Nebraska Center for Excellence in Electronics
4740 Discovery Drive
Lincoln, NE 68521
Phone: 402-472-5880
Fax: 402-472-5881

EMC Test Report

Company:	MediaCell 6950 S. Tucson Way, Ste H Centennial, CO 80112
Contact:	Don Bishop
Product:	WirelessTap, Strand Mount
FCC ID:	TRPWE2106A
Test Report No:	R101005-01B
APPROVED BY:	Doug Kramer Senior Test Engineer
DATE:	8 May 2006
Total Pages:	48

ACCREDITED
Certificate Number 1953-01

1.0 Summary of test results

1.1 Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARDS: FCC Part 15, Subpart C			
Standard Section	**Test Type and Limit**	**Result**	**Remark**
15.203	Unique Antenna Requirement	Pass	SMA connection sealed in enclosure
15.207	AC Power Conducted Emission	N/A	No connection to public power utility
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System, Limit: Min. 500kHz	Pass	Meets the requirement of the limit.
15.247(b)	Maximum Peak Output Power, Limit: Max. 30dBm	Pass	Meets the requirement of the limit.
15.247(c)	Transmitter Radiated Emissions, Limit: Table 15.209	Pass	Meets the requirement of the limit.
15.247(d)	Power Spectral Density, Limit: Max. 8dBm	Pass	Meets the requirement of the limit.
15.247(c)	Band Edge Measurement, Limit: 20dB less than the peak value of fundamental frequency	Pass	Meets the requirement of the limit.

1.2 Test Methods

1.2.1 Conducted Emissions

Conducted emissions testing is not applicable to this device because the EUT is supplied with power though a coaxial television cable and has no direct connection to a public power network.

1.2.2 Radiated Emissions

Compliance to CFR 47 Parts 15.209 and 15.247 was tested in accordance with the methods of ANSI/IEEE C63.4: 2003. Several configurations were examined and the results presented represent a worst-case scenario. The EUT was placed on a wooden table approximately 80cm high and centered on a 4m diameter turntable. The table was rotated to find the angles of maximum emissions and the receiving antenna was moved from 1m to 4m in both vertical and horizontal positions. All measurements were taken at a distance of 3m from the EUT for Part 15.209 intentional radiator measurements, and 3m for 15.247 measurements of the fundamental frequency in the 2400-2483.5GHz band and subsequent harmonics.

2.0 Description

2.1 Equipment under test

The Equipment Under Test (EUT) was a WirelessTap from MediaCell in the stand mount platform. The unit was an integrated UNIX wireless edge device with embedded Linux operating system. The unit included 2 Senao Atheros 1g Mini-PCI Adapter wireless cards (M/N NL-3054MP) and 4 antennas, placed at 90° angles from one another.

EUT Received Date: *25 April 2006*
EUT Tested Date: *25 – 26 April 2006*

PRODUCT	MediaCell WirelessTap
MODEL	Strand mount
POWER SUPPLY	60VAC
MODULATION TYPE	DBPSK, DQPSK, BPSK, QPSK, CCK, 16QAM, 64QAM
RADIO TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 1/2/505/11Mbps 802.11g: 6/9/12/18/24/36/48/54MPs
FREQUENCY RANGE	2412MHz - 2462MHz
NUMBER OF CHANNELS	11
MAXIMUM OUTPUT POWER	20.00dBm (rated)
ANTENNA TYPE	8.5 dBi panel
DATA CABLE	shielded coax (75Ω)
I/O PORTS	N/A
ASSOCIATED DEVICES	N/A

NOTE:
1. Fully compatible with the 802.11g standard to provide a wireless data rate of up to 54Mbps.
2. Backwards compatible with the 802.11b standard to provide a wireless data rate of up to 11Mbps.
3. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.

2.2 Laboratory description

All testing was performed at the NCEE Lincoln facility, which is a FCC registered lab. This site has been fully described in a report submitted to the FCC, and accepted in a letter dated May 4, 2001. Laboratory environmental conditions varied slightly throughout the tests:

Relative humidity of 45 ± 4%
Temperature of 20 ± 3° Celsius

2.3 Description of test modes

Channel	Frequency	Channel	Frequency
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

NOTE:

1. Below 1 GHz, the EUT was tested with one wireless card transmitting on channel 1, and another on channel 11 at 54mbps. All configurations were pre-tested and this configuration was chosen to represent a worse case scenario.
2. Above 1 GHz, channels 1, 6, and 11 were tested individually.
4. Two test results were presented in the following sections, the test result A is for a data rate of 11mbps and B is for 54mbps.

2.4 Applied standards

The EUT is a digital transmission device operating between 2412MHz and 2462MHz. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247) using ANSI/IEEE C63.4: 2003

All test items have been performed and recorded as per the above standards.

2.5 Description of support units

None

2.6 Configuration of system under test

The EUT was configured by MediaCell personnel to run a in a test mode that provided continuous transmission of a data stream and user defined RF power output. The test mode was set to transmit from two wireless cards to all 4 antennas (two cards, two antennas each). The EUT was powered by an external 60VAC voltage source via a 75Ω shielded coaxial cable. The RF output power of the EUT was configured to run at the "14dBm" setting on the transceiver cards. This power reduction was necessary in order for the EUT to meet the FCC requirements.

3.0 Test equipment used

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE
Rohde & Schwarz Test Receiver	ESIB26	100037	10-Aug-05
Rohde & Schwarz Test Receiver	ESIB7	100007	28-Dec-05
EMCO Biconilog Antenna	3142B	1654	13-Mar-06
EMCO Horn Antenna	3115	6416	12-Oct-05
EMCO Horn Antenna	3116	2576	12-Oct-05
Rohde & Schwarz Artificial Mains	836679/010	ESH3-Z5	27-May05
Rohde & Schwarz Preamplifier	TS-PR18	082001/003	5-Nov-04
Trilithic Inc. Highpass Filter	6HC330/ 18000-1.5-KK	200332488	5-Nov-04

4.0 Detailed results

4.1 Unique antenna requirement

4.1.1 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.

4.1.2 Antenna description

The gain of the antenna used for this product is 8.5dBi. This is the only antenna approved for use with this product.

4.2 Radiated emissions

4.2.1 Limits for radiated emissions measurements

Emissions radiated outside of the specified bands shall be applied to the limits in 15.209 as followed:

FREQUENCIES (MHz)	FIELD STRENGTH (μV/m)	MEASUREMENT DISTANCE (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 * log * Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20dB under any condition of modulation.

4.2.2 Test procedures

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground plane in a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

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

d. For each suspected emission, the EUT was arranged to maximize its emissions and then the antenna height was varied from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum emission reading.

e. The test-receiver system was set to use a peak detector with a specified resolution bandwidth. For spectrum analyzer measurements, the composite maximum of several analyzer sweeps was used for final measurements.

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

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

2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for peak and average detectors at frequencies above 1GHz.

4.2.3 Deviations from test standard

No deviation.

4.2.4 Test setup

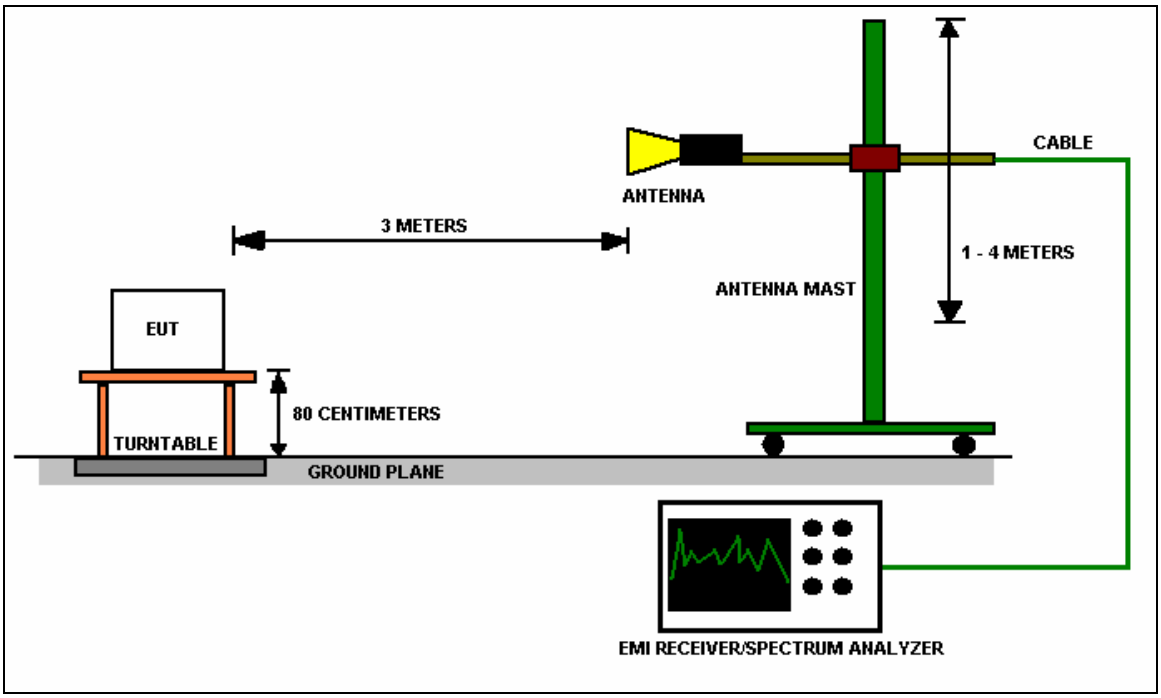

Figure 1 Radiated Emissions Test Setup

For the actual test configuration, please refer to Appendix A for actual photographs of the test configuration.

4.2.5 EUT operating conditions

The EUT was powered by 60VAC via a coaxial cable. The EUT was placed in its upright position (as it would be installed) and was set to transmit continuously at 11mbps (mode A) and 54mbps (mode B). The output power of the EUT was configured to run at the "14dBm" setting on the transceiver cards.

4.2.6 Test results

EUT	Wireless Tap	Model	Strand mount
MODE	Worse Case	FREQUENCY RANGE	30MHz - 1000MHz
INPUT POWER (SYSTEM)	60VAC	ORIENTATION	Vertical, Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	DKramer

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
100.020000	34.97	43.5	8.5	300.0	262	HORI
150.000000	30.84	43.5	12.7	150.0	252	HORI
225.000000	30.36	46.0	15.6	99.0	96	HORI
499.980000	27.64	46.0	18.4	185.0	162	VERT
723.240000	28.86	46.0	17.1	284.0	352	HORI
940.260000	27.91	46.0	18.1	217.0	153	VERT

REMARKS:
1. Emission level (dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

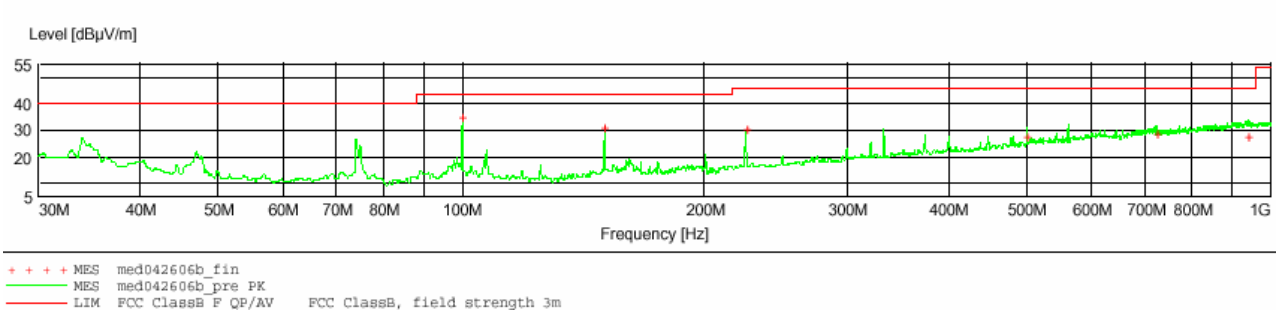

Figure 2 Radiated Emissions Plot, Worse Case

EUT	Wireless Tap	Model	Strand mount
MODE	Channel 1, Mode (A)	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	60VAC	ORIENTATION	Vertical, Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	DKramer

Frequency, MHz	Average Level, dBµV/m	Average Limit dBµV/m	Average Margin	Peak Level, dBµV/m	Peak Limit, dBµV/m	Peak Margin
*2412.00	92.37	N/A	N/A	119.16	N/A	N/A
4824.00	50.70	54.00	3.30	55.87	74.00	18.13
7236.00	43.15	54.00	10.85	50.54	74.00	23.46
9648.00	50.95	54.00	3.05	60.13	74.00	13.87

REMARKS:
1. Emission level (dBuV/m)= Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “* “: Fundamental frequency

EUT	Wireless Tap	Model	Strand mount
MODE	Channel 6, Mode (A)	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	60VAC	ORIENTATION	Vertical, Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	DKramer

Frequency, MHz	Average Level, dBµV/m	Average Limit dBµV/m	Average Margin	Peak Level, dBµV/m	Peak Limit, dBµV/m	Peak Margin
*2437.00	96.22	N/A	N/A	113.58	N/A	N/A
4874.00	51.58	54.00	2.42	53.08	74.00	20.92
7311.00	42.89	54.00	11.11	50.91	74.00	23.09
9748.00	52.48	54.00	1.52	60.50	74.00	13.50

REMARKS:
1. Emission level (dBuV/m) = Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “* “: Fundamental frequency

EUT	Wireless Tap	Model	Strand mount
MODE	Channel 11, Mode (A)	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	60VAC	ORIENTATION	Vertical, Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	DKramer

Frequency, MHz	Average Level, dBµV/m	Average Limit dBµV/m	Average Margin	Peak Level, dBµV/m	Peak Limit, dBµV/m	Peak Margin
*2462.00	90.06	N/A	N/A	120.26	N/A	N/A
4924.00	44.34	54.00	9.96	44.24	74.00	29.76
7386.00	43.08	54.00	10.92	52.40	74.00	21.60
9848.00	51.79	54.00	2.21	61.02	74.00	12.98

REMARKS:
1. Emission level (dBuV/m) = Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “* “: Fundamental frequency

EUT	Wireless Tap	Model	Strand mount
MODE	Channel 1, Mode (B)	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	60VAC	ORIENTATION	Vertical, Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	DKramer

Frequency, MHz	Average Level, dBµV/m	Average Limit dBµV/m	Average Margin	Peak Level, dBµV/m	Peak Limit, dBµV/m	Peak Margin
*2412.00	89.79	N/A	N/A	121.57	N/A	N/A
4824.00	53.12	54.00	0.88	54.20	74.00	19.80
7236.00	39.90	54.00	14.10	52.35	74.00	21.65
9648.00	52.04	54.00	1.96	62.44	74.00	11.56

REMARKS:
1. Emission level (dBuV/m) = Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “* “: Fundamental frequency

EUT	Wireless Tap	Model	Strand mount
MODE	Channel 6, Mode (B)	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	60VAC	ORIENTATION	Vertical, Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	DKramer

Frequency, MHz	Average Level, dBµV/m	Average Limit dBµV/m	Average Margin	Peak Level, dBµV/m	Peak Limit, dBµV/m	Peak Margin
*2437.00	84.75	N/A	N/A	117.24	N/A	N/A
4874.00	53.86	54.00	0.14	55.32	74.00	18.68
7311.00	41.30	54.00	12.7	52.55	74.00	21.45
9748.00	52.10	54.00	1.90	62.44	74.00	11.56

REMARKS:
1. Emission level (dBuV/m) = Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “* “: Fundamental frequency

EUT	Wireless Tap	Model	Strand mount
MODE	Channel 11, Mode (B)	FREQUENCY RANGE	Above 1000MHz
INPUT POWER (SYSTEM)	60VAC	ORIENTATION	Vertical, Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	DKramer

Frequency, MHz	Average Level, dBµV/m	Average Limit dBµV/m	Average Margin	Peak Level, dBµV/m	Peak Limit, dBµV/m	Peak Margin
*2462.00	90.06	N/A	N/A	123.26	N/A	N/A
4924.00	53.04	54.00	0.96	55.08	74.00	19.92
7386.00	42.62	54.00	11.38	52.50	74.00	21.50
9848.00	50.94	54.00	3.06	60.19	74.00	13.81

REMARKS:
1. Emission level (dBuV/m) = Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “* “: Fundamental frequency

4.3 Bandwidth

4.3.1 Limits of bandwidth measurements

The 6dB bandwidth of the signal needs to be greater than 0.5MHz

4.3.2 Test procedures

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

4.3.3 Deviations from test standard

No deviation.

4.3.4 Test setup

4.3.5 EUT operating conditions

The EUT was powered by 60VAC via a coaxial cable. The EUT was set to transmit continuously at 11mbps (mode A) and 54mbps (mode B). The RF output power of the EUT was configured to run at the "14dBm" setting on the transceiver cards.

4.3.6 Test results

EUT	Wireless Tap	MODEL	Strand mount
INPUT POWER (SYSTEM)	60VAC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	(A)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	RESULT
1	2412	12.30	0.500	Pass
6	2437	12.38	0.500	Pass
11	2462	12.30	0.500	Pass

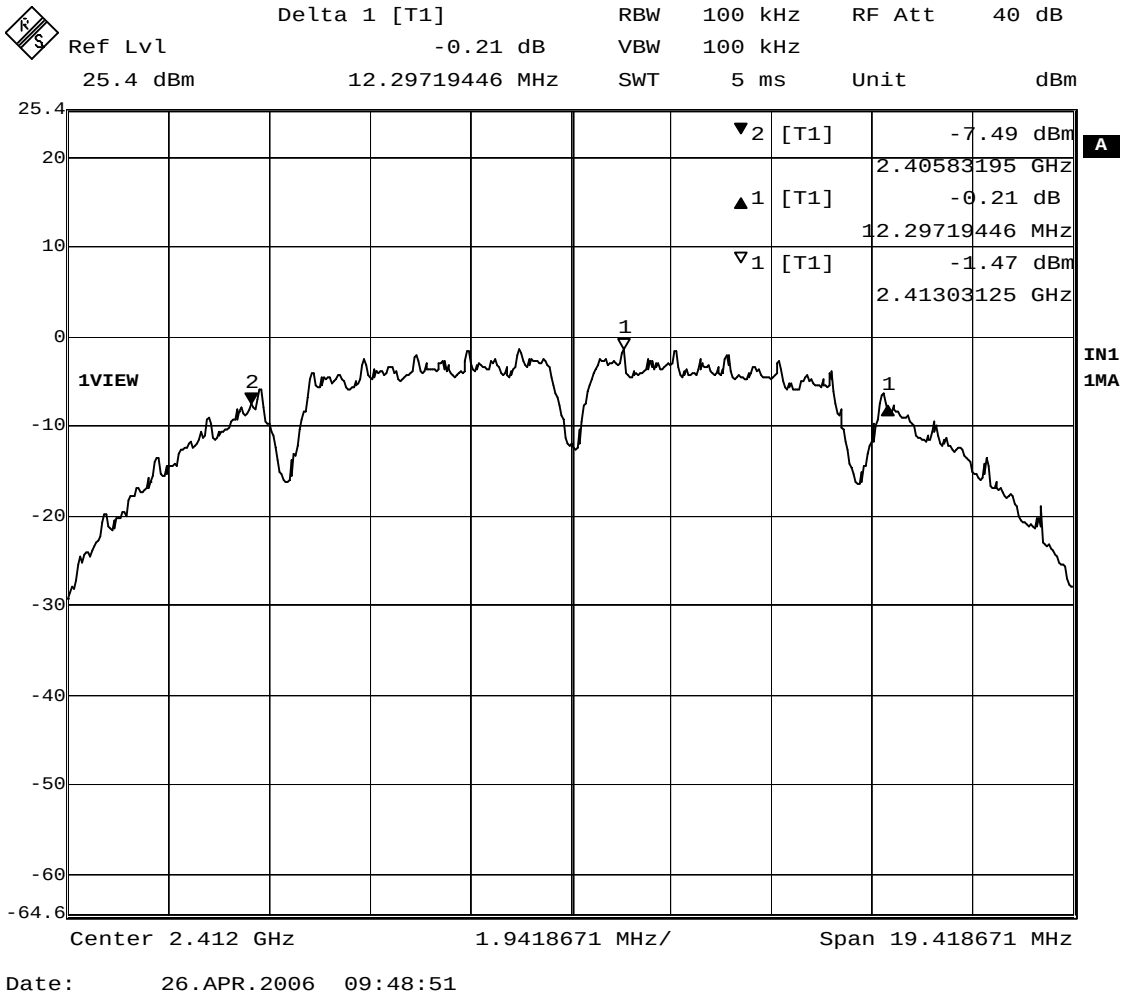

Figure 3 Channel 1, 100kHz RBW, 12.30MHz bandwidth, 11Mbps

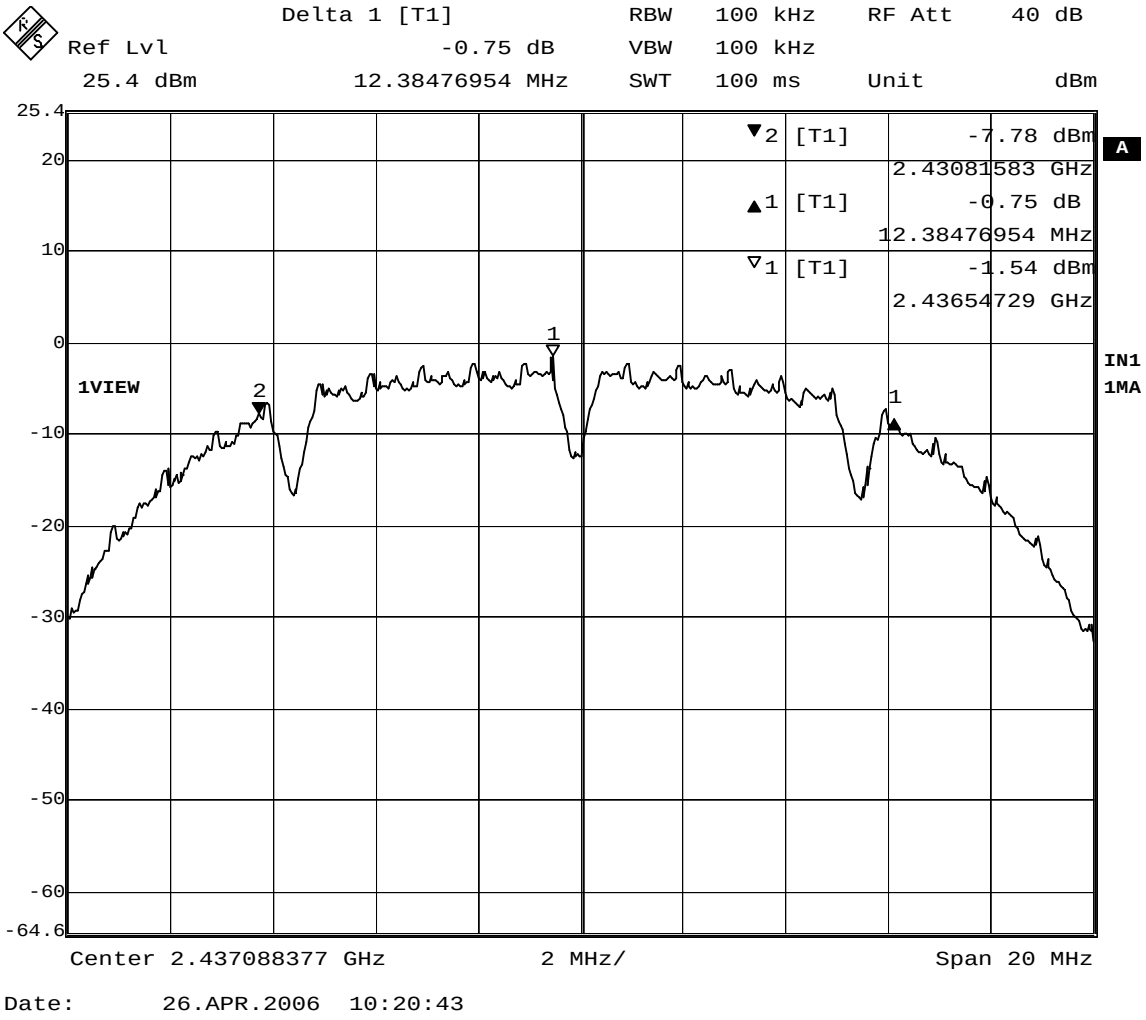

Figure 4 Channel 6, 100kHz RBW, 12.38MHz bandwidth, 11Mbps

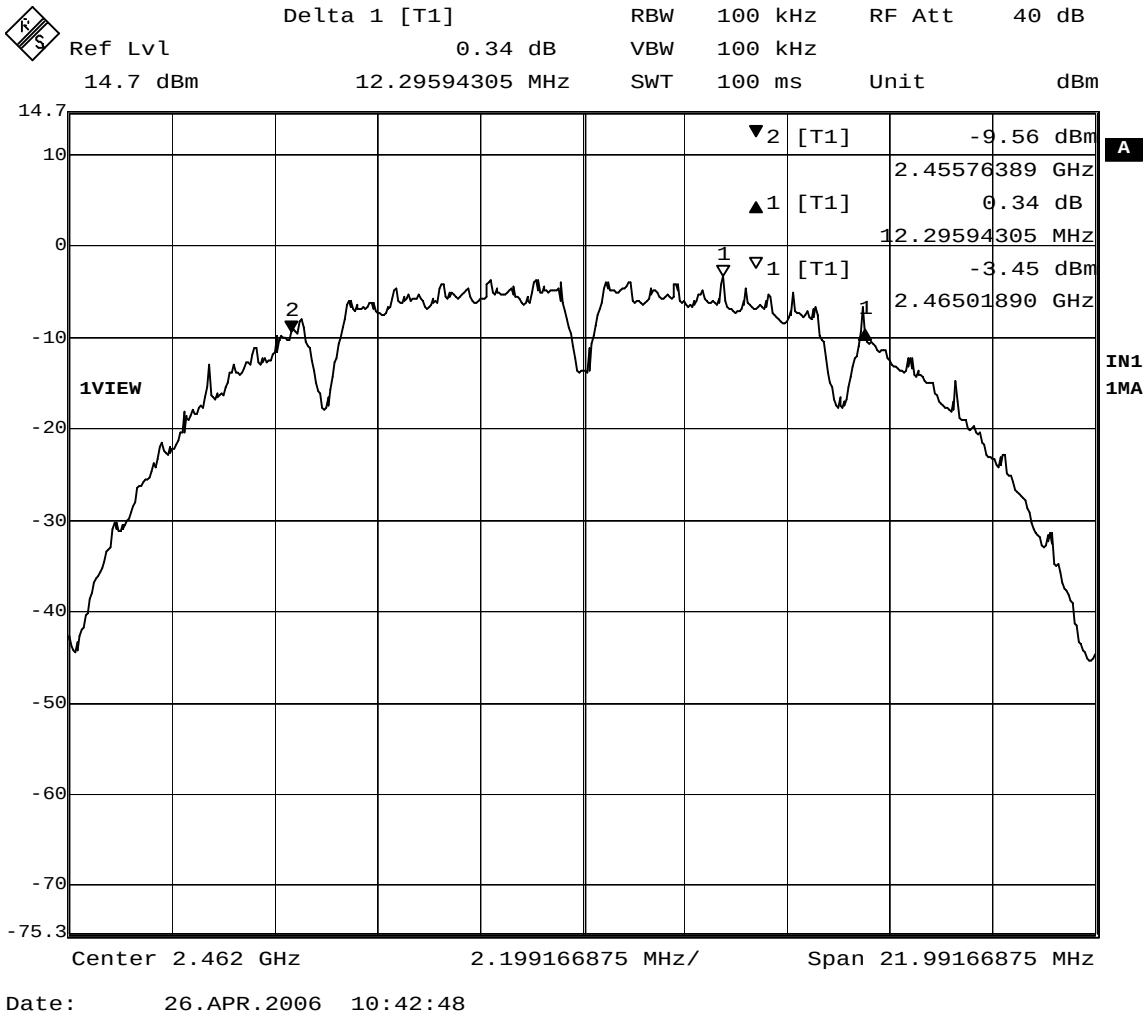

Figure 5 Channel 11, 100kHz RBW, 12.30MHz bandwidth, 11Mbps

EUT	Wireless Tap	MODEL	Strand mount
INPUT POWER (SYSTEM)	60VAC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	(B)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	RESULT
1	2412	12.79	0.500	Pass
6	2437	12.28	0.500	Pass
11	2462	12.28	0.500	Pass

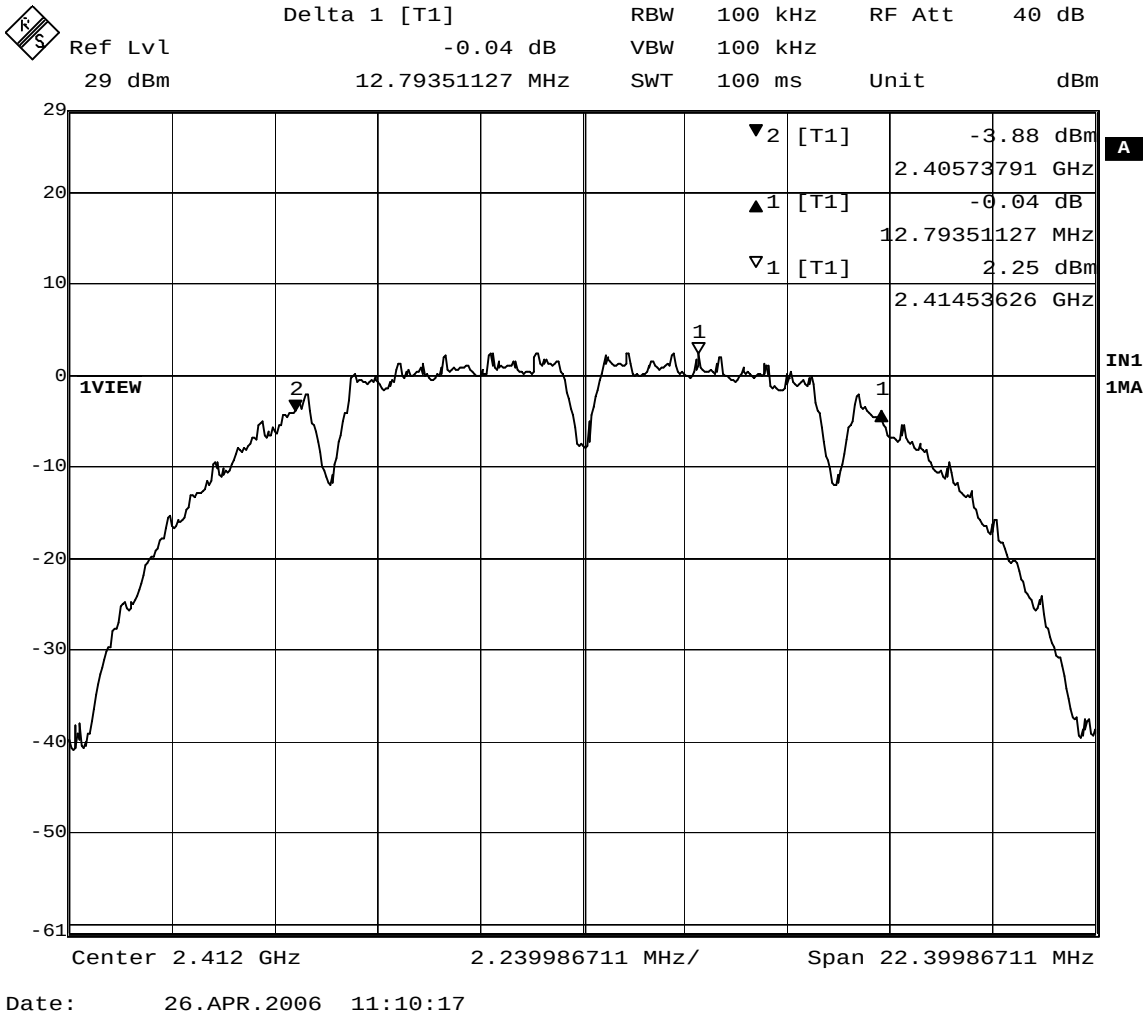

Figure 6 Channel 1, 100kHz RBW, 12.79MHz bandwidth, 54Mbps

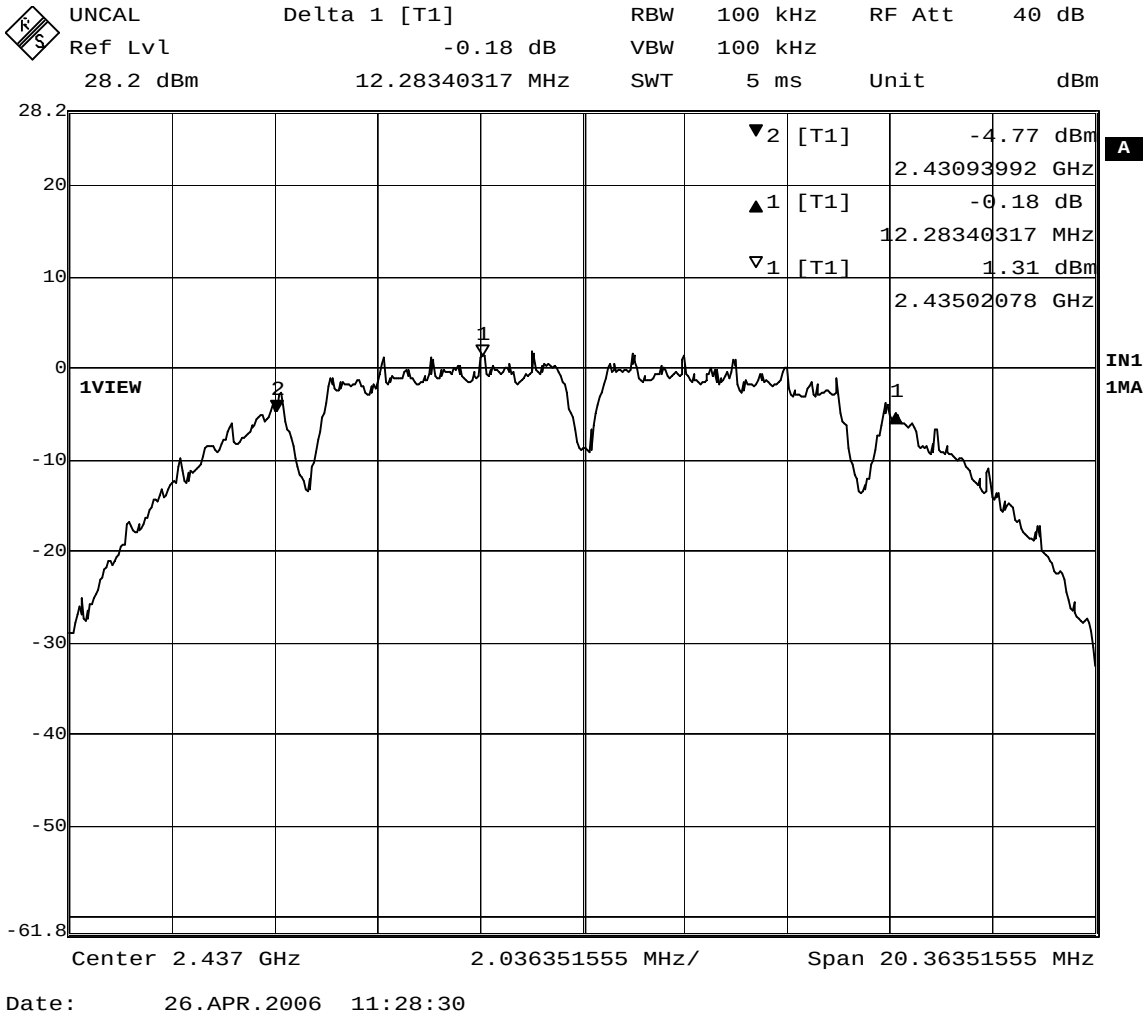

Figure 7 Channel 6, 100kHz RBW, 12.28MHz bandwidth, 54Mbps

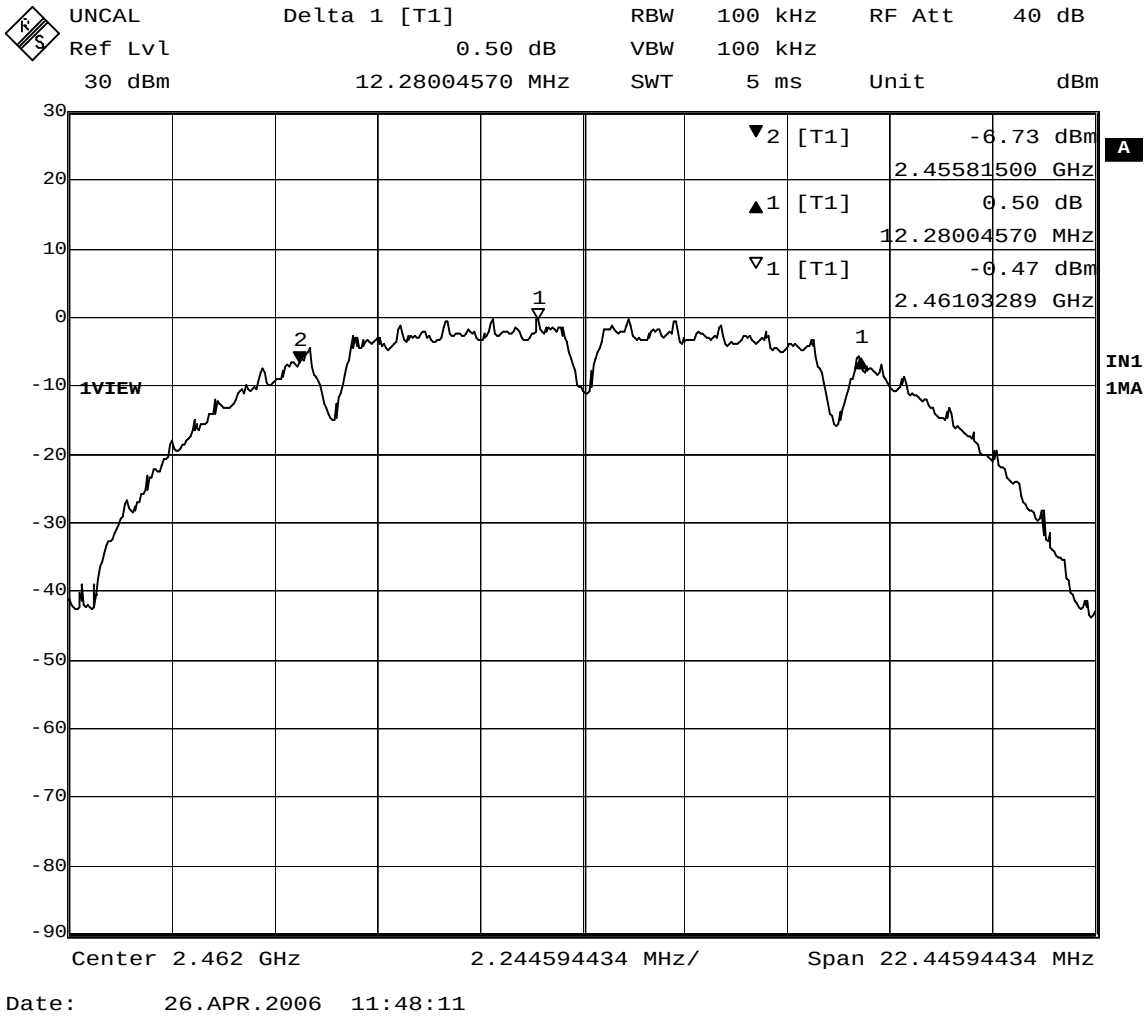

Figure 8 Channel 11, 100kHz RBW, 12.28MHz bandwidth, 54Mbps

4.4 Maximum peak output power

4.4.1 Limits of bandwidth measurements

The maximum peak output allowed is 30dBm

4.4.2 Test procedures

1. A detector was used on the output port of the EUT. An oscilloscope was used to read the response of the detector.

2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.

3. Adjusted the power to have the same reading on oscilloscope. Record the power level.

4.4.3 Deviations from test standard

No deviation.

4.4.5 Test setup

4.4.5 EUT operating conditions

The EUT was powered by 60VAC via a coaxial cable. The EUT was set to transmit continuously at 11mbps (mode A) and 54mbps (mode B). The RF output power of the EUT was configured to run at the "14dBm" setting on the transceiver cards.

4.4.6 Test results

Maximum peak output power, 11 Mbps

EUT	Wireless Tap	MODEL	Strand mount
INPUT POWER (SYSTEM)	60VAC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	(A)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	RESULT
1	2412	14.85	30	Pass
6	2437	13.94	30	Pass
11	2462	12.31	30	Pass

Maximum peak output power, 54 Mbps

EUT	Wireless Tap	MODEL	Strand mount
INPUT POWER (SYSTEM)	60VAC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	(B)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	RESULT
1	2412	18.64	30	Pass
6	2437	17.68	30	Pass
11	2462	15.98	30	Pass

4.5 Power spectral density

4.5.1 Limits of bandwidth measurements

The maximum power spectral density allowed is 8dBm.

4.5.2 Test procedures

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

4.5.3 Deviations from test standard

No deviation.

4.5.4 Test setup

4.5.5 EUT operating conditions

The EUT was powered by 60VAC via a coaxial cable. The EUT was set to transmit continuously at 11mbps (mode A) and 54mbps (mode B). The RF output power of the EUT was configured to run at the "14dBm" setting on the transceiver cards.

4.5.6 Test results

Power Spectral Density, 11Mbps

EUT	Wireless Tap	MODEL	Strand mount
INPUT POWER (SYSTEM)	60VAC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	(A)

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN # KHz BW (dBm)	MAXIMUM POWER LIMIT (dBm)	RESULT
1	2412	-8.66	8	Pass
6	2437	-14.32	8	Pass
11	2462	-12.97	8	Pass

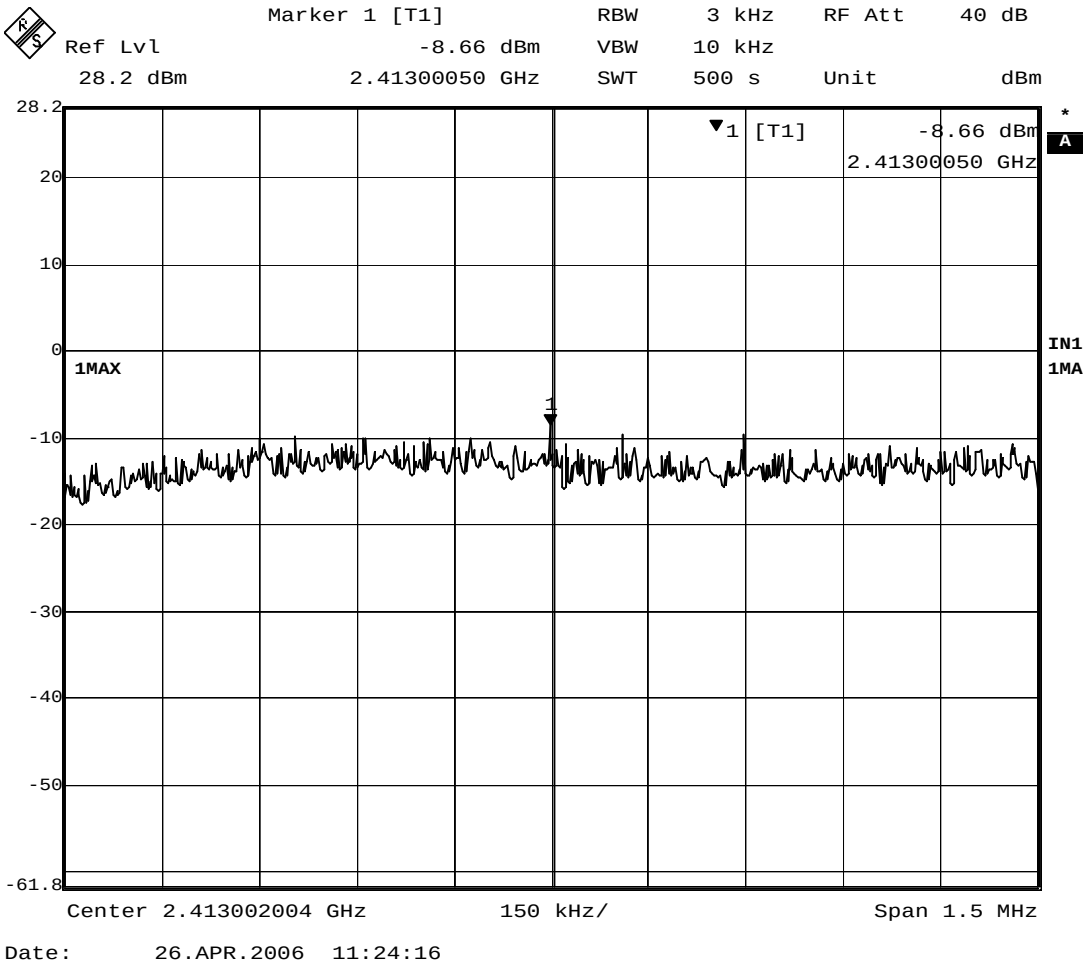

Figure 9 Channel 1, PSD -8.66dBm, 11Mbps

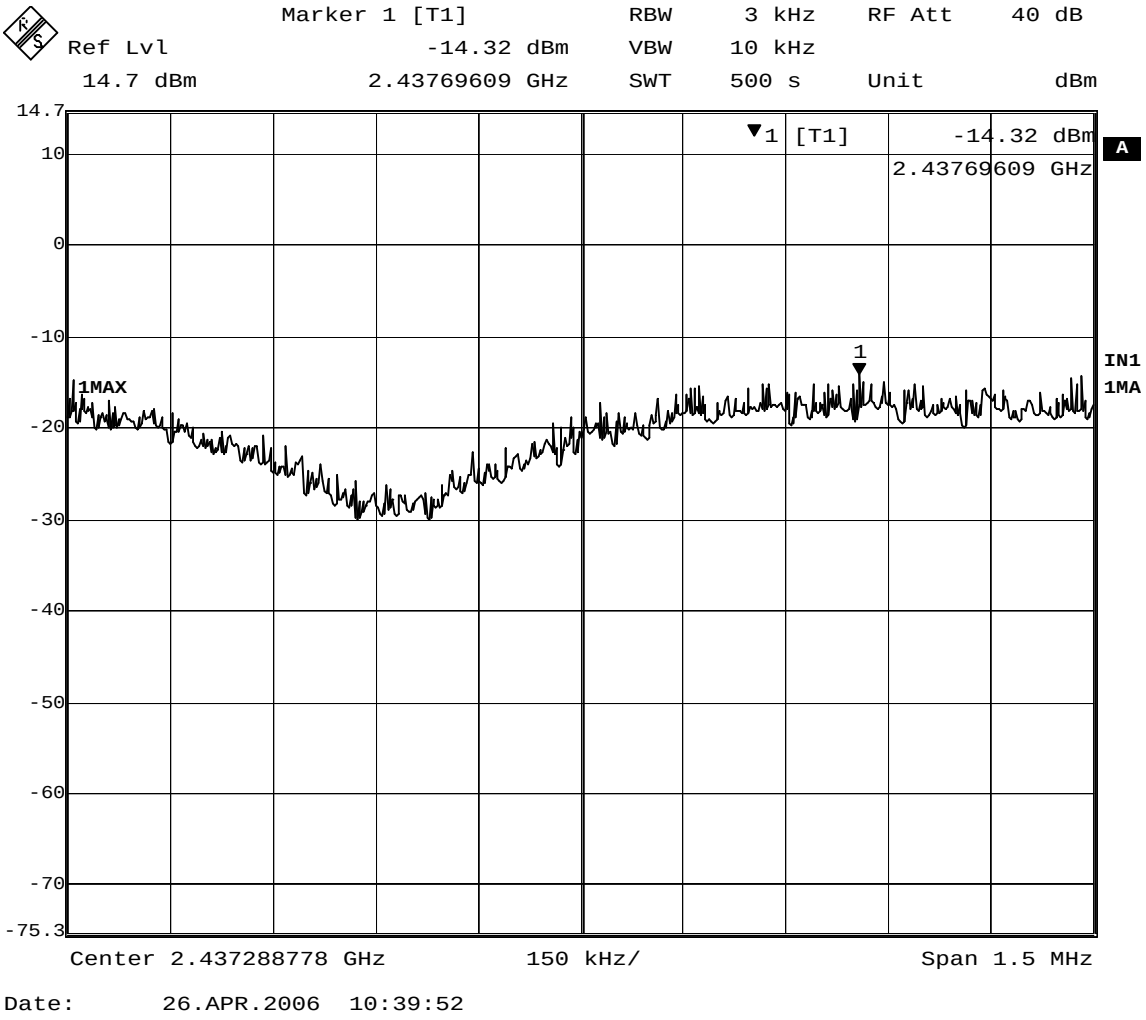

Figure 10 Channel 6, PSD -8.66dBm, 11Mbps

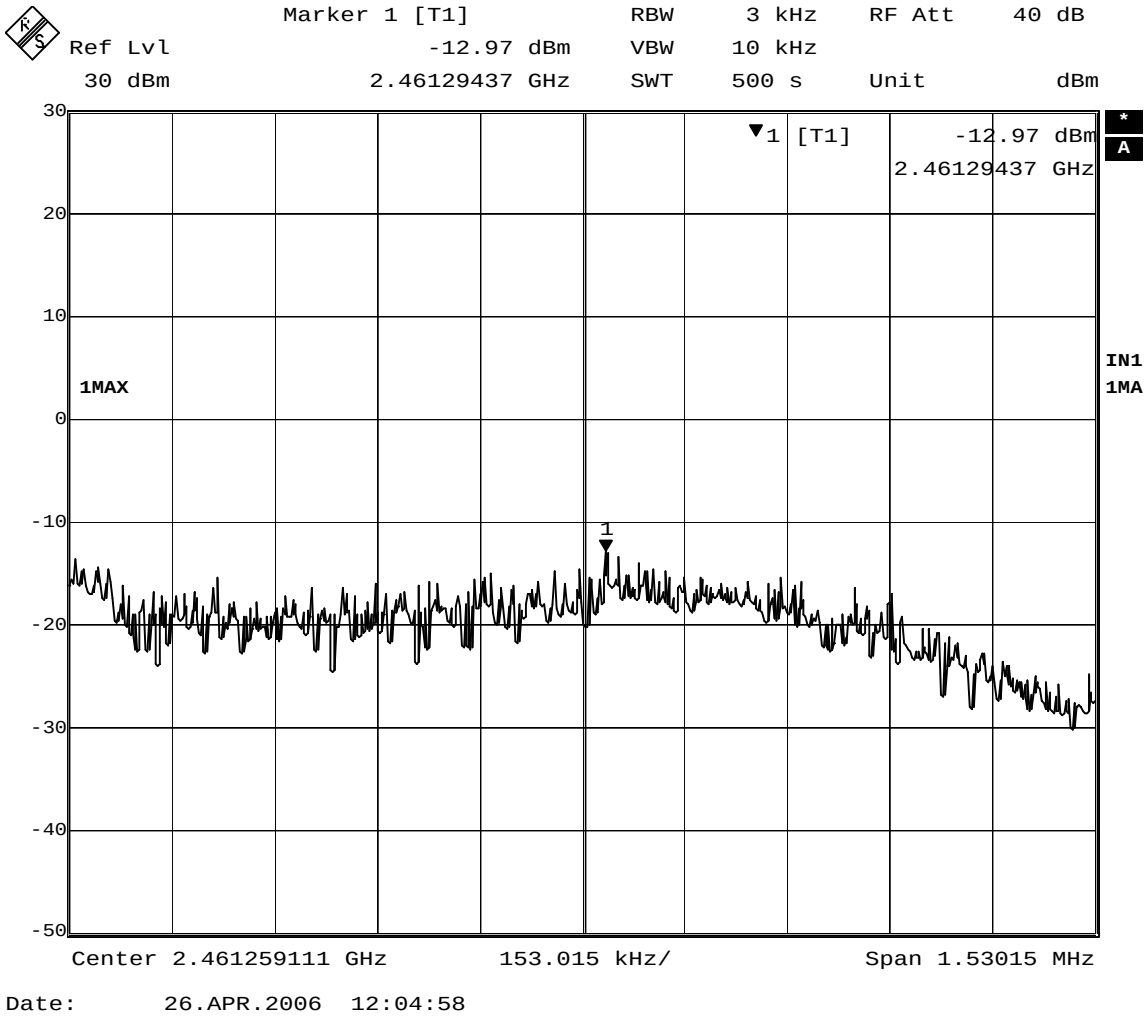

Figure 11 Channel 11, PSD -8.66dBm, 11Mbps

Power Spectral Density, 54 Mbps

EUT	Wireless Tap	MODEL	Strand mount
INPUT POWER (SYSTEM)	60VAC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	(B)

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN # KHz BW (dBm)	MAXIMUM POWER LIMIT (dBm)	RESULT
1	2412	-13.68	8	Pass
6	2437	-11.56	8	Pass
11	2462	-13.12	8	Pass

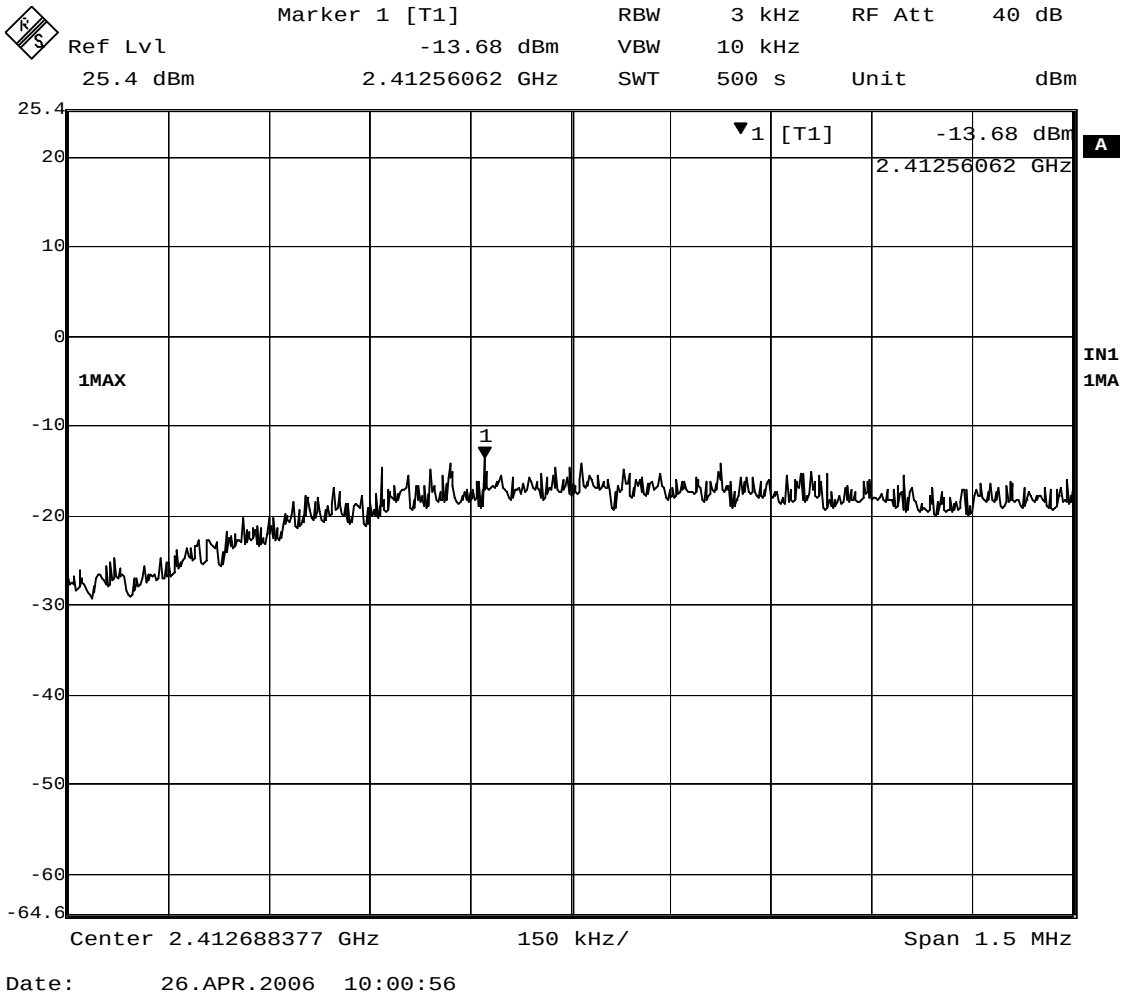

Figure 12 Channel 1, PSD -13.68dBm, 54Mbps

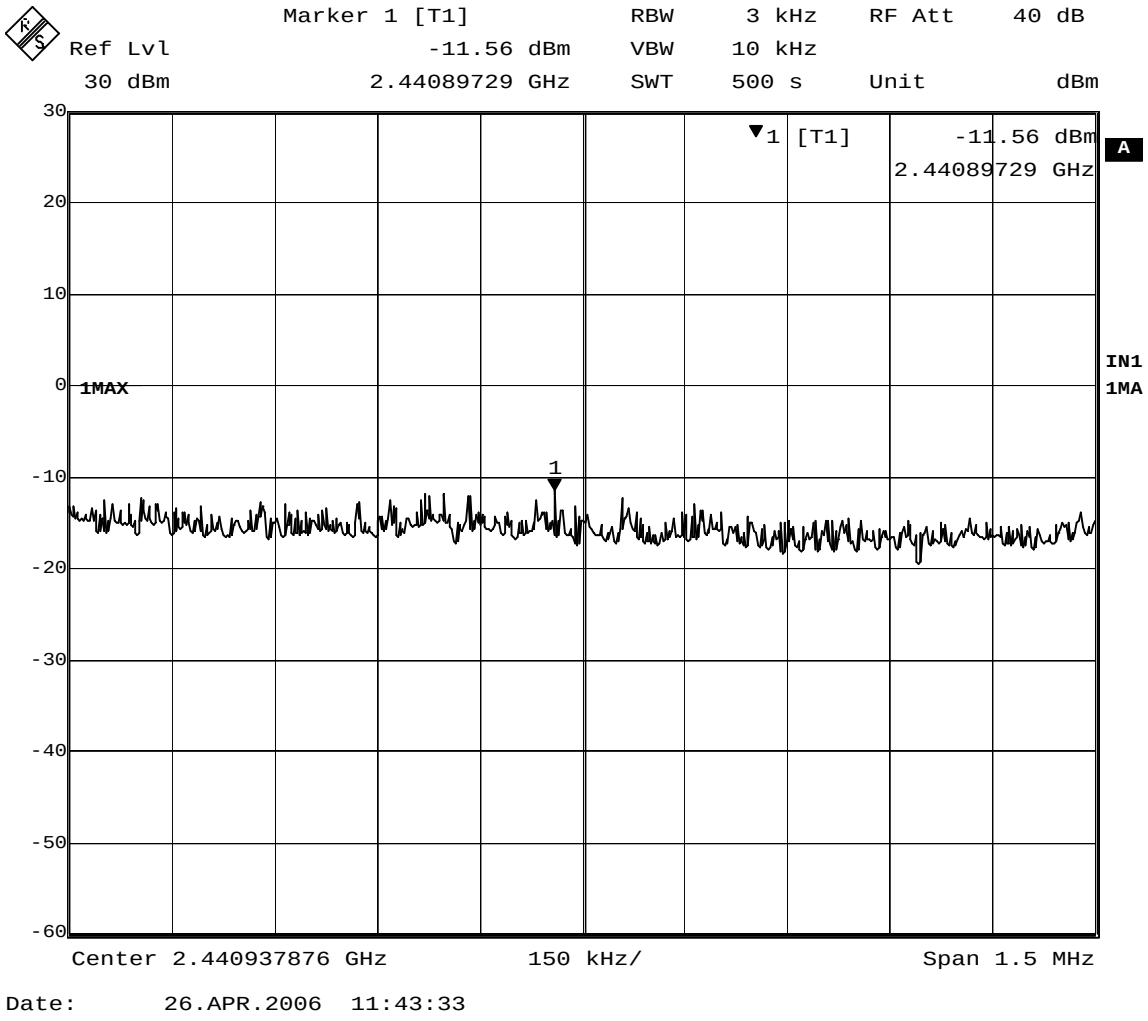

Figure 13 Channel 6, PSD -11.56dBm, 54Mbps

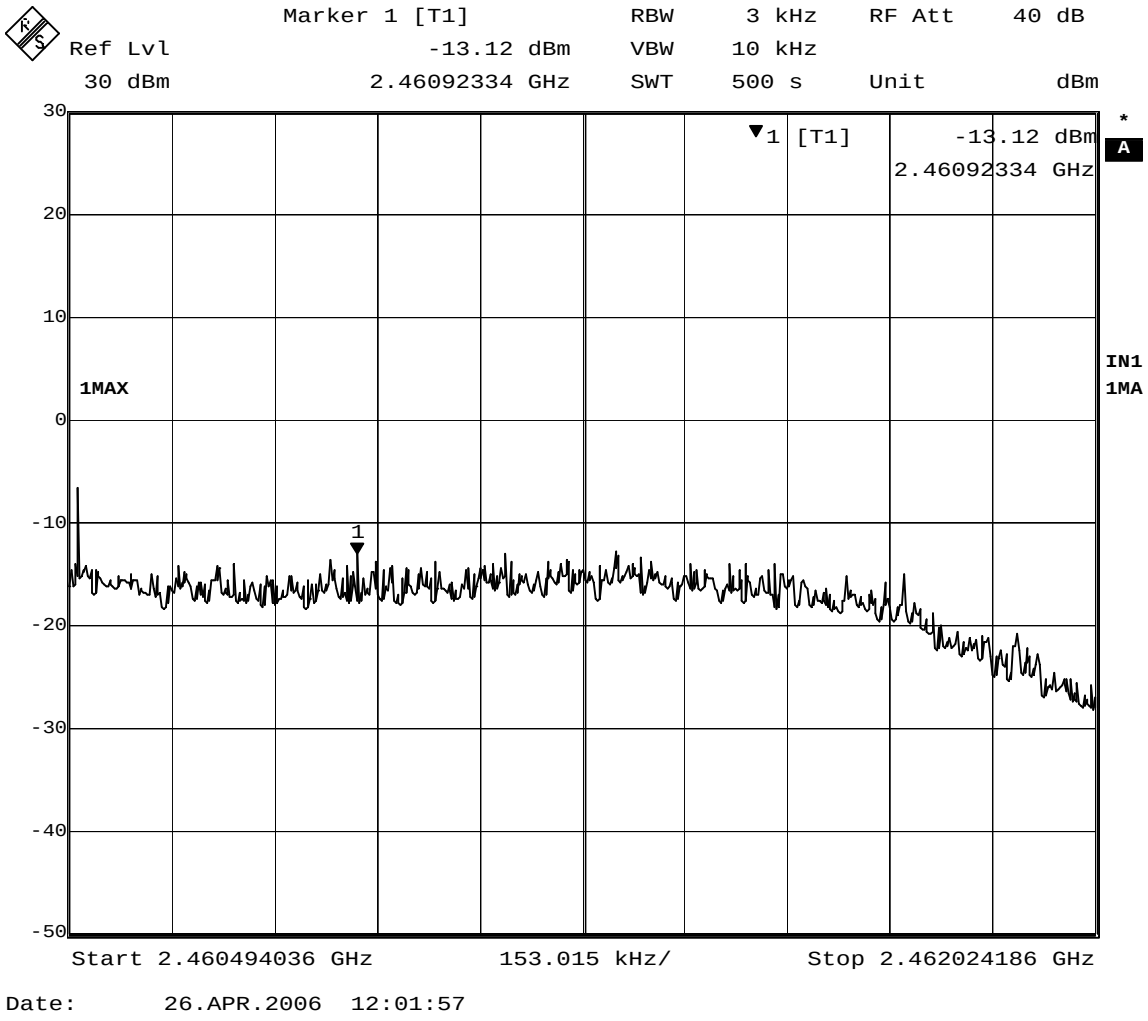

Figure 14 Channel 11, PSD -13.12dBm, 54Mbps

(signal to left is outlier and still below 8dBm limit)

4.6 Bandedges

4.6.1 Limits of bandedge measurements

Emission levels at the band edges need to be 20dB below the highest emission level in the operating band (in 100kHz resolution bandwidth).

4.6.2 Test procedures

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 1 MHz and 10 Hz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.6.3 Deviations from test standard

No deviation.

4.6.4 Test setup

4.6.5 EUT operating conditions

The EUT was powered by 60VAC via a coaxial cable. The EUT was set to transmit continuously at 11mbps (mode A) and 54mbps (mode B). The RF output power of the EUT was configured to run at the "14dBm" setting on the transceiver cards.

4.6.6 Test results Mode, (A)

Radiated Bandedge Emissions

CHANNEL	MEASUREMENT FREQUENCY (MHz)	AV Level (dBµV/m)	15.209 Limit	Margin
1	2390	44.04	54.00	9.96
11	2483.5	42.85	54.00	11.15

Highest Restricted Band Emissions

CHANNEL	MEASUREMENT FREQUENCY (MHz)	AV Level (dBµV/m)	15.209 Limit	Margin
1	2336	50.4	54.00	3.5
11	2496	43.25	54.00	10.65

The spectrum plots can be seen in Figures 15 and 16 on the following page. The lowest channel, channel 1, was tested at the low end of the frequency band (2390MHz) and the highest channel, channel 11, was tested at the upper end of the frequency band (2483.5MHz). The peak and average plots are shown in the plot and Markers were placed on the fundamental frequency emission, the band edge frequency, and the highest emission in the restricted band. The markers reflect the average measurements. Peak measurements are required to be within 20dB of the average measurements, which can be seen in the plots.

NOTE:
The plots show uncorrected measurements. At the frequencies of concern the antenna used has an antenna factor of 28.44 and a cable loss of 6.40dB. This translates to a correction factor of 34.84dB ±1dB, which is reflected in the above results.

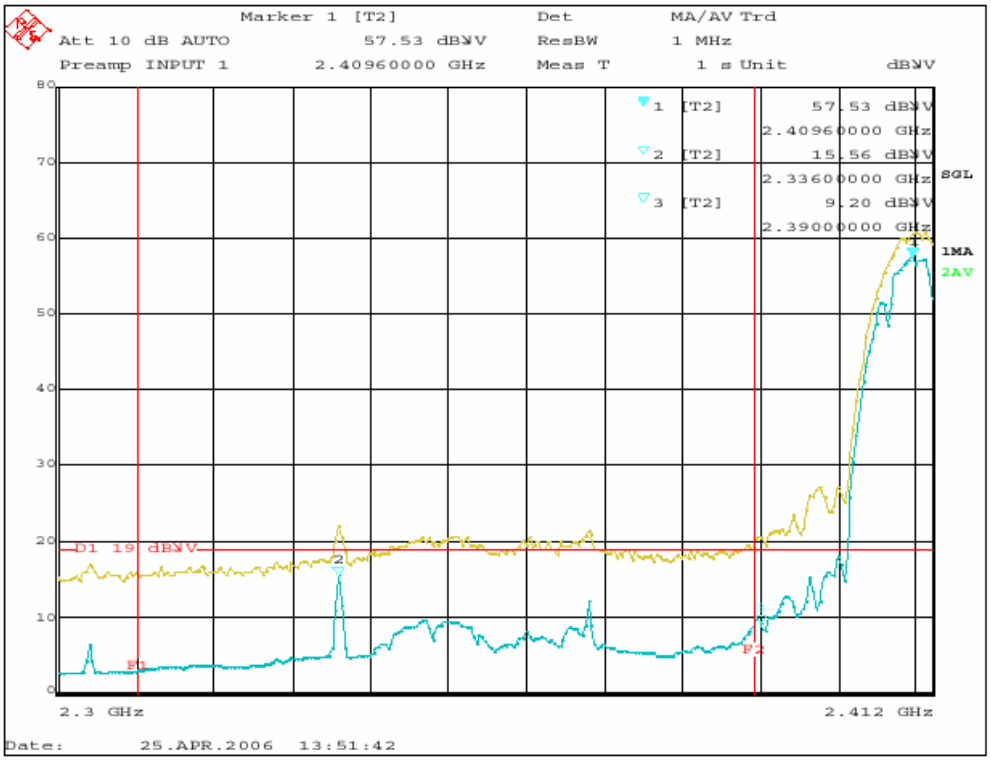

Figure 15 Channel 1, Mode A, Bandedge Measurements, Plot Uncorrected

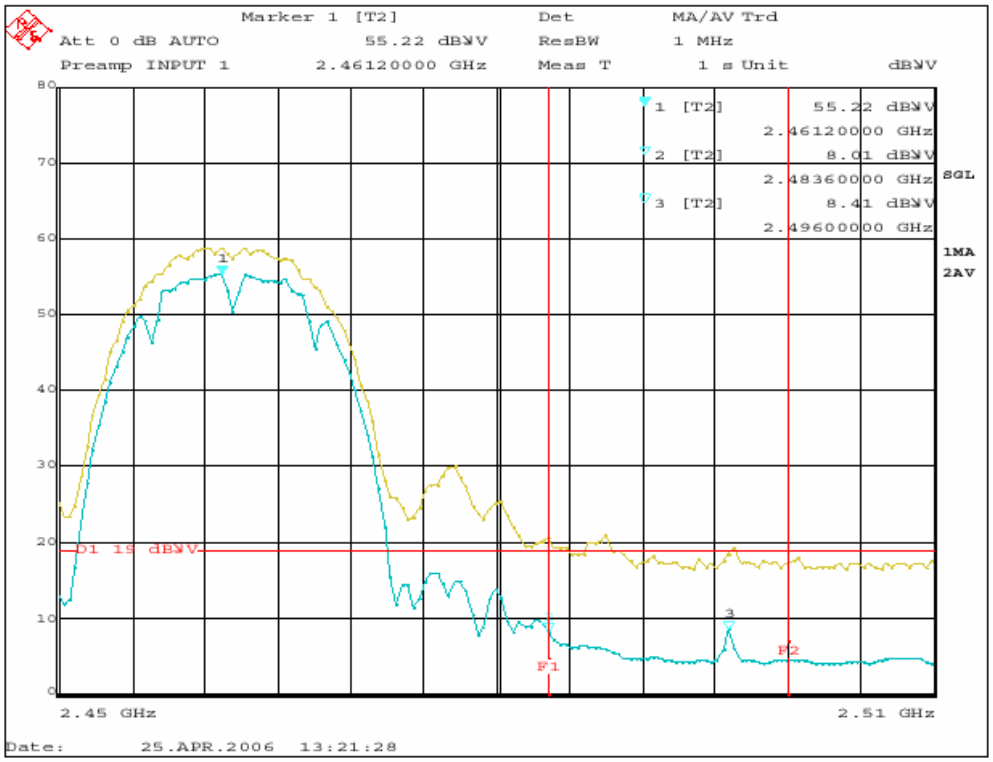

Figure 16 Channel 11, Mode A, Bandedge Measurements, Plot Uncorrected

4.6.7 Test results Mode, (B)

Bandedge Radiated Emissions

CHANNEL	MEASUREMENT FREQUENCY (MHz)	AV Level (dBµV/m)	15.209 Limit	Margin
1	2390	41.07	53.9	12.83
11	2483.5	39.27	53.9	14.63

Restricted Band Radiated Emissions

CHANNEL	MEASUREMENT FREQUENCY (MHz)	AV Level (dBµV/m)	15.209 Limit	Margin
1	2336	48.67	53.9	5.23
11	2496	40.93	53.9	12.97

The spectrum plots can be seen in Figures 17 and 18 on the following page. The lowest channel, channel 1, was tested at the low end of the frequency band (2390MHz) and the highest channel, channel 11, was tested at the upper end of the frequency band (2483.5MHz). The peak and average plots are shown in the plot and Markers were placed on the fundamental frequency emission, the band edge frequency, and the highest emission in the restricted band. The markers reflect the average measurements. Peak measurements are required to be within 20dB of the average measurements, which can be seen in the plots.

NOTE:
The plots show uncorrected measurements. At the frequencies of concern the antenna used has an antenna factor of 28.44 and a cable loss of 6.40dB. This translates to a correction factor of 34.84dB ±1dB, which is reflected in the above results.

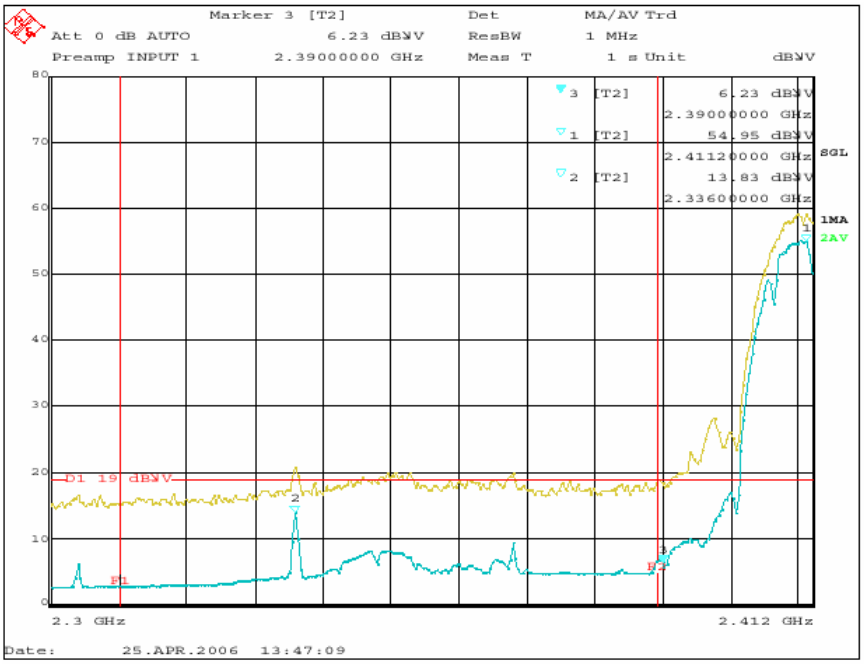

Figure 17 Channel 1, Mode B, Bandedge Measurements, Plot Uncorrected

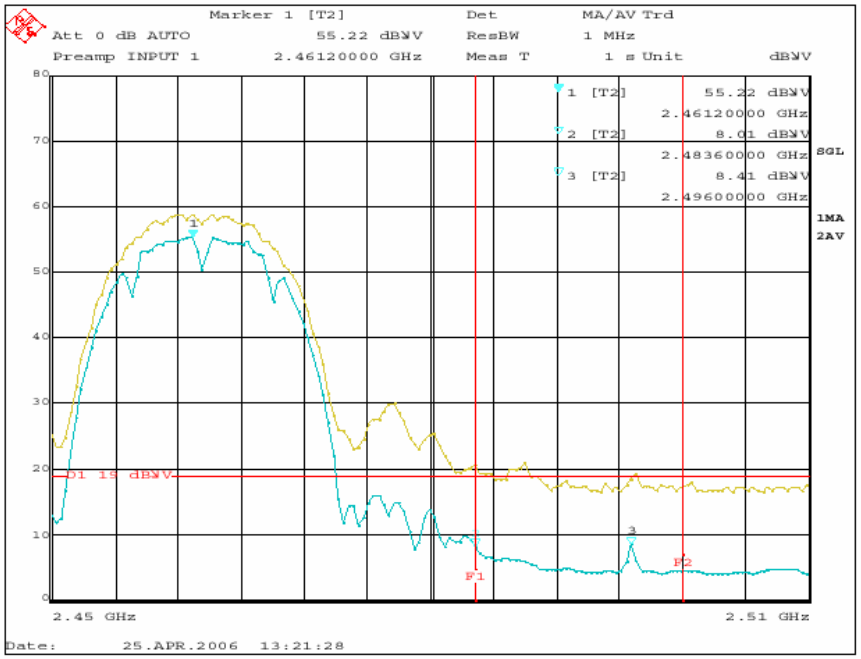

Figure 18 Channel 11, Mode B, Bandedge Measurements, Plot Uncorrected

Appendix A: Test Photos

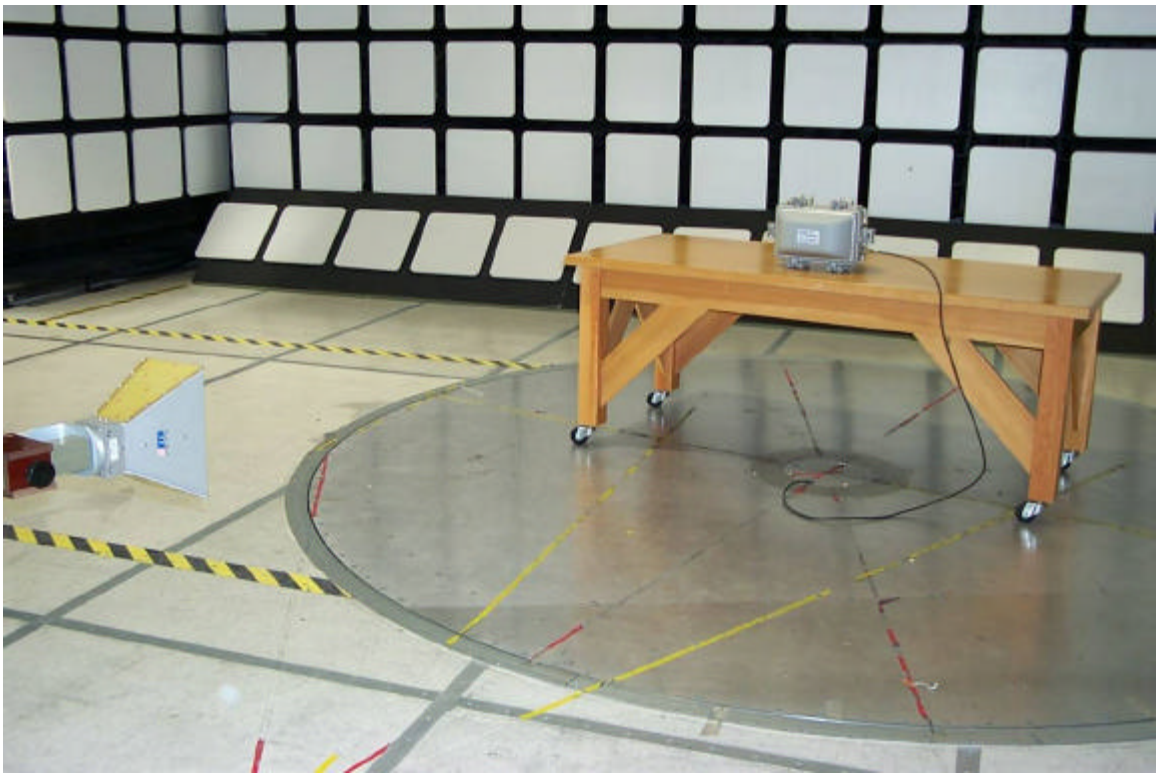

Figure 19 EUT test setup

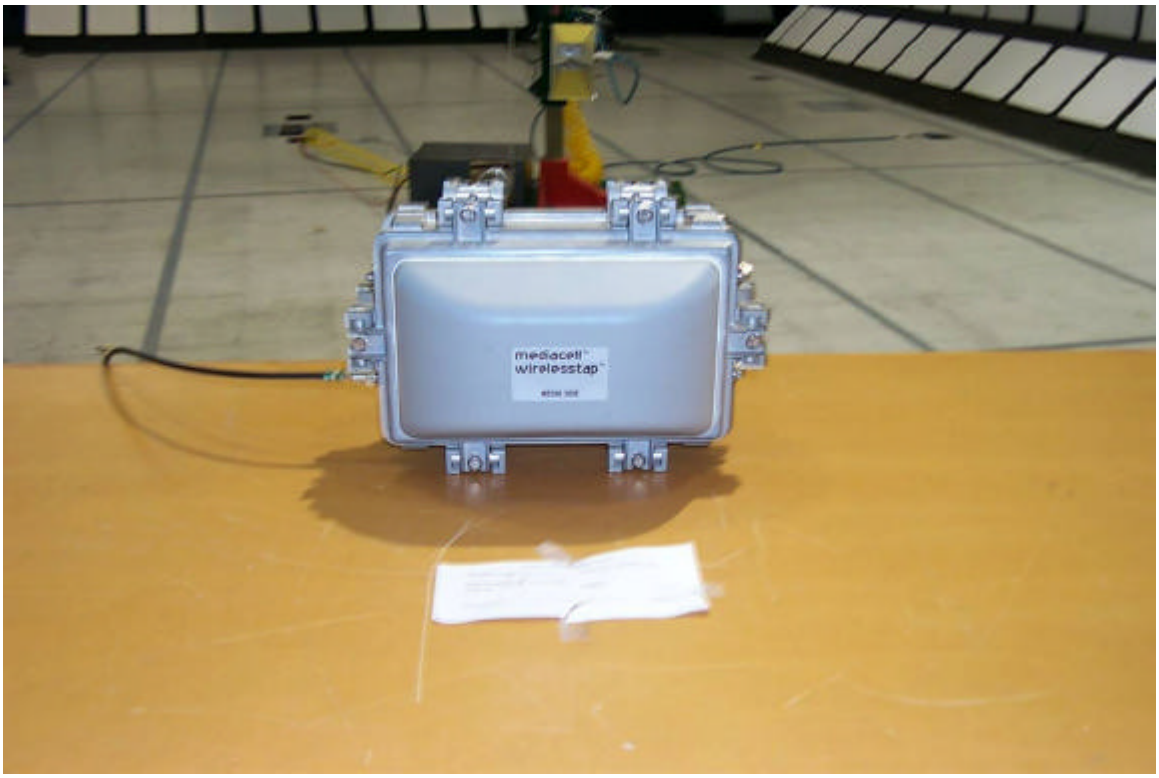

Figure 20 EUT test setup

Figure 21 External Photo of EUT

Figure 22 External Photo of EUT

Figure 23 Antenna inside cover of EUT

Appendix B: Sample Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:
FS = RA + AF – (-CF + AG) + AV

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

AV = Averaging Factor (if applicable)

Assume a receiver reading of 55 dBµV is obtained. The Antenna Factor of 12 and a Cable Factor of 1.1 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dBµV/m.

FS = 55 + 12 – (-1.1 + 20) + 0 = 48.1 dBµV/m

The 48.1 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m = Common Antilogarithm [(48.1 dBµV/m)/20]= 254.1 µV/m

AV is calculated by the taking the 20*log(T_{on}/100) where T_{on} is the maximum transmission time in any 100ms window.

Appendix C: RF Exposure Evaluation

FCC ID: TRPWE2106A
RF Exposure Statement for MediaCell Wireless Tap:

Notice in Installation Manual:
FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 6.42cm (2.257 inches) between the radiator and your body.

RF Exposure Calculations:

The following information provides the minimum separation distances for the two major antenna types used in this system.

Directional Antenna:
The 8.5dBi antenna is the maximum gain antenna certified for use with the product. The minimum separation distance is calculated from **FCC OET 65 Appendix B, Table 1B** Guidelines for General Population/Uncontrolled Exposure. This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1.0 mW/cm^2 uncontrolled exposure limit. The formula used was:

S = (Po * G) / (4 * Pi * r^2) or r = SQRT [(Po * G) / (4 * Pi * S)]

Where S = 1.0 mW/cm^2 for 2400 MHz
Where Po = 73.12 mW (Peak RF, 18.64dBm)
Where G = 7.08 (numeric equivalent to 8.5dBi antenna gain with 0.0 dB cable loss)
Where r = Minimum Safe Distance from antenna (cm)

For TRPWE2106A, r = 6.42 cm (2.257 inches)

For a distance [r] of 20cm from this antenna, the field density S = 0.103 mW/cm^2

Notes:

1. The minimum safe distance is based on a conservative “worse case” prediction, i.e. using the formula shown above and no duty factor. In practice the minimum distance will be much shorter. (Ref. 2)
2. The minimum safe distance has been calculated for the maximum allowed Power Density (S) limit of 1.0 mW/cm^2 in the frequency range 1500-100,000 MHz for uncontrolled environments (Ref. 2).

References:

1. FCC Part 15, sub-clause 15.247 (b) (4) (i)
2. FCC OET Bulletin 65, Edition 97-01
3. FCC Supplement C to OET Bulletin 65, edition 01-01

Appendix D: Table of Figures

Figure **Page Number**