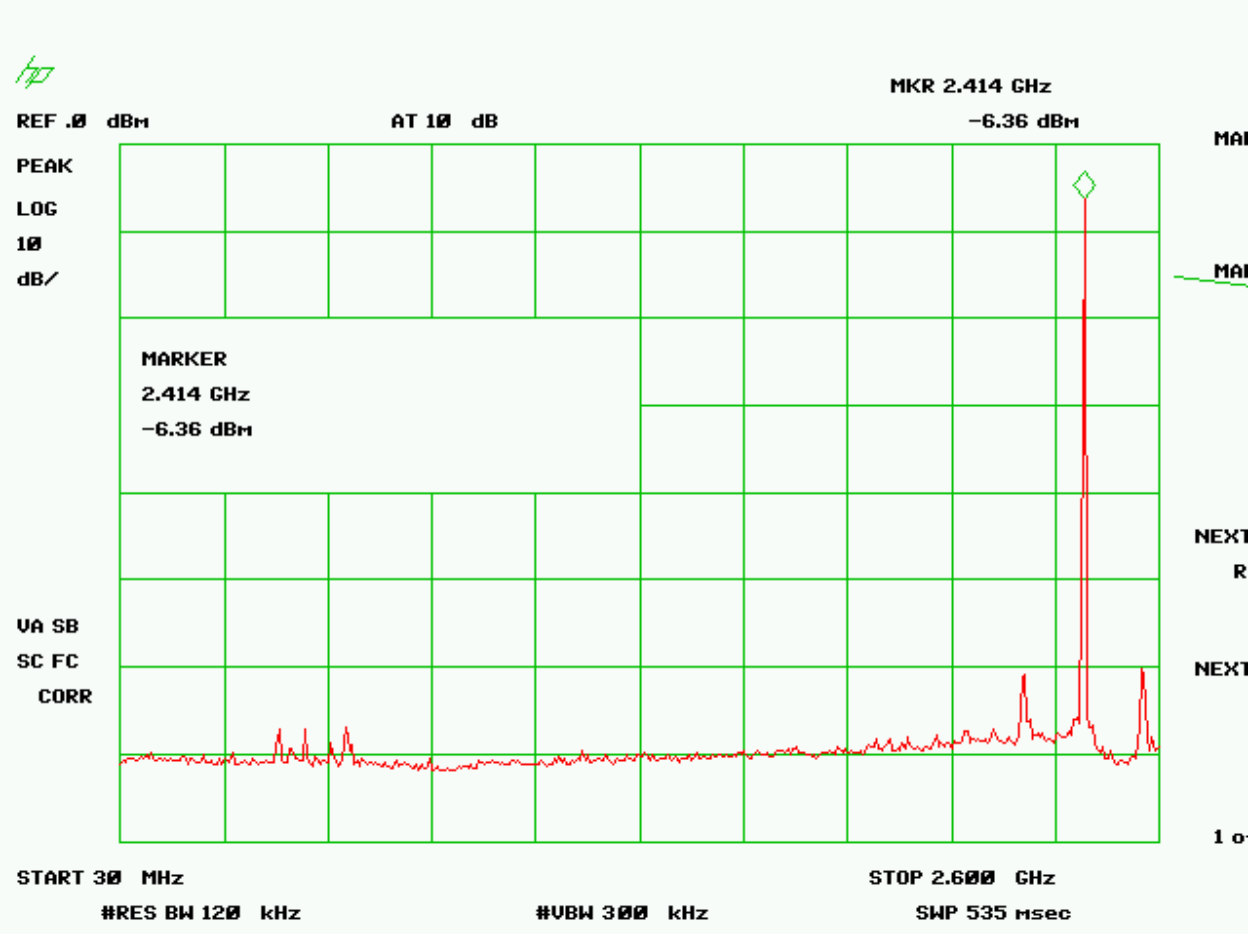
2 Tests and Measurements (Cont'd)

2.7 Antenna Conducted Spurious Emissions (CFR 15.247(b)(3)), ((IC RSS 210, A2.9(a)))

Antenna conducted spurious emissions in the frequency range of 30 MHz – 25000 MHz were measured per FCC KDB Publication 558074 as a conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short cable, to the antenna output terminals. The spectrum analyzer was set for a 50 Ω impedance with the RBW = 120 kHz & VBW = 300 kHz. All antenna conducted spurious emissions were measured as greater than 20 dB down from the fundamental. The results of antenna conducted spurious emissions are given in Figure 12 through 17. Figures 12 through 17 are actually 4.23 dB larger than the graphs show because of cable loss.

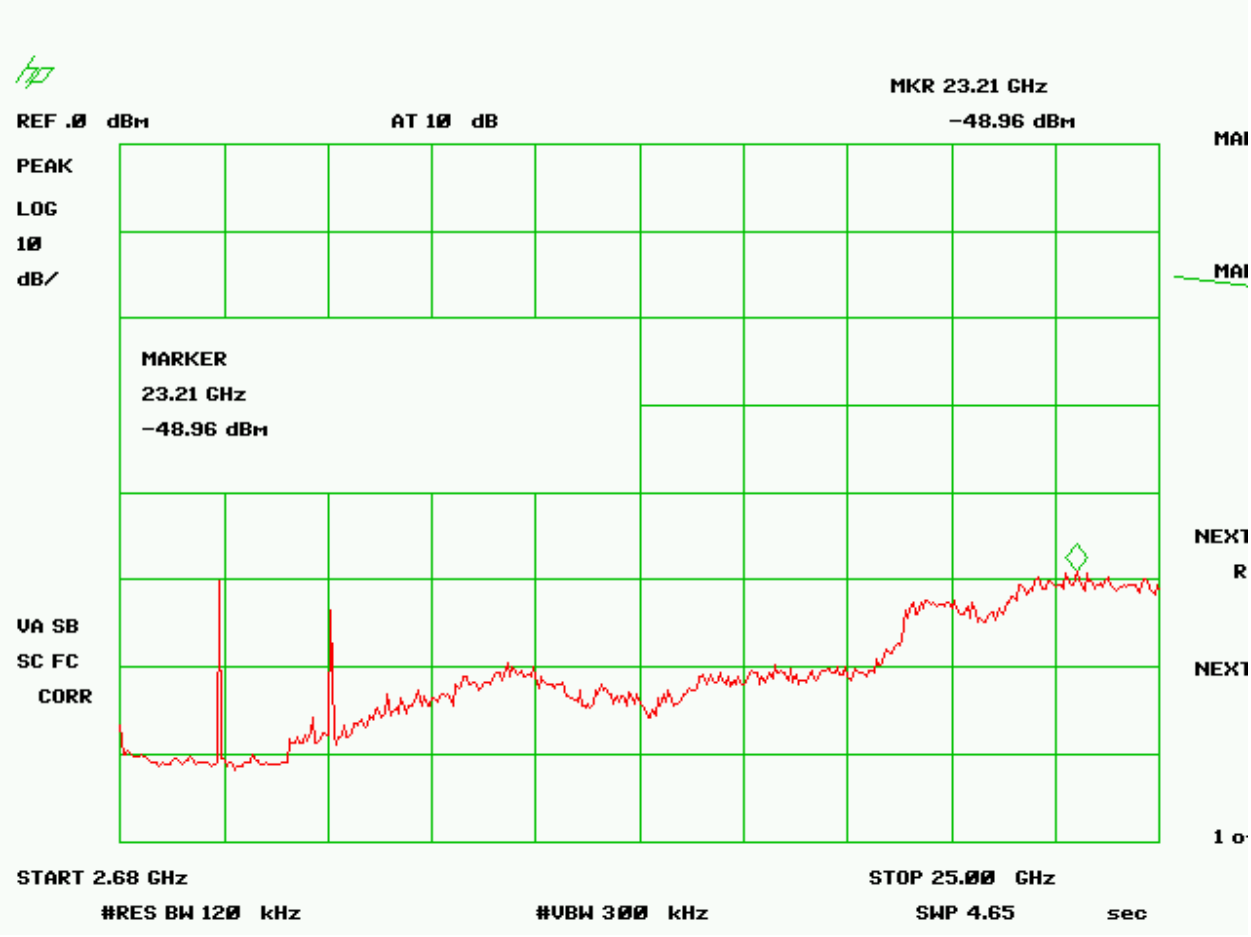
2 Test and Measurements (Cont'd)

Figure 12
Antenna Conducted Spurious Emissions-CFR 15.247(b) Low



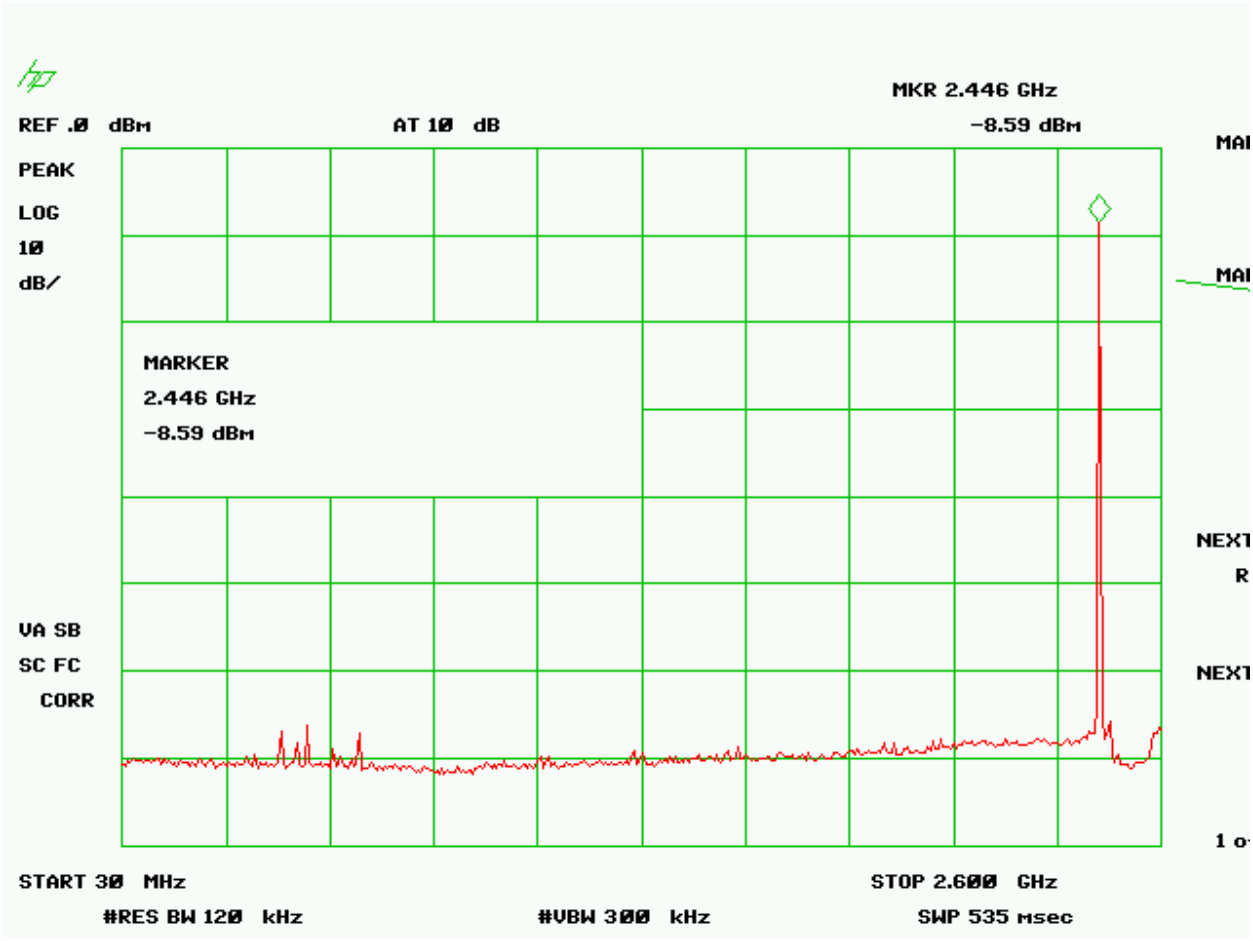
2 Test and Measurements (Cont'd)

Figure 13
Antenna Conducted Spurious Emissions- CFR 15.247(b), Low (Cont'd)



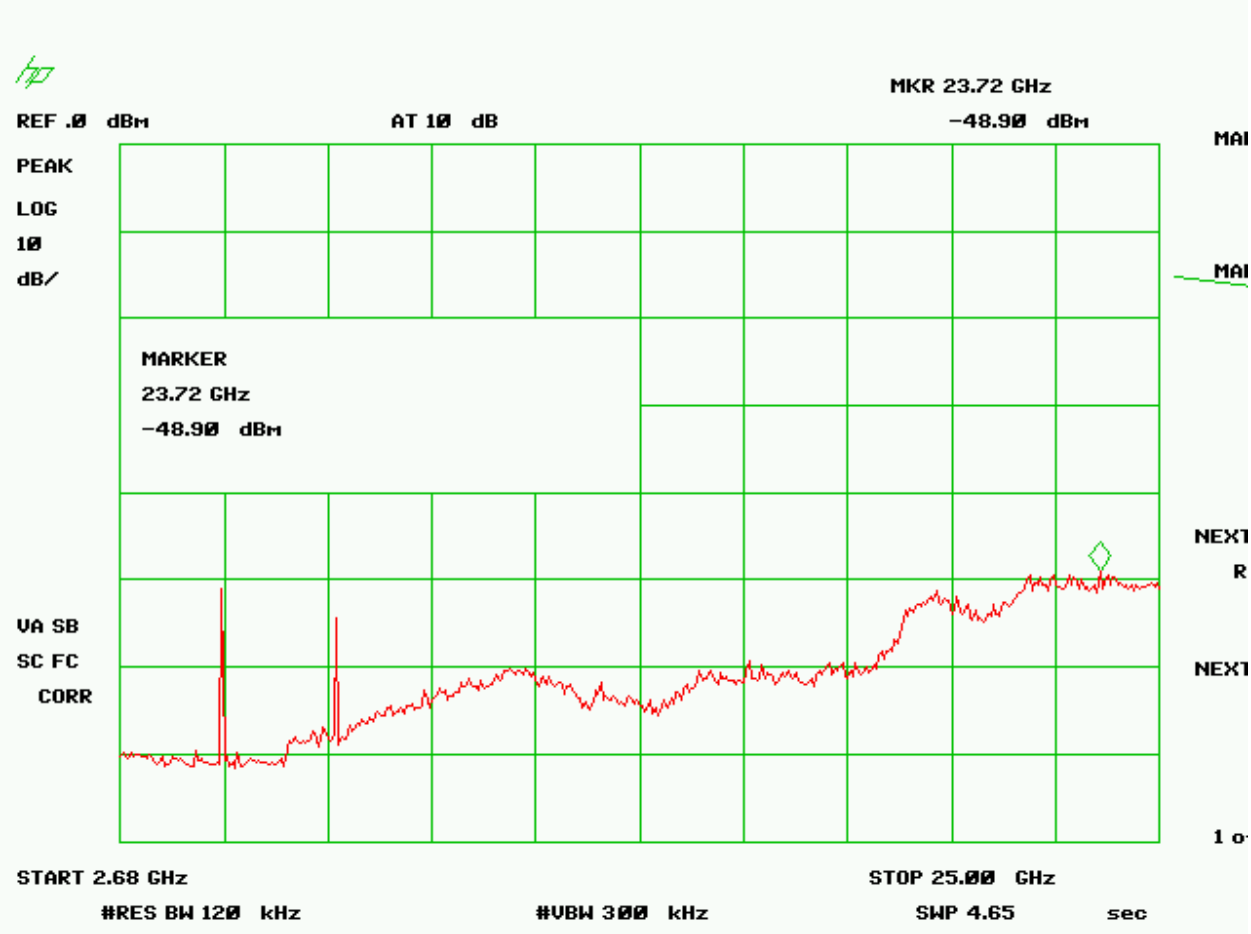
2 Test and Measurements (Cont'd)

Figure 14
Antenna Conducted Spurious Emissions- CFR 15.247(b), Mid



2 Test and Measurements (Cont'd)

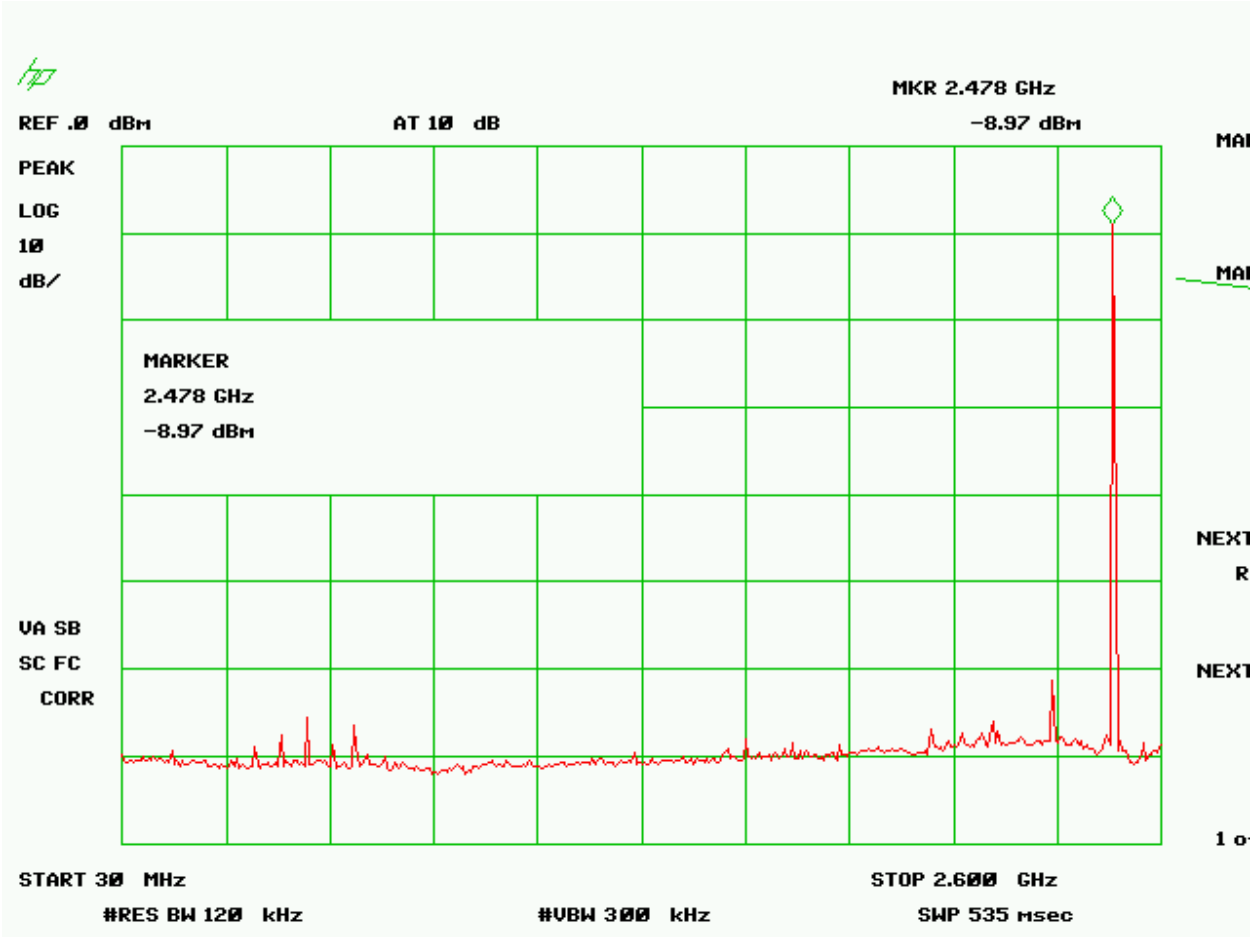
Figure 15
Antenna Conducted Spurious Emissions- CFR 15.247(b), Mid (Cont'd)



Note: Signal shown represents Fundamental Frequency.

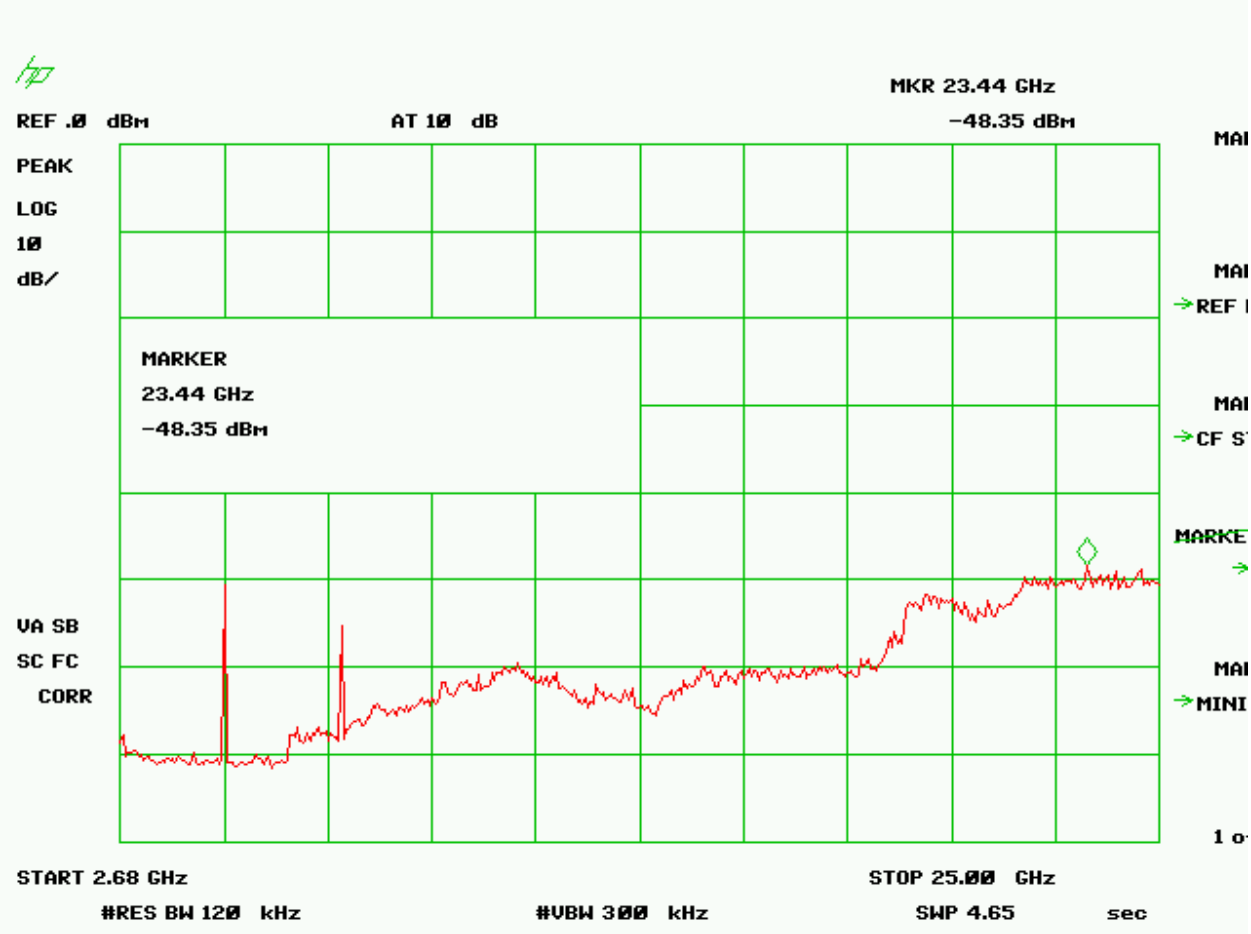
2 Test and Measurements (Cont'd)

Figure 16
Antenna Conducted Spurious Emissions – CFR 15.247(b), High



2 Test and Measurements (Cont'd)

Figure 17
Antenna Conducted Spurious Emissions- CFR 15.247(b), High (Cont'd)



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9 (a))

The EUT, a Direct Sequence Spread Spectrum transmitter, was placed into a continuous transmit mode of operation and tested per FCC KDB Publication 558074. A scan was performed on the EUT (see Figures 12 through 17) to determine spurious signals that were caused by the transmitter. Significant emissions that fell within restricted bands were then measured on an OATS site. Radiated measurements below 1 GHz were tested with a RBW = 120 kHz. Radiated measurements above 1 GHz were measured using a RBW = VBW = 1 MHz. The results of peak radiated spurious emissions falling within restricted bands are given in Tables 5 and 6 and Figures 18 through 24.

2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Model: **ZMN2430**

Table 5. Peak Radiated Spurious Emissions - Corner Antenna

Radiated Spurious Emissions

Test By: DA	**Test:** FCC Part 15 Corner Reflector Antenna		**Client:** Cirronet Corporation						
	Project: 08-0007		**Class:** B			**Model:** ZMN2430			
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits**	**Distance / Polarity**	**Margin**	**PK = n**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**		**(dB)**	**/ QP**
LOW									
2405.06	-39.5	1HN3mV	67.5	31.9	93422.5	50000.0 (2)	3m./VERT	**14.6**	**PK**
*4810.16	-61.0	1HN3mV	46.0	5.2	363.2	5000.0 (1)	3m./VERT	**22.8**	**PK**
7223.96	-56.2	1HN3mV	50.8	9.6	1043.7	5000.0	3m./VERT	**13.6**	**PK**
9620.2	-62.1	1HN3mH	44.9	13.3	807.3	5000.0	3m./HORZ	**15.8**	**PK**
*12025.44	-61.5	1HN3mV	45.5	17.3	1380.1	5000.0 (1)	3m./VERT	**11.2**	**PK**
MID									
2440.12	-39.4	1HN3mV	67.6	32.0	95157.3	50000.0 (2)	3m./VERT	**14.4**	**PK**
*4879.71	-62.8	1HN3mV	44.2	5.5	303.3	5000.0 (1)	3m./VERT	**24.3**	**PK**
*7320.35	-61.8	1HN3mH	45.2	10.2	583.2	5000.0(1)	3m./HORZ	**18.7**	**PK**
9763.34	-62.4	1HN3mH	44.6	13.5	799.7	5000.0	3m./HORZ	**15.9**	**PK**
*12199.46	-61.2	1HN3mV	45.8	17.6	1478.9	5000.0(1)	3m./VERT	**10.6**	**PK**
HIGH									
2474.82	-39.3	1HN3mV	67.7	32.0	96917.5	50000.0 (2)	3m./VERT	**14.3**	**PK**
*4950.27	-62.9	1HN3mV	44.1	5.7	308.1	5000.0(1)	3m./VERT	**24.2**	**PK**
*7419.78	-62.8	1HN3mH	44.2	10.4	536.1	5000.0(1)	3m./HORZ	**19.4**	**PK**
9898.65	-61.8	1HN3mV	45.2	13.5	855.0	5000.0	3m./VERT	**15.3**	**PK**
*12382.86	-61.7	1HN3mH	45.3	18.1	1480.1	5000.0(1)	3m./HORZ	**10.6**	**PK**

* - Falls within restricted bands of CFR 15.205
Data corrected by 0.1 dB for loss of high pass filter, except at fundamental
(1) Limits of 15.209 modified by 15.35
(2) Limit per 15.249
** Conversion from 1 meter to 3 meters = -9.54 dB
SAMPLE CALCULATION:
RESULTS: At 4810.16 MHz, = Antilog ((-61.0 + 5.2 + 107)/20) = 363.2 (uV/m @ 3m)
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature: Daniel Aparaschivei **Name: Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Model: **ZMN2430**

Table 6. Average Radiated Spurious Emissions - Corner Antenna

Radiated Spurious Emissions									
Test By: DA	**Test:** FCC Part 15 Corner Reflector Antenna					**Client:** Cirronet Corporation			
	Project: 08-0007			**Class:** B		**Model:** ZMN2430			
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits (1)**	**Distance / Polarity**	**Margin**	**Average**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**		**(dB)**	
LOW									
2405.06	-85.8	1HN3mV	21.2	31.9	452.3	50000.0	3m./VERT	**40.9**	**AVG**
*4810.16	-107.3	1HN3mV	-0.3	5.2	1.6	500.0	3m./VERT	**47.3**	**AVG**
7223.96	-102.5	1HN3mV	4.5	9.6	5.1	500.0	3m./VERT	**39.9**	**AVG**
9620.2	-108.4	1HN3mH	-1.4	13.3	3.9	500.0	3m./HORZ	**42.1**	**AVG**
*12025.44	-107.8	1HN3mV	-0.8	17.3	6.7	500.0	3m./VERT	**37.4**	**AVG**
MID									
2440.12	-85.7	1HN3mV	21.3	32.0	460.7	50000.0	3m./VERT	**40.7**	**AVG**
*4879.71	-109.1	1HN3mV	-2.1	5.5	1.5	500.0	3m./VERT	**50.6**	**AVG**
*7320.35	-108.1	1HN3mH	-1.1	10.2	2.8	500.0	3m./HORZ	**44.9**	**AVG**
9763.34	-108.7	1HN3mH	-1.7	13.5	3.9	500.0	3m./HORZ	**42.2**	**AVG**
*12199.46	-107.5	1HN3mV	-0.5	17.6	7.2	500.0	3m./VERT	**36.8**	**AVG**
HIGH									
2474.82	-55.6	1HN3mV	51.4	32.0	14838.9	50000.0	3m./VERT	**10.6**	**AVG**
*4950.27	-109.2	1HN3mV	-2.2	5.7	1.5	500.0	3m./VERT	**50.5**	**AVG**
*7419.78	-109.1	1HN3mH	-2.1	10.4	2.6	500.0	3m./HORZ	**45.7**	**AVG**
9898.65	-108.1	1HN3mV	-1.1	13.5	4.2	500.0	3m./VERT	**41.6**	**AVG**
*12382.86	-108.0	1HN3mH	-1.0	18.1	7.2	500.0	3m./HORZ	**36.8**	**AVG**

* - Falls within the restricted bands of CFR 15.205.
Data corrected by 0.1 dB for loss of high pass filter, except to fundamental
(1) Limits from CFR 15.249
** Conversion from 1 meter to 3 meters = -9.54 dB
SAMPLE CALCULATION:
RESULTS: At 4810.16 MHz, = Antilog ((-107.3 + 5.2 + 107)/20) = 1.6
CONVERSION FROM dBm TO dBuV = 107 dB

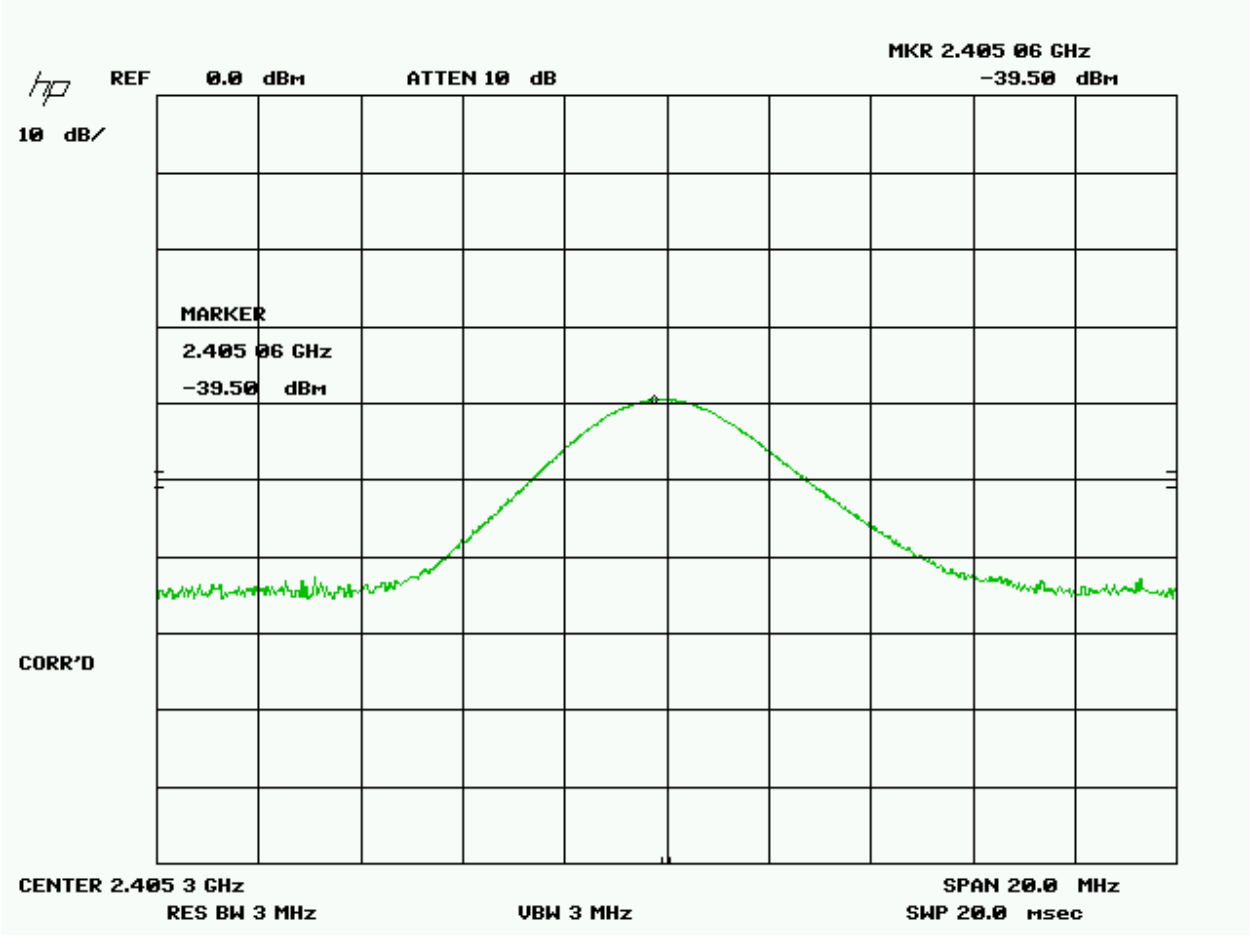
Tester Signature: _ Daniel Aparaschivei **Name:** **Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Figure 18.

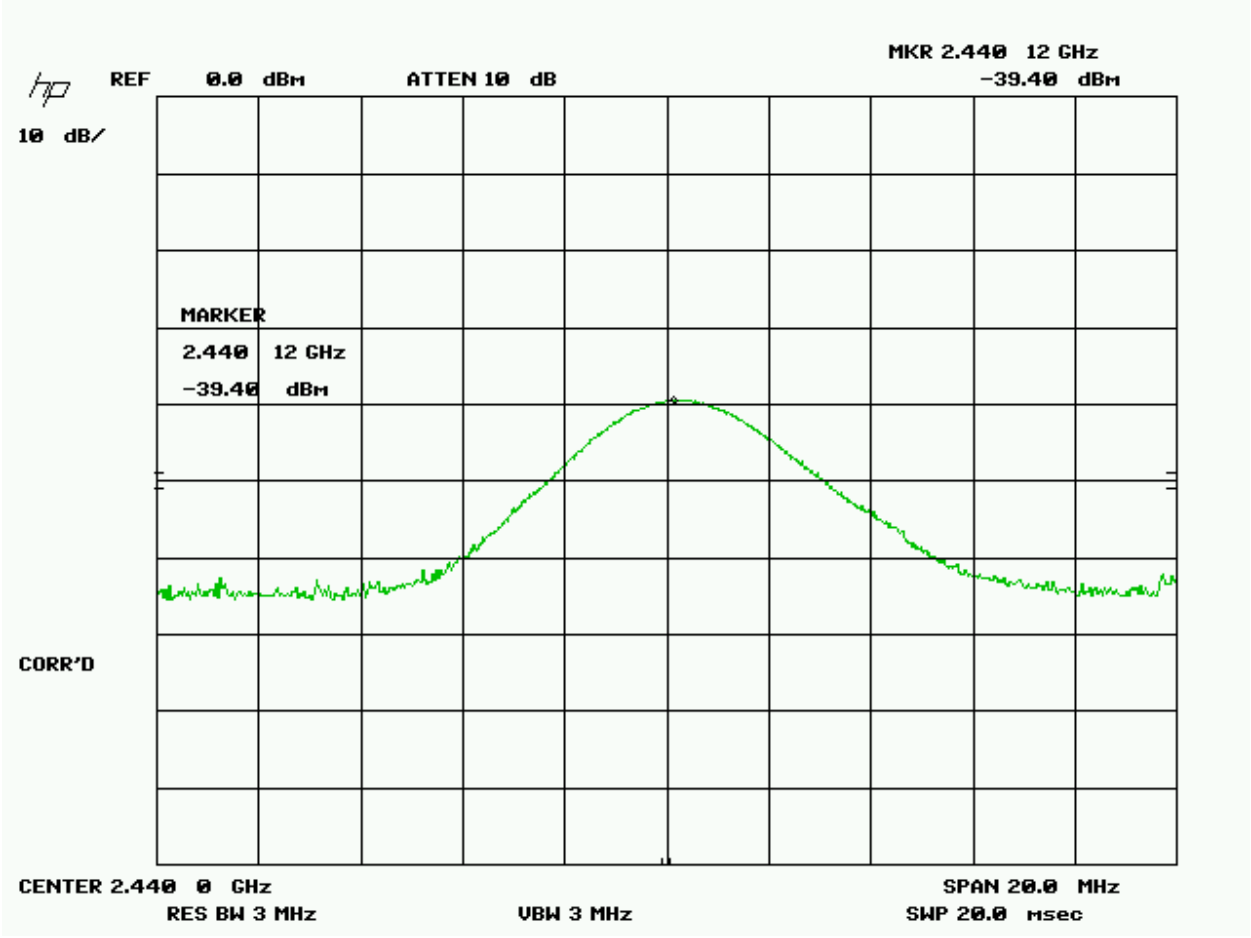
Peak Radiated Spurious Emissions, 15.247(d). Fundamental,Low, Corner Antenna



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Figure 19
Peak Radiated Spurious Emissions 15.247(d) Fundamental Mid, Corner Antenna

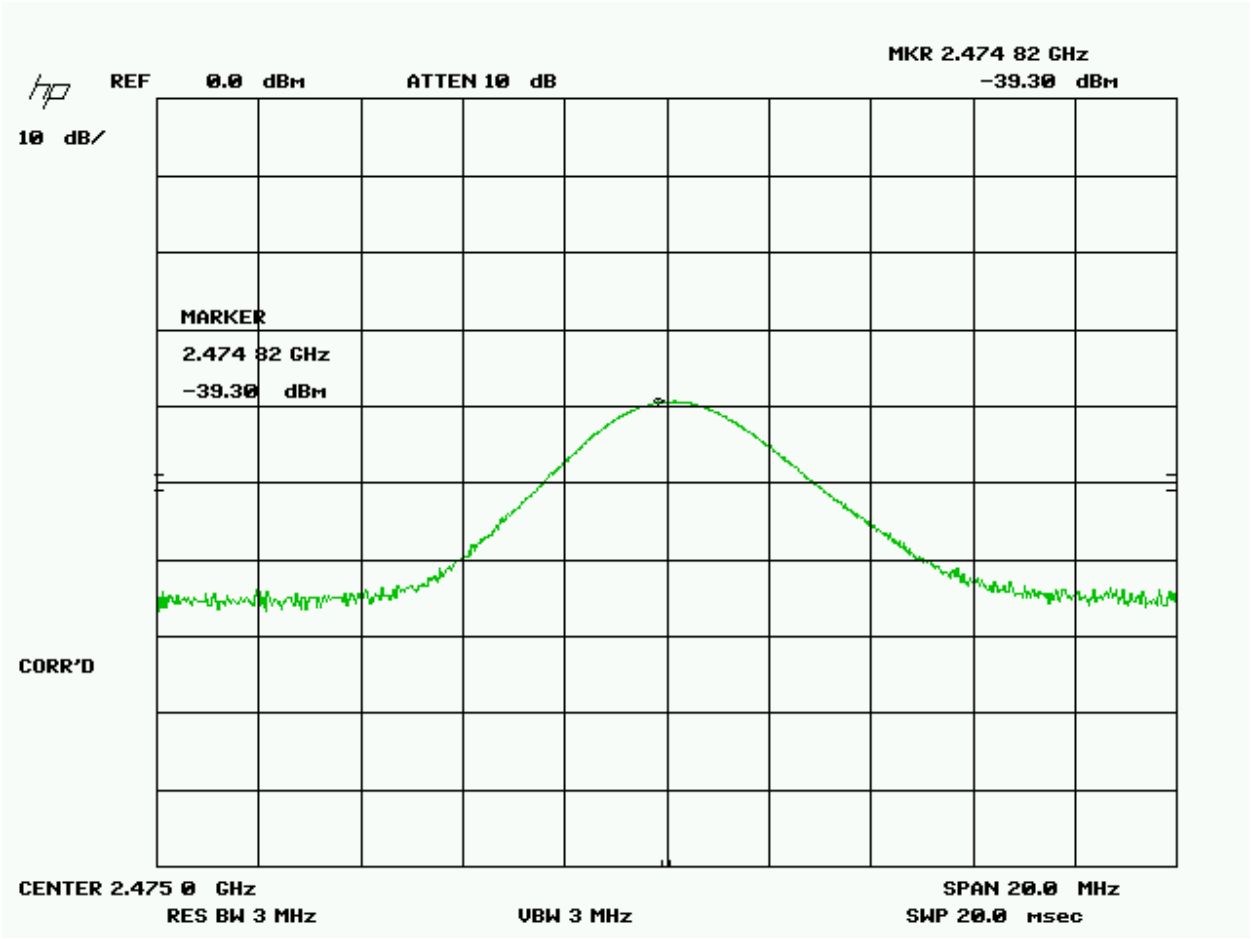


2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Figure 20.

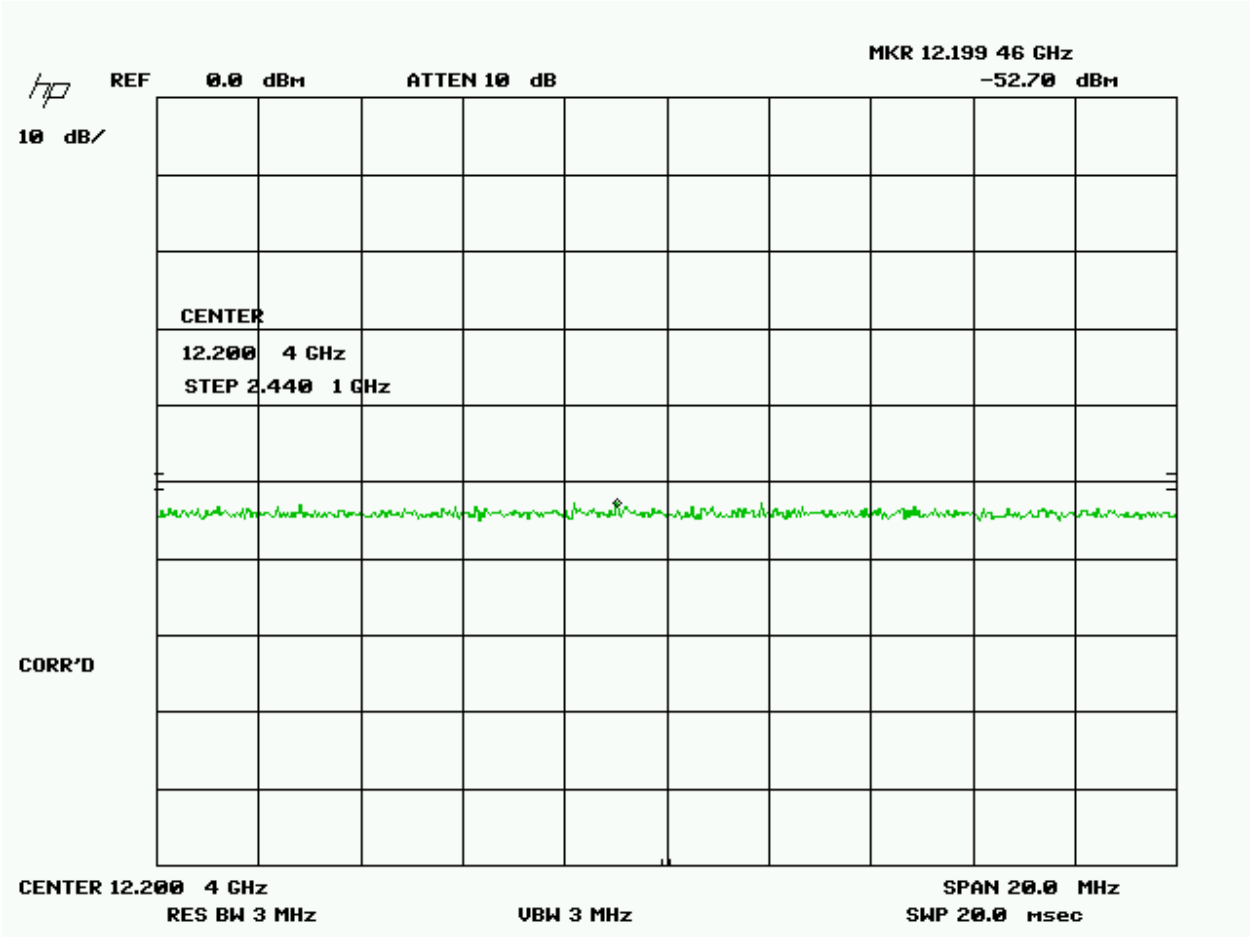
Peak Radiated Spurious Emissions 15.247(d) Fundamental High, Corner Antenna



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Figure 21. Peak Radiated Spurious Emissions 15.247(d)
Representative Harmonic Plot, Corner Antenna



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Model: **ZMN2430**

Table 6. Peak Radiated Spurious Emissions, Omni Antenna

Radiated Spurious Emissions

Test By: DA	**Test:** FCC Part 15 Omni Antenna		**Client:** Cirronet Corporation
	Project: 08-0007	**Class:** B	**Model:** ZMN2430

Frequency (MHz)	Test Data (dBm)	AF Table	Test Data (dBuV)	AF+CA-AMP (dB)	Results (uV/m)	Limits (uV/m)	Distance / Polarity	Margin (dB)	PK = n / QP
Low									
2405.12	-40.7	1HN3mV	66.3	31.9	81368.6	500000.0	3m./VERT	**15.8**	**PK**
4810.04	-55.8	1HN3mV	51.2	5.2	663.9	5000.0	3m./VERT	**17.5**	**PK**
7215.64	-68.2	1HN3mV	38.8	9.6	261.5	5000.0	3m./VERT	**25.6**	**PK**
Mid									
2440.04	-38.6	1HN3mV	68.4	32.0	104336.3	500000.0	3m./VERT	**13.6**	**PK**
4880.68	-54.7	1HN3mV	52.3	5.5	774.5	5000.0	3m./VERT	**16.2**	**PK**
7319.88	-68.3	1HN3mV	38.7	9.9	266.8	5000.0	3m./VERT	**25.5**	**PK**
High									
2474.96	-38.8	1HN3mV	68.2	32.0	102663.0	500000.0	3m./VERT	**13.8**	**PK**
4950.2	-54.0	1HN3mV	53.0	5.7	862.5	5000.0	3m./VERT	**15.3**	**PK**
7424.28	-67.7	1HN3mV	39.3	10.1	295.2	5000.0	3m./VERT	**24.6**	**PK**

Data corrected by 0.1 dB for loss of high pass filter, except to fundamental

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:
RESULTS: At 4810.04 MHz, = Antilog ((-55.8 + 5.2 + 107)/20) = 663.9 (uV/m @ 3m)
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature: Daniel Aparaschivei **Name:** **Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Model: **ZMN2430**

Table 7. Average Radiated Spurious Emissions, Omni Antenna

Radiated Spurious Emissions									
Test By: DA	**Test:** FCC Part 15 Omni Antenna					**Client:** Cirronet Corporation			
	Project: 08-0007		**Class:** B			**Model:** ZMN2430			
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits**	**Distance /**	**Margin**	**Average**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**	**Polarity**	**(dB)**	
LOW									
2405.12	-86.7	1HN3mV	20.3	31.9	406.9	50000.0	3m./VERT	**41.8**	**AVG**
4810.04	-101.8	1HN3mV	5.2	5.2	3.3	500.0	3m./VERT	**43.6**	**AVG**
7215.64	-114.3	1HN3mV	-7.3	9.6	1.3	500.0	3m./VERT	**51.6**	**AVG**
MID									
2440.04	-84.6	1HN3mV	22.4	32.0	521.7	50000.0	3m./VERT	**39.6**	**AVG**
4880.68	-100.7	1HN3mV	6.3	5.5	3.9	500.0	3m./VERT	**42.2**	**AVG**
7319.88	-114.4	1HN3mV	-7.4	9.9	1.3	500.0	3m./VERT	**51.5**	**AVG**
HIGH									
2474.96	-84.8	1HN3mV	22.2	32.0	513.4	50000.0	3m./VERT	**39.8**	**AVG**
4950.2	-100.0	1HN3mV	7.0	5.7	4.3	500.0	3m./VERT	**41.3**	**AVG**
7424.28	-113.8	1HN3mV	-6.8	10.1	1.5	500.0	3m./VERT	**50.6**	**AVG**

Data corrected by 0.1 dB for loss of high pass filter, except to fundamental

** Conversion from 1 meter to 3 meters = -9.54 dB

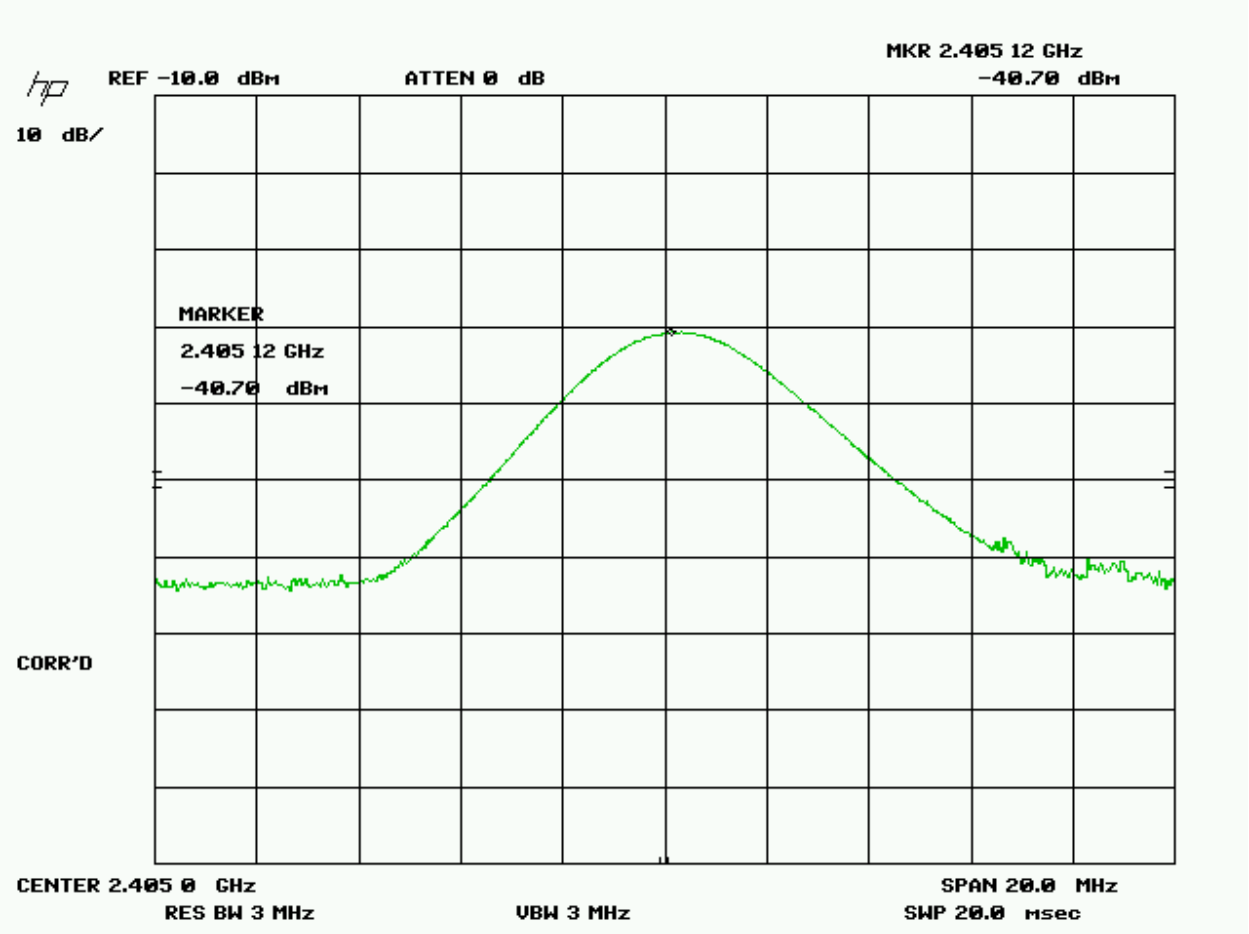
SAMPLE CALCULATION:
RESULTS: At 4810.04 MHz, = Antilog ((-101.8 + 5.2 + 107)/20) = 3.3 (uV/m @ 3m)
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature: Daniel Aparaschivei **Name:** **Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

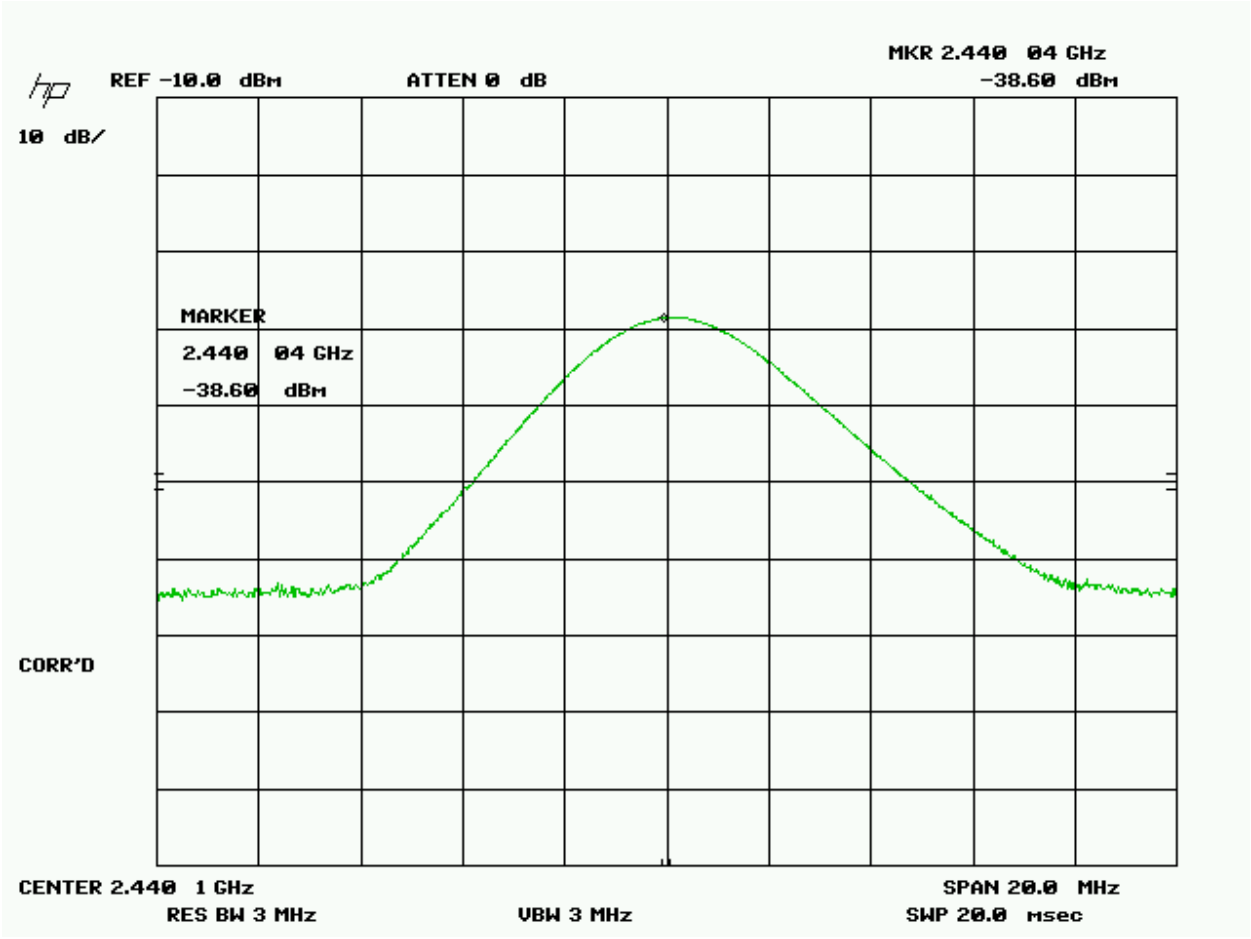
Figure 22.
Peak Radiated Spurious Emissions, 15.247(d). Fundamental, Low, Omni Antenna



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

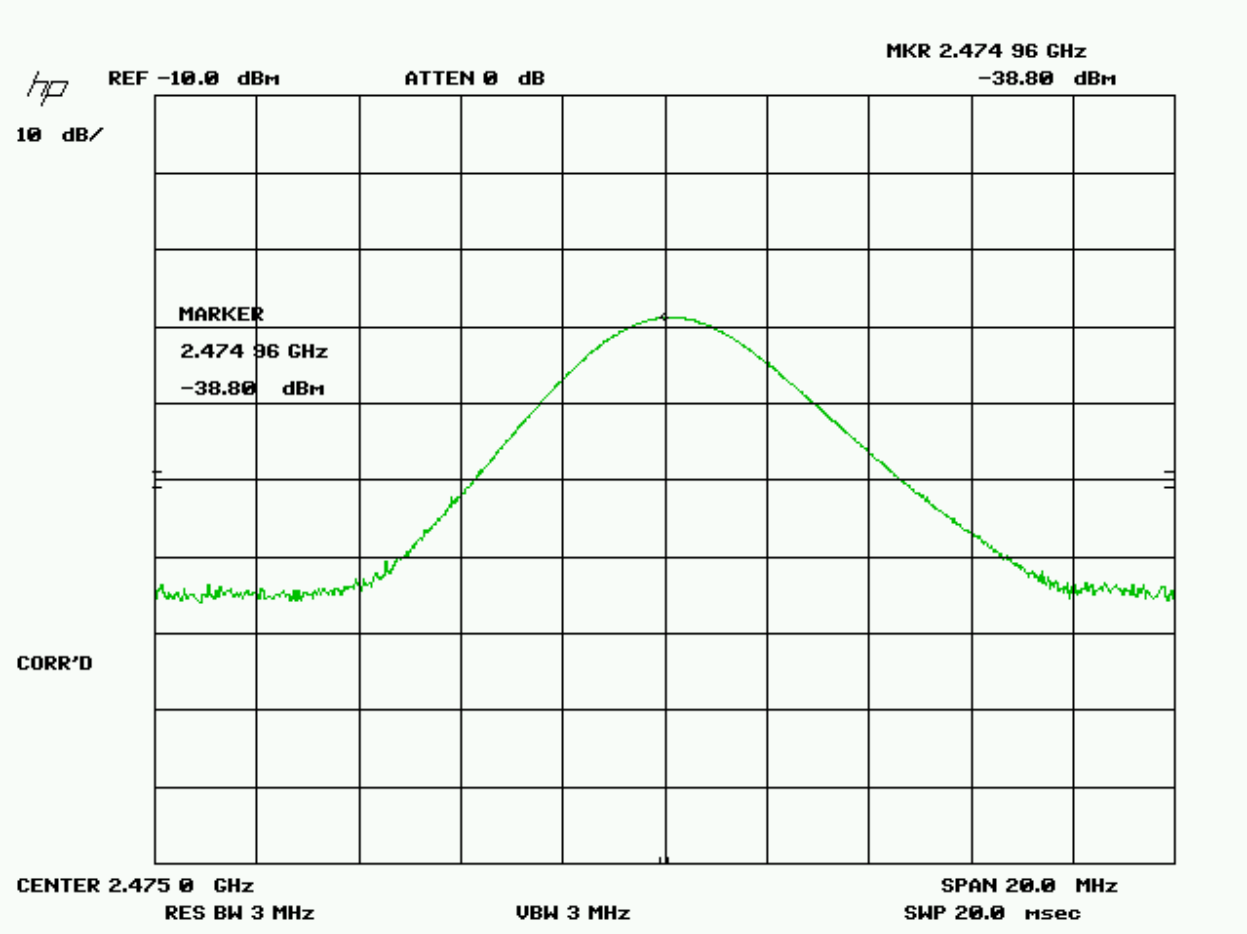
Figure 23
Peak Radiated Spurious Emissions, 15.247(d). Fundamental, Mid, Omni Antenna



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

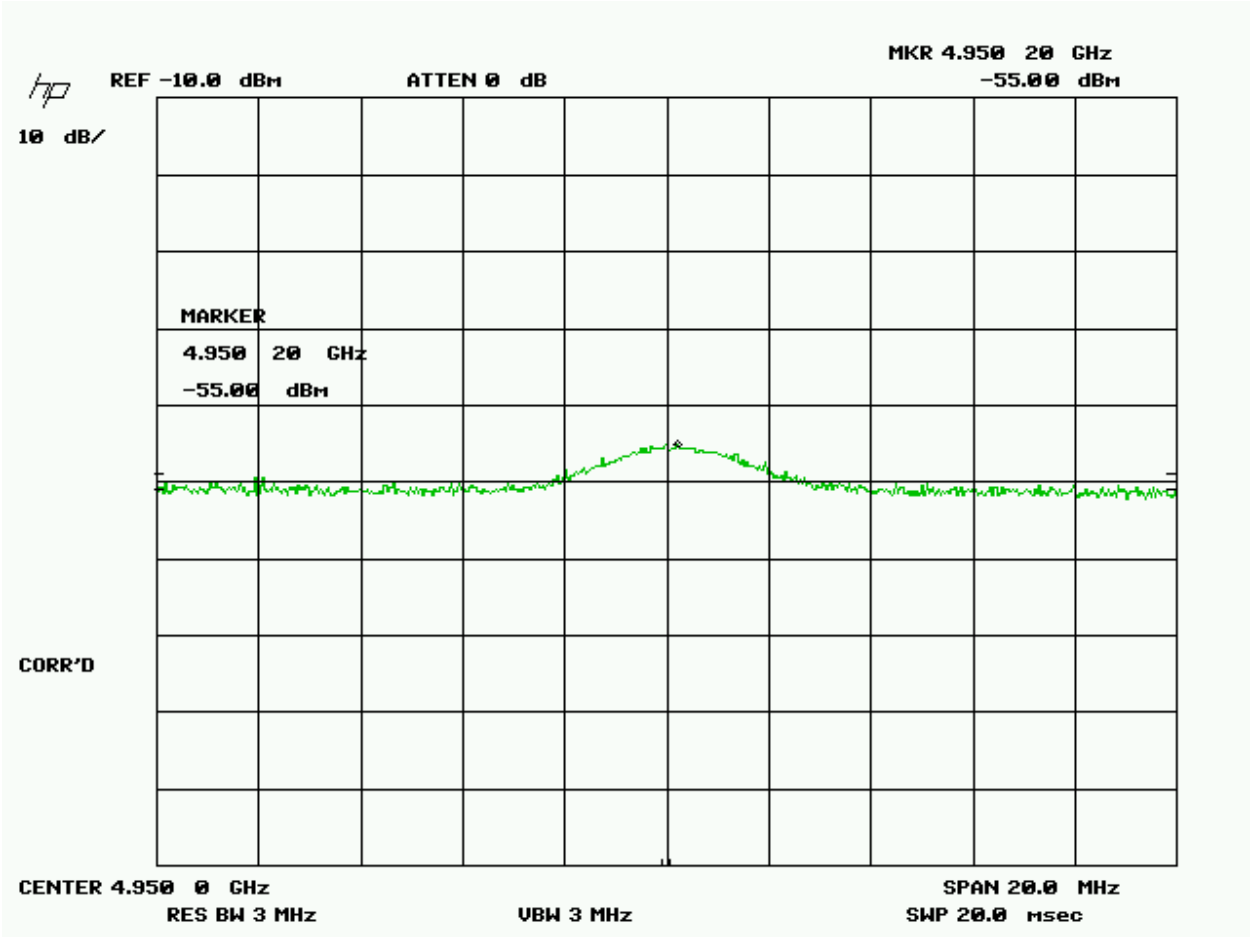
Figure 24
Peak Radiated Spurious Emissions, 15.247(d). Fundamental, High, Omni Antenna



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Figure 25
Peak Radiated Spurious Emissions, 15.247(d). Representative Harmonic Plot, Omni Antenna



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Model: **ZMN2430**

Table 8. Peak Radiated Spurious Emissions, 15.247(d). Representative Harmonic Plot, Omni Antenna

Radiated Spurious Emissions

Test By: DA	**Test:** FCC Part 15 Patch Antenna			**Client:** Cirronet Corporation				
	Project: 08-0007		**Class:** B	**Model:** ZMN2430				
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits**	**Distance /**	**Margin**	**PK = n**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**	**Polarity**	**(dB)**	**/ QP**
Low									
2405.18	-38.5	1HN3mV	68.5	31.9	104824.3	50000.0	3m./VERT	**13.6**	**PK**
*4809.96	-49.4	1HN3mH	57.6	5.5	1420.9	5000.0	3m./HORZ	**10.9**	**PK**
7214.64	-65.0	1HN3mV	42.0	9.6	377.9	5000.0	3m./VERT	**22.4**	**PK**
Mid									
2440.04	-36.5	1HN3mV	70.5	32.0	132872.6	50000.0	3m./VERT	**11.5**	**PK**
*4880.28	-52.1	1HN3mH	54.9	5.7	1069.2	5000.0	3m./HORZ	**13.4**	**PK**
*7320.44	-63.0	1HN3mV	44.0	9.9	491.3	5000.0	3m./VERT	**20.2**	**PK**
High									
2474.96	-34.8	1HN3mV	72.2	32.0	162709.9	50000.0	3m./VERT	**9.8**	**PK**
*4950.24	-53.9	1HN3mH	53.1	5.9	892.3	5000.0	3m./HORZ	**15.0**	**PK**
*7425.1	-60.1	1HN3mV	46.9	10.1	708.2	5000.0	3m./VERT	**17.0**	**PK**

* Falls within the restricted bands of CFR 15.205

Data corrected by 0.1 dB for loss of high pass filter, except to fundamental

** Conversion from 1 meter to 3 meters = -9.54 dB

SAMPLE CALCULATION:
RESULTS: At 4809.96 MHz, = Antilog ((-49.4 + 5.5 + 107)/20) = 1420.9 (uV/m @ 3m)
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature: Daniel Aparaschivei **Name: Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet,Inc.**
Model: **ZMN2430**

Table 9. Average Radiated Spurious Emissions, Patch Antenna.

Radiated Spurious Emissions

Test By: DA	**Test:** FCC Part 15 Patch Antenna		**Client:** Cirronet Corporation
	Project: 08-0007	**Class:** B	**Model:** ZMN2430

Frequency (MHz)	**Test Data (dBm)**	**AF Table**	**Test Data (dBuV)**	**AF+CA-AMP (dB)**	**Results (uV/m)**	**Limits (uV/m)**	**Distance / Polarity**	**Margin (dB)**	**Average**
LOW									
2405.18	-84.5	1HN3mV	22.5	31.9	524.2	50000.0	3m./VERT	**39.6**	**AVG**
*4809.96	-95.4	1HN3mH	11.6	5.5	7.1	500.0	3m./HORZ	**36.9**	**AVG**
7214.64	-111.1	1HN3mV	-4.1	9.6	1.9	500.0	3m./VERT	**48.5**	**AVG**
MID									
2440.04	-82.5	1HN3mV	24.5	32.0	664.4	50000.0	3m./VERT	**37.5**	**AVG**
*4880.28	-98.1	1HN3mH	8.9	5.7	5.3	500.0	3m./HORZ	**39.4**	**AVG**
*7320.44	-109.1	1HN3mV	-2.1	9.9	2.5	500.0	3m./VERT	**46.2**	**AVG**
HIGH									
2474.96	-80.8	1HN3mV	26.2	32.0	813.6	50000.0	3m./VERT	**35.8**	**AVG**
*4950.24	-99.9	1HN3mH	7.1	5.9	4.5	500.0	3m./HORZ	**41.0**	**AVG**
*7425.1	-106.2	1HN3mV	0.8	10.1	3.5	500.0	3m./VERT	**43.0**	**AVG**

* - Falls within restricted bands of CFR 15.205
Data corrected by 0.1 dB for loss of high pass filter, except to fundamental

** Conversion from 1 meter to 3 meters = -9.54 dB

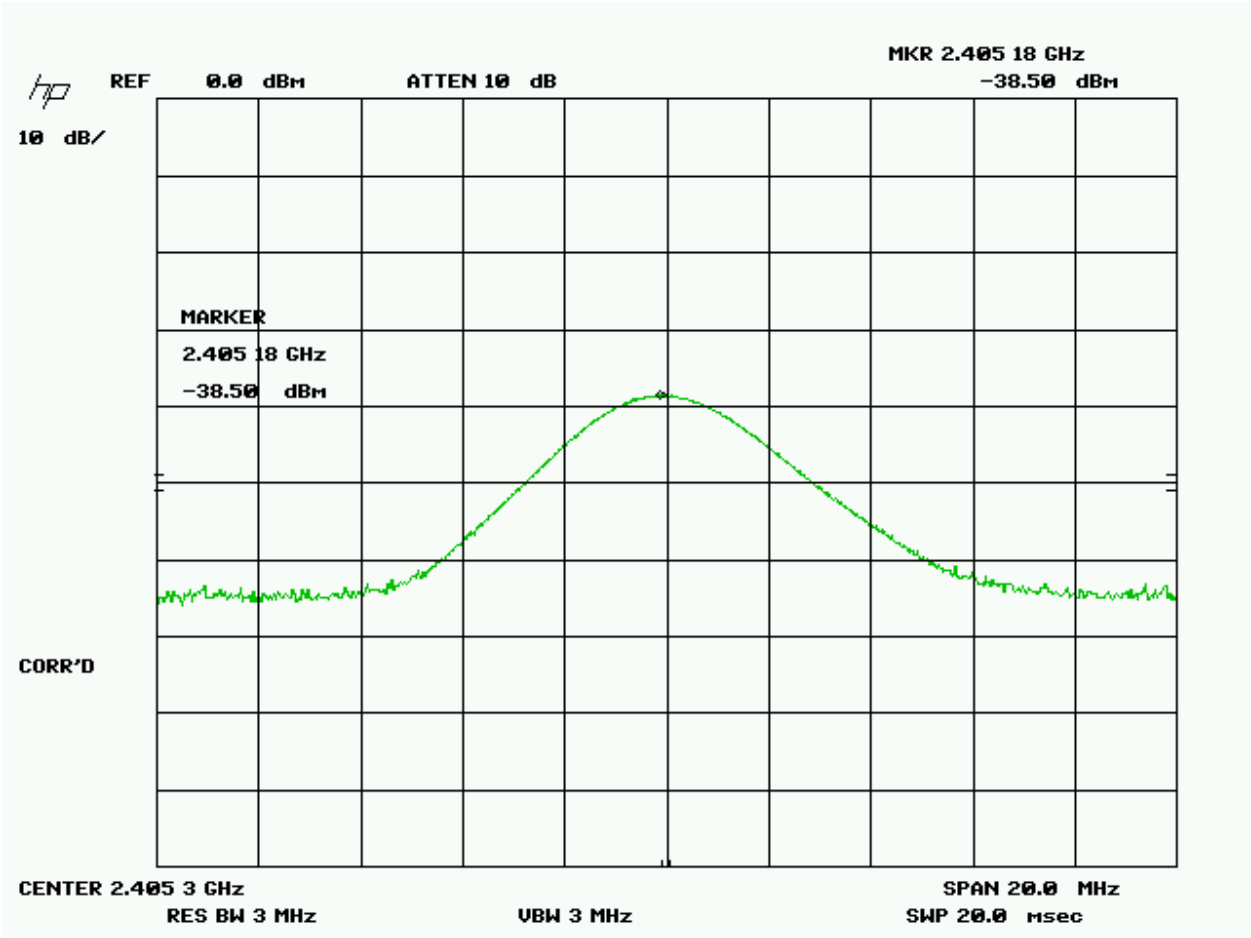
SAMPLE CALCULATION:
RESULTS: At 4809.96 MHz, = Antilog ((-95.4 + 5.5 + 107)/20) = 7.1 (uV/m @ 3m)
CONVERSION FROM dBm TO dBuV = 107 dB

Tester Signature: Daniel Aparaschivei **Name: Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

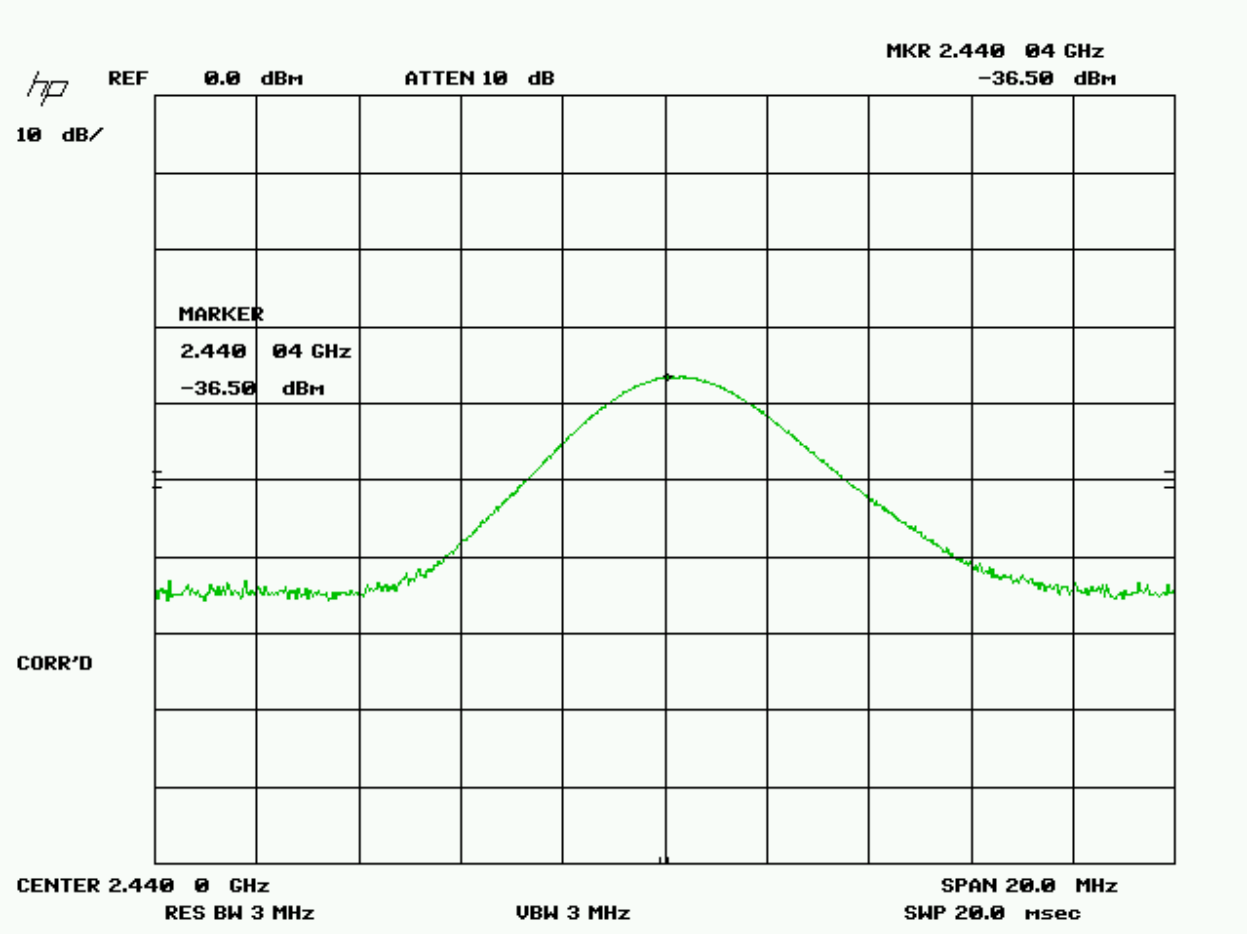
Figure 26.
Peak Radiated Spurious Emissions, 15.247(d). Fundamental, Low, Patch Antenna.



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

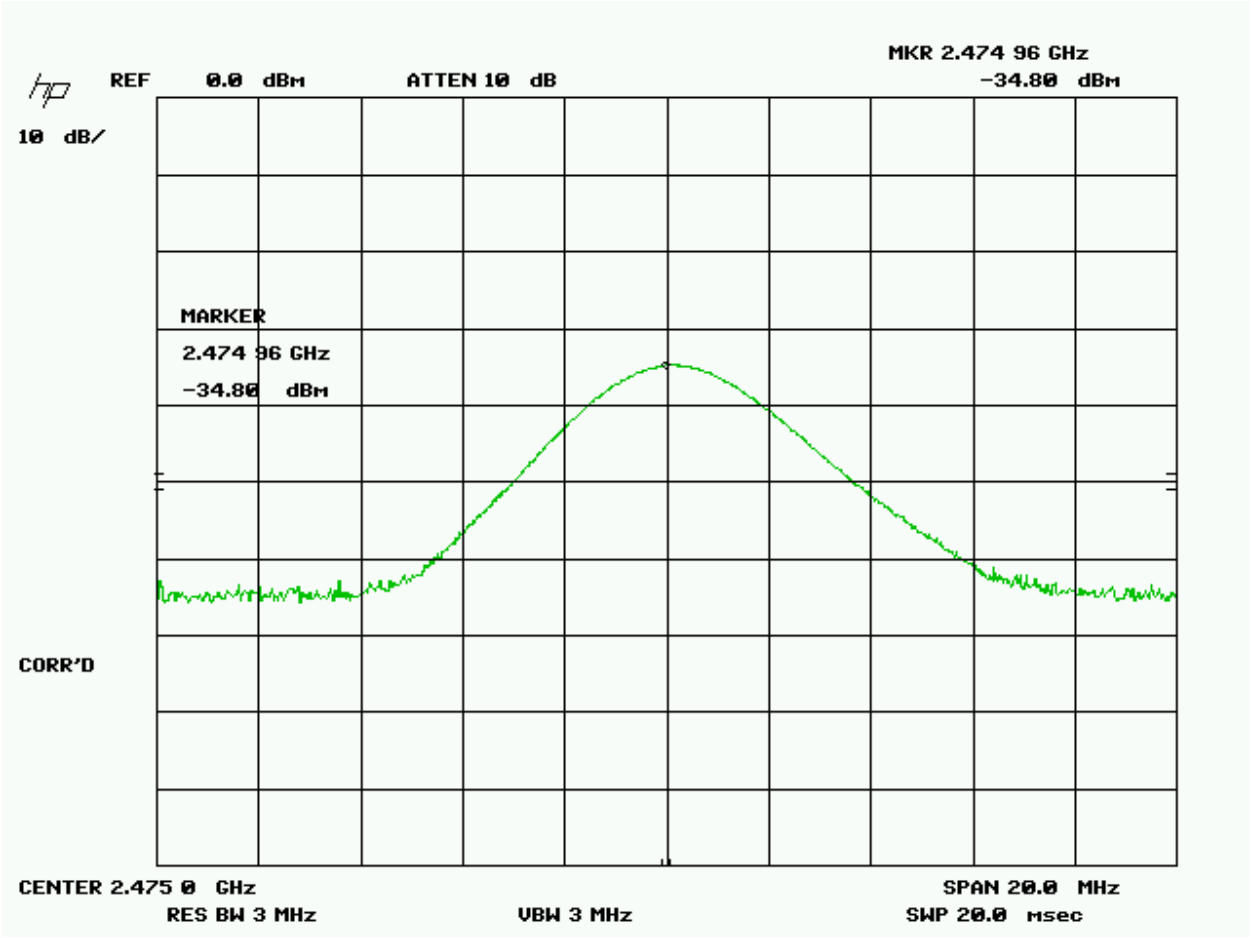
Figure 27.
Peak Radiated Spurious Emissions 15.247(d). Fundamental, Mid, Patch Antenna.



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

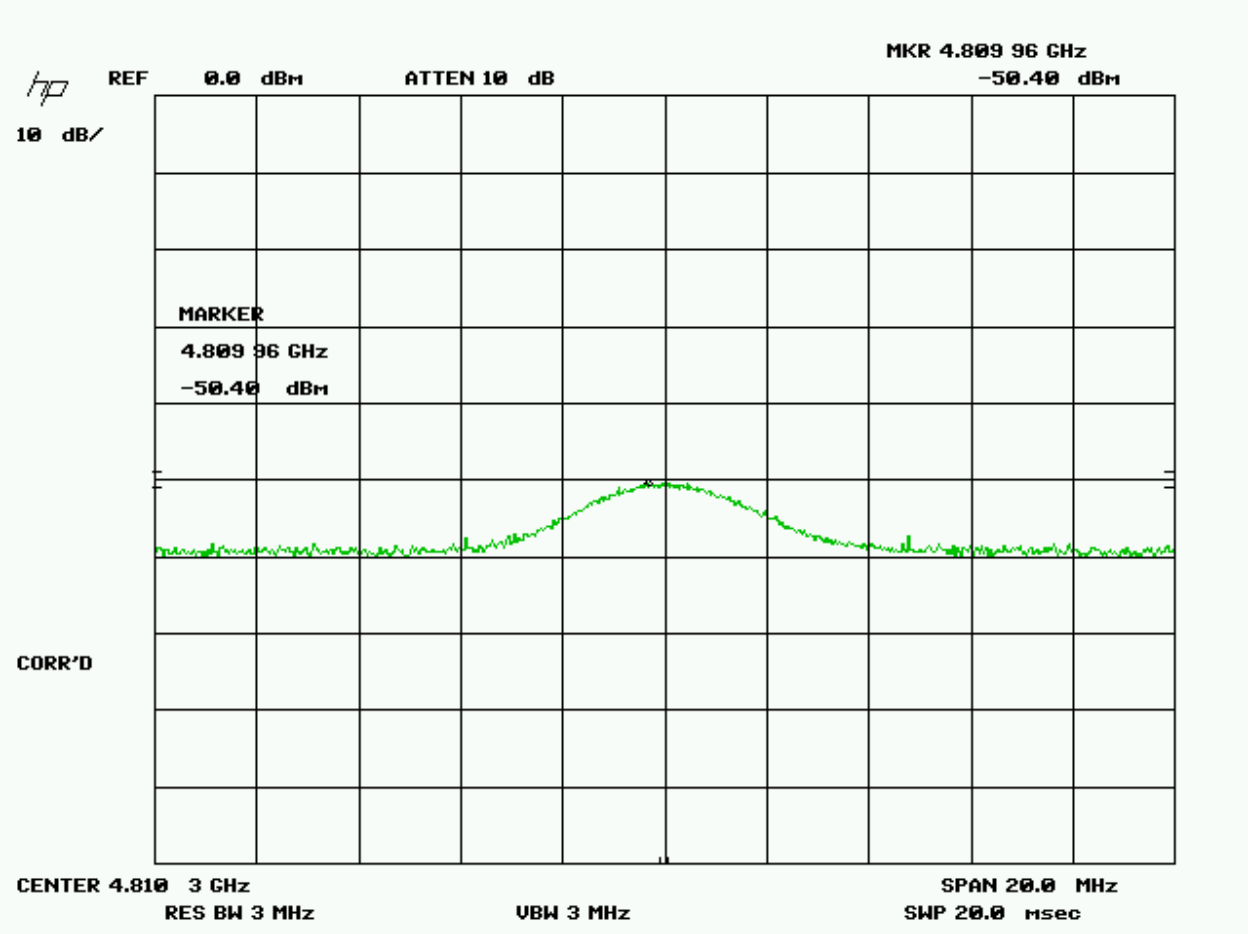
Figure 28.
Peak Radiated Spurious Emissions 15.247(d). Fundamental, High, Patch Antenna.



2 Test and Measurements (Cont'd)

2.8 Peak Radiated Spurious Emissions and Average Radiated Spurious Emissions (CFR 15.247(d)) (IC RSS 210, A2.9(a))

Figure 29.
Peak Radiated Spurious Emissions 15.247(d). Representative Harmonic, Patch Antenna.



2 Test and Measurements (Cont'd)

2.9 Band - Edge Measurements – (CFR 15.247 (d))

Band Edge measurements were made per FCC DA 00-705 at a Low Channel and High Channel peak at the highest EUT related emission outside the occupied bandwidth. This is a radiated measurement. A peak measurement was made of the fundamental using a peak detector. A Resolution Bandwidth (RBW) of > 1% of the emission bandwidth was used. Video bandwidth > RBW. This procedure was repeated for the high channel.

The plots shown were verified to be from the worst case antenna used (Patch), using a 17 foot Flexco cable and Horn Antenna connected to the Spectrum Analyzer. No preamp was used.

2.9.1 Lower Band Edge

With the transmitter set to 2.405 GHz, Figure 31, the signal level at 2.400 GHz, the lower band edge, is more than 50 dB but less than 60 dB down from the peak. The limit is that it be at least 20 dB down.

CFR 15.249 limit for spurious and harmonics is:

5000 uV/m = - 33 dBm

-33 dBm – 32.03 dB (antenna factor and cable loss for 2.4 GHz) = - 65 dBm
-65 dBm + 9.54* dB = -55.46 dBm = limit

* -9.54 dB correction from 3m to 1m distance.

2.9.2 Higher Band Edge

The channel 2475 to 2480 MHz is reserved for factory tests (see last page of report), therefore with the transmitter was set to 2.480 GHz, Figure 30. The signal level at 2.4835 GHz is more than 55 dB but less than 60 dB down from the peak. The limit is that it must be down by at least 20 dB.

5000 uV/m = -33 dBm

-33 dBm – 31.88 dB (antenna factor and cable loss for 2.4835 GHz) = - 64.9 dBm
-64.9 dBm + 9.54* dB = - 55.36 dBm = limit

For the limit -55.36 dBm/m = 51.64 dBuV/m = $10^{(51.64/20)} = 10^{2.582}$ = 381 uV/m (< 500 uV/m)

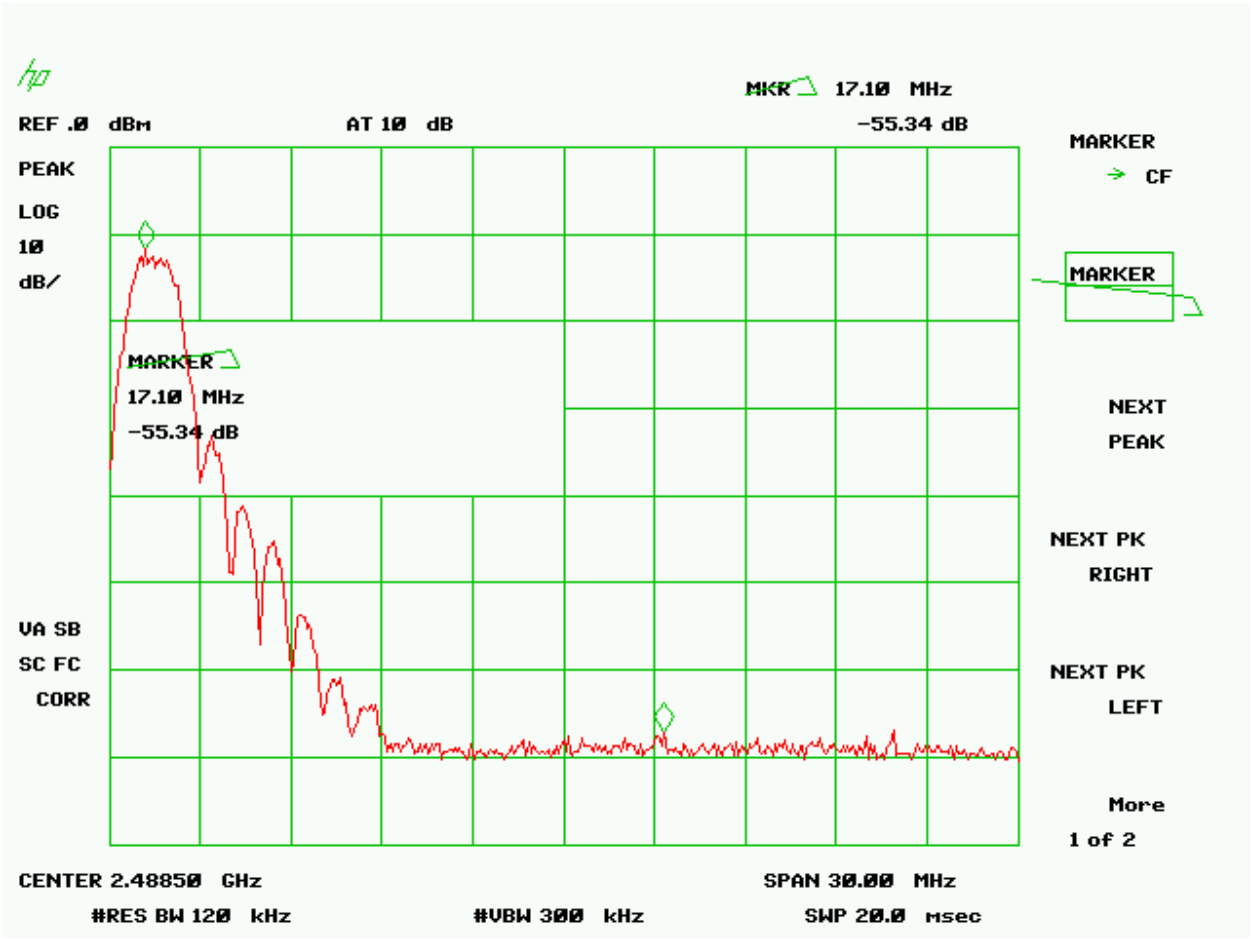
* -9.54 dB correction from 3m to 1m distance.

2 Test and Measurements (Cont'd)

2.9 Band Edge Measurements

Figure 30.

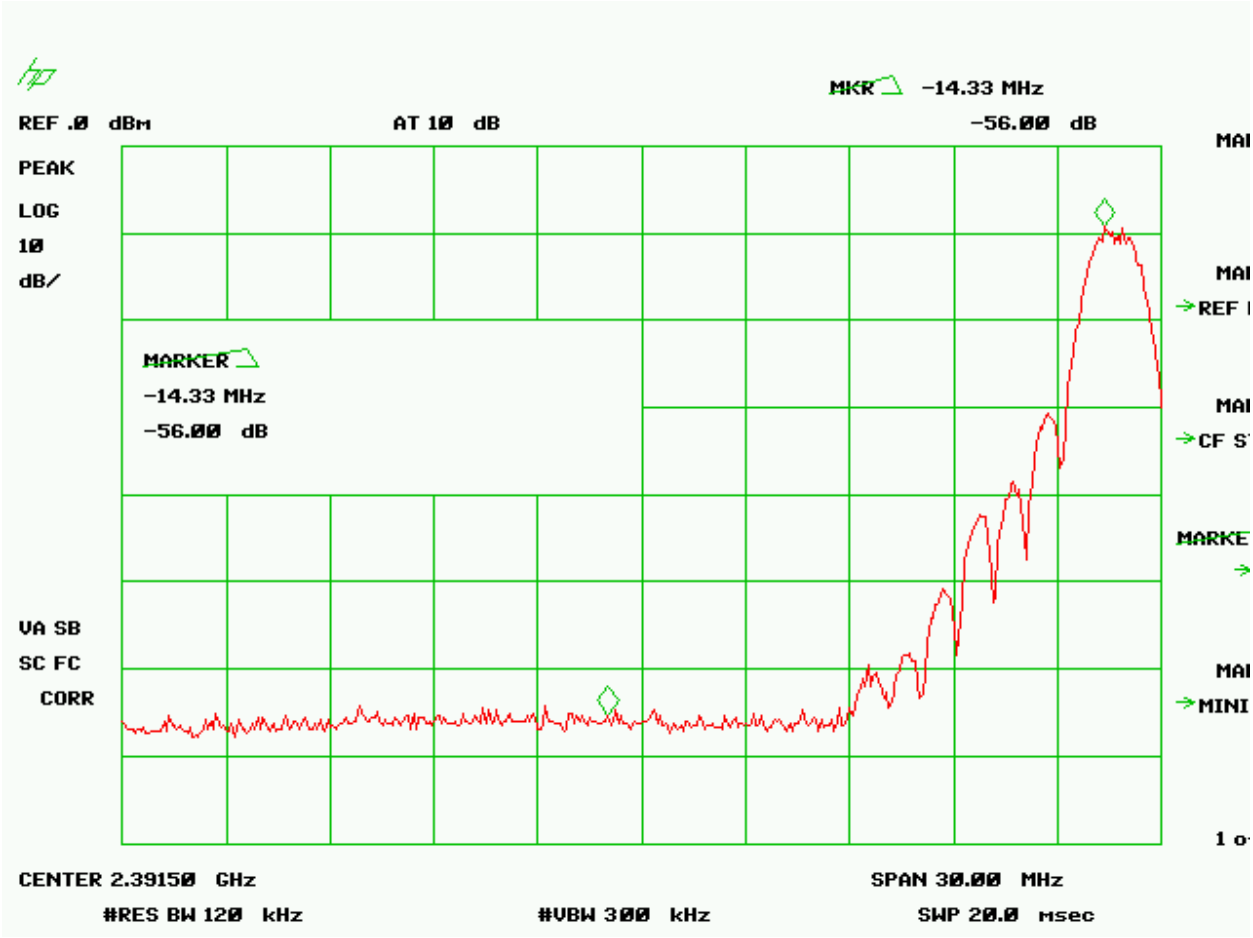
Band Edge Compliance, High Channel



2 Test and Measurements (Cont'd)

2.9 Band Edge Measurements

Figure 31.
Band Edge Compliance, Lower Channel



2 Test and Measurements (Cont'd)

2.10 Six dB Bandwidth per CFR 15.247(a)(1)(ii), (IC RSS 210, A8.2(a))

The EUT antenna port was connected to a spectrum analyzer that was set for a 50 Ω impedance. Measurements were performed similar to the method of FGG DA 00-7.5 except that the bandwidth is six db not 20 dB. With the RBW at approximately 1/100 of the manufacturers claimed RBW and with the VBW > RBW. The results of this test are given in Table 10 and Figure 32.

2 Test and Measurements (Cont'd)

2.10 Six dB Bandwidth per CFR 15.247(a)(1)(ii), (IC RSS 210, A8.2(a))

Table 10
Six dB Bandwidth

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Model: **ZMN2430**

Frequency (GHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)
2.404738	1.59	0.5
2.439750	1.58	0.5
2.474750	1.58	0.5

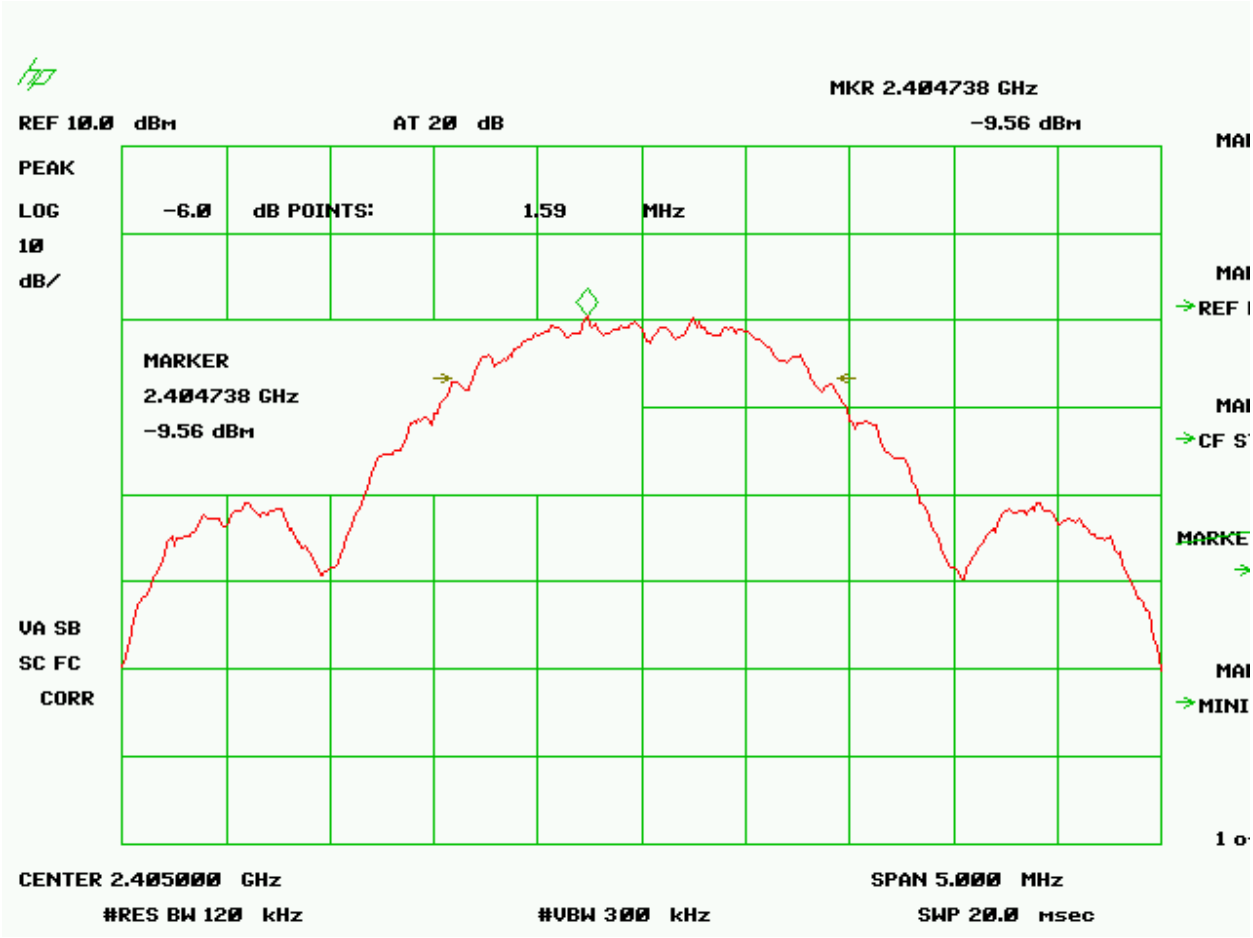
.

Tester Signature: Daniel Aparaschivei **Name:** **Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.10 Six dB Bandwidth per CFR 15.247(a)(1)(ii), (IC RSS 210, A8.2(a))

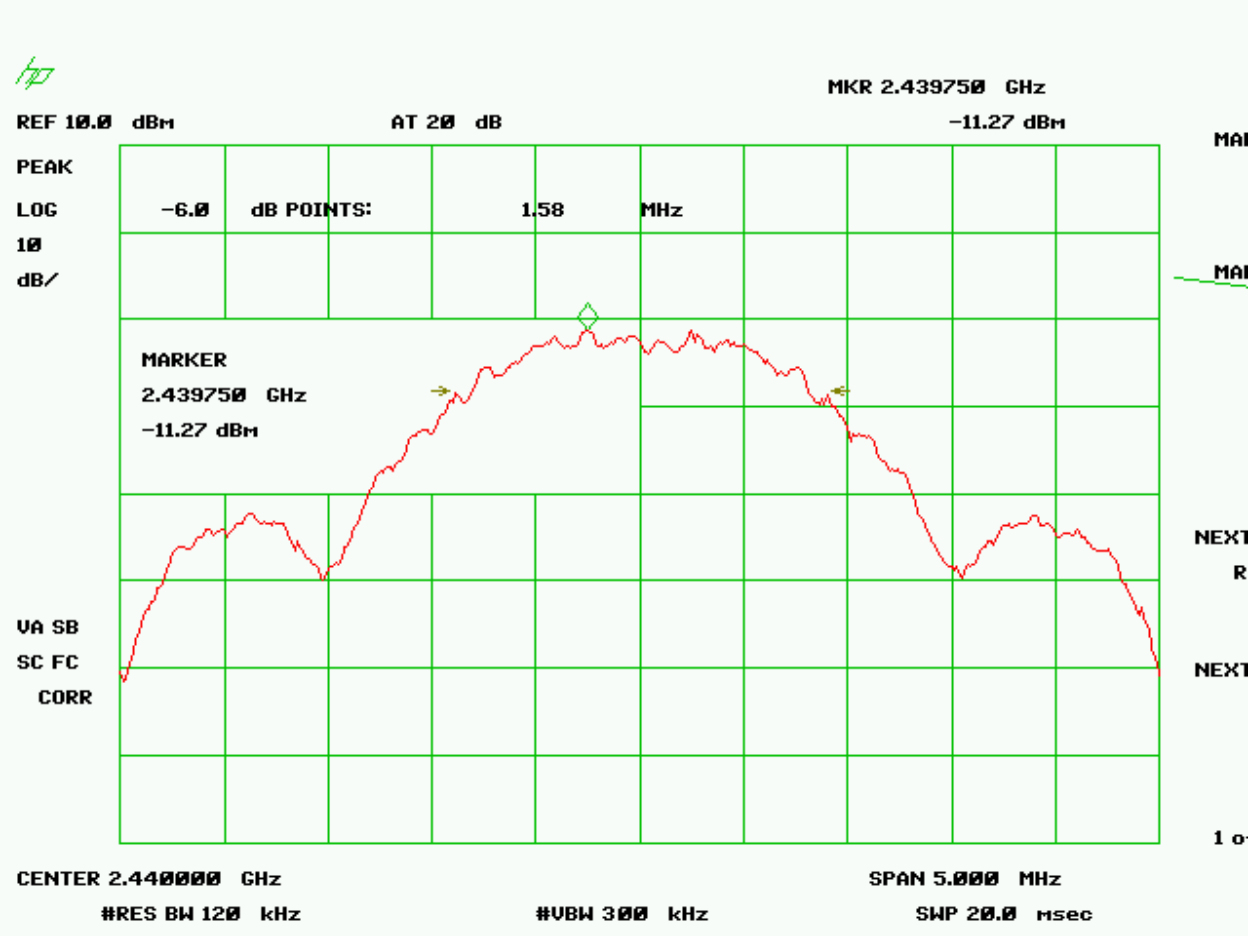
Figure 32.
Six dB Bandwidth per FCC Section 15.247(a)(1)(ii) Low



2 Test and Measurements (Cont'd)

2.10 Six dB Bandwidth per CFR 15.247(a)(1)(ii), (IC RSS 210, A8.2(a))

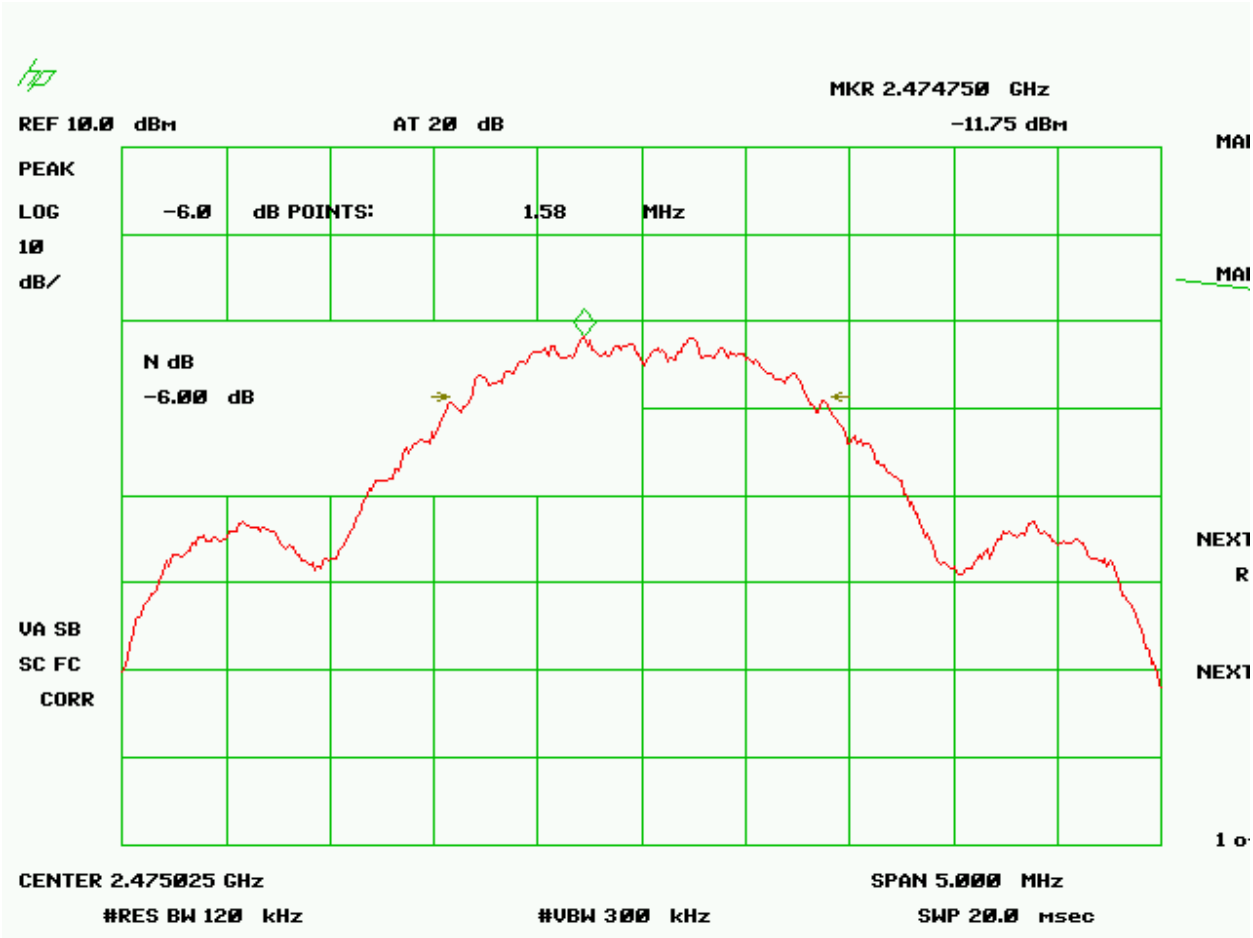
Figure 33.
Six dB Bandwidth per FCC Section 15.247(a)(1)(ii) Mid



2 Test and Measurements (Cont'd)

2.10 Six dB Bandwidth per CFR 15.247(a)(1)(ii), (IC RSS 210, A8.2(a))

Figure 34.
Six dB Bandwidth per FCC Section 15.247(a)(1)(ii) High



2 Test and Measurements (Cont'd)

2.11. Worst Case Transmit Duty Cycle for ZMN2430, CFR 15.209

The duty cycle de-rating factor used in the calculation of average radiated limits (per CFR 15.209) is described below. This factor was calculated by first determining the worst case scenario for system operation.

The worst case operating scenario is as follows:

The EUT transmits 253 kBytes x 8 bits/Byte x 1/4064 kbits/Second = 0.5 mSec

Maximum transmit time on equals 0.5ms over a 100 ms period.

The transmission duty cycle correction factor is then calculated as:

$$20 \log_{10} (0.5\text{ms}/100\text{ms}) = \textbf{- 46 dB}$$

2 Test and Measurements (Cont'd)

2.12 Power Line Conducted Emissions for Digital Device and Receiver - CFR 15.107

The power line conducted voltage measurements have been carried out in accordance with CFR 15.107 per FCC KDB Publication Number 558074 with a spectrum analyzer connected to an LISN and the EUT placed into an idle condition or a continuous mode of receive. Similar results were seen as compared to the EUT in a transmit mode of operation. Therefore, please refer to the results as shown in Table 11.

2 Test and Measurements (Cont'd)

2.13 Power Line Conducted Emissions for Transmitter CFR 15.207

The power line conducted voltage measurements have been carried out in accordance with CFR 15.207, per FCC KDB Publication Number 558074 with a spectrum analyzer connected to an LISN and the EUT placed into a continuous mode of transmit. The results are given in Table 11.

2 Test and Measurements (Cont'd)

Table 11. Power Line Conducted Emissions Data, Class B CFR 15.107.

Test Date: **January 22, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Model: **ZMN2430**

(Peak Measurement vs Average Limits)

.

Conducted Emissions									
Test By:	**Test:** Peak vs Average Conducted Emissions					**Client:** **Cirronet Corporation**			
DA	**Project:** 08-0007		**Class:** **B**			**Model:** ZMN2430			
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits**	**Distance /**	**Margin**	**PK**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(dBuV)**	**(dBuV)**	**Location**	**(dB)**	**/ QP**
0.15	-61.2	LISNP	45.8	-0.2	45.6	56.0	Phase	**10.4**	**PK**
0.51	-71.4	LISNP	35.6	-0.1	35.5	46.0	Phase	**10.5**	**PK**
1.25	-79.2	LISNP	27.8	0.2	28.0	46.0	Phase	**18.0**	**PK**
9.55	-79.6	LISNP	27.4	0.4	27.8	50.0	Phase	**22.2**	**PK**
15.71	-84.0	LISNP	23.0	0.6	23.6	50.0	Phase	**26.4**	**PK**
21.09	-87.8	LISNP	19.2	0.7	19.9	50.0	Phase	**30.1**	**PK**
0.152	-65.9	LISNN	41.1	-0.2	40.9	56.0	Neutral	**15.1**	**PK**
0.945	-84.0	LISNN	23.0	0.1	23.1	46.0	Neutral	**22.9**	**PK**
2.24	-83.2	LISNN	23.8	0.3	24.1	46.0	Neutral	**21.9**	**PK**
5.1	-85.7	LISNN	21.3	0.2	21.5	50.0	Neutral	**28.5**	**PK**
12.9	-85.2	LISNN	21.8	0.5	22.3	50.0	Neutral	**27.7**	**PK**
24.81	-87.7	LISNN	19.3	0.7	20.0	50.0	Neutral	**30.0**	**PK**

SAMPLE CALCULATIONS: At 150 kHz, = 45.8 + (- 0.2) = 45.6 dBuV

Tester Signature: Daniel Aparaschivei **Name: Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.14 Radiated Emissions for Digital Device & Receiver (CFR 15.109 (a))

Radiated emissions were evaluated from 30 MHz to 14500 MHz per the methods of FCC KDB Publication Number 558074 while the EUT was placed into a Receive mode of operation. Measurements were made with the analyzer's bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made greater than or equal to 1 GHz. The results are shown in Table 12.

2 Test and Measurements (Cont'd)

2.14 Radiated Emissions for Digital Device & Receiver (CFR 15.109 (a))

Table 12. Radiated Emissions Data (Digital Device & Receiver)

CLASS B

Test Date: **January 21, 2008**
UST Project: **08-0007**
Customer: **Cirronet, Inc.**
Product: **ZMN2430**

Measurements 30 MHz – 1 GHz

Radiated Emissions									
Test By: DA			**Test:** FCC Part 15		**Client:** Cirronet Corporation				
Project: 08-0007			**Class: B**		**Model:** ZMN2430				
Frequency	**Test Data**	**AF**	**Test Data**	**AF+CA-AMP**	**Results**	**Limits**	**Distance/ Polarity**	**Margin**	**PK**
(MHz)	**(dBm)**	**Table**	**(dBuV)**	**(dB)**	**(uV/m)**	**(uV/m)**		**(dB)**	**/ QP**
No emissions detected within 20 dB of the FCC Part 15 B Limit.									

Tester Signature: Daniel Aparaschivei **Name: Daniel Aparaschivei**

2 Test and Measurements (Cont'd)

2.15 Peak Power Spectral Density (CFR 15.247(e)) (IC RSS 210 A8.5)

The transmitter was placed into a continuous mode of operation. The center frequency was set to 2405.000 MHz for low channel and 2440.000 for mid channel and 2475.000 for high channel with a 500 kHz span. The measurements were performed per the procedures of FCC KDB Procedure 558074. The RBW was set to 3 kHz and the Video Bandwidth was set to 30 kHz. The trace capture time was set to (Span/3 kHz).

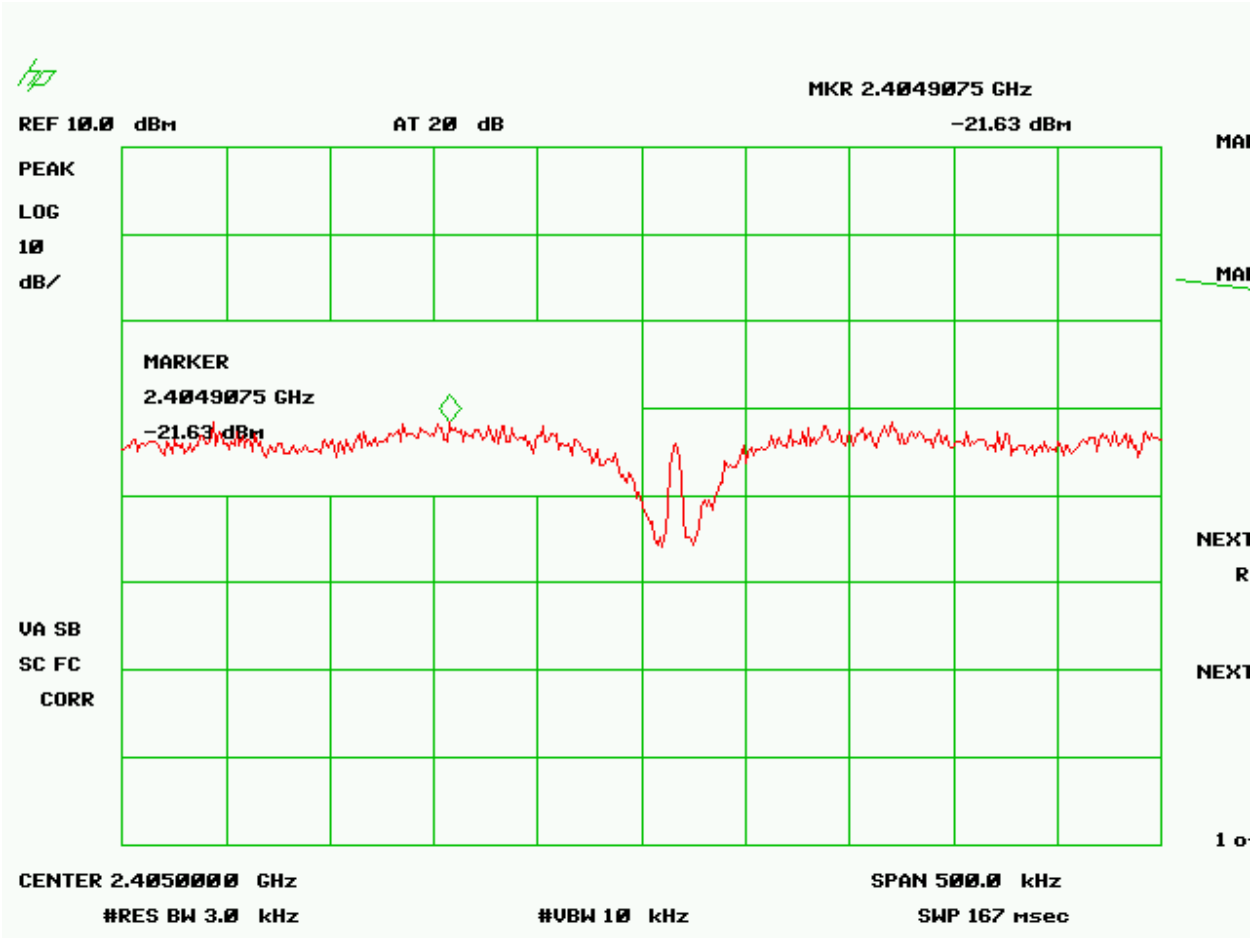
The power spectral density shall be no greater than +8 dBm per any 3 kHz band.

Results are shown in Figure 35 through 37. Note that 4.23 dB of cable loss must be added to the measurements.

2 Test and Measurements (Cont'd)

2.15 Peak Power Spectral Density (15.247(e))

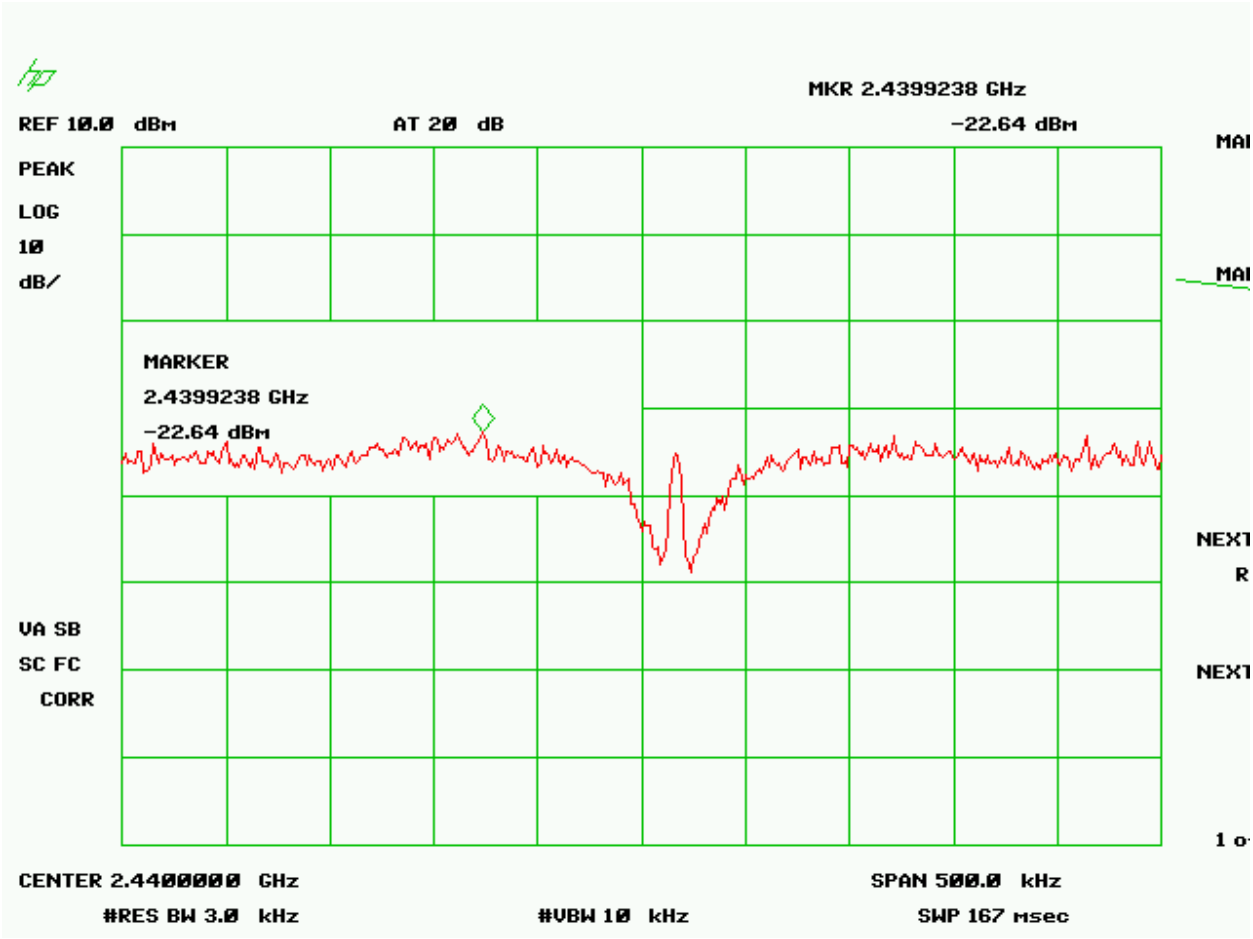
Figure 35. Peak Power Spectral Density (15.247(e)) Low Channel



2 Test and Measurements (Cont'd)

2.15 Peak Power Spectral Density (15.247(e))

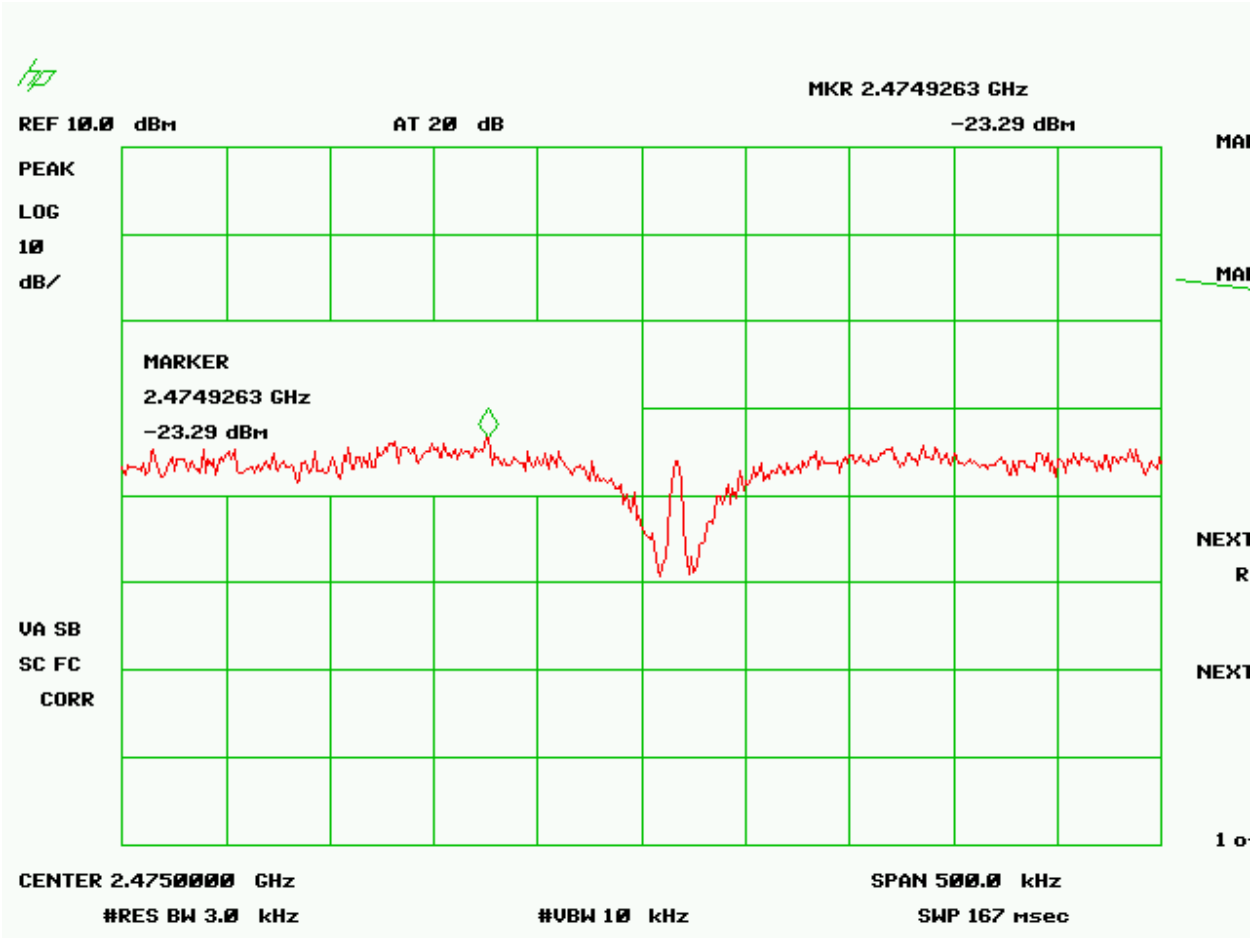
Figure 36. Peak Power Spectral Density (15.247(e)) Mid Channel



2 Test and Measurements (Cont'd)

2.15 Peak Power Spectral Density (15.247(e))

Figure 37. Peak Power Spectral Density (15.247(e)) High Channel



2.16 Maximum Public Exposure to RF (MPE) CFR 15.247 (i)

The maximum exposure level to the public from the RF power of the EUT shall not exceed a power density, S, of 1 mW/cm^2 at a distance, d, of 20 cm from the EUT.

Therefore, for :

Peak Power (Watts) = 0.006150 (from Table 4, herein)
Gain of Transmit Antenna = 14 dB_i = 25.1 numeric (from Table 3, herein)
Distance = 20 cm

$$S = (PG/ 4\pi d^2) = EIRP/4A$$

Where: A = The area of the circle of radius d = 20cm.

Therefore,

$$S = 0.000615 \times 25.1 / 1600p = 3.07\ \mu W/cm^2$$

5 Photographs

Photos of the Tested EUT

The following photos are attached:

Photo 1. Top of EUT with Shield
Photo 2. Top of EUT, Shield Removed
Photo 3. Bottom of EUT, Shield Removed