

Product Safety Engineering, Inc
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TEST REPORT

05F429B
11/21/2005

Applicant:

Hauppauge Computer Works
91 Cabot Court
Hauppauge, NY 11788

Product:

Model - 86017
Wireless Media Player

Test dates:

11/03/2005 - 11/11/2005

Receive Date:

10/18/2005

Prepared by: Steven E. Hoke - EMC Site Manager

A handwritten signature in black ink, appearing to read "Steven E. Hoke". The signature is written in a cursive, flowing style.

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Test Procedures

Product description: The 86017 produces baseband audio and video outputs from received streaming data. The received data is achieved with an internal direct sequence spread spectrum transceiver operating in the 2.4 Ghz frequency band.

Powerline conducted interference: The AC powerline conducted emissions measurements were made in accordance with ANSI C64.3 2003.

Band Edge: The Spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low, medium and high transmit frequencies. The data rate of the radio was varied to determine the level that produced the worst case. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 25 MHz below the band edge to 25 MHz above the band edge.

Power Output: The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at its maximum output power. The data rate of the radio was varied to determine the level that produced the highest output power. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The following procedure was followed during measurements:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set sweep trigger to "free run".
3. Set RBW = 1 MHz. Set VBW = 3 MHz
4. Use linear display mode.
5. Use peak detector mode.
6. Set max hold.
7. Allow max hold to run for 60 seconds.
8. Compute power by integrating the spectrum across the 26 dB EBW.. The integration was performed using the spectrum analyzer's band power measurement function with band limits set equal to the 26 dB down points of the EBW.

Power Spectral Density: The peak power spectral density measurements were measured with the EUT set to low, medium and high transmit frequencies. The data rate of the radio was varied to determine the level that produced the worst case. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer.

Occupied Bandwidth: The occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies. The data rate of the radio was varied to determine the level that produced the worst case. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer.

Conducted Spurious Emissions: The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The data rate of the radio was varied to determine the level that produced the worst case. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. All emissions up to 25 Ghz were investigated.

Radiated Spurious Emissions: The radiated spurious emissions measurements were measured with the EUT set to low, medium and high transmit frequencies. The data rate of the radio was varied to determine the level that produced the worst case. The measurements were made using our open area test site. All emissions up to 25 Ghz were investigated and those falling into restricted bands were measured for compliance.

TEST EQUIPMENT CALIBRATION INFORMATION

Manufacturer	Model	Description	Serial Number	Cal Due
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526	07/18/06
Hewlett Packard	85662A	Display	2403A07352	07/18/06
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00209	07/18/06
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06832	12/13/05
Hewlett Packard	8568B	Spectrum Analyzer	2407A03213	08/03/06
Hewlett Packard	85662A	Display	2340A05806	08/03/06
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00358	08/03/06
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06901	08/03/06
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	1937A03247	08/03/06
Hewlett Packard	8449B	Preamp 1 - 26.5 GHz	3008A00320	12/13/05
Hewlett Packard	8648B	Signal Generator	3443U00312	05/26/06
Hewlett Packard	8672A	Signal Generator	2211A02426	12/13/05
Eaton	96005	Log Periodic Antenna	1099	01/26/06
Electro-Metrics	LPA 30	Log Periodic Antenna	2280	01/11/06
Electro-Metrics	BIA 30	Biconical Antenna	3852	01/11/06
Electro-Metrics	BIA 25	Biconical Antenna	4283	01/27/06
Electro-Mechanics	3115	Double Ridge Guide Ant.	3810	11/25/05
Electro-Metrics	ALR30M	Magnetic Loop Antenna	824	01/10/06
Solar	8012	LISN	924840	03/10/06
Solar	8028	LISN	829012/809022	12/15/05
Solar	8028	LISN	903725/903726	12/15/05
Agilent	E7402A	Absorbing Clamp	US39150137	12/13/05
Leader	EMC-30	Function Generator	8060233	05/26/06
Electro-Metrics	ALA-130/A	EMI Receiver	191	05/26/06
Antenna Research	63-867	Loop Antenna	106	06/02/06
Radio Shack	63-867A	Temp/Hygrometer	N/A	05/27/06
Radio Shack		Temp/Hygrometer	N/A	05/27/06

Test: Band Edge Compliance

Date: 11/04/2005

Requirement: In any (100) kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least (20) dB down from the highest emissions level within the authorized band.

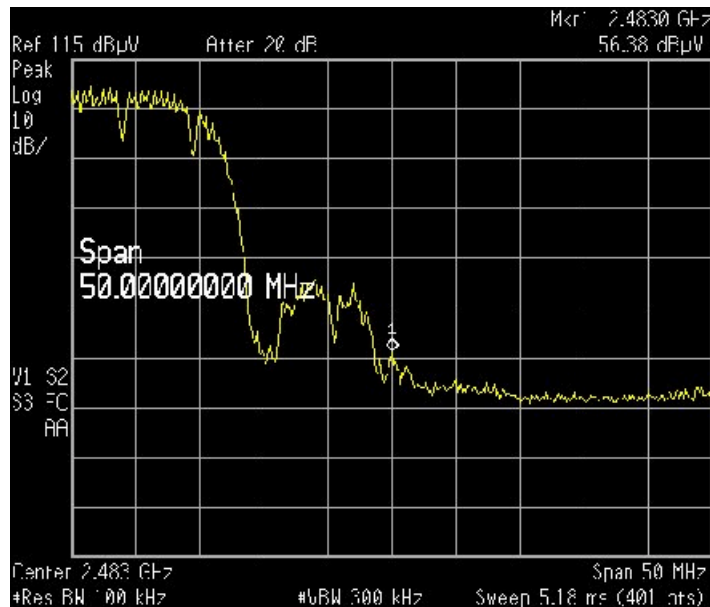
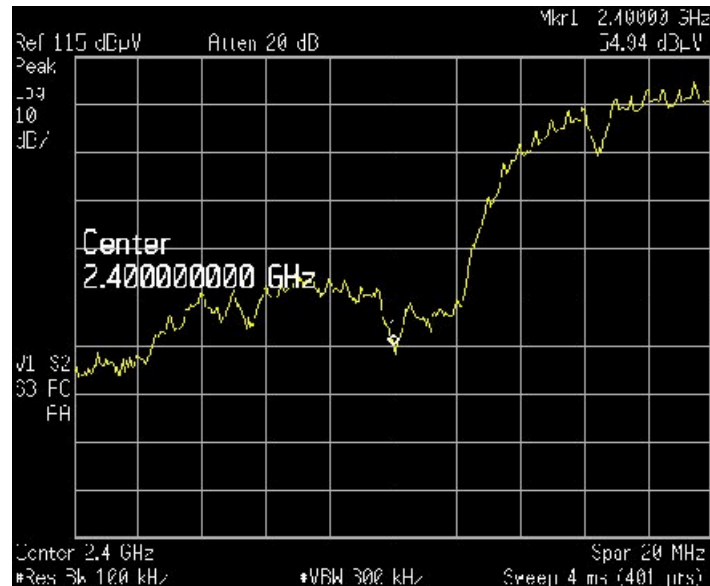
RBW: (100) kHz

VBW: (300) kHz

Channel: 1

Data Rate: 1 Mbps

Modulation: DBPSK/DQPSK



Test: Band Edge Compliance

Date: 11/04/2005

Requirement: In any (100) kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least (20) dB down from the highest emissions level within the authorized band.

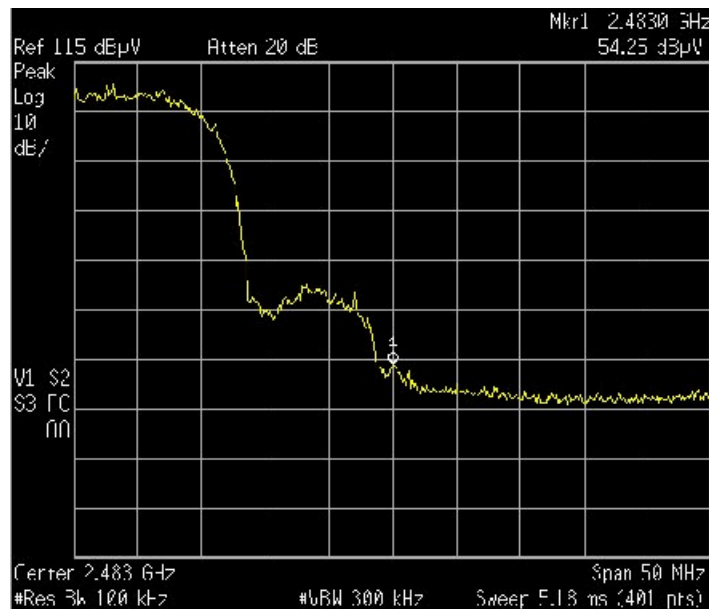
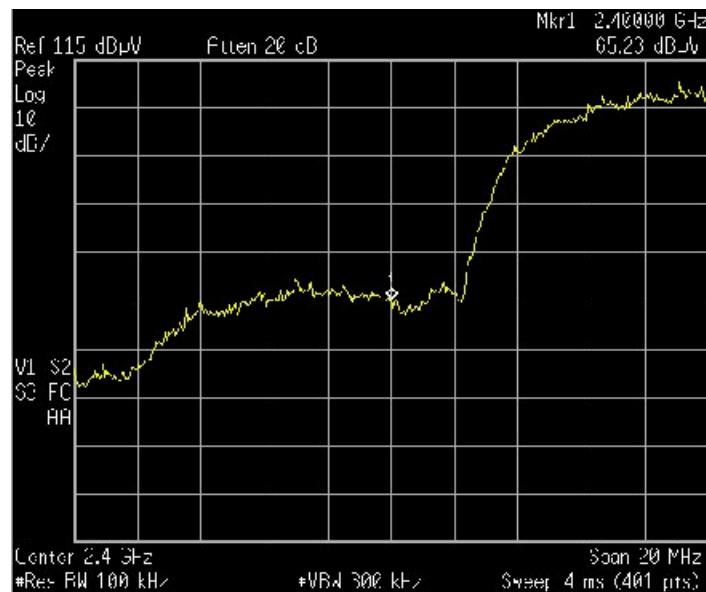
RBW: (100) kHz

VBW: (300) kHz

Channel: 11

Data Rate: 1 Mbps

Modulation: CCK



Test: Band Edge Compliance

Date: 11/04/2005

Requirement: In any (100) kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least (20) dB down from the highest emissions level within the authorized band.

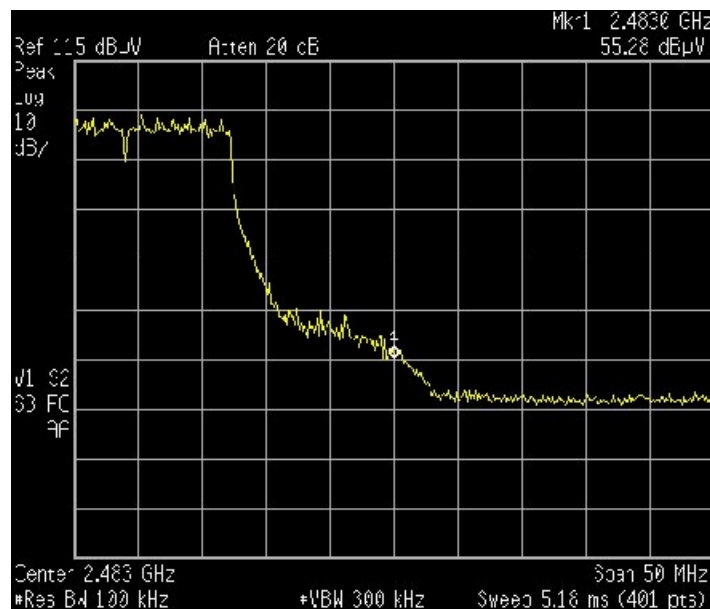
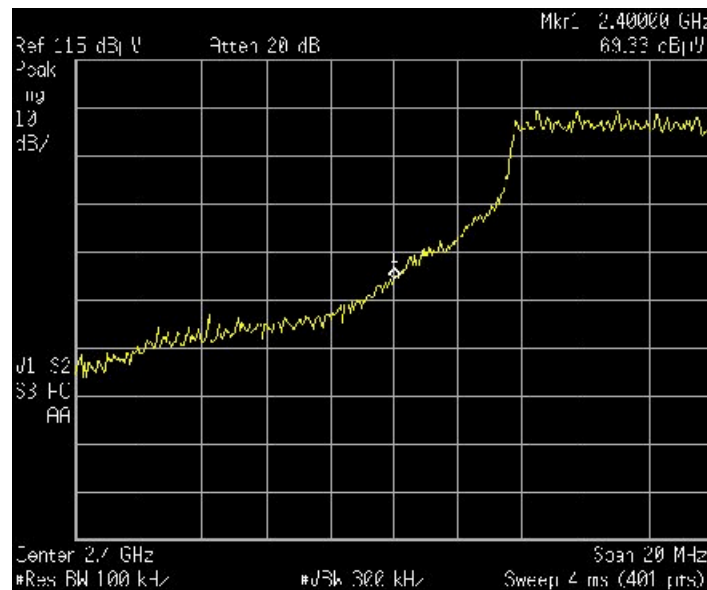
RBW: (100) kHz

VBW: (300) kHz

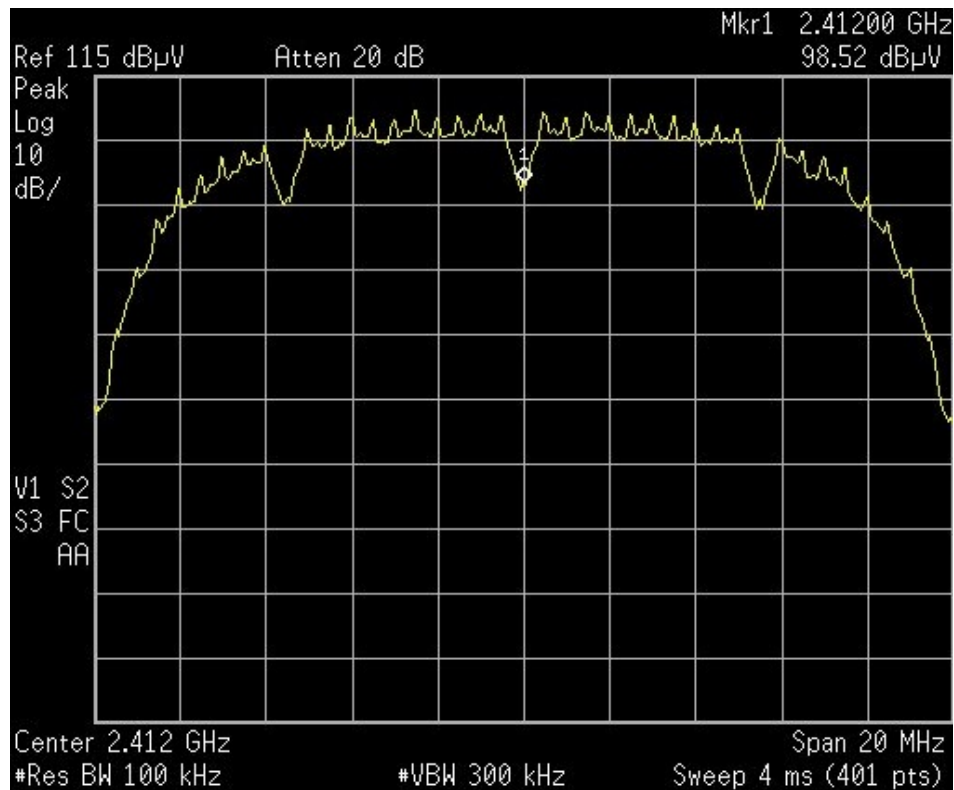
Channel: 11

Data Rate: 54 Mbps

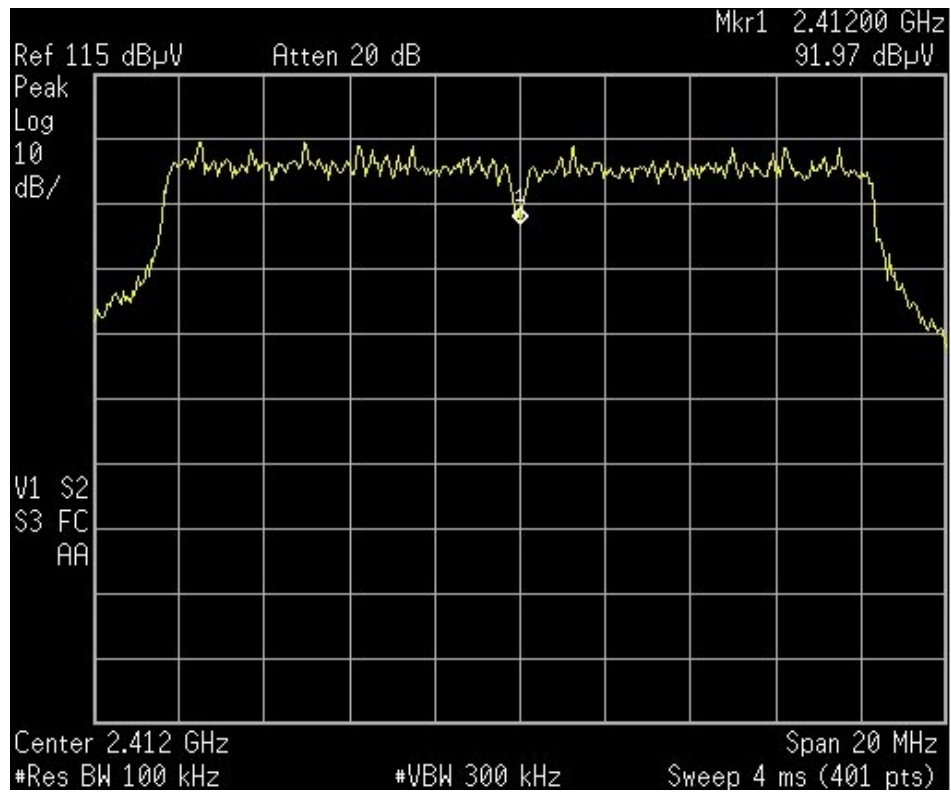
Modulation: OFDM



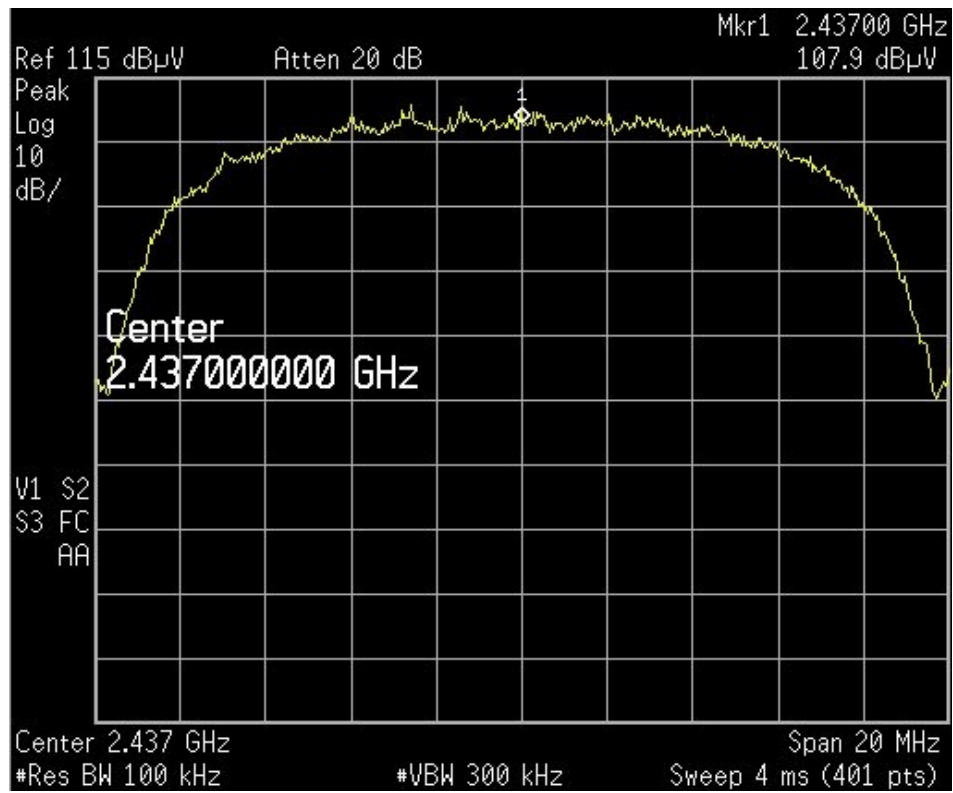
Test: Occupied Bandwidth per 15.247(a2)
Date: 11/04/2005
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 1
Data Rate: 1 Mbps
Modulation: DBPSK/DQPSK



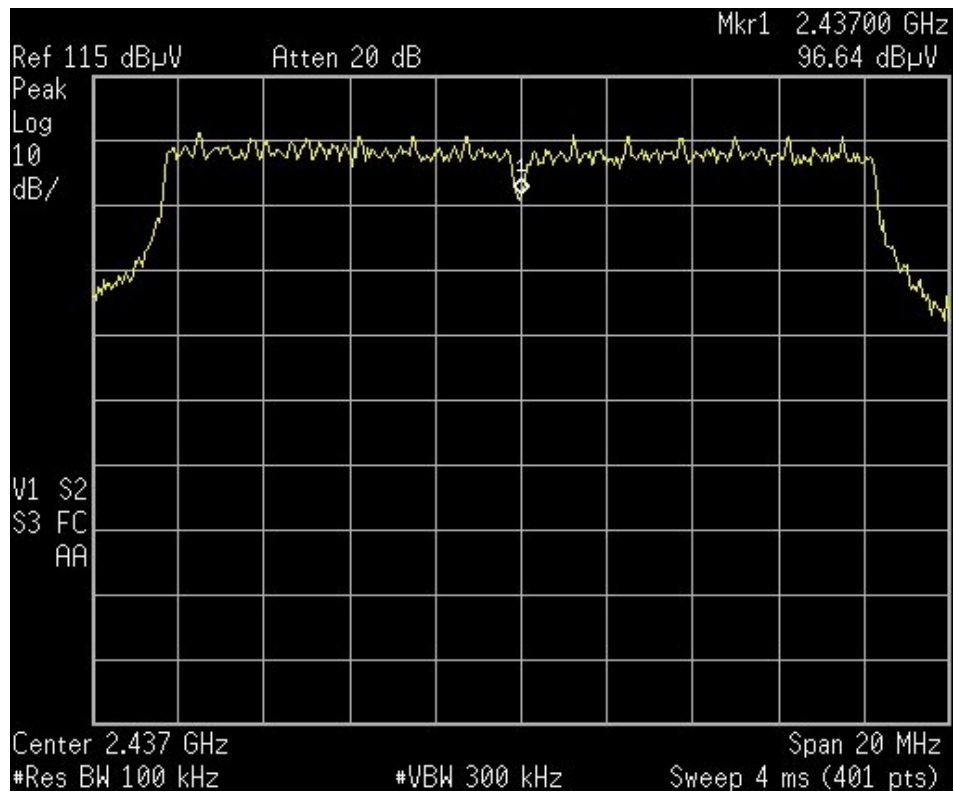
Test: Occupied Bandwidth per 15.247(a2)
Date: 11/04/2005
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 1
Data Rate: 54Mbps
Modulation: OFDM



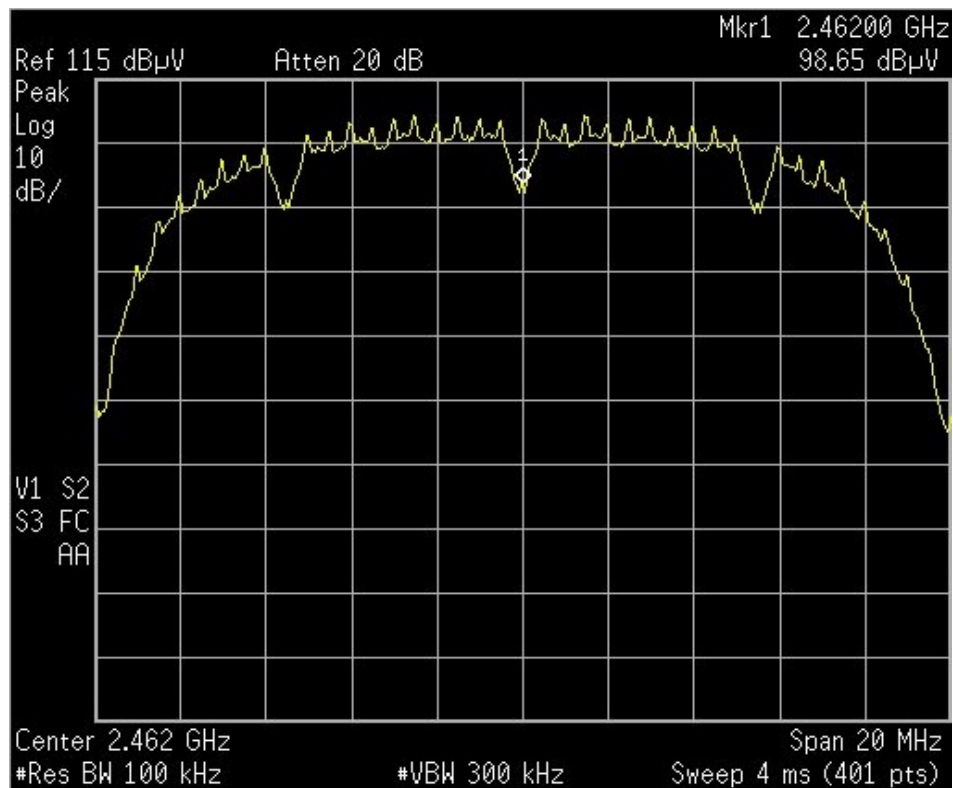
Test: Occupied Bandwidth per 15.247(a2)
Date: 11/04/2005
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 6
Data Rate: 5.5 Mbps
Modulation: DBSK/DQPSK



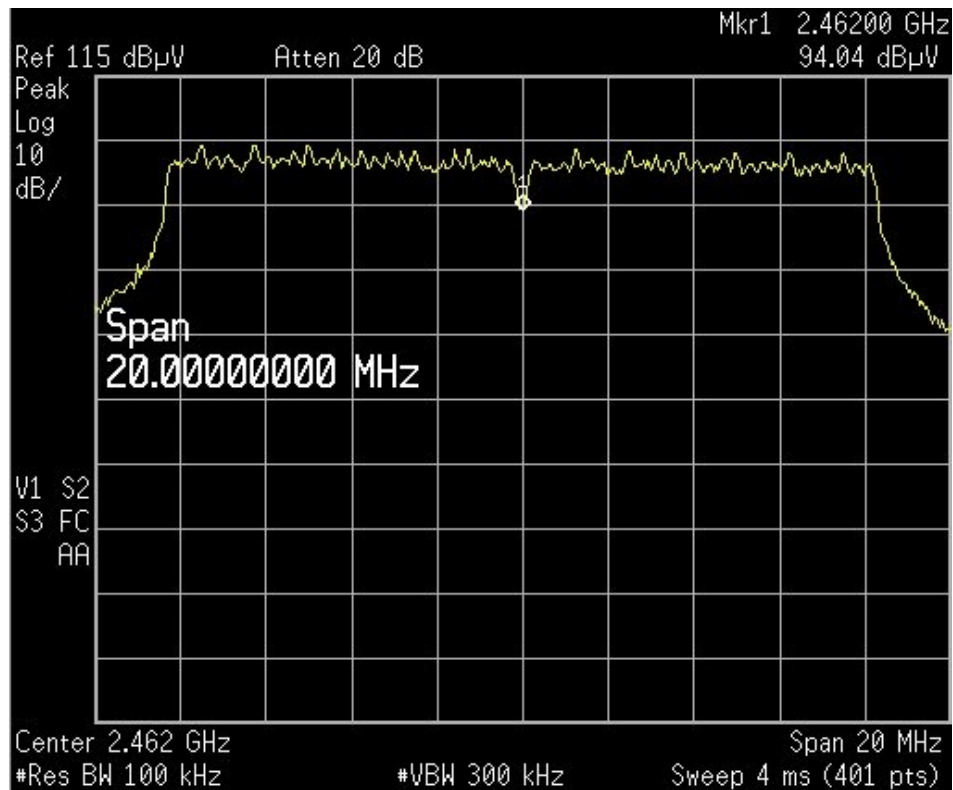
Test: Occupied Bandwidth per 15.247(a2)
Date: 11/04/2005
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 6
Data Rate: 24 Mbps
Modulation: OFDM



Test: Occupied Bandwidth per 15.247(a2)
Date: 11/04/2005
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 11
Data Rate: 11 Mbps
Modulation: PBCC



Test: Occupied Bandwidth per 15.247(a2)
Date: 11/04/2005
Requirement: The (6) dB bandwidth must be at least (500) kHz
RBW: (100) kHz
VBW: (300) kHz
Channel: 11
Data Rate: 36 Mbps
Modulation: OFDM



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencr transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

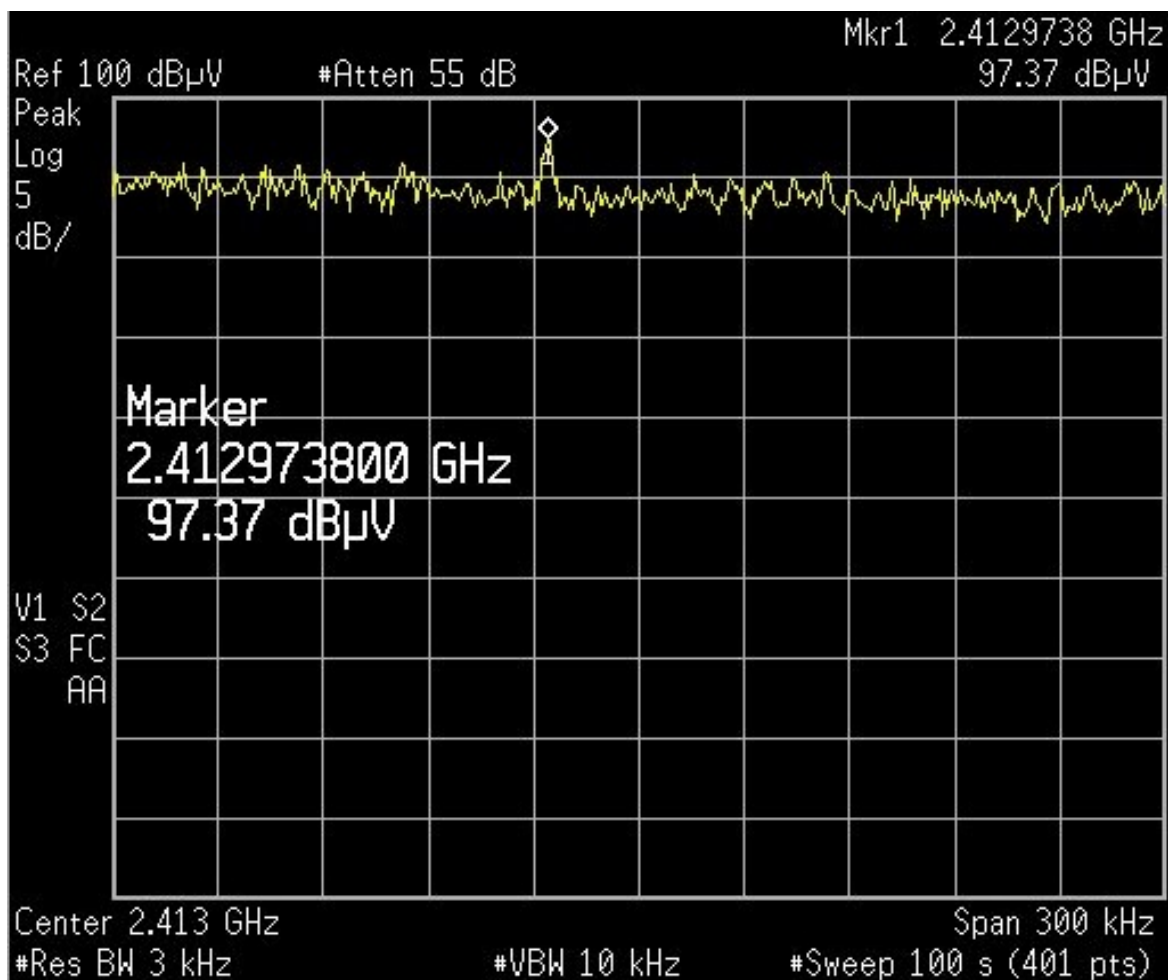
VBW: (10) kHz

Channel: 1

Data Rate: 1 Mbps

Modulation: DBPSK/DQPSK

Peak Power Spectral Density = (97.37 dBuV + 2 dB cable loss -107) = -7.6 dBm / 3 kHz



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencer transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

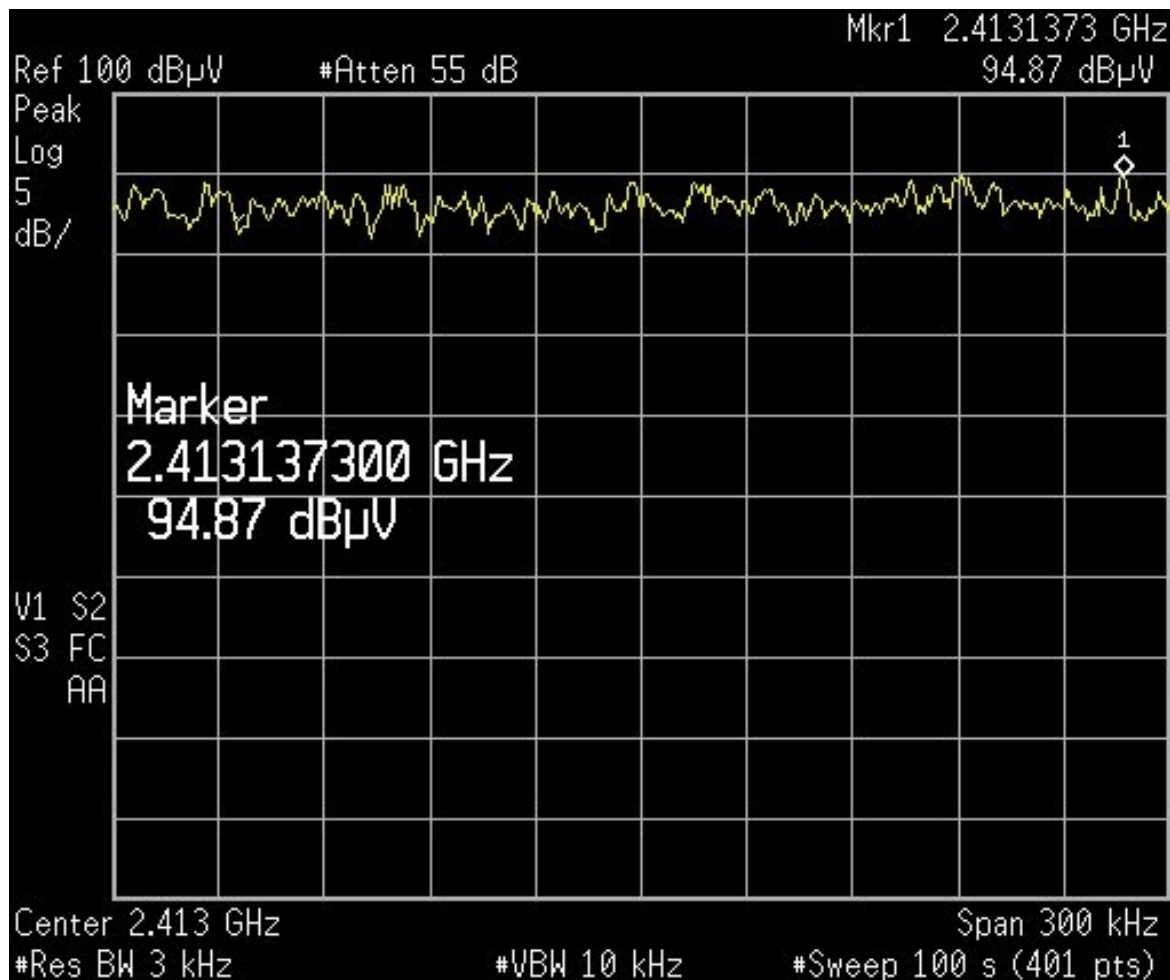
VBW: (10) kHz

Channel: 1

Data Rate: 5.5 Mbps

Modulation: CCK

Peak Power Spectral Density = (94.87 dBuV + 2 dB cable loss - 107) = -10.13 dBm / 3 kHz



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencr transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

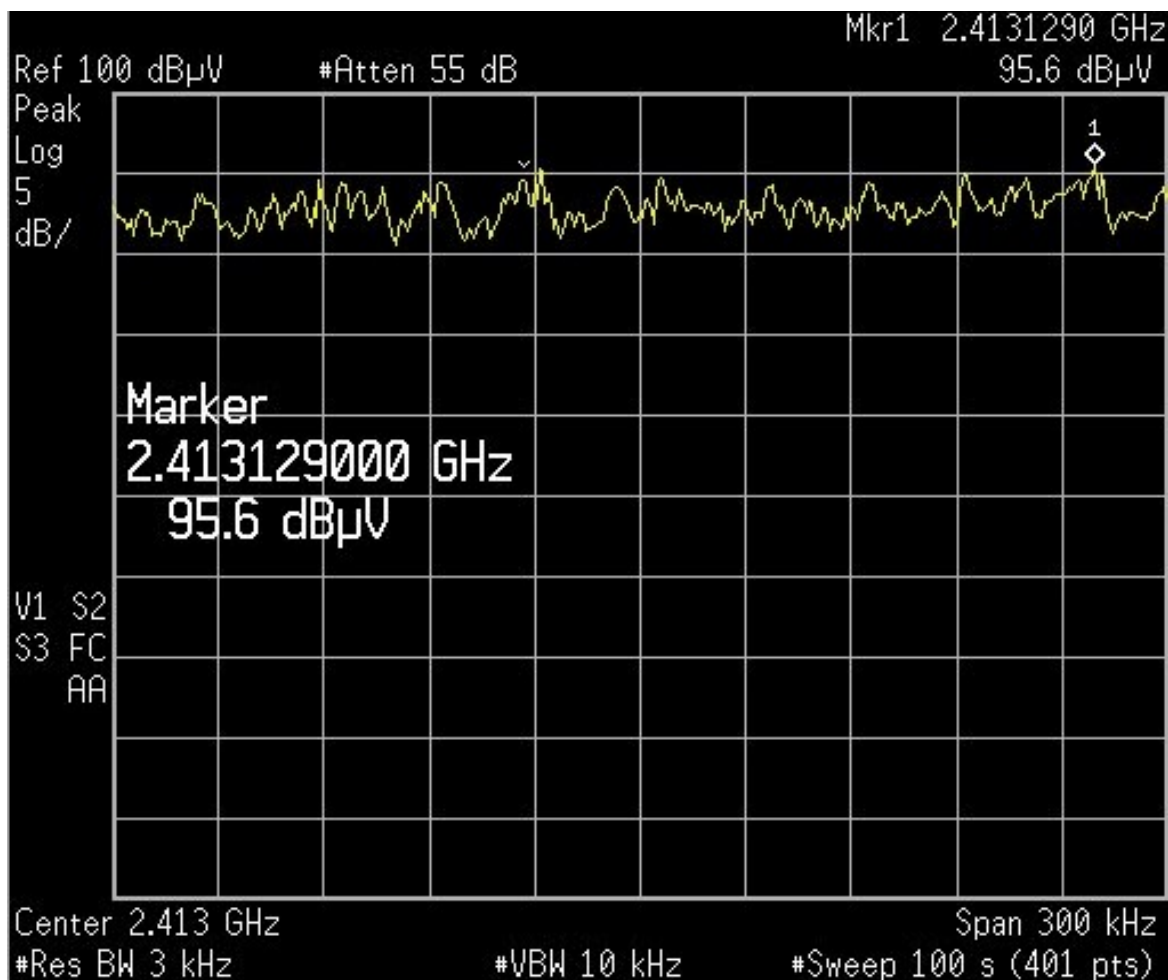
VBW: (10) kHz

Channel: 1

Data Rate: 11 Mbps

Modulation: CCK

Peak Power Spectral Density = $(95.6 \text{ dB}\mu\text{V} + 2 \text{ dB cable loss} - 107) = -9.4 \text{ dBm} / 3 \text{ kHz}$



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencer transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

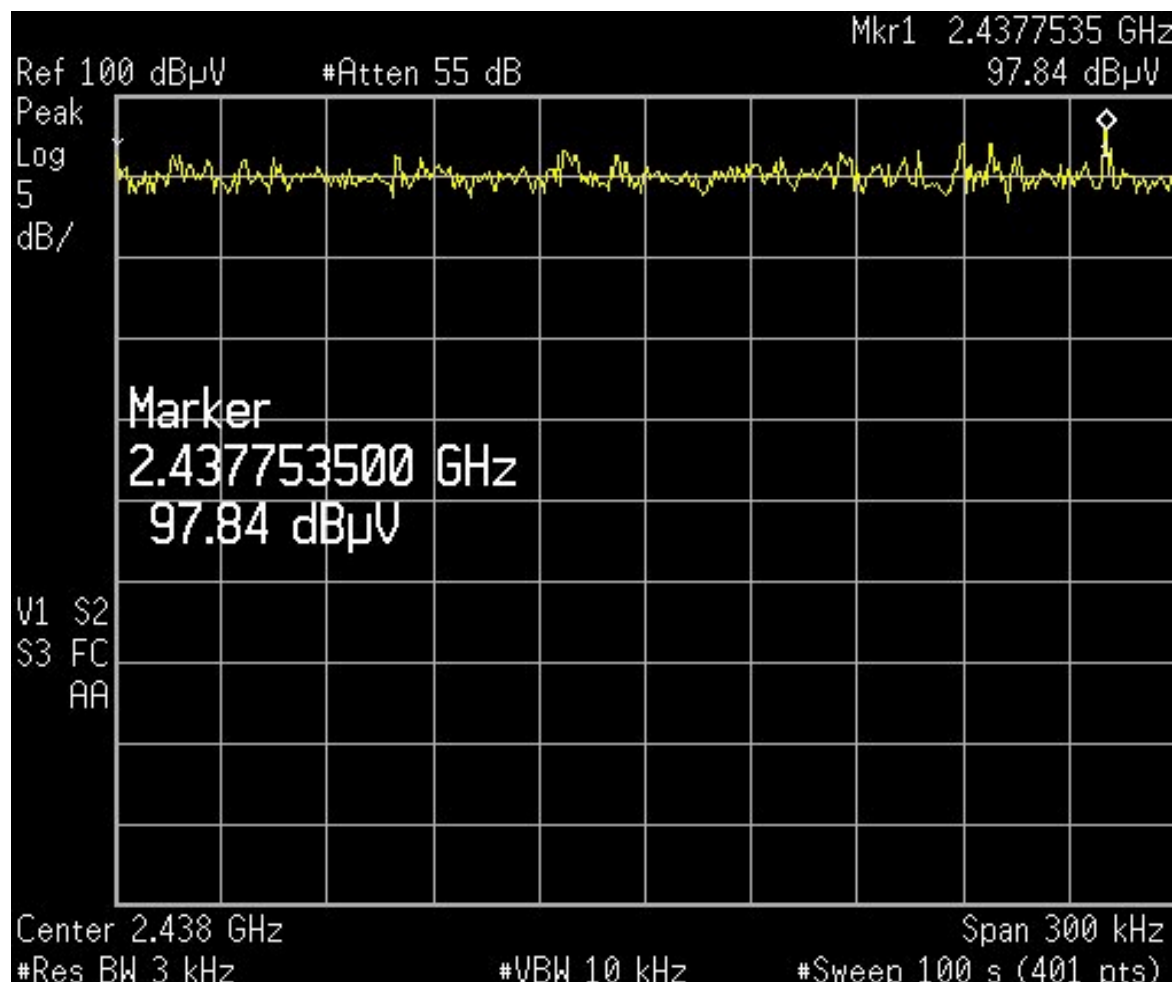
VBW: (10) kHz

Channel: 6

Data Rate: 1 Mbps

Modulation: DBPSK/DQPSK

Peak Power Spectral Density = $(95.6 \text{ dB}\mu\text{V} + 2 \text{ dB cable loss} - 107) = -7.2 \text{ dBm} / 3 \text{ kHz}$



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencer transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

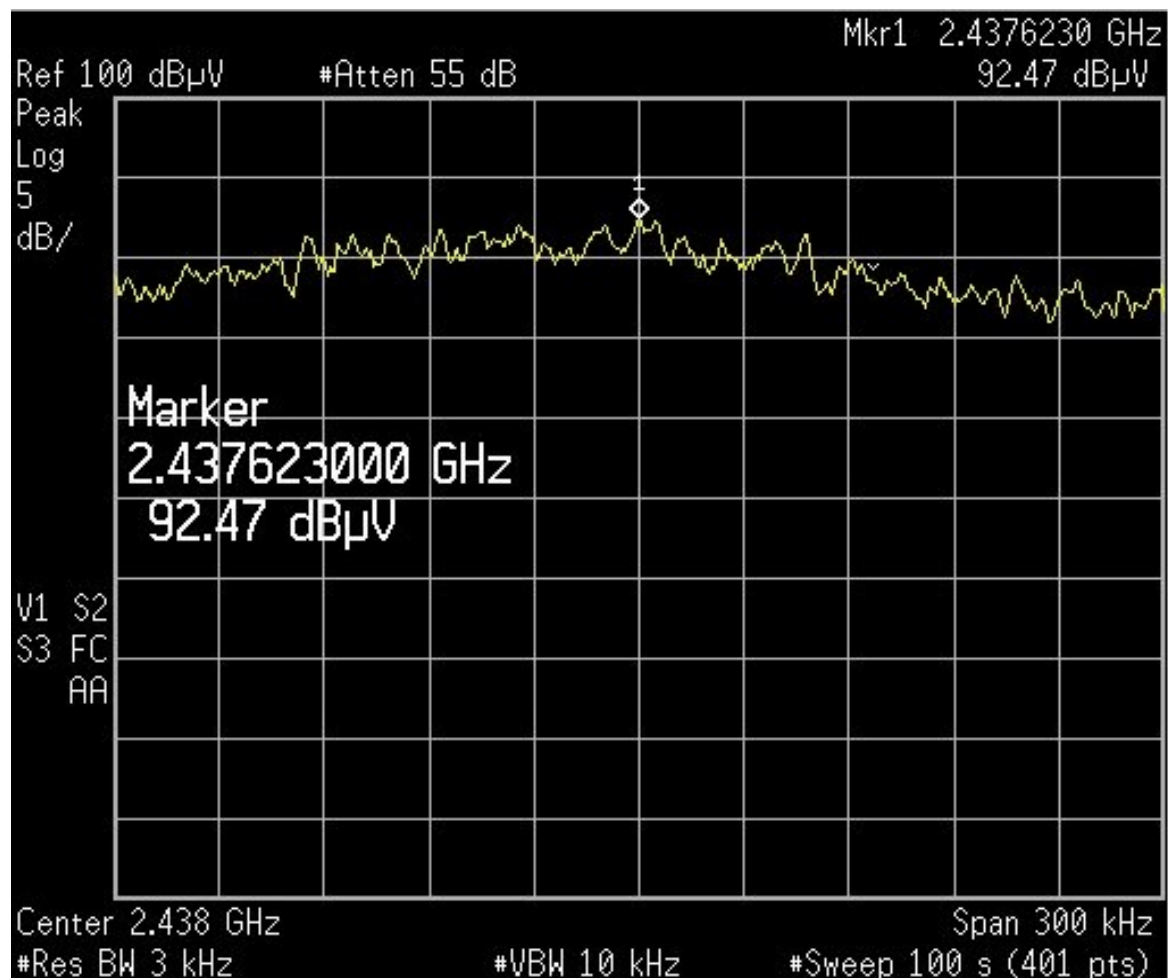
VBW: (10) kHz

Channel: 6

Data Rate: 36 Mbps

Modulation: OFDM

Peak Power Spectral Density = (92.47 dBuV + 2 dB cable loss -107) = -12.5 dBm / 3 kHz



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencr transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

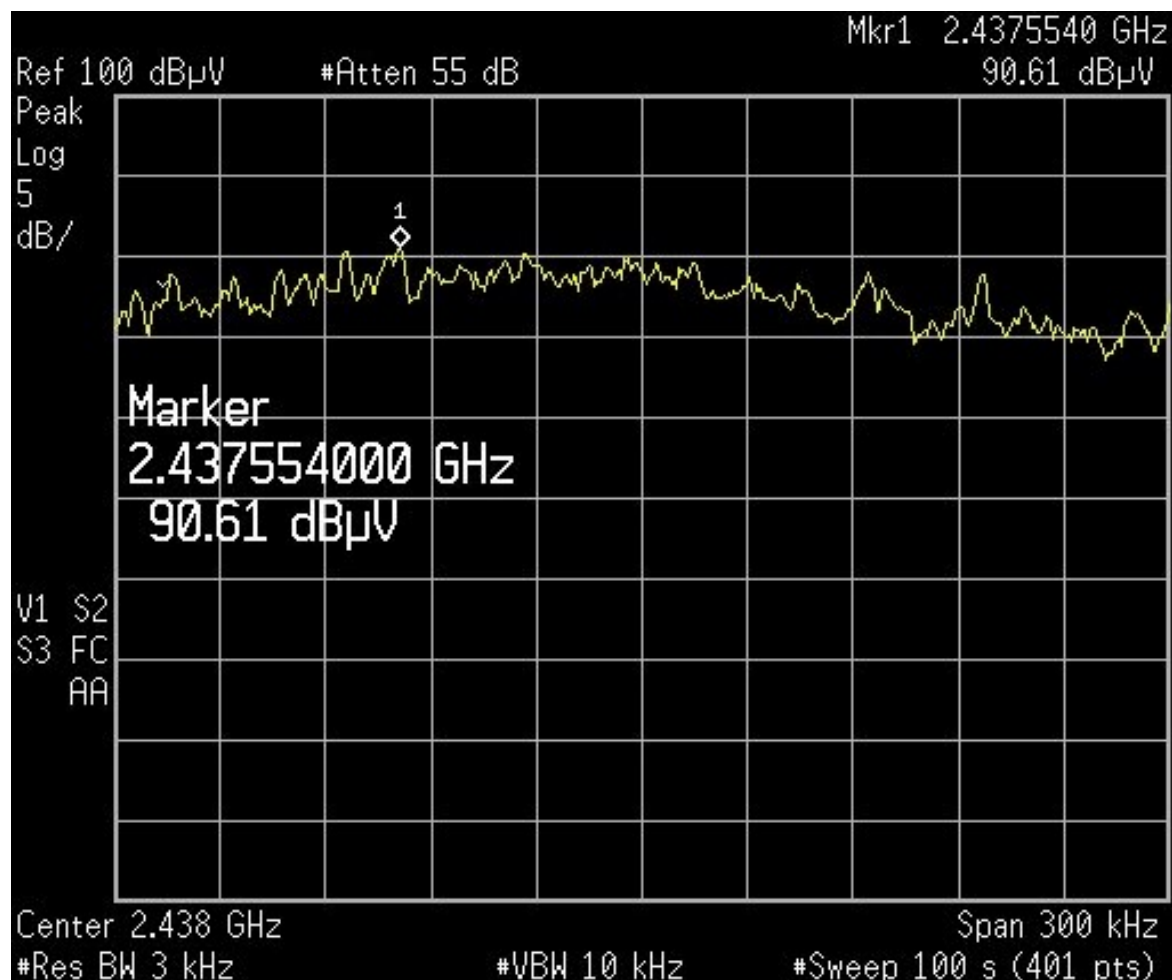
VBW: (10) kHz

Channel: 6

Data Rate: 54 Mbps

Modulation: OFDM

Peak Power Spectral Density = (90.61 dBuV + 2 dB cable loss -107) = -14.4 dBm / 3 kHz



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencer transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

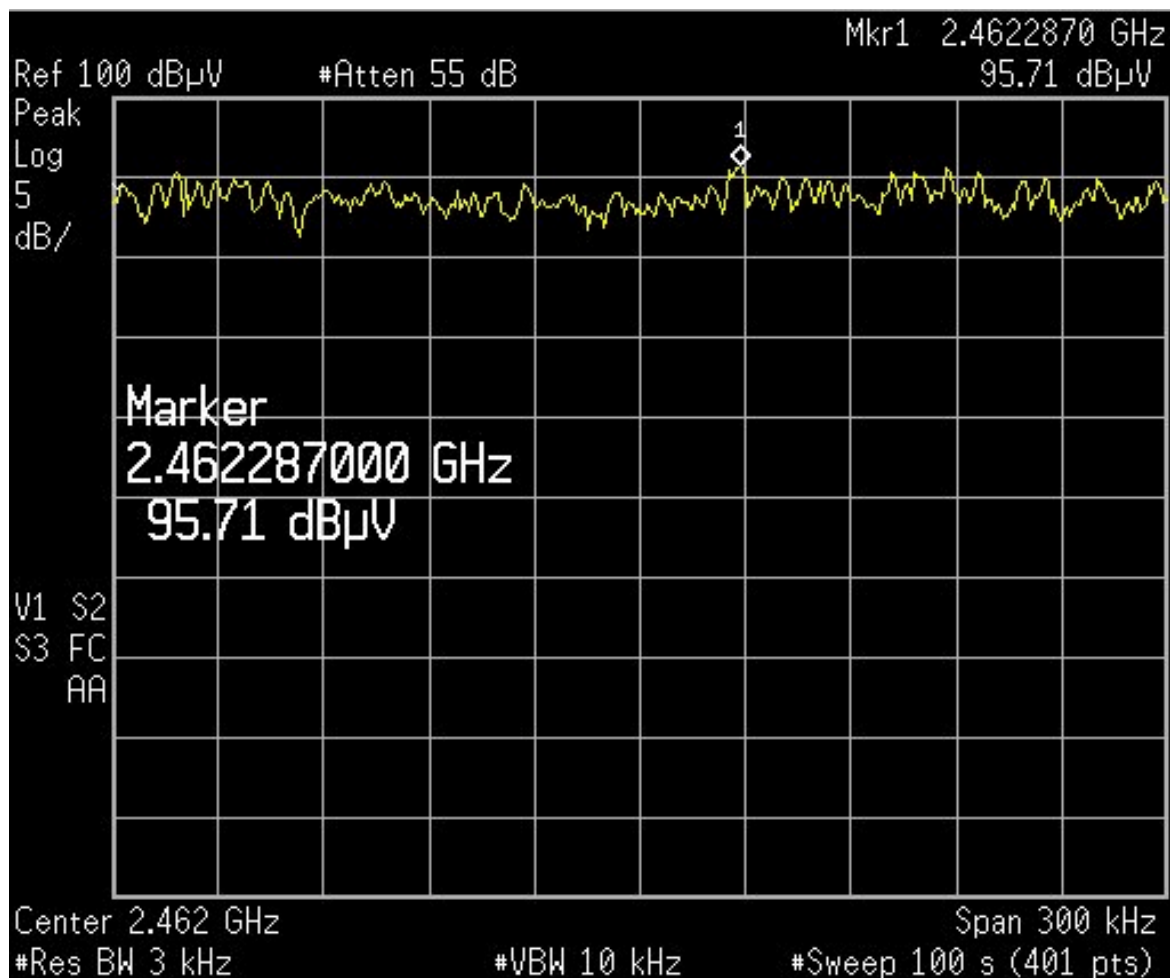
VBW: (10) kHz

Channel: 11

Data Rate: 5.5 Mbps

Modulation: CCK

Peak Power Spectral Density = (95.71 dBuV + 2 dB cable loss -107) = -9.3 dBm / 3 kHz



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencer transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

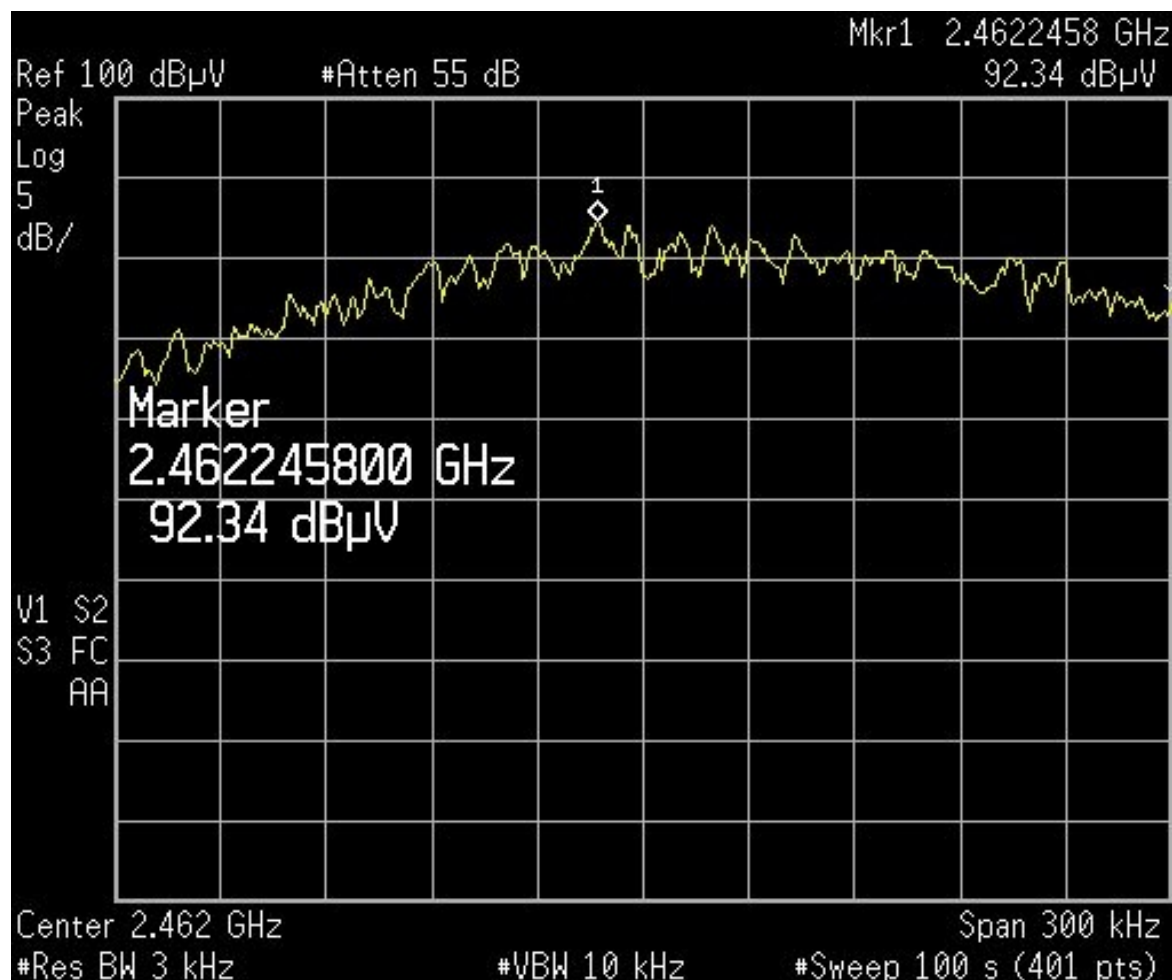
VBW: (10) kHz

Channel: 11

Data Rate: 36 Mbps

Modulation: OFDM

Peak Power Spectral Density = $(92.34 \text{ dB}\mu\text{V} + 2 \text{ dB cable loss} - 107) = -12.7 \text{ dBm} / 3 \text{ kHz}$



Test: Power Spectral Density per 15.247(e)

Date: 11/03/2005

Requirement: The peak power spectral density conducted from the antenna port of a direct sequencer transmitter must not be greater than (+8) dBm in any (3) kHz band during any time interval of continuous transmission.

RBW: (3) kHz

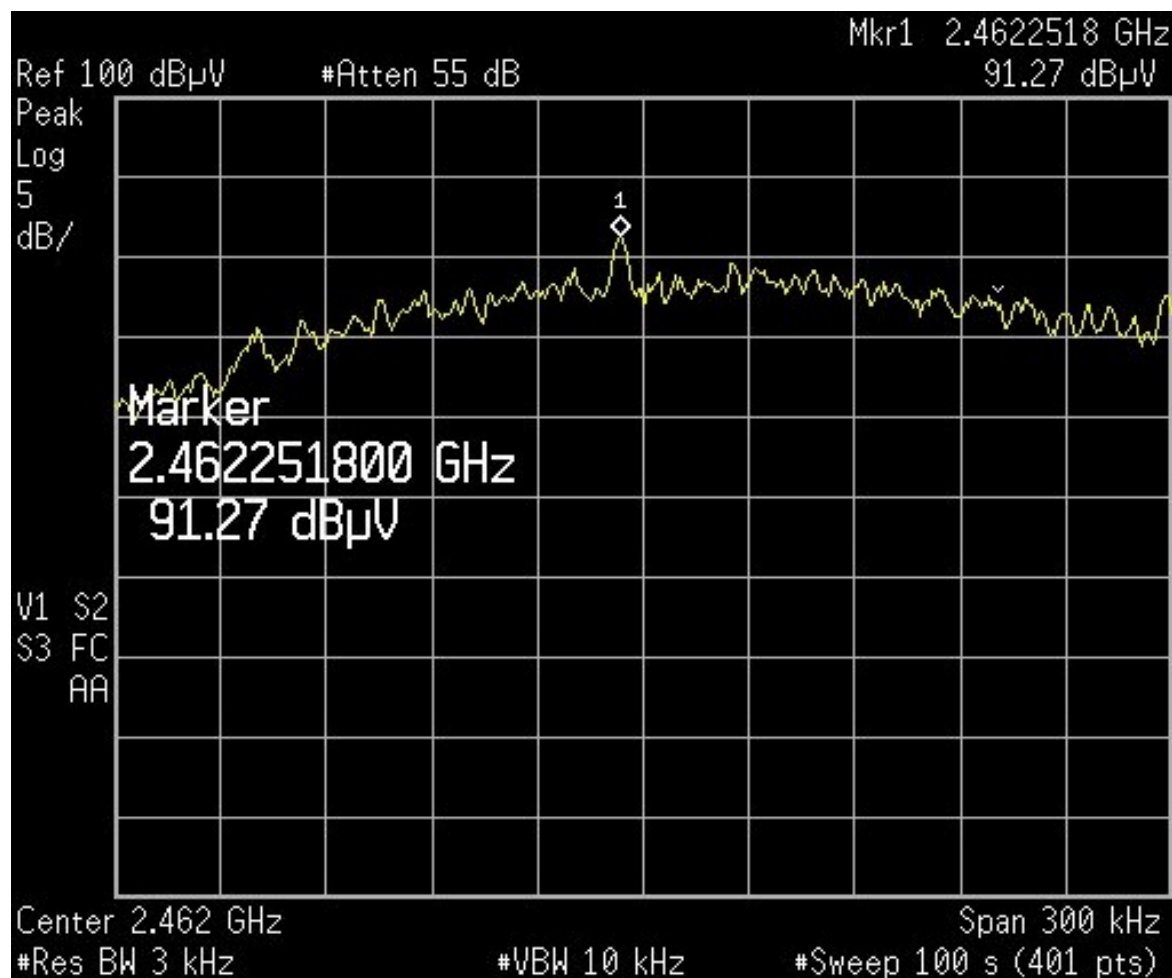
VBW: (10) kHz

Channel: 11

Data Rate: 54 Mbps

Modulation: OFDM

Peak Power Spectral Density = $(91.27 \text{ dB}\mu\text{V} + 2 \text{ dB cable loss} - 107) = -13.7 \text{ dBm} / 3 \text{ kHz}$



Test: Output Power per 15.247(b)(3)

Date: 11/04/2005

Requirement: The maximum peak output power must not exceed 1 watt.

RBW: (1) MHz

VBW: (3) MHz

Channel: See Table

Data Rate: See table

Modulation: See table

Peak Output Power = (66.1) mW

Channel	Data Rate Mbps	Modulation	Level dBuV	Cable Loss dB	Adj. Level	dBm	Watts mW
1	1	0	120.5	2.0	122.5	15.5	35.5
1	54	3	120.8	2.0	122.8	15.8	38.0
6	5	1	123.2	2.0	125.2	18.2	66.1
6	24	3	122.7	2.0	124.7	17.7	58.9
11	11	2	119.9	2.0	121.9	14.9	30.9
11	36	3	122.1	2.0	124.1	17.1	51.3

Modulation codes

0 = DBPSK/DQPSK

1 = CCK

2 = PBCC

3 = OFDM

Test: Spurious Conducted Emissions per 15.247(d)

Date: 11/03/2005

Requirement: In any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20 dB down from the highest emissions level within the authorized band.

RBW: (100) kHz

VBW: (300) kHz

Channel: 1, 6, & 11

Data Rate: 1, 5.5, 11, 24, 36, & 54 Mbps

Modulation: OFDM, DBPSK/DQPSK, CCK & PBCC

Maximum Conducted Spurious Emissions = Greater than (40) dB down

Test: Radiated Spurious Emissions per 15.205

Date: 11/04/2005

Requirement: The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, is measured. The peak level must comply with the limits specified in 47 CFR 15.35(b). The average level (taken with a 10 Hz VBW) must comply with the limits specified in 15.209.

RBW: (5) MHz

VBW: (3) MHz

Channel: See Table

Data Rate: See table

Modulation: See table

Maximum Radiated Spurious = (48.6) dBuV/m (average level)

Maximum Radiated Spurious = (58.0) dBuV/m (peak level)

Channel	Data Rate Mbps	Modulation	Detector	Freq.(GHz)	Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1	0	Avg	2.310-2.390	40.6	54	-13.4
1	1	0	Peak	2.310-2.390	48.0	74	-26.0
1	54	3	Avg	2.310-2.390	39.4	54	-14.6
1	54	3	Peak	2.310-2.390	49.5	74	-24.5
1	54	3	Avg	2.369-2.384	34.3	54	-19.7
1	54	3	Peak	2.369-2.384	47.6	74	-26.4
6	5.5	0	Avg	2.248-2.262	34.0	54	-20.0
6	5.5	0	Peak	2.248-2.262	39.9	74	-34.1
6	24	3	Avg	2.248-2.262	34.0	54	-20.0
6	24	3	Peak	2.248-2.262	42.3	74	-31.7
11	11	2	Avg	2.200-2.300	48.6	54	-5.4
11	11	2	Peak	2.200-2.300	51.4	74	-22.6
11	36	3	Avg	2.297-2.300	47.7	54	-6.3
11	36	3	Peak	2.297-2.300	58.0	74	-16.0

* All measurements listed above were recorded with the measurement antenna in the vertical polarity.

Test: AC powerline Conducted Emissions per15.207

Date: 10/19/2005

Requirement: If the EUT is connected to the AC power, it must meet the limits set forth from (150) kHz to (30) MHz.

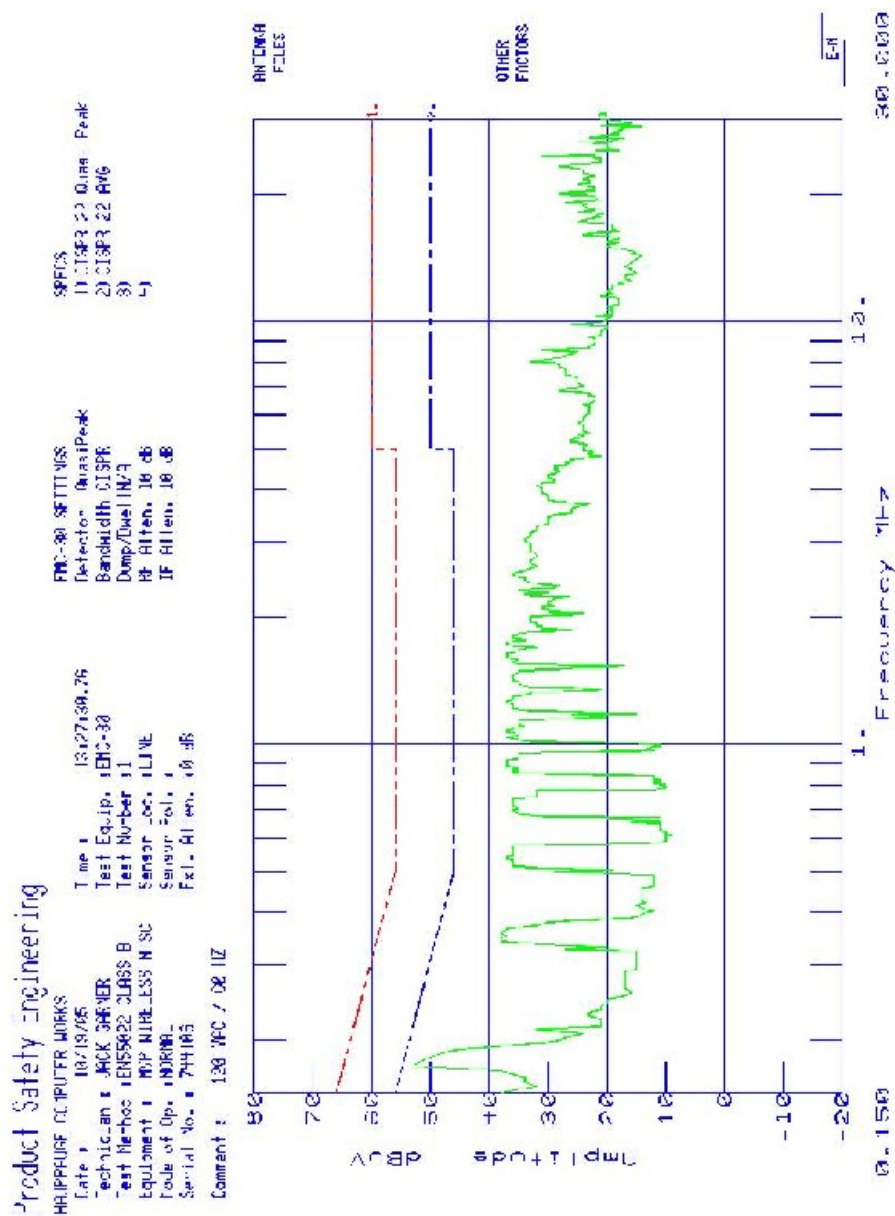
RBW: (9) kHz

VBW: (10) kHz

Channel: 1,6,11 (worst case shown below)

Detector: Quasi-Peak

Line Side: QP Margin = 11.8 dB at 0.173 MHz / Average Margin = 1.8 dB



Test: AC powerline Conducted Emissions per 15.207

Date: 10/19/2005

Requirement: If the EUT is connected to the AC power, it must meet the limits set forth from (150) kHz to (30) MHz.

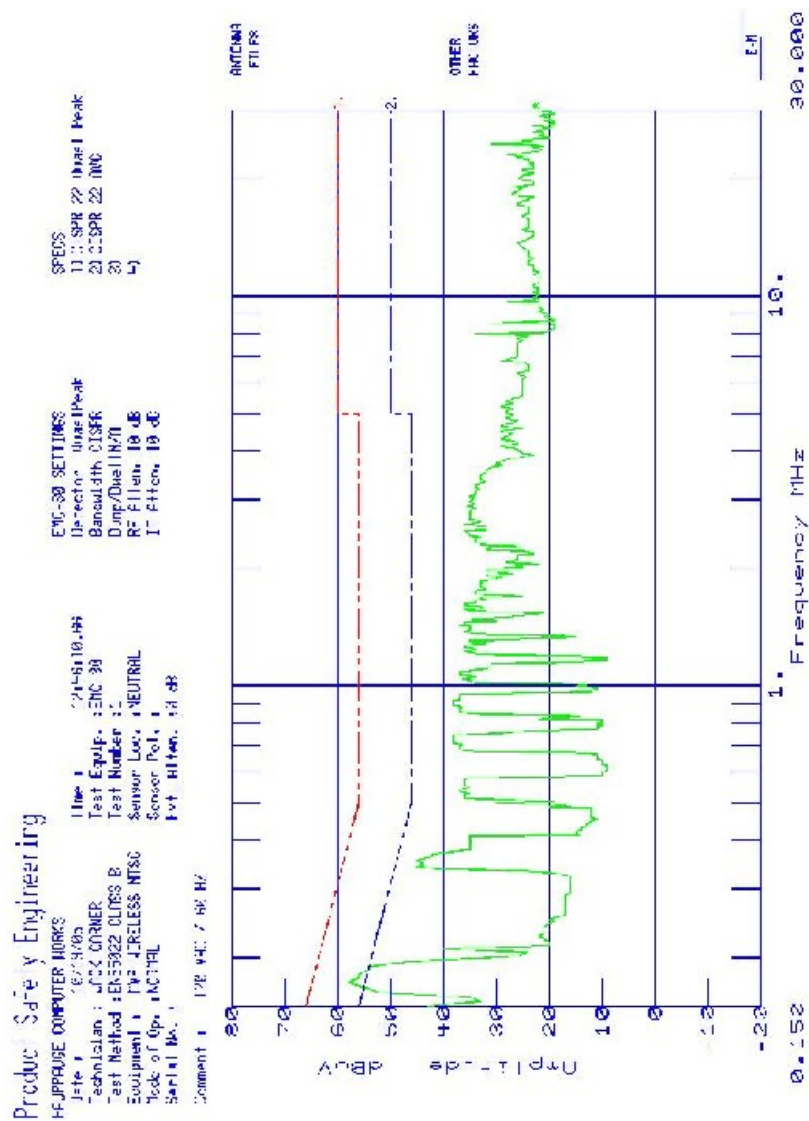
RBW: (9) kHz

VBW: (10) kHz

Channel: 1,6,11 (worst case shown below)

Detector: Quasi-Peak

Neutral Side: QP Margin = 6.8 dB at 0.173 MHz / AVG Margin = +3.2 dB



Test: AC powerline Conducted Emissions per 15.207

Date: 10/19/2005

Requirement: If the EUT is connected to the AC power, it must meet the limits set forth from (150) kHz to (30) MHz.

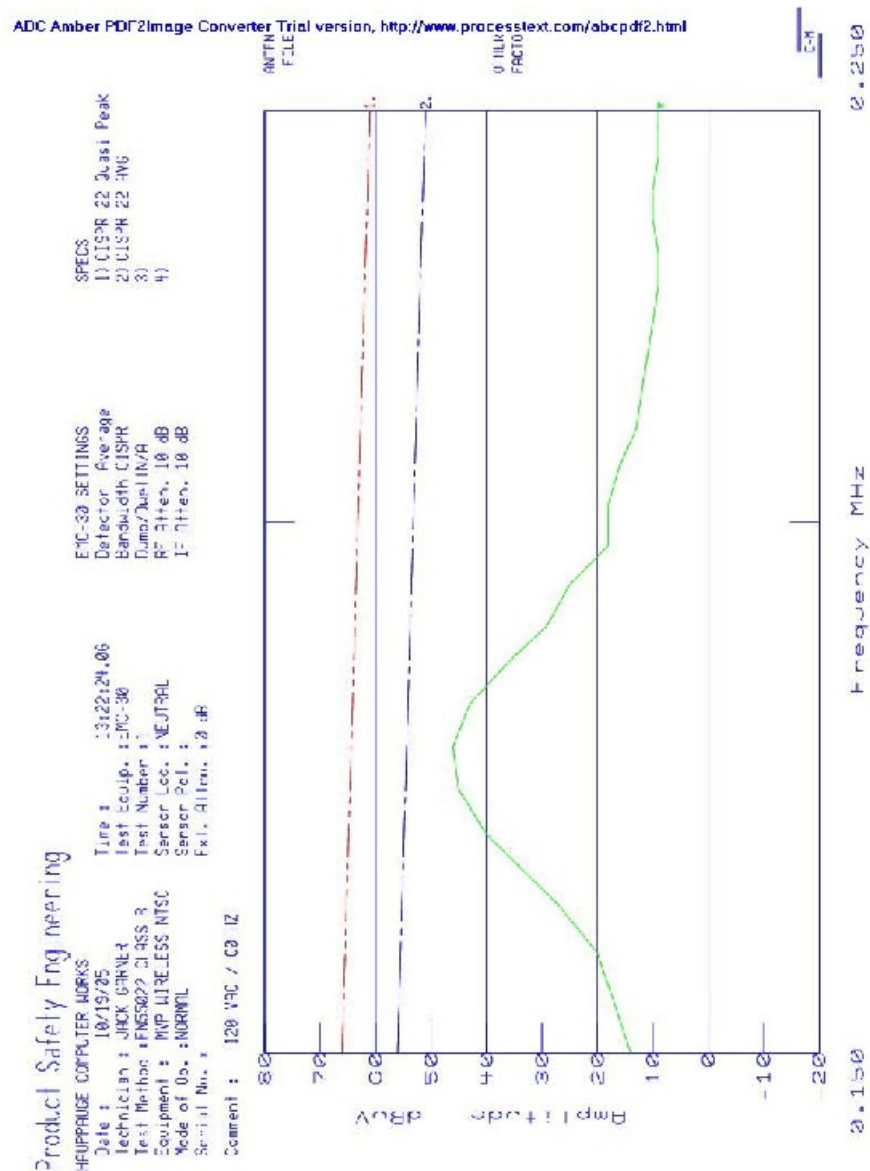
RBW: (9) kHz

VBW: (10) kHz

Channel: 1,6,11 (worst case shown below)

Detector: Average

Neutral Side: QP Margin = 18.6 dB at 0.173 MHz / AVG Margin = 8.6 dB



RF Exposure - Power Density Compliance Calculation

15.247(I) - Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Compliance is based upon section CFR 47 section 1.1310, Table (1) Limits for Maximum Permissible Exposure (MPE), (b) Limits for General Population/Uncontrolled Exposure. The stated limit is (1.0) mW/cm² and compliance was calculated using the following formula:

$$S = (P G) / (4 \pi r^2)$$

Where:

S = Power density in mW/cm²

P = Power in mW

G = Numerical antenna gain

r = Distance in cm

Maximum output power = (66.1) mW

Antenna gain (isotropic) = 2.14 dB

Antenna gain (numeric) = 1.64 dB

Distance = 20 cm

$$S = (66.1 * 1.64) / (12.57 * 400)$$

$$S = (70.03) / (5,028)$$

$$S = (0.0216) \text{ mW} / \text{cm}^2$$

$$\text{Limit} = (1.0) \text{ mW} / \text{cm}^2$$