

EMC TEST REPORT

Report No. : EME-040878
Model No. : ZyAIR G-220F
Issued Date : Oct. 11, 2004

Applicant : ZyXEL Communications Corporation
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Hsin-Chu, Taiwan

Test By : Intertek Testing Services Taiwan Ltd.
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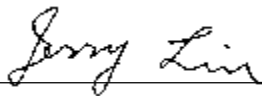
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Project Engineer



Kevin Chen

Reviewed By



Jerry Liu

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Summary of Tests**802.11g Wireless USB Adapter-Model: ZyAIR G-220F
FCC ID: I88G220F**

Test	Reference	Results
Minimum 6dB Bandwidth test	15.247(a)(2)	Complies
Maximum Output Power test	15.247(b)	Complies
Radiated Spurious Emission test	15.205, 15.209	Complies
Power Spectrum Density test	15.247(d)	Complies
Power Line Conducted Emission test	15.207	Complies

1. General information

1.1 Identification of the EUT

Applicant	: ZyXEL Communications Corporation
Product	: 802.11g Wireless USB Adapter
Model No.	: ZyAIR G-220F
FCC ID.	: I88G220F
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(EUT)	: 5Vdc
Rated Power(Notebook)	: 120Vac/60Hz
Power Cord	: N/A
Sample Received	: Sep. 9, 2004
Test Date(s)	: Sep. 9, 2004 to Oct. 10, 2004

A FCC DoC report has been generated for the client.

1.2 Additional information about the EUT

The EUT is an 802.11g Wireless USB Adapter, and was defined as information technology equipment.

We verified that G-220F is series model to ZyAIR G-220F, for these models are identical in hardware aspect, and the different is in model number only.

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

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 0dBi max

Antenna Type : Ceramic Antenna

Connector Type : N/A

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Notebook	HP	DY839PA#ABD	CNU41174K	FCC DoC Approved
Modem	Dynalink	V1456VQE	00V230A00051494	FCC DoC Approved
Printer	HP	C2642A	TH86K1N2ZB	FCC DoC Approved
Access Point	Z-COM	XI-1450	AF16001-00242	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 supplied with 120Vac, 60Hz.

Plug the EUT into Notebook, and turn on the power, then run the test program “ZD1211EVL” under windows OS.

During the radiation test, the EUT was transmitted continuously.

During the conduction test, the EUT was linked with the Access Point, and tested in normal operation mode.

After verifying the maximum output power, the maximum output power was occurred at low channel with 11Mbps data rate in 802.11b and at low channel with 9Mbps data rate in 802.11g. The final test was executed under this condition and recorded the worst-case emission (802.11b Tx at low channel) in this report during below 1GHz radiated tests.

During above 1GHz tests, we 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	04/13/2005
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	07/14/2005
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/13/2005
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	10/19/2004
Horn Antenna	EMCO	1GHz~18GHz	3115	EC338	09/18/2005
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2005
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	EC368	05/20/2005
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	4/14/2005
Pre-Amplifier	MITEQ	26GHz~40GHz	828825	EC374	1/29/2005
Controller	HDGmbH	N/A	HD 100	EP317-1	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP317-2	N/A
Turn Table	HDGmbH	N/A	DS 420S	EP317-3	N/A
Signal Generator	Rohde & Schwarz	20MHz~27GHz	SMR27	EC354	08/18/2005
Power Meter / Sensor	Boonton	30MHz~8GHz	4231A / 51011-EMC	EC359	03/21/2005
Crystal Detector	Agilent	10MHz~18GHz	8472B	EC395	09/02/2005
Two Channel Digital Storage Oscilloscope	Tektronix	N/A	TDS1012	EC394	08/16/2005
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/14/2005

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

3. Minimum 6dB Bandwidth test

3.1 Operating environment

Temperature: 24 °C
 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 300kHz, 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 operating (DSSS Modulation) mode

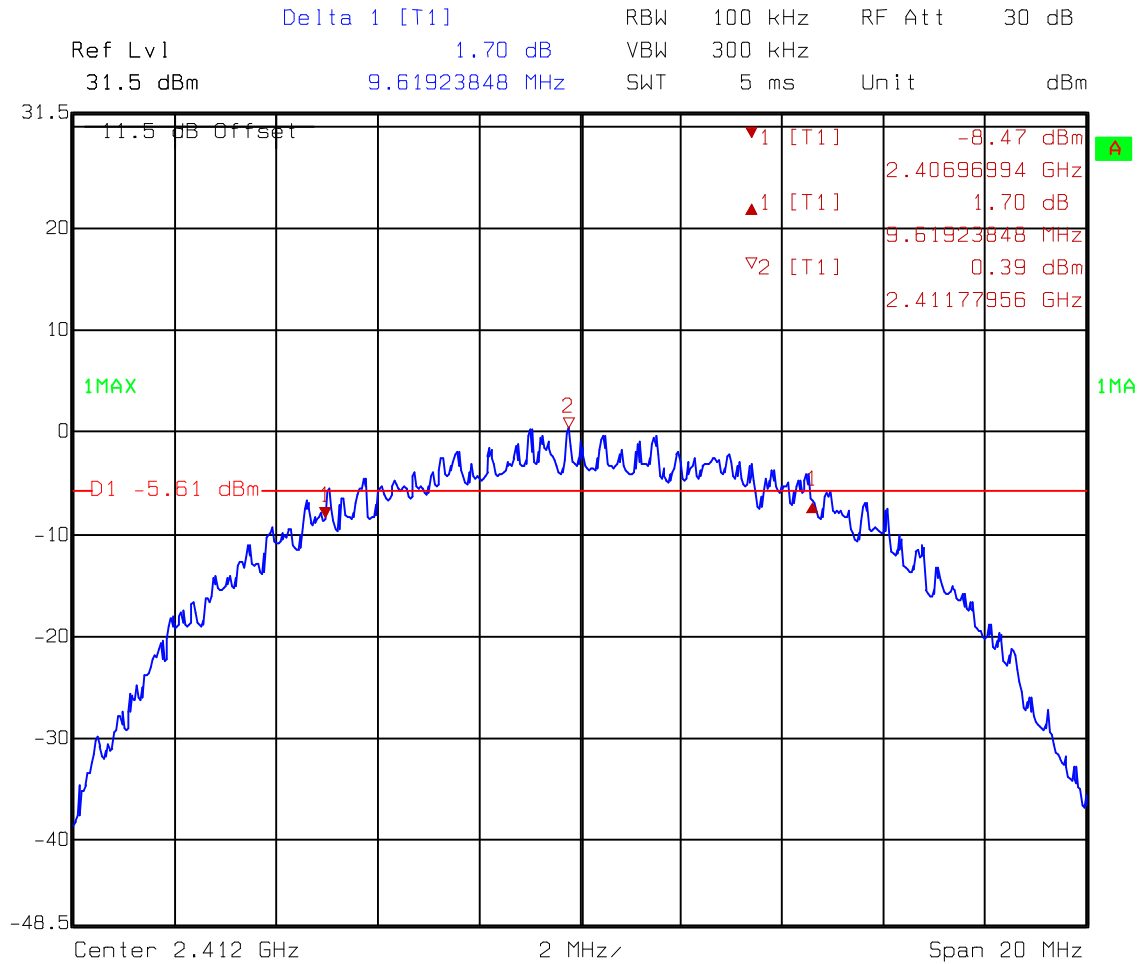
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1	2412	9.62	> 500kHz
6	2437	10.14	> 500kHz
11	2462	9.14	> 500kHz

Test Mode: 802.11g operating (OFDM Modulation) mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1	2412	16.47	> 500kHz
6	2437	16.47	> 500kHz
11	2462	16.43	> 500kHz

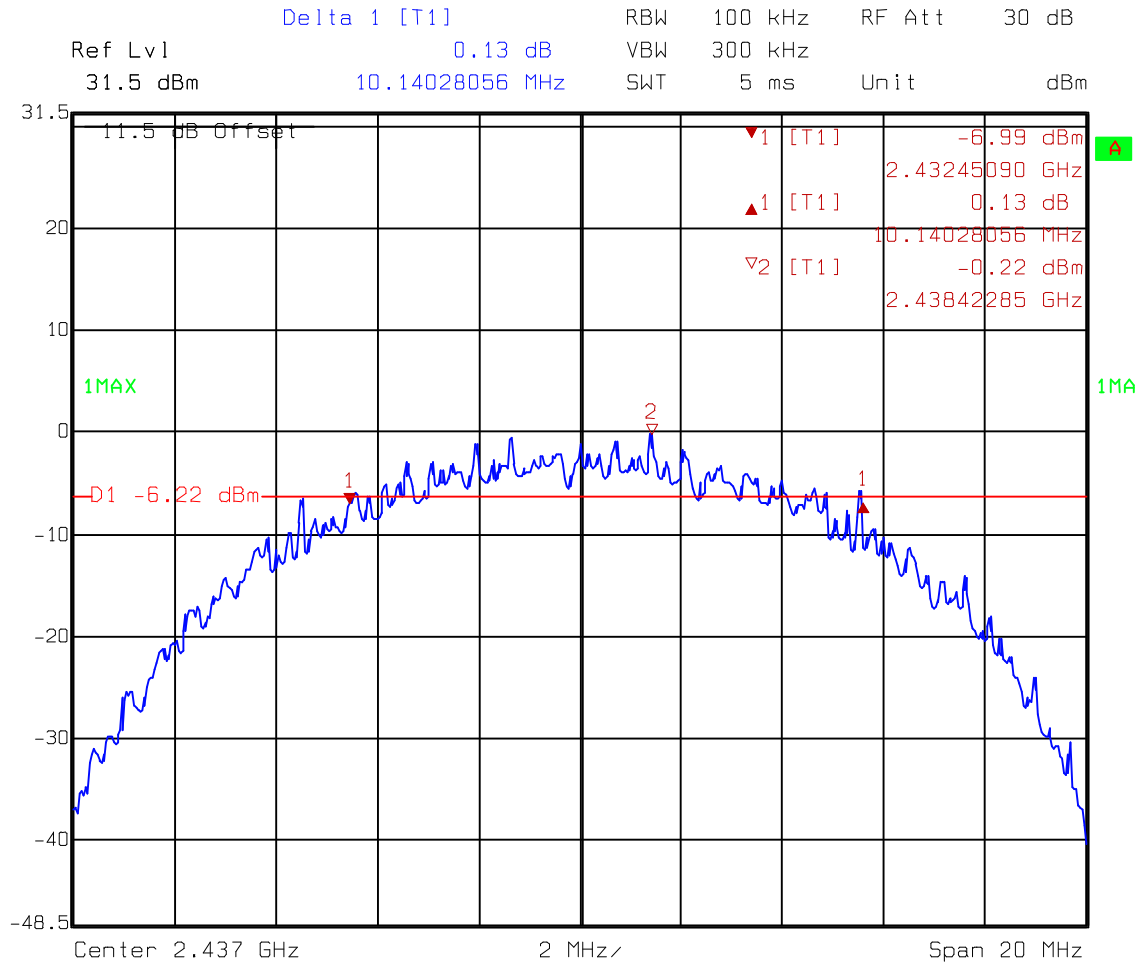
Please see the plot below.

Test Mode: 802.11b operating (DSSS Modulation) mode



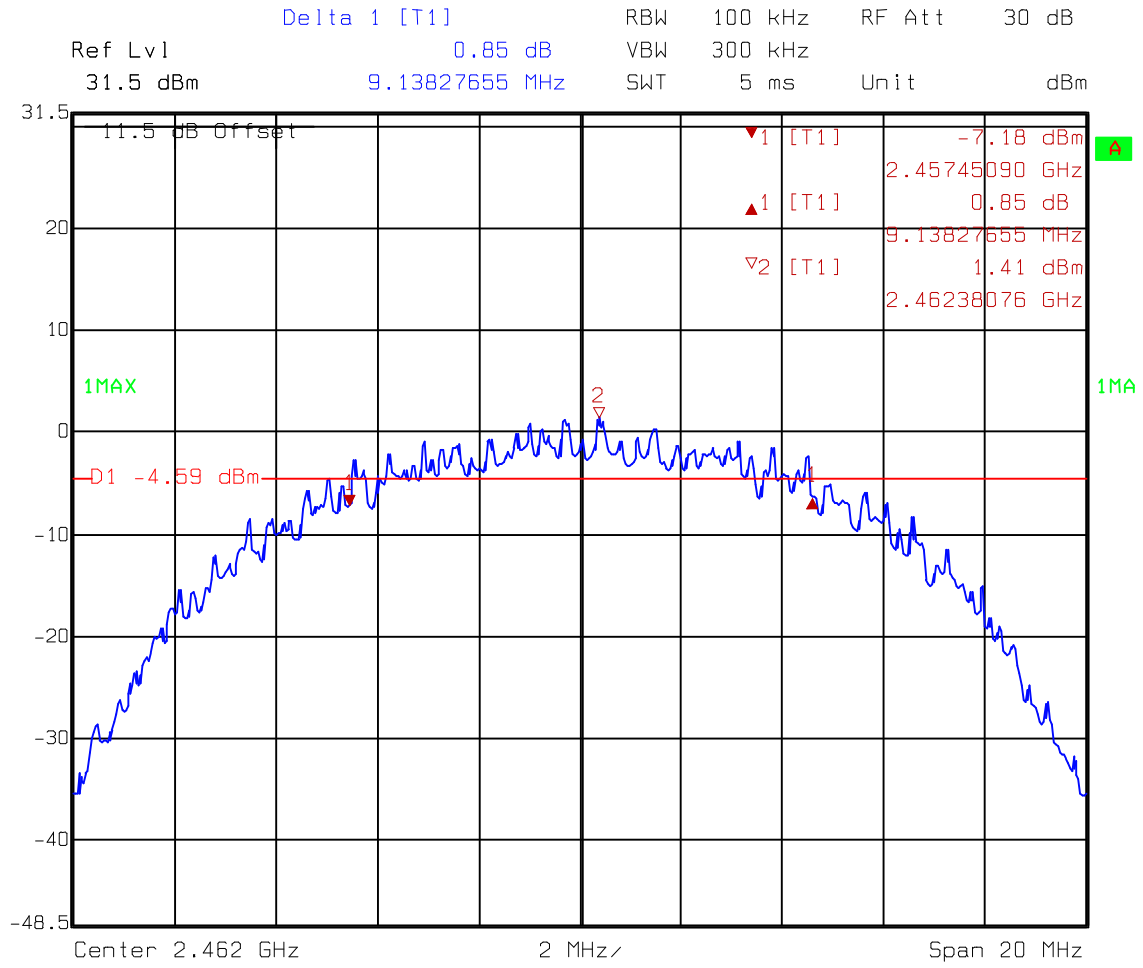
Comment A: 6dB bandwidth at low channel (EC365)

Date: 21.SEP.2004 16:23:07



Comment A: 6dB bandwidth at middle channel (EC365)

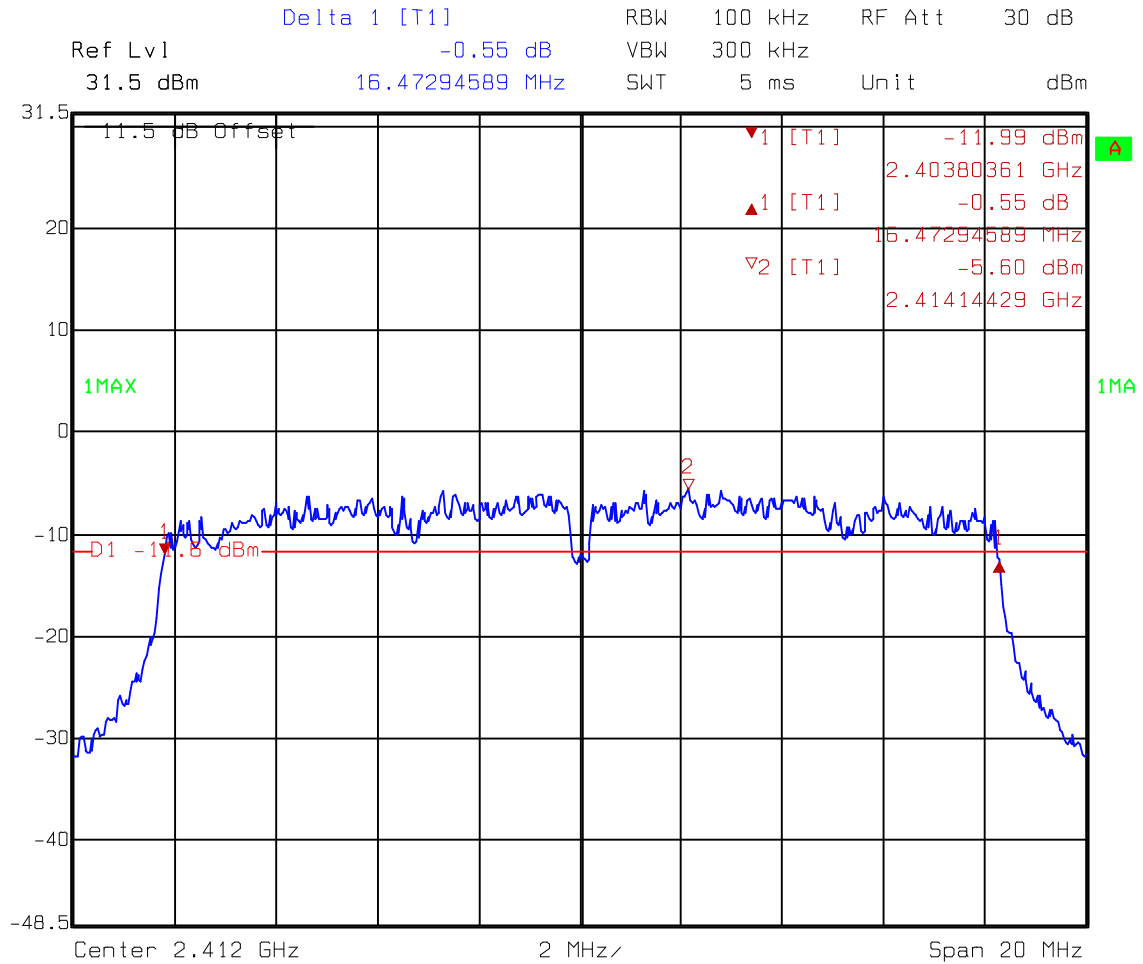
Date: 21.SEP.2004 16:21:11



Comment A: 6dB bandwidth at high channel (EC365)

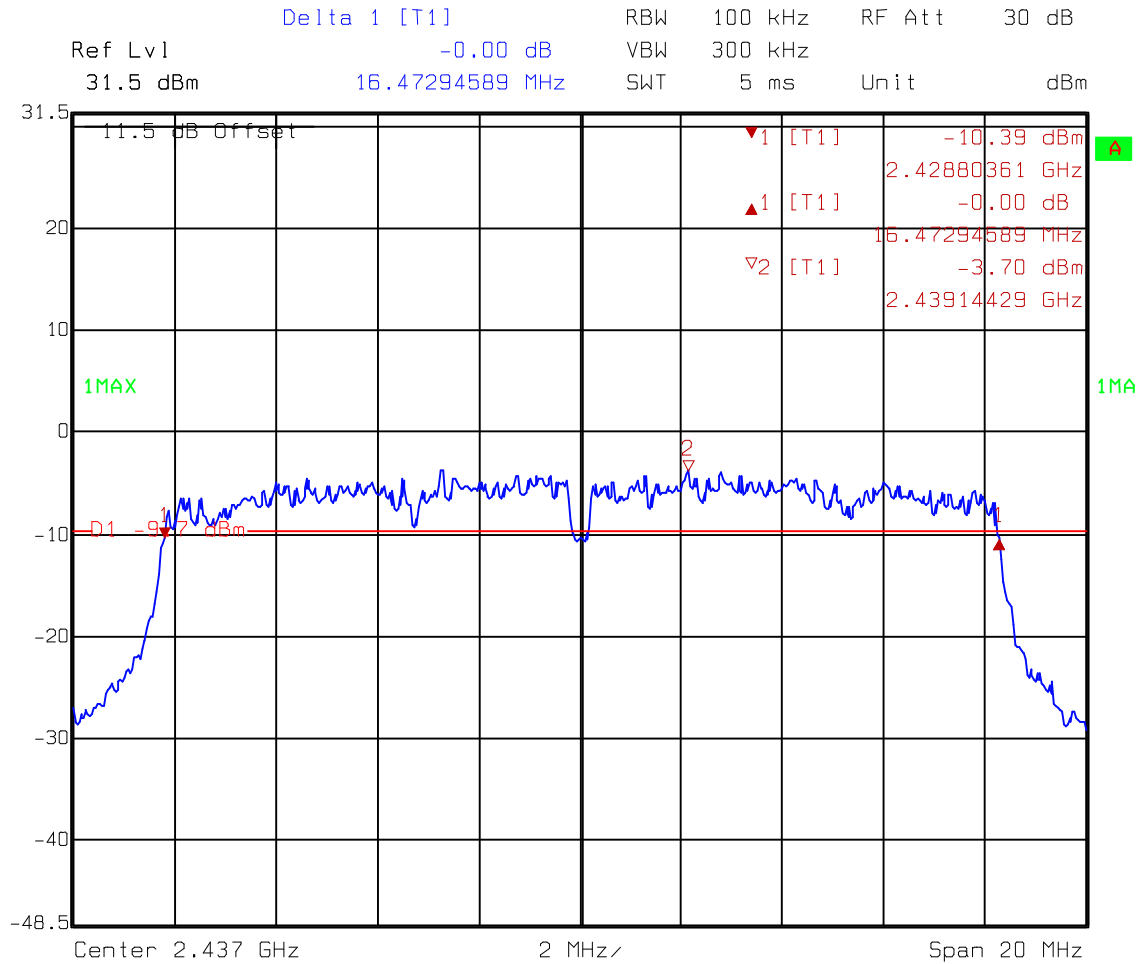
Date: 21.SEP.2004 16:19:01

Test Mode: 802.11g operating (OFDM Modulation) mode



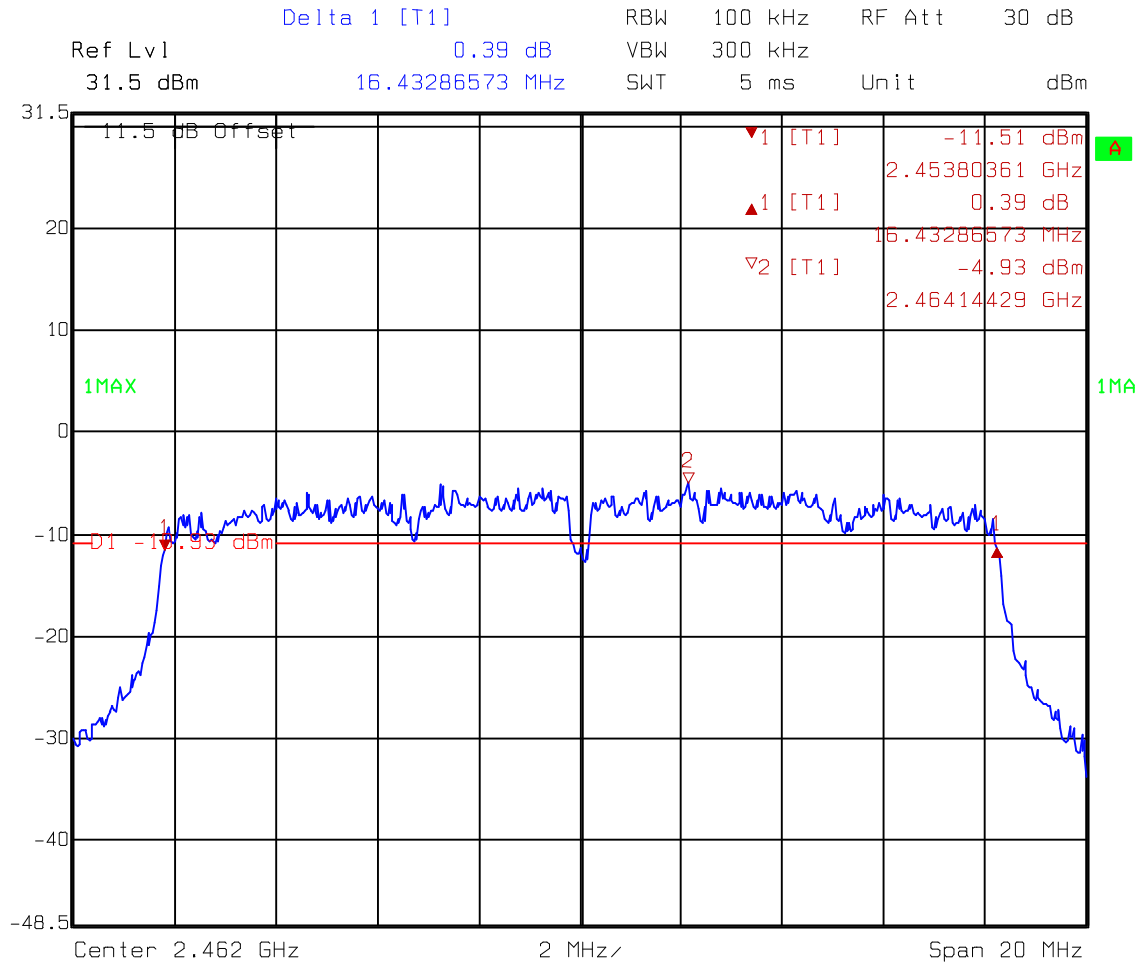
Comment A: 6dB bandwidth at low channel (EC365)

Date: 21.SEP.2004 16:29:14



Comment A: 6dB bandwidth at middle channel (EC365)

Date: 21.SEP.2004 16:32:32



Comment A: 6dB bandwidth at high channel (EC365)

Date: 21.SEP.2004 16:35:59

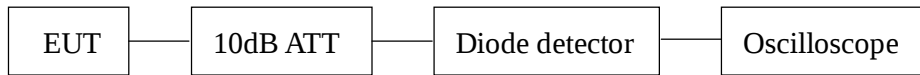
4. Maximum Output Power test

4.1 Operating environment

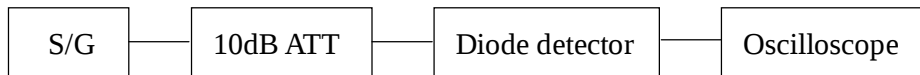
Temperature: 22 °C
Relative Humidity: 52 %
Atmospheric Pressure 1023 hPa

4.2 Test setup & procedure

A:



B:



1. The output of the transmitter via a 10 dB attenuator and coupled to a diode detector.
2. The output of the diode detector connected to the vertical channel of an oscilloscope. The observed trace of the oscilloscope shall be recorded as “A”.
3. The transmitter replaced by a signal generator. The output frequency of the signal made equal to the center of the frequency range occupied by the transmitter and unmodulated.
4. The output of the signal generator raised to reach the peak of trace “A” named X.
5. The signal generator output level X (dBm) is the transmitter peak output power.

4.3 Measured data of Maximum Output Power test results

Test Mode: 802.11b operating (DSSS Modulation) mode

Channel	Frequency (MHz)	Reading (dBm)	Output Power		Limit (dBm)
			(dBm)	(mW)	
1	2412	17.02	17.02	50.35	30
6	2437	17.12	17.12	51.52	30
11	2462	17.39	17.39	54.83	30

Test Mode: 802.11g operating (OFDM Modulation) mode

Channel	Frequency (MHz)	Reading (dBm)	Output Power		Limit (dBm)
			(dBm)	(mW)	
1	2412	17.34	17.34	54.20	30
6	2437	17.29	17.29	53.58	30
11	2462	17.45	17.45	55.59	30

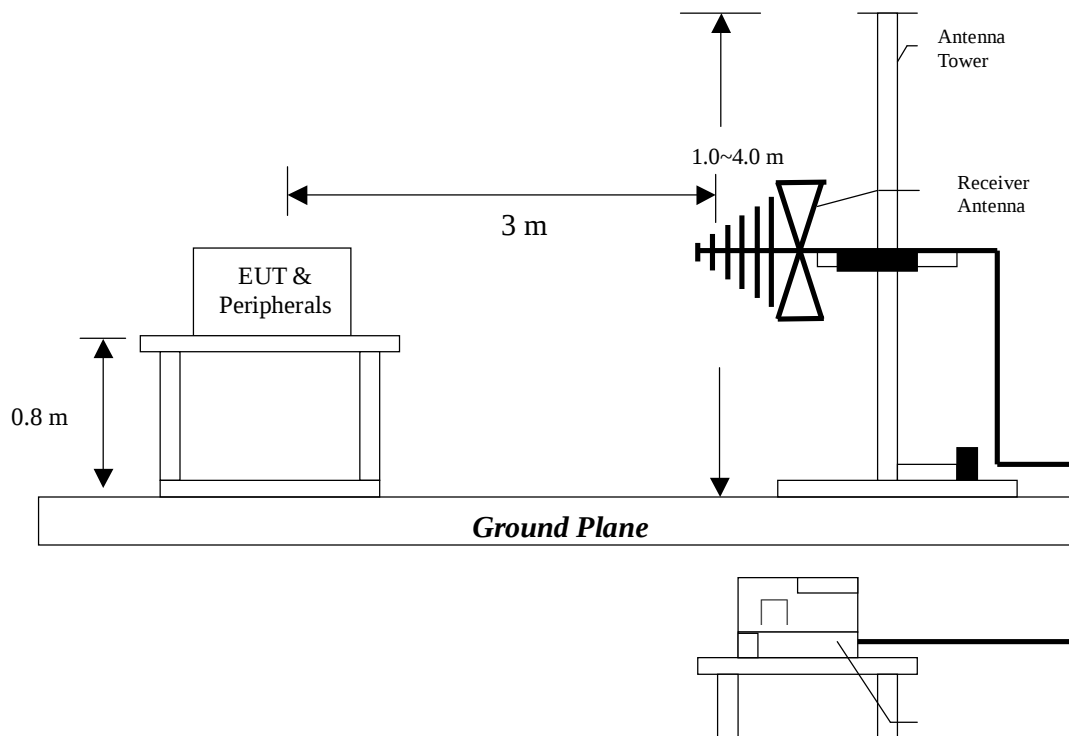
5. Radiated Emission test

5.1 Operating environment

Temperature:	22	°C	(10-40°C)
Relative Humidity:	55	%	(10-90%)
Atmospheric Pressure	1010	hPa	(860-1060hPa)

5.2 Test setup & procedure

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



Radiated emissions were investigated 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 three meter reading using inverse scaling with distance.

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

5.3 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.

5.4 Radiated spurious emission test data

The radiated spurious emissions at

Frequency (MHz)	Margin	Test condition
-2.20	233.700	802.11b Tx at channel 1 (vertical)
-2.10	398.600	802.11b Tx at channel 1 (vertical)
-3.90	233.700	802.11b Tx at channel 1 (horizontal)
-3.90	365.700	802.11b Tx at channel 1 (horizontal)
-2.50	466.500	802.11b Tx at channel 1 (horizontal)

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

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

The test was performed the 802.11b and 802.11g transmitting continuously modes with channel 1,6,11, the worst case was occurred in 802.11b Tx at channel 1.

EUT : ZyAIR G-220F

Worst case : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
233.700	QP	V	12.28	31.52	43.8	46.00	-2.20	100.00	25.00
299.700	QP	V	13.93	22.07	36.00	46.00	-10.00	136.00	145.00
363.700	QP	V	15.48	23.62	39.10	46.00	-6.90	105.00	128.00
398.600	QP	V	16.37	27.53	43.90	46.00	-2.10	144.00	300.00
466.500	QP	V	18.03	21.67	39.70	46.00	-6.30	125.00	211.00
499.500	QP	V	18.8	18.00	36.80	46.00	-9.20	114.00	264.00

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

EUT : ZyAIR G-220F

Worst case : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
233.700	QP	H	12.28	29.82	42.10	46.00	-3.90	148.00	56.00
332.600	QP	H	14.75	24.85	39.60	46.00	-6.40	201.00	89.00
365.600	QP	H	15.53	26.57	42.10	46.00	-3.90	188.00	245.00
412.200	QP	H	16.70	24.10	40.80	46.00	-5.20	224.00	305.00
466.500	QP	H	18.03	25.47	43.50	46.00	-2.50	195.00	187.00
499.500	QP	H	18.80	21.10	39.90	46.00	-6.10	234.00	65.00

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

5.4.2 Measurement results: frequency above 1GHz

EUT : ZyAIR G-220F

Test Condition : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
4824.00	PK	V	39.60	35.25	54.65	50.30	74.00	-23.70	171	147.00
4824.00	AV	V	39.60	35.25	41.95	37.60	54.00	-16.40	171	147.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
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

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 : ZyAIR G-220F

Test Condition : 802.11b Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
4874.00	PK	V	39.60	35.25	54.83	50.48	74.00	-23.52	174	153.00
4874.00	AV	V	39.60	35.25	41.96	37.61	54.00	-16.39	174	153.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
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

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 : ZyAIR G-220F

Test Condition : 802.11b Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
4924.00	PK	V	39.60	35.25	52.83	48.48	74.00	-25.52	166	145.00
4924.00	AV	V	39.60	35.25	40.14	35.79	54.00	-18.21	166	145.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
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

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 : ZyAIR G-220F

Test Condition : 802.11g Tx at channel 1

No Spurious emissions were found above the spectrum analyzer noise floor in the frequency range 1GHz to 25GHz.

Noise floor level

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 : ZyAIR G-220F

Test Condition : 802.11g Tx at channel 6

No Spurious emissions were found above the spectrum analyzer noise floor in the frequency range 1GHz to 25GHz.

Noise floor level

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 : ZyAIR G-220F

Test Condition : 802.11g Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
2088.00	PK	V	39.55	29.46	67.60	57.51	74.00	-16.49	1.01	8.00
2088.00	AV	V	39.55	29.46	60.00	49.91	54.00	-4.09	1.01	8.00

Remark:

1. Corrected Level = Reading Level + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
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

For PK:

1GHz-3GHz: 20dBuV

3GHz-14GHz: 27dBuV

14GHz-26.5GHz: 39dBuV

For AV:

1GHz-3GHz: 10dBuV

3GHz-14GHz: 16dBuV

14GHz-26.5GHz: 28dBuV

6. Power Spectrum Density test

6.1 Operating environment

Temperature: 22 °C
 Relative Humidity: 54 %
 Atmospheric Pressure 1023 hPa

6.2 Test setup & procedure

The power spectrum density per FCC §15.247(d) 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 1.5 MHz, and the sweep time set at 500 seconds. Power Density was read directly and cable loss (1.5dB) 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.

6.3 Measured data of Power Spectrum Density test results

Test Mode: 802.11b operating (DSSS Modulation) mode

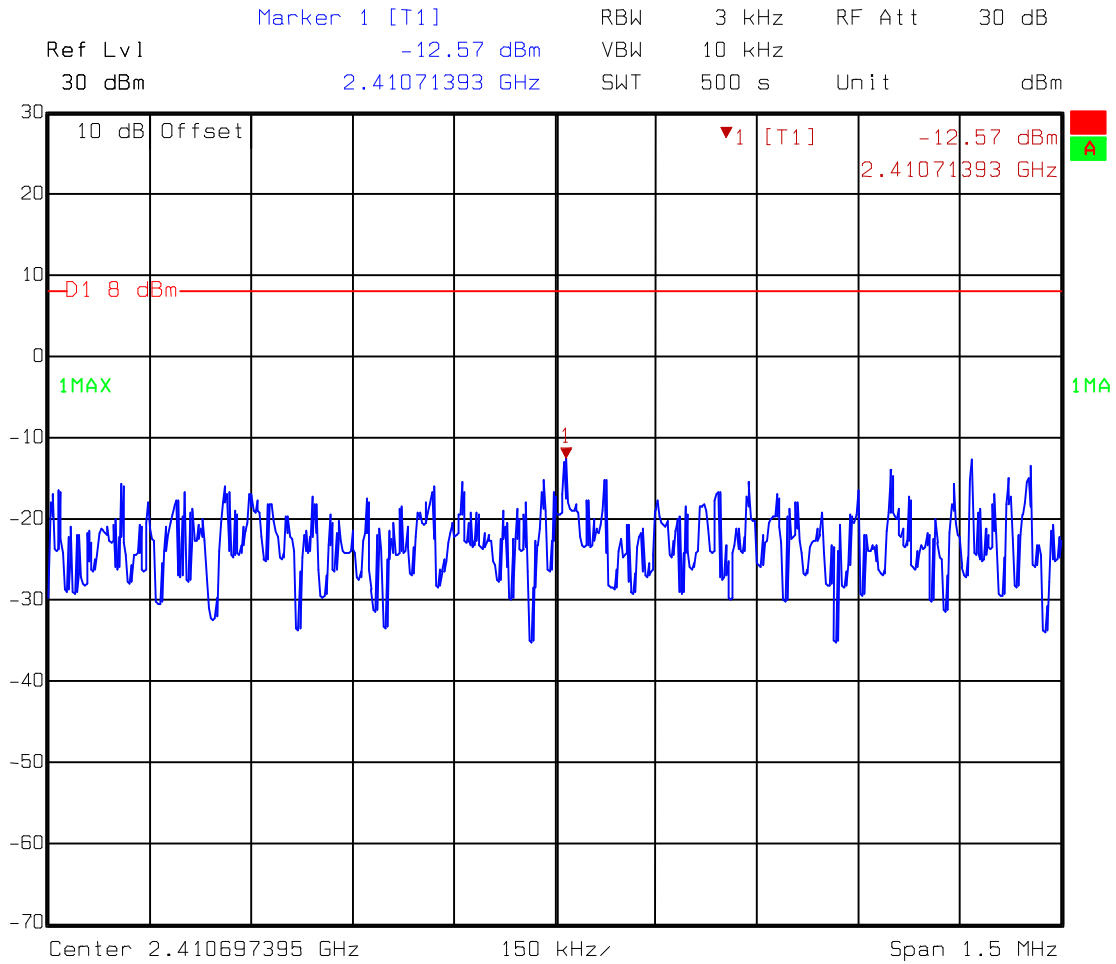
Channel	Frequency (MHz)	Measured level (dBm)	Cable loss (dB)	Calculated level (dBm)	Limit (dBm)
1	2412	-12.57	1.5	-11.07	8
6	2437	-11.62	1.5	-10.12	8
11	2462	-14.30	1.5	-12.80	8

Test Mode: 802.11g operating (OFDM Modulation) mode

Channel	Frequency (MHz)	Measured level (dBm)	Cable loss (dB)	Calculated level (dBm)	Limit (dBm)
1	2412	-18.62	1.5	-17.12	8
6	2437	-18.50	1.5	-17.00	8
11	2462	-19.76	1.5	-18.26	8

Please see the plot below.

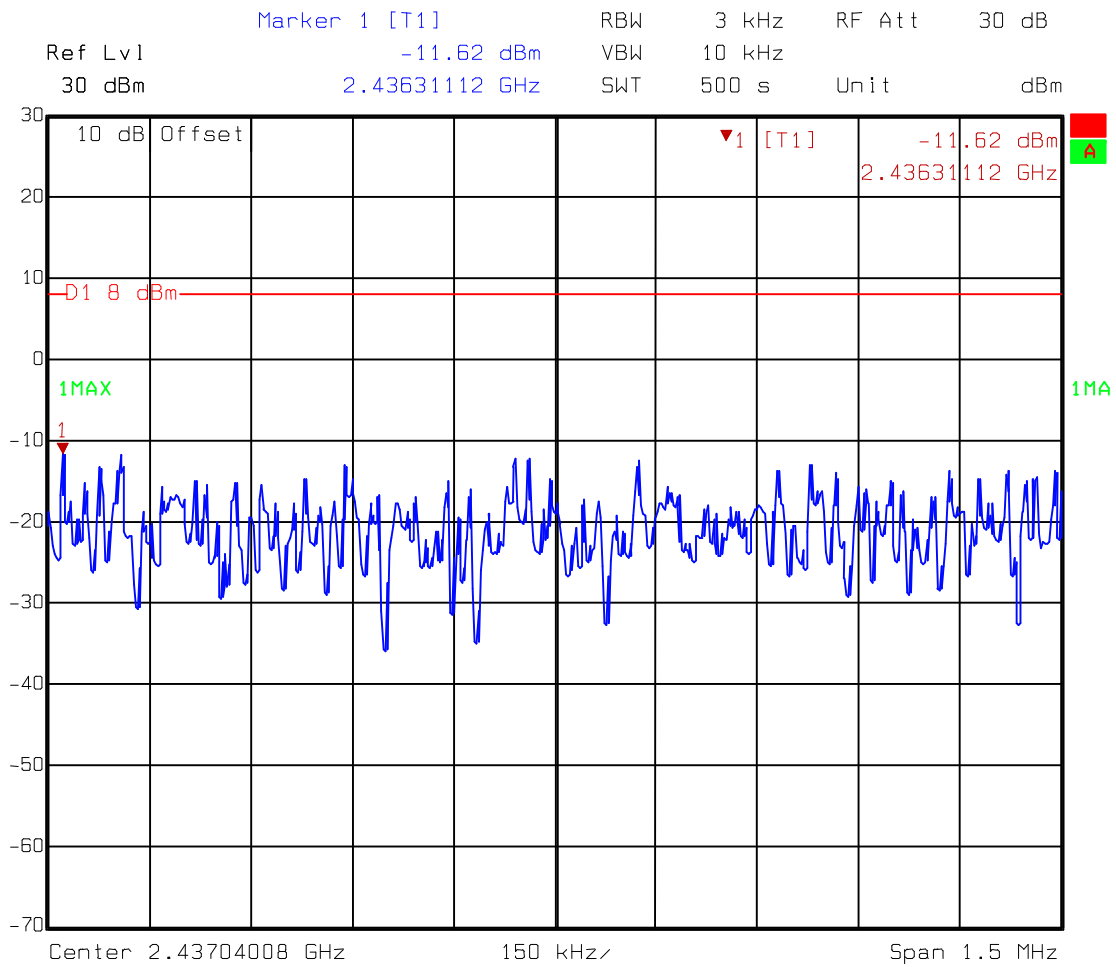
Test Mode: 802.11b operating (DSSS Modulation) mode



Comment A: Power spectrum density at low channel

CL=1.5dB (EC365) 11b

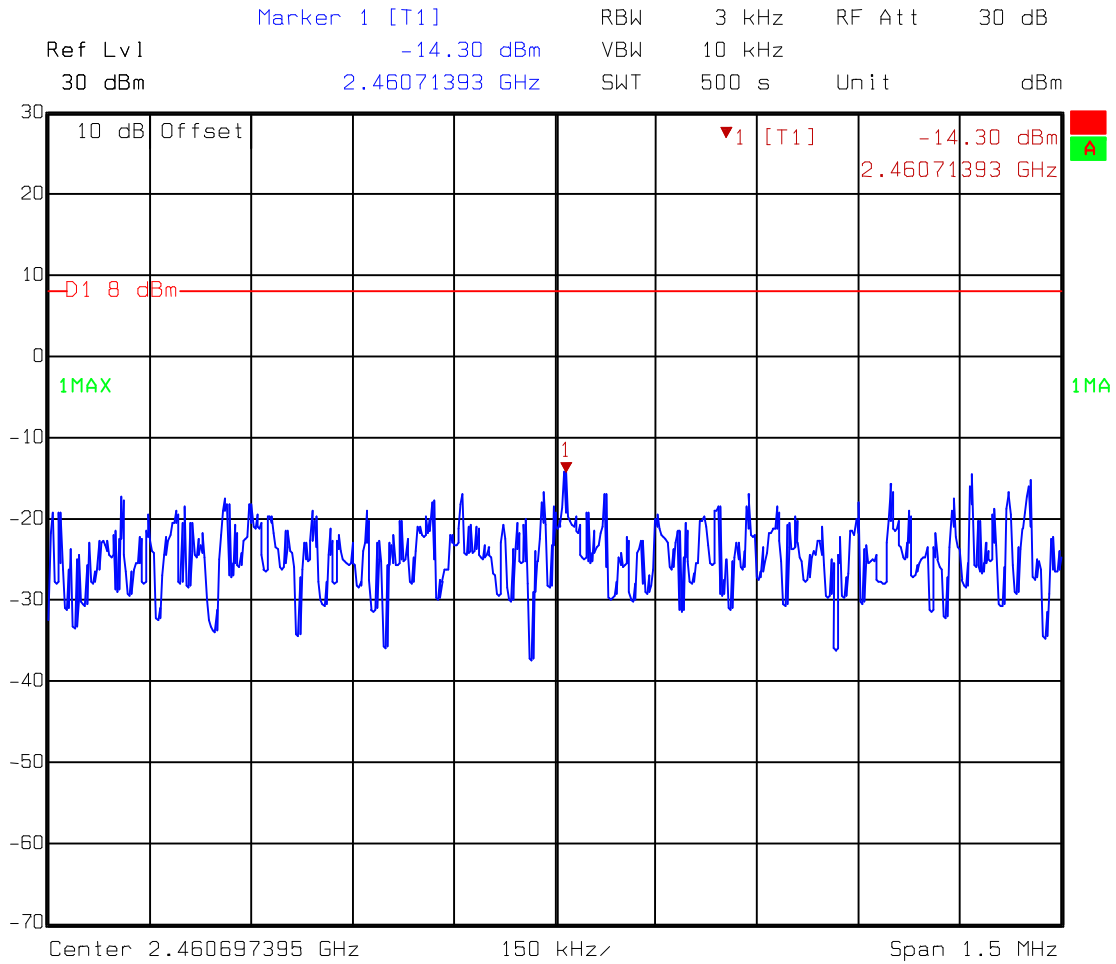
Date: 21.SEP.2004 16:55:11



Comment A: Power spectrum density at middle channel

CL=1.5 (EC365) 11b

Date: 25.SEP.2004 12:59:16

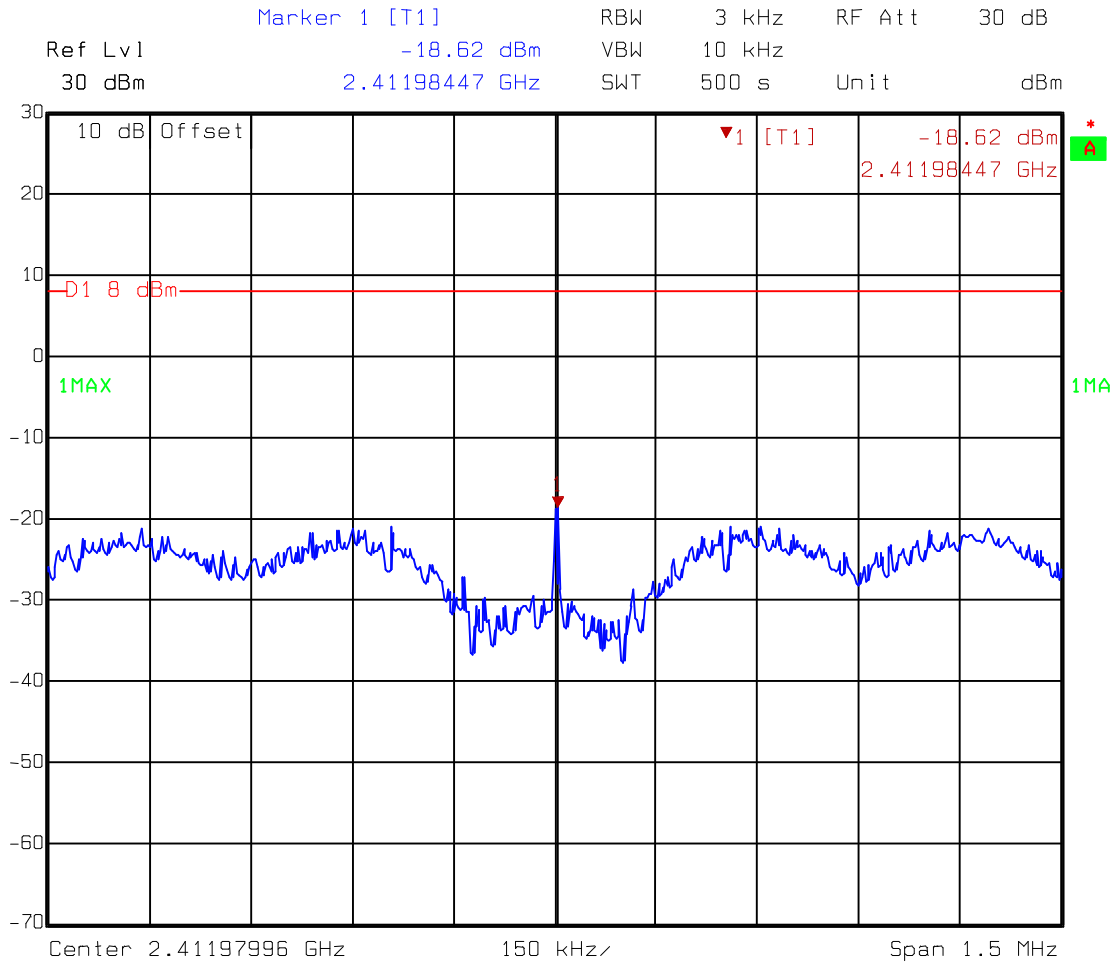


Comment A: Power spectrum density at high channel

CL=1.5dB (EC365) 11b

Date: 21.SEP.2004 16:51:54

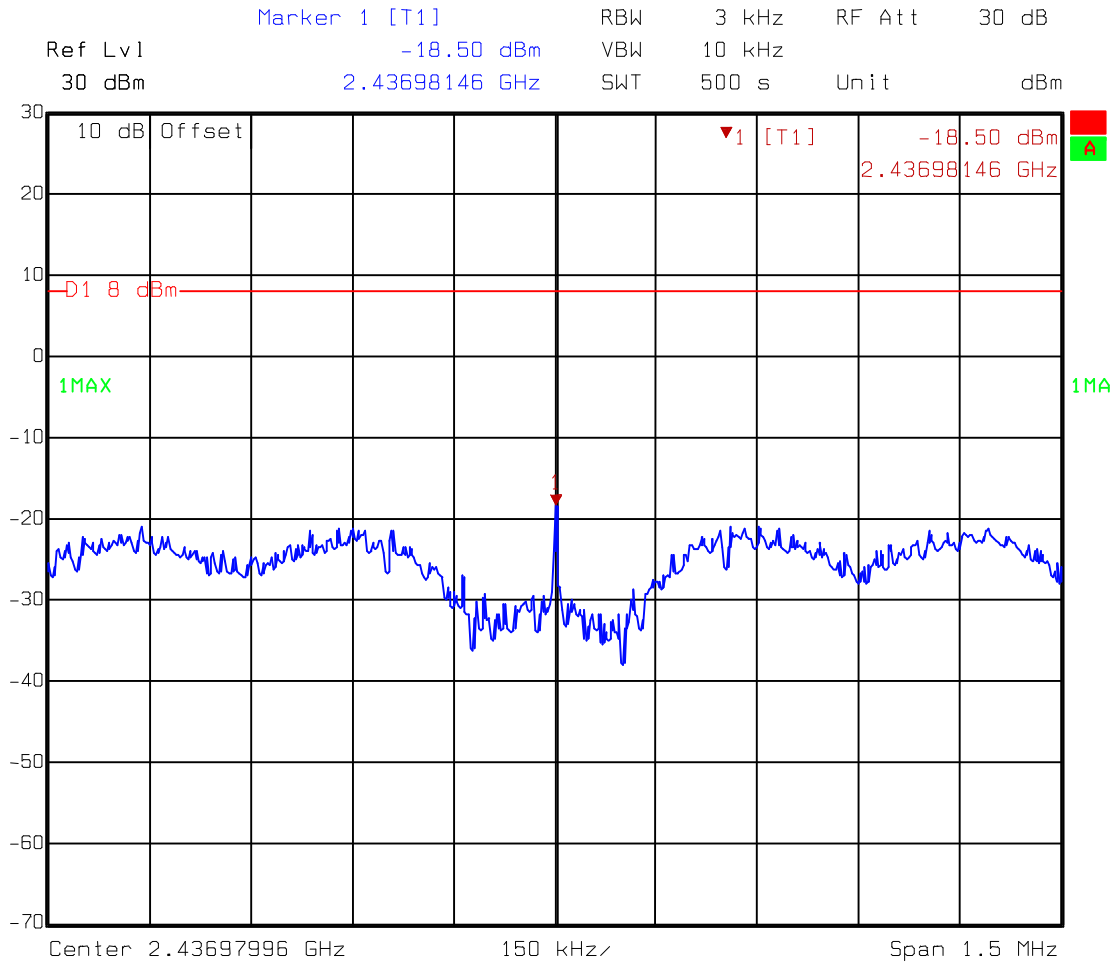
Test Mode: 802.11g operating (OFDM Modulation) mode



Comment A: Power spectrum density at low channel

CL=1.5dB (EC365) 11g

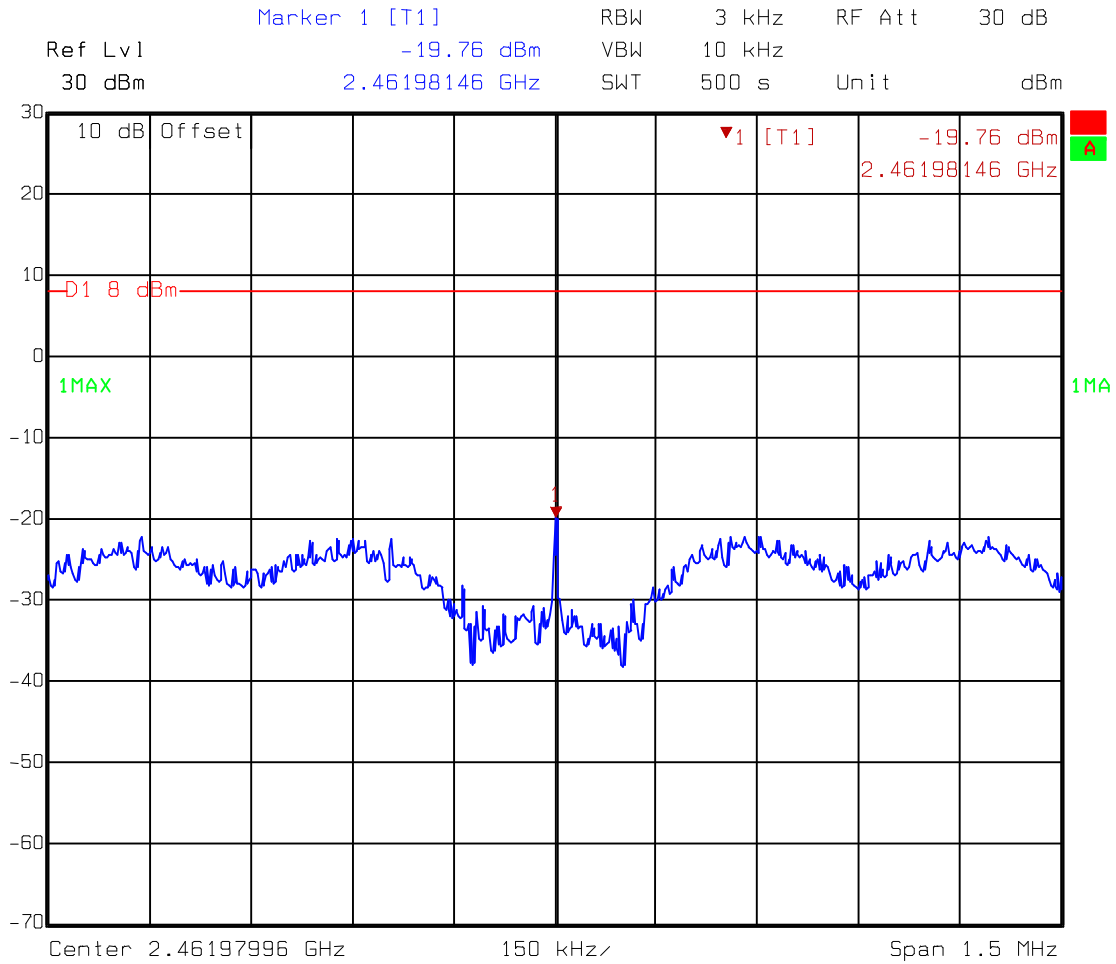
Date: 21.SEP.2004 16:48:39



Comment A: Power spectrum density at middle channel

CL=1.5dB (EC365) 11g

Date: 21.SEP.2004 16:47:48



Comment A: Power spectrum density at high channel

CL=1.5dB (EC365) 11g

Date: 21.SEP.2004 16:50:13

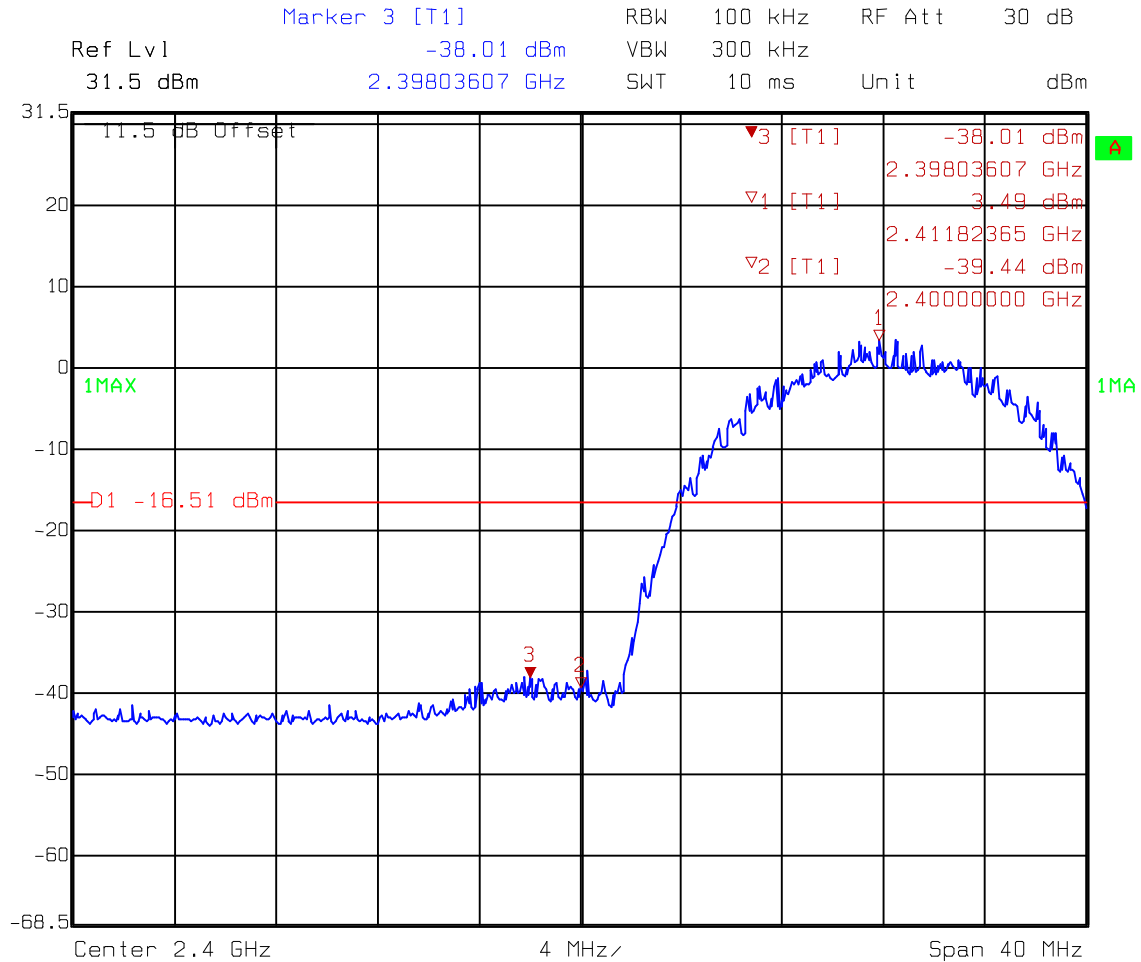
7. Emission on the band edge §FCC 15.247(C)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum 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.

Please see the plot below.

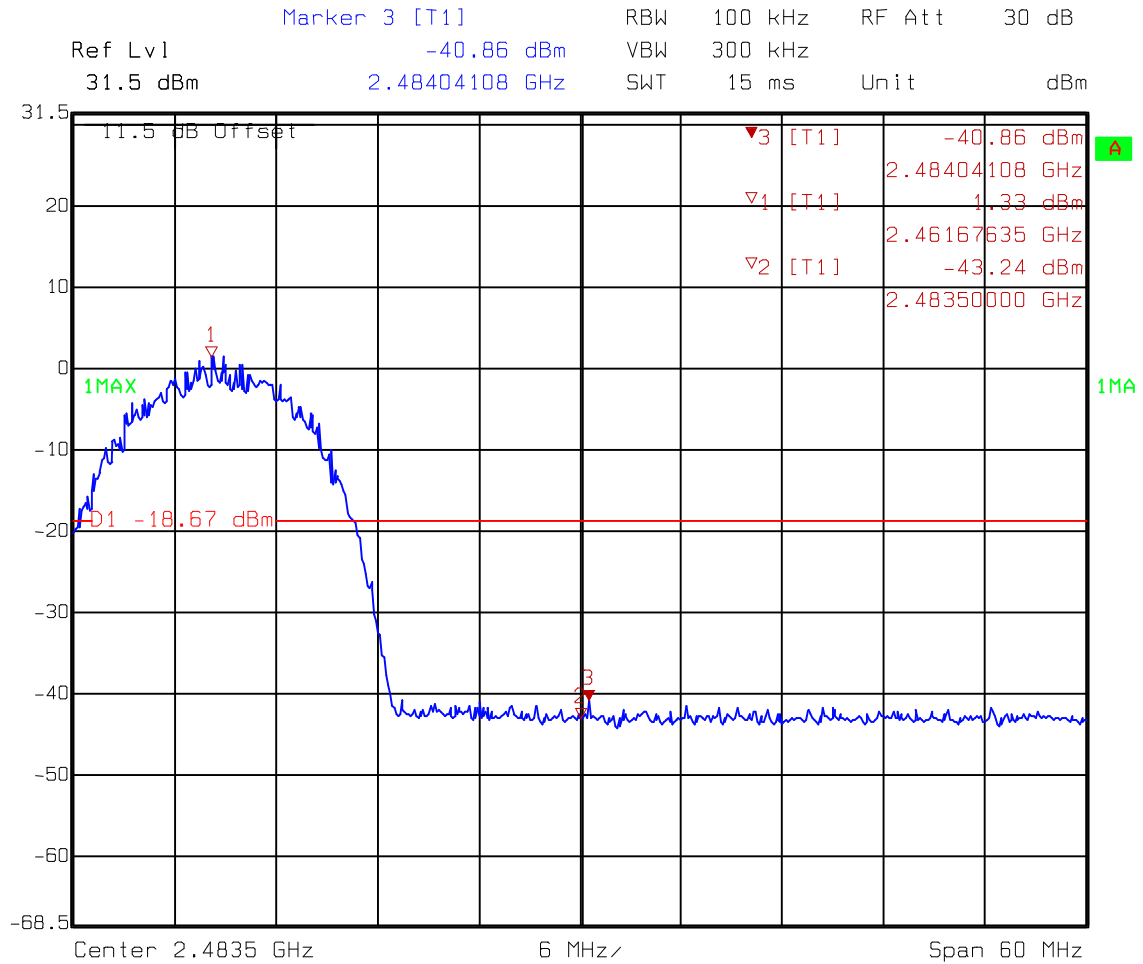
7.1 Band-edge (Conducted method)

Test Mode: 802.11b operating (DSSS Modulation) mode



Comment A: Band-edge at low channel (EC365) 11b

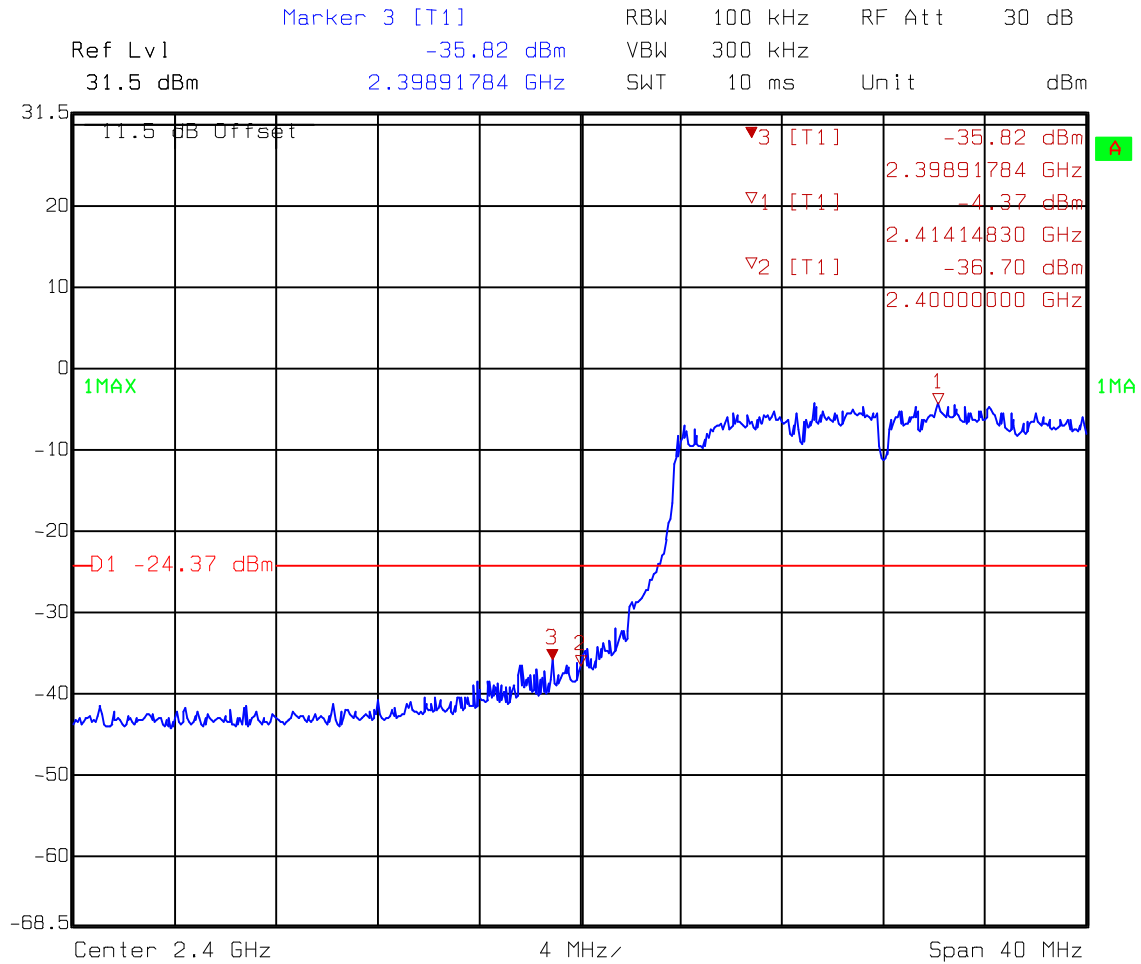
Date: 21.SEP.2004 17:24:04



Comment A: Band-edge at high channel (EC365) 11b

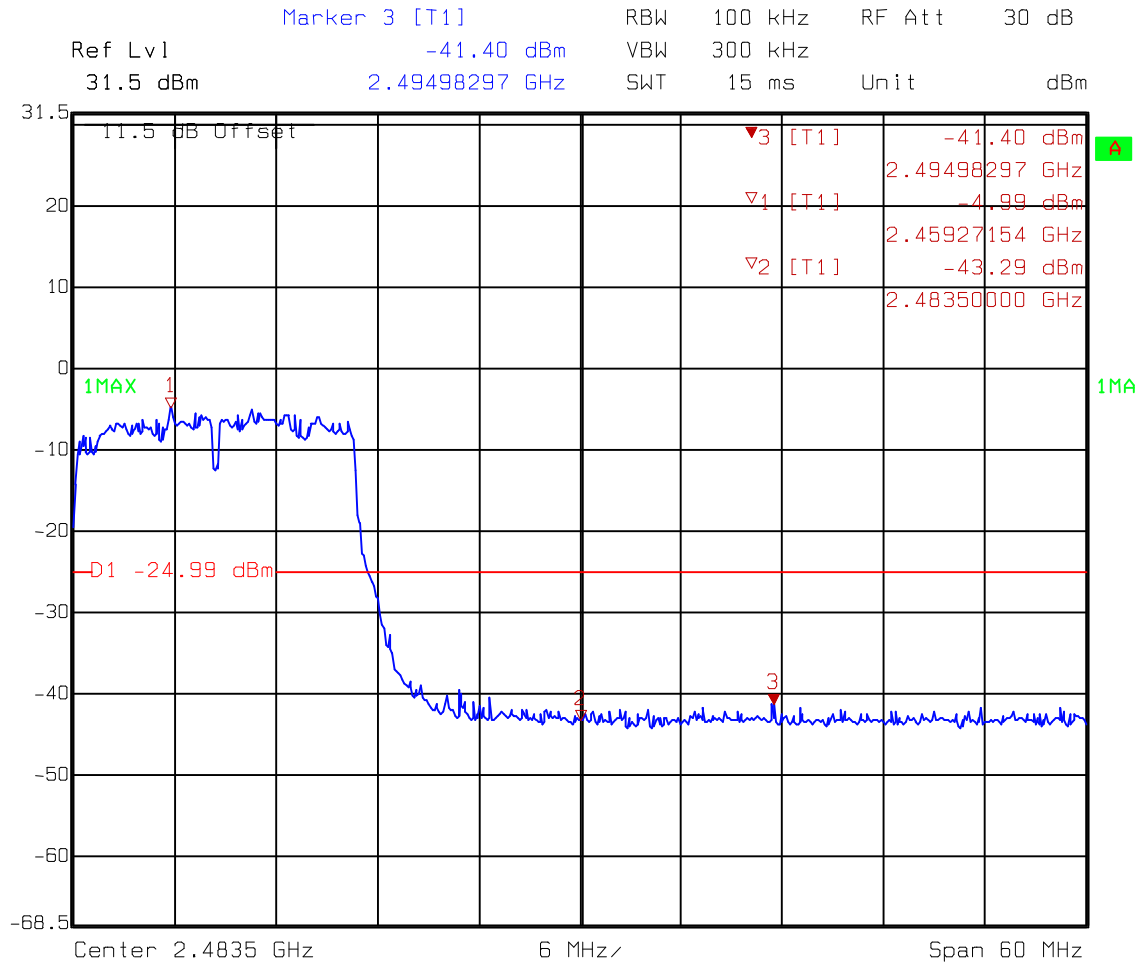
Date: 21.SEP.2004 17:03:37

Test Mode: 802.11g operating (OFDM Modulation) mode



Comment A: Band-edge at low channel (EC365) 11g

Date: 21.SEP.2004 17:20:05

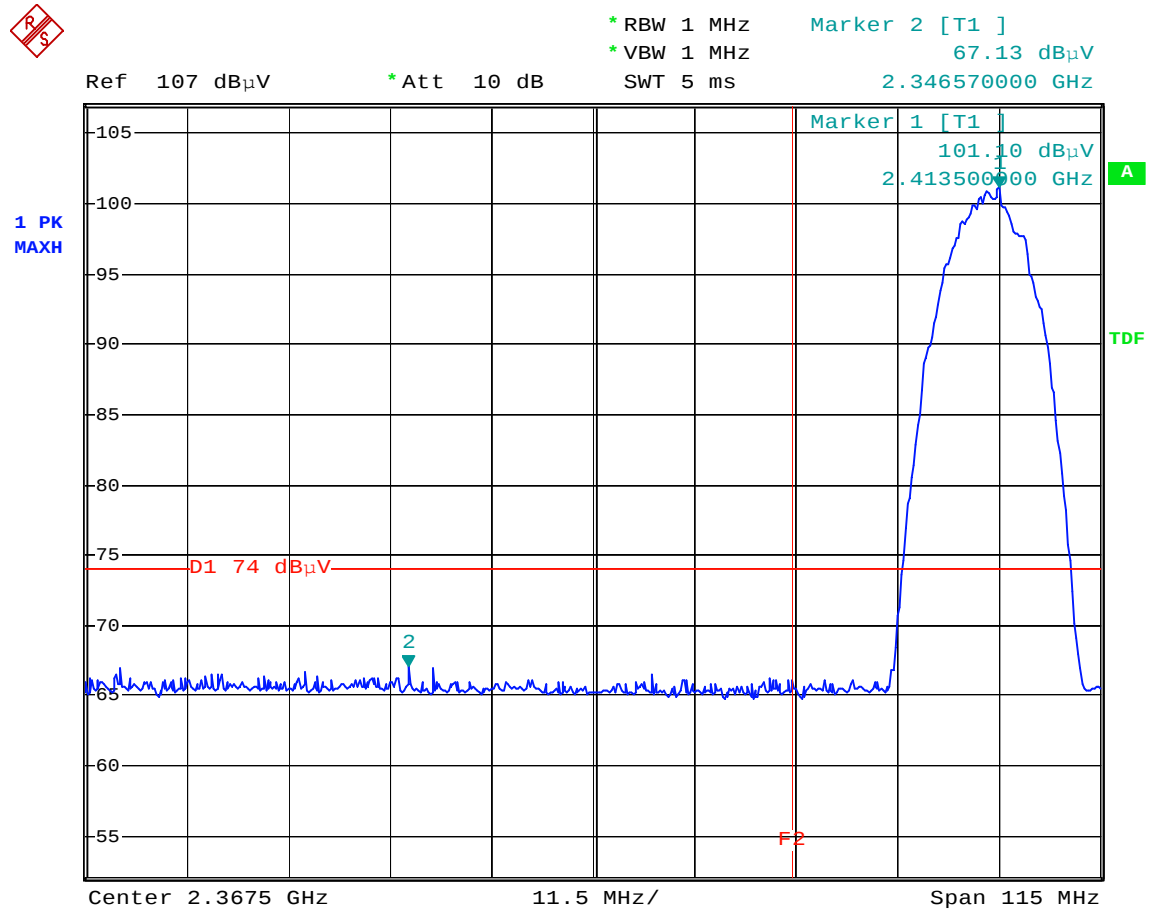


Comment A: Band-edge at high channel (EC365) 11g

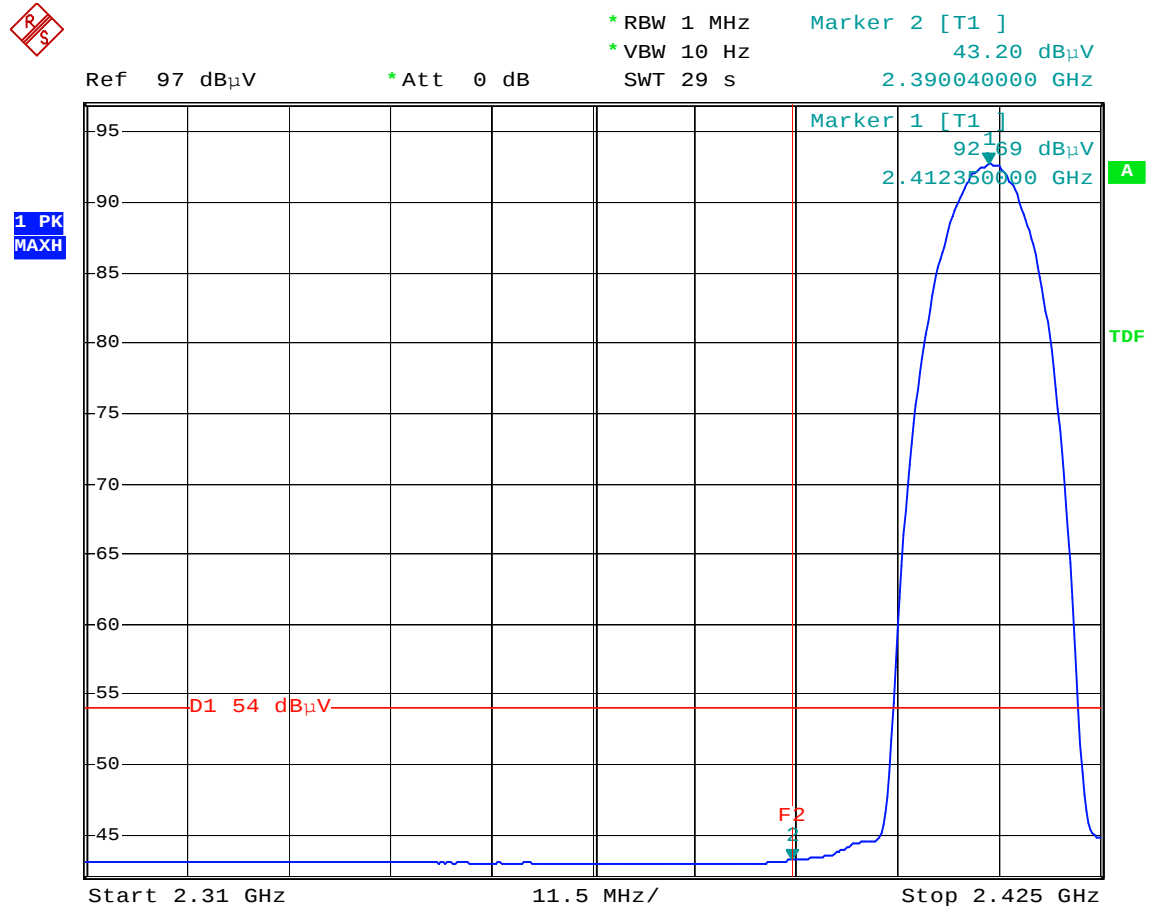
Date: 21.SEP.2004 17:21:57

7.2 Band-edge (Radiated method)

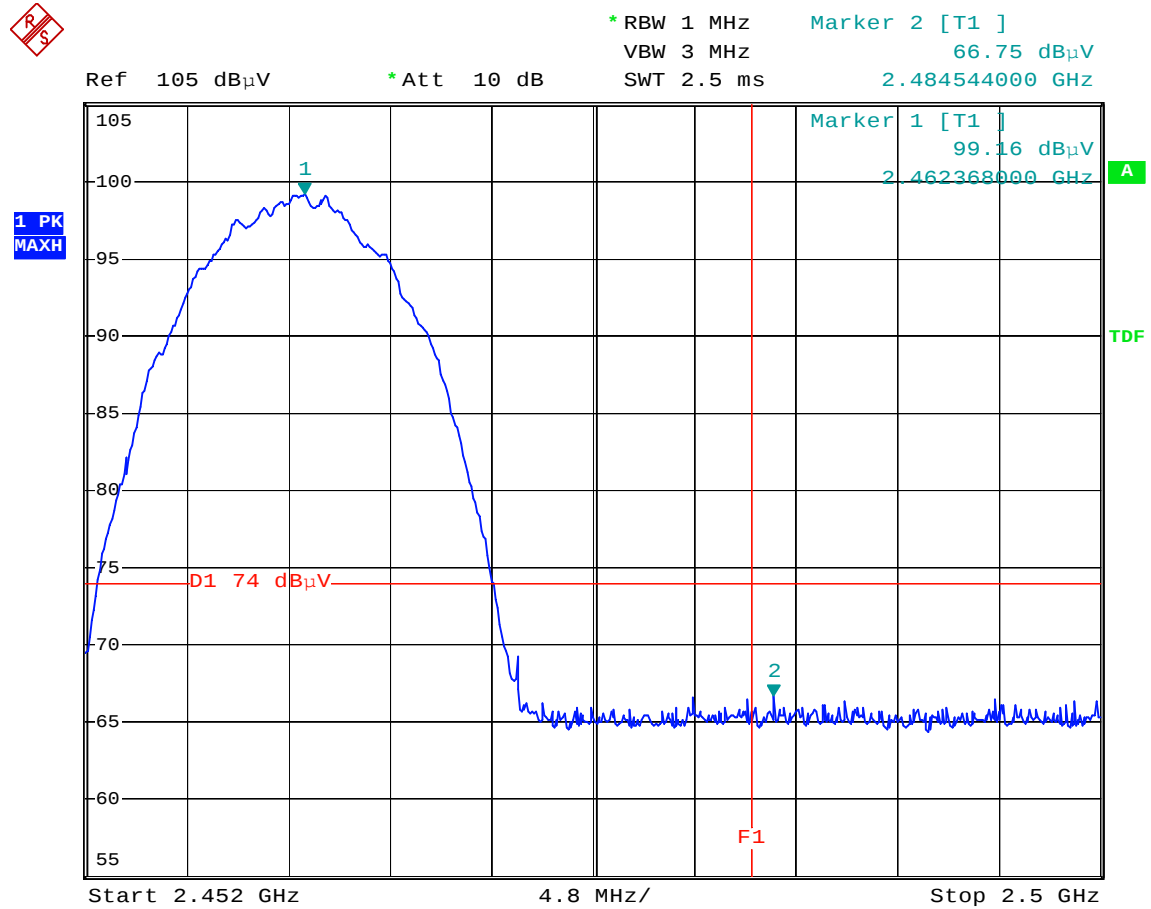
Test Mode: 802.11b operating (DSSS Modulation) mode



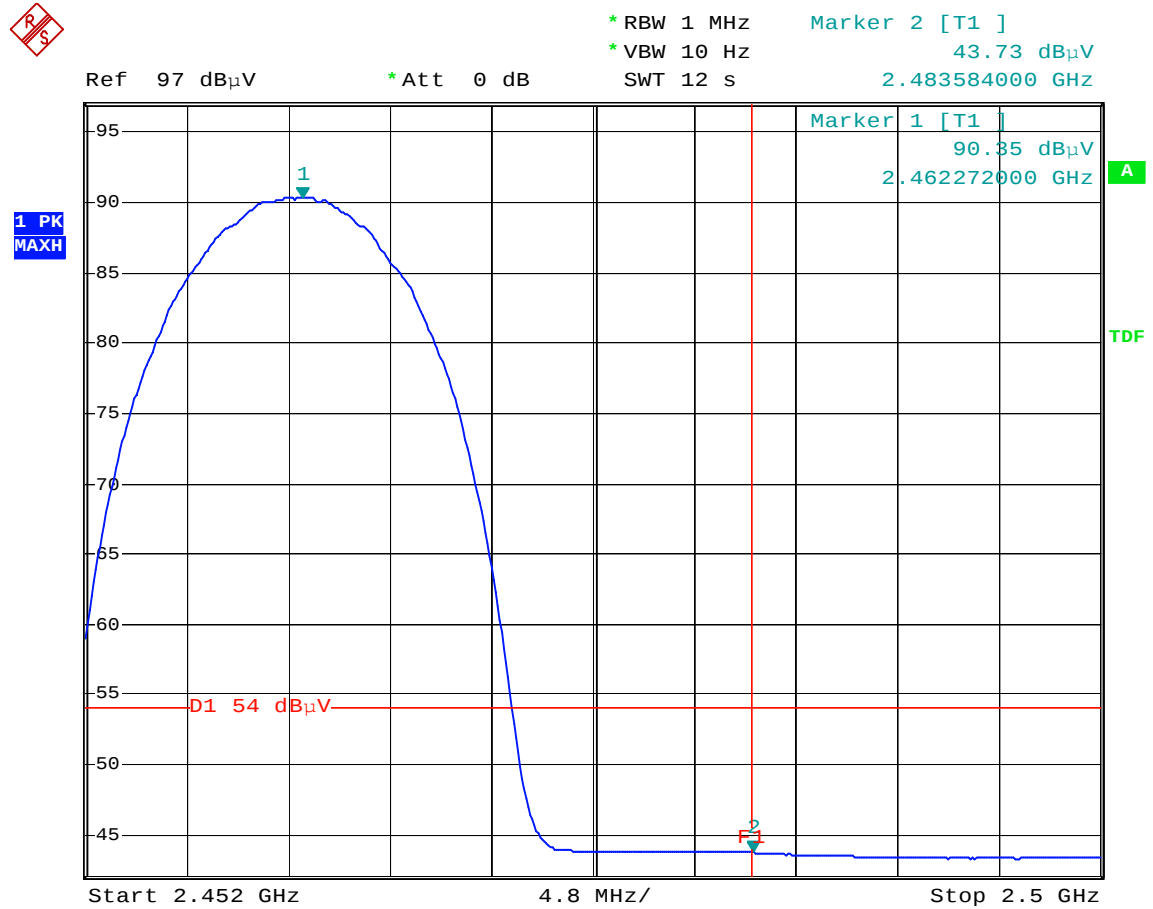
Comment: Band edge 802.11b low channel
 Comment: PK detector F2=2390MHz(EC353/338)
 Date: 21.SEP.2004 22:50:47



Comment: Band edge 802.11b low channel
 Comment: AV detector F2=2390MHz(EC353/338)
 Date: 21.SEP.2004 22:58:16

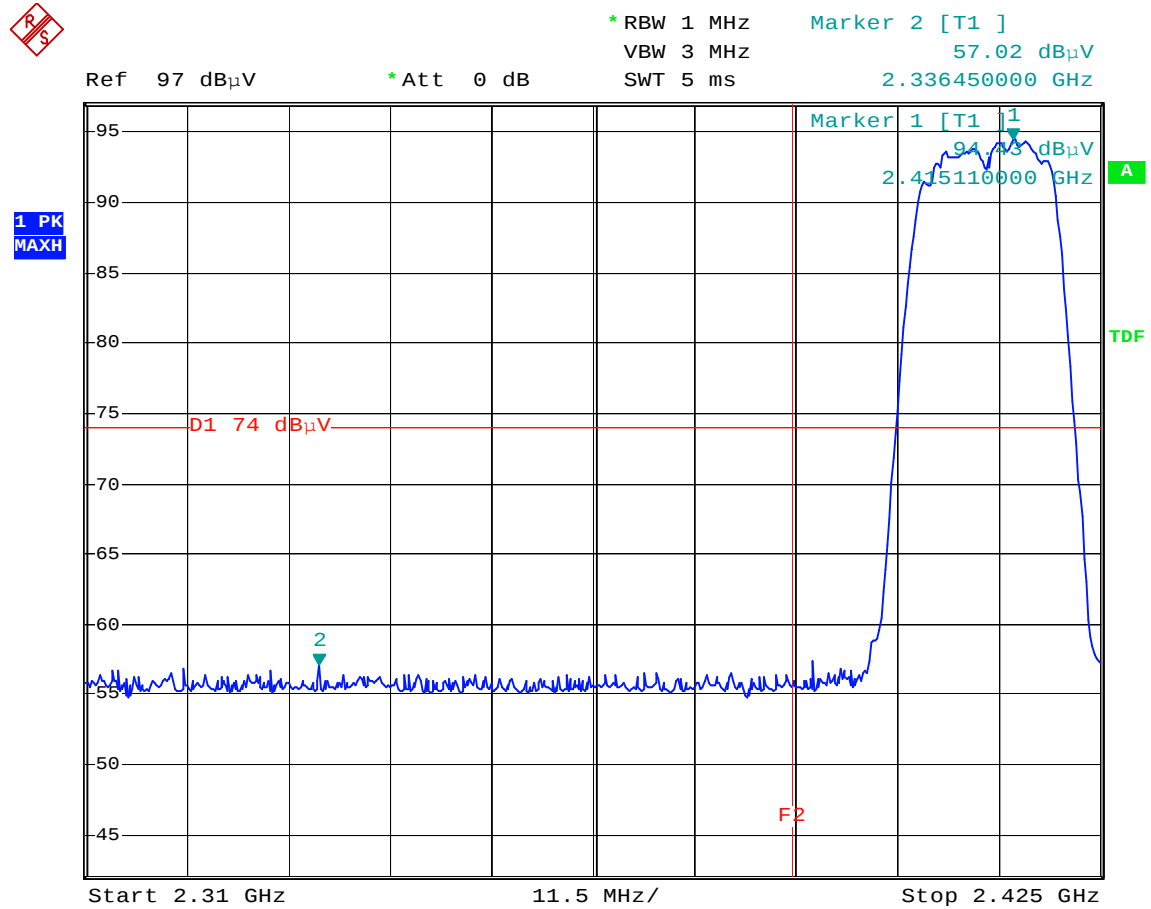


Comment: Band-edge 802.11b high channel
 Comment: Peak detector F1=2483.5MHz(EC353/338)
 Date: 21.SEP.2004 23:11:15

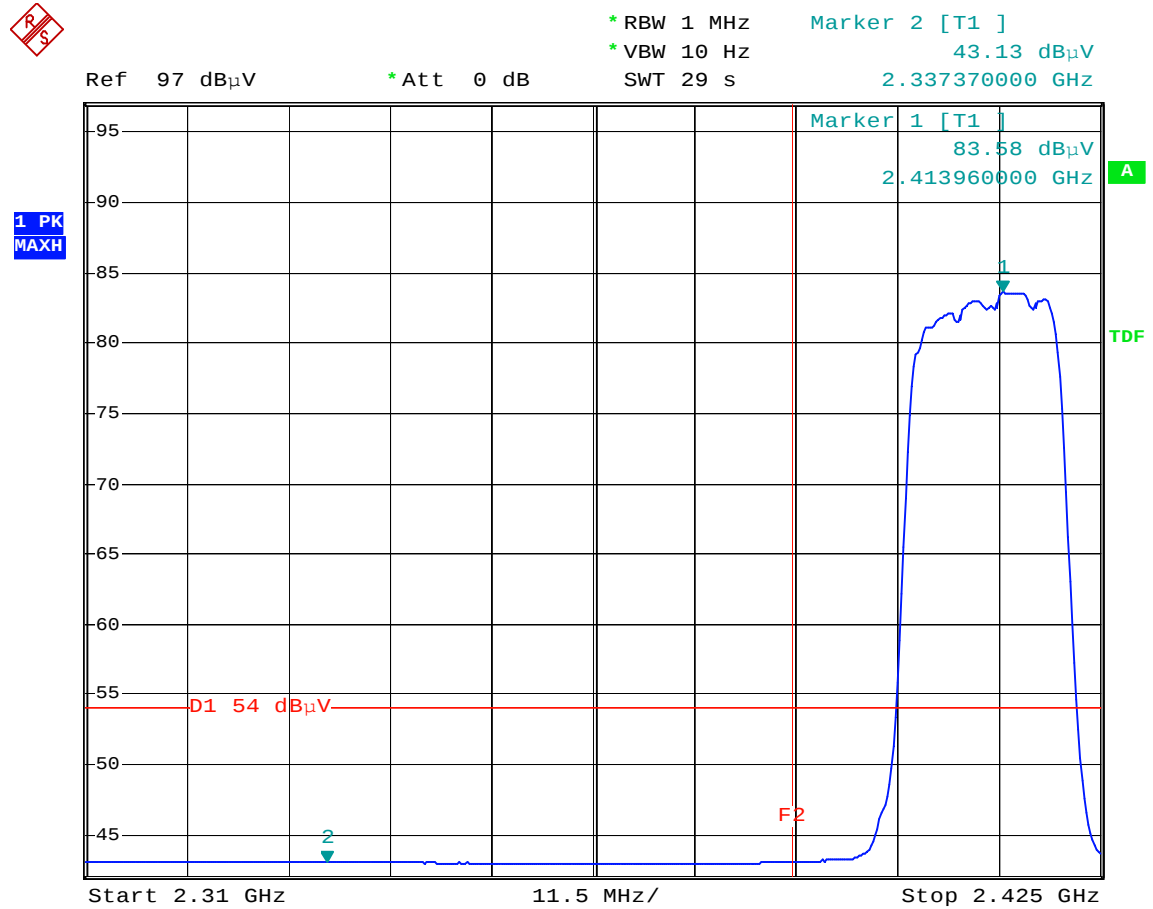


Comment: Band-edge 802.11b high channel
 Comment: AV detector F1=2483.5MHz(EC353/338)
 Date: 21.SEP.2004 23:15:56

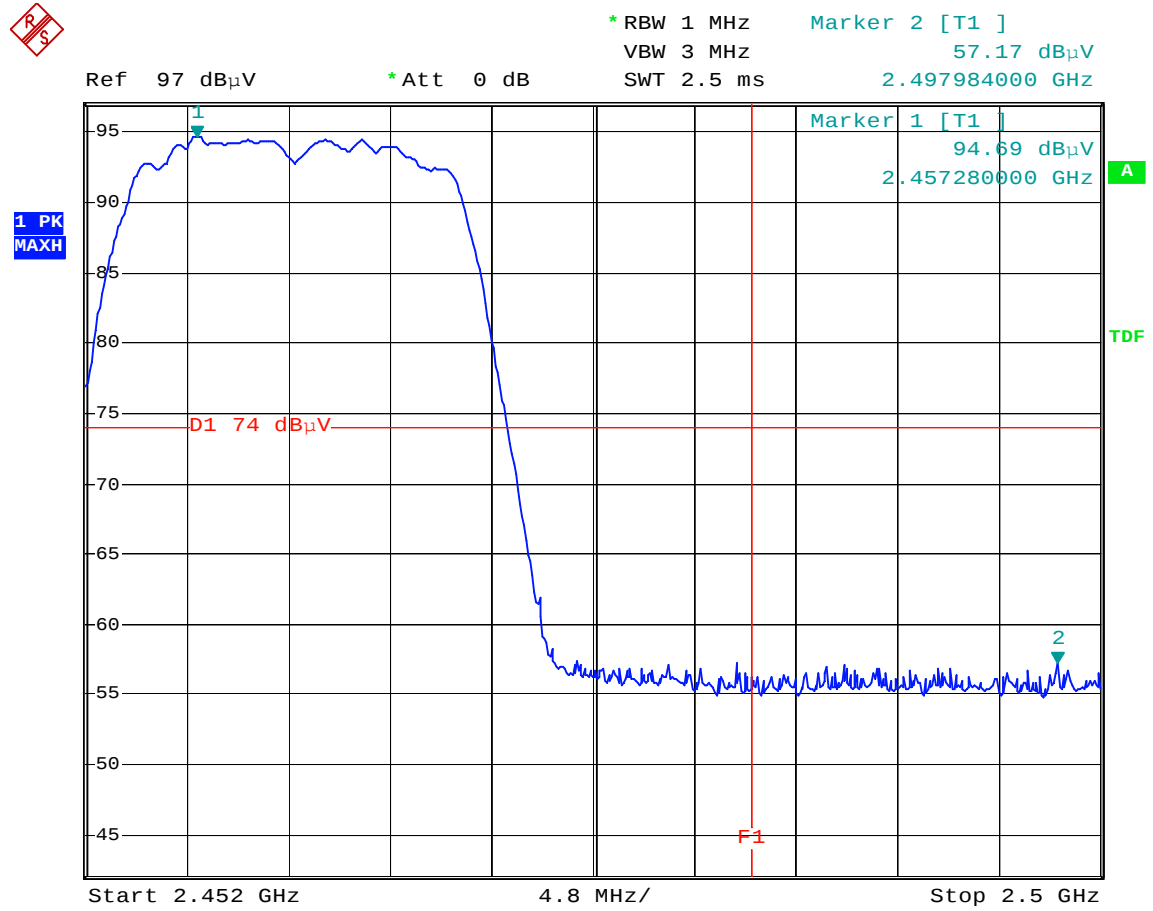
Test Mode: 802.11g operating (OFDM Modulation) mode



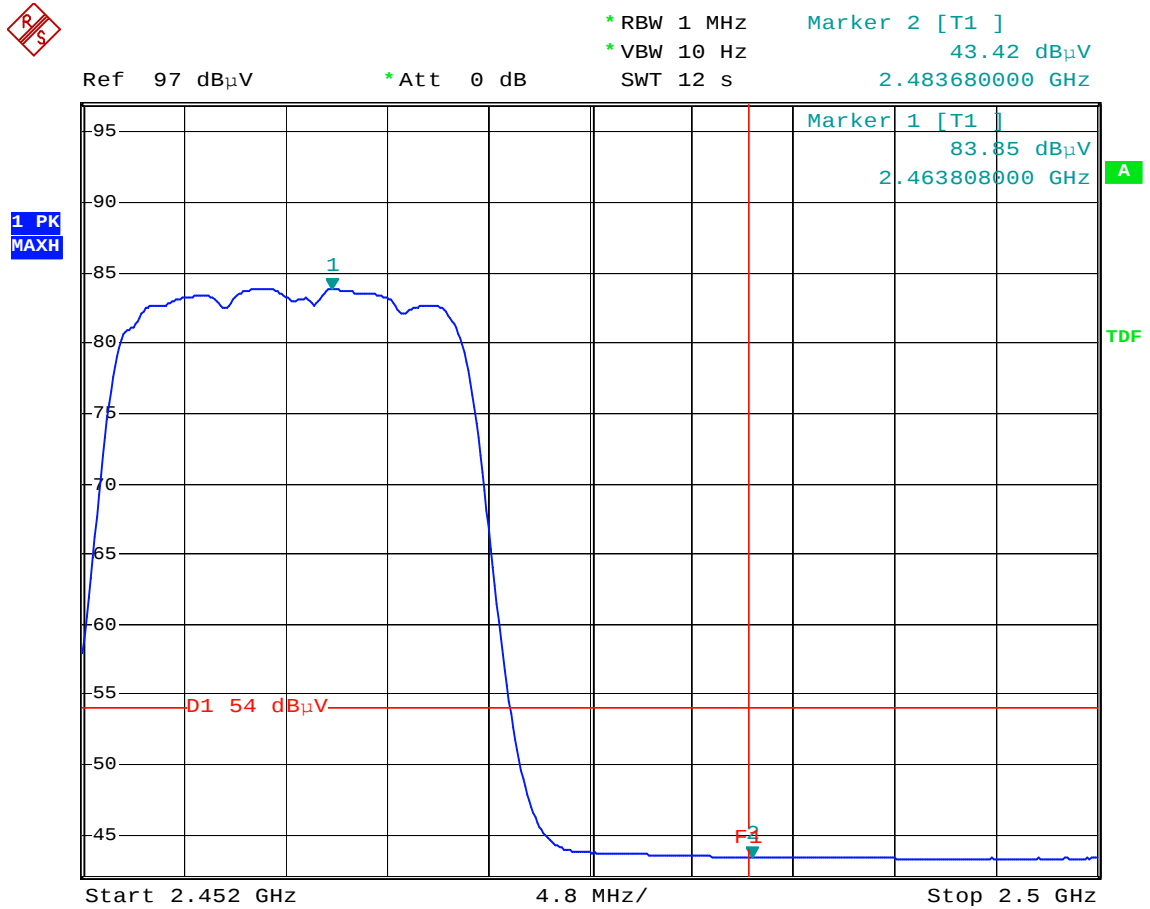
Comment: Band-edge 802.11g low channel
 Comment: PK detector F1=2390MHz(ec353/338)
 Date: 21.SEP.2004 23:40:59



Comment: Band-edge 802.11g low channel
 Comment: AV detector F1=2390MHz(ec353/338)
 Date: 21.SEP.2004 23:43:13



Comment: Band-edge 802.11g high channel
 Comment: PK detector F1=2483.5MHz(EC353/338)
 Date: 21.SEP.2004 23:28:14



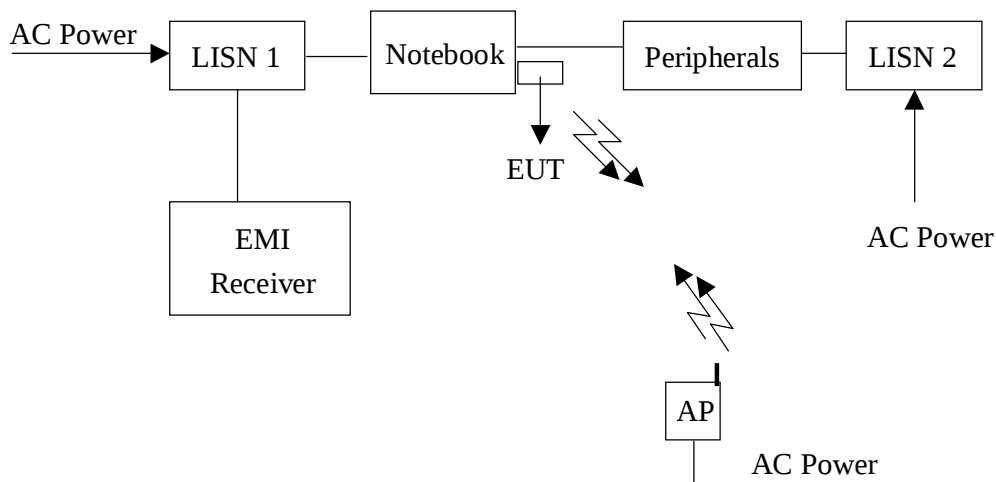
Comment: Band-edge 802.11g high channel
 Comment: AV detector F1=2483.5MHz(EC353/338)
 Date: 21.SEP.2004 23:25:26

8. Power Line Conducted Emission test §FCC 15.207

8.1 Operating environment

Temperature:	23	°C	(10-40°C)
Relative Humidity:	55	%	(10-90%)
Atmospheric Pressure:	1023	hPa	(860-1061hPa)

8.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement. The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

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

8.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

8.5 Uncertainty of Conducted Emission

Expanded uncertainty (k=2) of conducted emission measurement is ± 2.6 dB.

8.5 Power Line Conducted Emission test data

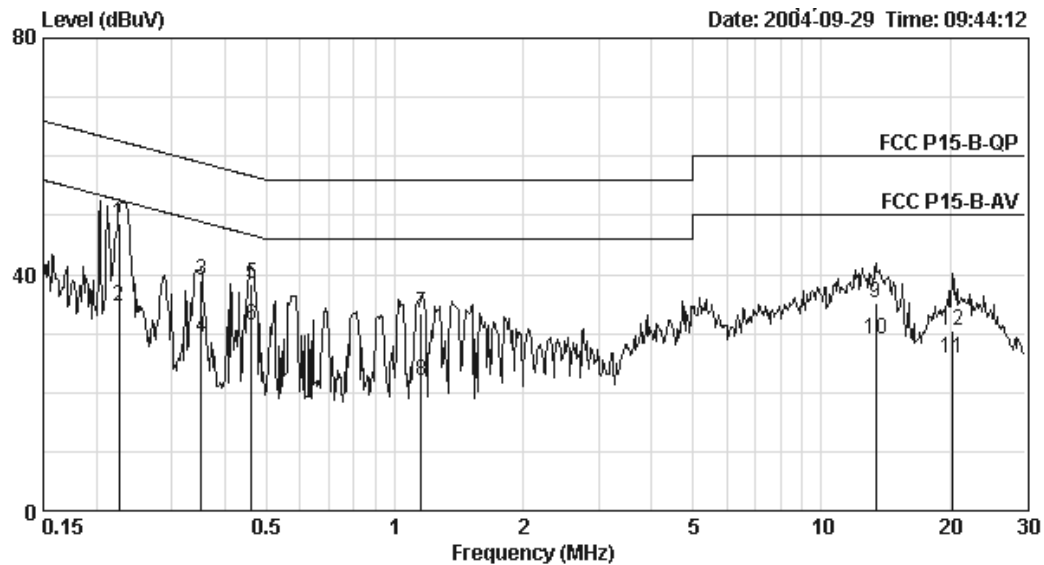
The EUT was linked with the Access Point, and tested in normal operation mode.

Phase: Line
Model No.: ZyAIR G-220F
Test Condition: Normal operation mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.226	0.10	48.51	62.59	34.62	52.59	-14.08	-17.97
0.352	0.10	39.02	58.92	29.40	48.92	-19.90	-19.52
0.461	0.10	38.35	56.67	31.29	46.67	-18.32	-15.38
1.153	0.10	33.49	56.00	22.07	46.00	-22.51	-23.93
13.422	0.60	35.10	60.00	29.15	50.00	-24.90	-20.85
20.313	0.81	30.61	60.00	25.71	50.00	-29.39	-24.29

Remark:

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



Phase: Neutral
 Model No.: ZyAIR G-220F
 Test Condition: Normal operation mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.210	0.10	42.06	63.22	20.25	53.22	-21.16	-32.97
0.232	0.10	47.77	62.36	39.92	52.36	-14.59	-12.44
0.352	0.10	39.12	58.92	30.02	48.92	-19.80	-18.90
1.032	0.10	33.65	56.00	24.72	46.00	-22.35	-21.28
4.651	0.20	21.20	56.00	11.64	46.00	-34.80	-34.36
13.638	0.34	36.54	60.00	29.48	50.00	-23.46	-20.52

Remark:

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

