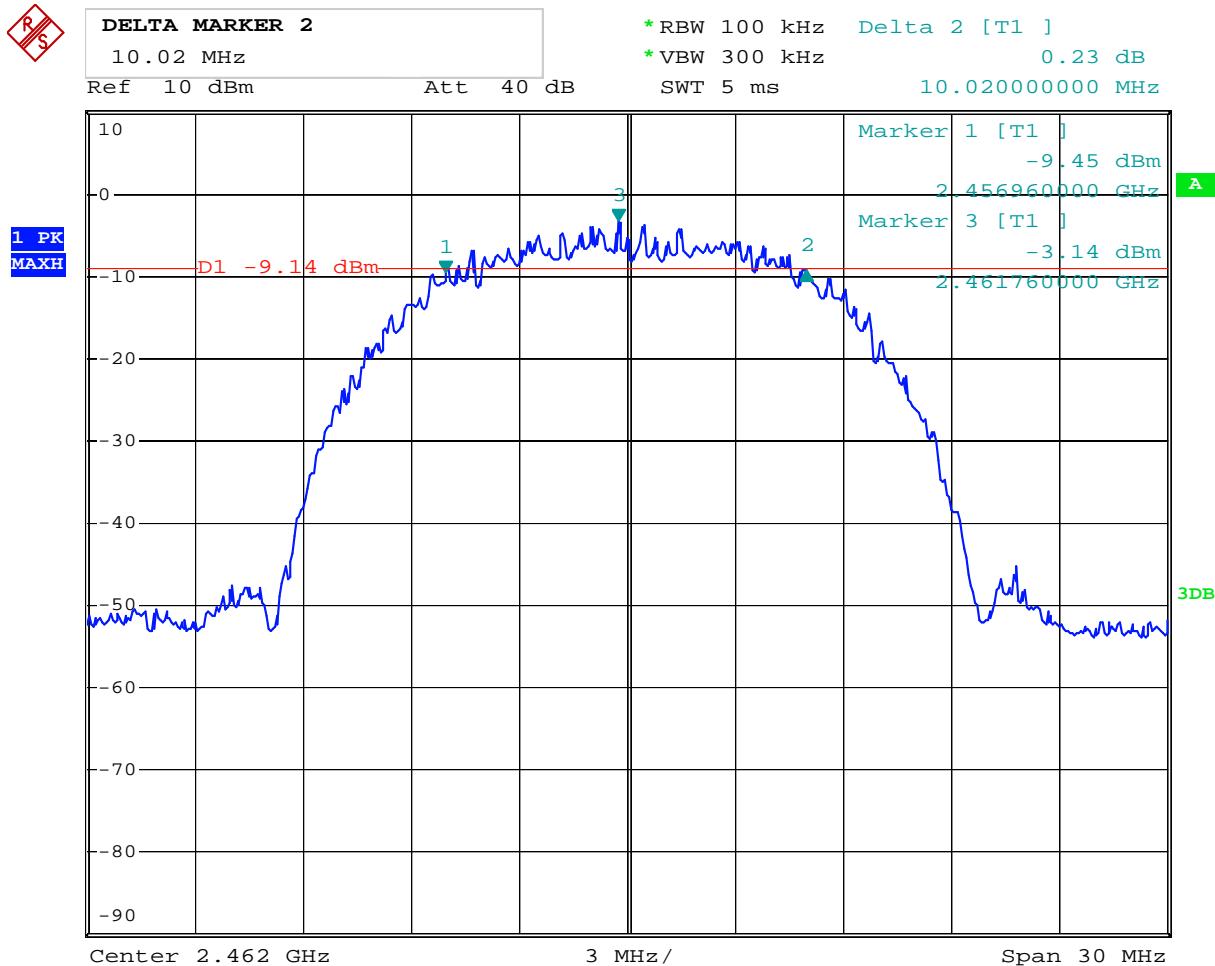
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## 6. 802.11b at 11Mbps of CH11



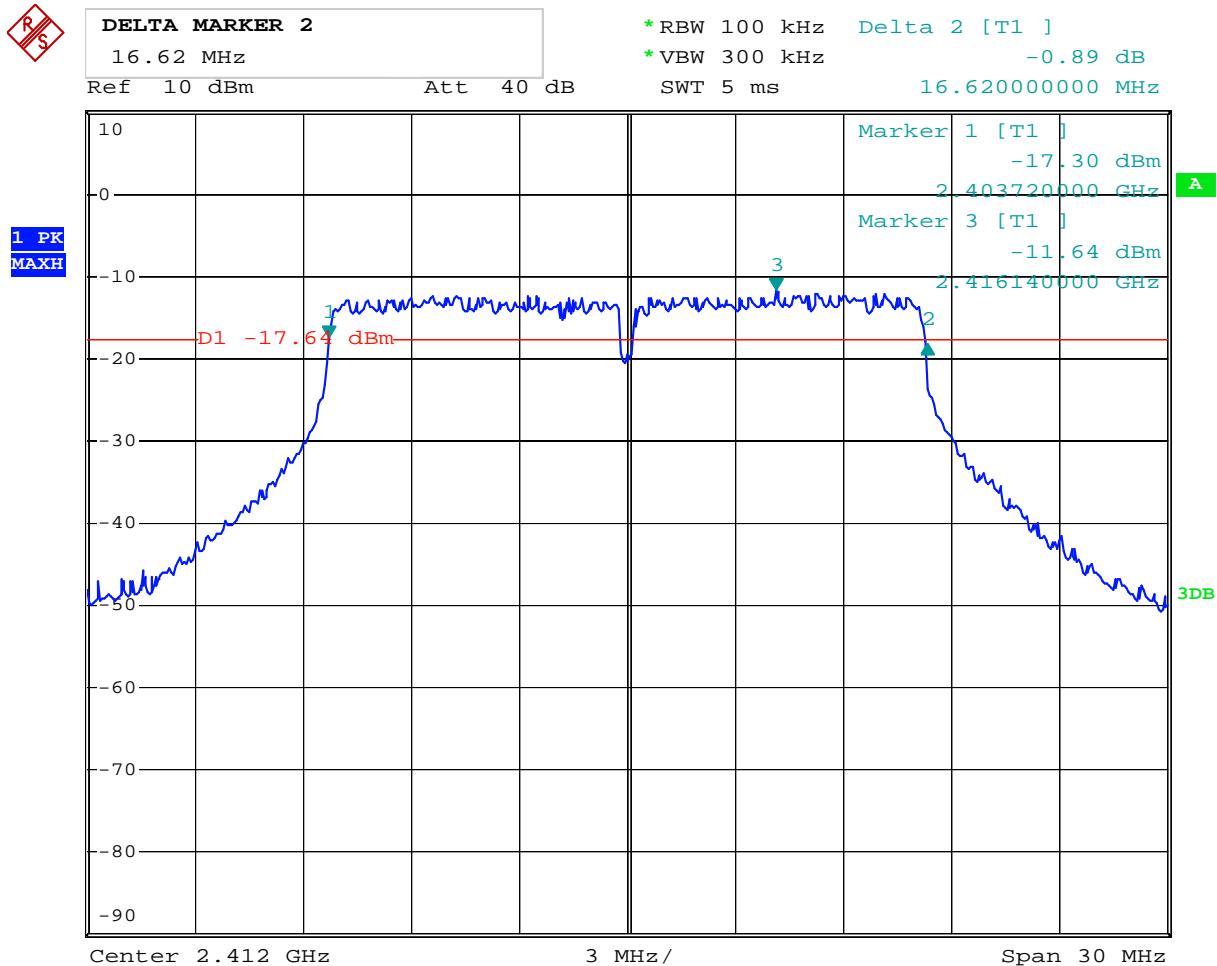
Date: 20.NOV.2012 08:41:01

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### 7. 802.11g at 54 Mbps of CH01



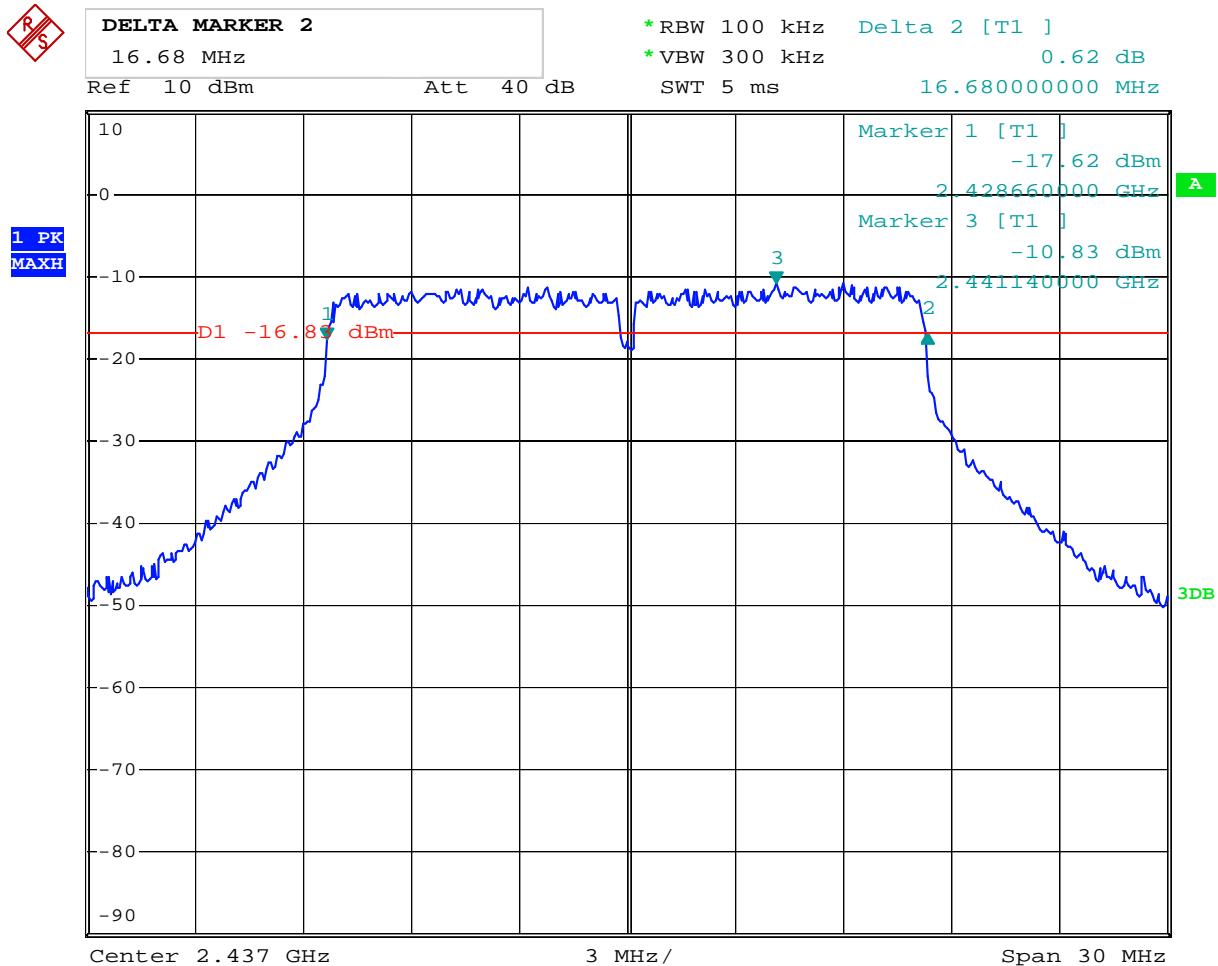
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### 8. 802.11g at 54 Mbps of CH06



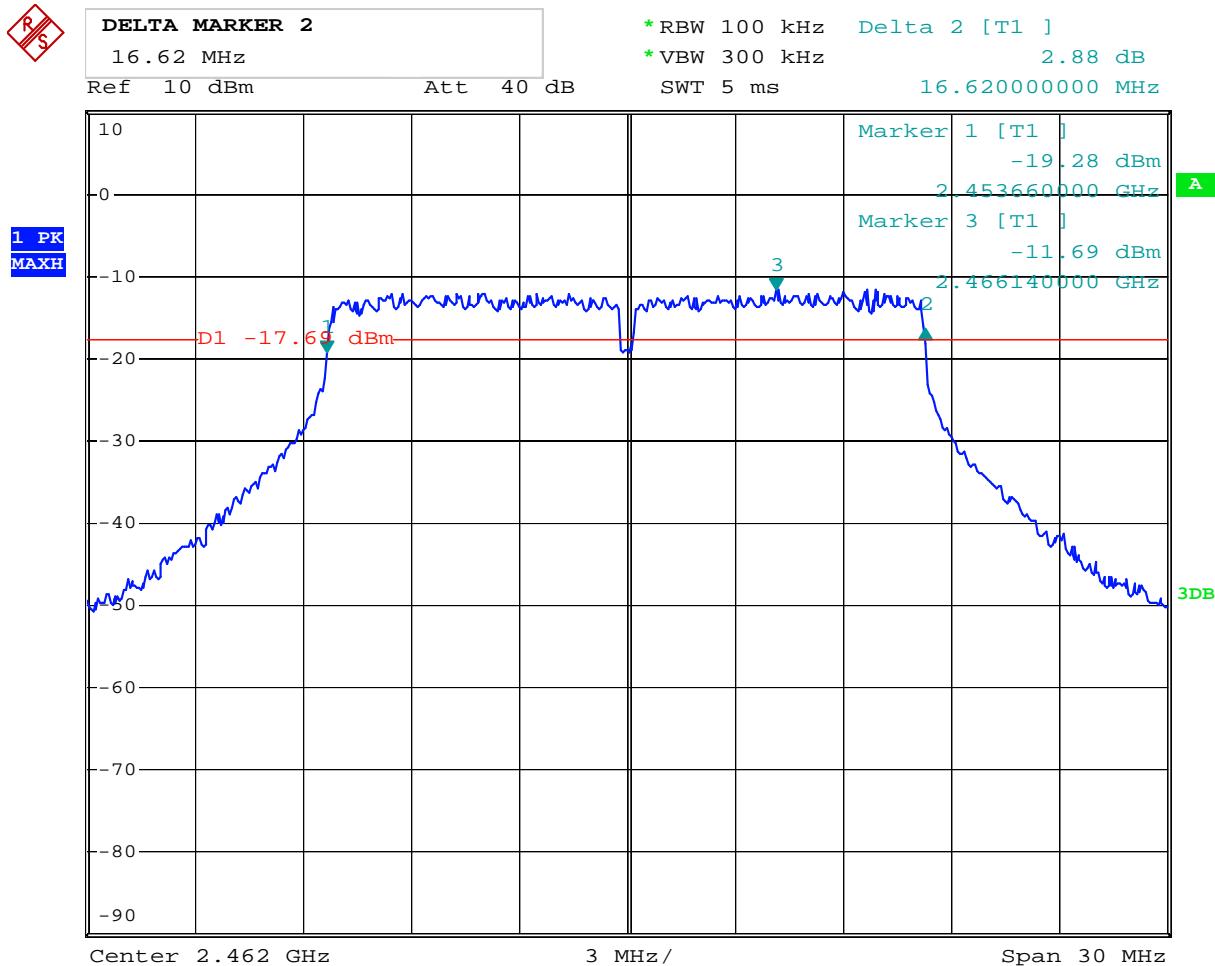
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### 9. 802.11g at 54 Mbps of CH11



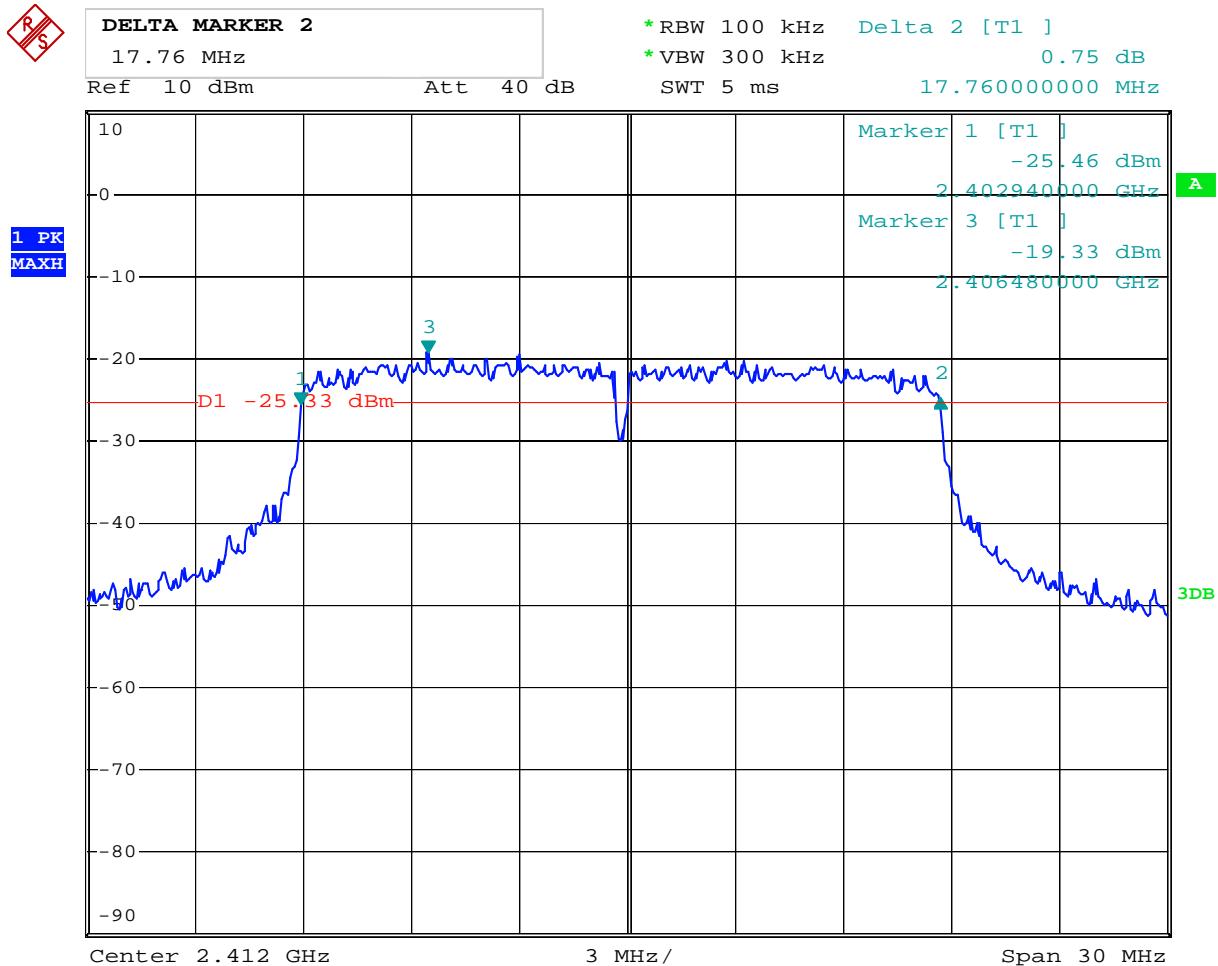
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### 10. 802.11n at HT20 of CH01



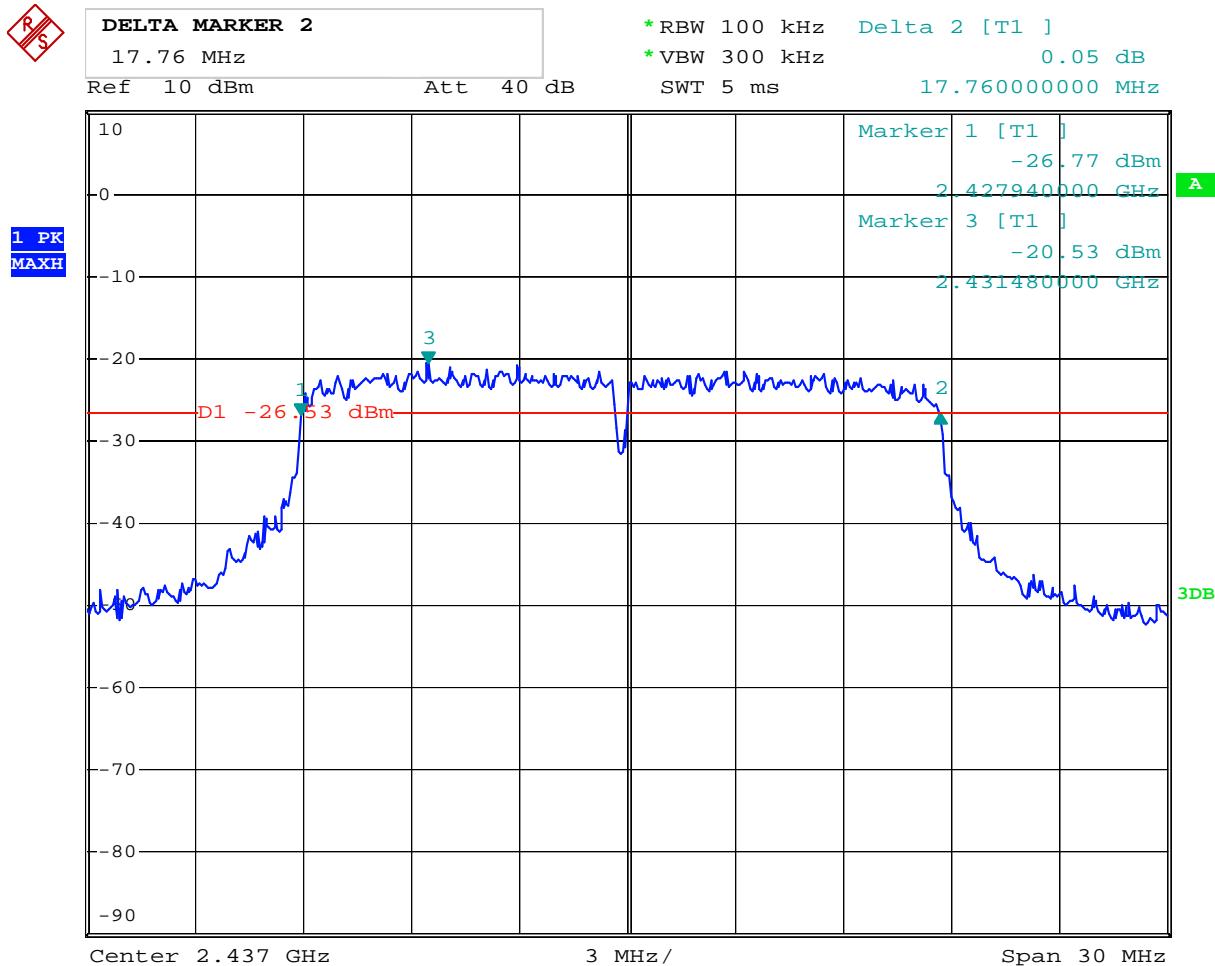
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### 11. 802.11n at HT20 of CH06



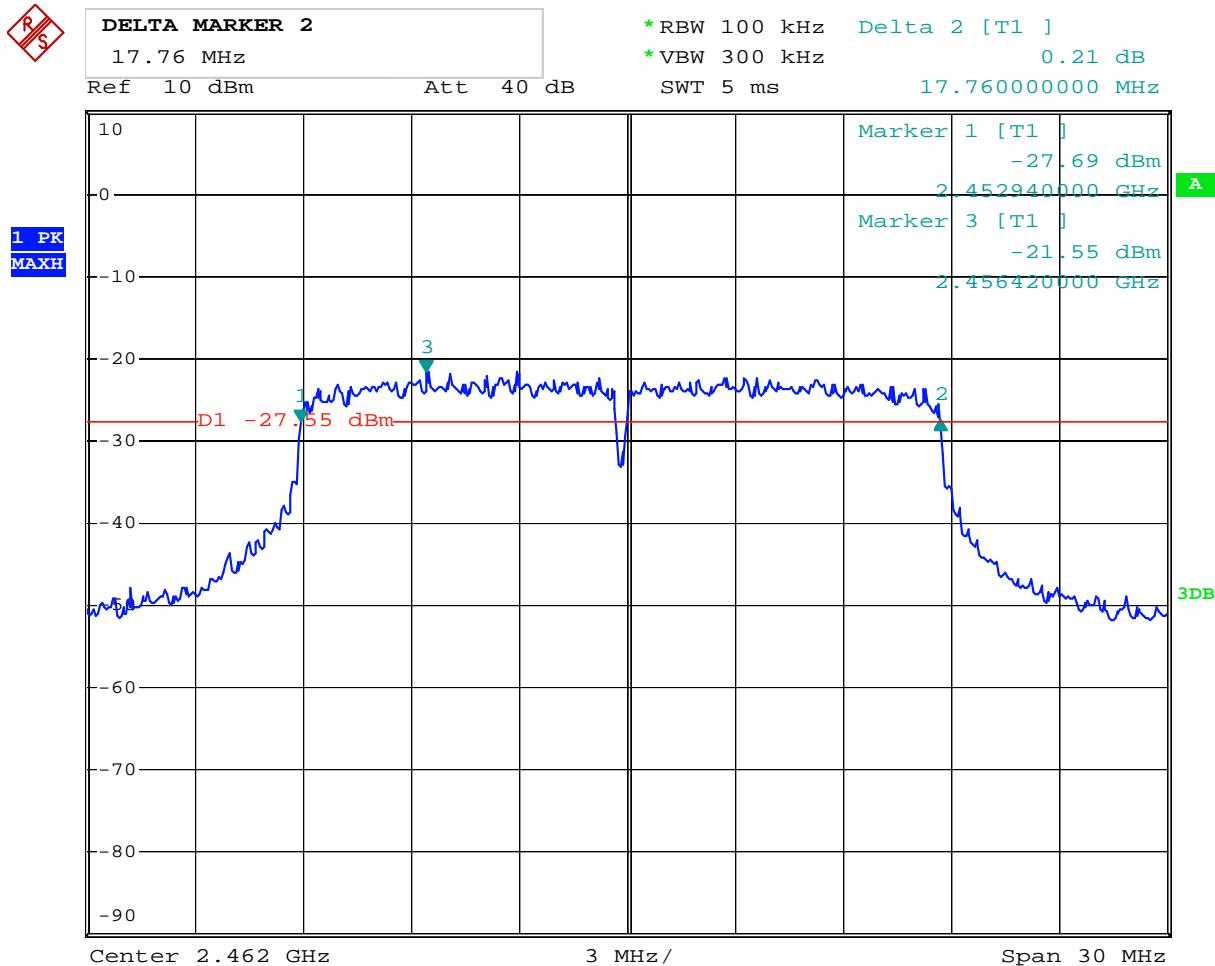
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## 12. 802.11n at HT20 of CH11



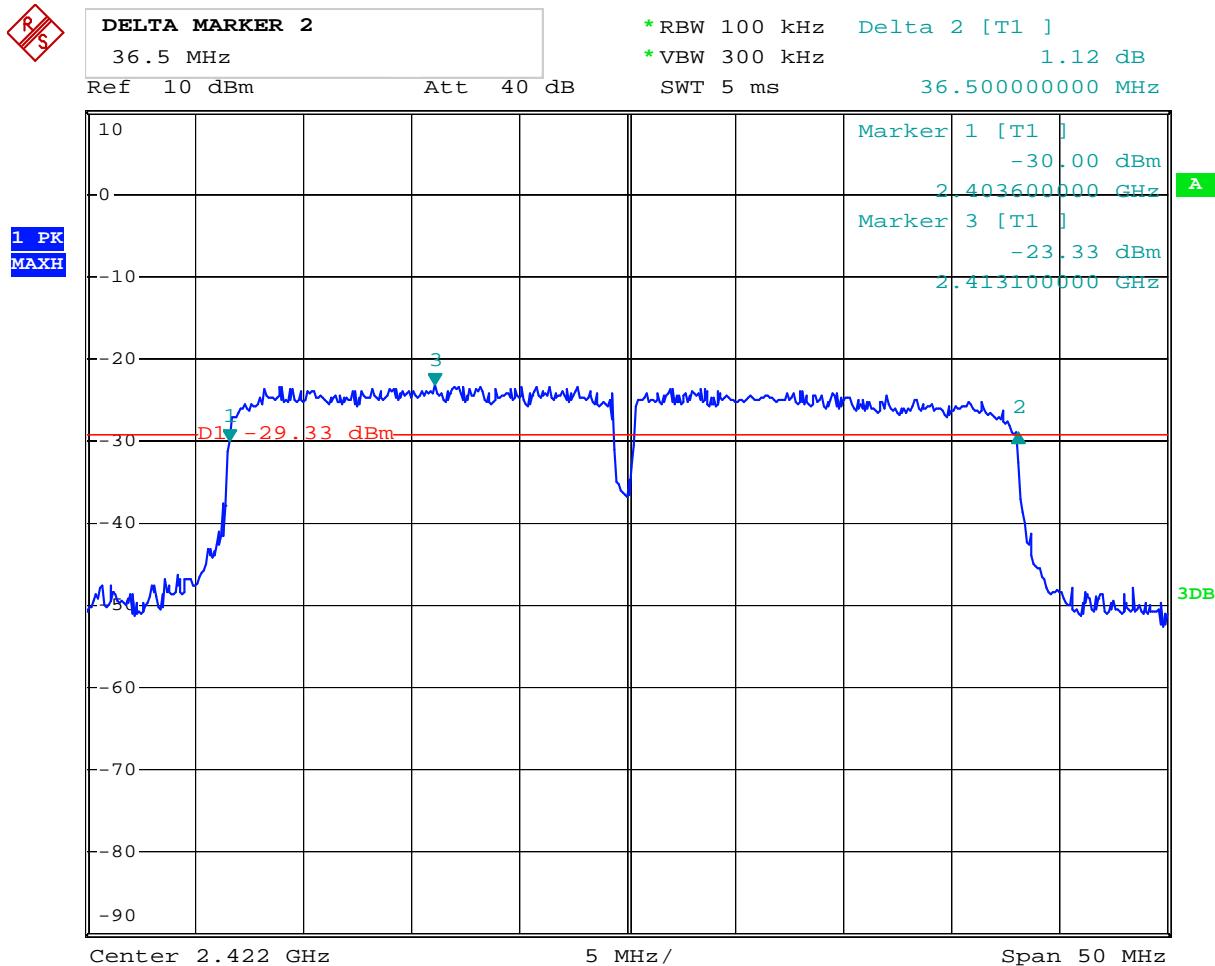
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### 13. 802.11n at HT40 of CH01



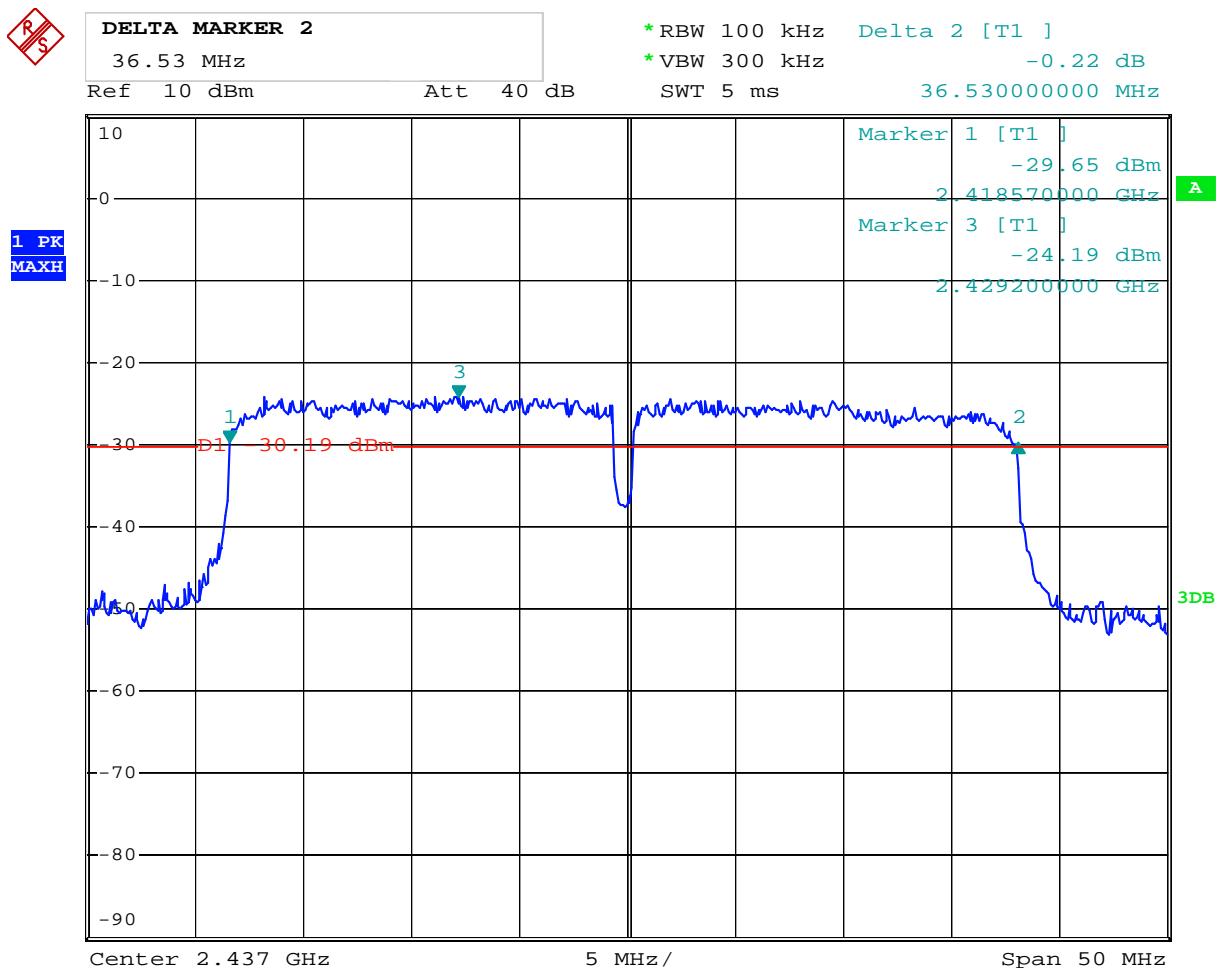
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#### 14. 802.11n at HT40 of CH04



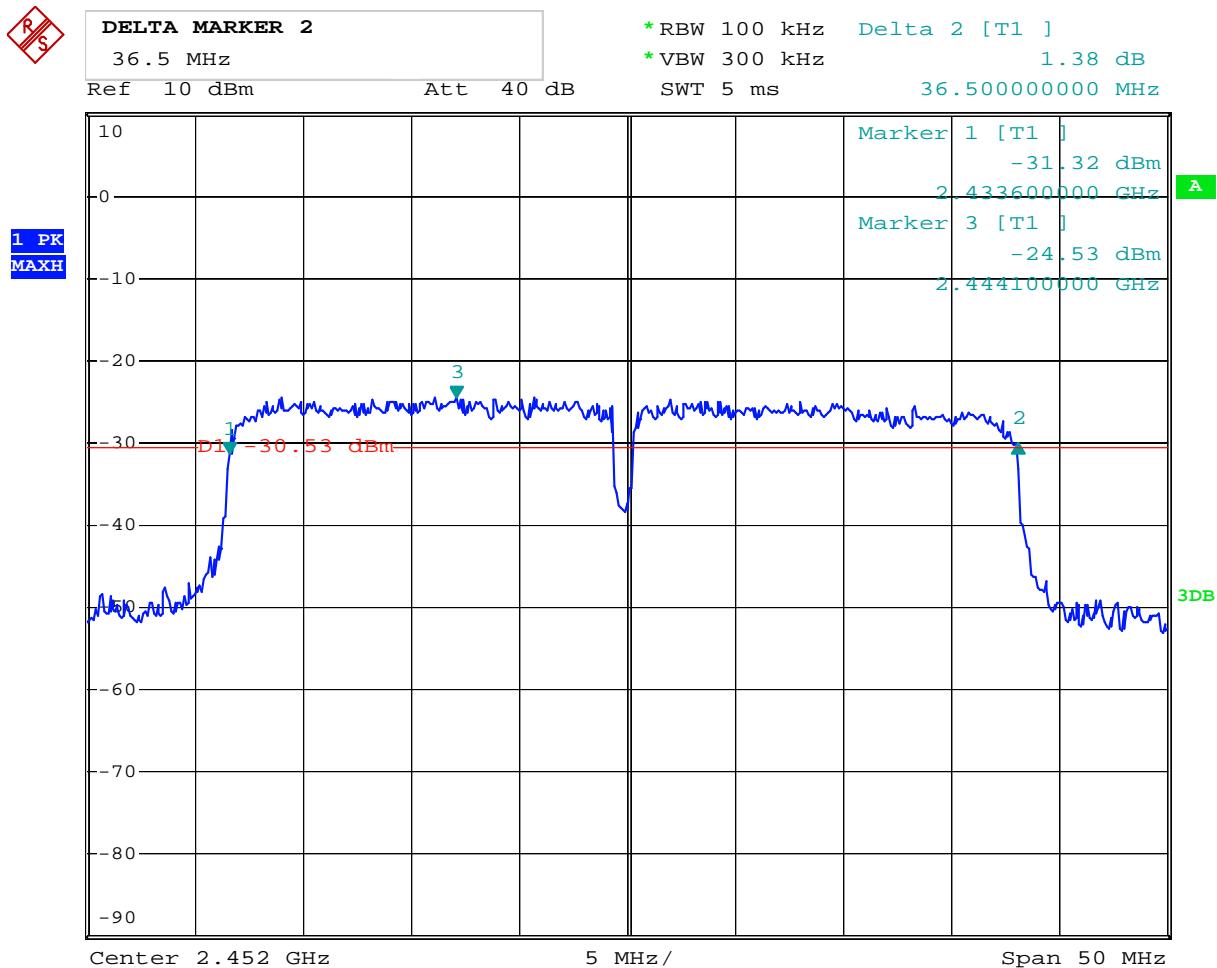
Date: 20.NOV.2012 10:13:38

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### 15. 802.11n at HT40 of CH7



Date: 20.NOV.2012 10:15:38

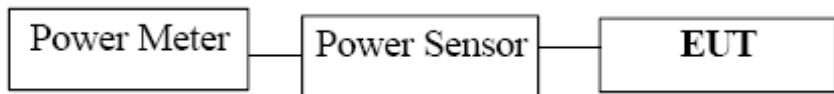
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## 8. Maximum Peak Output Power

### 8.1 Test Setup



### 8.2 Limits of Maximum Peak Output Power

The Maximum Peak Output Power Measurement is 30dBm.

### 8.3 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector ( conducted measurement ) while EUT was operating in transmit mode at the appropriate centre frequency.

**Note: the peak power was measured**

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#### 8.4 Test Results

EUT		SET TOP BOX	Model	HD409N
Mode		802.11b 11Mbps	Input Voltage	See Below
Temperature		24 deg. C,	Humid Pity	56% RH
Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
Test Voltage: 120V~				
1	2412	14.78	30	Pass
6	2437	14.95	30	Pass
11	2462	15.23	30	Pass
Test Voltage: 138V~				
1	2412	15.05	30	Pass
6	2437	15.22	30	Pass
11	2462	15.32	30	Pass
Test Voltage: 102V~				
1	2412	15.16	30	Pass
6	2437	15.18	30	Pass
11	2462	15.35	30	Pass

Note: 1. At final test to get the worst-case emission at 11Mbps for CH01, CH06 and CH11

2. The result basic equation calculation as follow:

$$\text{Peak Power Output} = \text{Peak Power Reading} + \text{Cable loss} + \text{Attenuator}$$

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EUT		SET TOP BOX		Model	HD409N
Mode		802.11g		Input Voltage	See Below
Temperature		24 deg. C,		Humid Pity	56% RH
Channel	Channel Frequency (MHz)		Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
Test Voltage:120V~					
1	2412		14.08	30	Pass
6	2437		14.79	30	Pass
11	2462		14.02	30	Pass
Test Voltage:138V~					
1	2412		14.33	30	Pass
6	2437		14.65	30	Pass
11	2462		14.18	30	Pass
Test Voltage:102V~					
1	2412		15.21	30	Pass
6	2437		15.72	30	Pass
11	2462		15.88	30	Pass

Note: 1. At final test to get the worst-case emission at 54Mbps for CH01, CH06 and CH11

2. The result basic equation calculation as follow:

$$\text{Peak Power Output} = \text{Peak Power Reading} + \text{Cable loss} + \text{Attenuator}$$

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EUT		SET TOP BOX		Model	HD409N
Mode		802.11n HT20		Input Voltage	See Below
Temperature		24 deg. C,		Humid Pity	56% RH
Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail	
Test Voltage:120V~					
1	2412	13.22	30	Pass	
6	2437	13.38	30	Pass	
11	2462	13.85	30	Pass	
Test Voltage:138V~					
1	2412	13.35	30	Pass	
6	2437	13.26	30	Pass	
11	2462	13.77	30	Pass	
Test Voltage:102V~					
1	2412	13.31	30	Pass	
6	2437	13.32	30	Pass	
11	2462	13.62	30	Pass	

Note: 1. At finial test to get the worst-case emission at 65Mbps for CH01, CH06 and CH11

2. The result basic equation calculation as follow:

$$\text{Peak Power Output} = \text{Peak Power Reading} + \text{Cable loss} + \text{Attenuator}$$

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EUT		SET TOP BOX		Model	HD409N
Mode		802.11n HT40		Input Voltage	See Below
Temperature		24 deg. C,		Humid Pity	56% RH
Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail	
Test Voltage:120V~					
1	2422	13.51	30	Pass	
5	2437	13.70	30	Pass	
7	2452	14.19	30	Pass	
Test Voltage:138V~					
1	2422	13.68	30	Pass	
5	2437	13.83	30	Pass	
7	2452	14.36	30	Pass	
Test Voltage:102V~					
1	2422	13.65	30	Pass	
5	2437	13.59	30	Pass	
7	2452	14.22	30	Pass	

Note: 1. At final test to get the worst-case emission at 65Mbps for CH01, CH06 and CH11

2. The result basic equation calculation as follow:

$$\text{Peak Power Output} = \text{Peak Power Reading} + \text{Cable loss} + \text{Attenuator}$$

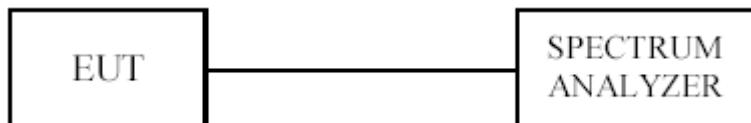
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## 9. Power Spectral Density Measurement

### 9.1 Test Setup



### 9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm.

### 9.3 Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 10 kHz.
3. Set the VBW  $\geq$  30 kHz.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be  $\leq$  8 dBm.

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#### 9.4 Test Result

EUT		SET TOP BOX	Model	HD409N
Mode		802.11b 1Mbps	Input Voltage	AC 120V
Temperature		24 deg. C,	Humid Pity	56% RH
Channel	Channel Frequency (MHz)	Final RF Power Level in 3kHz BW (dBm)	Maximum Limit (dBm)	Pass/ Fail
1Mbps				
1	2412	-16.62	8	Pass
6	2437	-17.15	8	Pass
11	2462	-16.88	8	Pass

**Note:** At finial test to get the worst-case emission at 1Mbps for CH01, CH06 and CH11

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EUT		SET TOP BOX	Model	HD409N
Mode		802.11b 11Mbps	Input Voltage	AC 120V
Temperature		24 deg. C,	Humid Pity	56% RH
Channel	Channel Frequency (MHz)	Final RF Power Level in 3kHz BW (dBm)	Maximum Limit (dBm)	Pass/ Fail
11Mbps				
1	2412	-12.85	8	Pass
6	2437	-13.02	8	Pass
11	2462	-13.02	8	Pass

**Note:** At finial test to get the worst-case emission at 11Mbps for CH01, CH06 and CH11

The report refers only to the sample tested and does not apply to the bulk.

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EUT		SET TOP BOX	Model	HD409N
Mode		802.11g	Input Voltage	AC 120V
Temperature		24 deg. C,	HuWIFI Router/APity	56% RH
Channel	Channel Frequency (MHz)	Final RF Power Level in 3kHz BW (dBm)	Maximum Limit (dBm)	Pass/ Fail
54Mbps				
1	2412	-19.40	8	Pass
6	2437	-19.14	8	Pass
11	2462	-19.31	8	Pass

**Note:** At final test to get the worst-case emission at 54Mbps for CH01, CH06 and CH11

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EUT		SET TOP BOX	Model	HD409N
Mode		802.11n HT20	Input Voltage	AC 120V
Temperature		24 deg. C,	HuWIFI Router/APity	56% RH
Channel	Channel Frequency (MHz)	Final RF Power Level in 3kHz BW (dBm)	Maximum Limit (dBm)	Pass/ Fail
11n HT20				
1	2412	-27.43	8	Pass
6	2437	-28.21	8	Pass
11	2462	-29.67	8	Pass

**Note:** At finial test to get the worst-case emission at 65M for CH01, CH06 and CH11

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EUT		SET TOP BOX	Model	HD409N
Mode		802.11n HT40	Input Voltage	AC 120V
Temperature		24 deg. C,	HuWIFI Router/APity	56% RH
Channel	Channel Frequency (MHz)	Final RF Power Level in 3kHz BW (dBm)	Maximum Limit (dBm)	Pass/ Fail
11n HT40				
1	2422	-29.74	8	Pass
5	2437	-30.23	8	Pass
7	2452	-31.32	8	Pass

**Note:** At final test to get the worst-case emission at 65M for CH01, CH04 and CH07

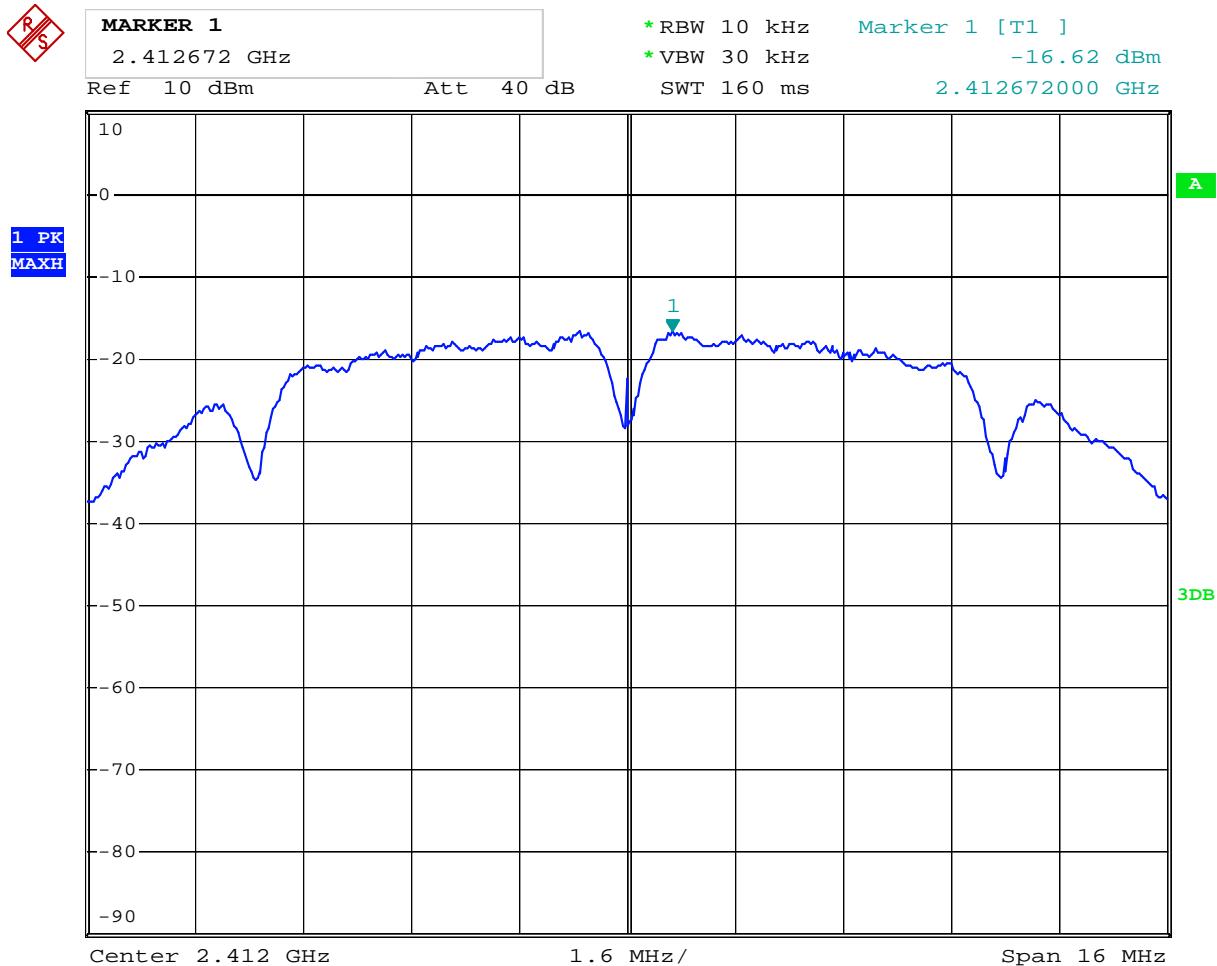
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## 9.5 Photo of Power Spectral Density Measurement

### 1. 802.11b at 1Mbps of CH01



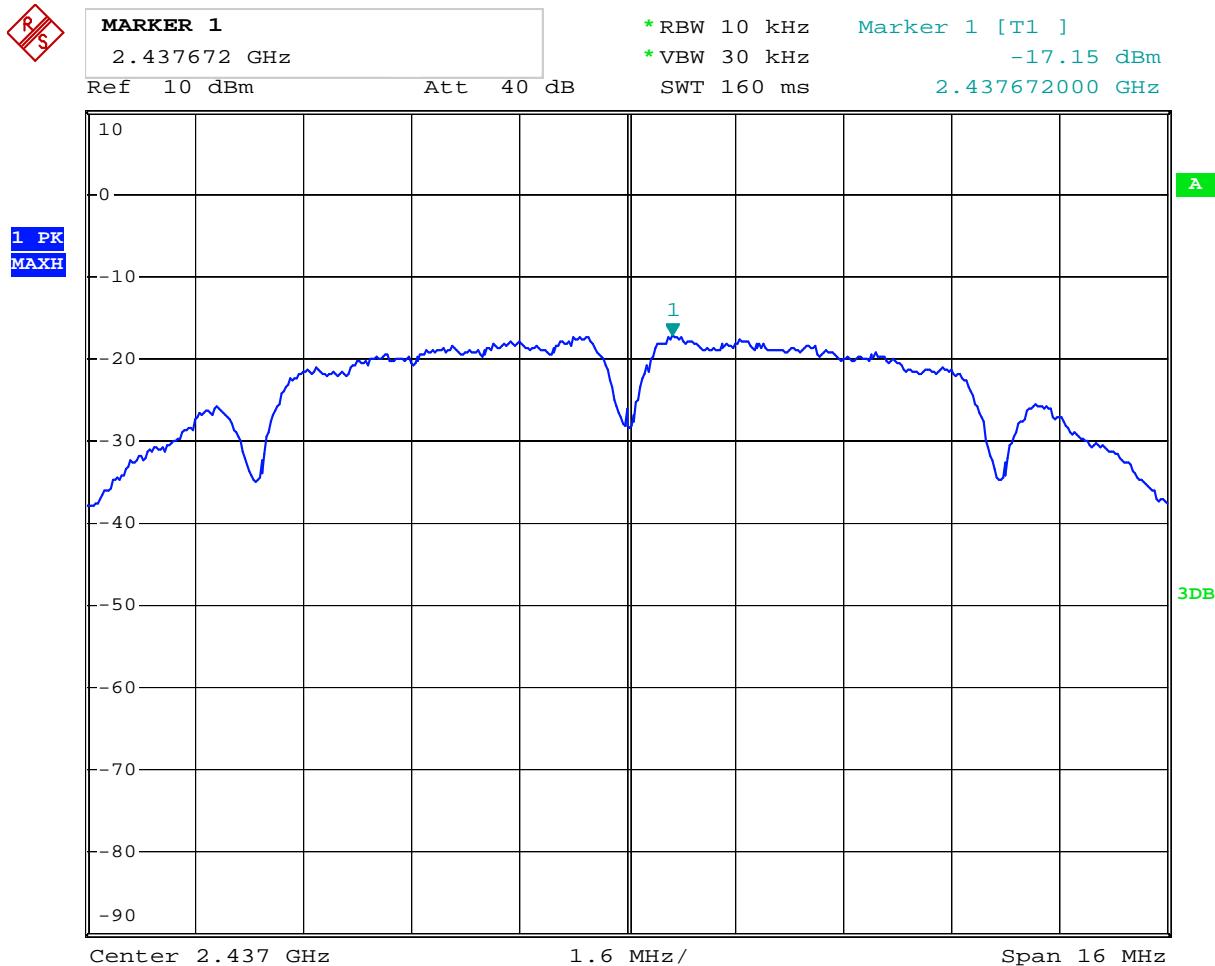
Date: 20.NOV.2012 09:00:07

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2. 802.11b at 1Mbps of CH06



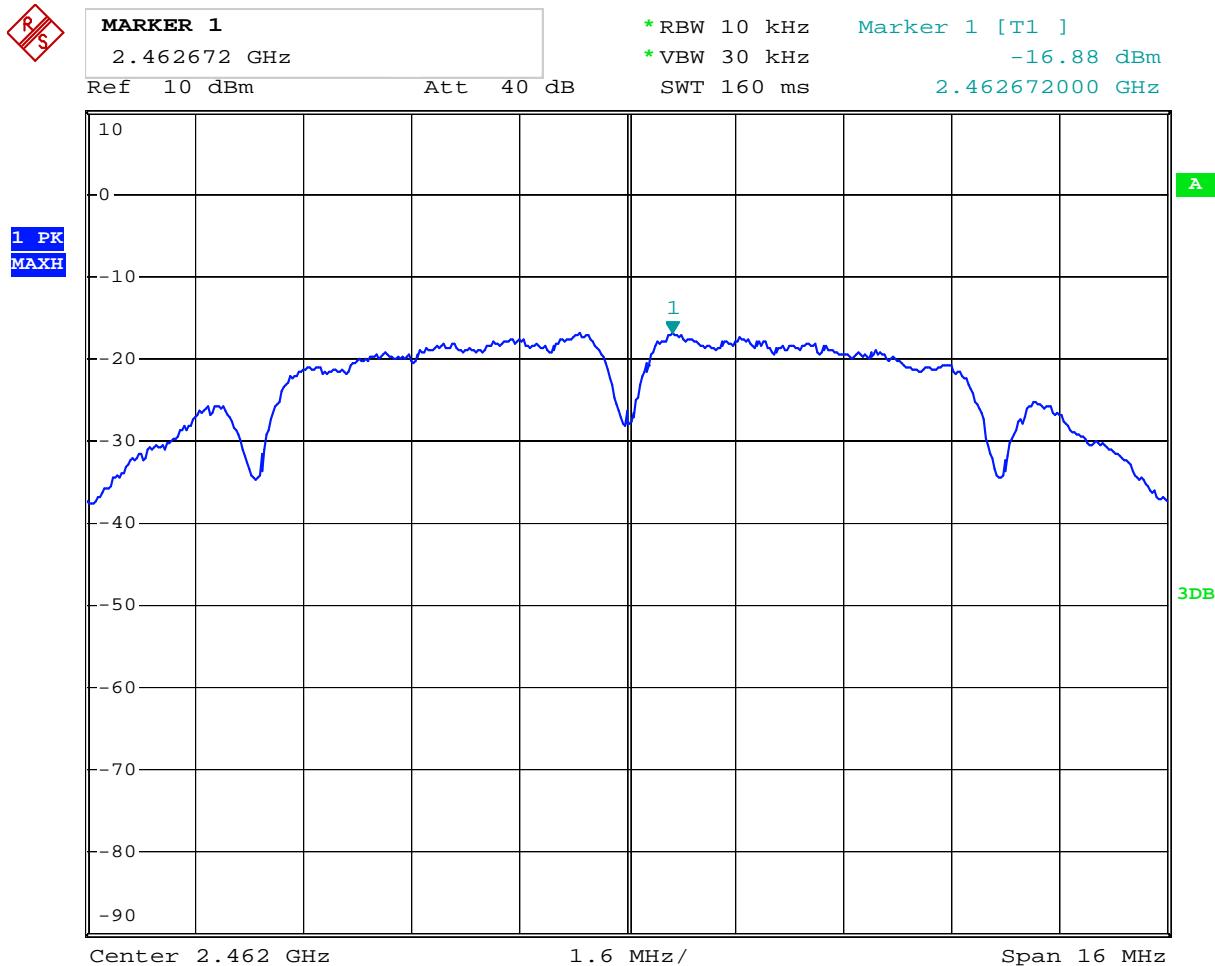
Date: 20.NOV.2012 08:59:22

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3. 802.11b at 1Mbps of CH11



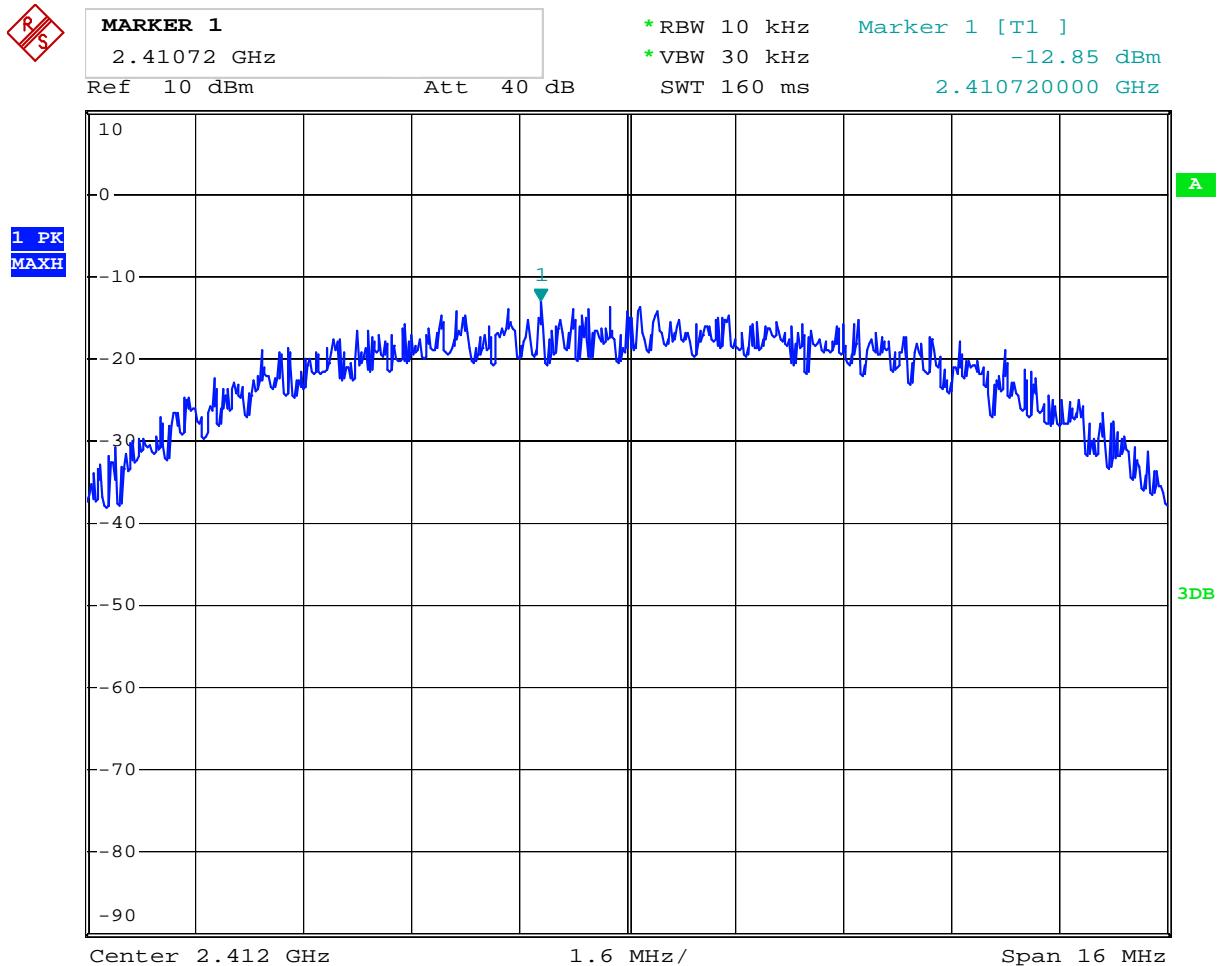
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4. 802.11b at 11Mbps of CH01



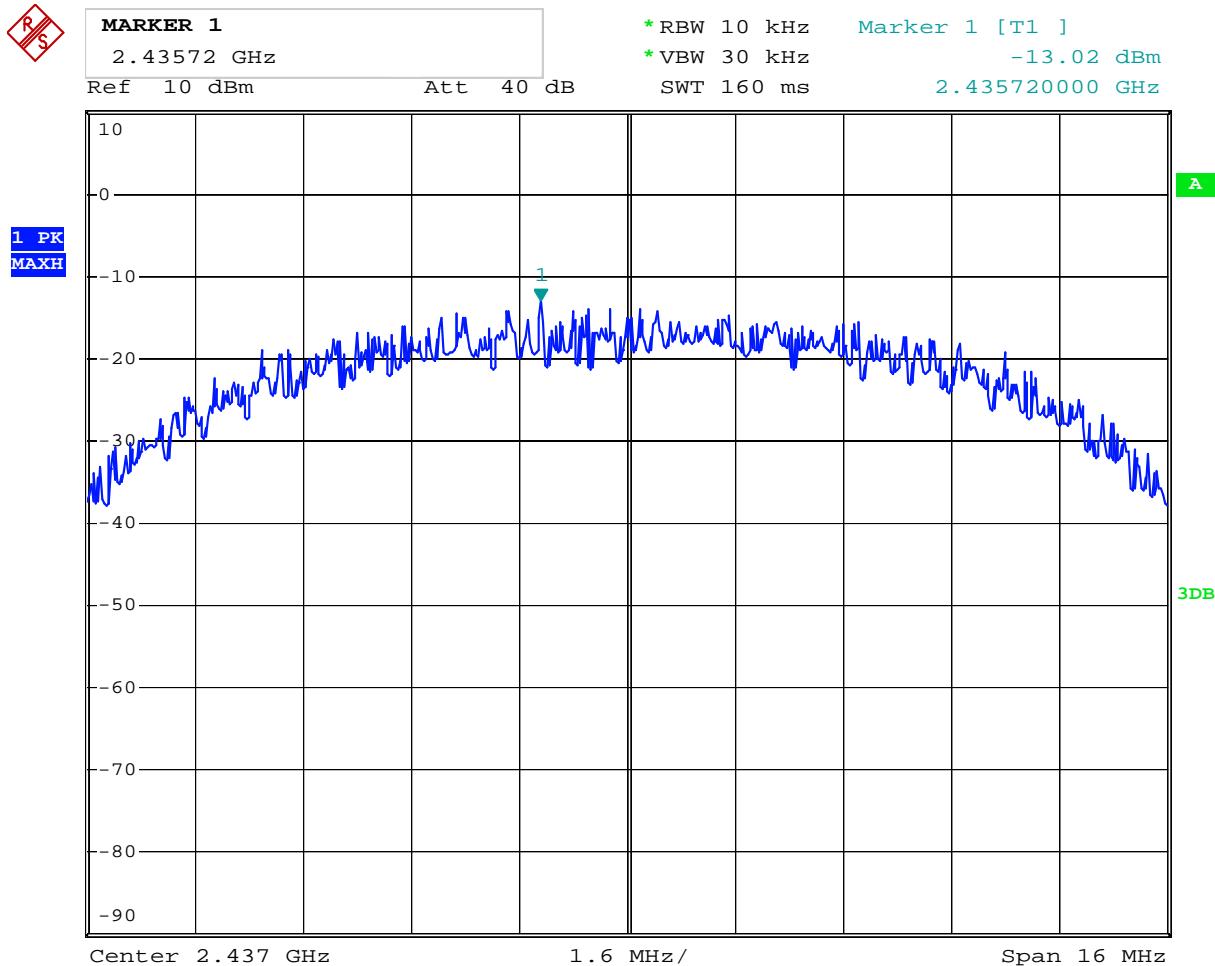
Date: 20.NOV.2012 08:52:39

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5. 802.11b at 11Mbps of CH06



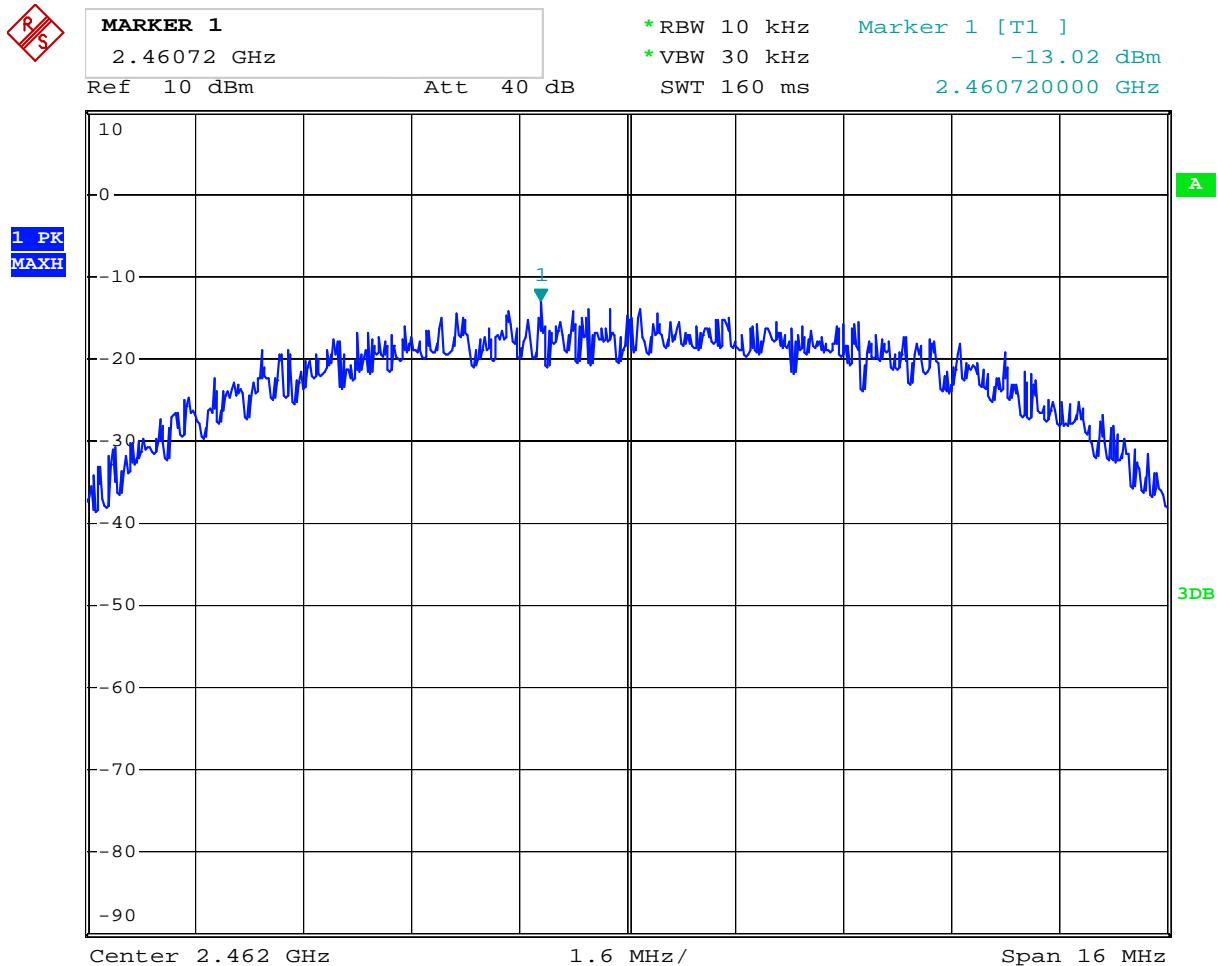
Date: 20.NOV.2012 08:54:42

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6. 802.11b at 11Mbps of CH11



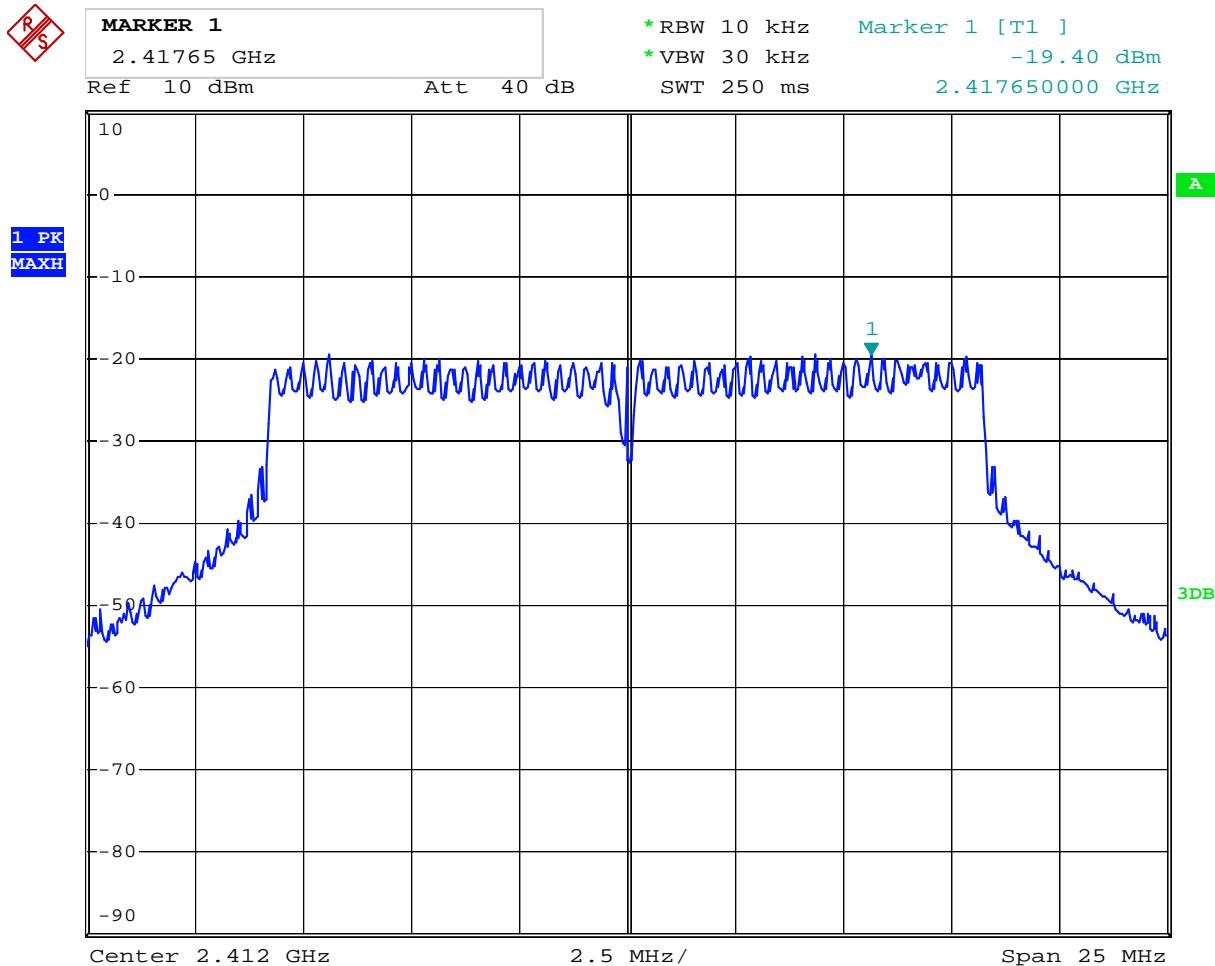
Date: 20.NOV.2012 08:55:36

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7. 802.11g at 54Mbps of CH1



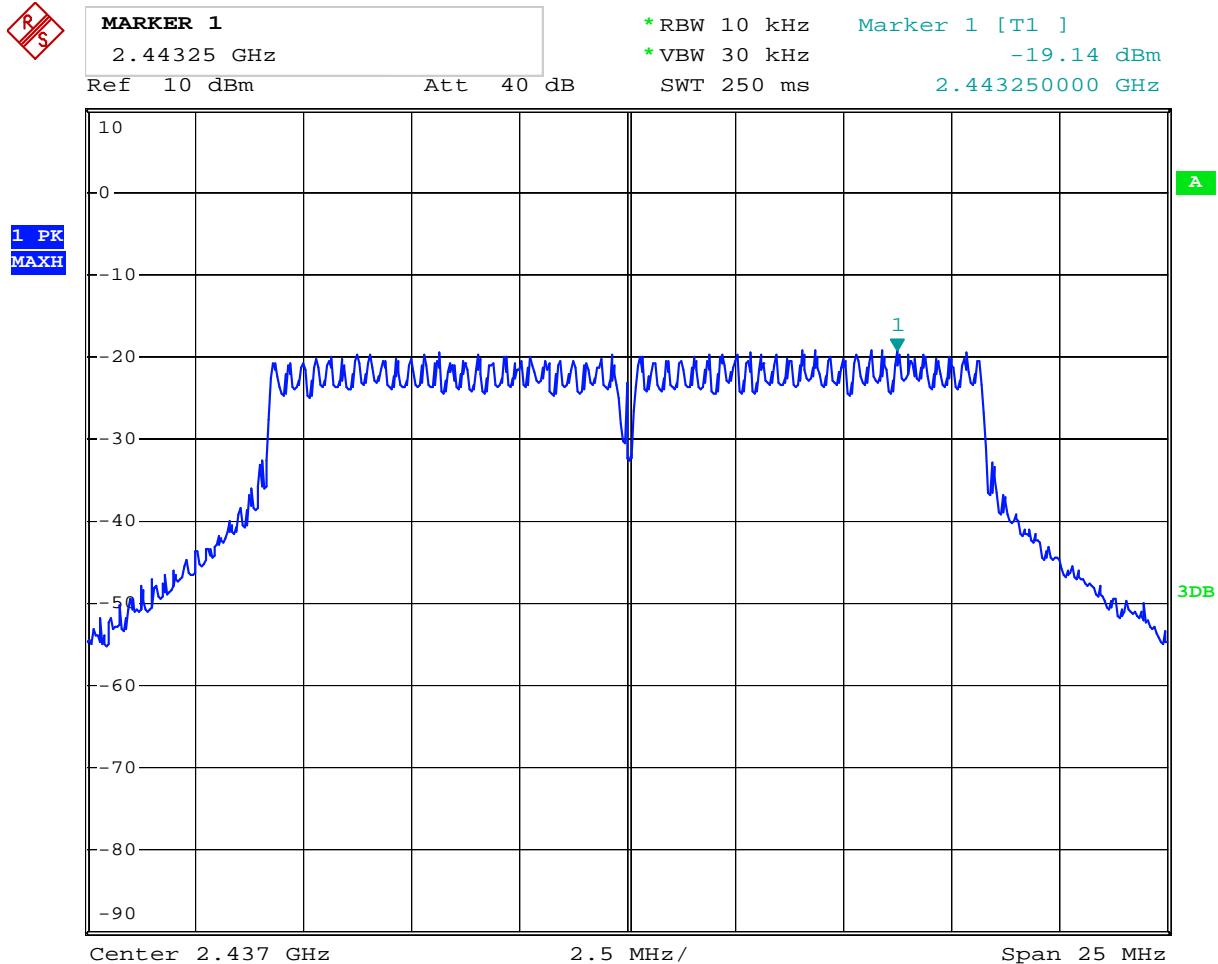
Date: 20.NOV.2012 08:51:45

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8. 802.11g at 54Mbps of CH6



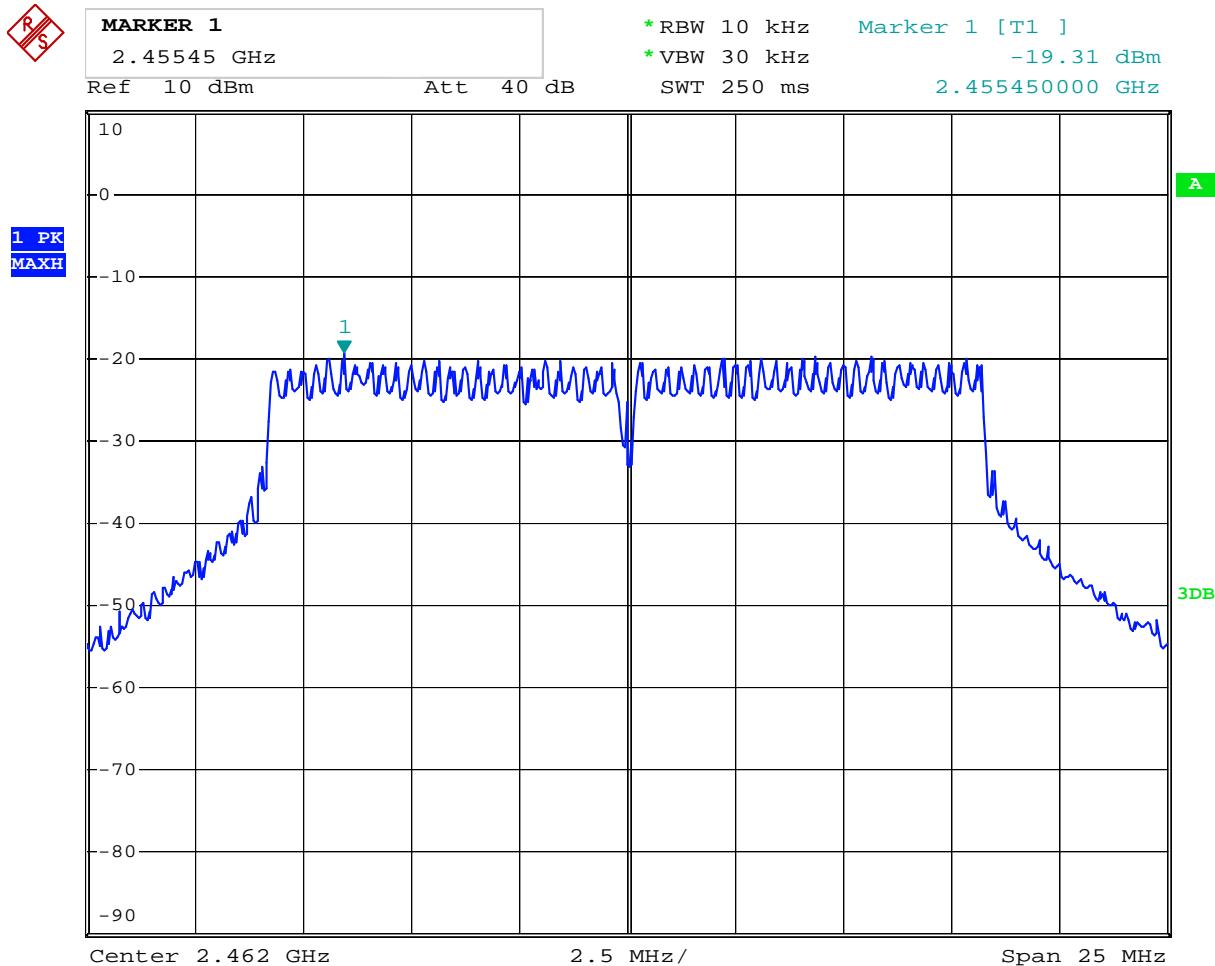
Date: 20.NOV.2012 08:50:44

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9. 802.11g at 54Mbps of CH11



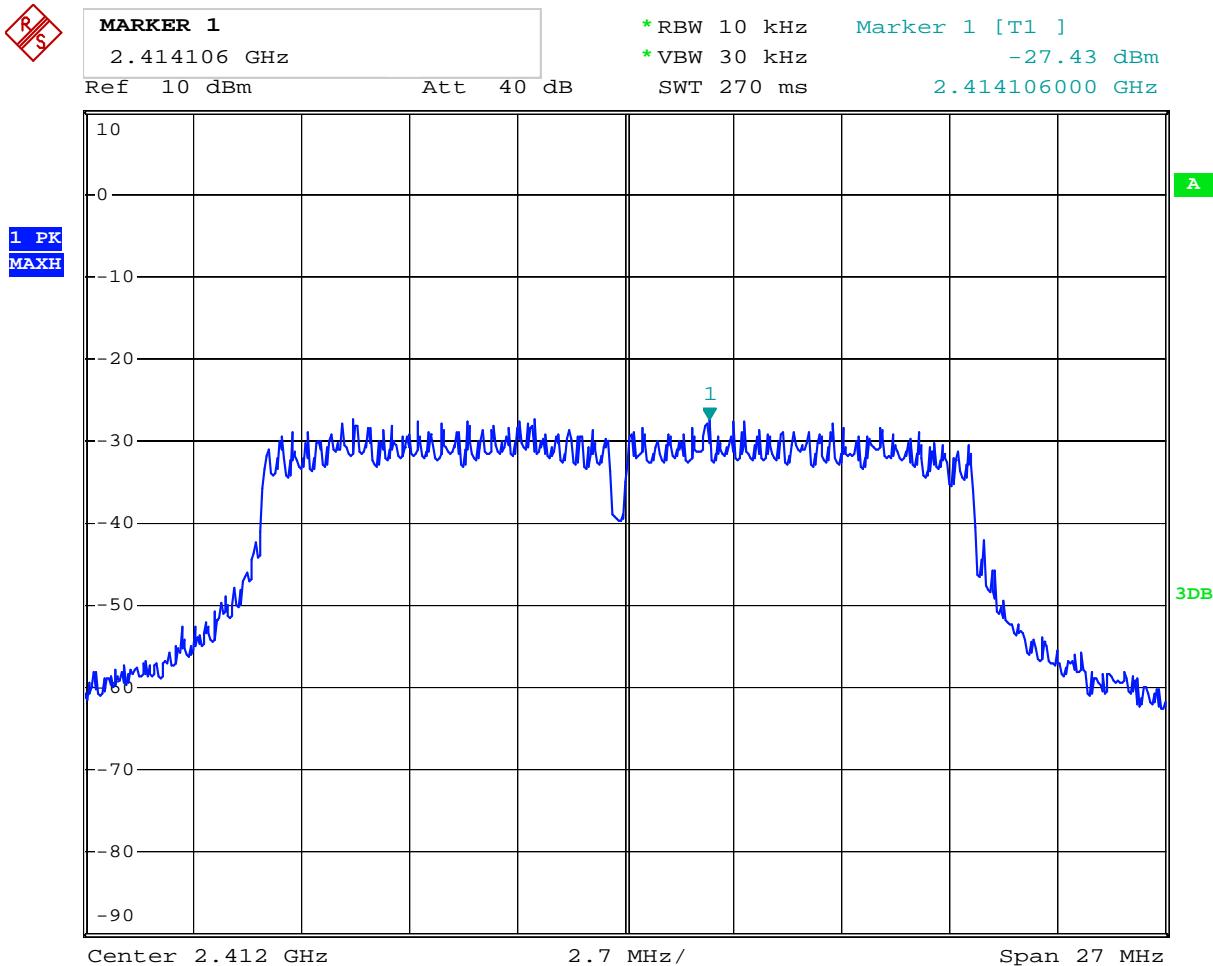
Date: 20.NOV.2012 08:49:57

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10. 802.11n at HT20 of CH01 65Mbps



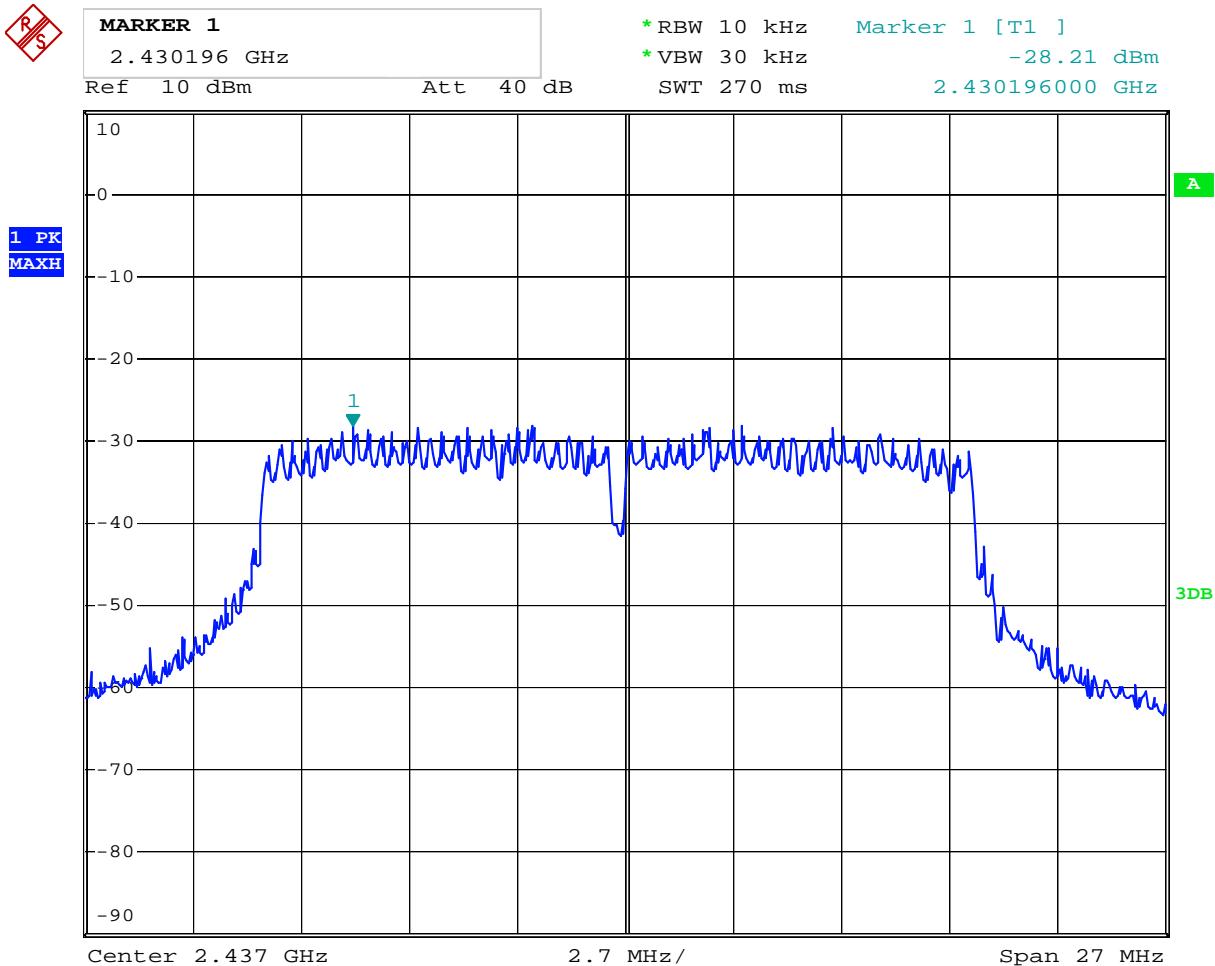
Date: 20.NOV.2012 09:53:17

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11. 802.11n at HT20 of CH06 65Mbps



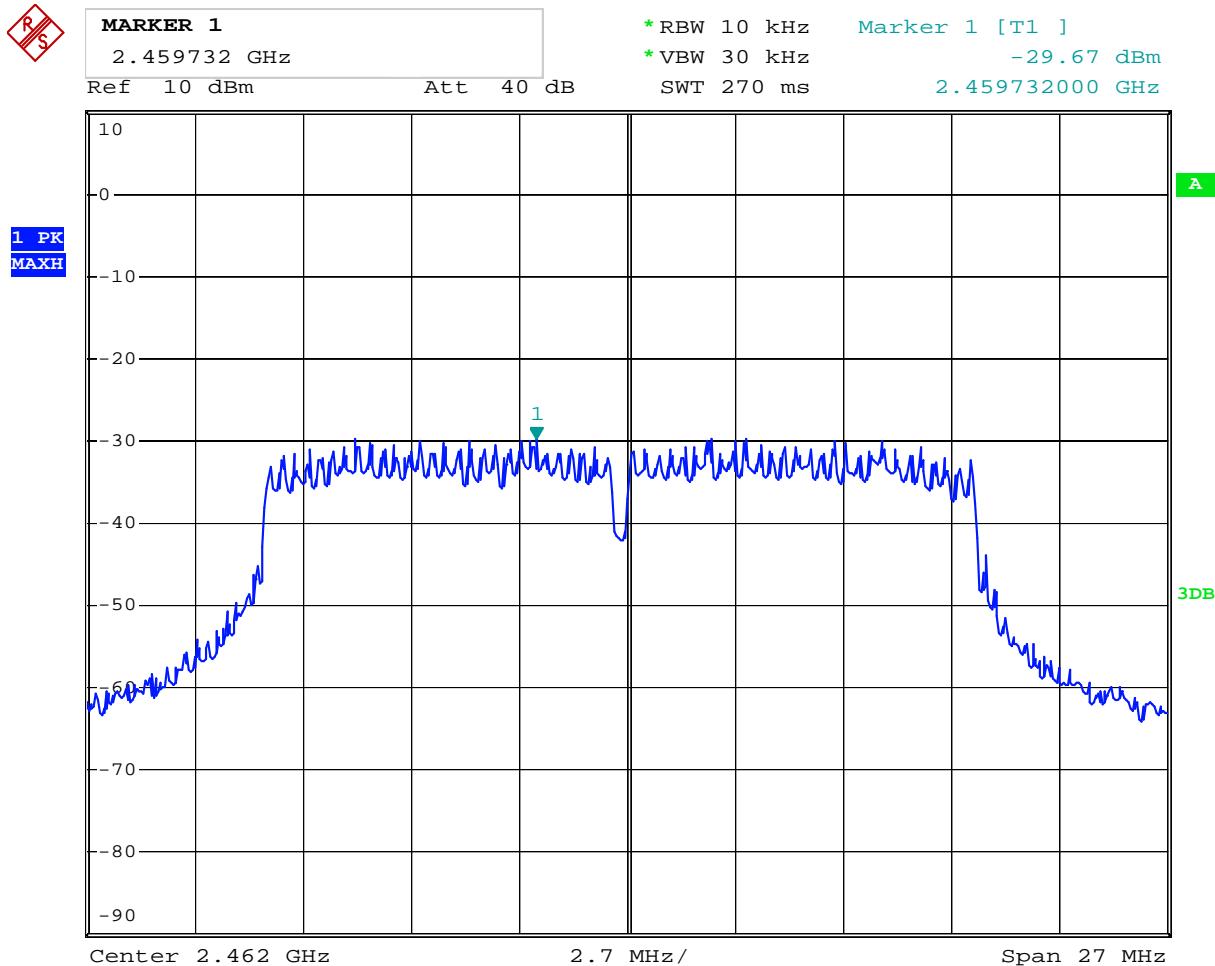
Date: 20.NOV.2012 09:55:04

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12. 802.11n at HT20 of CH11 65Mbps



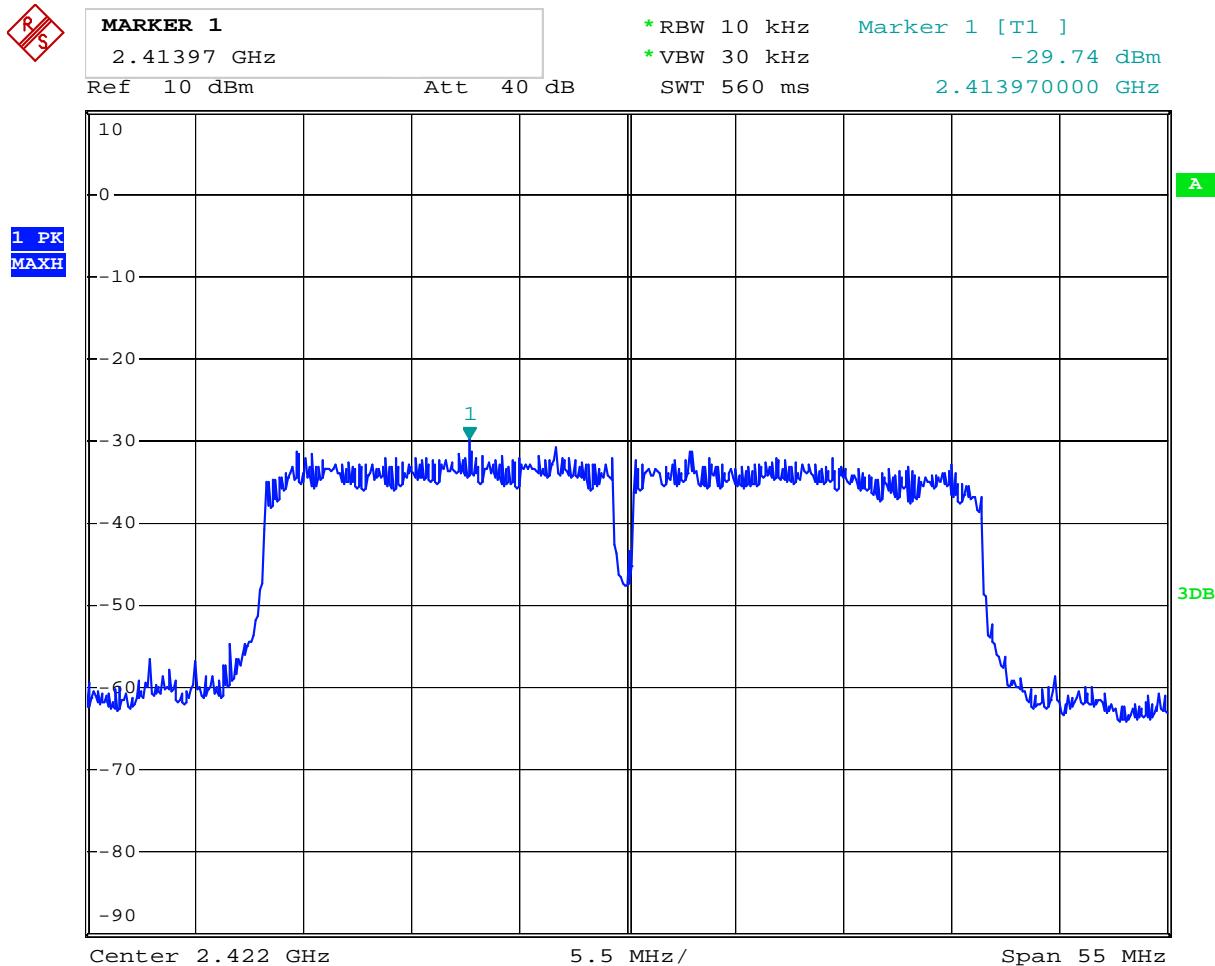
Date: 20.NOV.2012 10:06:10

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13. 802.11n at HT40 of CH01 65Mbps



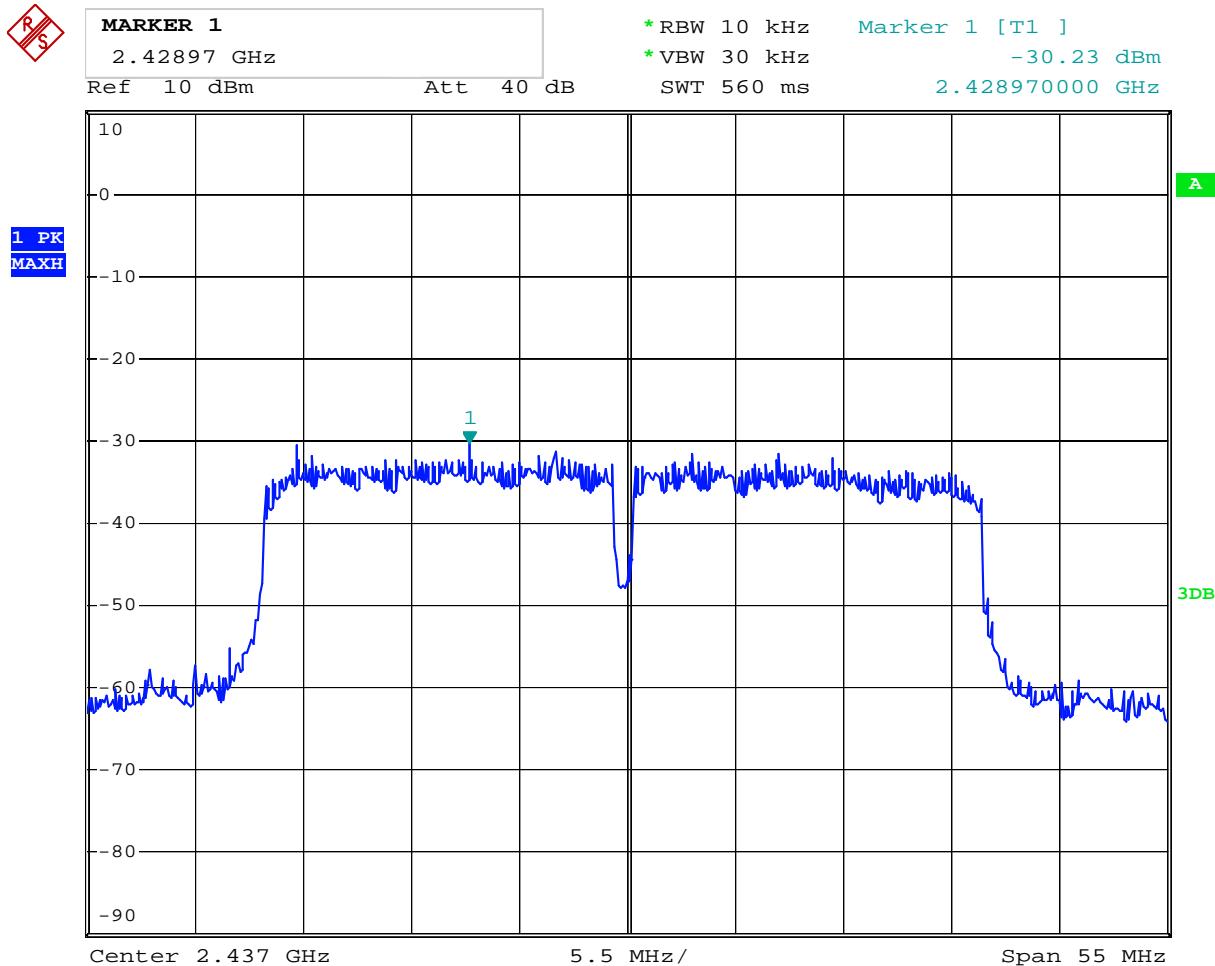
Date: 20.NOV.2012 10:10:12

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14. 802.11n at HT40 of CH04 65Mbps



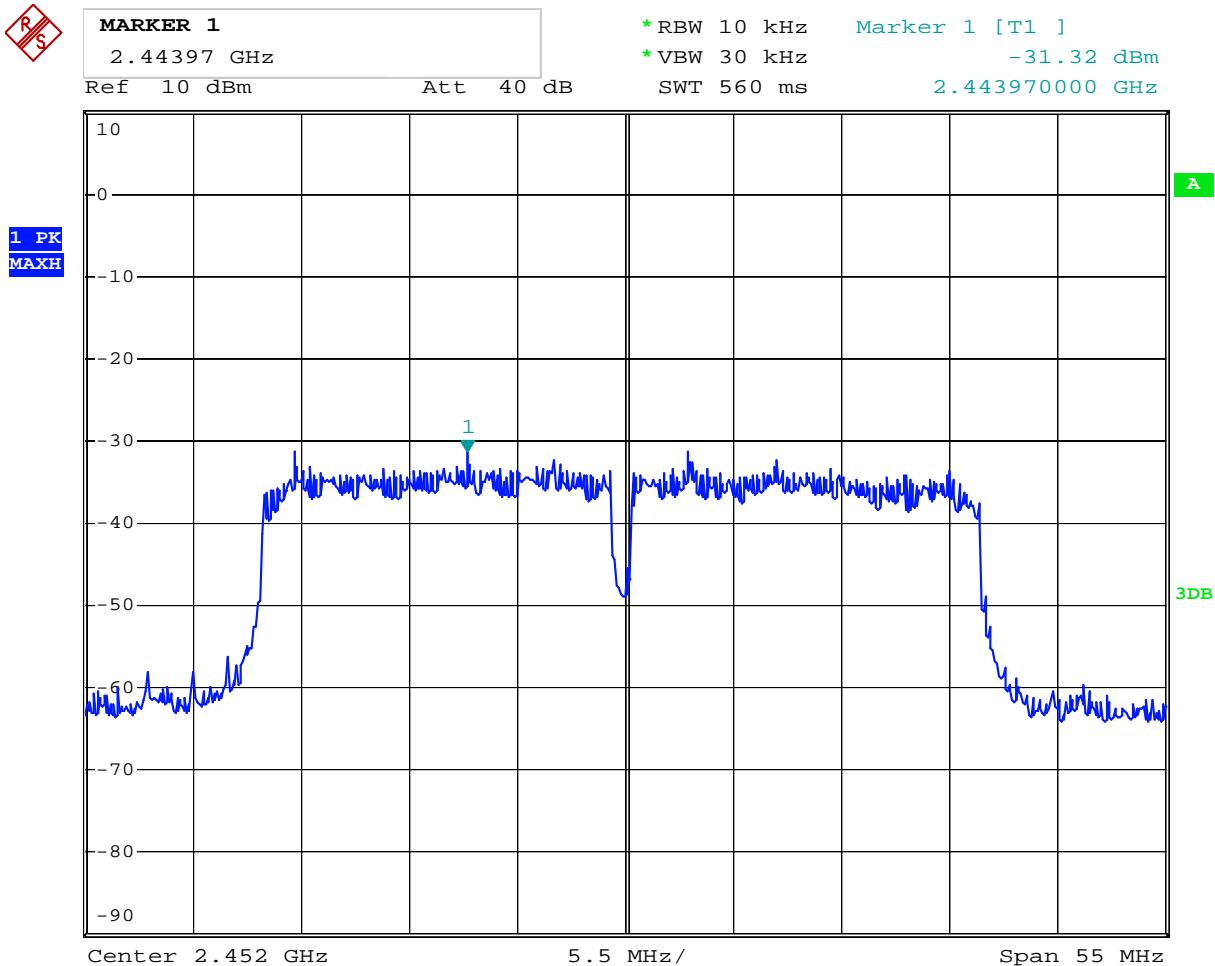
Date: 20.NOV.2012 10:12:04

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15. 802.11n at HT40 of CH07 65Mbps



Date: 20.NOV.2012 10:17:20

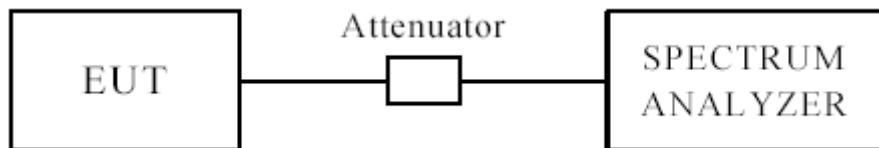
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## 10 Out of Band Measurement

### 10.1 Test Setup for band edge



**The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup**

### 10.2 Limits of Out of Band Emissions Measurement

1. Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

### 10.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test.( Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector)

For bandage test, the spectrum set as follows: RBW=VBW=100 kHz. A conducted measurement used

### 10.4 Test Result

Please see next pages

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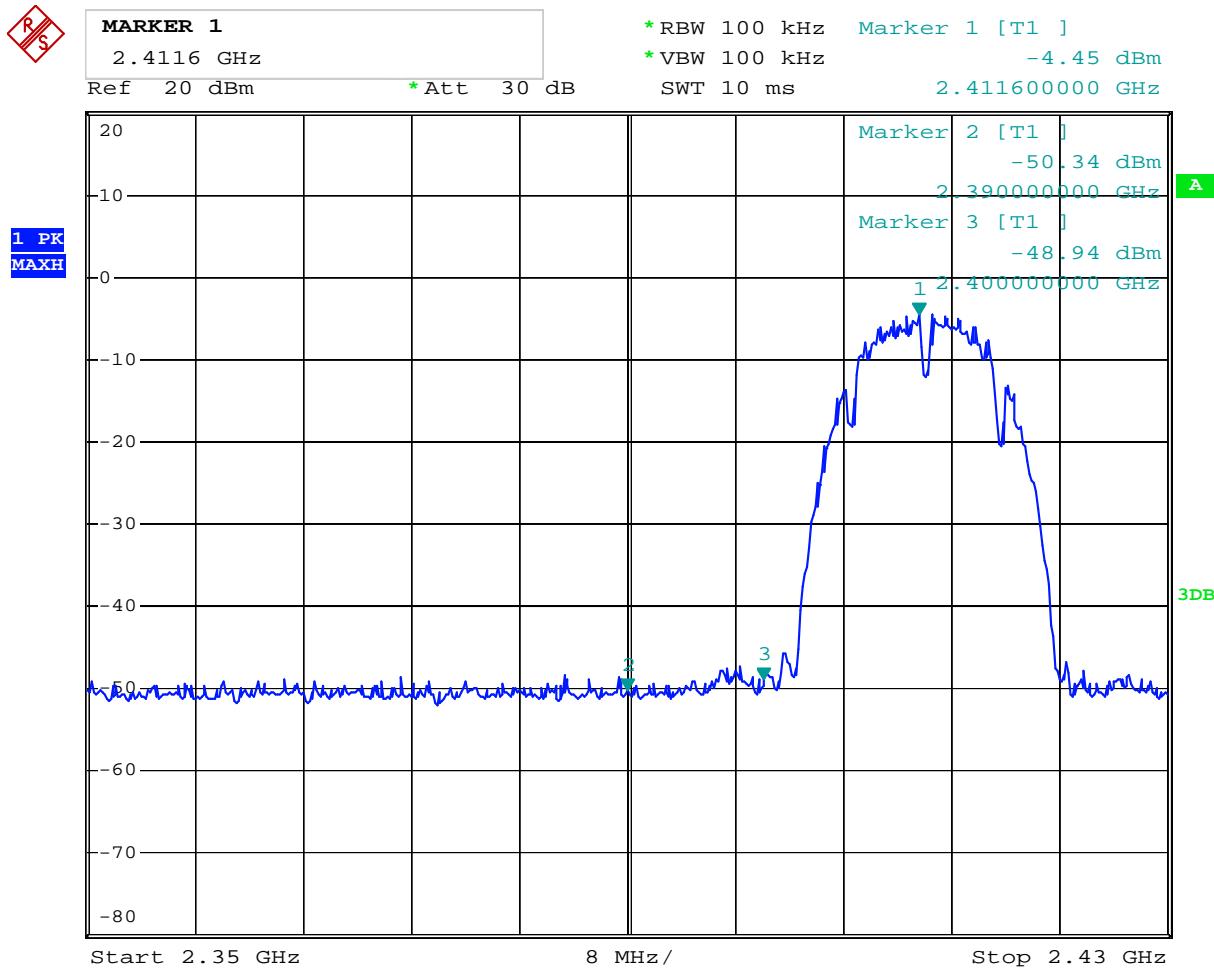
For 802.11b mode

CH01 at 1Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Humid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 11:25:47

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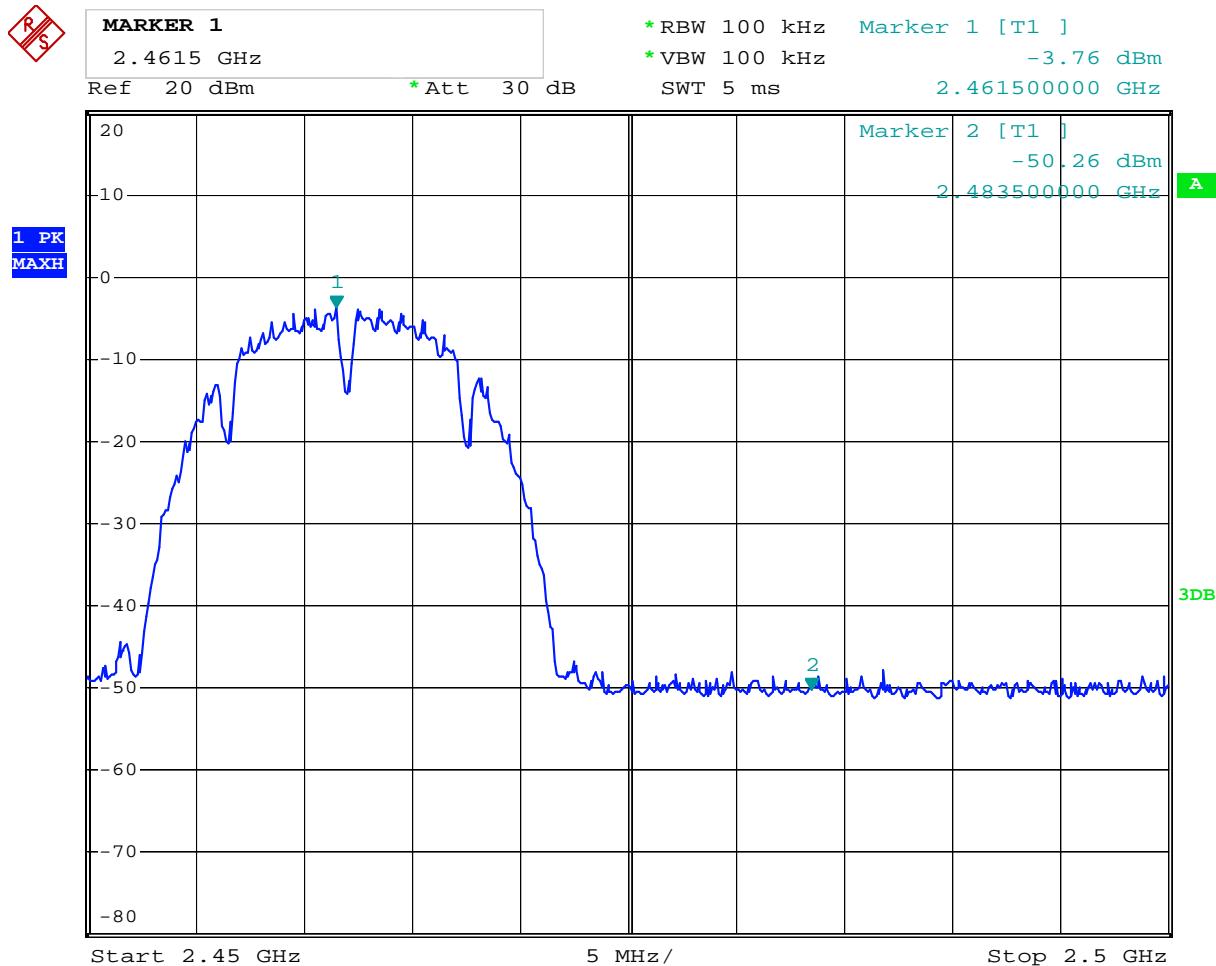
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CH11 at 1Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Humid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 11:27:03

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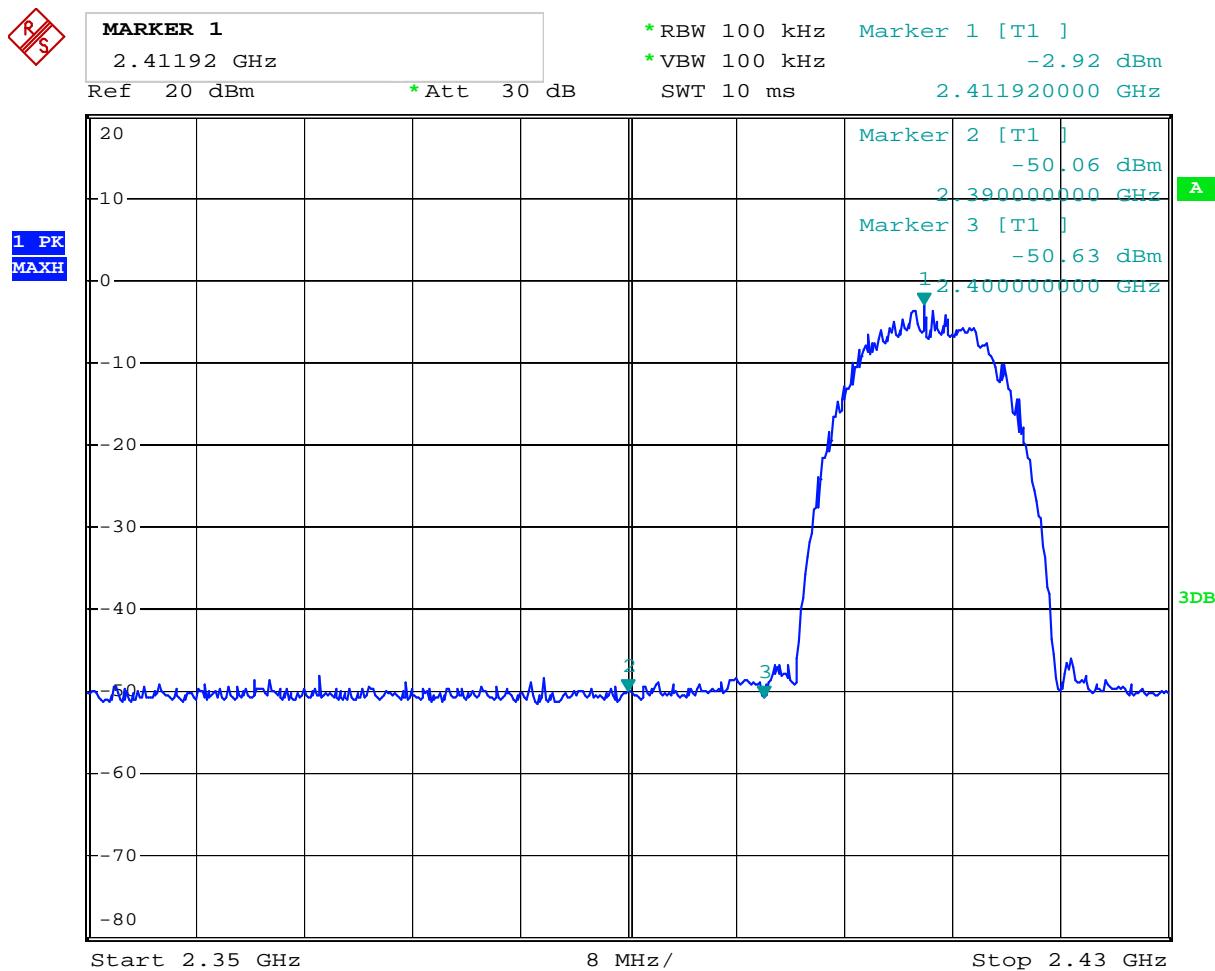
For 802.11b mode

CH01 at 11Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Humid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 11:25:08

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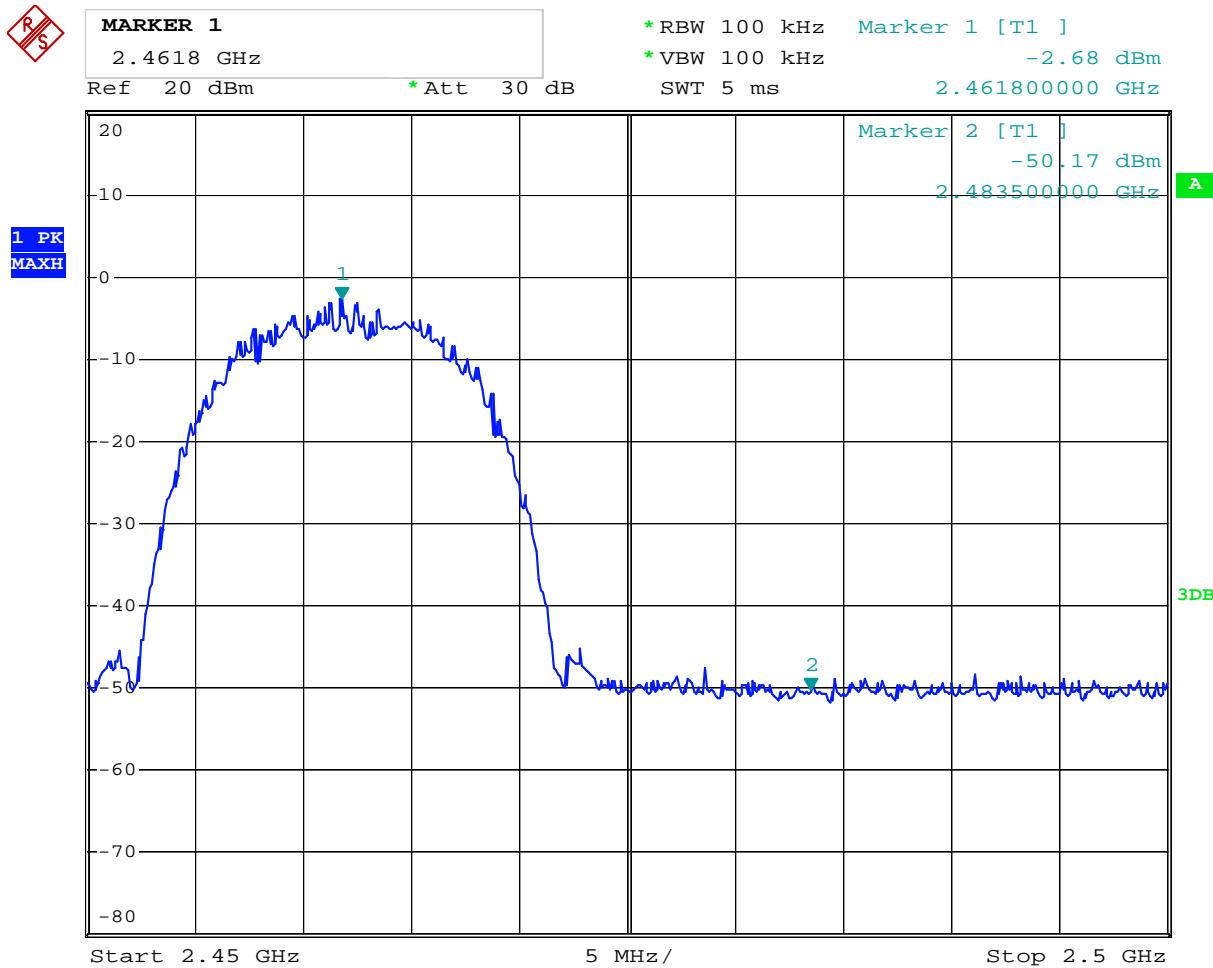
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CH11 at 11Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Hmid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 11:27:48

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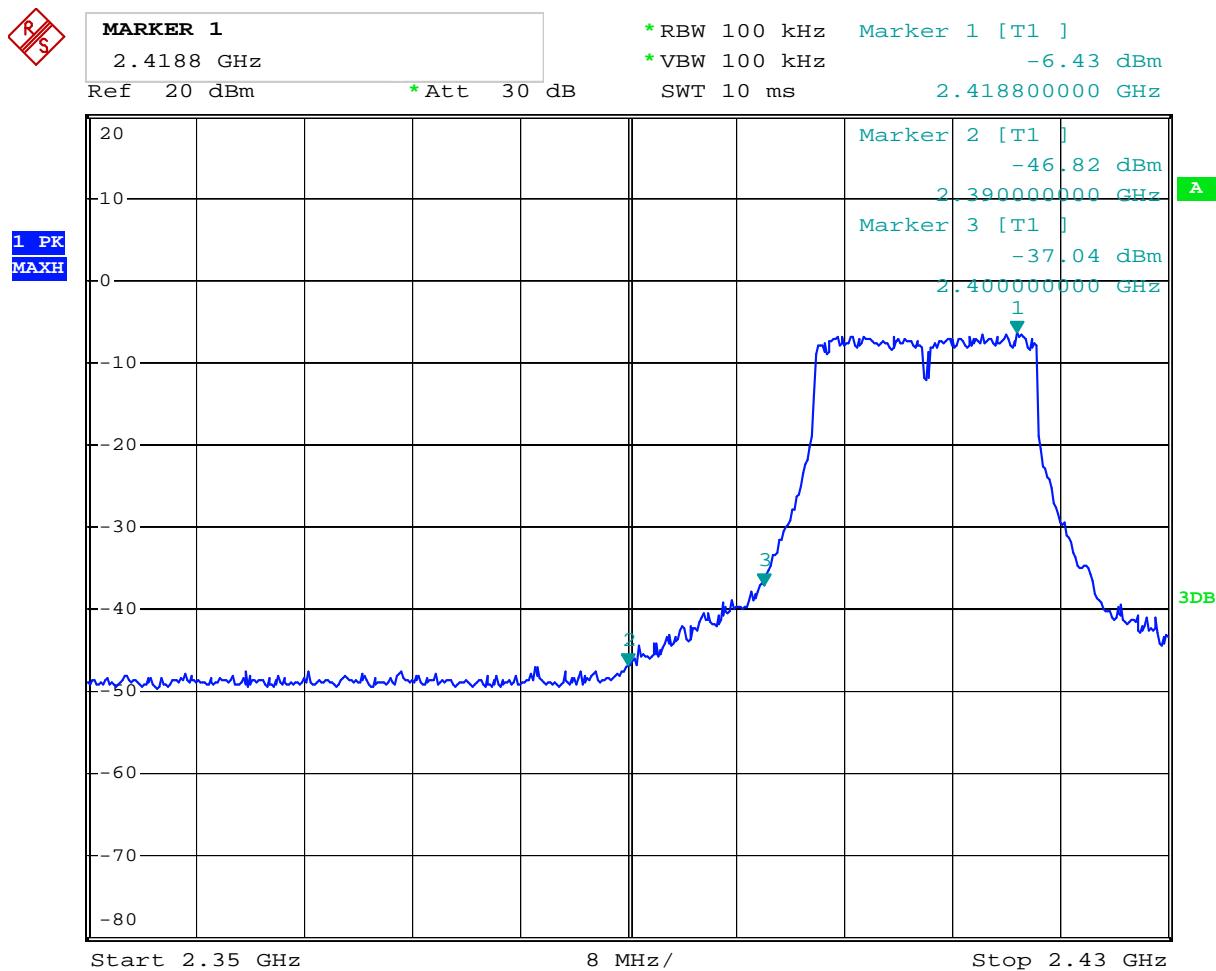
For 802.11g mode

CH01 at 54Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Humid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 11:23:55

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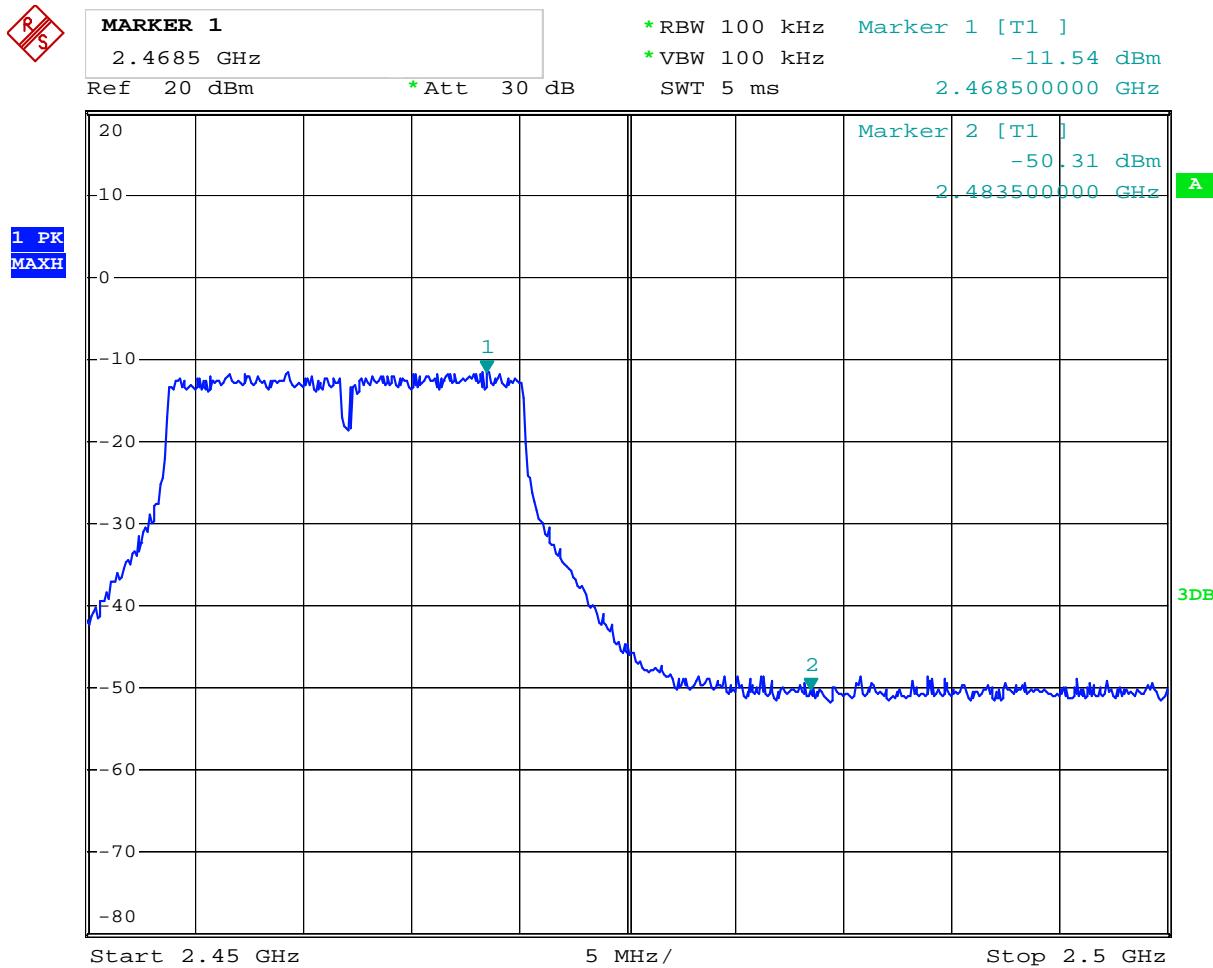
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CH11 at 54Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Hmid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 11:28:34

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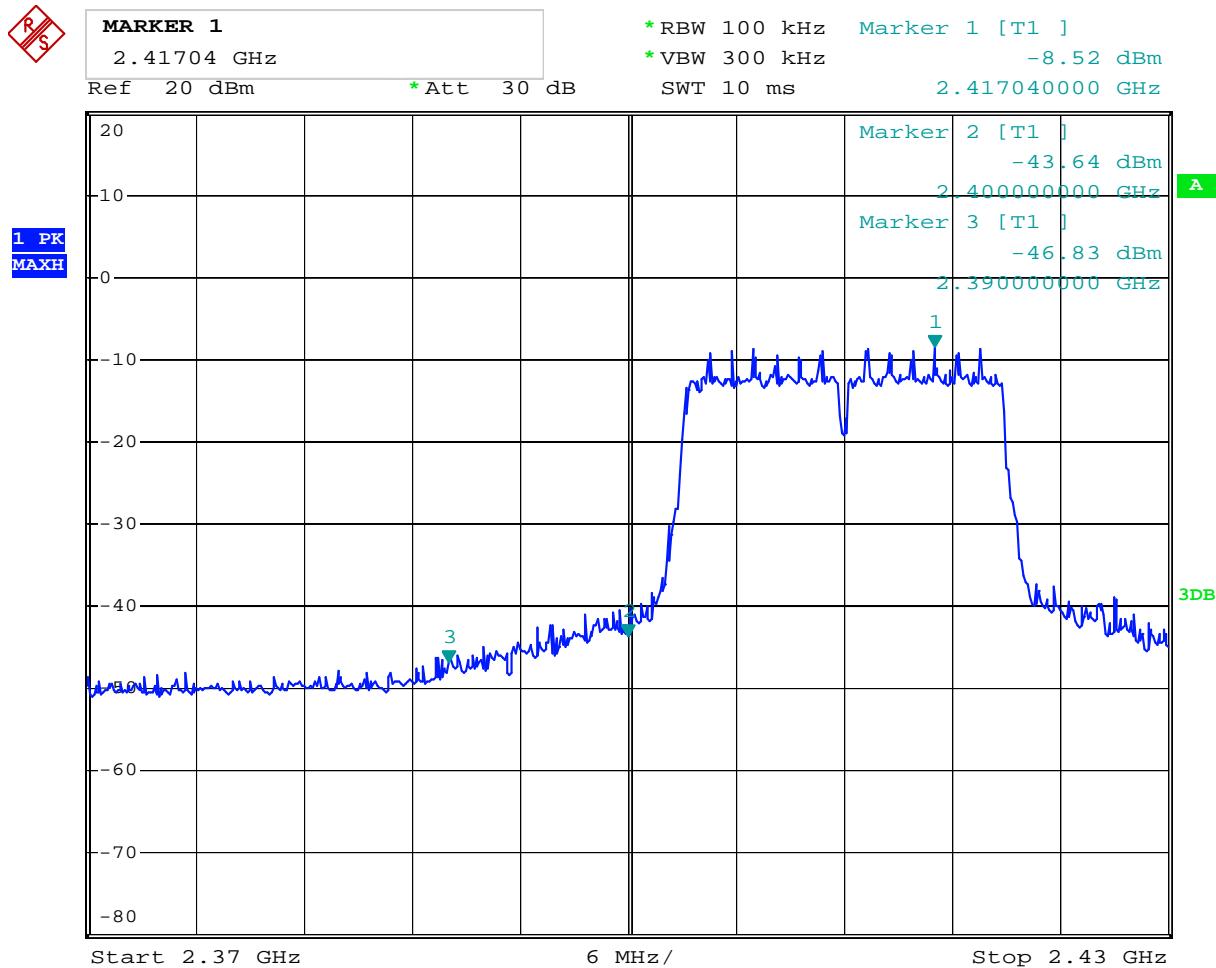
For 802.11n mode

CH01 at HT20 65Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Humid Pity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 24.JUL.2012 15:09:07

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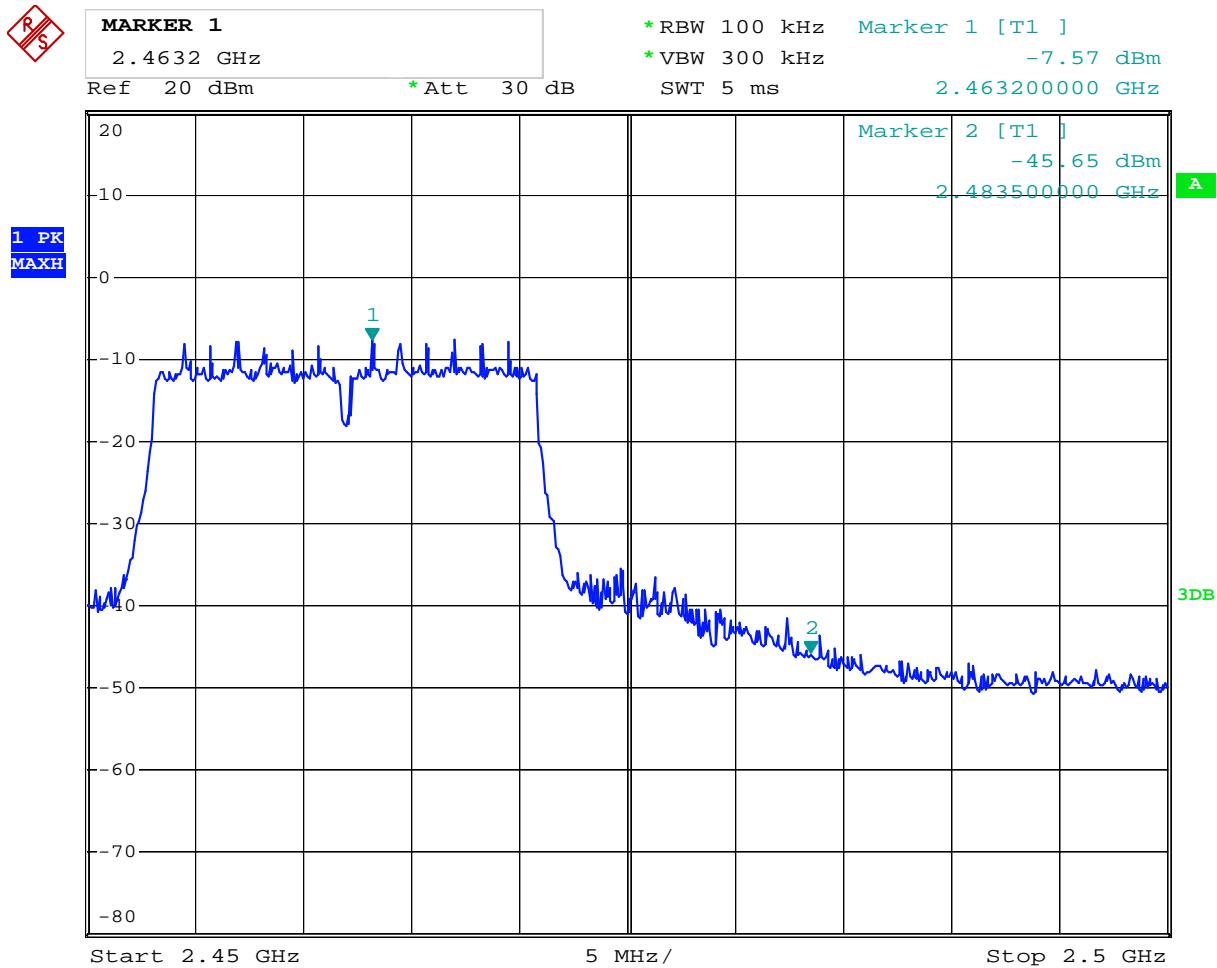
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CH11 at HT20 65Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Hmid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 15:10:12

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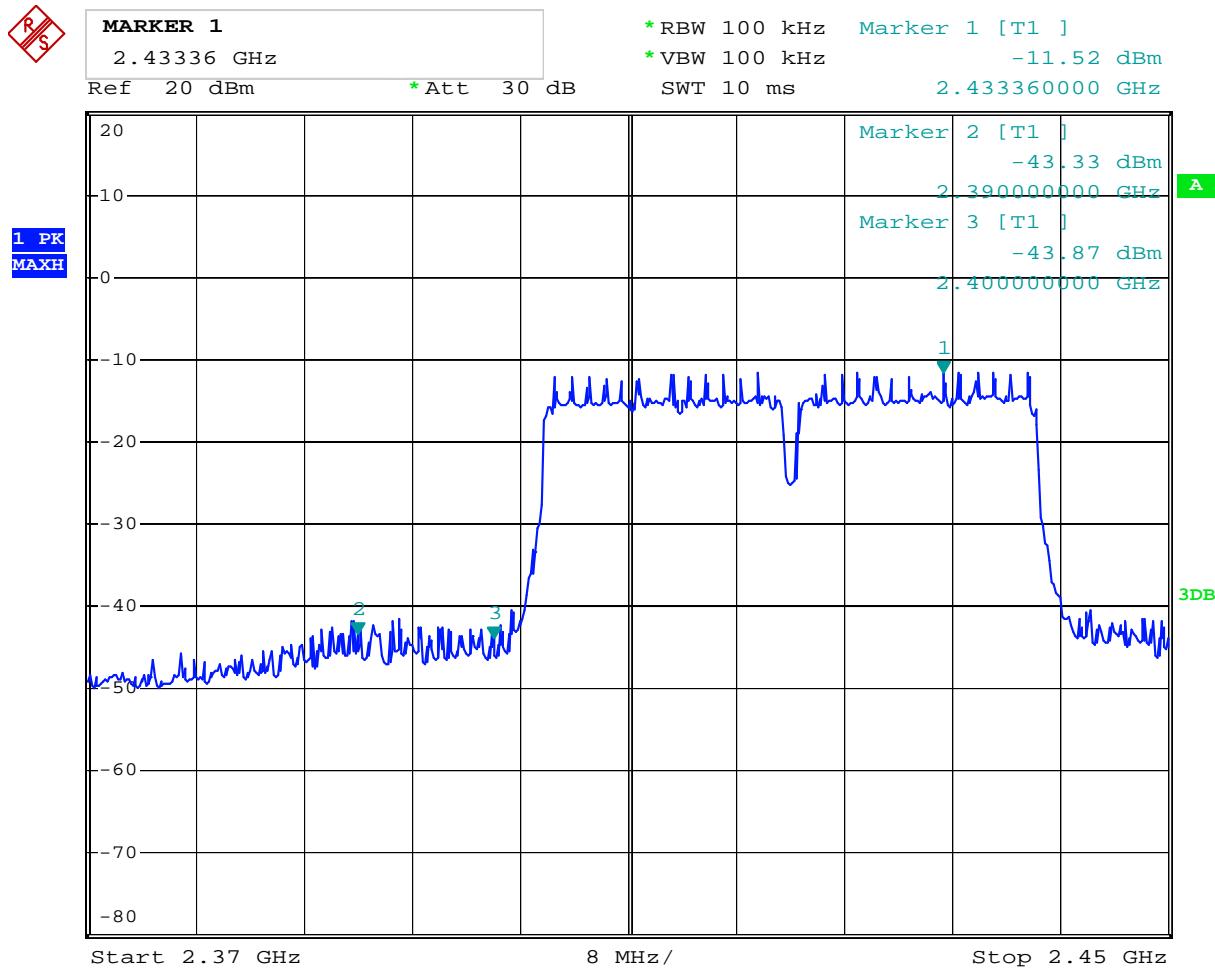
For 802.11n mode

CH01 at HT40 65Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Humid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 15:27:34

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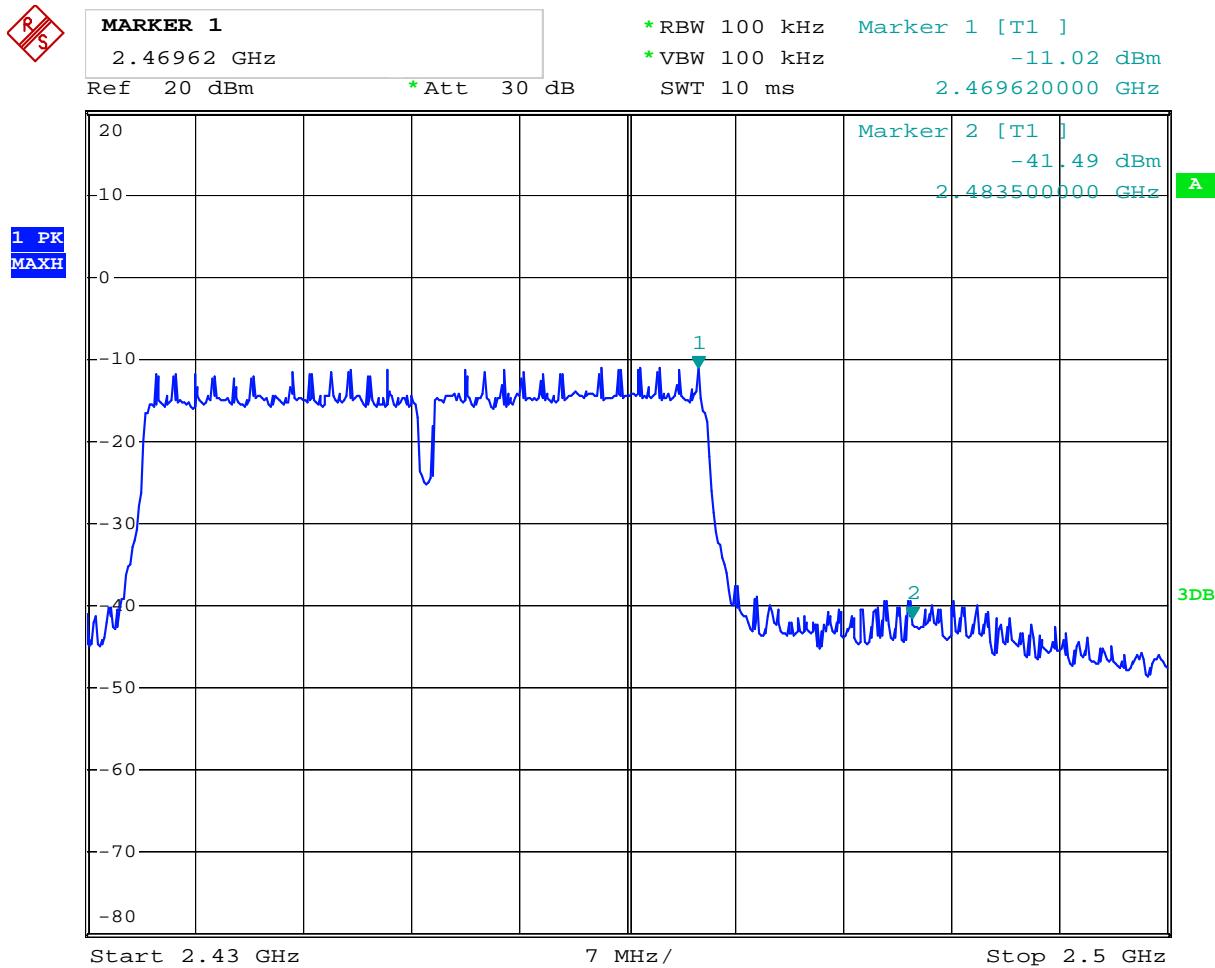
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CH11 at HT40 65Mbps

#### 10.4 Band-edge Measurement

Product:	SET TOP BOX	Model:	HD409N
Mode	Keeping Transmitting	Input Voltage	AC 120V
Temperature	24 deg. C,	Hmid Pity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



Date: 24.JUL.2012 15:25:36

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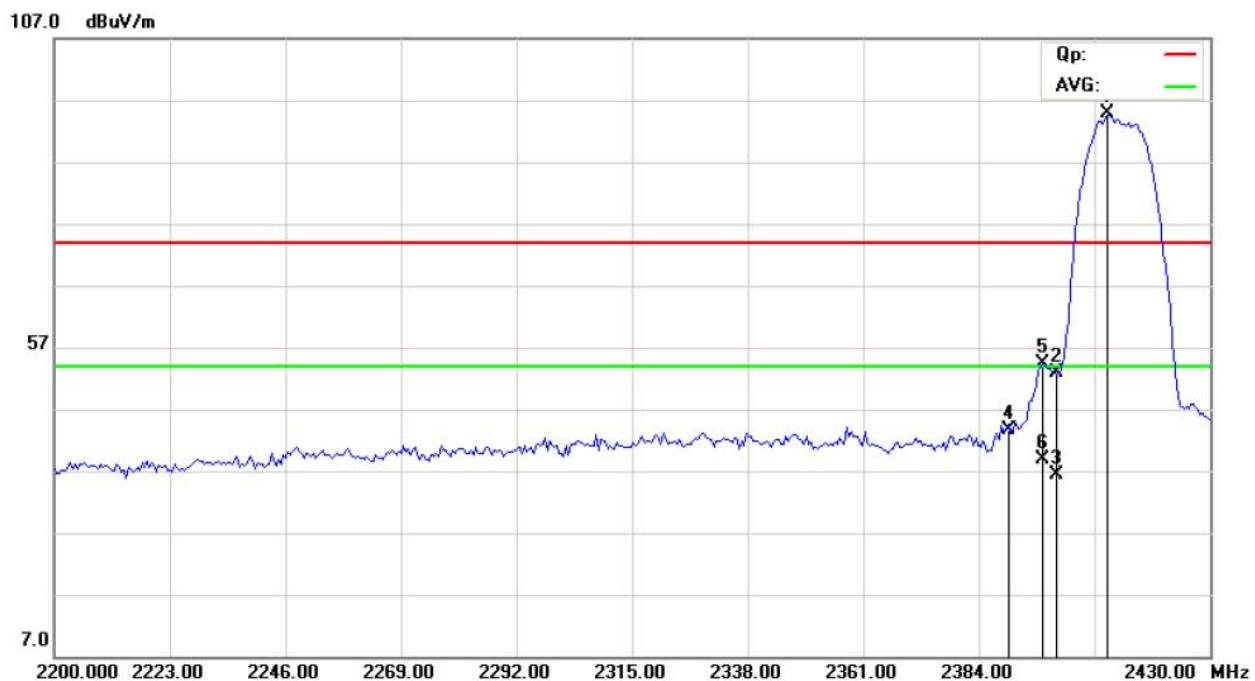
For 802.11b mode

CH01 at 11Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2400	PK (dB $\mu$ V/m)	52.88	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	36.47		54(dB $\mu$ V/m)
2397	PK (dB $\mu$ V/m)	54.45	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	38.91		54(dB $\mu$ V/m)
2390	PK (dB $\mu$ V/m)	43.65	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)

#### Test Figure: Horizontal



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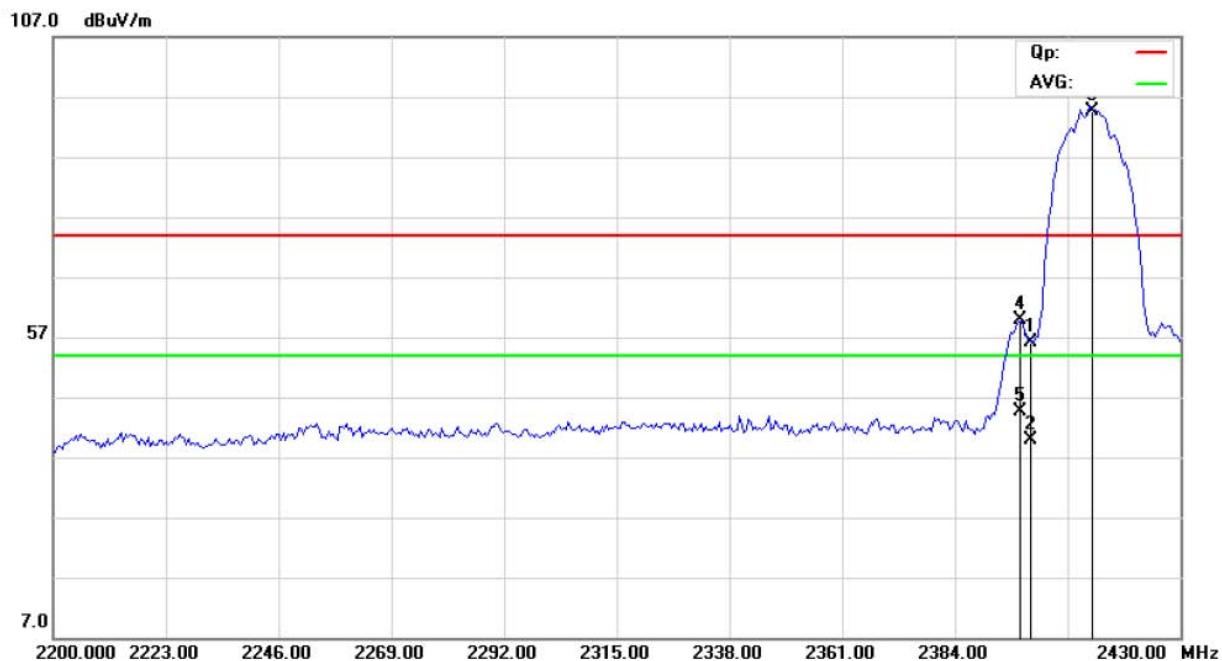
For 802.11b mode

CH01 at 11Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2400	PK (dB $\mu$ V/m)	56.11	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	39.82		54(dB $\mu$ V/m)
2397	PK (dB $\mu$ V/m)	59.89	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	44.51		54(dB $\mu$ V/m)

Test Figure: Vertical



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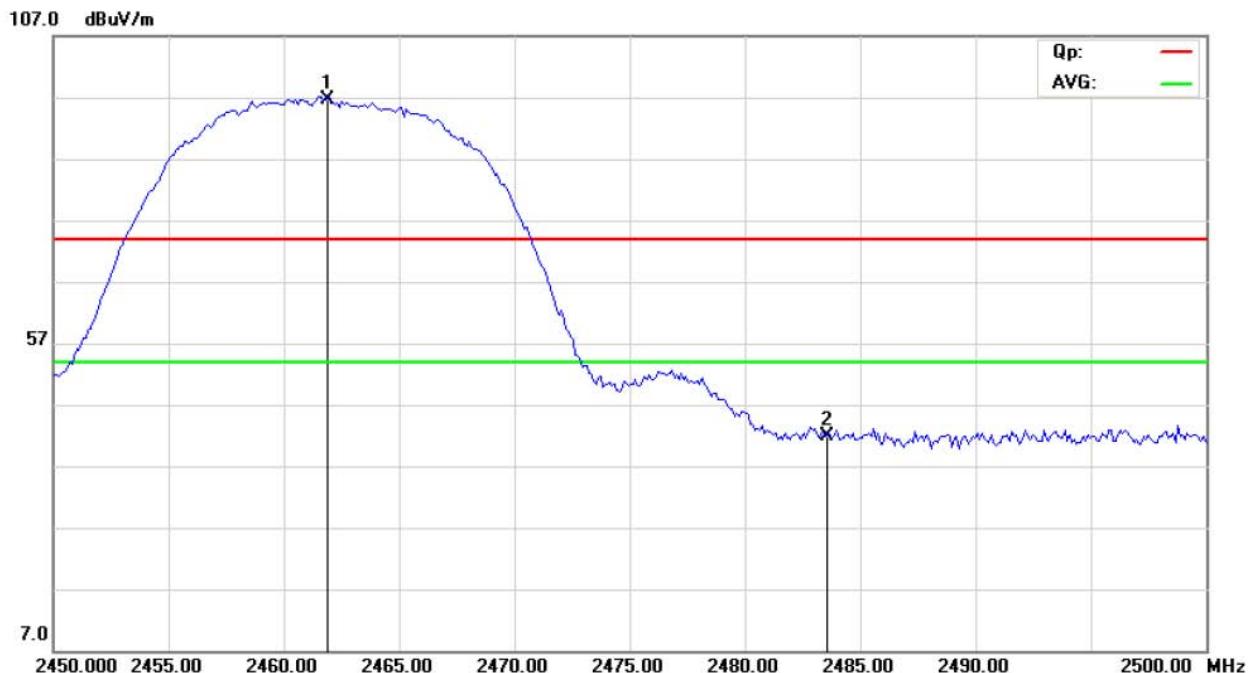
For 802.11b mode

CH11 at 11Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	41.90	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)

**Test Figure: Vertical**



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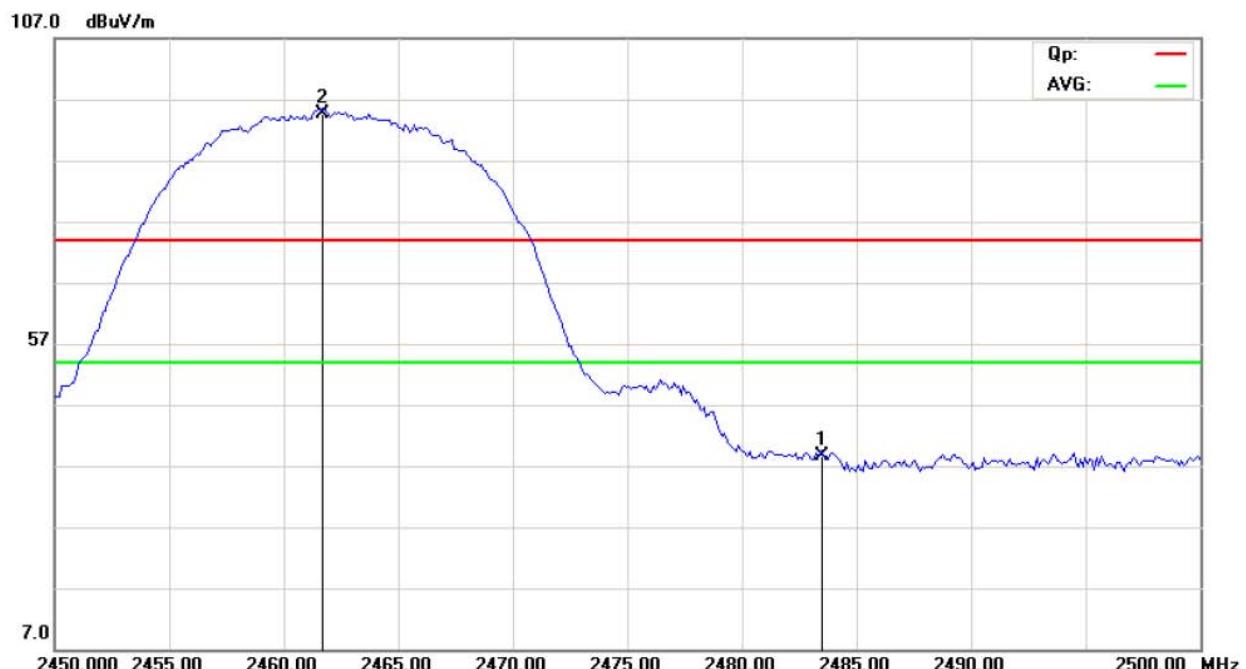
For 802.11b mode

CH11 at 11Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	38.57	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)

#### Test Figure: Horizontal



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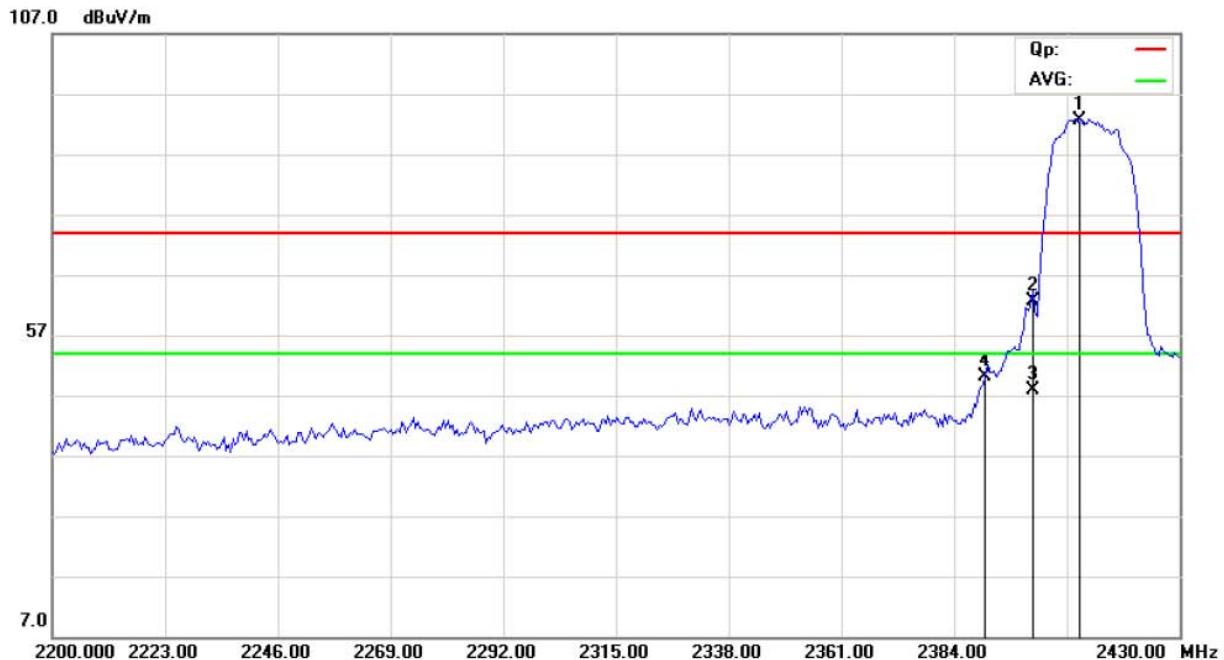
For 802.11g mode

CH01 at 54Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2390.000	PK (dB $\mu$ V/m)	50.18	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)
2400.000	PK (dB $\mu$ V/m)	62.63	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	47.92		54(dB $\mu$ V/m)

Test Figure: Horizontal



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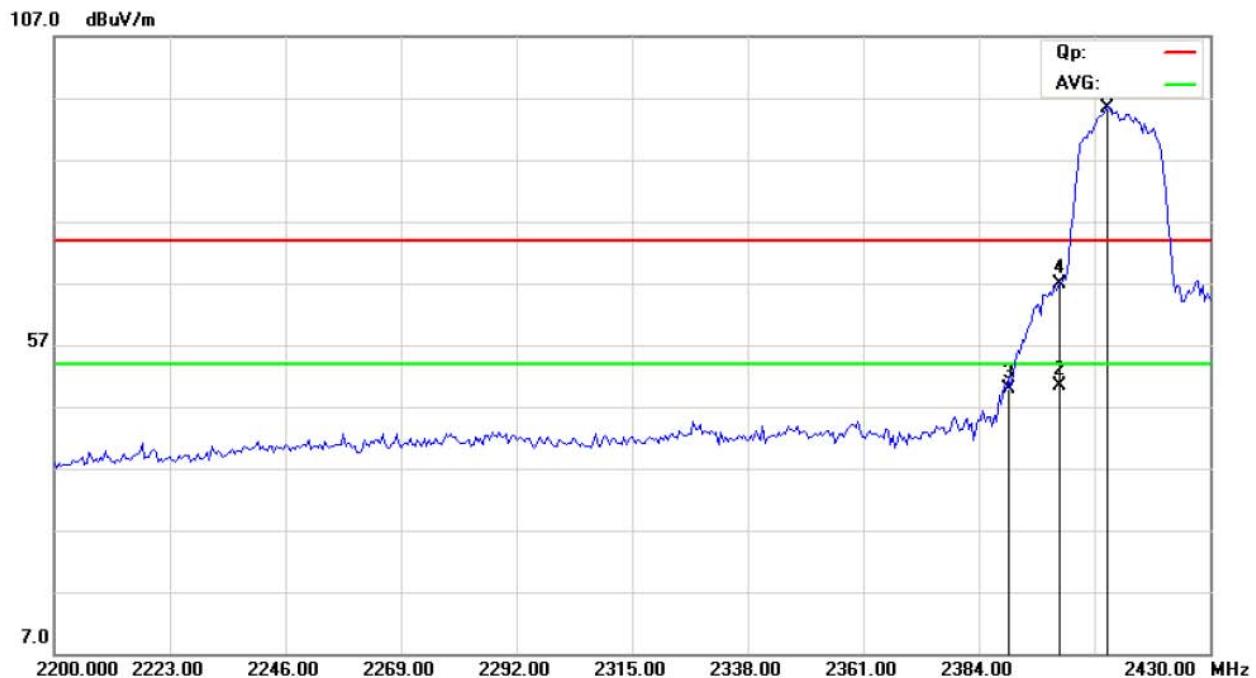
For 802.11g mode

CH01 at 54Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2390.000	PK (dB $\mu$ V/m)	49.86	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)
2400.000	PK (dB $\mu$ V/m)	66.78	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	50.45		54(dB $\mu$ V/m)

Test Figure: Vertical



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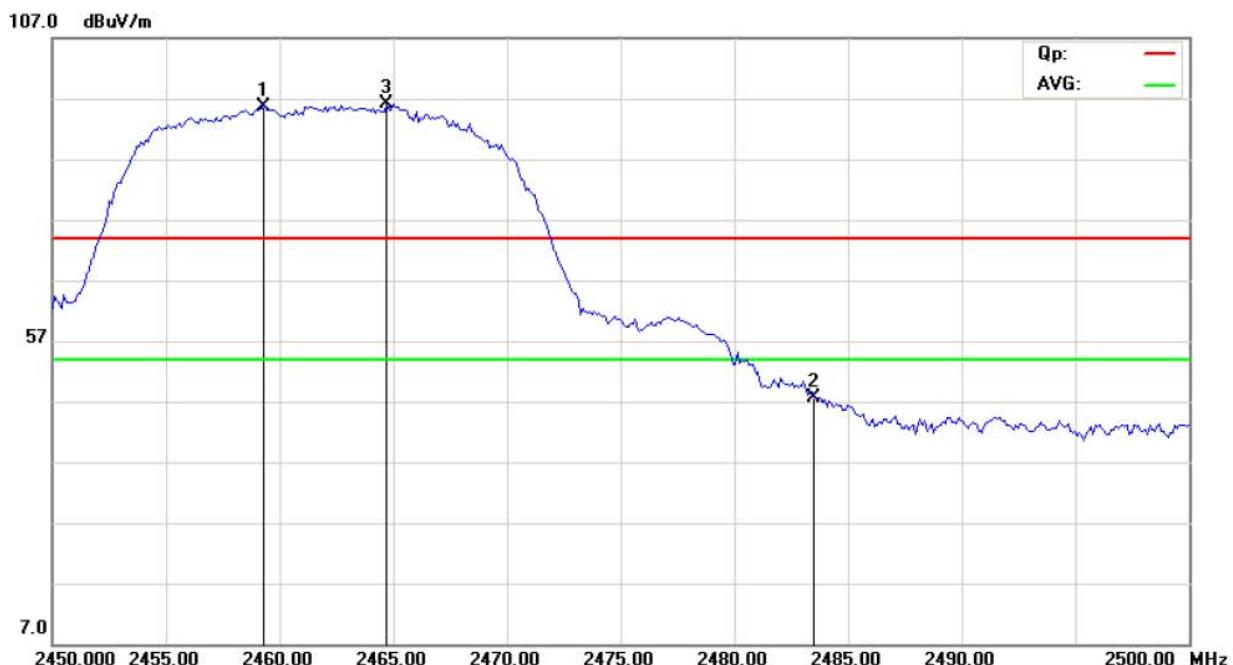
For 802.11g mode

CH11 at 54Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	47.62	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)

Test Figure: Vertical



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For 802.11g mode

CH11 at 54Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	42.68	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)

#### Test Figure: Horizontal



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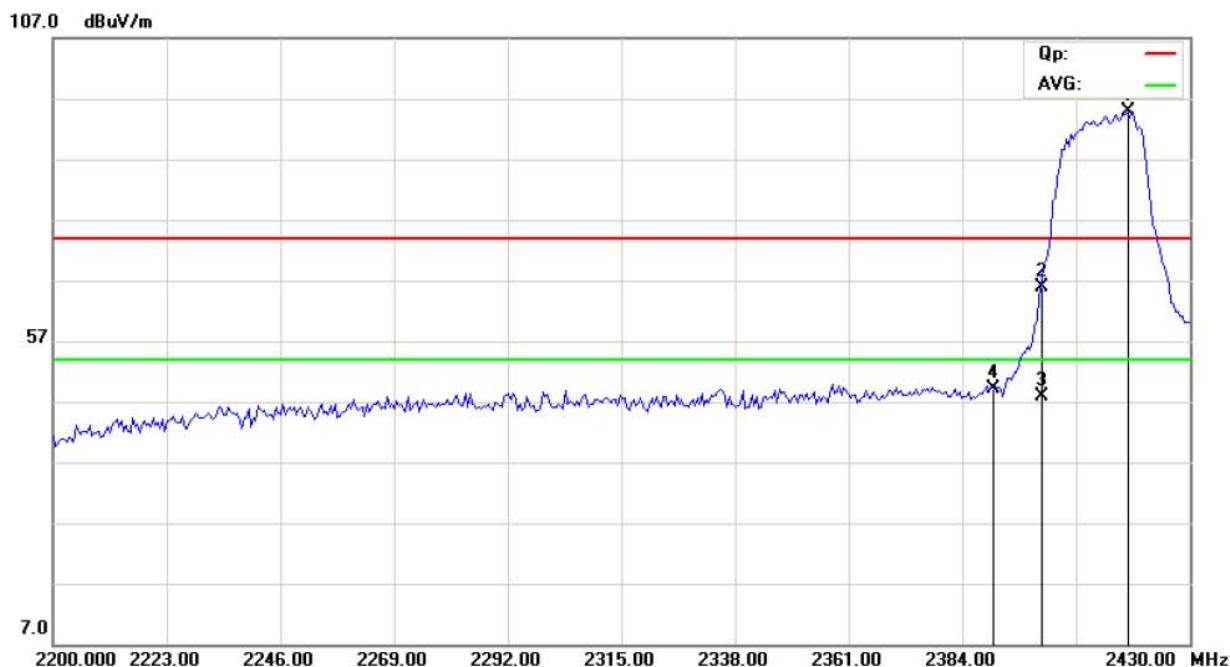
For 802.11n mode

CH01 at 11n HT20 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2390.000	PK (dB $\mu$ V/m)	49.19	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)
2400.000	PK (dB $\mu$ V/m)	65.89	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	47.85		54(dB $\mu$ V/m)

Test Figure: Horizontal



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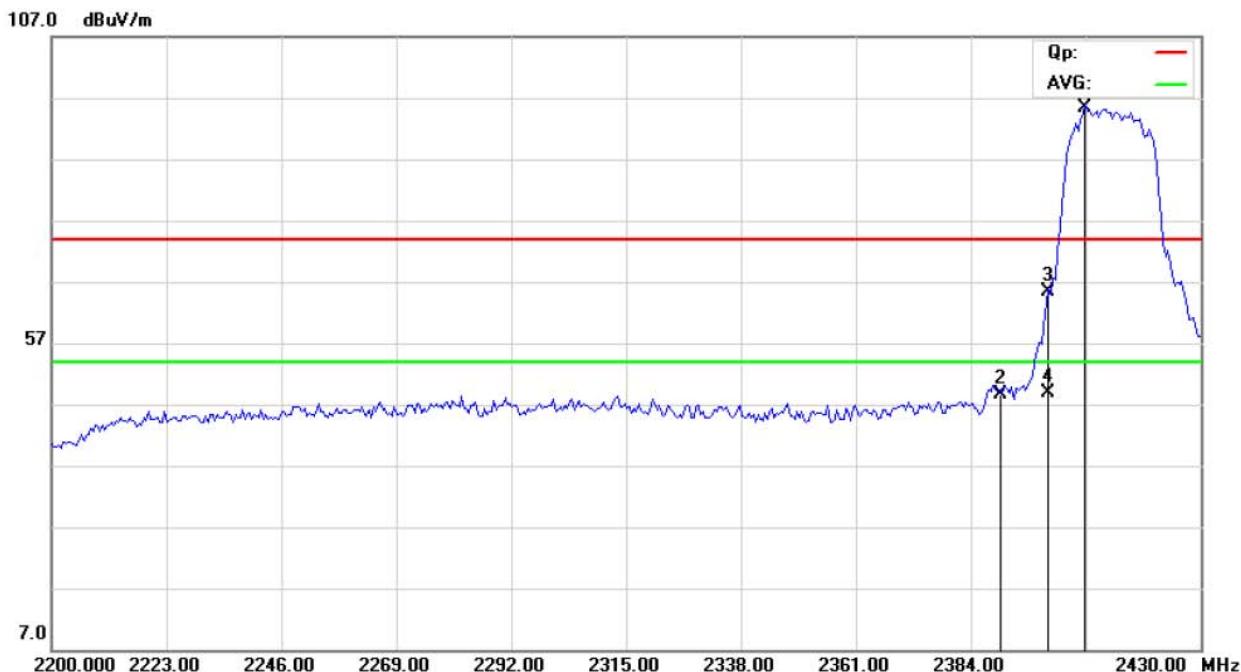
For 802.11n mode

CH01 at 11n HT20 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2390.000	PK (dB $\mu$ V/m)	48.57	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)
2400.000	PK (dB $\mu$ V/m)	65.37	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	48.88		54(dB $\mu$ V/m)

Test Figure: Vertical



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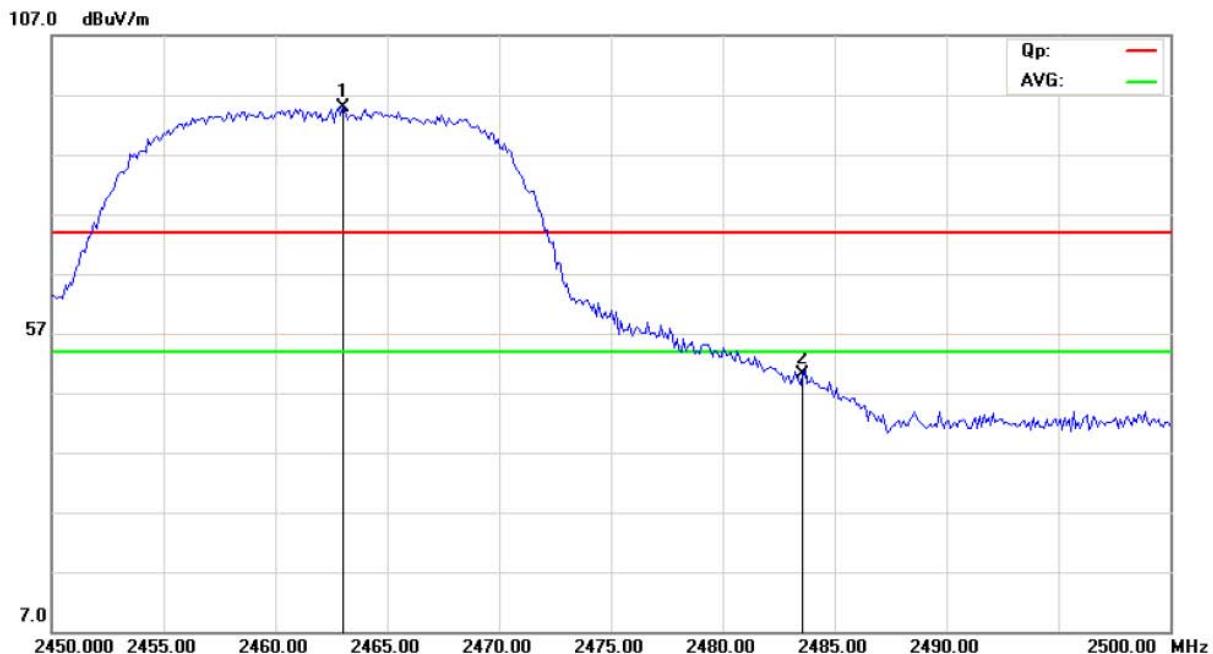
For 802.11n mode

CH11 at 11n HT20 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	50.14	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)

**Test Figure: Vertical**



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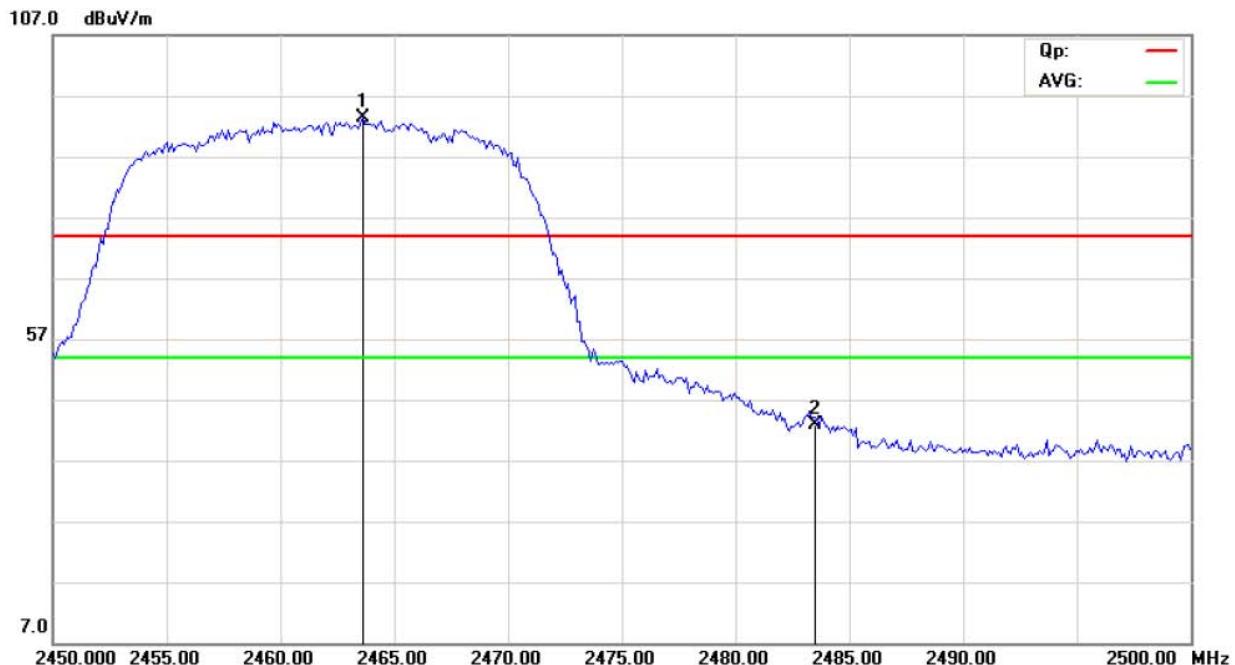
For 802.11n mode

CH11 at 11n HT20 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	42.83	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	--		54(dB $\mu$ V/m)

**Test Figure: Horizontal**



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For 802.11n mode

CH01 at 11n HT40 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2390.000	PK (dB $\mu$ V/m)	60.77	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	45.54		54(dB $\mu$ V/m)
2400.000	PK (dB $\mu$ V/m)	66.35	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	48.92		54(dB $\mu$ V/m)

**Test Figure: Horizontal**



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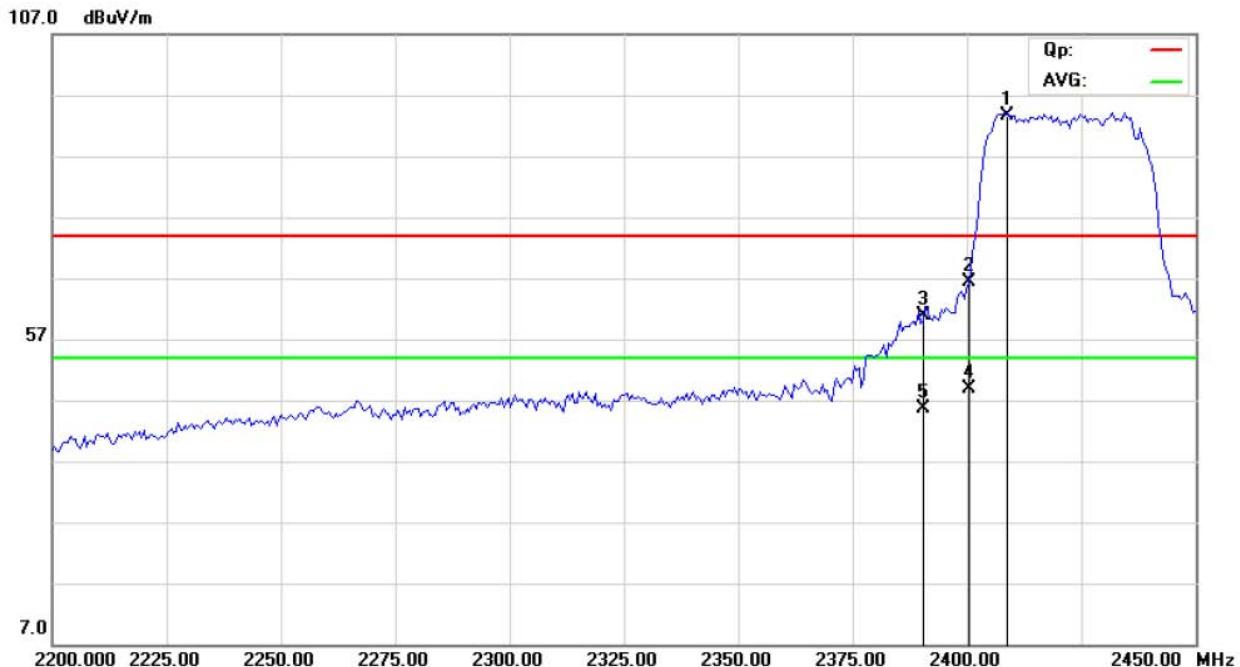
For 802.11n mode

CH01 at 11n HT40 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2390.000	PK (dB $\mu$ V/m)	65.76	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	49.66		54(dB $\mu$ V/m)
2400.000	PK (dB $\mu$ V/m)	70.04	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	50.96		54(dB $\mu$ V/m)

Test Figure: Vertical



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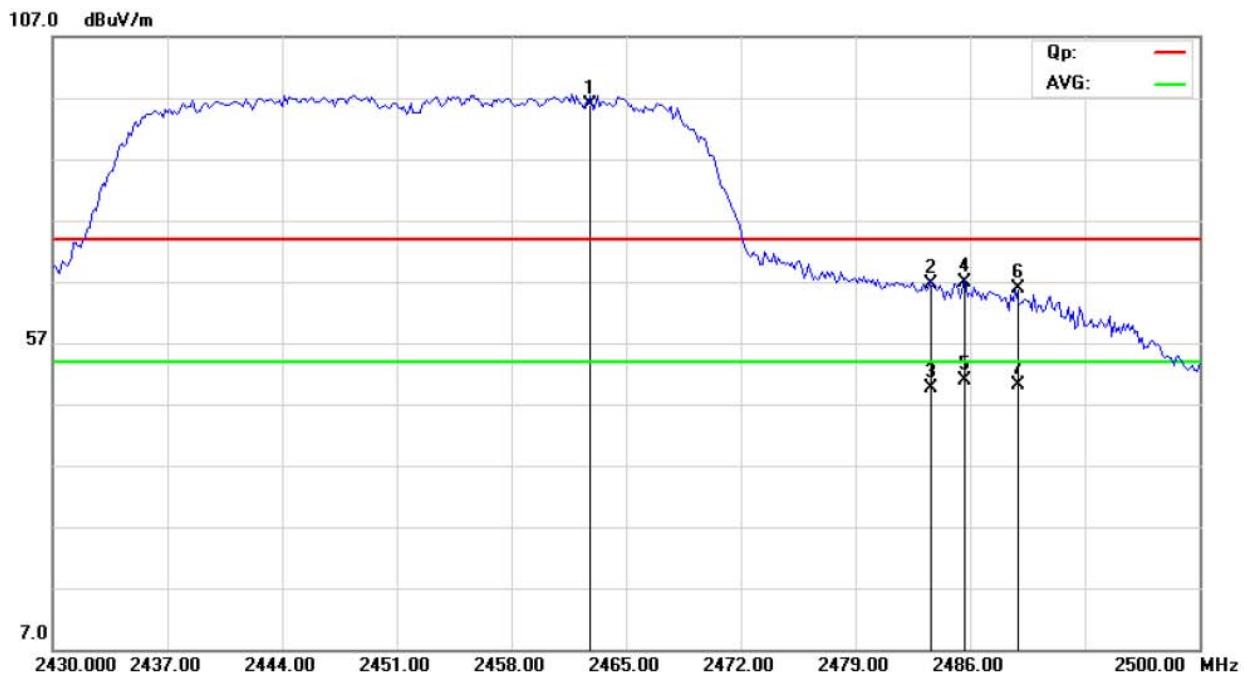
For 802.11n mode

CH11 at 11n HT40 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	66.64	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	49.52		54(dB $\mu$ V/m)
2485.691	PK (dB $\mu$ V/m)	66.99	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	50.84		54(dB $\mu$ V/m)
2488.918	PK (dB $\mu$ V/m)	65.89	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	50.21		54(dB $\mu$ V/m)

Test Figure: Vertical



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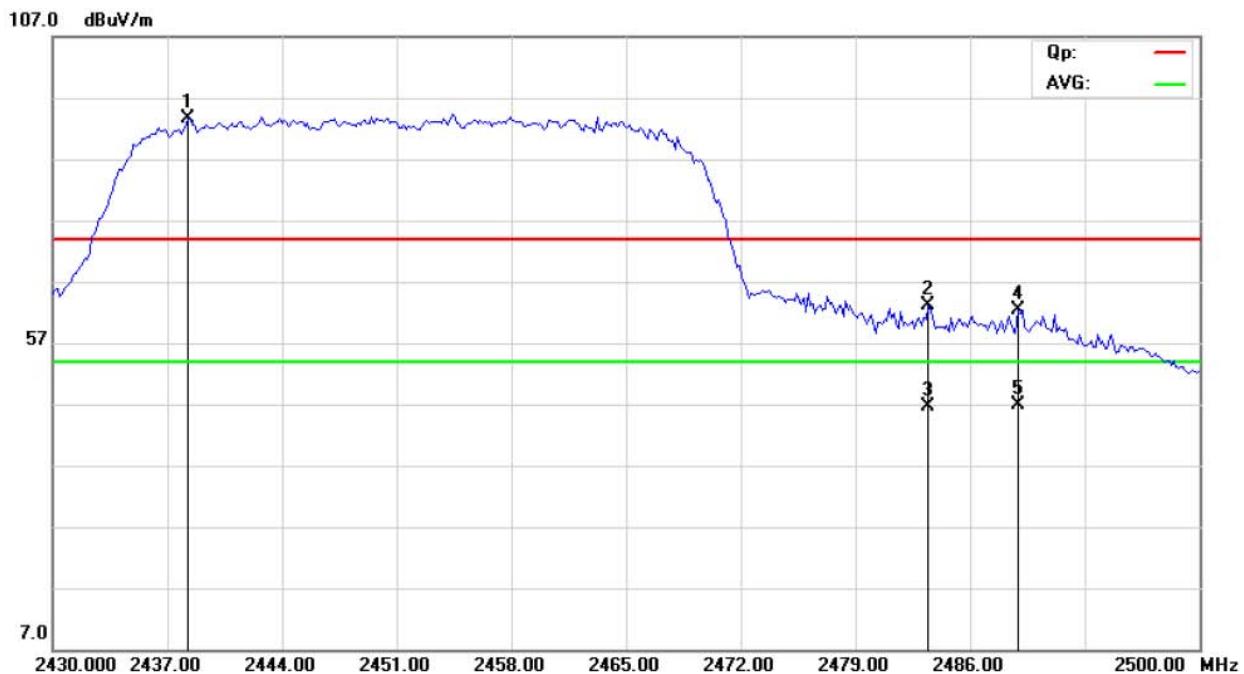
For 802.11n mode

CH11 at 11n HT40 65Mbps

#### 10.4 Restricted band Measurement

Product:	SET TOP BOX		Model:	HD409N
Mode	Keeping Transmitting		Input Voltage	AC 120V
Temperature	24 deg. C,		Humid Pity	56% RH
Test Result:	Pass		Detector	PK
2483.500	PK (dB $\mu$ V/m)	63.02	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	46.61		54(dB $\mu$ V/m)
2489.058	PK (dB $\mu$ V/m)	62.50	Limit	74(dB $\mu$ V/m)
	AV (dB $\mu$ V/m)	46.81		54(dB $\mu$ V/m)

**Test Figure: Horizontal**



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## 11.0 Antenna Requirement

### 11.1 Standard Applicable

For intentional device, according to FCC 47 CFR 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

### 11.2 Antenna Connected construction

PCB antenna used. The maximum Gain of the antennas is 3.3dBi.

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## 12.0 Maximum Permissible Exposure

### Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

#### (a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100000			5	6

#### (b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100000			1.0	30

Note: f=frequency in MHz; \*Plane-wave equivalent power density

### MPE Calculation Method

$$E \text{ (V/m)} = (30 * P * G)^{0.5} / d \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = E^2 / 377$$

**E** = Electric Field (V/m)

**P** = Peak RF output Power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = (30 * P * G) / (377 * d^2)$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

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## Calculated Result and Limit

**Antenna Gain: 3.3dBi**

Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
2.138	15.88	38.726	0.016	1	Compiles

**Note: the worse case was recorded.**

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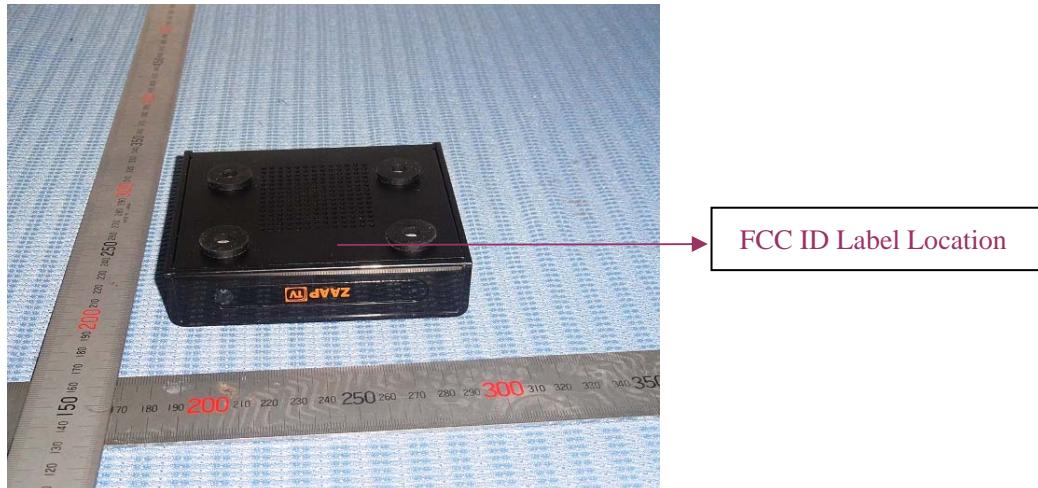
### 13.0 FCC ID Label

**FCC ID: R67HD409N**

**This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

#### Mark Location:



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#### 14.0 Photo of testing

Conducted Emissions



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Radiated Emissions

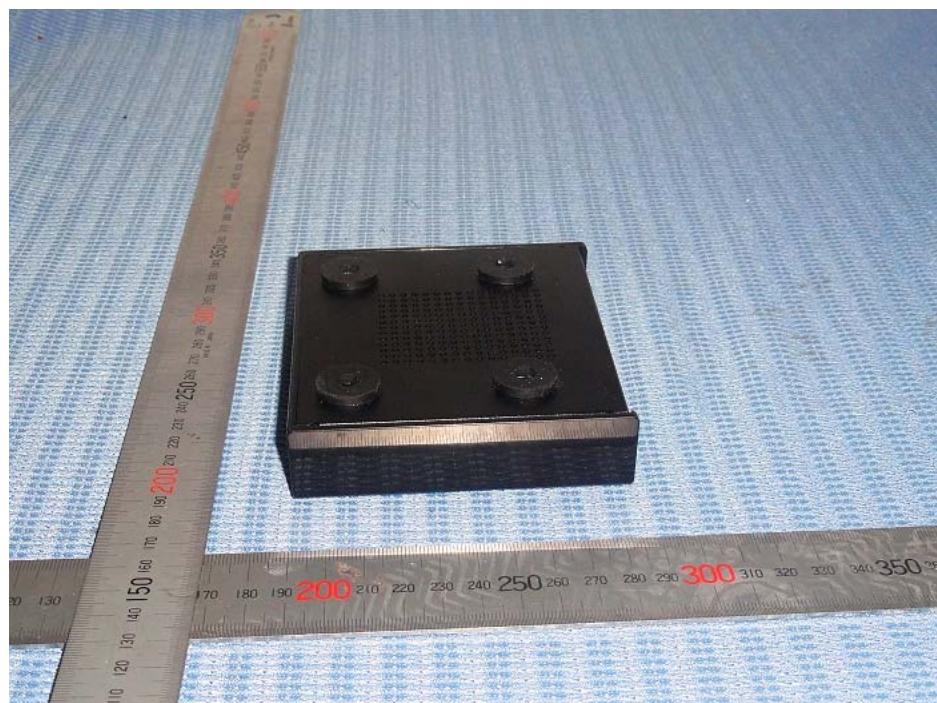


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**Outside view (ZAAP)**



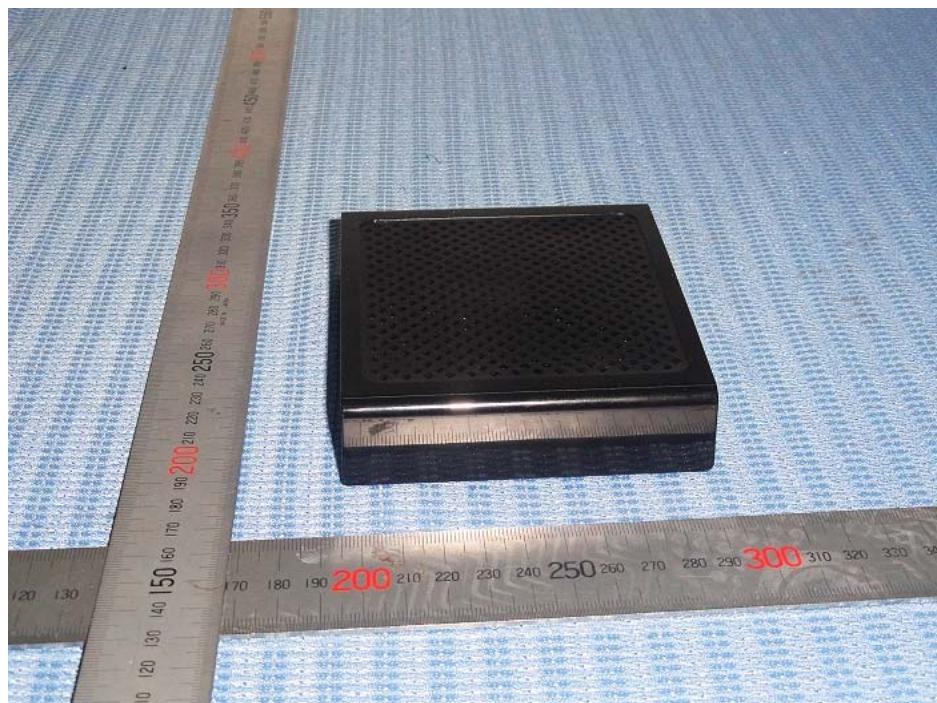
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## Appendix:

### Outside view (ZAAP)



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Inside view



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Inside view

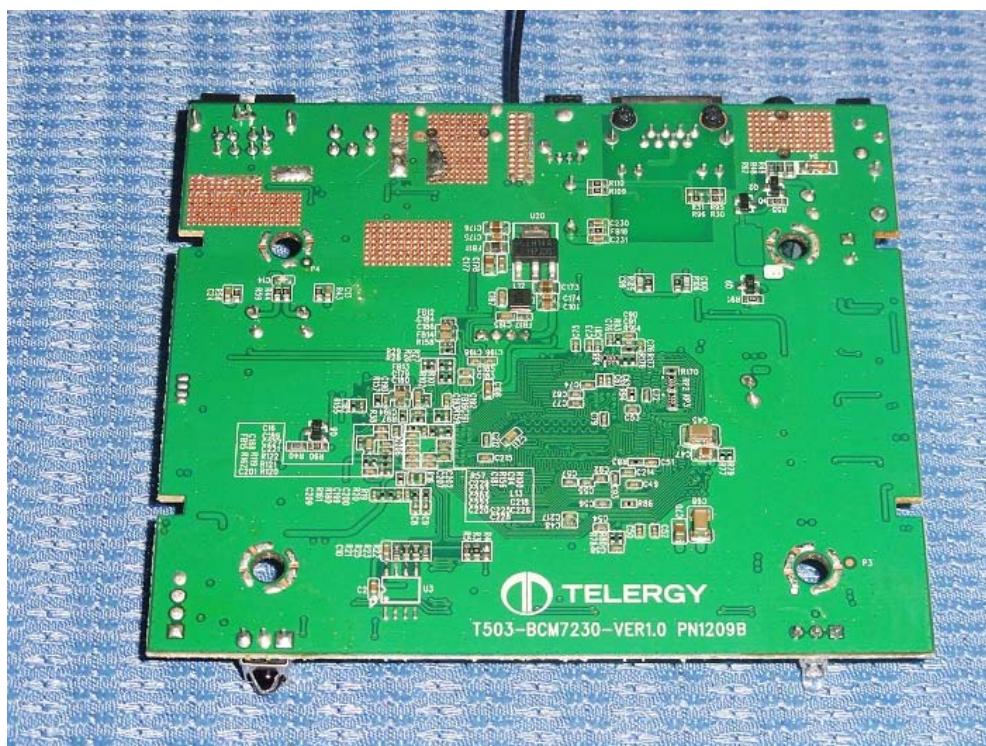


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Inside view



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Antenna

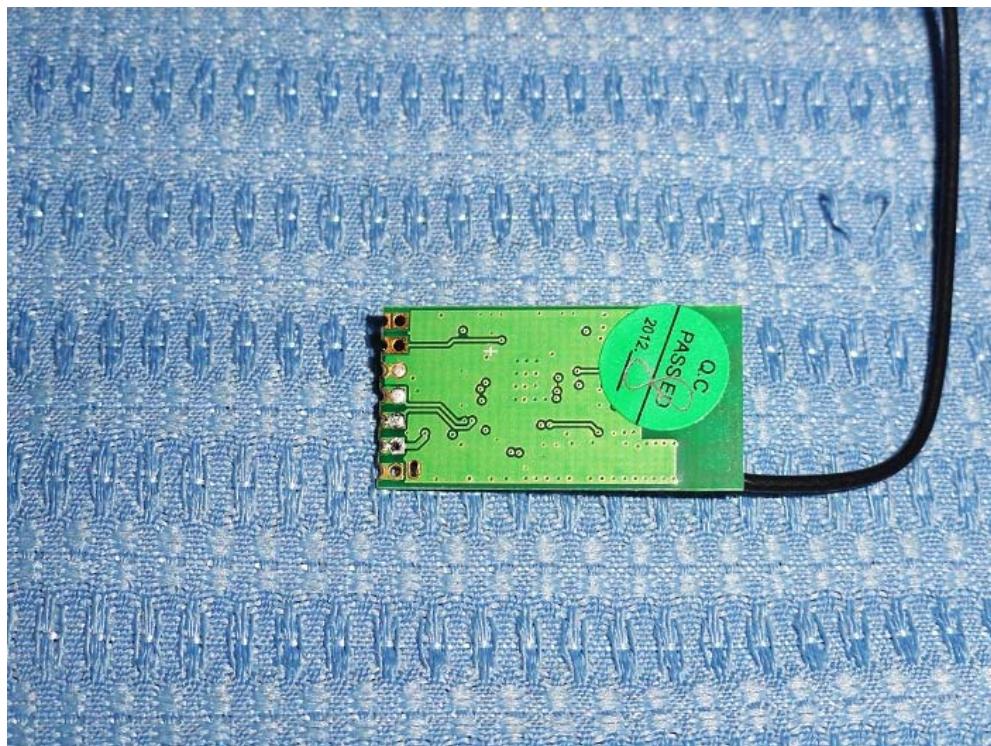
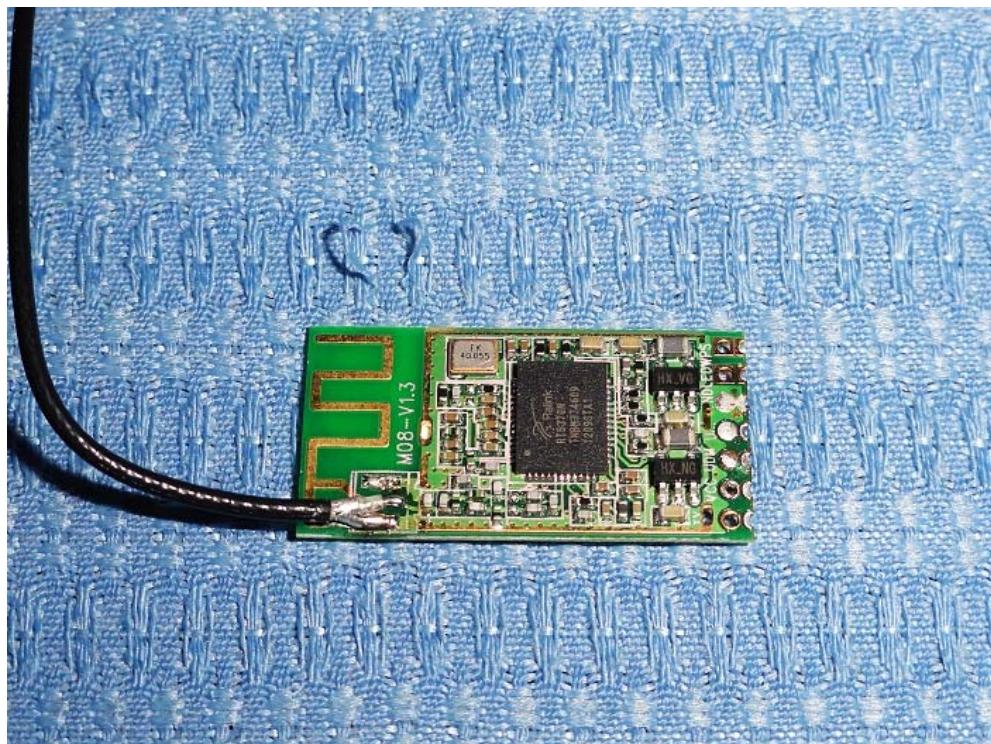


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Modular



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Photos of the Product



Power Supply: S024WM1200200



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Power Supply: S024WM1200200



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Power Supply: XA024AM1200200



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Power Supply: XA024AM1200200



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