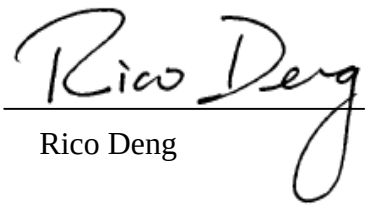
EMC
TEST REPORT

Report No. : EME-070405
Model No. : NBG-318S, NBG318S, PLA-450, PLA450, PLA-470, PLA470, 401666
Issued Date : Jun 22, 2007

Applicant : **ZyXEL Communications Corporation**
6, Innovation Rd. II, Science-Based Industrial Park, Hsin-Chu, Taiwan

Test By : **Intertek Testing Services Taiwan Ltd.**
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan

Project Engineer



Rico Deng

Reviewed By

Kevin Chen

Table of Contents

Summary of Tests

Powerline Wireless Ethernet Adapter-Model: NBG-318S
FCC ID: I88NBG318S

Test	Reference	Results
Minimum 6dB Bandwidth test	15.247(a)(2)	Pass
Maximum Output Power test	15.247(b)	Pass
RF Antenna Conducted Spurious test	15.247(d)	Pass
Radiated Spurious Emission test	15.205, 15.209	Pass
Power Spectrum Density test	15.247(e)	Pass
Emission on the Band Edge test	15.247(d)	Pass
AC Power Line Conducted Emission test	15.207	Pass

1. General information

1.1 Identification of the EUT

Applicant	: ZyXEL Communications Corporation
Product	: Powerline Wireless Ethernet Adapter
Model No.	: NBG-318S
FCC ID.	: I88NBG318S
Frequency Range	: 2412MHz ~ 2462MHz
Channel Number	: 11 channels
Frequency of Each Channel	: 2412MHz, 2417MHz, 2422MHz, 2427MHz, 2432MHz, 2437MHz, 2442MHz, 2447MHz, 2452MHz, 2457MHz, 2462MHz
Type of Modulation	: DSSS, OFDM
Rated Power	: 100-240Vac, 50-60Hz
Power Cord	: 2C×0.75mm^2 ×1.8meter unshielded cable
Sample Received	: May 09, 2007
Test Date(s)	: May 17, 2007 ~ May 22, 2007

A FCC DoC report has been generated for the client.

1.2 Additional information about the EUT

The EUT is a Powerline Wireless Ethernet Adapter, and was defined as information technology equipment.

According to the hardware aspect, we verified the models listed as below are series model to NBG-318S (EUT), the difference please refer to the following table:

Model Number	Difference
NBG-318S / NBG318S	Powerline wireless AP with 4 Ethernet ports
PLA-450 / PLA450	Powerline wireless AP with one Ethernet port
PLA-470 / PLA470	Powerline with 4port switch
401666	-

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Antenna description

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 1.8dBi max
Antenna Type : Dipole antenna
Connector Type : SMA Plug Reverse

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Notebook PC	DELL	PP01L	CN-03P83-48643-33O-3930	FCC DoC Approved

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.205、§15.207、§15.209、§15.247 and ANSI C63.4/2003.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT was transmitted continuously during the test.

With individual verifying, the maximum output power was found out 1Mbps data rate for 802.11b mode and 6Mbps data rate for 802.11g mode. The final tests were executed under these conditions and recorded in this report individually.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/17/2008
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/24/2007
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	11/01/2007
Horn Antenna	SCHWARZBECK	1GHz~18GHz	BBHA 9120 D	EC371	12/22/2007
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2007
Bilog Antenna	SCHWARZBECK	25MHz~2GHz	VULB 9168	EC347	12/23/2007
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	02/11/2008
Wideband Peak Power Meter/ Sensor	Anritsu	100MHz~18GHz	ML2497A/ MA2491A	EC396	11/10/2007
Controller	HDGmbH	N/A	CM 100	EP346	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP347	N/A
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/13/2008

Note: The above equipments are within the valid calibration period.

3. Minimum 6dB Bandwidth test

3.1 Operating environment

Temperature: 23 ℃
Relative Humidity: 54 %
Atmospheric Pressure: 1023 hPa

3.2 Test setup & procedure

The minimum 6dB bandwidth per FCC §15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 100kHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel). The minimum 6-dB modulation bandwidth is in the following Table.

3.3 Measured data of Minimum 6dB Bandwidth test results

Test Mode: 802.11b mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1 (lowest)	2412	13.04	＞500kHz
6 (middle)	2437	13.04	＞500kHz
11 (highest)	2462	13.12	＞500kHz

Test Mode: 802.11g mode

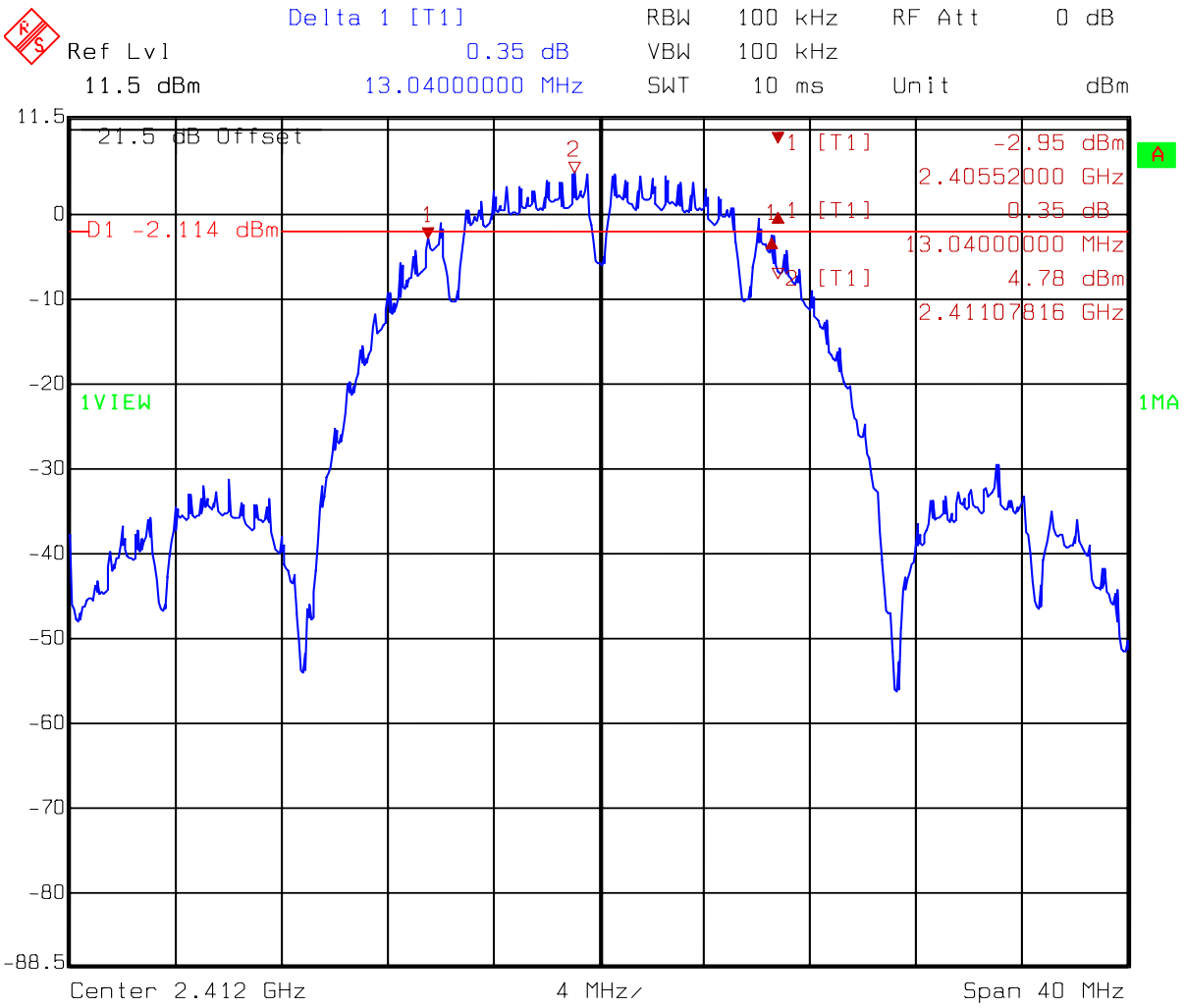
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1 (lowest)	2412	16.72	＞500kHz
6 (middle)	2437	16.80	＞500kHz
11 (highest)	2462	16.56	＞500kHz

Test Mode: 802.11g turbo mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
6 (middle)	2437	32.84	＞500kHz

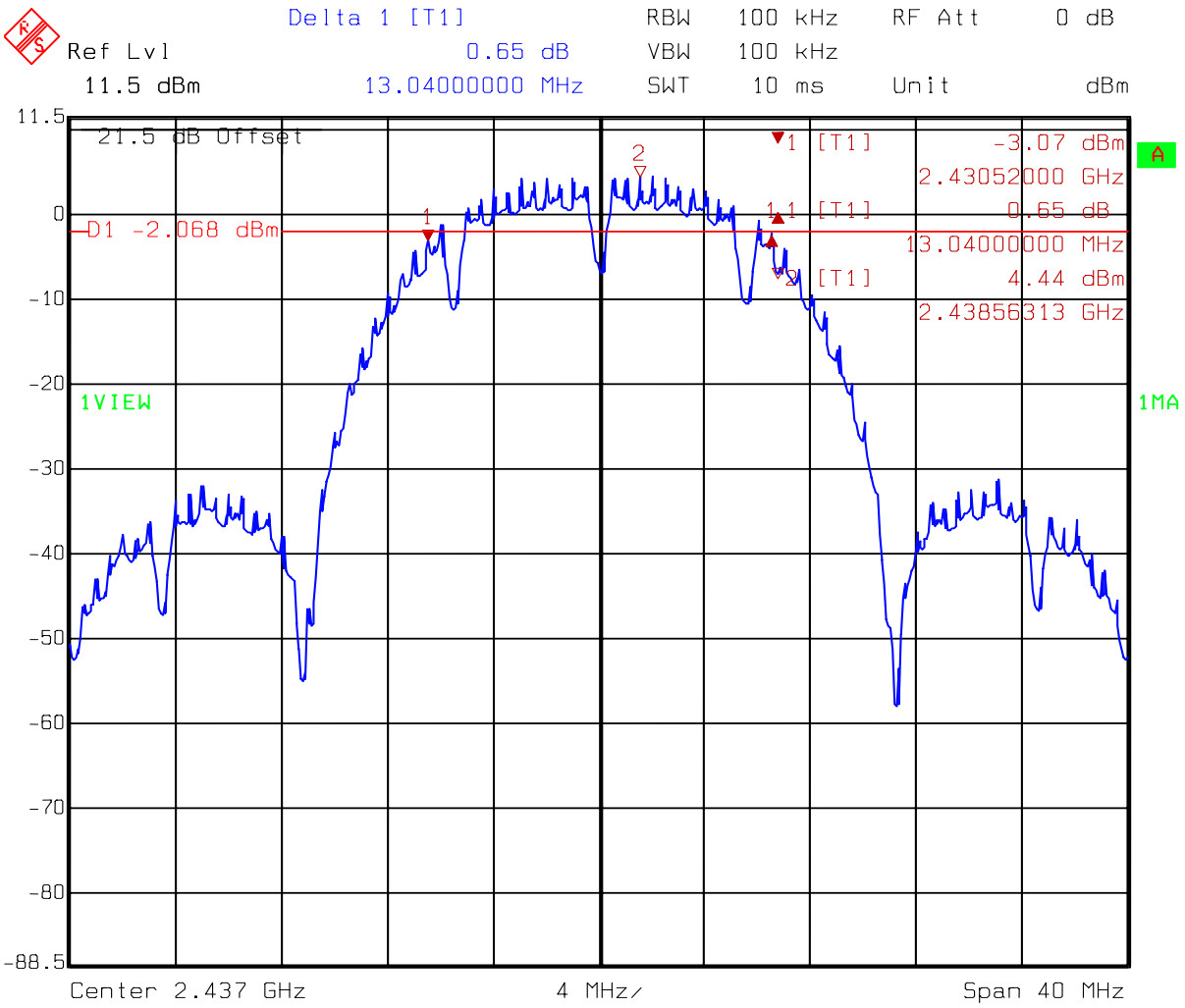
Please see the plot below.

Test Mode: 802.11b mode (ch1)



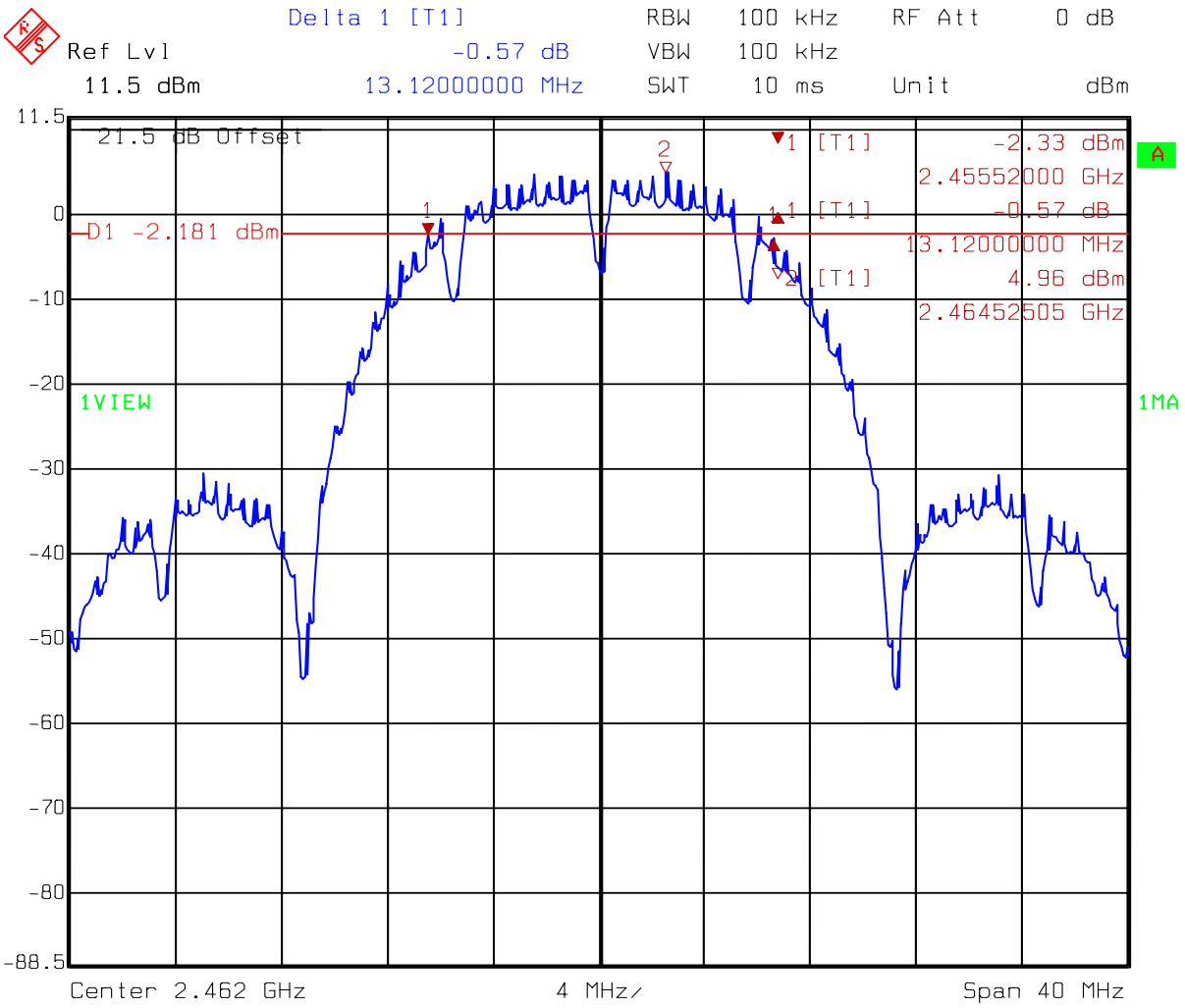
Title: 6dB Band-Width
Comment A: CH 1 at 802.11b mode
Date: 14.MAY 2007 16:17:38

Test Mode: 802.11b mode (ch6)



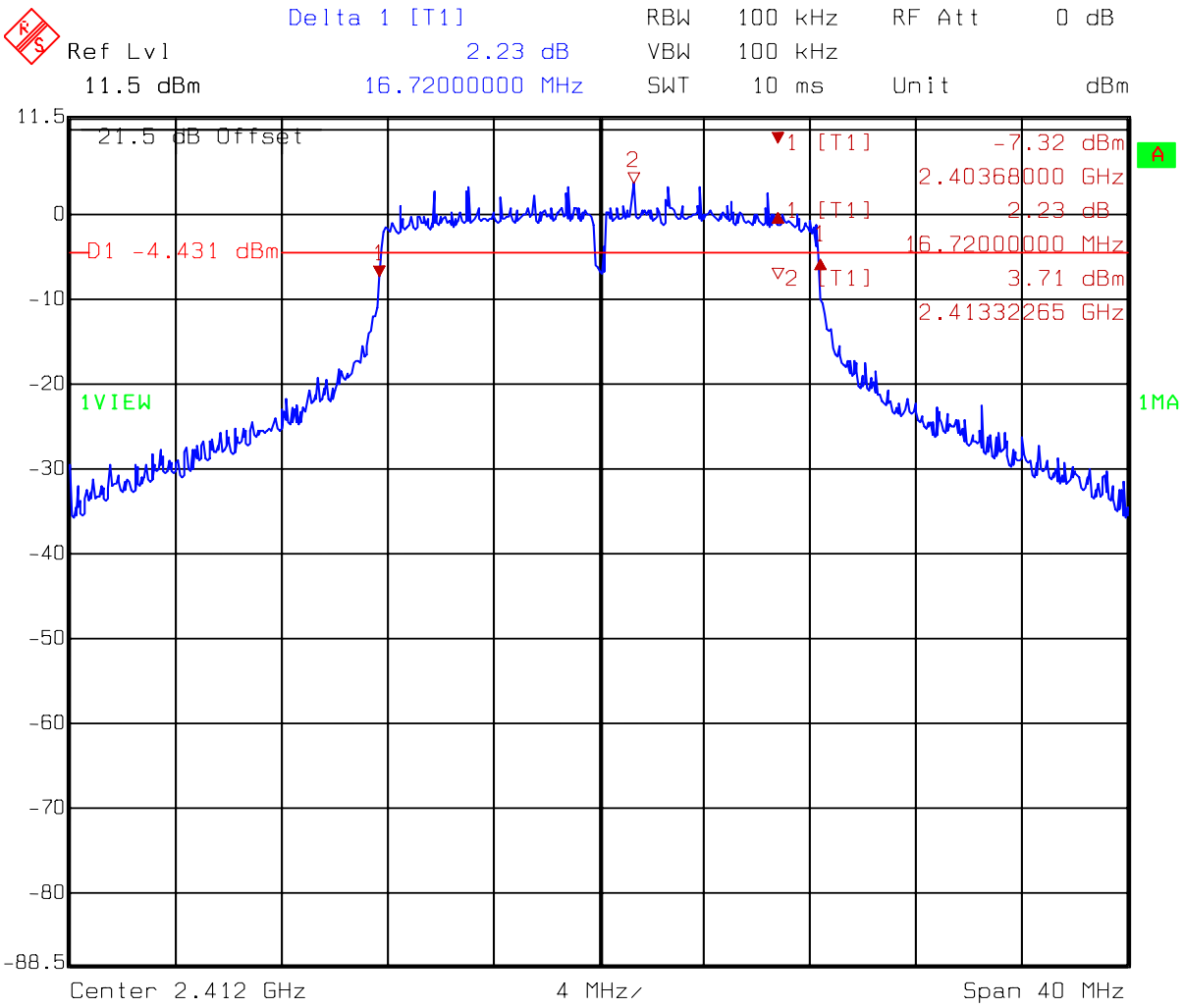
Title: 6dB Band-Width
Comment A: CH 6 at 802.11b mode
Date: 14.MAY 2007 16:27:28

Test Mode: 802.11b mode (ch11)



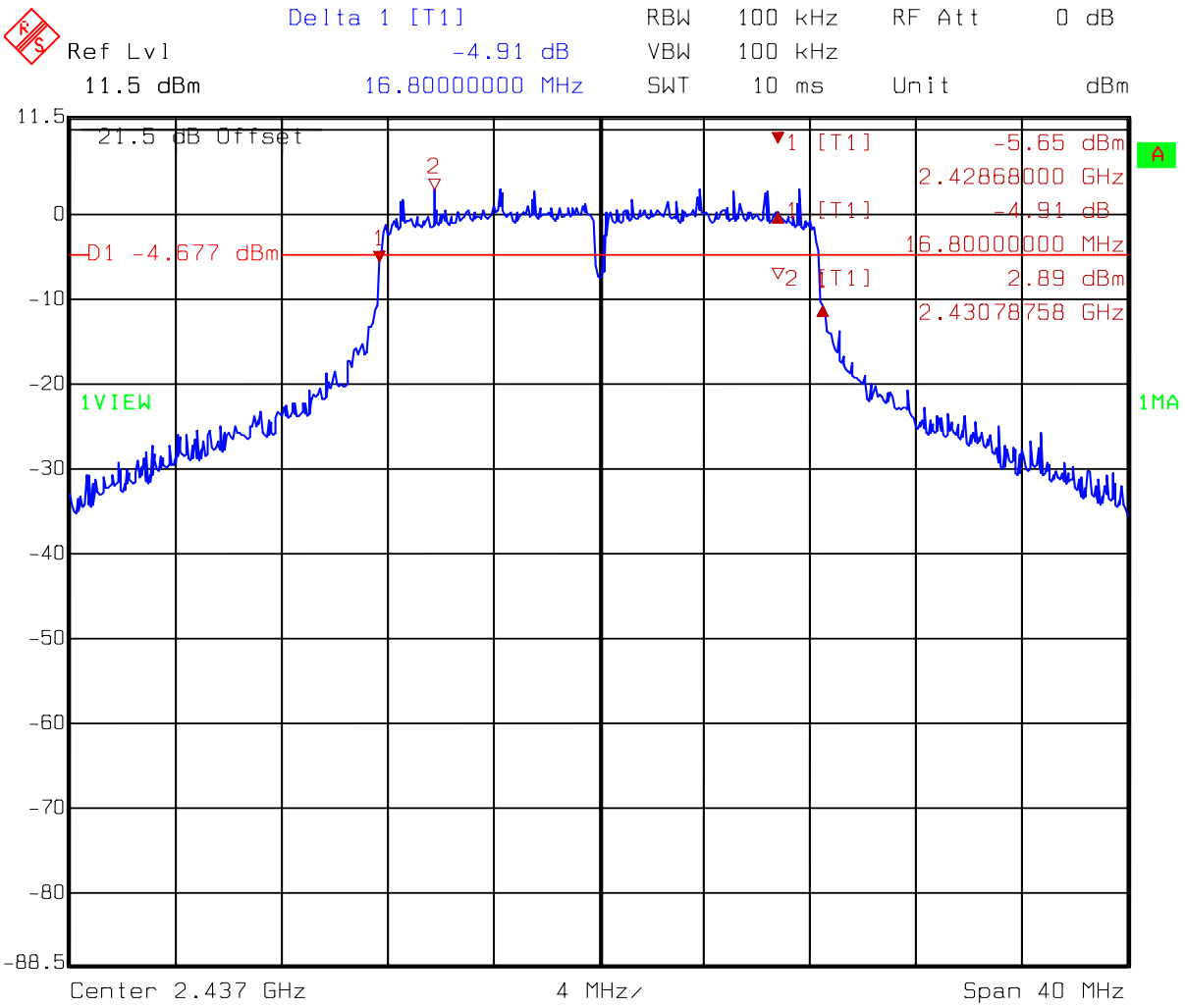
Title: 6dB Band-Width
Comment A: CH 11 at 802.11b mode
Date: 14.MAY 2007 16:29:46

Test Mode: 802.11g mode (ch1)



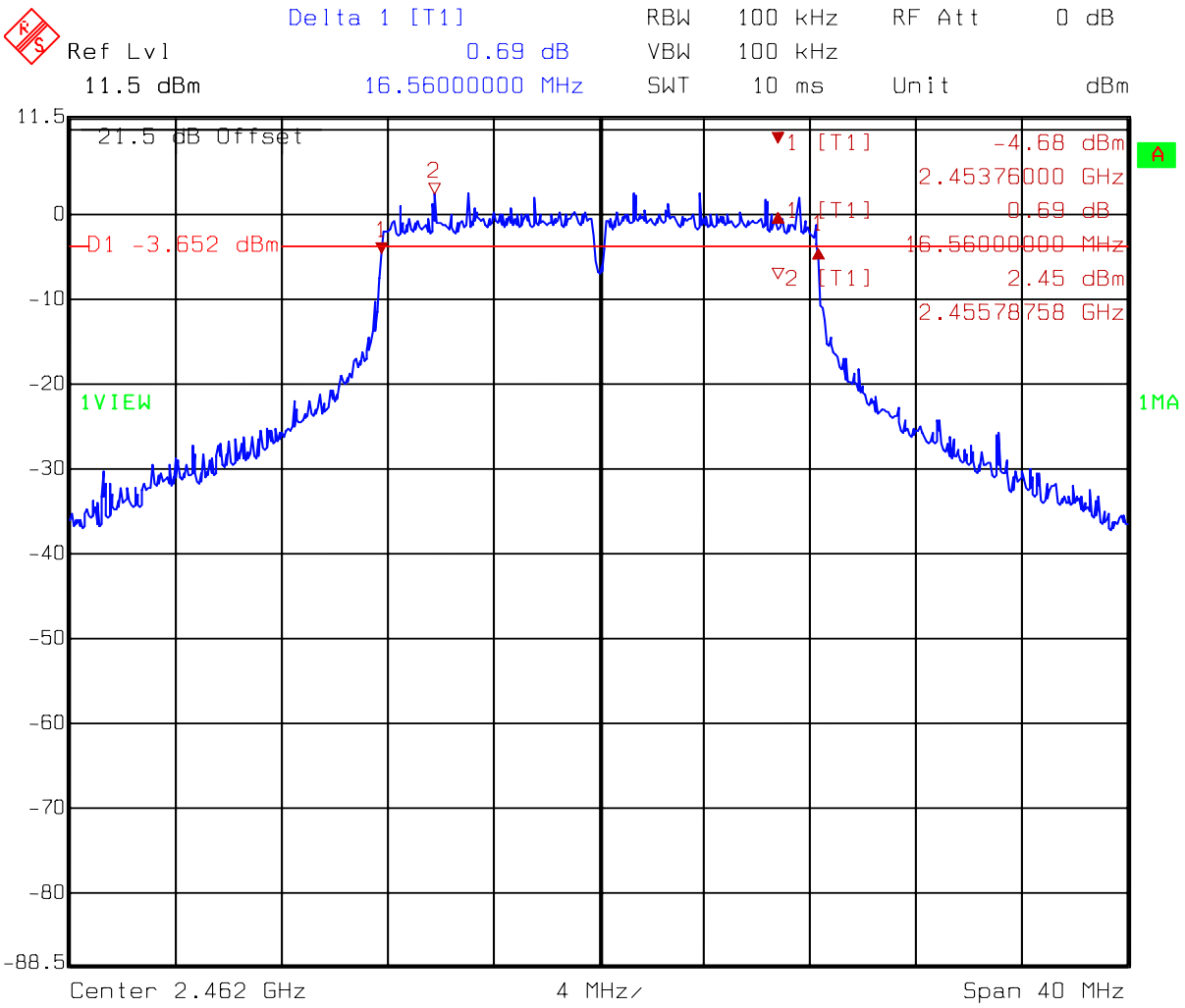
Title: 6dB Band-Width
Comment A: CH 1 at 802.11g mode
Date: 14.MAY 2007 16:36:15

Test Mode: 802.11g mode (ch6)



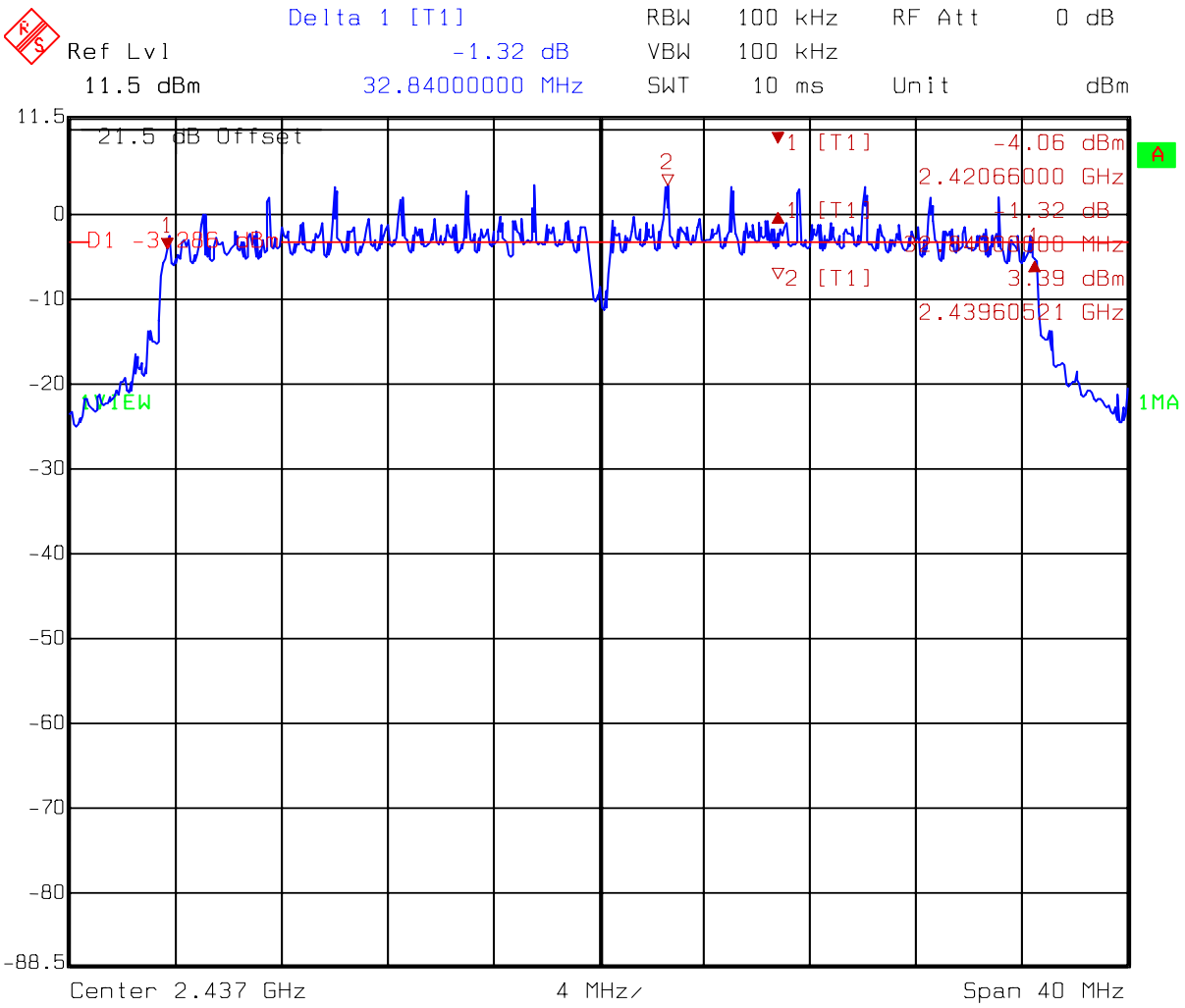
Title: 6dB Band-Width
Comment A: CH 6 at 802.11g mode
Date: 14.MAY 2007 16:37:22

Test Mode: 802.11g mode (ch11)



Title: 6dB Band-Width
Comment A: CH 11 at 802.11g mode
Date: 14.MAY 2007 16:34:29

Test Mode: 802.11g turbo mode (ch6)



Title: 6dB Band-Width
Comment A: CH 6 at 802.11g mode
Date: 14.MAY 2007 16:39:46

4. Maximum Output Power test

4.1 Operating environment

Temperature: 23 ℃
Relative Humidity: 54 %
Atmospheric Pressure: 1023 hPa

4.2 Test setup & procedure

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (2dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

4.3 Measured data of Maximum Output Power test results

Test Mode: 802.11b mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (W)
				(dBm)	(mW)	
1 (lowest)	2412	2	17.75	19.75	94.41	1
6 (middle)	2437	2	18.33	20.33	107.89	1
11 (highest)	2462	2	17.65	19.65	92.26	1

Test Mode: 802.11g mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (W)
				(dBm)	(mW)	
1 (lowest)	2412	2	19.44	21.44	139.32	1
6 (middle)	2437	2	21.84	23.84	242.10	1
11 (highest)	2462	2	19.14	21.14	130.02	1

Test Mode: 802.11g turbo mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (W)
				(dBm)	(mW)	
6 (middle)	2437	2	22.34	24.34	271.64	1

Remark: Conducted Peak Output Power = Reading + C.L.

5. RF Antenna Conducted Spurious test

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	58	%

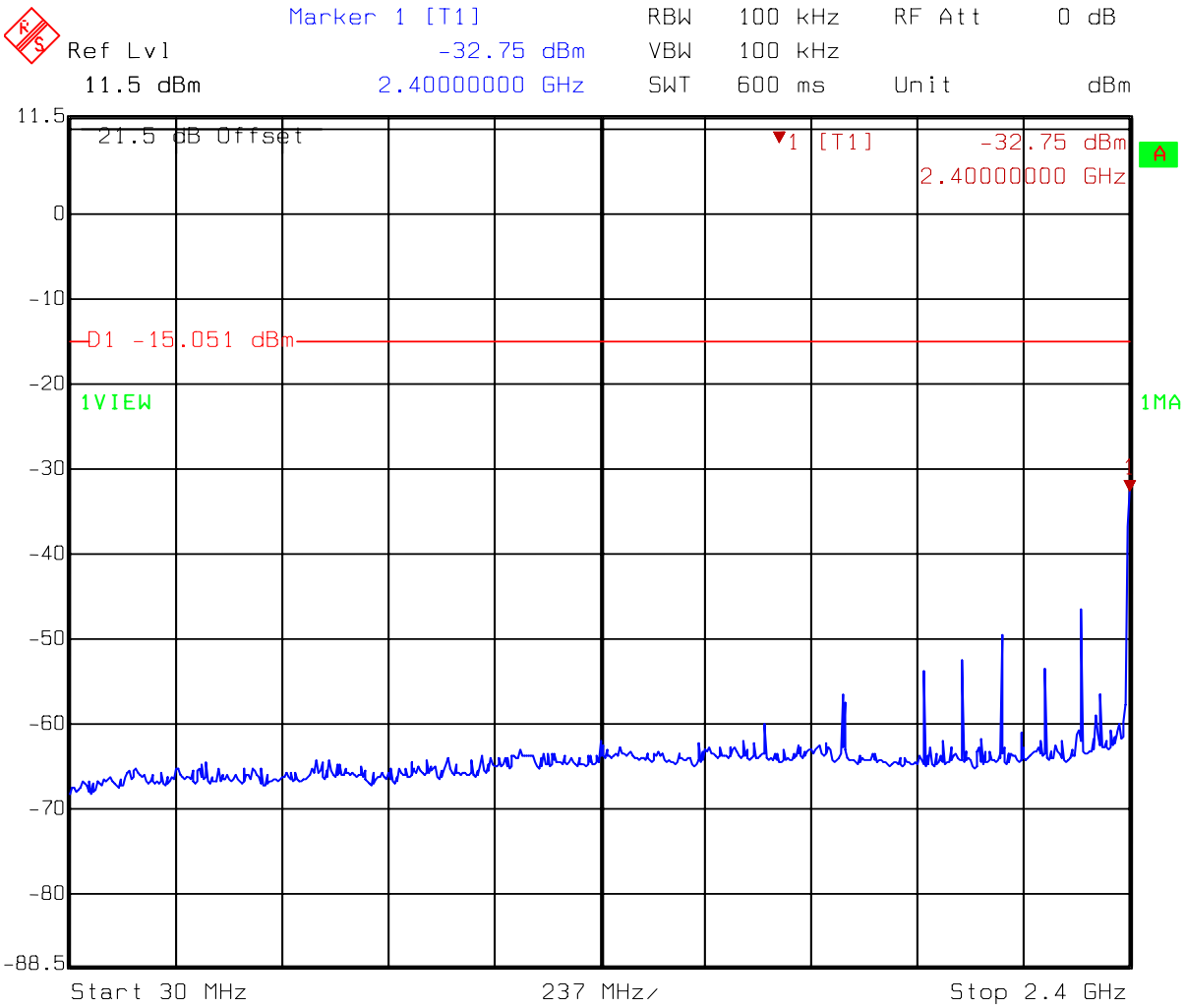
5.2 Test setup & procedure

The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (d) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.
Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel.

5.3 Measured data of the highest RF Antenna Conducted Spurious test result

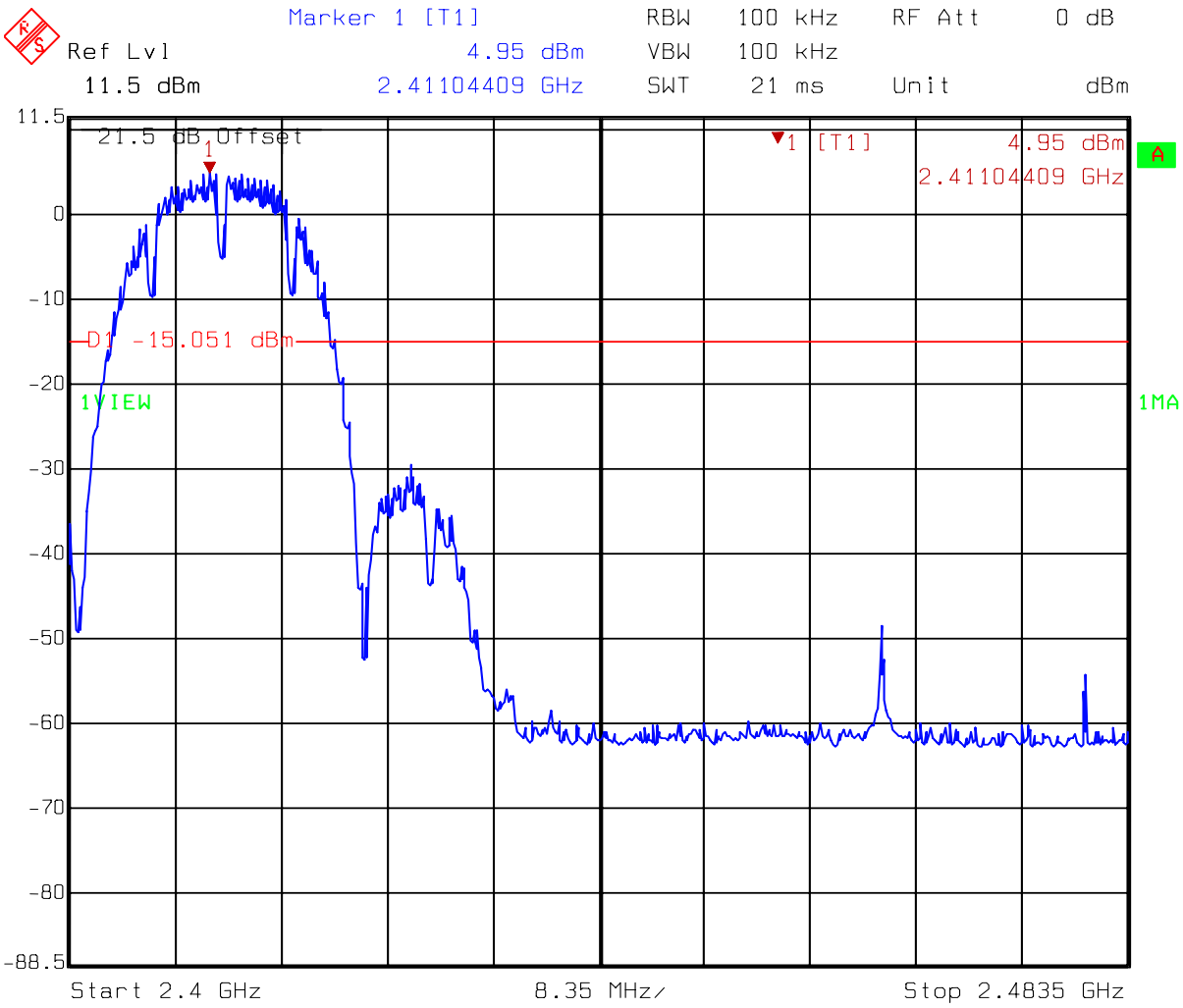
The test results please see the plot below.

Test Mode: 802.11b mode (ch1)



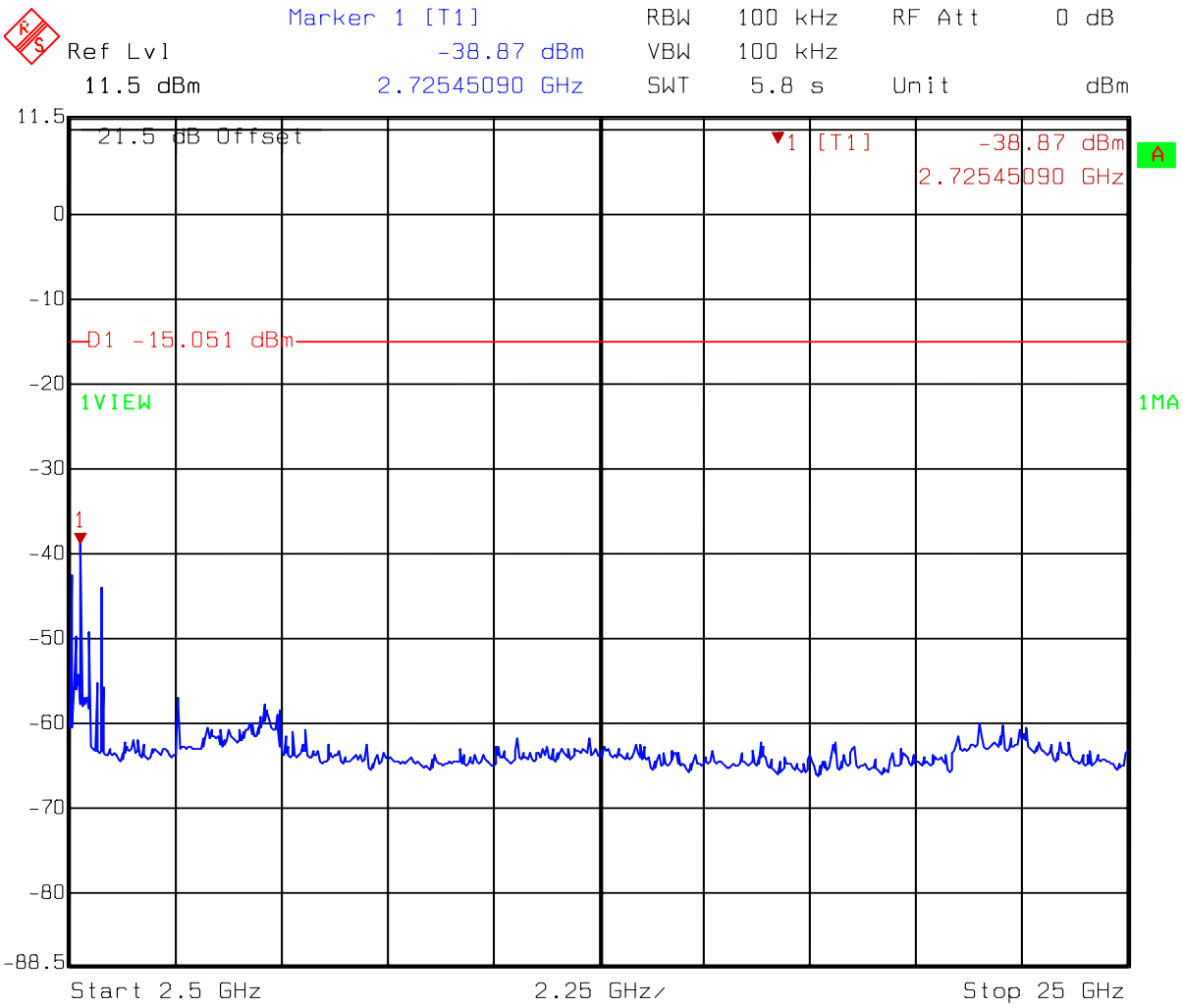
Title: Conductive-Spurious
Comment A: CH 1 at 802.11b mode 30MHz~2400MHz
Date: 14.MAY 2007 17:19:06

Test Mode: 802.11b mode (ch1)



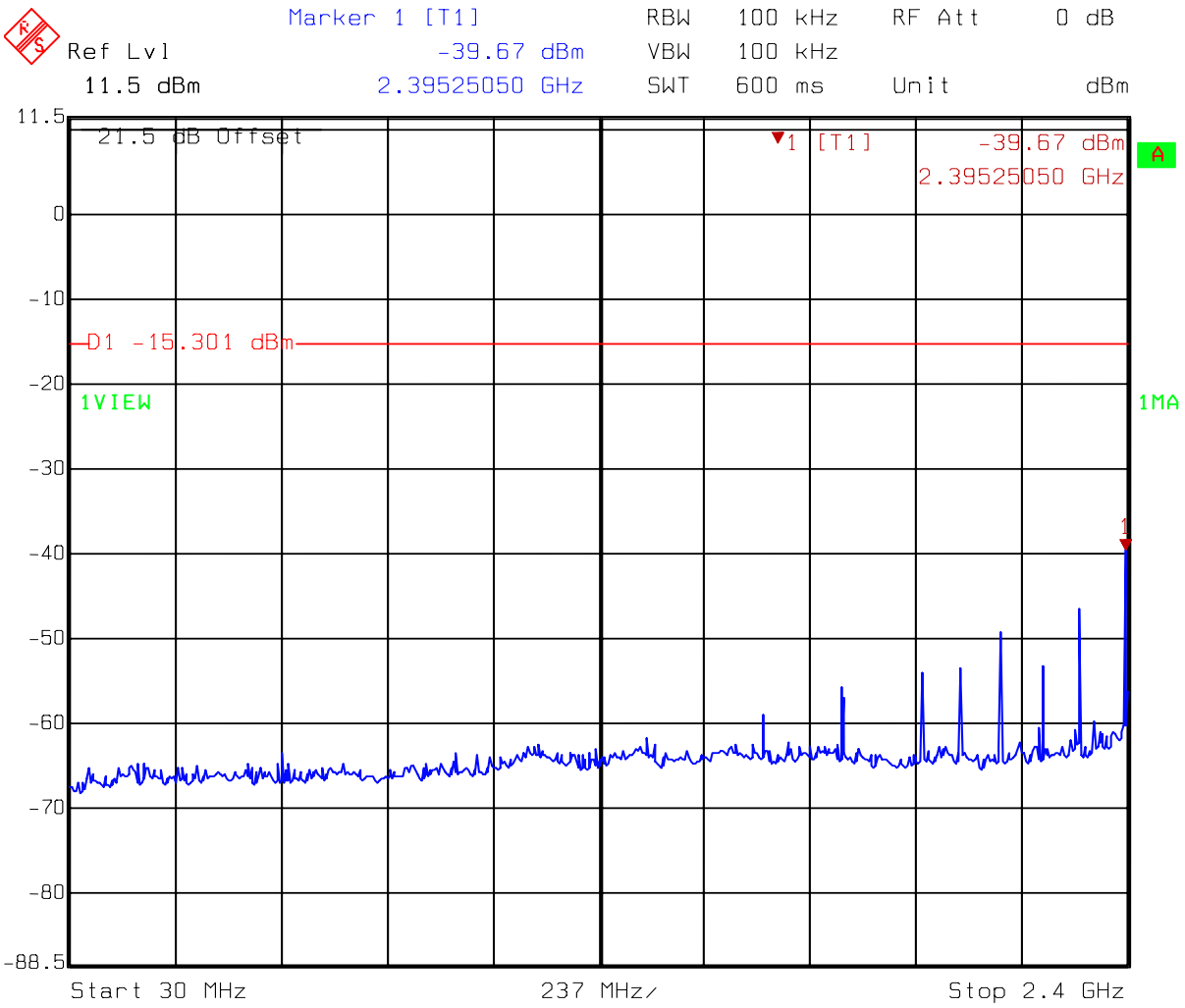
Title: Conductive-Spurious
Comment A: CH 1 at 802.11b mode 2400MHz~2483.5MHz
Date: 14.MAY 2007 17:18:44

Test Mode: 802.11b mode (ch1)



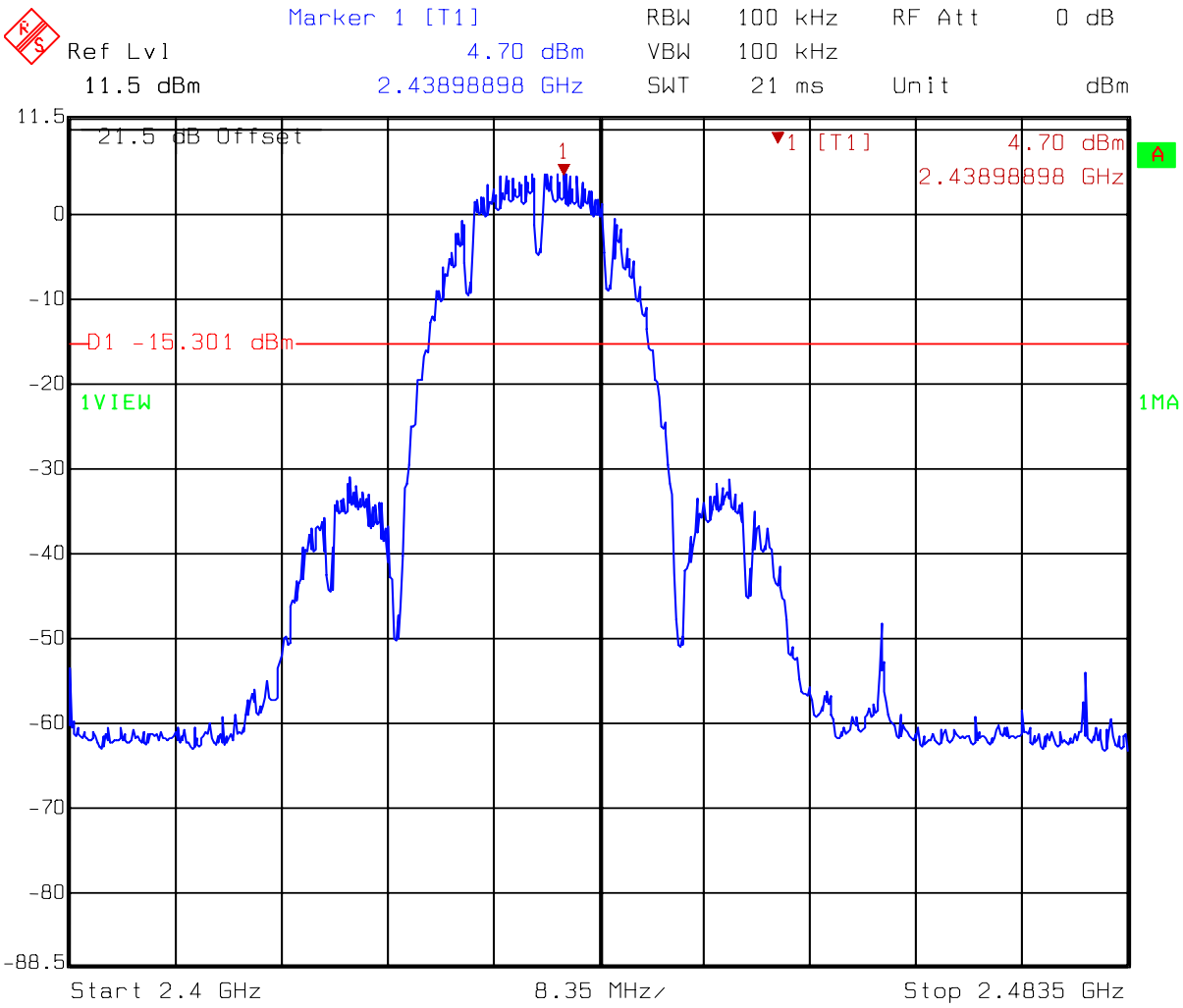
Title: Conductive-Spurious
Comment A: CH 1 at 802.11b mode 2483.5MHz~25GHz
Date: 14.MAY 2007 17:19:33

Test Mode: 802.11b mode (ch6)



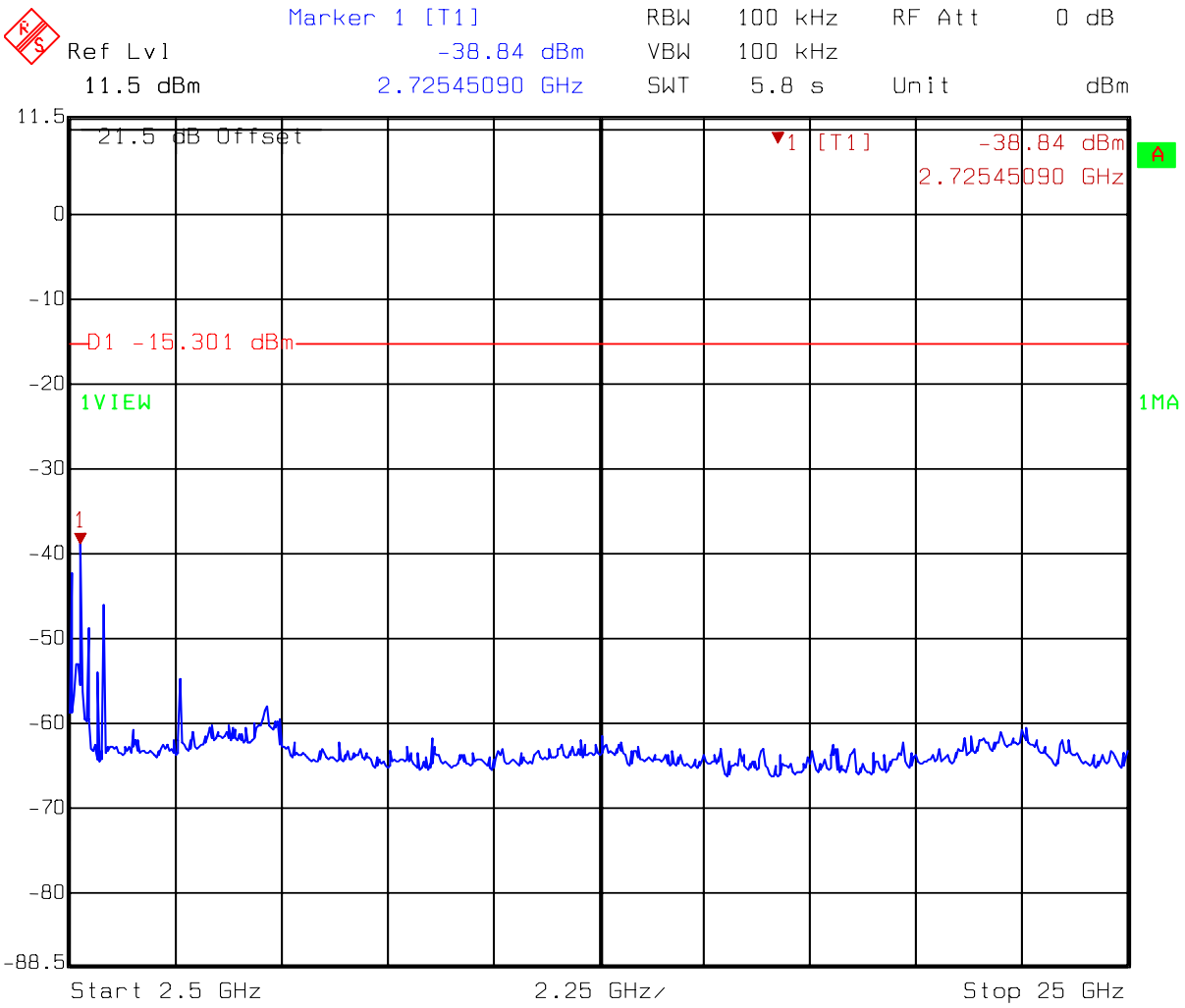
Title: Conductive-Spurious
Comment A: CH 6 at 802.11b mode 30MHz~2400MHz
Date: 14.MAY 2007 17:21:49

Test Mode: 802.11b mode (ch6)



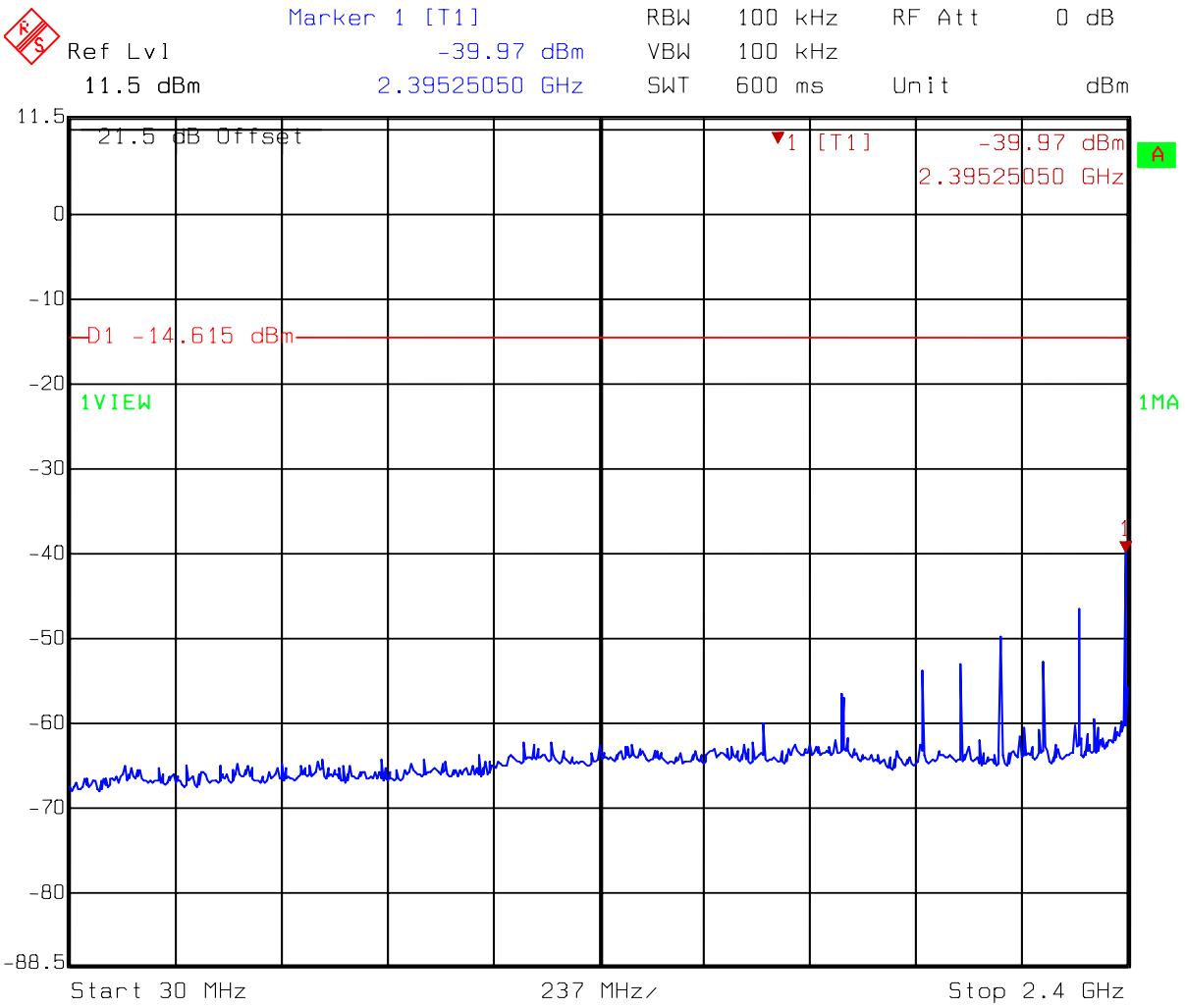
Title: Conductive-Spurious
Comment A: CH 6 at 802.11b mode 2400MHz~2483.5MHz
Date: 14.MAY 2007 17:21:27

Test Mode: 802.11b mode (ch6)



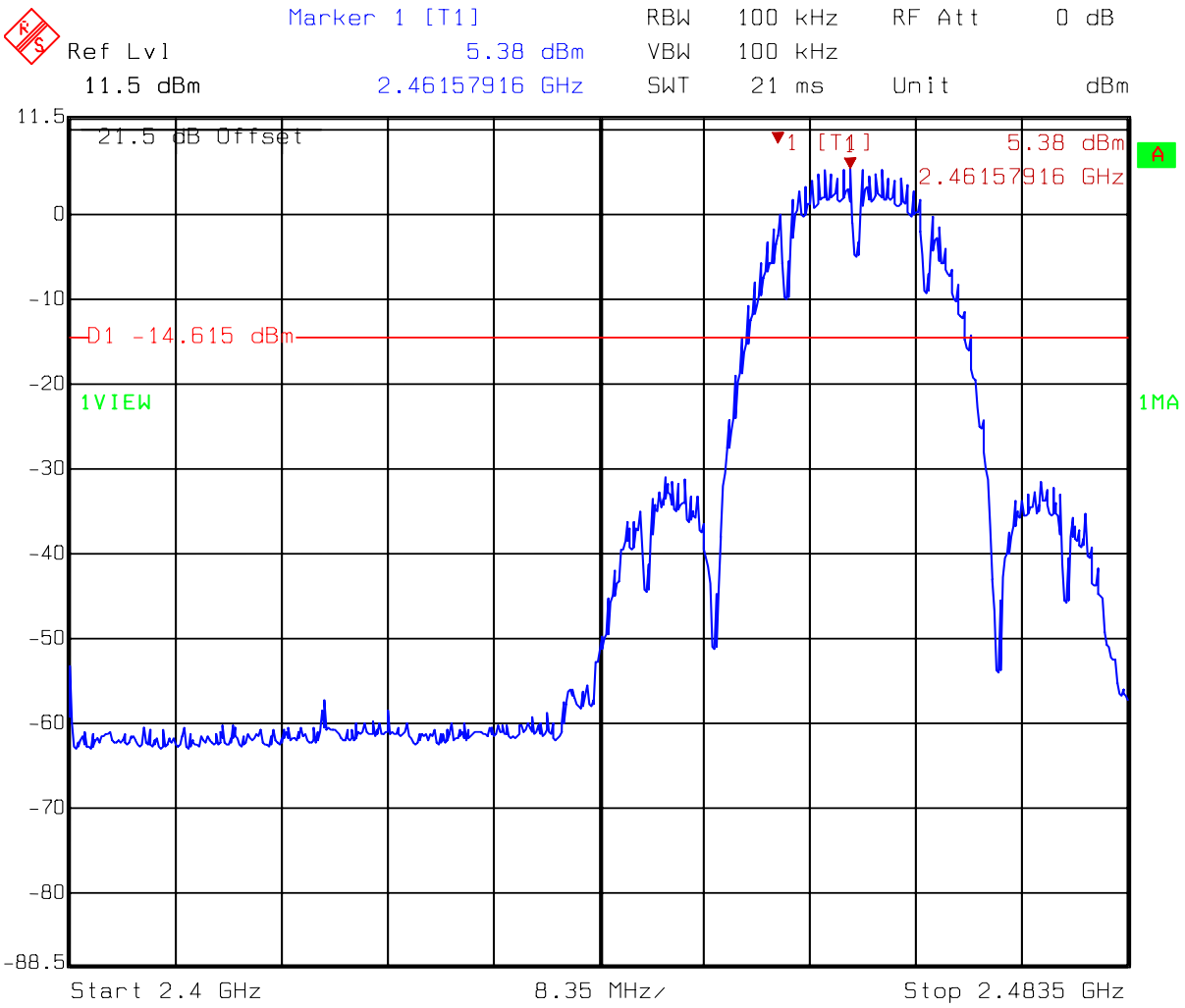
Title: Conductive-Spurious
Comment A: CH 6 at 802.11b mode 2483.5MHz~25GHz
Date: 14.MAY 2007 17:22:17

Test Mode: 802.11b mode (ch11)



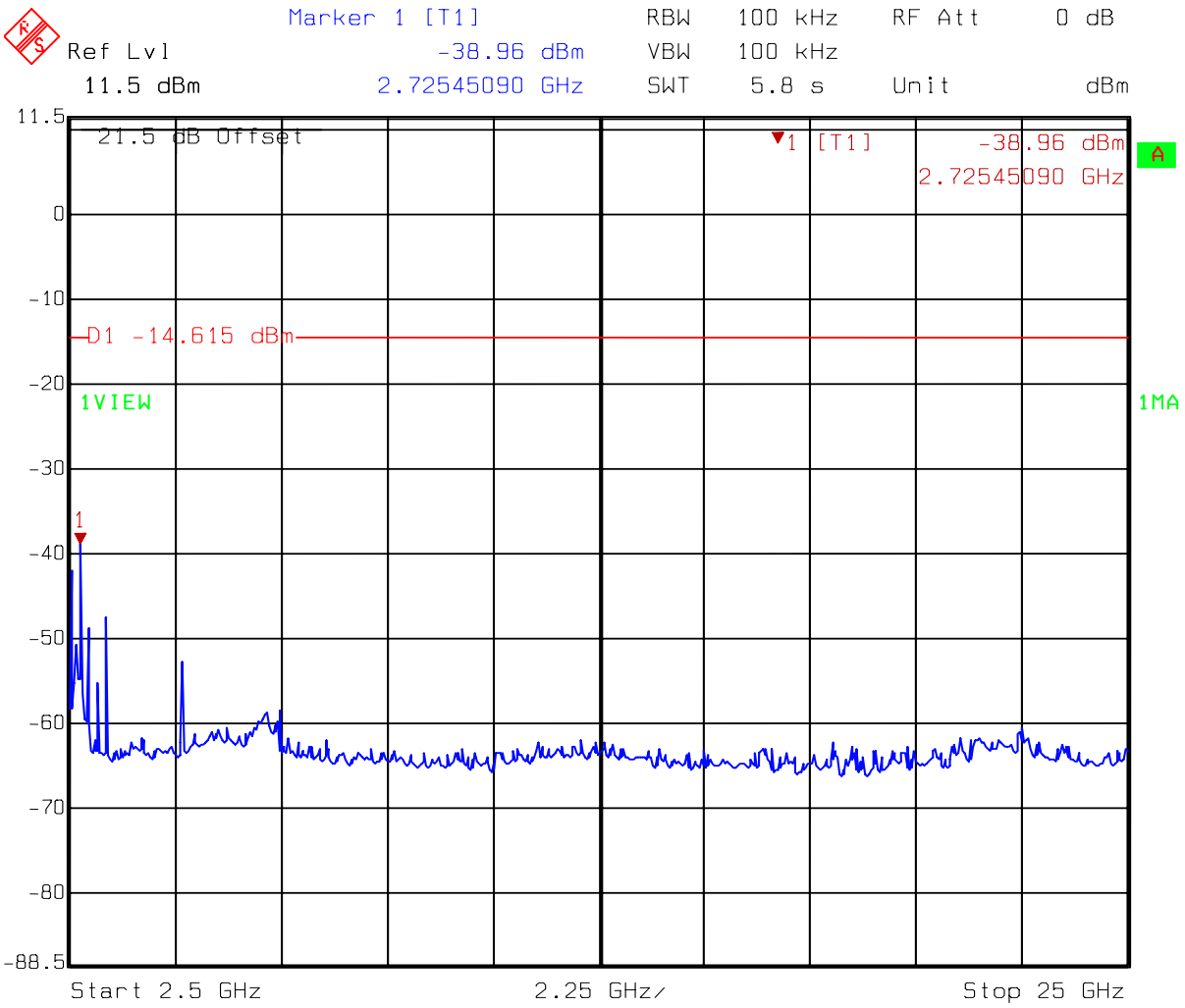
Title: Conductive-Spurious
Comment A: CH 11 at 802.11b mode 30MHz~2400MHz
Date: 14.MAY 2007 17:26:09

Test Mode: 802.11b mode (ch11)



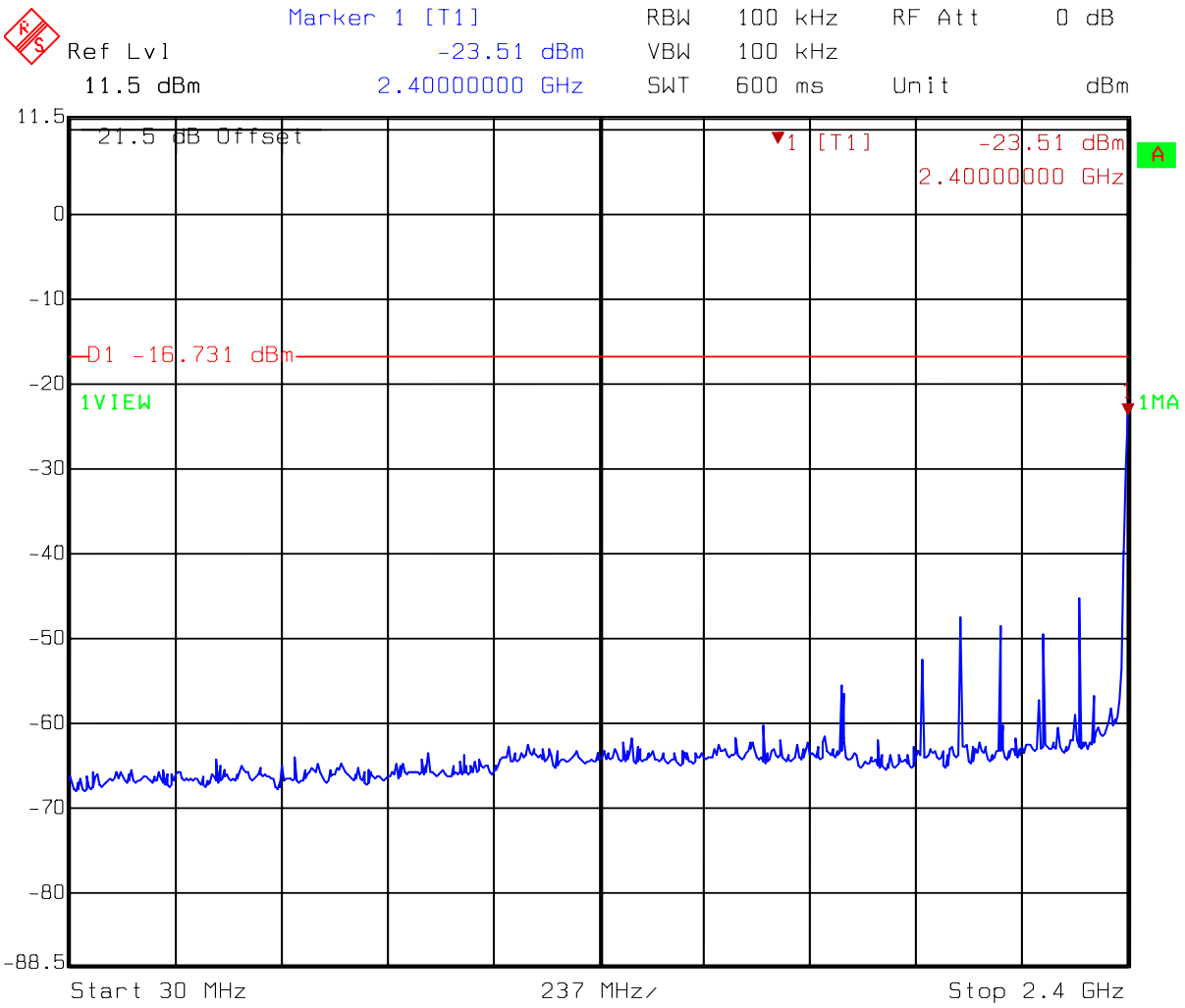
Title: Conductive-Spurious
Comment A: CH 11 at 802.11b mode 2400MHz~2483.5MHz
Date: 14.MAY 2007 17:25:48

Test Mode: 802.11b mode (ch11)



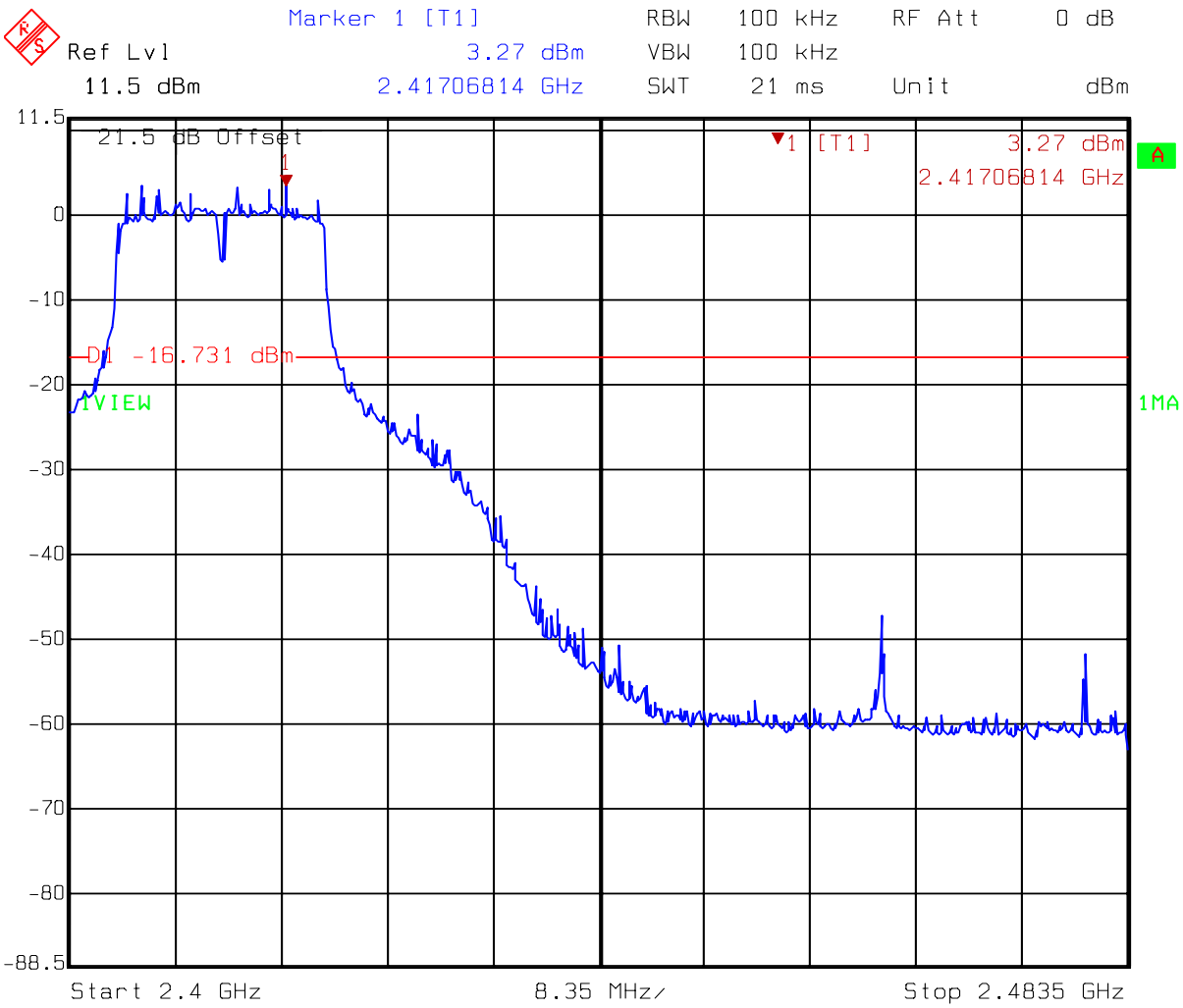
Title: Conductive-Spurious
Comment A: CH 11 at 802.11b mode 2483.5MHz~25GHz
Date: 14.MAY 2007 17:26:37

Test Mode: 802.11g mode (ch1)



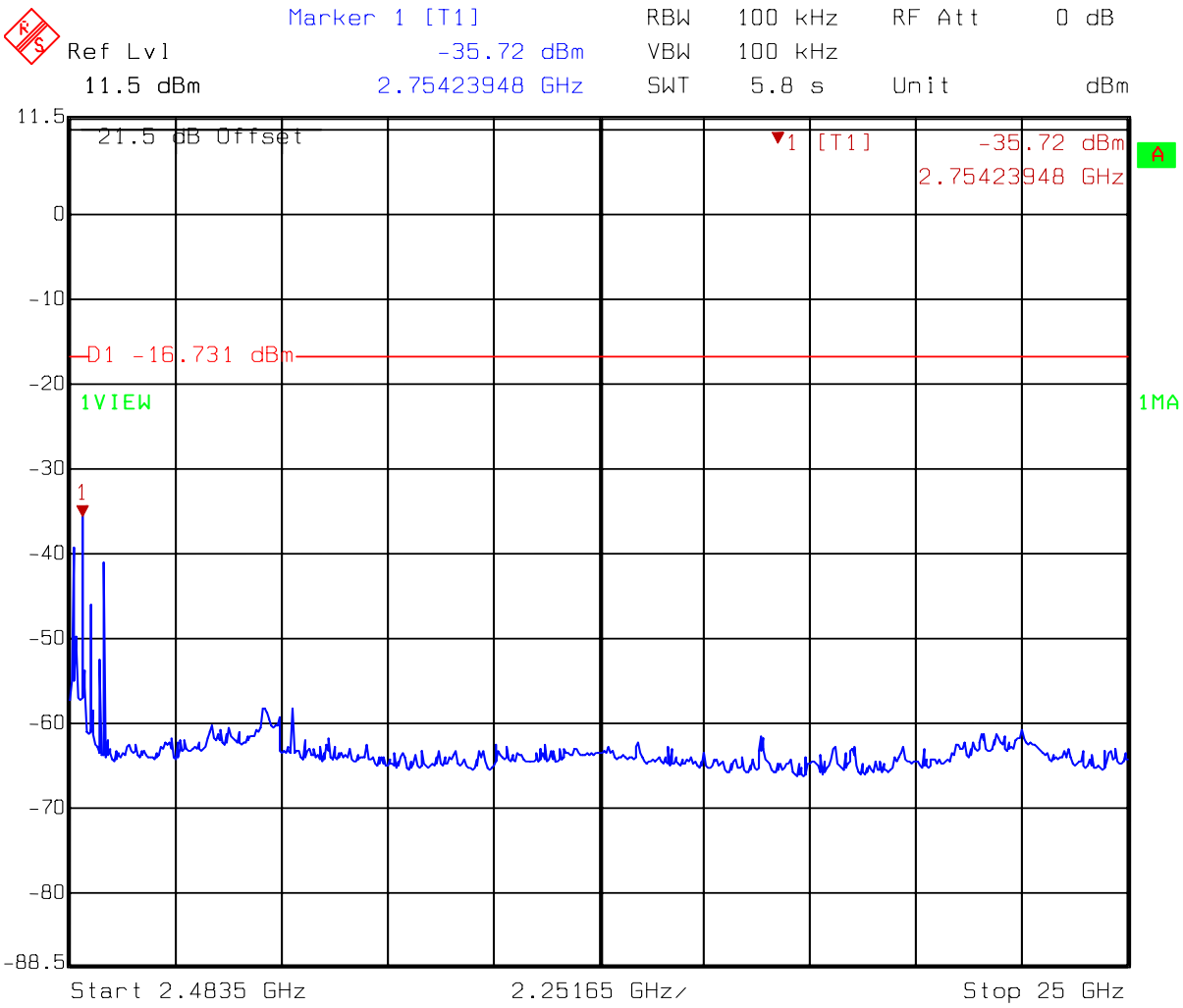
Title: Conductive-Spurious
Comment A: CH 1 at 802.11g mode 30MHz~2400MHz
Date: 14.MAY 2007 17:08:14

Test Mode: 802.11g mode (ch1)



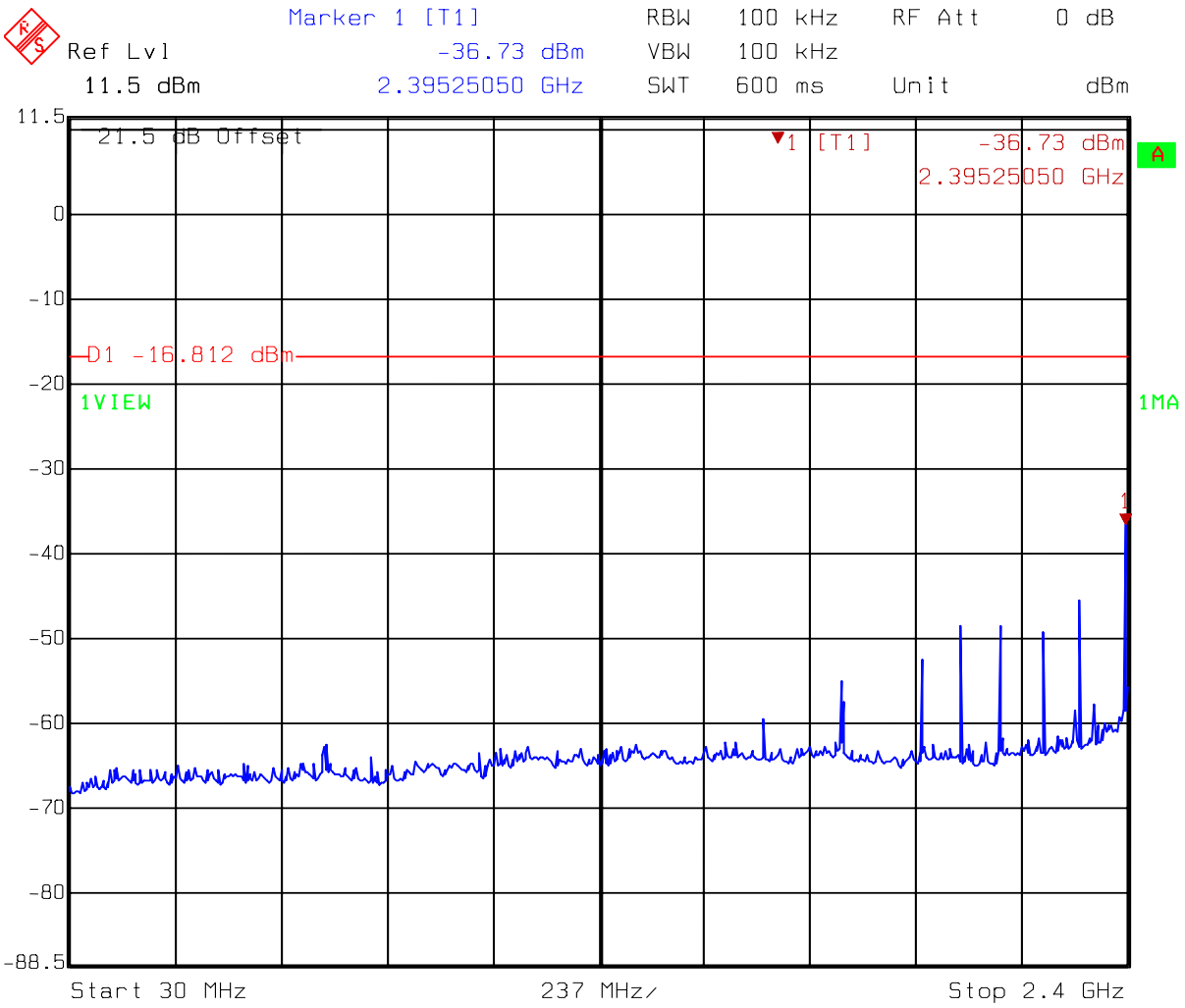
Title: Conductive-Spurious
Comment A: CH 1 at 802.11g mode 2400MHz~2483.5MHz
Date: 14.MAY 2007 17:07:52

Test Mode: 802.11g mode (ch1)



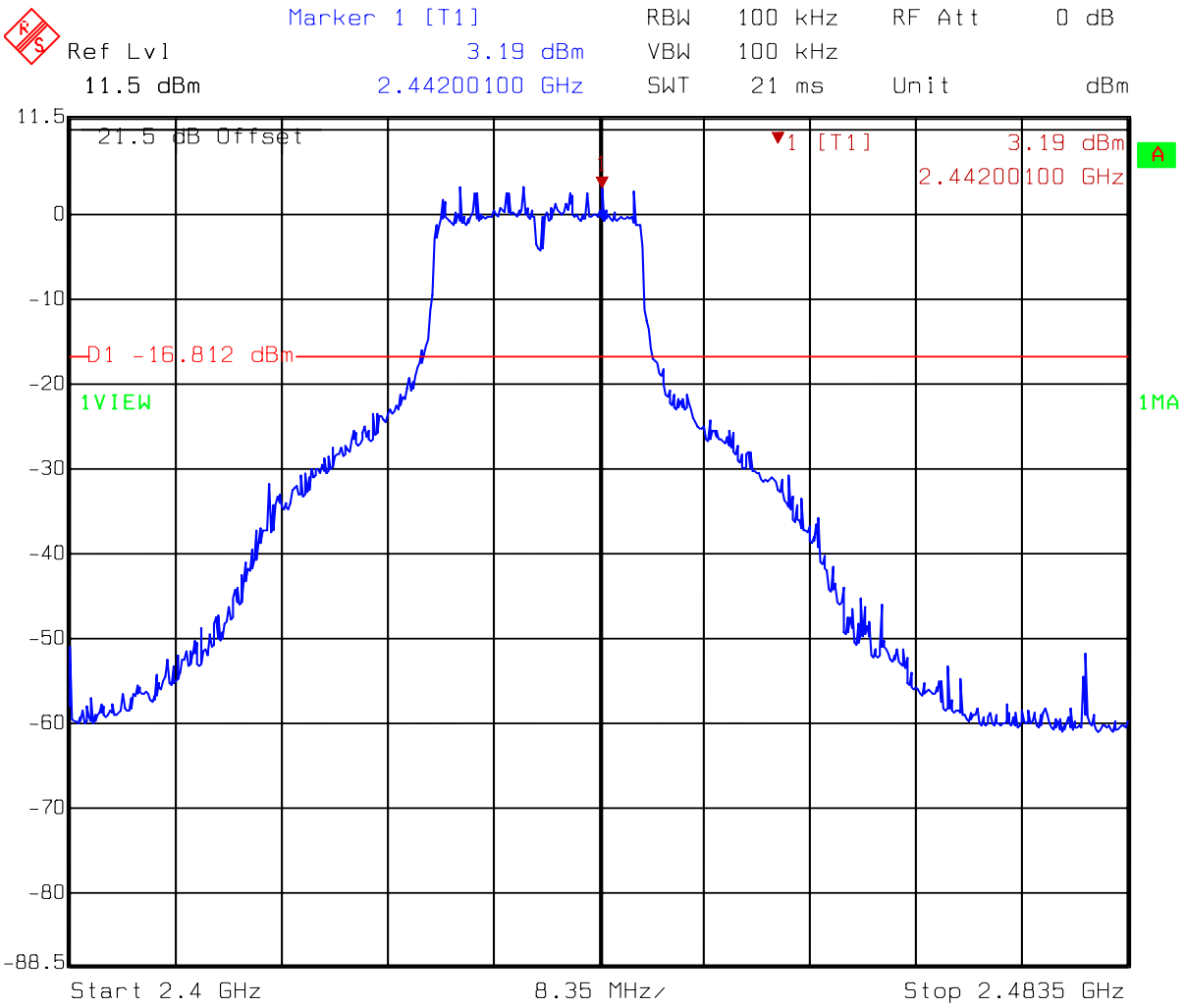
Title: Conductive-Spurious
Comment A: CH 1 at 802.11g mode 2483.5MHz~25000MHz
Date: 14.MAY 2007 17:08:41

Test Mode: 802.11g mode (ch6)



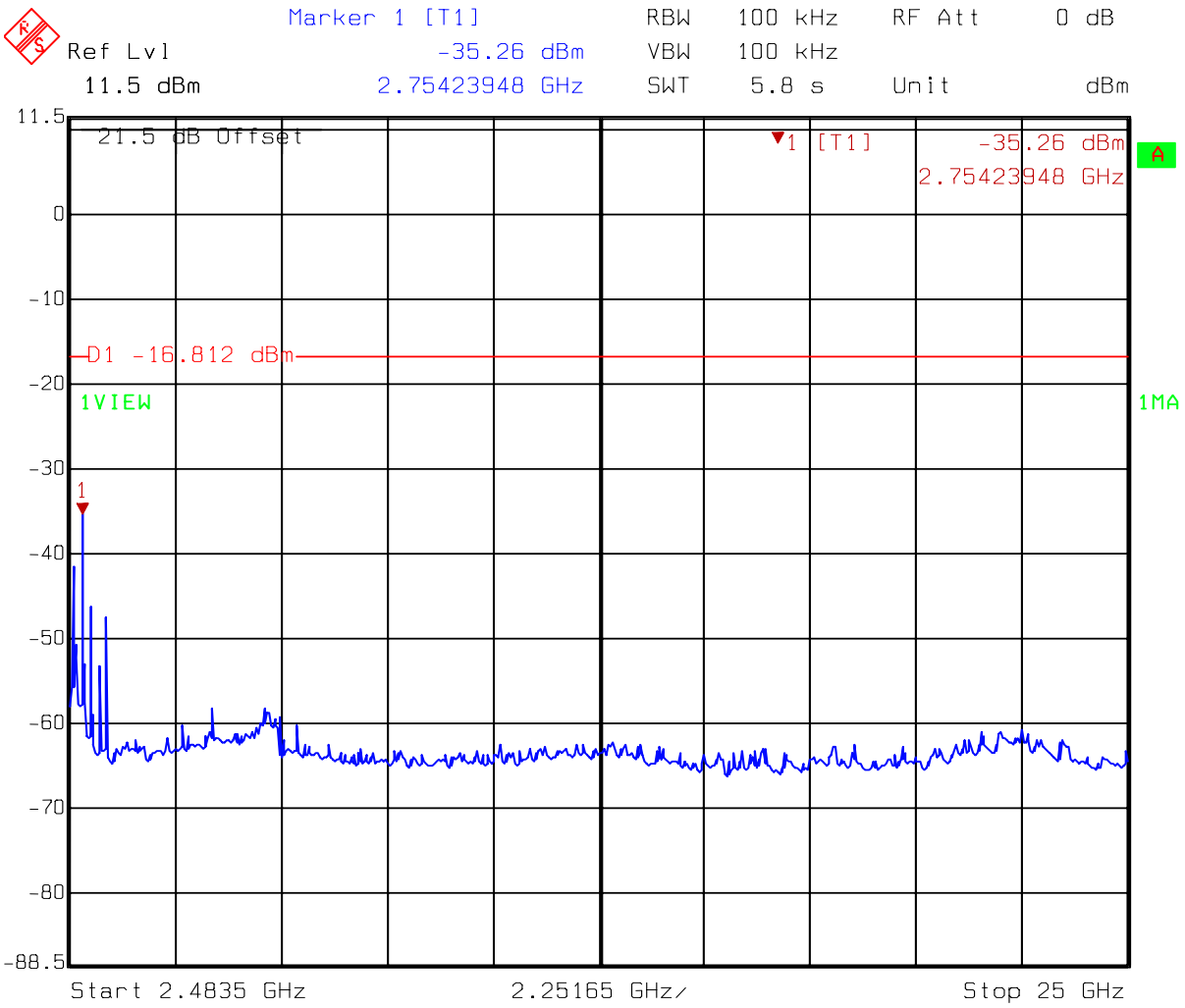
Title: Conductive-Spurious
Comment A: CH 6 at 802.11g mode 30MHz~2400MH:
Date: 14.MAY 2007 17:00:14

Test Mode: 802.11g mode (ch6)



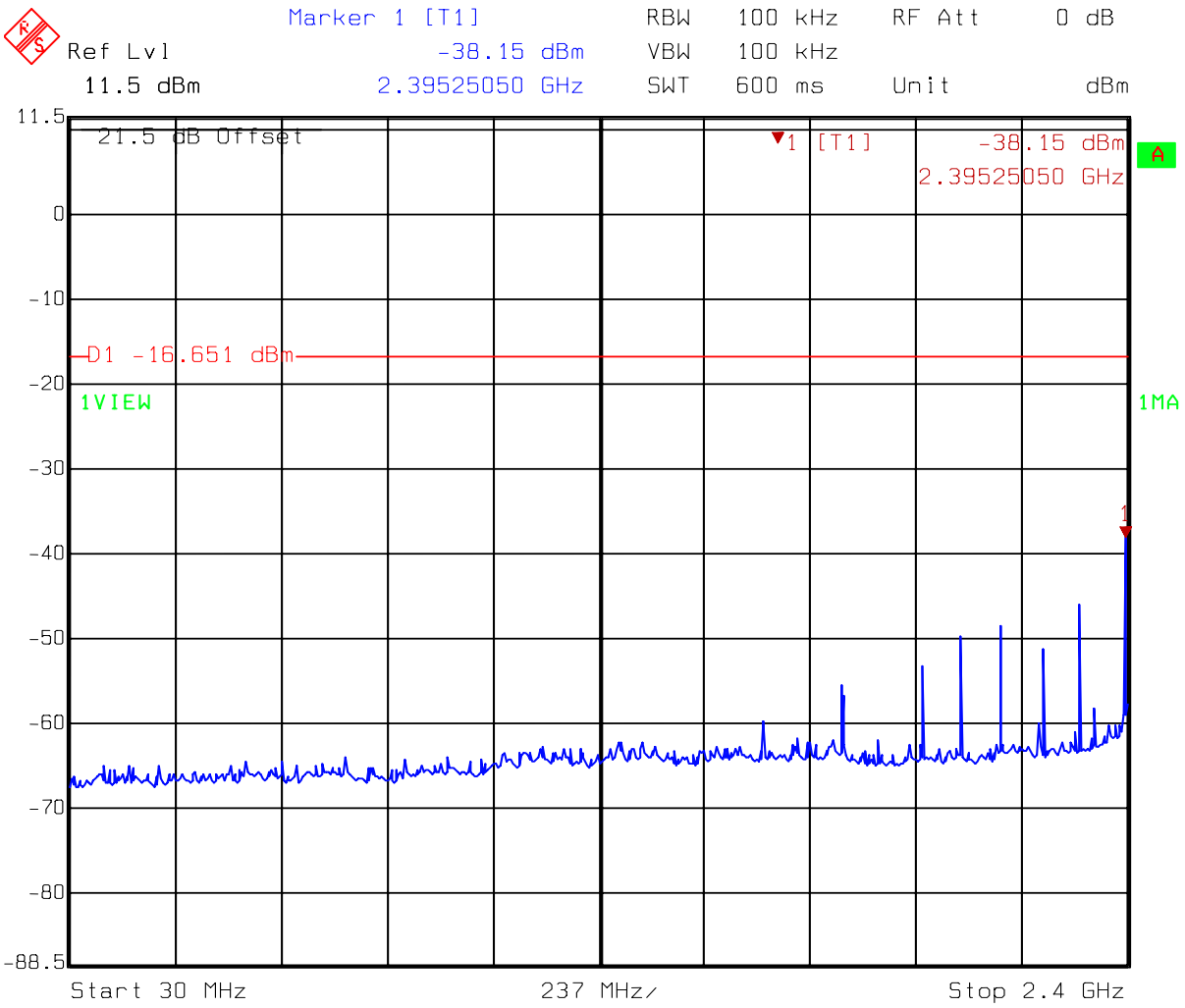
Title: Conductive-Spurious
Comment A: CH 6 at 802.11g mode 2400MHz~2483.5MHz
Date: 14.MAY 2007 16:59:52

Test Mode: 802.11g mode (ch6)



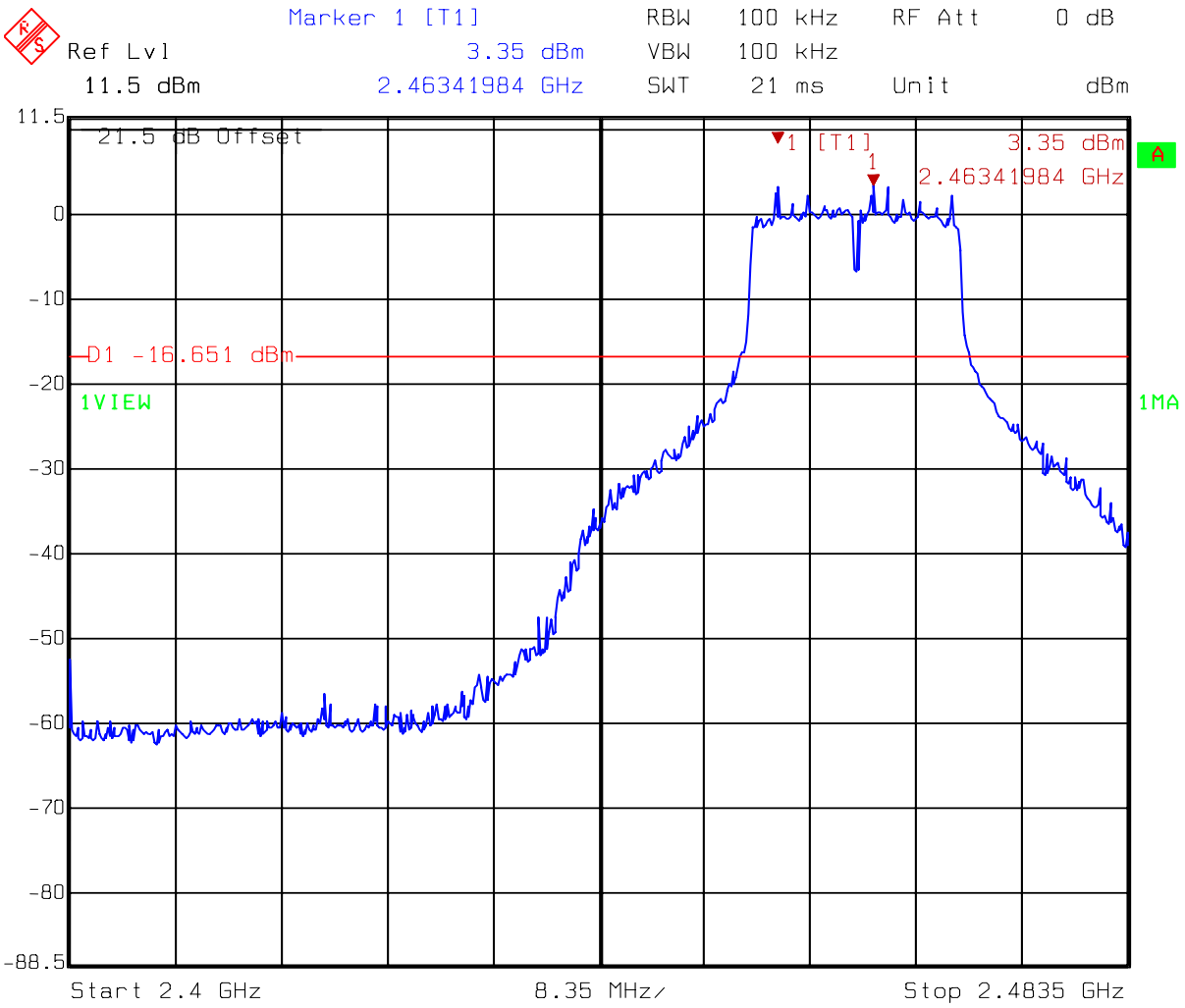
Title: Conductive-Spurious
Comment A: CH 6 at 802.11g mode 2483.5MHz~25000MHz
Date: 14.MAY 2007 17:00:41

Test Mode: 802.11g mode (ch11)



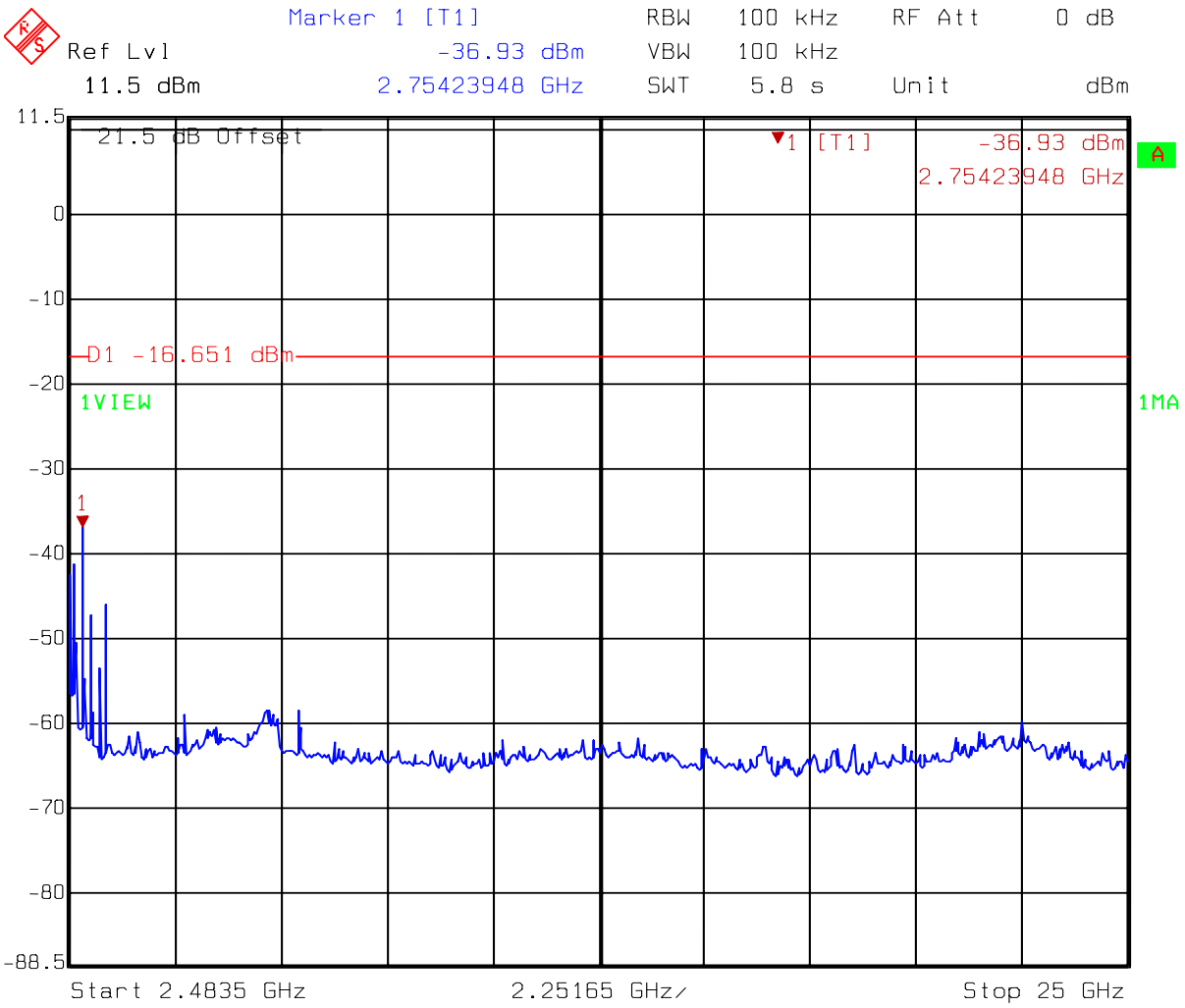
Title: Conductive-Spurious
Comment A: CH 11 at 802.11g mode 30MHz~2400MHz
Date: 14.MAY 2007 17:11:18

Test Mode: 802.11g mode (ch11)



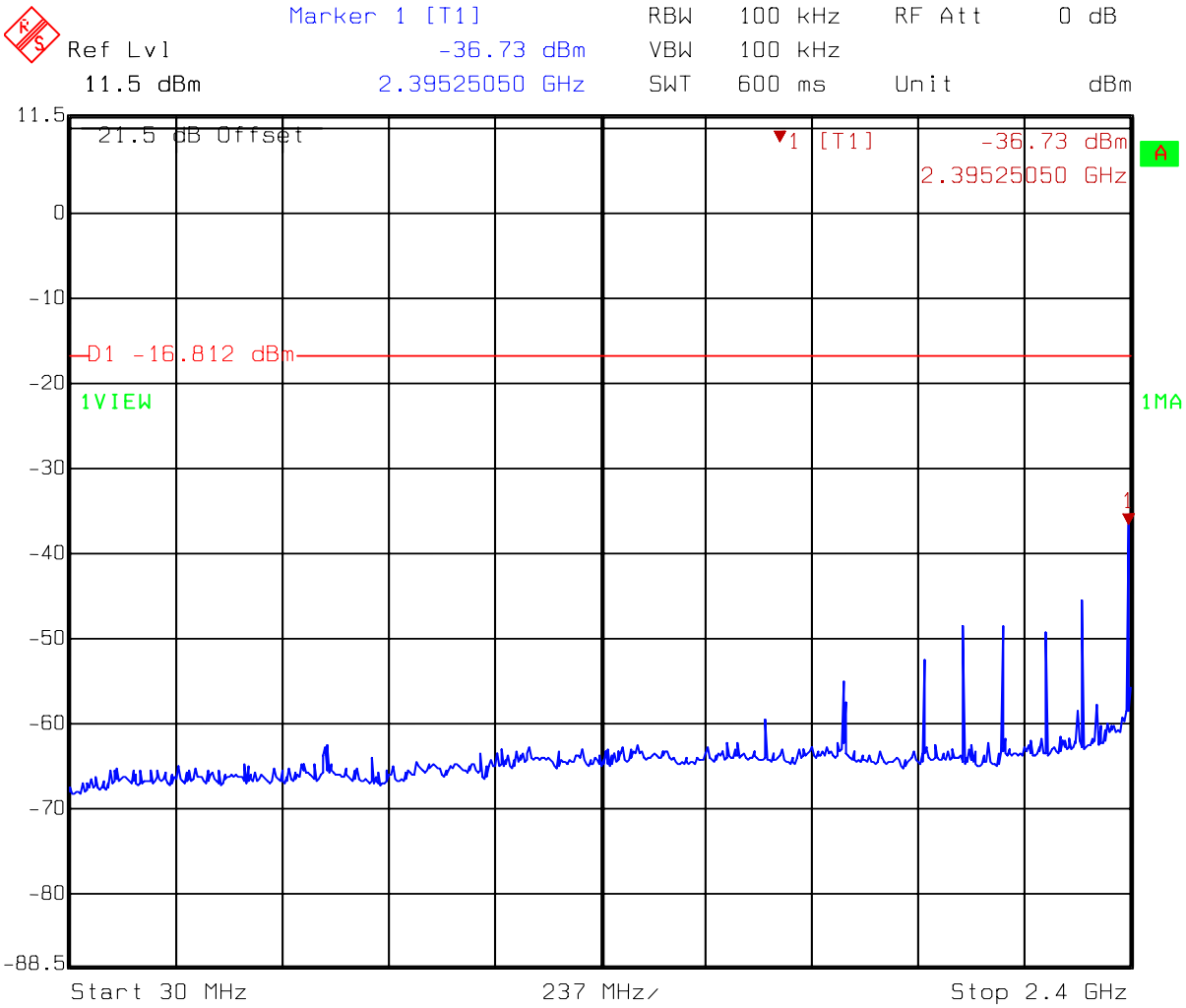
Title: Conductive-Spurious
Comment A: CH 11 at 802.11g mode 2400MHz~2483.5MHz
Date: 14.MAY 2007 17:10:56

Test Mode: 802.11g mode (ch11)



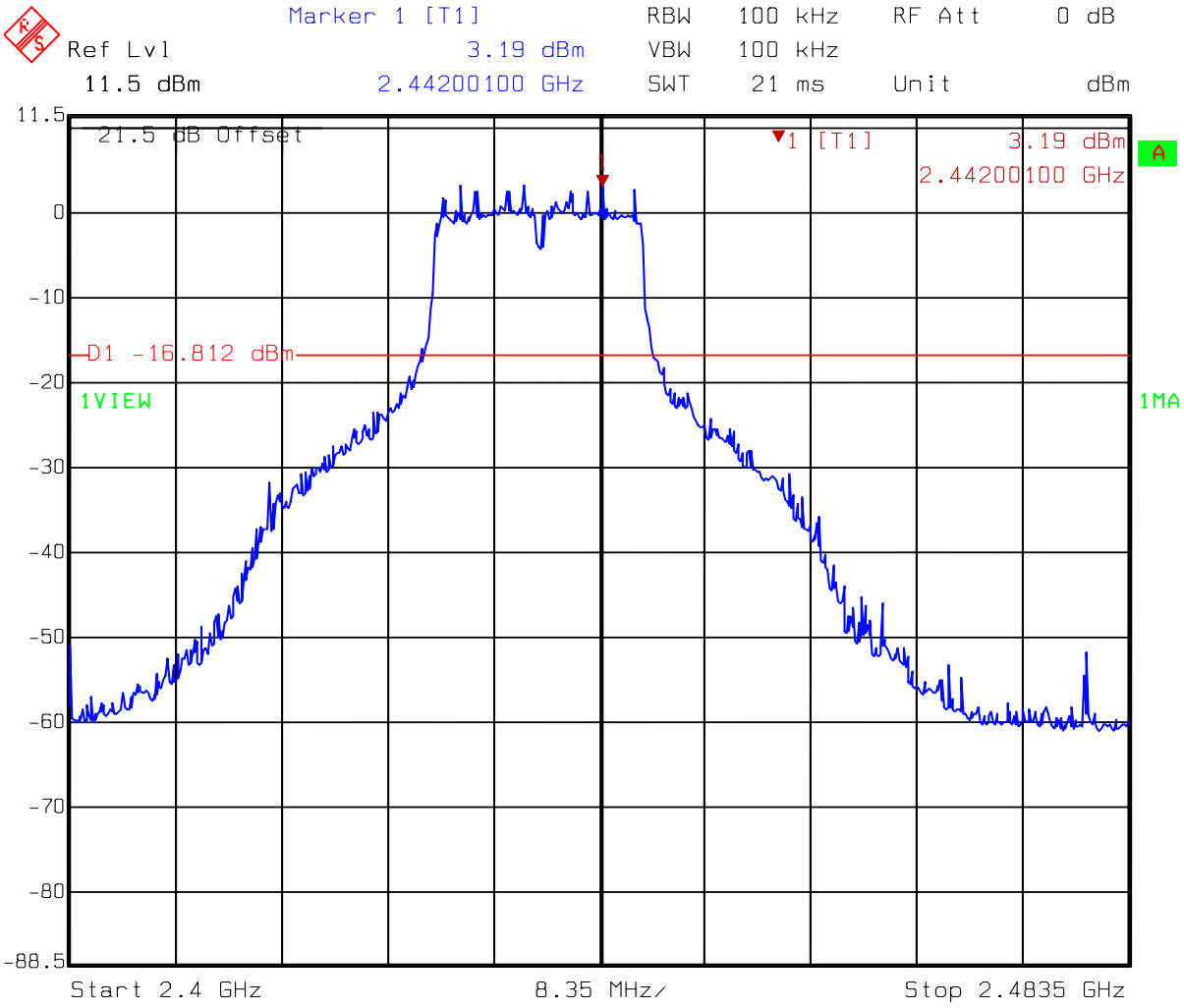
Title: Conductive-Spurious
Comment A: CH 11 at 802.11g mode 2483.5MHz~25000MHz
Date: 14.MAY 2007 17:11:45

Test Mode: 802.11g turbo mode (ch6)



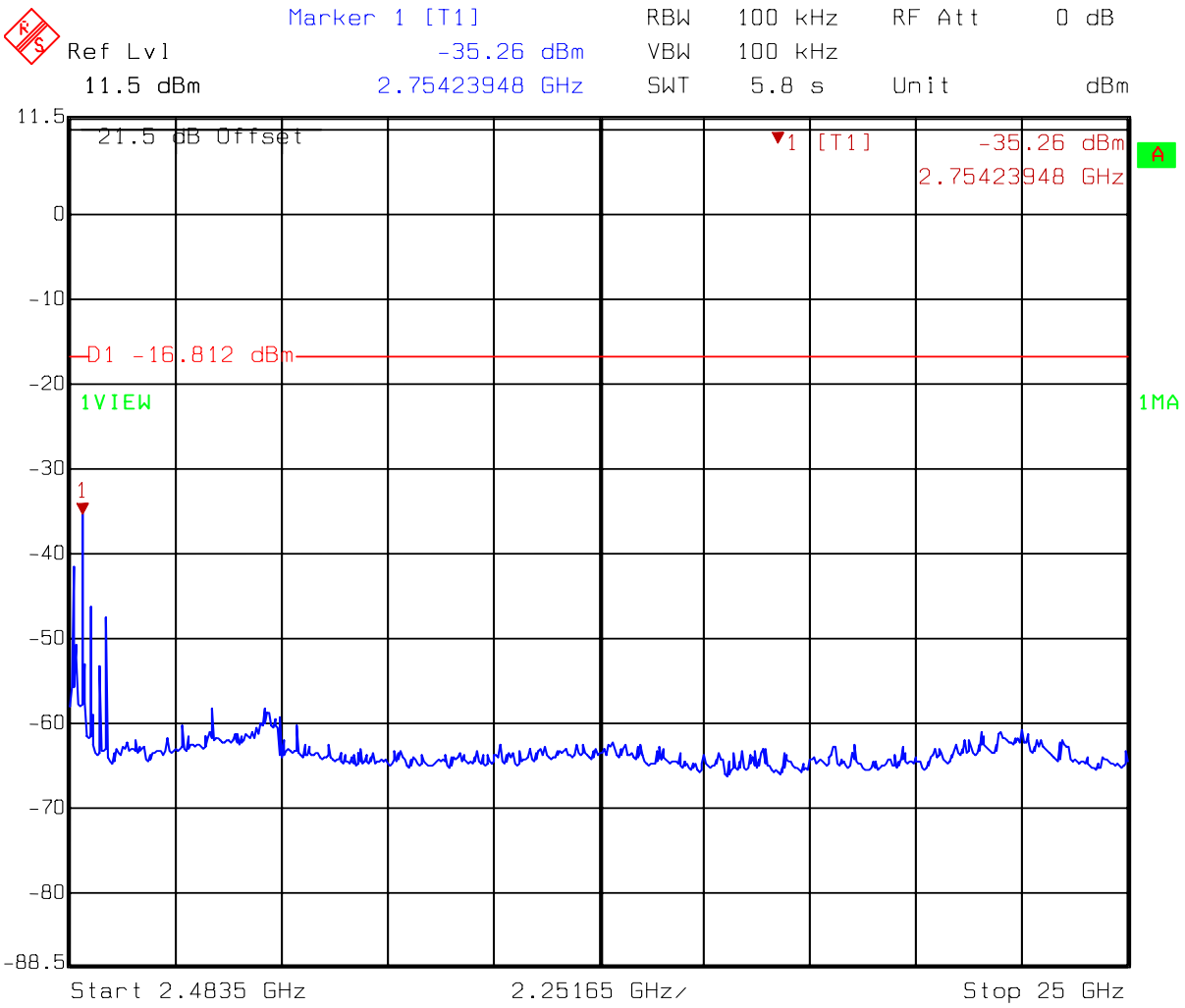
Title: Conductive-Spurious
Comment A: CH 6 at 802.11g mode 30MHz~2400MHz
Date: 14.MAY 2007 17:00:14

Test Mode: 802.11g turbo mode (ch6)



Title: Conductive-Spurious
Comment A: CH 6 at 802.11g mode 2400MHz~2483.5MHz
Date: 14.MAY 2007 16:59:52

Test Mode: 802.11g turbo mode (ch6)



Title: Conductive-Spurious
Comment A: CH 6 at 802.11g mode 2483.5MHz~25000MHz
Date: 14.MAY 2007 17:00:41

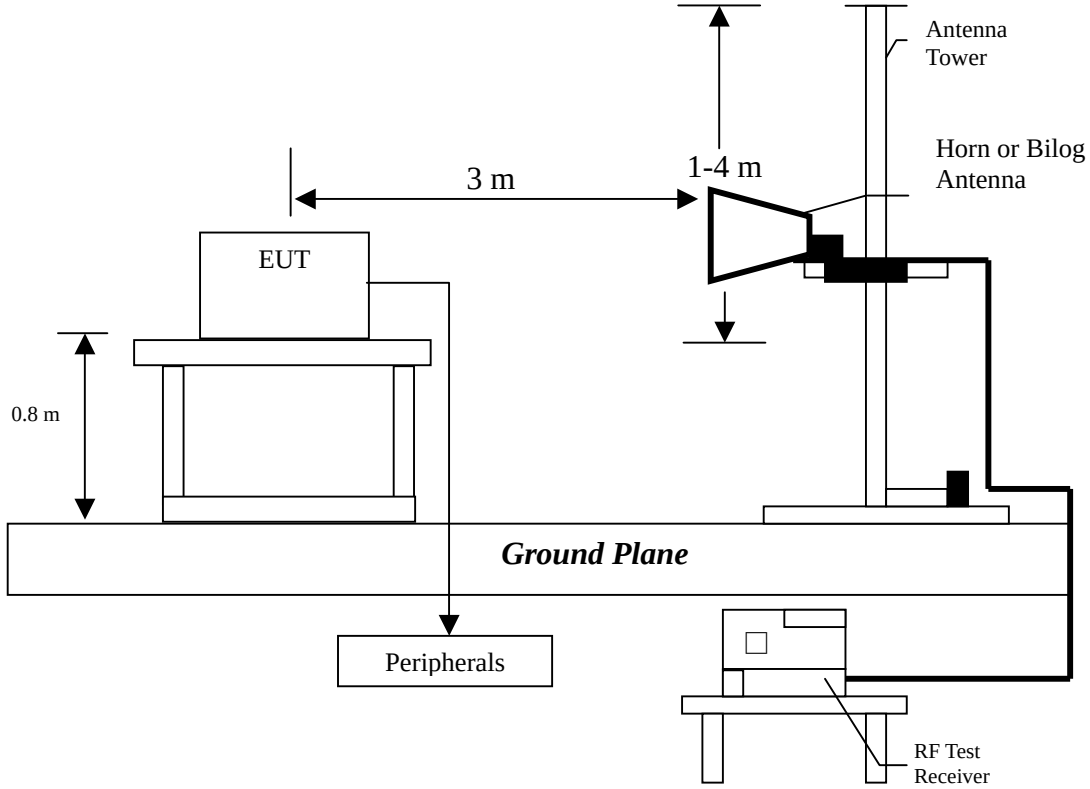
6. Radiated Emission test

6.1 Operating environment

Temperature:	22	℃
Relative Humidity:	55	%
Atmospheric Pressure:	1023	hPa

6.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



The frequency range from 30MHz to 1000MHz using Bilog Antenna.
The frequency range over 1GHz using Horn Antenna.

Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.
The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

6.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.
Expanded uncertainty (k=2) of radiated emission measurement is ±4.98 dB.

6.4 Radiated spurious emission test data

The radiated spurious emissions at

Frequency(MHz)	Margin
74.620	-3.71

are less than uncertainty. This is within the stated measurement uncertainty, this may affect compliance determined in other test arrangements.

6.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under 802.11b and 802.11g continuously transmitting mode. Channel 1, 6, 11 were verified. The worst case occurred at 802.11b Tx channel 11.

EUT : NBG-318S
Worst Case : 802.11b Tx at channel 11

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
V	58.130	QP	12.48	21.66	34.14	40.00	-5.86
V	74.620	QP	10.06	26.23	36.29	40.00	-3.71
V	374.350	QP	15.75	18.90	34.65	46.00	-11.35
V	474.260	QP	18.10	14.25	32.35	46.00	-13.65
V	524.700	QP	19.04	14.39	33.43	46.00	-12.57
V	574.170	QP	20.12	15.98	36.10	46.00	-9.90
H	92.080	QP	8.04	23.28	31.32	43.50	-12.18
H	299.660	QP	14.31	22.10	36.41	46.00	-9.59
H	374.350	QP	16.13	21.27	37.40	46.00	-8.60
H	374.350	QP	16.13	21.27	37.40	46.00	-8.60
H	424.790	QP	17.48	17.67	35.15	46.00	-10.85
H	524.700	QP	19.24	15.55	34.79	46.00	-11.21

Remark:
1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

6.4.2 Measurement results: frequency above 1GHz

EUT : NBG-318S
Test Condition : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3210.00	PK	V	35.54	34.62	51.45	50.53	54	-3.47
4824.00	PK	V	36.07	37.77	49.62	51.32	54	-2.68
7236.00	PK	V	36.18	43.97	43.47	51.26	54	-2.74
4824.00	PK	H	36.07	37.77	43.59	45.29	54	-8.71

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : NBG-318S
Test Condition : 802.11b Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3240.00	PK	V	35.54	34.62	50.36	49.44	54	-4.56
4874.00	PK	V	36.07	37.77	46.8	48.5	54	-5.50
4874.00	PK	H	36.07	37.77	43.07	44.77	54	-9.23

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : NBG-318S
Test Condition : 802.11b Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	47.33	49.03	54	-4.97
4924.00	PK	H	36.07	37.77	50.04	51.74	54	-2.26

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : NBG-318S
Test Condition : 802.11g Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3210.00	PK	V	35.54	34.62	57.67	56.75	82.95	-26.20
4824.00	PK	V	36.07	37.77	47.45	49.15	54	-4.85
7236.00	PK	V	36.18	43.97	55.6	63.39	82.95	-19.56
3210.00	PK	H	35.54	34.62	44.33	43.41	54	-10.59
4824.00	PK	H	36.07	37.77	42.46	44.16	54	-9.84

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : NBG-318S
Test Condition : 802.11g Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3240.00	PK	V	35.54	34.62	53.28	52.36	54	-1.64
4874.00	PK	V	36.07	37.77	46.26	47.96	54	-6.04
7311.00	PK	V	36.18	43.97	57.44	65.23	74	-8.77
7311.00	AV	V	36.18	43.97	39.56	47.35	54	-6.65
3240.00	PK	H	35.54	34.62	43.41	42.49	54	-11.51
7311.00	PK	H	36.18	43.97	43.85	51.64	54	-2.36

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : NBG-318S
Test Condition : 802.11g Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3270.00	PK	V	35.54	34.62	52.43	51.51	54	-2.49
4924.00	PK	V	36.07	37.77	45.46	47.16	54	-6.84
7386.00	PK	V	36.18	43.97	58.13	65.92	74	-8.08
7386.00	AV	V	36.18	43.97	39.77	47.56	54	-6.44
3270.00	PK	H	35.54	34.62	43.79	42.87	54	-11.13
7386.00	PK	H	36.18	43.97	43.41	51.20	54	-2.80

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : NBG-318S
Test Condition : 802.11g Tx at channel 6 Turbo mode

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3240.00	PK	V	35.54	34.62	53.03	52.11	54	-1.89
4874.00	PK	V	36.07	37.77	44.55	46.25	54	-7.75
7311.00	PK	V	36.18	43.97	52.09	59.88	74	-14.12
7311.00	AV	V	36.18	43.97	36.41	44.20	54	-9.8
3240.00	PK	H	35.54	34.62	44.72	43.80	54	-10.20

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is:

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

7. Power Spectrum Density test

7.1 Operating environment

Temperature:	23	℃
Relative Humidity:	54	%
Atmospheric Pressure	1023	hPa

7.2 Test setup & procedure

The power spectrum density per FCC §15.247(e) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 10kHz, a span of 1.5MHz, and the sweep time set at 500 seconds. Power Density was read directly correction was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel). The Power Spectral Density measured result is in the following table.

7.3 Measured data of Power Spectrum Density test results

Test Mode: 802.11b mode

Channel	Frequency (MHz)	Cable loss (dB)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	2	-9.22	8
6 (middle)	2437	2	-8.94	8
11 (highest)	2462	2	-8.35	8

Test Mode: 802.11g mode

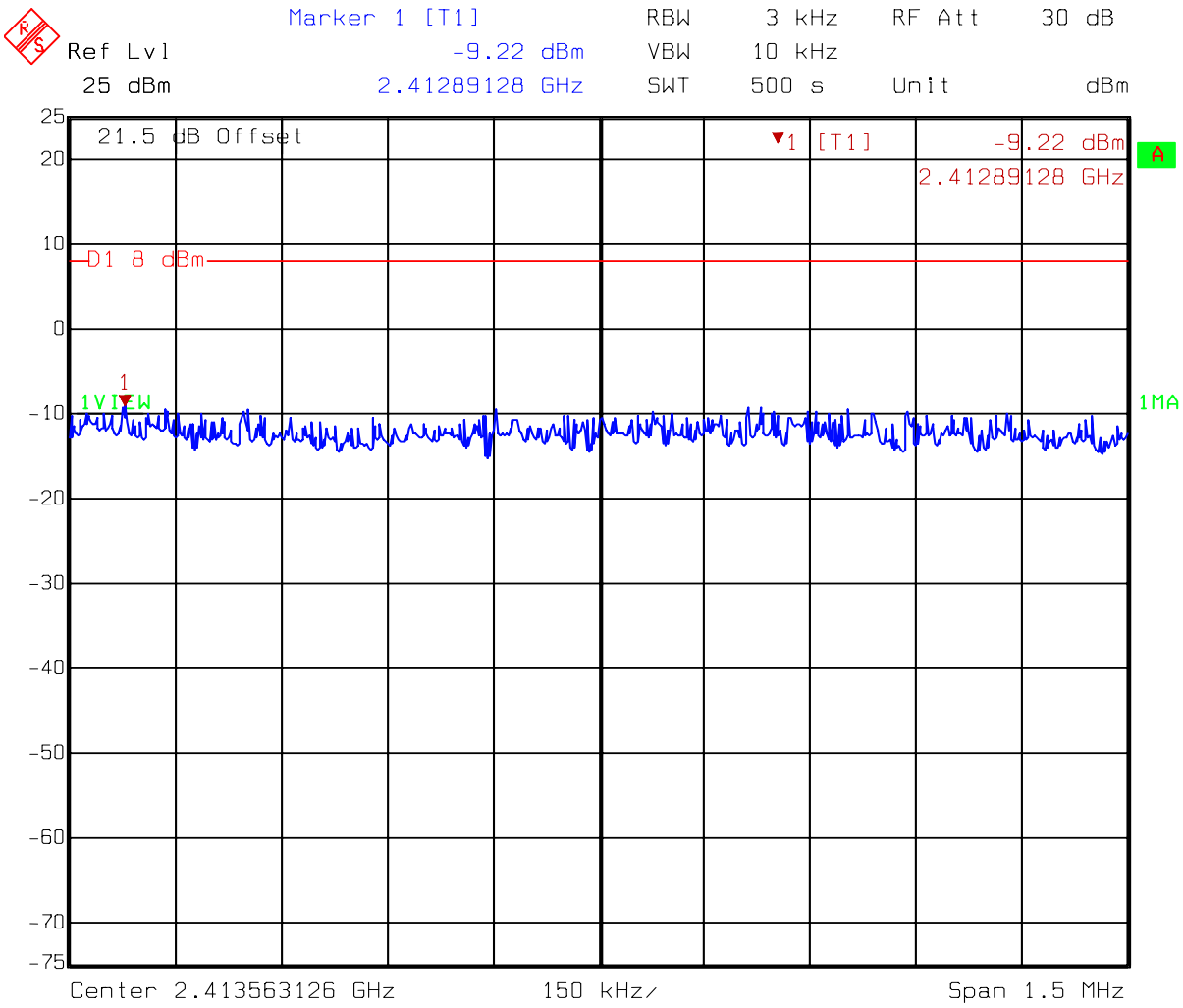
Channel	Frequency (MHz)	Cable loss (dB)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	2	-10.01	8
6 (middle)	2437	2	-9.62	8
11 (highest)	2462	2	-8.87	8

Test Mode: 802.11g turbo mode

Channel	Frequency (MHz)	Cable loss (dB)	Power spectrum density (dBm)	Limit (dBm)
6 (middle)	2437	2	-11.86	8

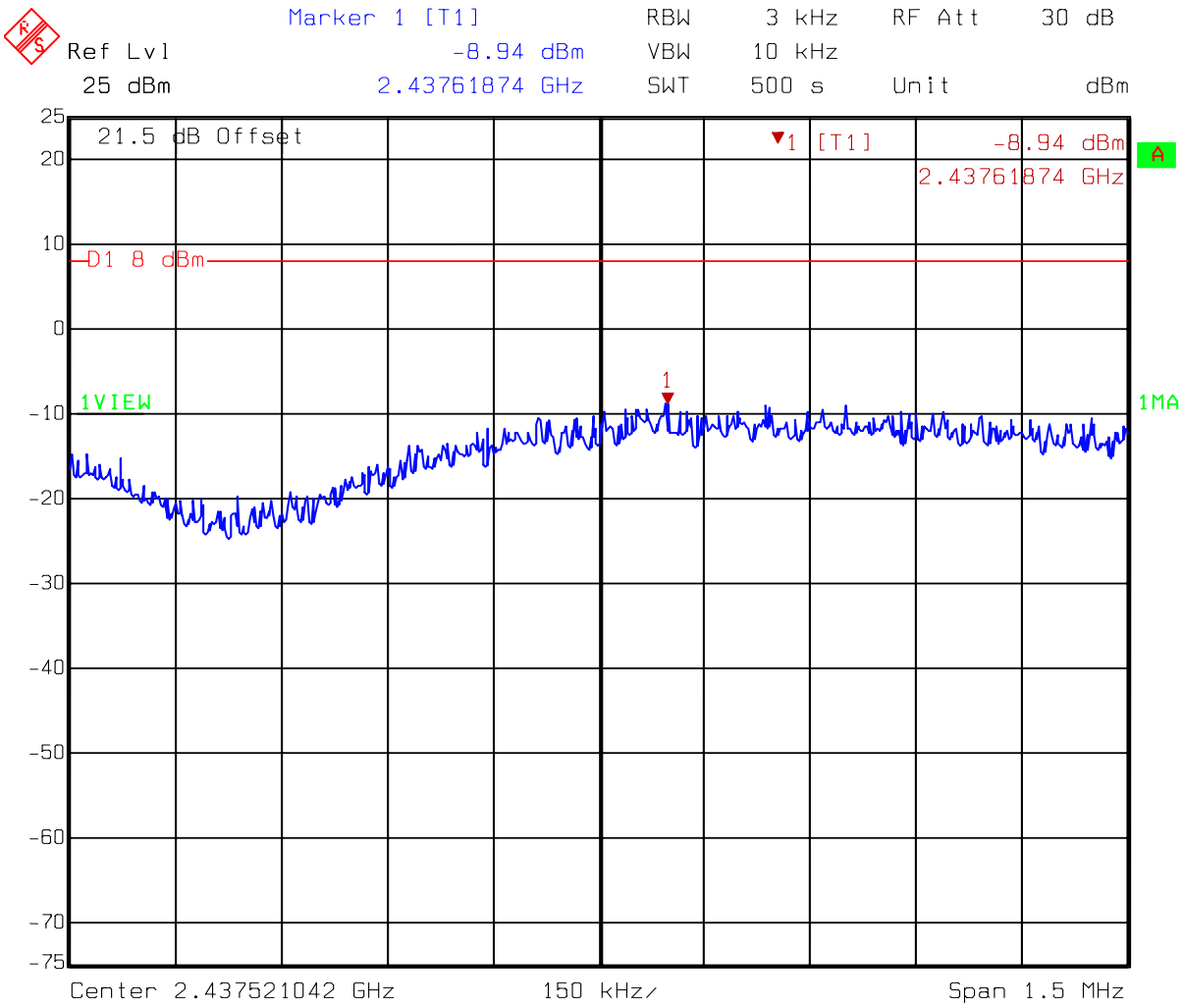
Please see the plot below.

Test Mode: 802.11b mode (ch1)



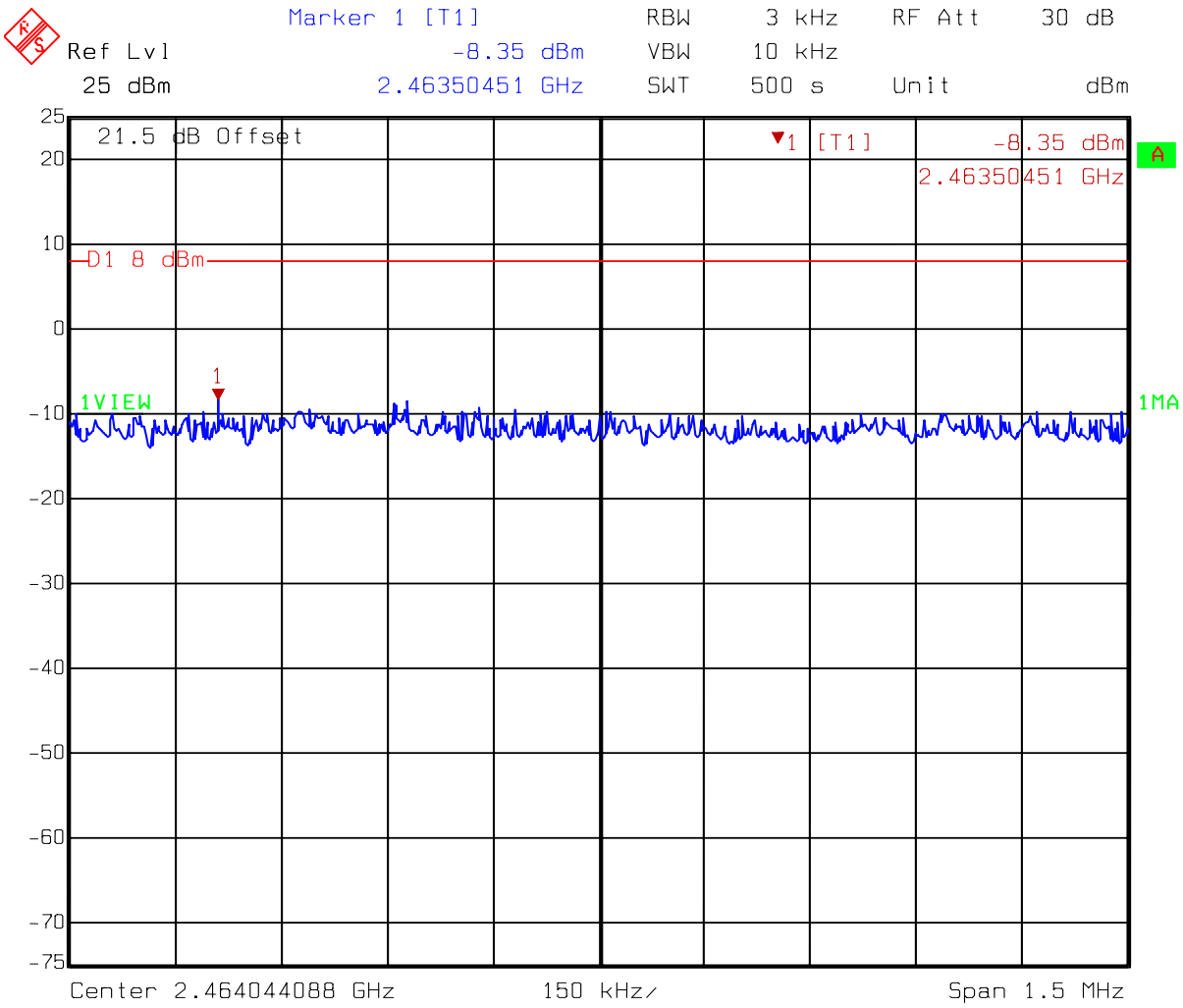
Title: Power density
Comment A: CH 1 at 802.11b mode
Date: 14.MAY 2007 17:18:11

Test Mode: 802.11b mode (ch6)



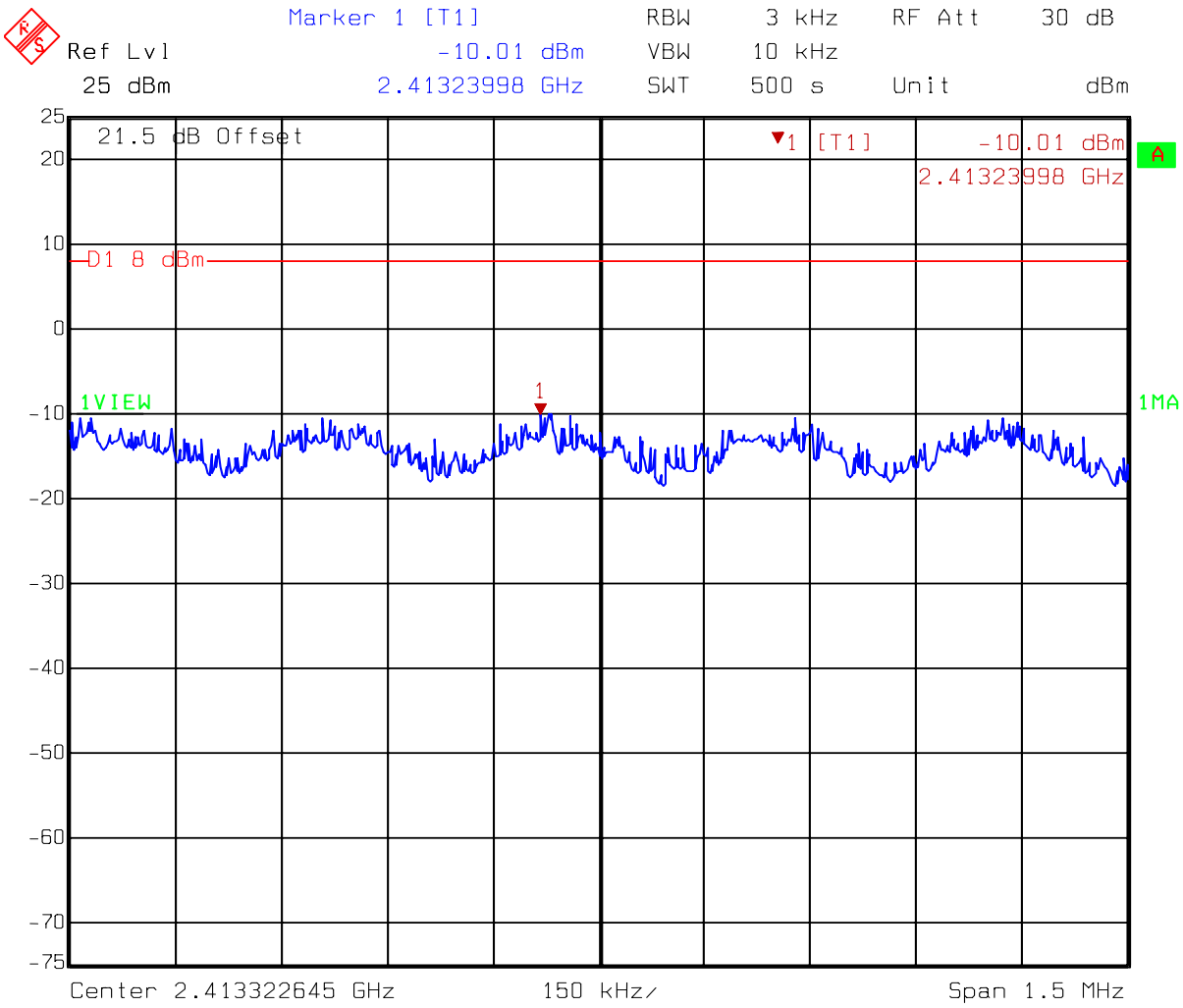
Title: Power density
Comment A: CH 6 at 802.11b mode
Date: 14.MAY 2007 17:20:58

Test Mode: 802.11b mode (ch11)



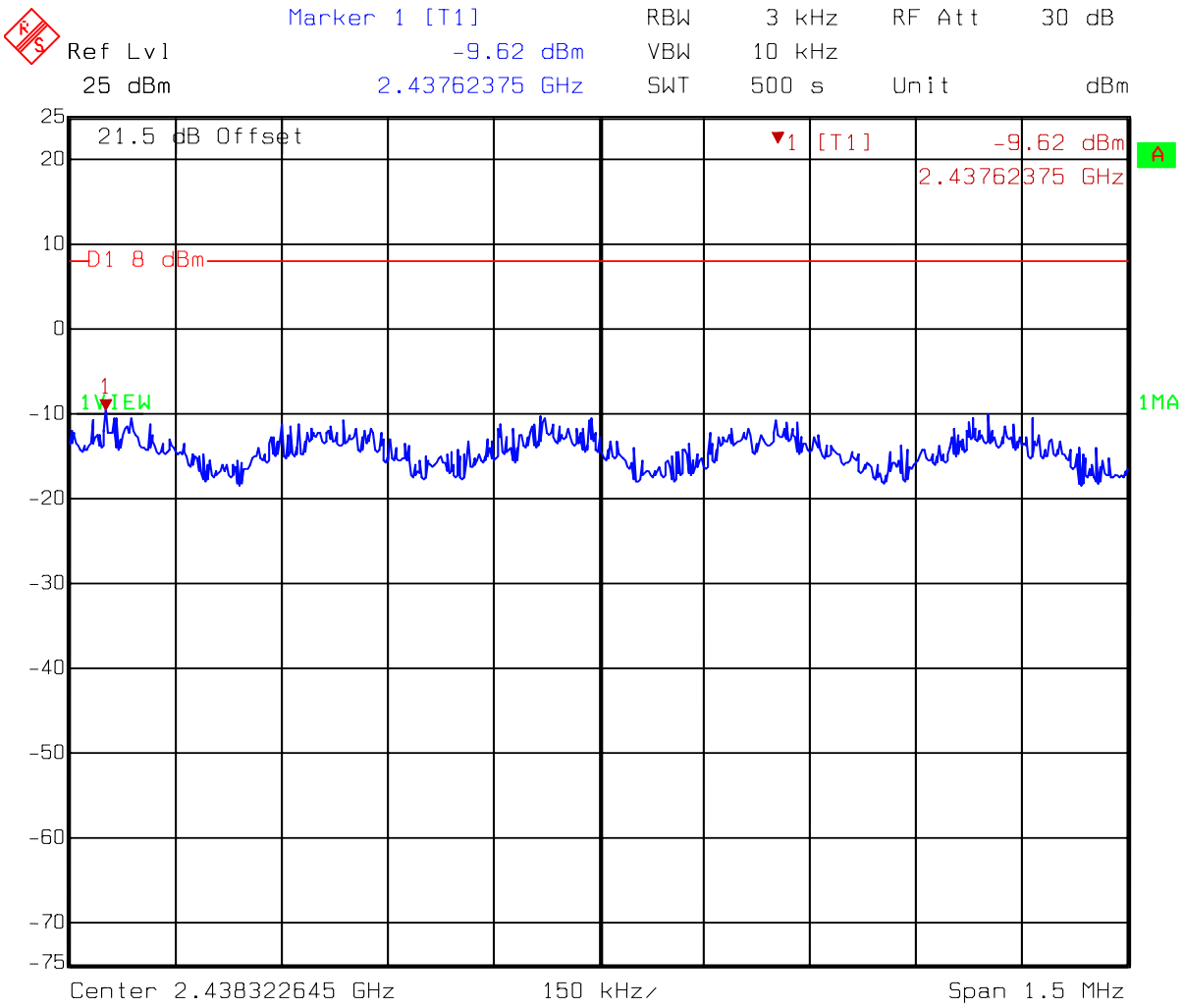
Title: Power density
Comment A: CH 11 at 802.11b mode
Date: 14.MAY 2007 17:24:38

Test Mode: 802.11g mode (ch1)



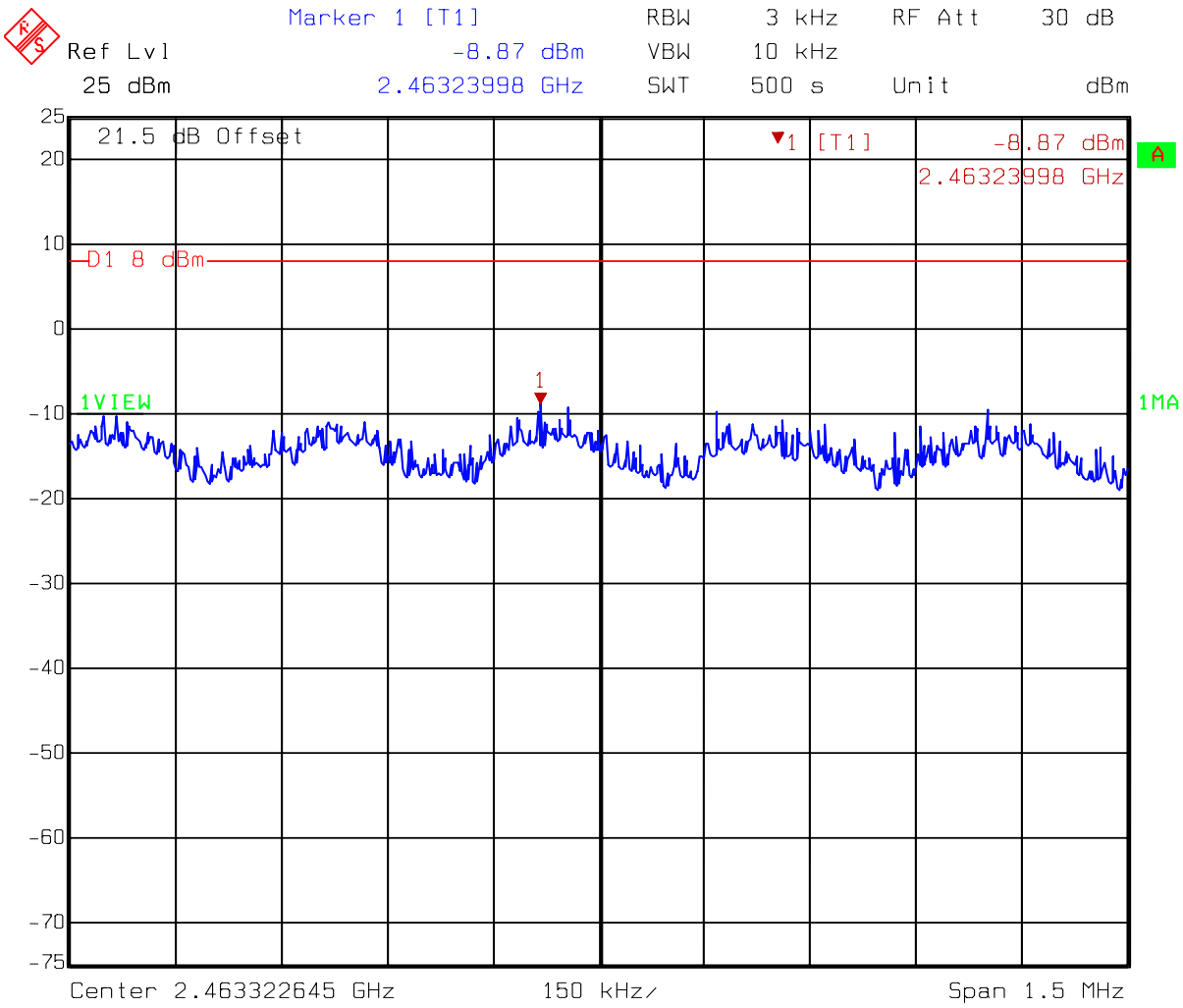
Title: Power density
Comment A: CH 1 at 802.11g mode
Date: 14.MAY 2007 17:07:14

Test Mode: 802.11g mode (ch6)



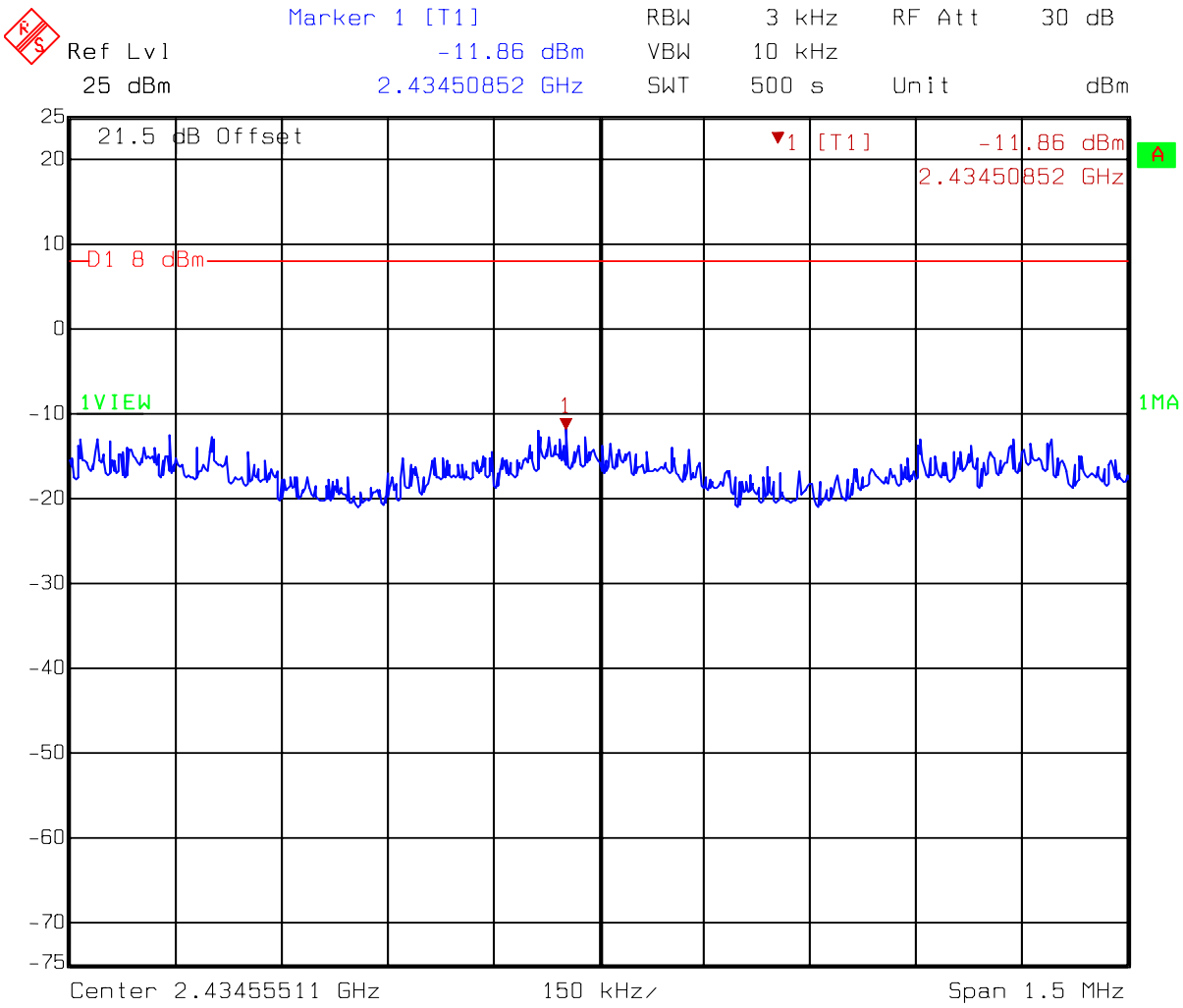
Title: Power density
Comment A: CH 6 at 802.11g mode
Date: 14.MAY 2007 16:59:11

Test Mode: 802.11g mode (ch11)



Title: Power density
Comment A: CH 11 at 802.11g mode
Date: 14.MAY 2007 17:10:21

Test Mode: 802.11g turbo mode (ch6)



Title: Power density
Comment A: CH 6 at 802.11g mode
Date: 14.MAY 2007 16:40:45

8. Emission on the band edge

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Radiated emissions, which fall in the restricted band, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

8.1 Operating environment

Temperature:	23	℃
Relative Humidity:	54	%
Atmospheric Pressure	1023	hPa

8.2 Test setup & procedure

Please refer to the clause 6.2 of this report.

8.3 Test Result

Test Mode: 802.11b mode

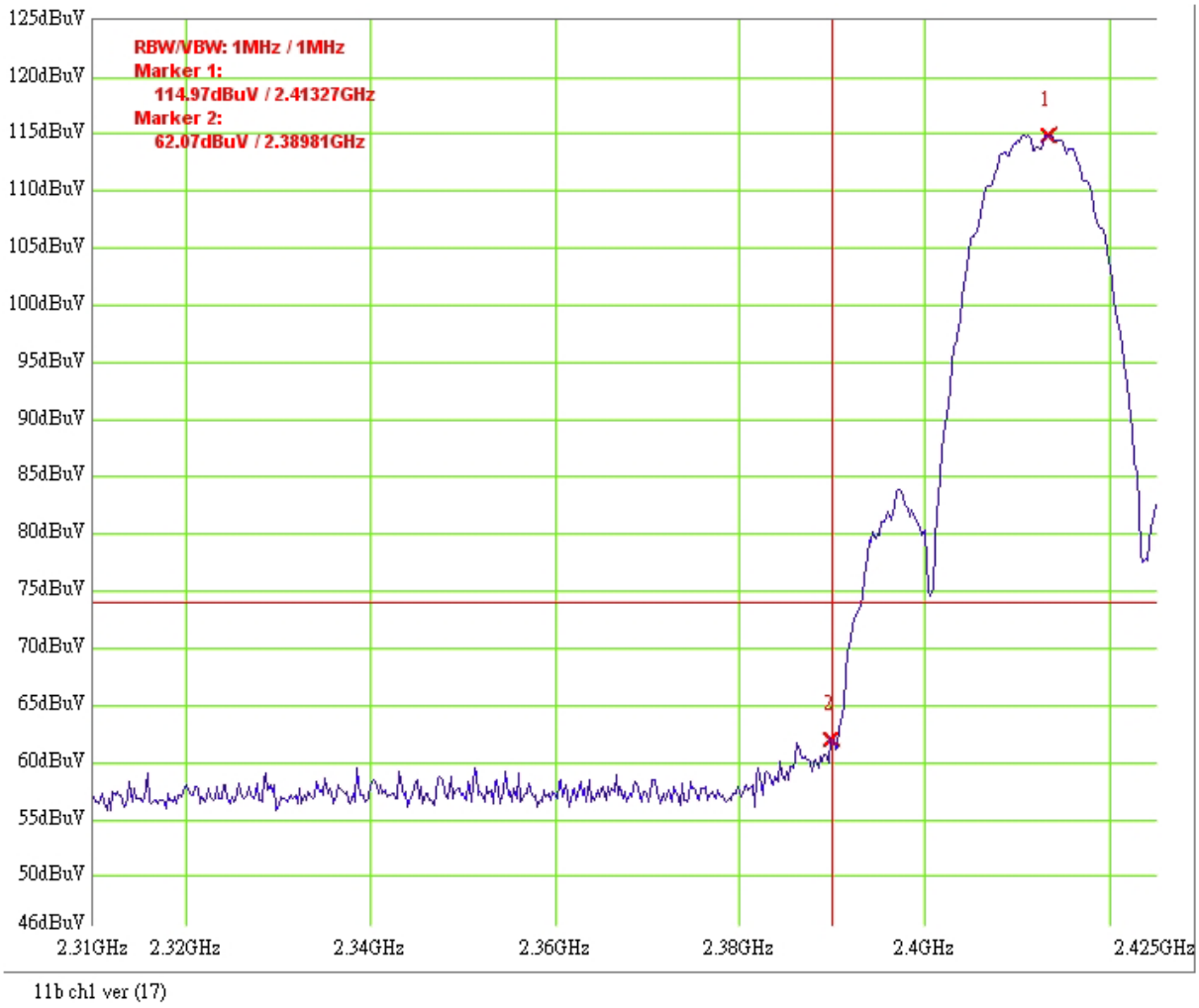
Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	62.07	74	-11.93
		AV	51.67	54	-2.33
11 (highest)	2483.5-2500	PK	61.87	74	-12.13
		AV	50.80	54	-3.20

Test Mode: 802.11g mode

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	70.62	74	-3.38
		AV	53.13	54	-0.87
11 (highest)	2483.5-2500	PK	71.07	74	-2.93
		AV	53.73	54	-0.27

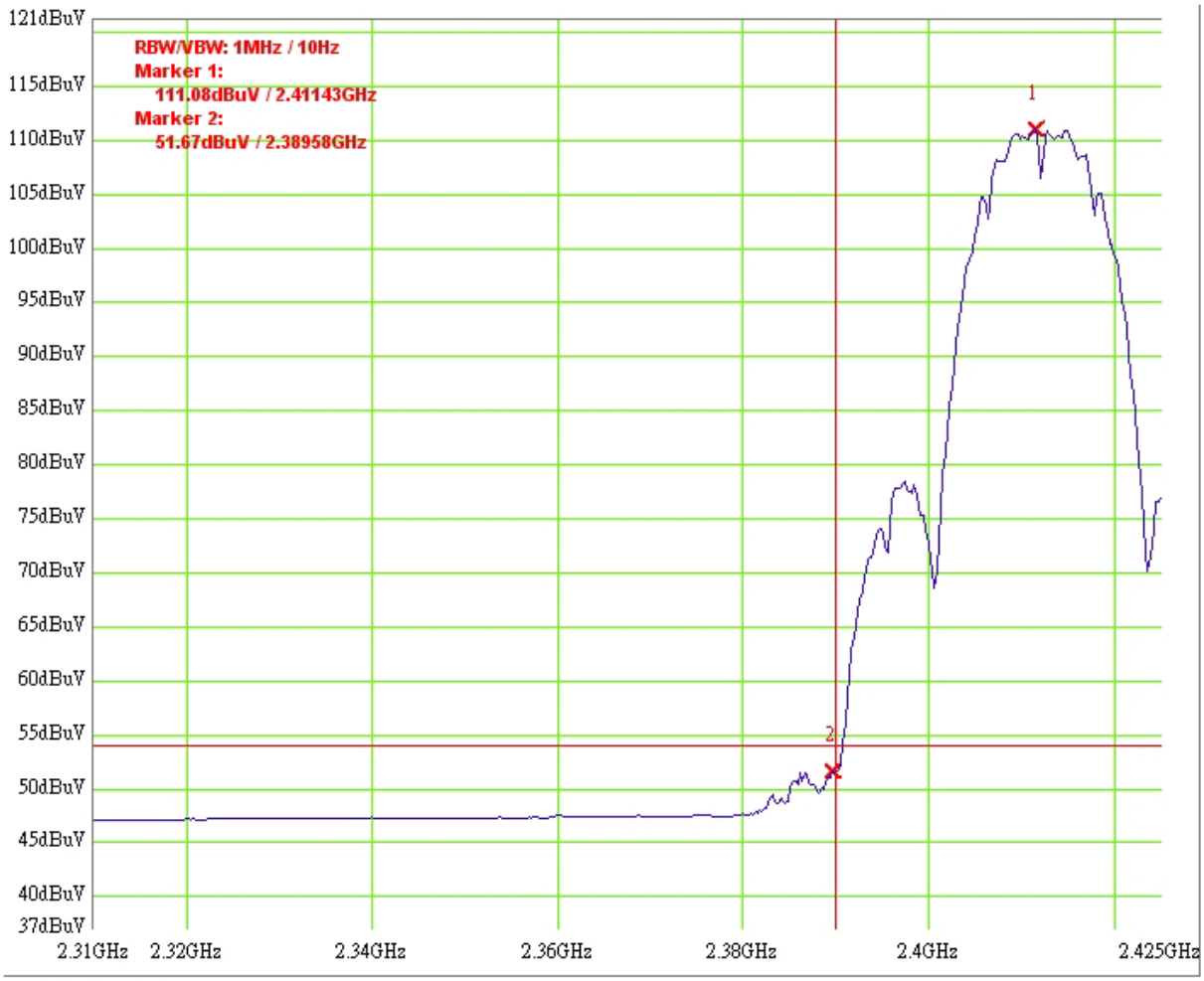
8.3.1 Conducted Method

Test Mode: 802.11b ch 1 PK



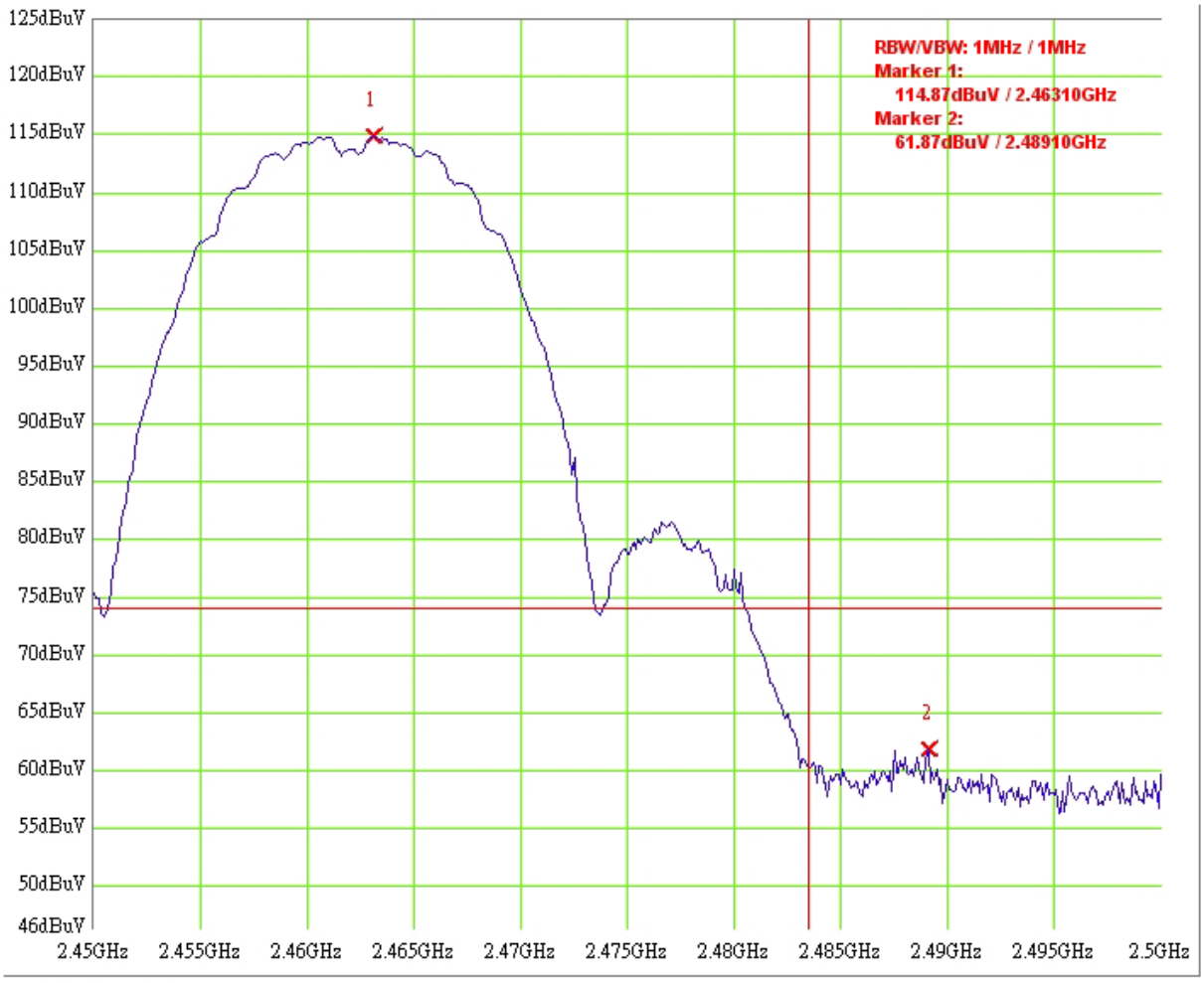
11b ch1 ver (17)

Test Mode: 802.11b ch 1 AV



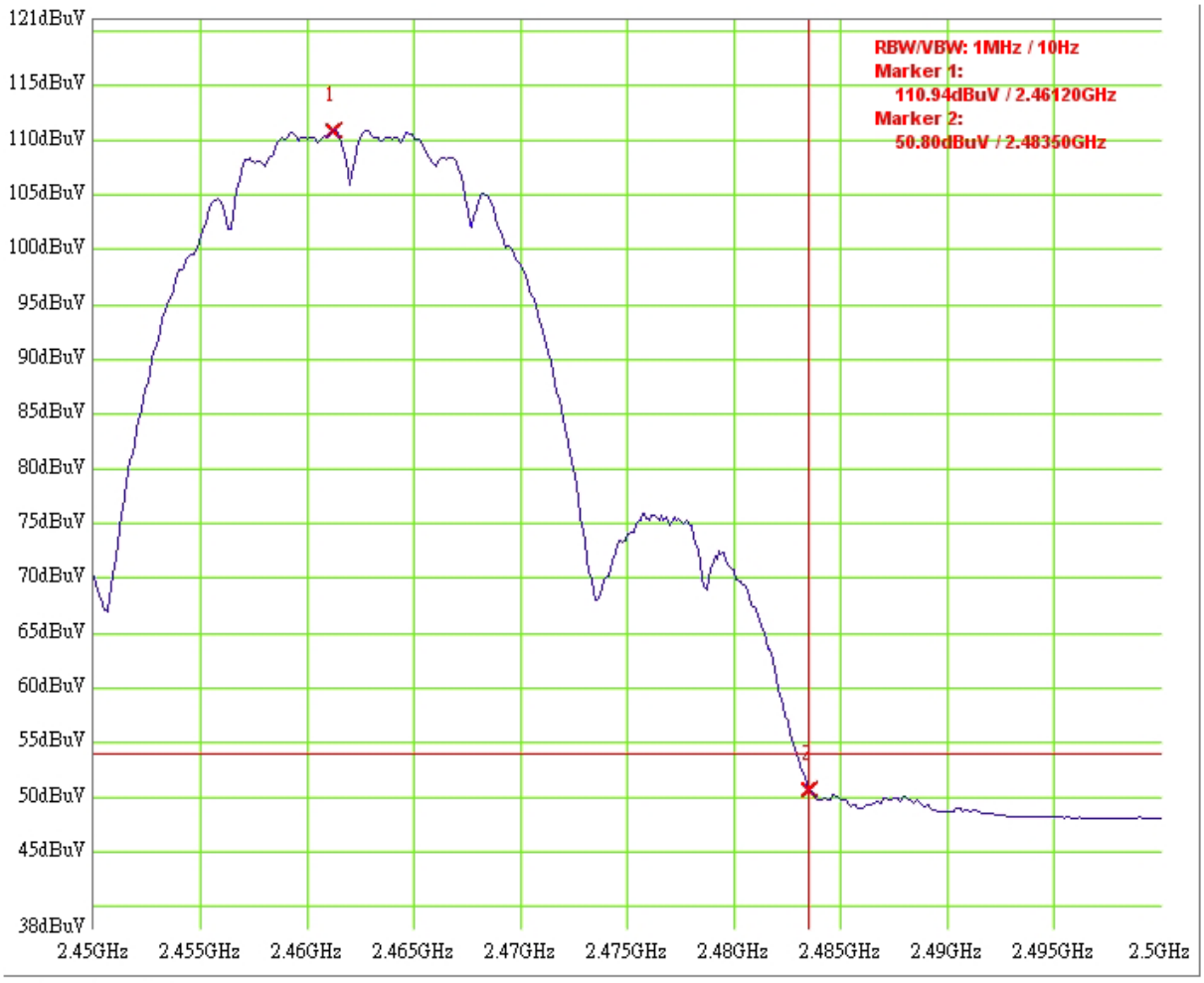
11b ch1 ver (17)

Test Mode: 802.11b ch 11 PK



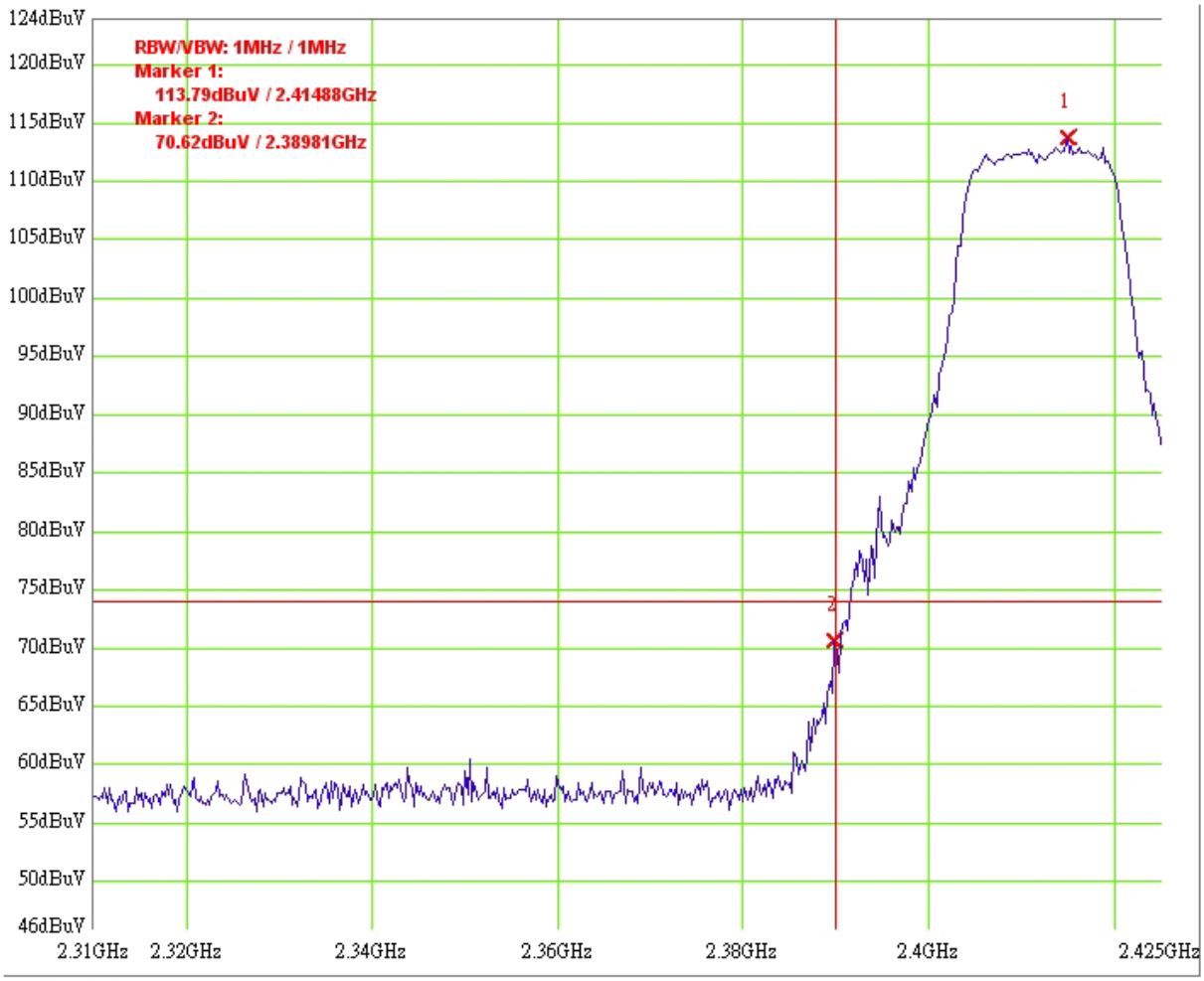
11b ch11 ver (17)

Test Mode: 802.11b ch 11 AV



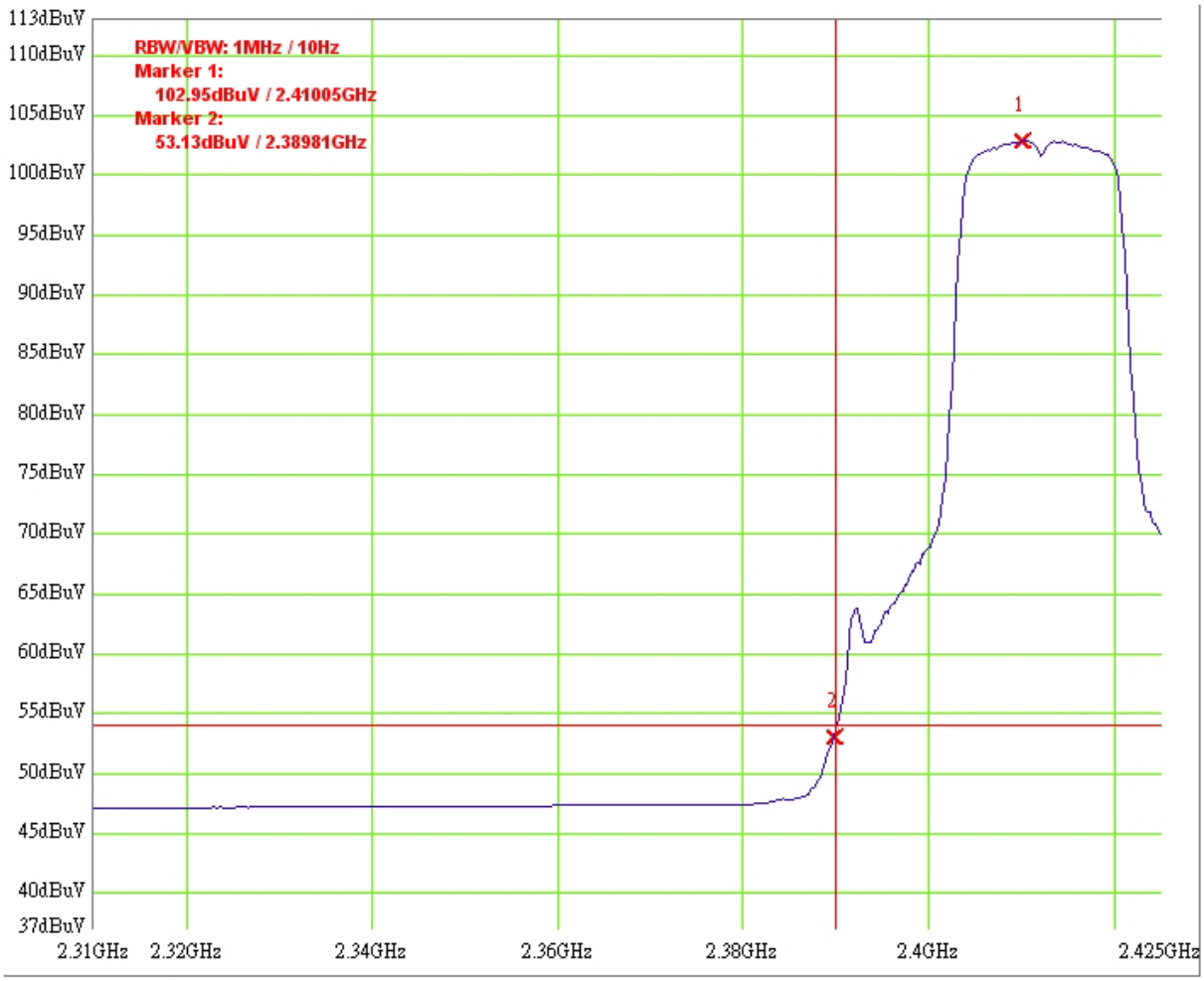
11g ch11 ver (17)

Test Mode: 802.11g ch 1 PK



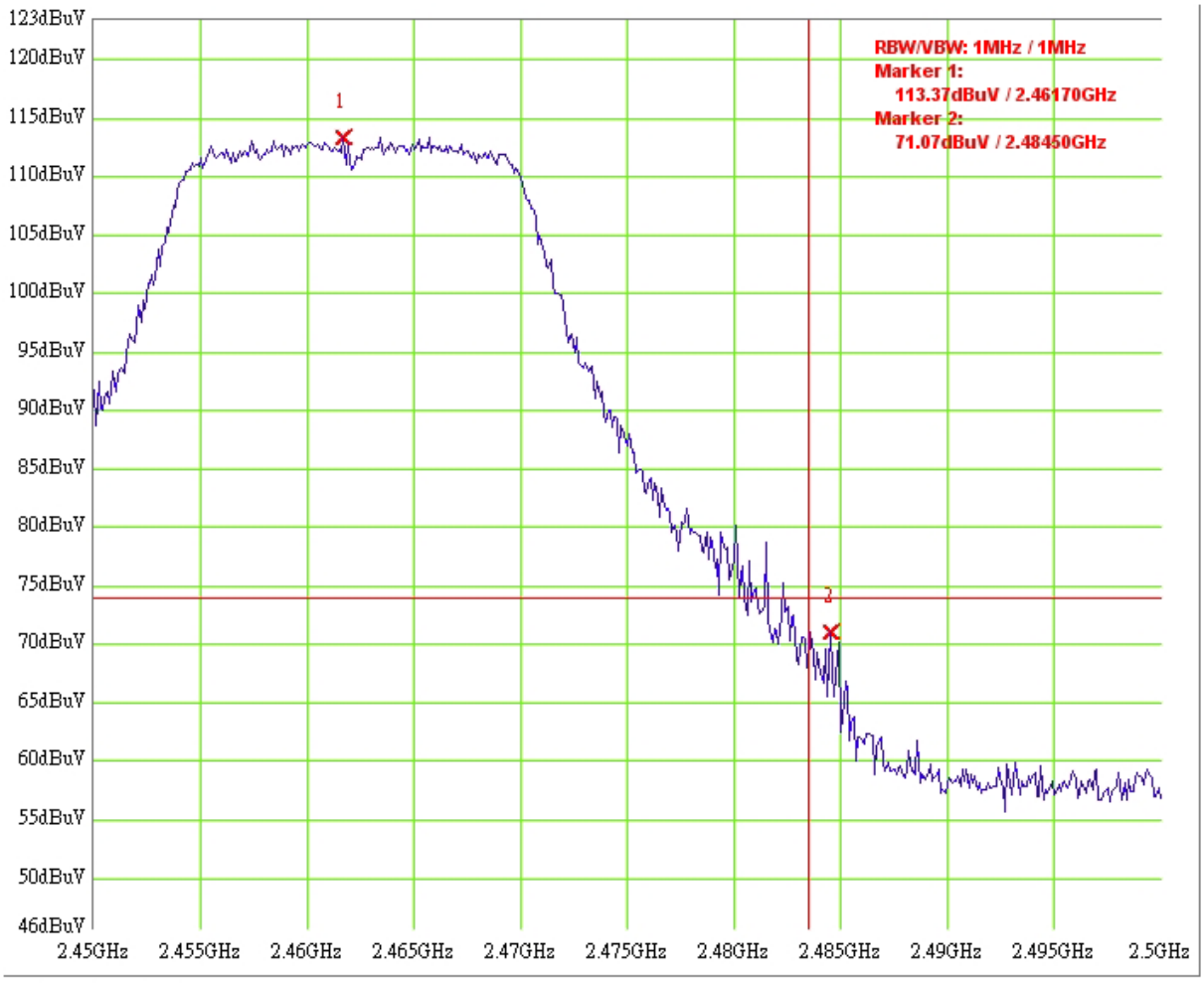
11g ch1 V(13.5)

Test Mode: 802.11g ch 1 AV



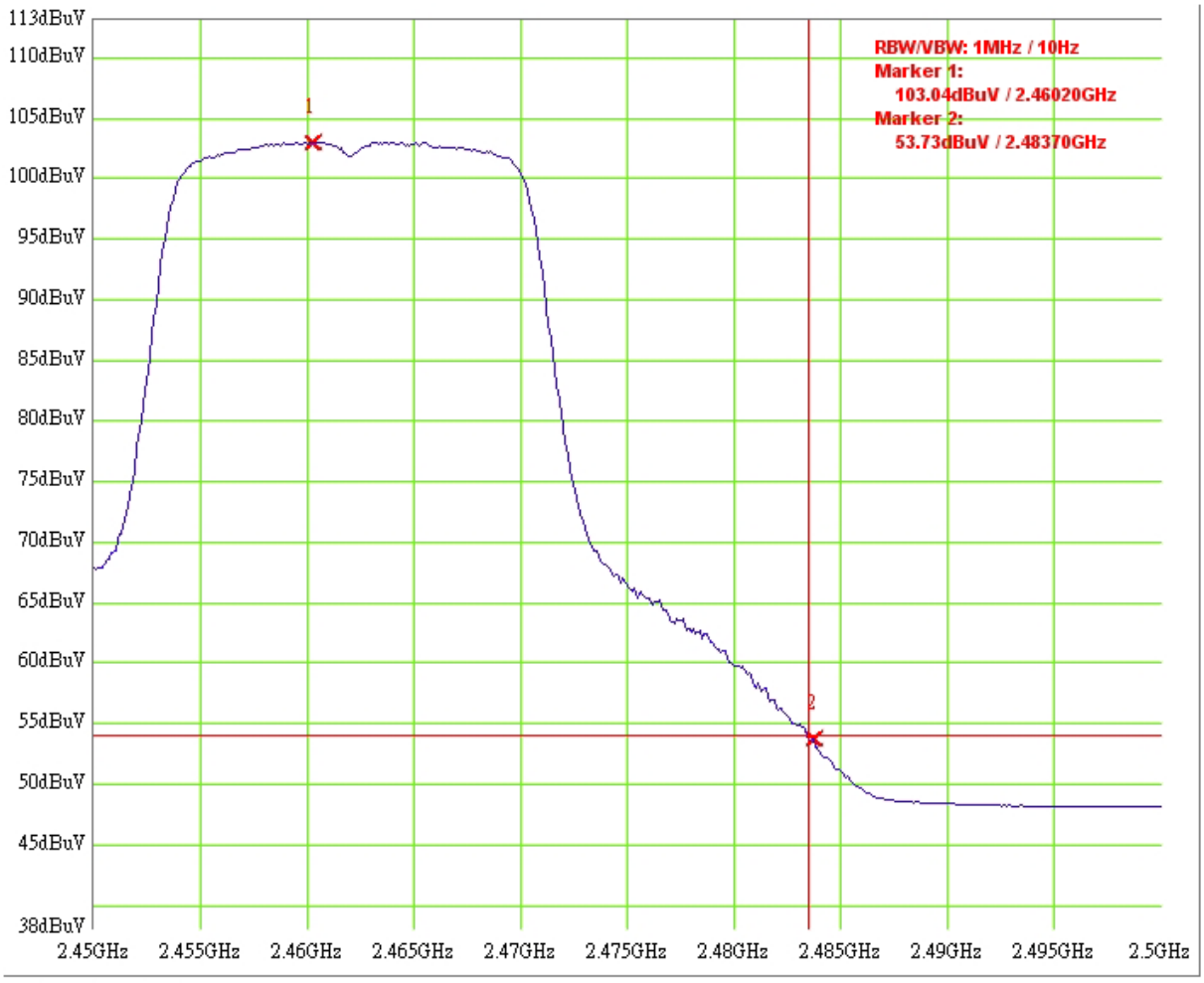
11g ch1 ver (12.5)

Test Mode: 802.11g ch 11 PK



11g ch11 ver (12.5)

Test Mode: 802.11g ch 11 AV



11g ch11 ver (12.5)

9. Power Line Conducted Emission test §FCC 15.207

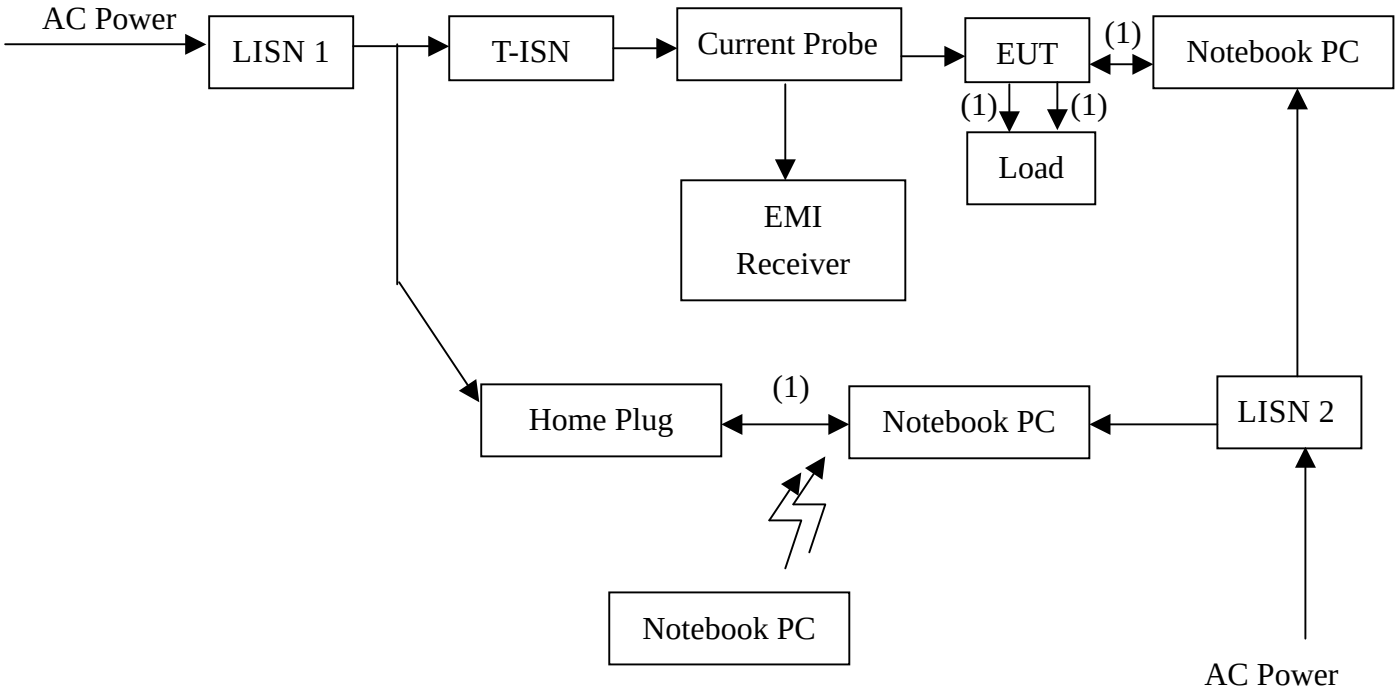
9.1 Operating environment

Temperature:	25	℃
Relative Humidity:	59	%
Atmospheric Pressure	1023	hPa

9.2 Test setup & procedure

9.2.1 Test Setup and procedure

Current on



(1) RJ-45 UTP Cat.5 10meter

The EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.
All connecting cables of EUT and peripherals were moved to find the maximum emission

9.2.2 LIMITS OF CONDUCTED EMISSION MEASUREMENT (CURRENT CARRIER ON)

Section 15.107(c)(2) for Class B device operating below 30 MHz of unintentional Carrier current radiators.

Freq. (MHz)	Maximum RF Line Voltage	
	QUASI-PEAK (μV)	QUASI-PEAK (dBμV)
0.535 ~ 1.705	1000	60

9.2.3 Uncertainty of Conducted Emission

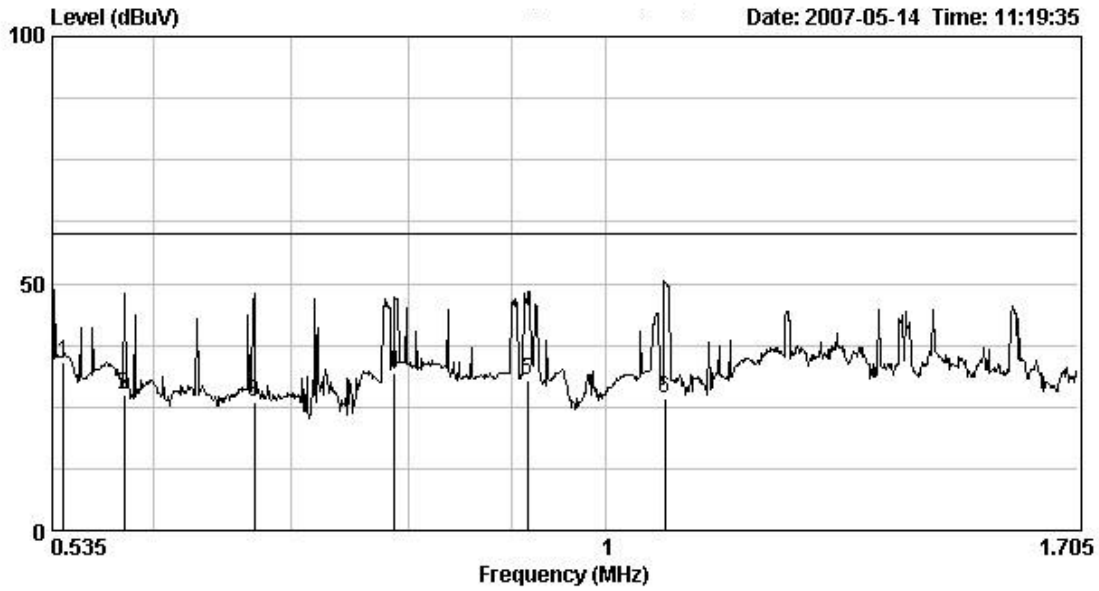
Expanded uncertainty (k=2) of conducted emission measurement is ±2.26 dB.

9.2.4 Conducted Emission Data (CURRENT CARRIER ON)

Phase: Line
Model No.: NBG-318S

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Margin (dB) Qp
0.542	0.10	34.10	60.00	-25.90
0.580	0.10	27.59	60.00	-32.41
0.673	0.10	26.06	60.00	-33.94
0.788	0.10	31.86	60.00	-28.14
0.915	0.10	30.36	60.00	-29.64
1.069	0.10	26.66	60.00	-33.34

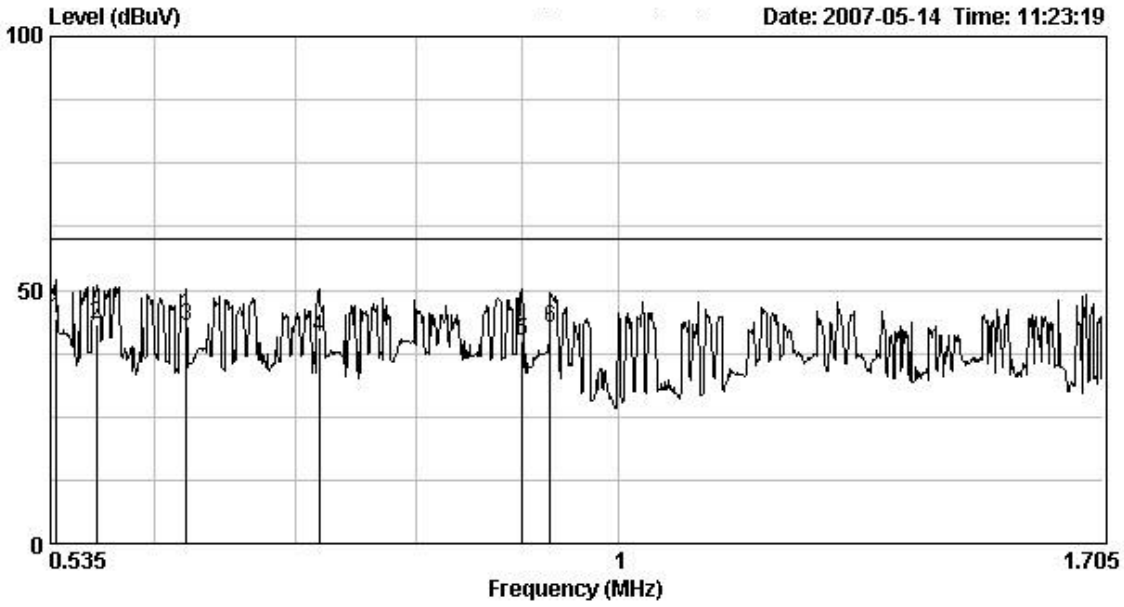
Remark:
1. Corr. Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral
Model No.: NBG-318S

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Margin (dB) Qp
0.539	0.10	44.34	60.00	-15.66
0.563	0.10	43.36	60.00	-16.64
0.622	0.10	42.99	60.00	-17.01
0.719	0.10	40.57	60.00	-19.43
0.900	0.10	40.09	60.00	-19.91
0.928	0.10	42.34	60.00	-17.66

Remark:
1. Corr. Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



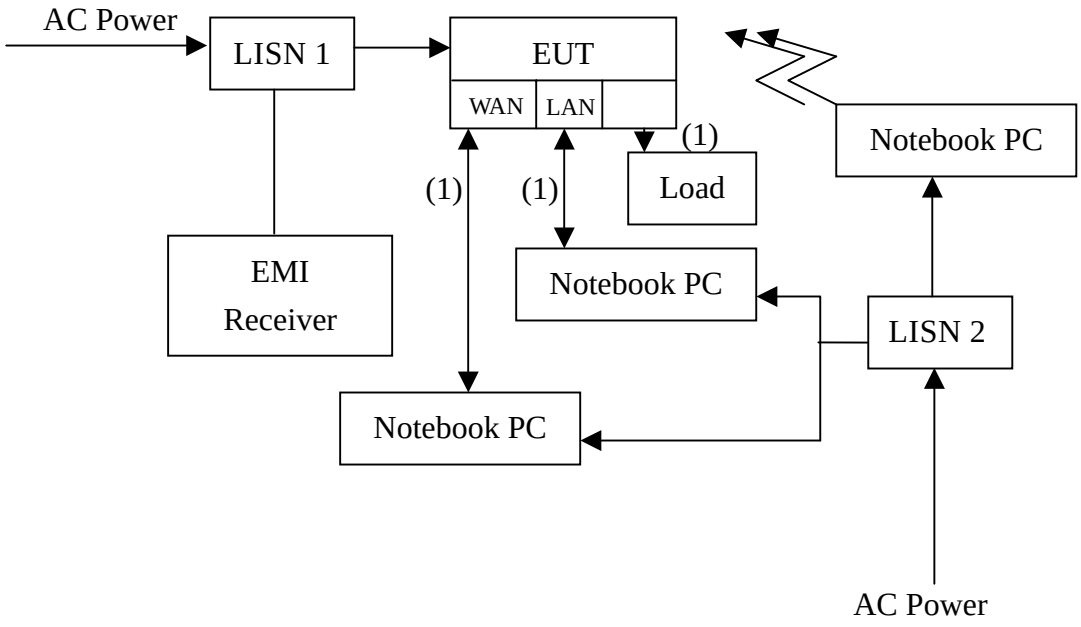
9.3.1 Conducted Emission Measurements (CURRENT CARRIER OFF)

9.3.2 Operating environment

Temperature:	25 ℃	Atmospheric Pressure:	1023 hPa
Relative Humidity:	59 %	Test Voltage:	120Vac, 60Hz

9.3.3 Test Setup and procedure

Current off



(1) RJ-45 UTP Cat.5 10meter

The EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.
All connecting cables of EUT and peripherals were moved to find the maximum emission

9.3.4 LIMITS OF CONDUCTED EMISSION MEASUREMENT (CURRENT CARRIER OFF)

Section 15.107(a) for Class B device operating above 30 MHz of unintentional radiators.

Freq. (MHz)	Maximum RF Line Voltage	
	QUASI-PEAK (dBμV)	AVERAGE (dBμV)
0.15~0.50	66 ~ 56	56 ~ 46
0.50~5.00	56	46
5.00~30.0	60	50

NOTES: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

9.3.5 Uncertainty of Conducted Emission

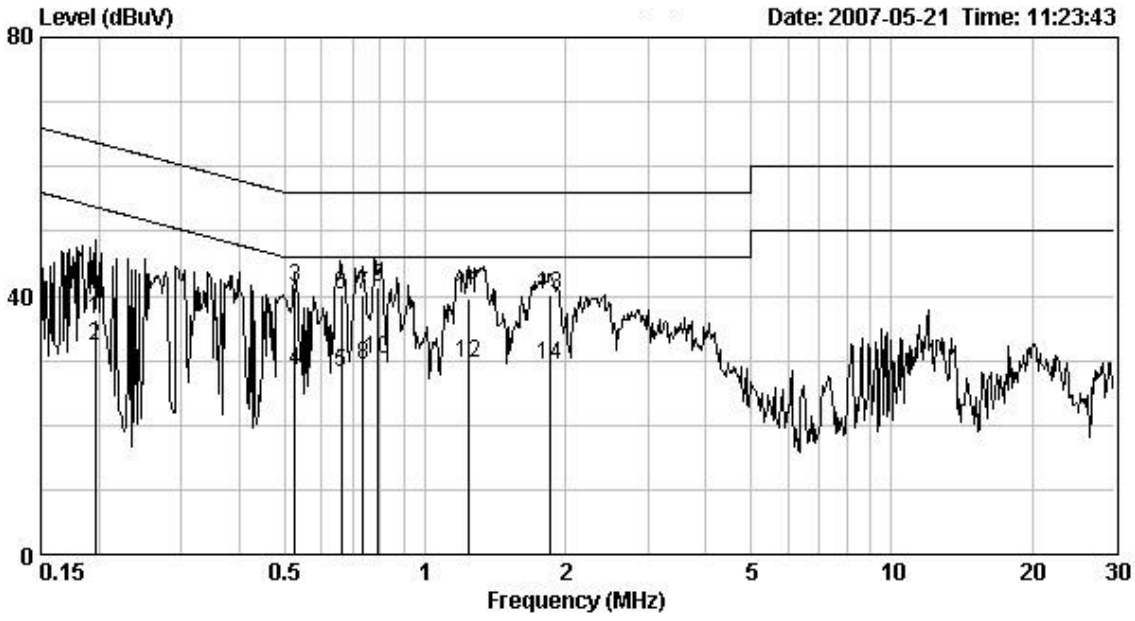
Expanded uncertainty (k=2) of conducted emission measurement is ±2.26 dB.

9.3.6 Conducted Emission Data (CURRENT CARRIER OFF)

Phase: Line
Model No.: NBG-318S

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.197	0.10	36.22	63.75	32.20	53.75	-27.53	-21.55
0.527	0.10	41.30	56.00	28.33	46.00	-14.70	-17.67
0.660	0.10	40.24	56.00	28.22	46.00	-15.76	-17.78
0.737	0.10	40.22	56.00	29.43	46.00	-15.78	-16.57
0.793	0.10	41.40	56.00	30.24	46.00	-14.60	-15.76
1.239	0.10	39.51	56.00	29.74	46.00	-16.49	-16.26
1.860	0.10	40.22	56.00	29.30	46.00	-15.78	-16.70

Remark:
1. Corr. Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral
Model No.: NBG-318S

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.263	0.10	45.22	61.33	43.20	51.33	-16.11	-8.13
0.335	0.10	39.72	59.32	33.20	49.32	-19.60	-16.12
0.399	0.10	41.99	57.88	36.22	47.88	-15.89	-11.66
0.527	0.10	41.30	56.00	29.40	56.00	-14.70	-26.60
0.655	0.10	44.91	56.00	36.22	46.00	-11.09	-9.78
0.738	0.10	43.42	56.00	36.42	46.00	-12.58	-9.58
0.793	0.10	44.22	56.00	33.31	46.00	-11.78	-12.69
1.210	0.10	41.73	56.00	29.41	46.00	-14.27	-16.59

Remark:
1. Corr. Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)