Testing Tomorrow's Technology

Application
For

Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraph 15.247

and

IC Radio Standards Specification: RSS-210

Permissive Change

For the

RFM / Cirronet Inc.,

Model(s): DNT900C and DNT900P

FCC ID: HSW-DNT900
IC: 4492A-DNT900

UST Project: 11-0044
Issue Date: March 22, 2011

Total Pages: 51

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Testing Tomorrow's Technology

I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: ______________

Title: Consulting Engineer President

Date: March 22, 2011

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: RFM / Cirronet Inc.

MODEL: DNT900C and DNT900P

FCC ID HSW-DNT900

DATE: March 22, 2011

This report concerns (check one): Original grant
Class II change [X]

Equipment type: DTS Transceiver Module

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No _X

If yes, defer until: ______N/A___________
date

agrees to notify the Commission by N/A
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
Alpharetta, GA 30004

Phone Number: (770) 740-0717
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1 General Information

1.1 Purpose of this Report

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210 for a Class II Permissive Change to include the use of new amplifier for the fact that the originally used amplifier has been discontinued. A KDB inquiry has been submitted and the approval has been granted as can be seen in the reference below:

Inquiry: KDB tracking number 299791
-**Reply from Customer on 08/31/2010**---

The output power of the PA (and hence the radio) is set by our production test set to the value listed on our grant: 29.7 dBm. The customer has no ability to raise this output power. Note that I have also indicated this on both comparison tables already sent.

Response:
If the input and output frequencies and power are equivalent, the component amplifier change can be considered a Class II.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on March 8, 2011 in good operating condition.

1.3 Product Description

The DNT900 series transceiver module is a point-to- I/O point and point-to-multipoint wireless systems in the 900 MHz ISM band. Two model variants of the DNT900 are available. Both model variants are electrically identical and differ only in the interface available for host integration. DNT900C radio modules are mounted by reflow soldering them to a host circuit board. DNT900P modules are mounted by plugging their pins into a set of mating connectors on the host circuit board.

DNT900 series modules must comply with Part 15.247 as a FHSS module when set to any of the following air data rates: 38.4, 115.2 and 200 kb/s. At a data rate of 500 kb/s, the DNT900 series modules must comply as a DTS module under the same rule part.

At 500 kb/s DNT900 series modules still employ frequency hopping to mitigate the effects of interference and multi-path fading, but hop on fewer, more widely spaced frequencies than at lower data rates.

The EUT was evaluated as a DTS module tested with both previously approved antennas.

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.4, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003)* for FCC subpart B Digital equipment Verification requirements and per FCC Public Notice DA 00-705 released March 30, 2000 for Frequency Hopping Spread Spectrum Systems operating under section 15.247. Also, Marker-Delta Method was followed to measure the upper band-edge.

Digital RF conducted and radiated Verification emissions data (FCC 15.107 and 109) below 1 GHz were taken with the measuring receiver (or spectrum analyzer's) resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements performed above 1.0 GHz were made with a RBW of 1 MHz. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process.

A list of EUT and Peripherals is found in Table 1 below. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are provided in separate Appendices.

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is US5117. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 2982A-1.

Table 1 - EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
(EUT) RFM / Cirronet Inc.	DNT900	None	HSW-DNT900	1m U USB
Evaluation Board RFM/Cirronet	DNT900 Eval Board	None	None	--
Switching Power Supply Globel Tek	GT-21088-0909-W2	None	None	6' U – P 120 VAC/ 60 Hz

2 Tests and Measurements

2.1 Test Equipment

Table 2 below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are included herewith.

Table 2 - Test Instruments

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	10/18/2010
SPECTRUM ANALYZER	8566B	HEWLETT-PACKARD	2410A00109	10/29/10
RF PREAMP 100 kHz to 1.3 GHz	8447D	HEWLETT-PACKARD	2944A06291	9/7/10
BICONICAL ANTENNA 25 MHz to 200 MHz	BIA-25	Electro-Metrics	2451	12/29/09 2 Year
LOG PERIODIC 100 MHz to 1000 MHz	3146	EMCO	3110-3236	1/22/10 2 Year
HORN ANTENNA 1 GHz to 18 GHz	SAS-571	A. H. Systems	605	2/9/2010 2 Year
PREAMP 1 GHz to 26.5 GHz	8449B	HEWLETT-PACKARD	3008A00480	9/21/10
CALCULATION PROGRAM	N/A	N/A	Ver. 6.0	N/A

2.2 Modifications to EUT Hardware

No modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 as follows:

Table 3 - Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates over 902 MHz to 928 MHz, 3 test frequencies will be used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to the range specified in 2.4.1 above, whichever is the higher range of investigation.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

The radiated and conducted emissions limits shown herein are based on the following:

2.6 EUT Antenna Requirements (CFR 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. RFM / Cirronet Inc. will sell the RF Module with the following antennas:

Table 4 - Allowed Antenna(s)

MANUFACTURER	TYPE OF ANTENNA	MODEL	REPORT REFERENCE	GAIN dB_i
CUSHCRAFT Cor.	Omni Antenna	8963B	Antenna 1	5
Astron wireless	Yagi	ISM Spread Spectrum/Video 918-2	Antenna 2	6

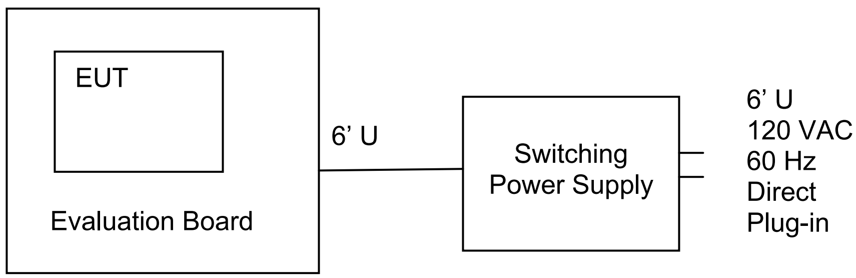

Figure 1 - Test Configuration

2.7 Intentional Radiator, Radiated Emissions (Antenna Conducted) (CFR 15.209, 15.247(d)) (IC RSS 210, A2.9 (a))

The EUT was put into a continuous-transmit mode of operation and tested per FCC Public Notice DA 00-705, for conducted out of band emissions emanating from the antenna port over the frequency range of 30 MHz to 12.5 GHz. A conducted scan was performed on the EUT to identify and record spurious signals that were related to the transmitter. Antenna Conducted Emissions of a significant magnitude that fell within restricted bands were then measured as radiated emissions on the OATS. The conducted emissions graphs are found in figures 4 through 10 below. The limit for antenna conducted power is 1 Watt (30 dBm) per 15.247 (b)(3) and b(4).

For radiated measurements, the EUT was set into a continuous transmission mode. Below 1 GHz, the RBW of the measuring instrument was set equal to 120 kHz. Peak measurements above 1 GHz were measured using a RBW = 1 MHz, with a VBW ≥ RBW. The results of peak radiated spurious emissions falling within restricted bands are given in Table 5, 6 and 7 below.

For Average Voltage measurements above 1 GHz, the emissions were measured using RBW = 1 MHz and VBW = 10 Hz. For a pulse-modulated transmitter, the EUT’s average emissions are further modified by adding to them the worst-case duty cycle, determined by adding the EUT’s total pulse widths (on time) over a 100 ms period and dividing by 100 ms.

On the OATS, the EUT was mounted on top of a non-conductive table, 80 cm above the floor, by placing it in the X-Z plane along the Z axis with its bottom cover in parallel with the ground. The front of the EUT faced the measurement antenna located 3 meters away. Each signal measured was maximized by raising and lowering the receive antenna between 1 and 4 meters in height while monitoring the ever changing spectrum analyzer display (with channel A in the Clear-Write mode and channel B in the Max-Hold mode) for the largest signal visible. That exact antenna height where the signal was maximized was recorded for reproducibility purposes. Also, the EUT was rotated about its Y-axis while monitoring the Spectrum Analyzer display for maximum. The EUT azimuth was recorded for reproducibility purposes. The EUT was measured when both maxima were simultaneously satisfied. Data is shown in table 5~7.

For test data, see Tables 5 and 7. Radiated emissions above 3 GHz were measured at a distance of 3 meter. There were no test failures.

2 Test and Measurements (Cont'd)

2.8 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d)) (IC RSS 210, A2.9 (a)) (Cont'd).

Note: Large Signal shown is Fundamental Frequency

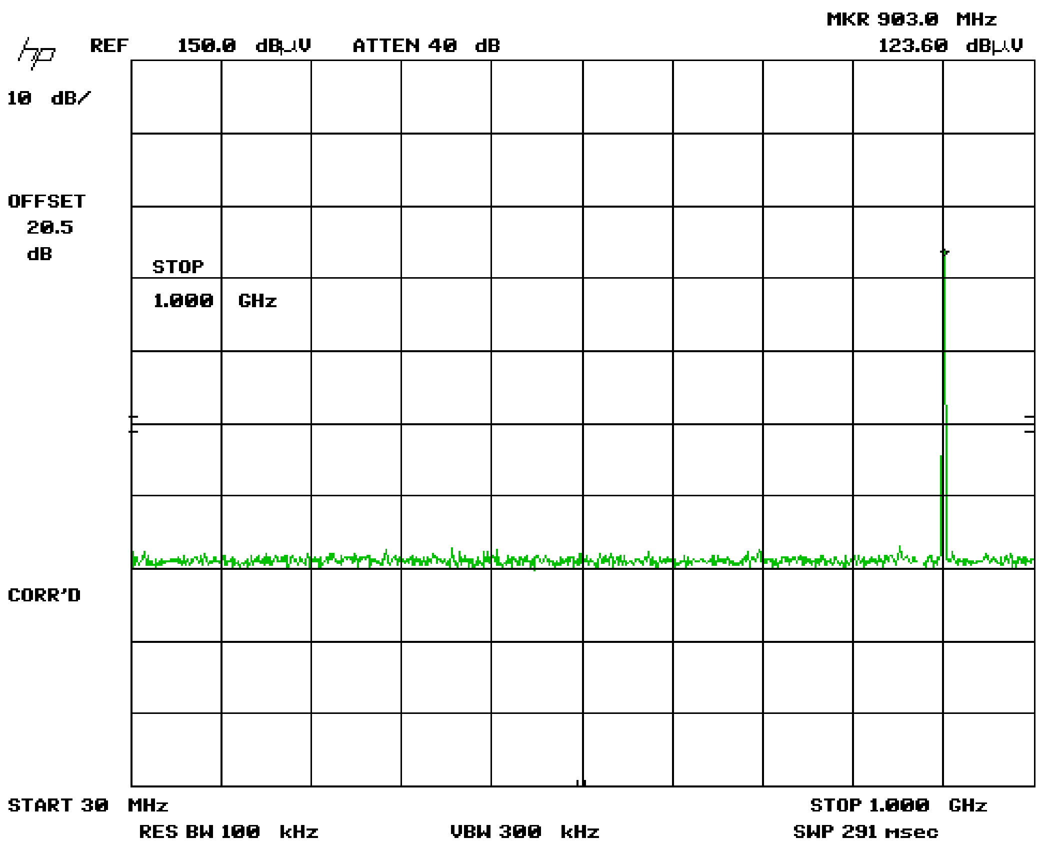

Figure 2 - Antenna Conducted Spurious Emissions – Low Channel, Part 1

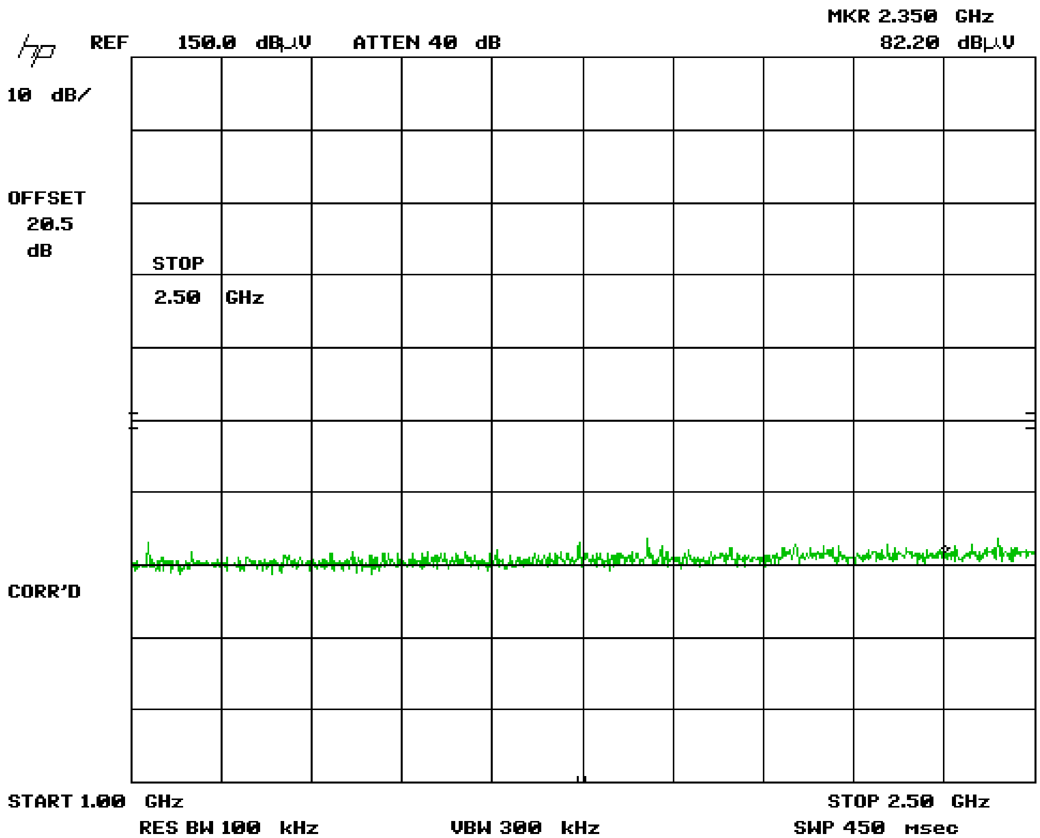

Figure 3 - Antenna Conducted Spurious Emissions – Low Channel, Part 2

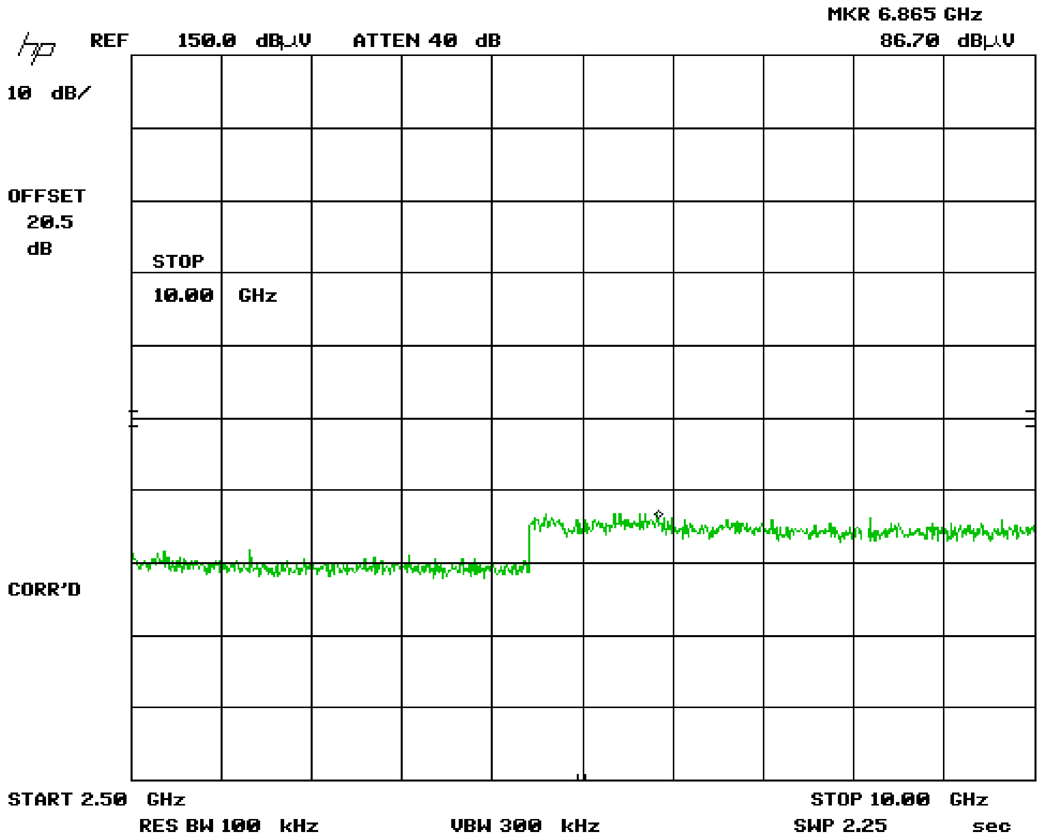

Figure 4 - Antenna Conducted Spurious Emissions – Low Channel, Part 3

Note: Signal shown represents Fundamental Frequency

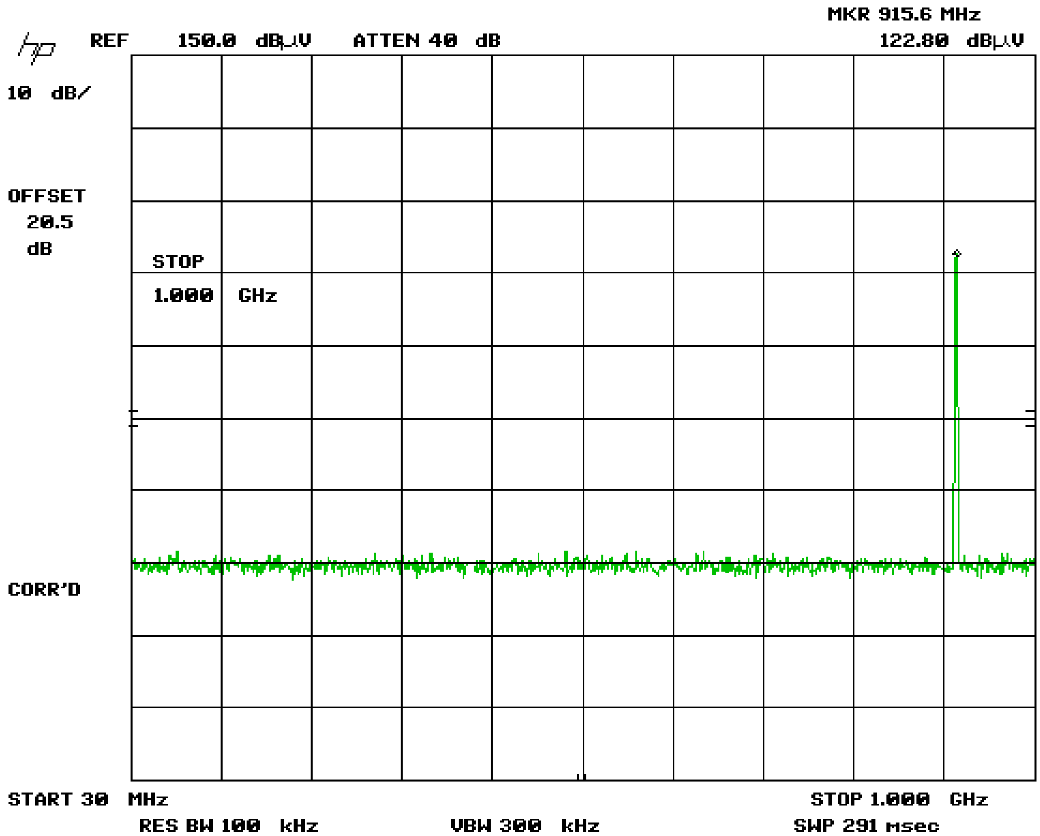

Figure 5 - Antenna Conducted Spurious Emissions - Mid Channel, Part 1

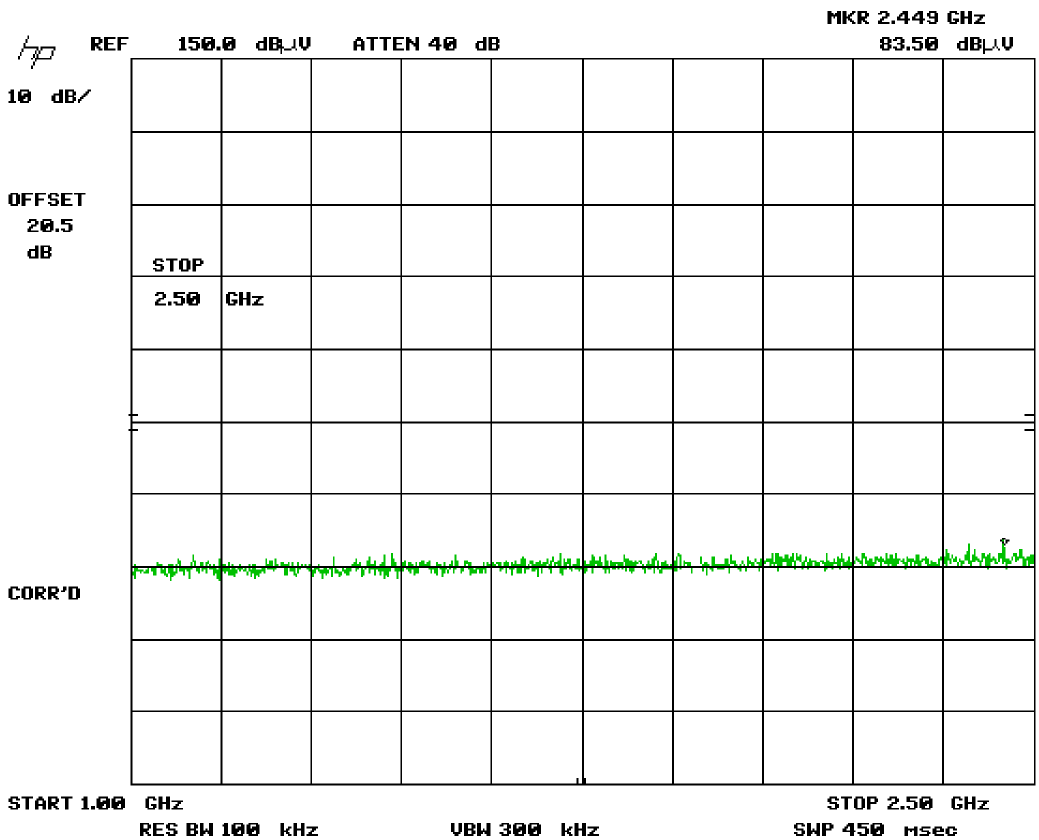

Figure 6 - Antenna Conducted Spurious Emissions – Mid Channel, Part 2

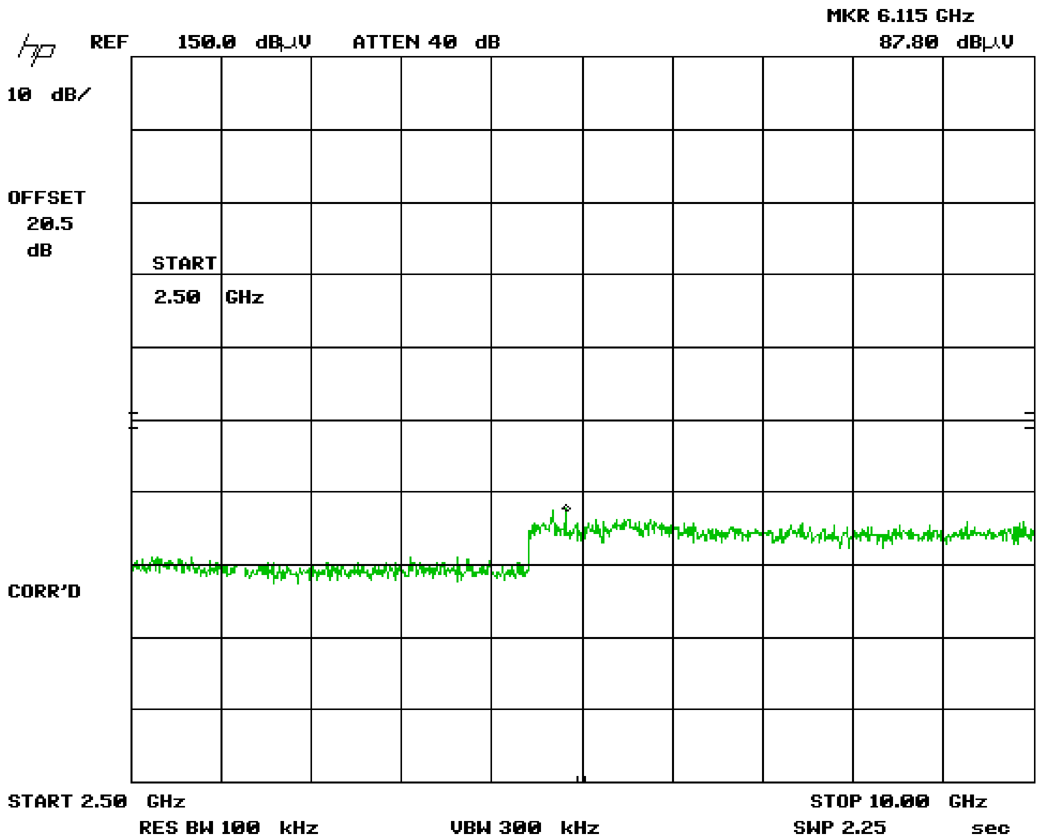

Figure 7 - Antenna Conducted Spurious Emissions – Mid Channel, Part 3

Note: Large Signal shown is Fundamental Frequency

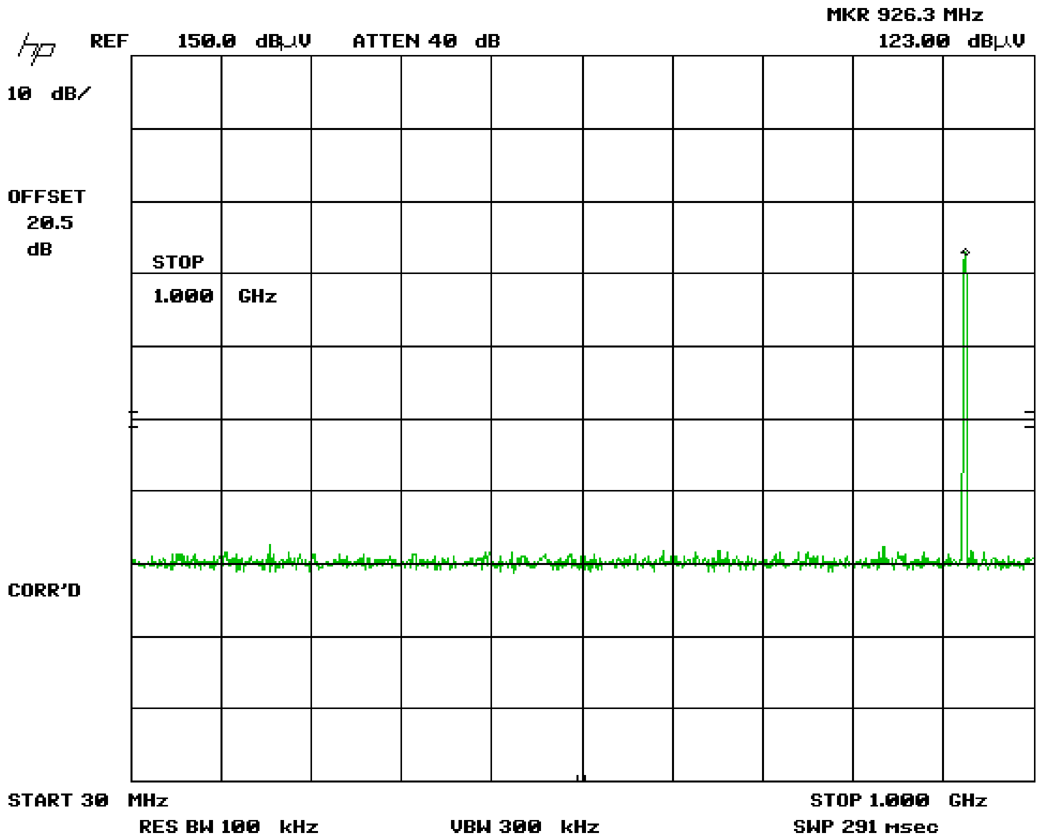

Figure 8 - Antenna Conducted Spurious Emissions – High Channel, Part 1

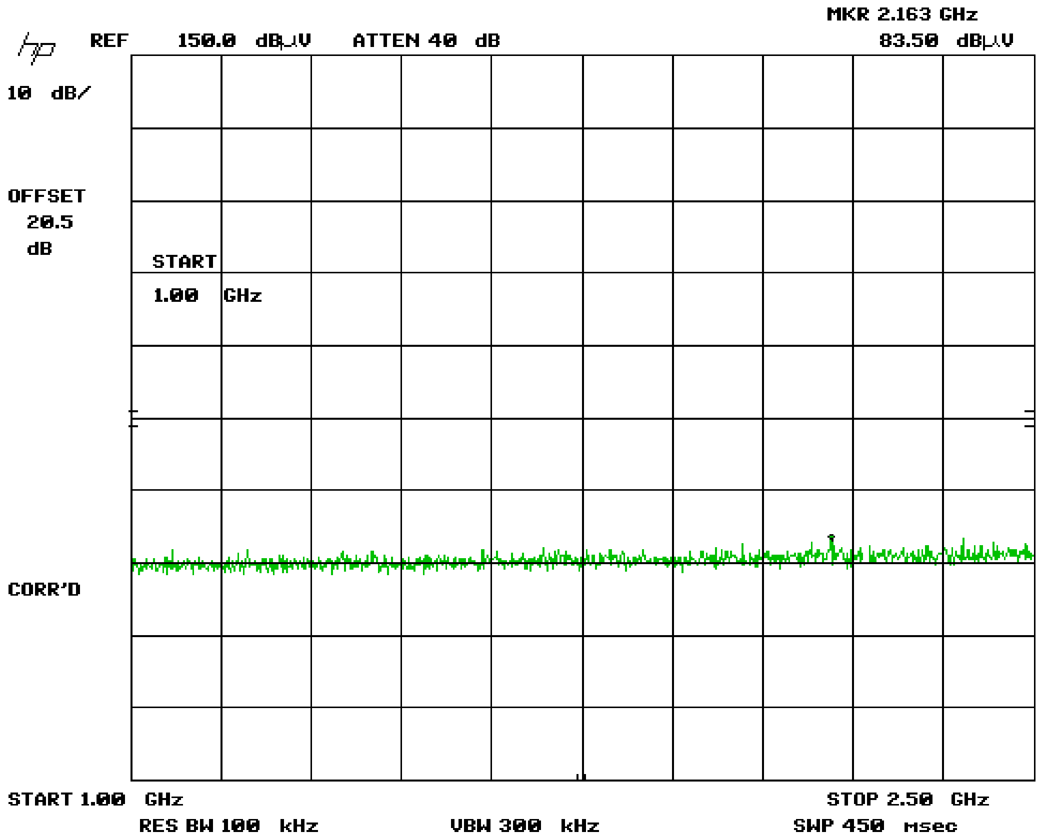

Figure 9 - Antenna Conducted Spurious Emissions - High Channel, Part 2

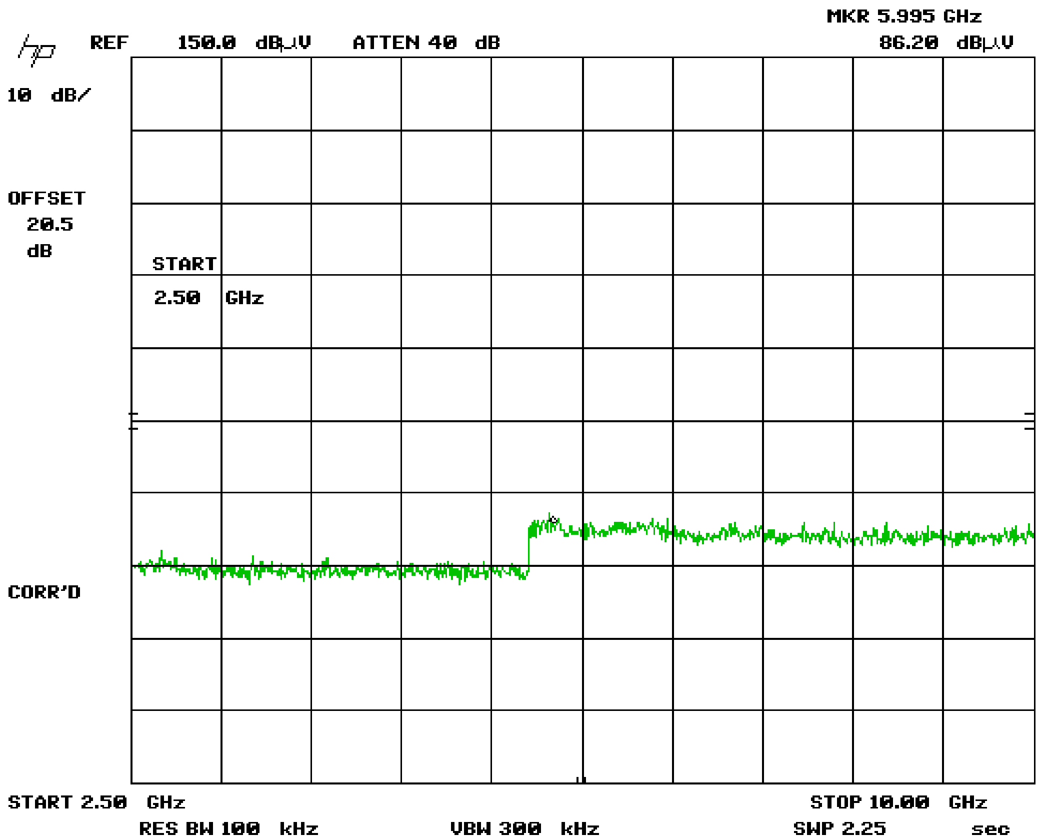

Figure 10 - Antenna Conducted Spurious Emissions - High Channel, Part 3

Table 5 - Peak Radiated Harmonic & Spurious Emissions-Antenna 1

Radiated Harmonic and Spurious Emissions								
Tested By: G.Y.	Test: FCC Part 15, Para 15.247(d)				Client: RFM / Cirronet Inc.			
	Project: 11-0044				Model: DNT900			
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Pass Margin (dB)**	**Detector PK / AVG**
LOW BAND - PEAK								
1852.81	53.08	1.50	-5.96	48.62	74.0	3.0m./	25.4	**PK**
2778.34	45.09	1.50	-1.65	44.94	74.0	3.0m./	29.1	**PK**
3705.50	40.86	-8.00	1.29	34.15	74.0	1.0m./	39.9	**PK**
4630.96	39.33	-8.00	4.81	36.14	74.0	1.0m./	37.9	**PK**
5557.43	39.26	-8.00	7.23	38.49	74.0	1.0m./	35.5	**PK**
MID BAND- PEAK								
1806.61	49.13	1.50	-6.28	44.35	74.0	3.0m./	29.6	**PK**
2709.60	45.16	1.50	-1.63	45.03	74.0	3.0m./	29.0	**PK**
3611.18	40.96	-8.00	0.89	33.85	74.0	1.0m./	40.1	**PK**
4516.70	39.79	-8.00	4.23	36.02	74.0	1.0m./	38.0	**PK**
5418.75	39.60	-8.00	7.17	38.77	74.0	1.0m./	35.2	**PK**
HIGH BAND- PEAK								
1830.71	49.24	1.50	-6.12	44.62	74.0	3.0m./	29.4	**PK**
2746.08	44.92	1.50	-1.67	44.75	74.0	3.0m./	29.3	**PK**
3662.54	40.01	-8.00	1.11	33.12	74.0	1.0m./	40.9	**PK**
4577.96	40.06	-8.00	4.47	36.53	74.0	1.0m./	37.5	**PK**
5493.34	39.31	-8.00	7.22	38.53	74.0	1.0m./	35.5	**PK**

- - Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
- Additional factors include loss due to filter and extrapolation factor of -9.5dB for 1meter to 3meter distance.

Note: the EUT passes the Average limits using 20dB relaxation factor with peak values as well as with the addition of the duty cycle factor.

SAMPLE CALCULATION:
RESULTS: At 1852.81 MHz: = 53.08 dBuV +1.50+(-5.95) dB/m = 48.62 dBuV/m @ 3m
Margin = (74.0 – 48.62) = 25.4 dB

Test Date: March 16, 2011
Tested By
Signature: Name: **George Yang**

Table 6 - Peak Radiated Harmonic & Spurious Emissions-Antenna 2

Radiated Harmonic and Spurious Emissions,								
Tested By: G.Y.	Test: FCC Part 15, Para 15.247(d)				Client: RFM / Cirronet Inc.			
	Project: 11-0044				Model: DNT900			
Frequency (MHz)	**Test Data (dBuV)**	**Additional Factor**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Pass Margin (dB)**	**Detector PK / AVG**
LOW BAND - PEAK								
1806.68	58.38	1.50	-6.28	53.60	74.0	3.0m./	20.4	**PK**
2710.28	44.56	1.50	-1.63	44.43	74.0	3.0m./	29.6	**PK**
3613.00	40.08	-8.00	0.90	32.98	74.0	1.0m./	41.0	**PK**
4515.76	39.90	-8.00	4.23	36.13	74.0	1.0m./	37.9	**PK**
5420.98	39.84	-8.00	7.18	39.02	74.0	1.0m./	35.0	**PK**
MID BAND- PEAK								
1830.63	55.35	1.50	-6.12	50.73	74.0	3.0m./	23.3	**PK**
2743.01	45.73	1.50	-1.67	45.56	74.0	3.0m./	28.4	**PK**
3661.00	40.54	-8.00	1.10	33.64	74.0	1.0m./	40.4	**PK**
4577.15	41.01	-8.00	4.47	37.48	74.0	1.0m./	36.5	**PK**
5489.64	39.17	-8.00	7.24	38.41	74.0	1.0m./	35.6	**PK**
HIGH BAND- PEAK								
1852.06	52.70	1.50	-5.97	48.23	74.0	3.0m./	25.8	**PK**
2779.25	45.53	1.50	-1.65	45.38	74.0	3.0m./	28.6	**PK**
3703.41	39.77	-8.00	1.27	33.04	74.0	1.0m./	41.0	**PK**
4629.70	40.09	-8.00	4.80	36.89	74.0	1.0m./	37.1	**PK**
5584.00	39.97	-8.00	7.17	39.14	74.0	1.0m./	34.9	**PK**

- - Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
- Additional factors include loss due to filter and extrapolation factor of -9.5dB for 1meter to 3meter distance.

Note: the EUT passes the Average limits using 20dB relaxation factor with peak values as well as with the addition of the duty cycle factor.

SAMPLE CALCULATION:
RESULTS: At 1806.68 MHz: = 58.38 dBuV+1.50+ (-6.28) dB/m = 53.60 dBuV/m @ 3m
Margin = (74.0 – 53.60) = 20.4 dB

Test Date: March 16, 2011
Tested By
Signature: Name: **George Yang**

2.9 Transmitter Duty Cycle – (CFR 15.35) (RSS-210 A8.1c)

The duty cycle de-rating factor used in the calculation of average radiated limits (per CFR 15.209 and 15.35(c)) is described below. This factor was calculated by first determining the worst case scenario for system operation. The details for the worst case scenario is found below in the Dwell Time Justification.

With the worst case operating scenario the transmission duty cycle is calculated as:

Under worst case conditions, the maximum duration of each transmission is 28.75mS within a 100mS time frame.

Total ON time: 28.75 milliseconds. Then (28.75 mS/100 mS)*100% = 28.75%
In terms of logarithmic voltage: dB = 20 log (0.2875) =

DC = - 10.83 dB

Dwell Time Justification

Note, 138 Bytes per hop is our maximum duty cycle.
Note, reducing bytes per hop reduces time on hop but increases number of hops.
Note,guard band time to remote response, 200us, minimum remote response is 20 bytes.

Data rate bps	Base		Base hop dur. s/hop	Remote		Remote hop dur. s/hop	Guard dur. s/hop	Total Ch Tx (B+R) s/ch	Total hop dwell (B+R+Guard) s/hop	Hop set Dur. 50 hops (B+R+Guard)*50 s	Total Hop Set Cycles/20s s	Channel hits 20s	Chan. Dwell 20s (B+R) s
	Bytes/ hop	Bits/ hop		Bytes/ hop	Bits/ hop								
3.84E+04	138	1104	2.88E-02	20	160	4.17E-03	2.5E-03	3.292E-02	3.542E-02	1.771E+00	1.129E+01	1.2E+01	3.950E-01
3.84E+04	128	1024	2.67E-02	20	160	4.17E-03	2.5E-03	3.083E-02	3.333E-02	1.667E+00	1.200E+01	1.2E+01	3.700E-01
3.84E+04	118	944	2.46E-02	20	160	4.17E-03	2.5E-03	2.875E-02	3.125E-02	1.5625E+00	1.280E+01	1.3E+01	3.738E-01
3.84E+04	100	800	2.08E-02	20	160	4.17E-03	2.5E-03	2.500E-02	2.750E-02	1.3750E+00	1.455E+01	1.5E+01	3.750E-01
3.84E+04	90	720	1.88E-02	20	160	4.17E-03	2.5E-03	2.292E-02	2.542E-02	1.2708E+00	1.574E+01	1.6E+01	3.667E-01
3.84E+04	80	640	1.67E-02	20	160	4.17E-03	2.5E-03	2.083E-02	2.333E-02	1.1667E+00	1.714E+01	1.8E+01	3.750E-01
3.84E+04	70	560	1.46E-02	20	160	4.17E-03	2.5E-03	1.875E-02	2.125E-02	1.0625E+00	1.882E+01	1.9E+01	3.563E-01
3.84E+04	60	480	1.25E-02	20	160	4.17E-03	2.5E-03	1.667E-02	1.917E-02	9.5833E-01	2.087E+01	2.1E+01	3.500E-01
3.84E+04	50	400	1.04E-02	20	160	4.17E-03	2.5E-03	1.458E-02	1.708E-02	8.5417E-01	2.341E+01	2.4E+01	3.500E-01
3.84E+04	40	320	8.33E-03	20	160	4.17E-03	2.5E-03	1.250E-02	1.500E-02	7.5000E-01	2.667E+01	2.7E+01	3.375E-01
3.84E+04	30	240	6.25E-03	20	160	4.17E-03	2.5E-03	1.042E-02	1.292E-02	6.4583E-01	3.097E+01	3.1E+01	3.229E-01

2.10 Peak Conducted Power – (CFR 15.247 (b3))

The DNT900 module, the transmitter, was programmed to operate at a maximum of +22 dBm across the bandwidth.

Peak power within the band 902 MHz to 928 MHz was measured per FCC KDB Publication 558074 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, to the antenna output terminals on the EUT. The spectrum analyzer was set for an impedance of 50 Ω with the RBW set greater than the 6 dB bandwidth of the EUT, and the VBW ≥ RBW. The loss of the short cable is 0.5 dB, and was included in spectrum analyzer reading as can be see in the offset. The final measured value is the actual correct measurement including the 0.5 dB loss which can be seen below.

Antenna Conducted Output Power was measured at Low Channel, Mid Channel and High Channel frequencies. See Figures 3 to 8 above. The 0.3 dB loss for the RF wire is taken into consideration here (Corrected Measurement column).

Table 9 - Peak Antenna Conducted Output Power per Part 15.247 (b) (3) (Same as EIRP)

Frequency of Fundamental (MHz)	Corrected Measurement (dBm)	(mW)	FCC Limit (mW Maximum)
Low Band (903.2 MHz)	17.6	57.54	1000
Mid Band (915.2 MHz)	17.0	50.12	1000
High Band (926.2 MHZ)	17.5	56.23	1000

Test Date: March 19, 2011
Tested By
Signature: ____________ Name: George Yang

2 Test and Measurements (Cont'd)

2.10 Peak Power Output (CFR 15.247 (b)(3))

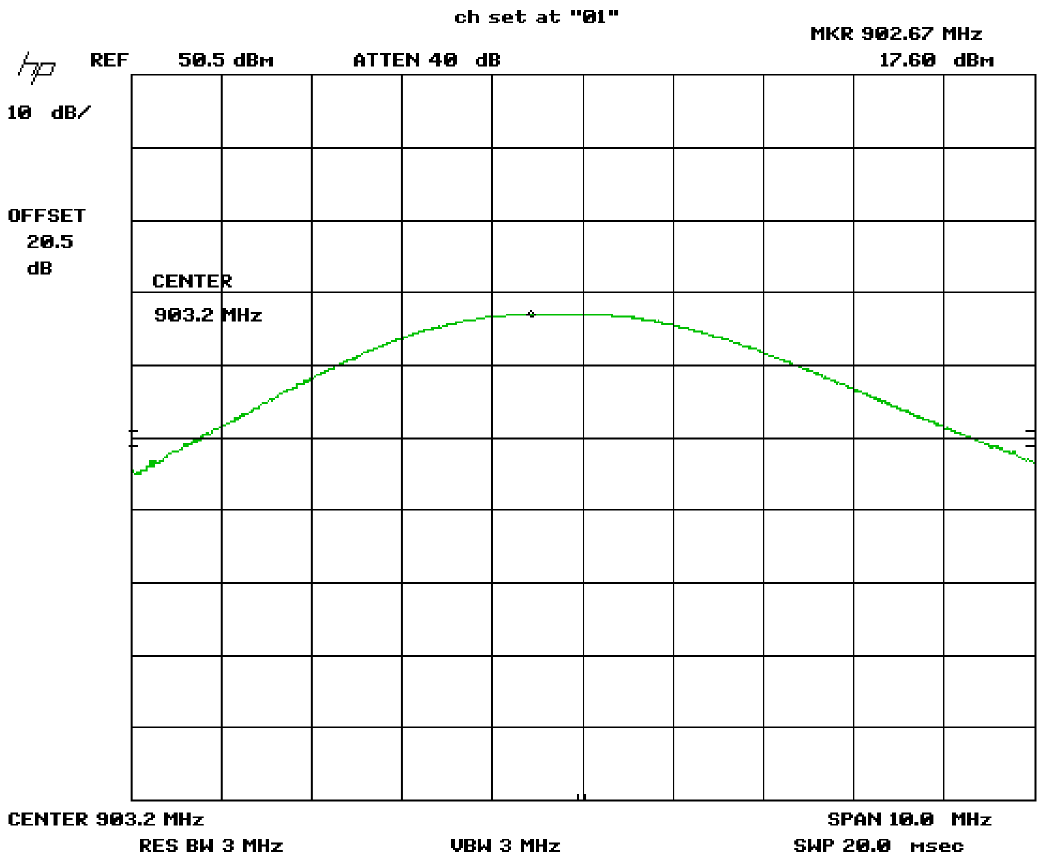

Figure 11 - Peak Antenna Conducted Output Power, Low Channel

2 Test and Measurements (Cont'd)

2.10 Peak Power Output (CFR 15.247 (b)(3))

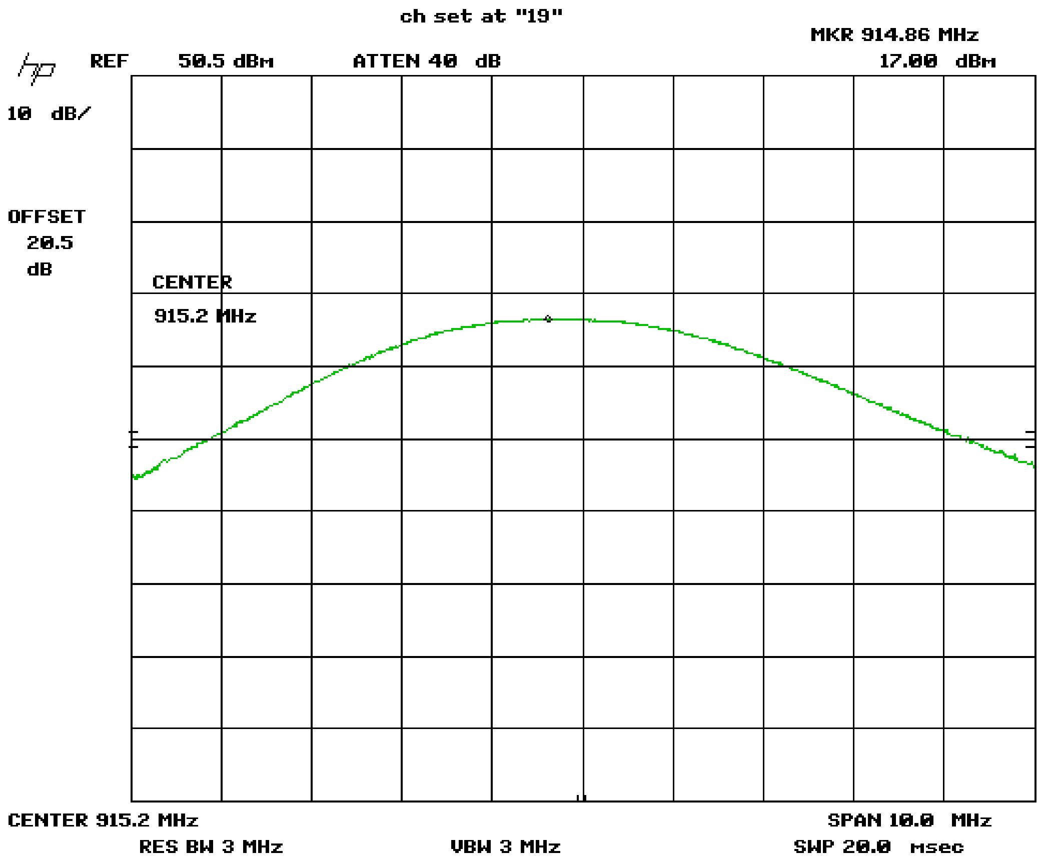

Figure 12 - Peak Antenna Conducted Output Power, Mid Channel

2 Test and Measurements (Cont'd)

2.10 Peak Power Output (CFR 15.247 (b)(3))

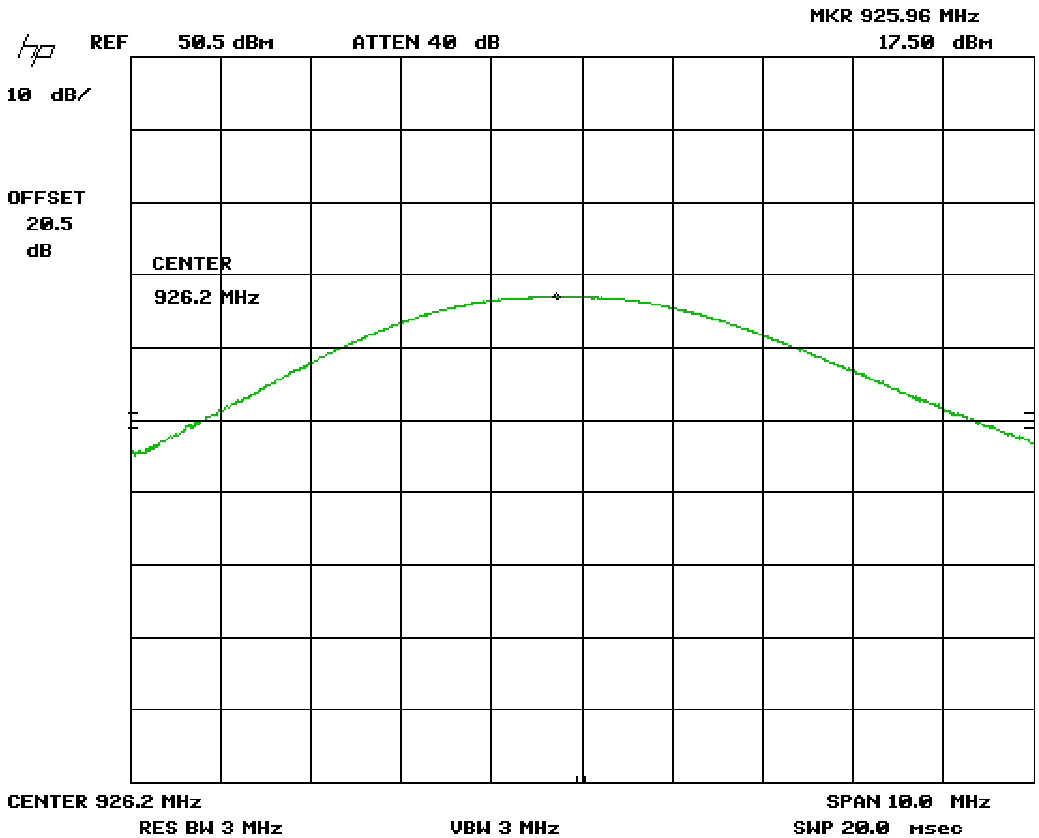

Figure 13 - Peak Antenna Conducted Output Power, High Channel

2.11 Band Edge Measurements – (CFR 15.247 (d))

Band Edge measurements are made with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Antenna port conducted measurements are performed to demonstrate compliance with the requirement of 15.247(d) that all emissions outside of the band edges be attenuated by at least 20 dB when compared to its highest in-band value (contained in a 100 kHz band). Because these frequencies occur above 1000 MHz they have both a peak and average requirement.

Set the Spectrum Analyzer frequency span large enough (usually around 10 MHz) to capture the peak level of the emission operating on the channel closest to the band edge as well as any modulation products falling outside of the authorized band of operation. Conducted measurements are performed with RBW ≥1% of the frequency span. In all cases, the VBW is set ≥ RBW.

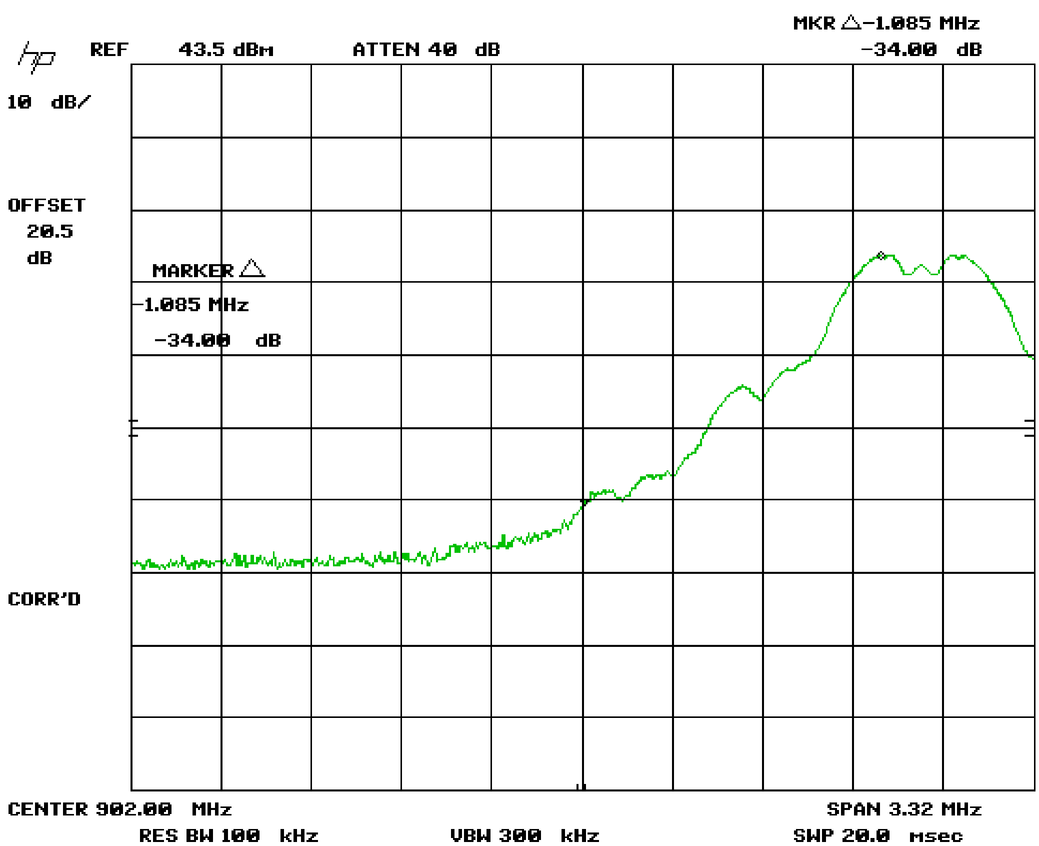

Figure 14 - Radiated Band Edge Compliance – Low Channel

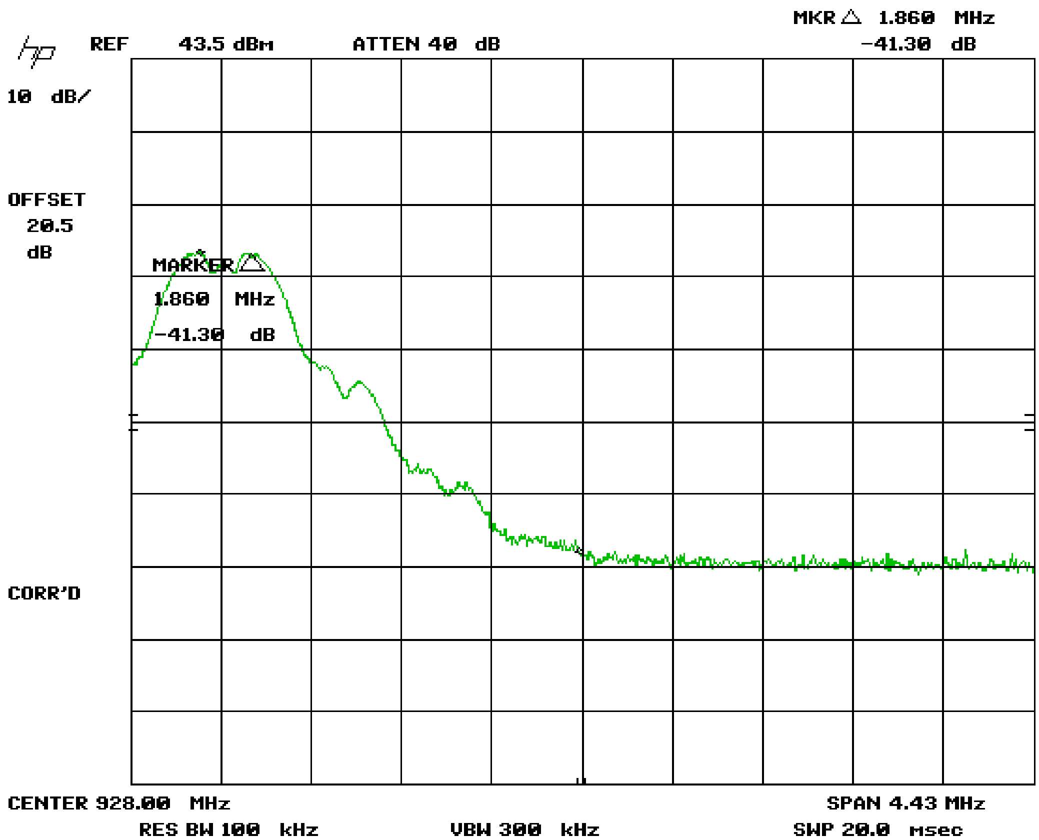

Figure 15 - Radiated Band Edge Compliance – High Channel

2.12 Unintentional Radiator, Radiated Emissions (CFR 15.109 (a))

The test data is provided herein to support the Verification requirement for digital devices. Radiated emissions coming from the EUT in a non-transmit state were evaluated from 30 MHz to 12.5 GHz per ANSI C63.4, Paragraph 8.

Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth; 1 MHz RBW and 3 MHz VBW. The test data was maximized for magnitude by rotating the turn-table through 360 degrees and raising and lowering the receiving antenna between 1 to 4 meters in height as a part of the measurement procedure.

All measured signals were at least 4.8 dB below the specification limit. The results are shown in Table 7 below.

Table 7 – Unintentional Radiator, Radiated Emissions.

Unintentional Radiator, Radiated Emissions- Antenna 1							
Test By: S.S.	Test: FCC Part 15.109, 15.209			Client: RFM/Cirronet			
	Project: 11-0044 Class: B			Model: DNT900			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP
Tested from 30 MHz to 12.5 GHz							
124.1080	18.60	14.70	33.30	43.5	3m./HORZ	10.2	**QP**
77.9080	28.50	7.84	36.34	40.0	3m./VERT	3.7	**QP**
122.9920	23.50	15.02	38.52	43.5	3m./VERT	5.0	**QP**
214.7800	20.10	14.46	34.56	43.5	3m./VERT	8.9	**PK**
258.0080	22.50	16.71	39.21	46.0	3m./VERT	6.8	**PK**
269.9990	18.10	17.58	35.68	46.0	3m./VERT	10.3	**PK**
1064.6100	56.16	-10.98	45.18	54.0	3.0m./VERT	8.8	**PK**
1329.5600	51.95	-8.64	43.31	54.0	3.0m./VERT	10.7	**PK**

No other emissions detected within 20 dB of the FCC Part 15.109 limits

AF is antenna factor. CL is cable loss. PA is preamplifier gain

SAMPLE CALCULATION:

RESULTS: At 124.1080 MHz: = (18.60+14.70) = 33.30 dBuV/m @ 3m

Margin = (43.5-33.30) = 10.2 dB

Test Date: March 14-15, 2011

Tested By Signature: Name: Sina Sobhaniyan

Table 8 – Unintentional Radiator, Radiated Emissions.

Unintentional Radiator, Radiated Emissions- Antenna 2							
Test By: S.S.	Test: FCC Part 15.109, 15.209			Client: RFM/Cirronet			
	Project: 11-0044 Class: B			Model: DNT900			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP
Tested from 30 MHz to 12.5 GHz							
64.5200	23.40	10.44	33.84	40.0	3m./HORZ	6.2	**PK**
121.6000	20.00	14.66	34.66	43.5	3m./HORZ	8.8	**QP**
134.0320	23.10	14.50	37.60	43.5	3m./HORZ	5.9	**QP**
63.7040	21.70	10.51	32.21	40.0	3m./VERT	7.8	**QP**
257.9850	16.80	16.71	33.51	46.0	3m./VERT	12.5	**PK**
206.4350	14.20	14.55	28.75	43.5	3m./HORZ	14.7	**PK**
219.3420	15.70	14.46	30.16	46.0	3m./HORZ	15.8	**PK**
224.9220	17.50	14.64	32.14	46.0	3m./HORZ	13.9	**PK**
525.2400	19.30	23.19	42.49	46.0	3m./HORZ	3.5	**PK**
1274.1000	48.01	-8.93	39.08	54.0	3.0m./VERT	14.9	**PK**
1330.2000	49.60	-8.64	40.96	54.0	3.0m./VERT	13.0	**PK**
1439.3000	48.79	-8.64	40.15	54.0	3.0m./VERT	13.8	**AVG**

No other emissions detected within 20 dB of the FCC Part 15.109 limits

AF is antenna factor. CL is cable loss. PA is preamplifier gain

SAMPLE CALCULATION:

RESULTS: At 65.52 MHz: = (23.40+10.44) = 33.84 dBuV/m @ 3m

Margin = (40-33.84) = 6.2 dB

Test Date: March 14-15, 2011

Tested By Signature: Sina Sobhaniyan Name: Sina Sobhaniyan

2.13 Unintentional Radiator Power Lines Conducted Emissions (CFR 15.107)

The test data provided herein is to support the Verification requirement for the digital apparatus. The power line conducted voltage measurements for Receiver and Digital Devices have been carried out in accordance with CFR 15.107 and ANSI C63.4, Paragraph 7, with a spectrum analyzer connected to an LISN and the EUT placed into an idle condition or a continuous mode of receive (non-transmitting). Please refer to the results as shown in Table 12 below.

Table 9 - Power Line Conducted Emissions Data, Class B

<table>
<tr><th colspan="7">CONDUCTED EMISSIONS</th></tr>
<tr><td>Tested By:
S.S.</td><td colspan="2">Specification Requirement:
FCC Part 15, Para 15.107
Class B</td><td>Project No.:
11-0044</td><td colspan="3">Manufacturer/Model:
RFM/Cirronet model: DNT900</td></tr>
<tr><th>Frequency
(MHz)</th><th>Test Data
(dBuV)</th><th>LISN+CL-PA
(dB)</th><th>Corrected
Results
(dBuV)</th><th>Avg
Limits
(dBuV)</th><th>Margin
(dB)</th><th>Detector</th></tr>
<tr><td colspan="7">This test was not re-evaluated because this is a C2PC and the change involves the amplifier at the antenna circuit, while all other circuits and components remain the same.</td></tr>
</table>

Tested from 150 kHz to 30 MHz
SAMPLE CALCULATIONS: N/A

Test Date: January 25, 2010
Tested By Signature: ____________ Name: Sina Sobhaniyan

2.14 Measurement Uncertainty

2.14.1 Conducted Emissions Measurement Uncertainty:

Measurement Uncertainty (within a 95% confidence level) for this test is ±2.8 dB.

2.14.2 Radiated Emissions Measurement Uncertainty:

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ±5.3 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ±5.1 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ±5.1 dB.

The data listed in this test report does not have sufficient margin to negate the effects of uncertainty, therefore, this test is conditionally acceptable.

2.15 6 dB Bandwidth Measurement per CFR 15.247, 99% Occupied Bandwidth (IC RSS 210, A8.1)

The EUT antenna port was connected to a spectrum analyzer having a 50 Ω input impedance. Measurements were performed similar to the method of FCC Docket # 558074 for a bandwidth of 6 dB. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW ≥ RBW. The results of this test are given in Table 10 and Figures 16 through 21.

Table 10 – 6 dB Bandwidth and 99% Occupied Bandwidth

Frequency (MHz)	6 dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)
902	594	1396
915	578	1424
926	592	1474

Test Date: March 19, 2011

Tested By
Signature: ________________ Name: George Yang

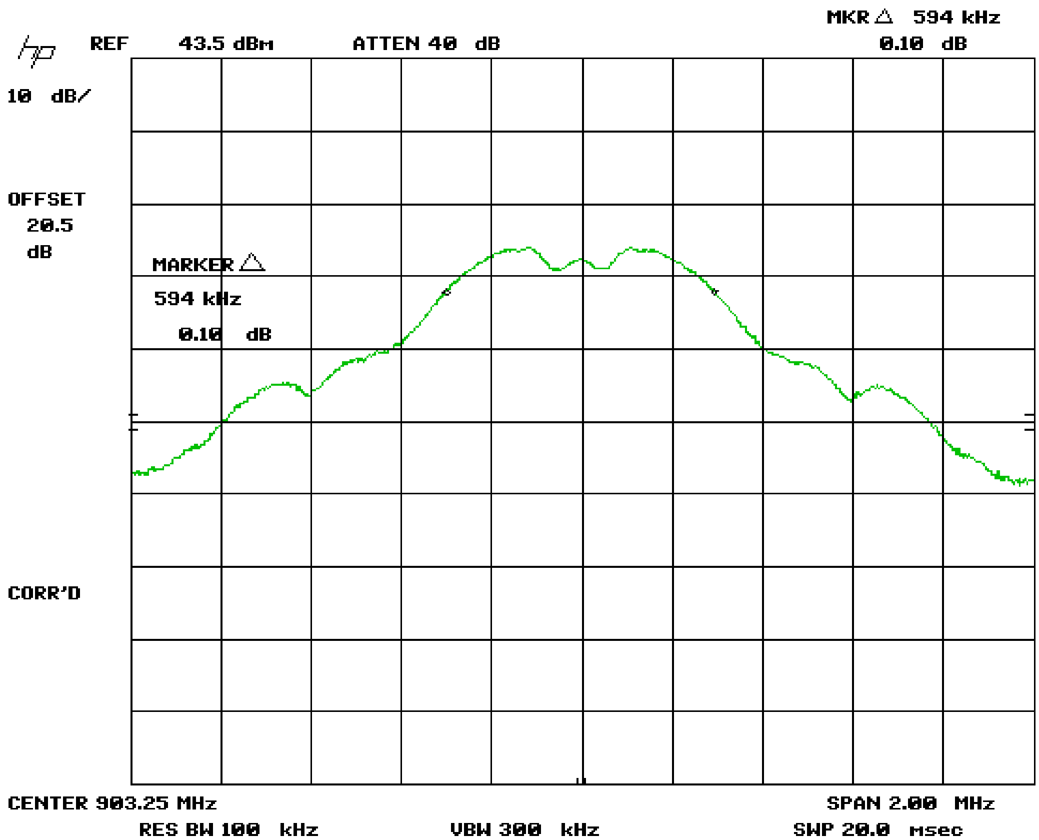

Figure 16 – Low Channel

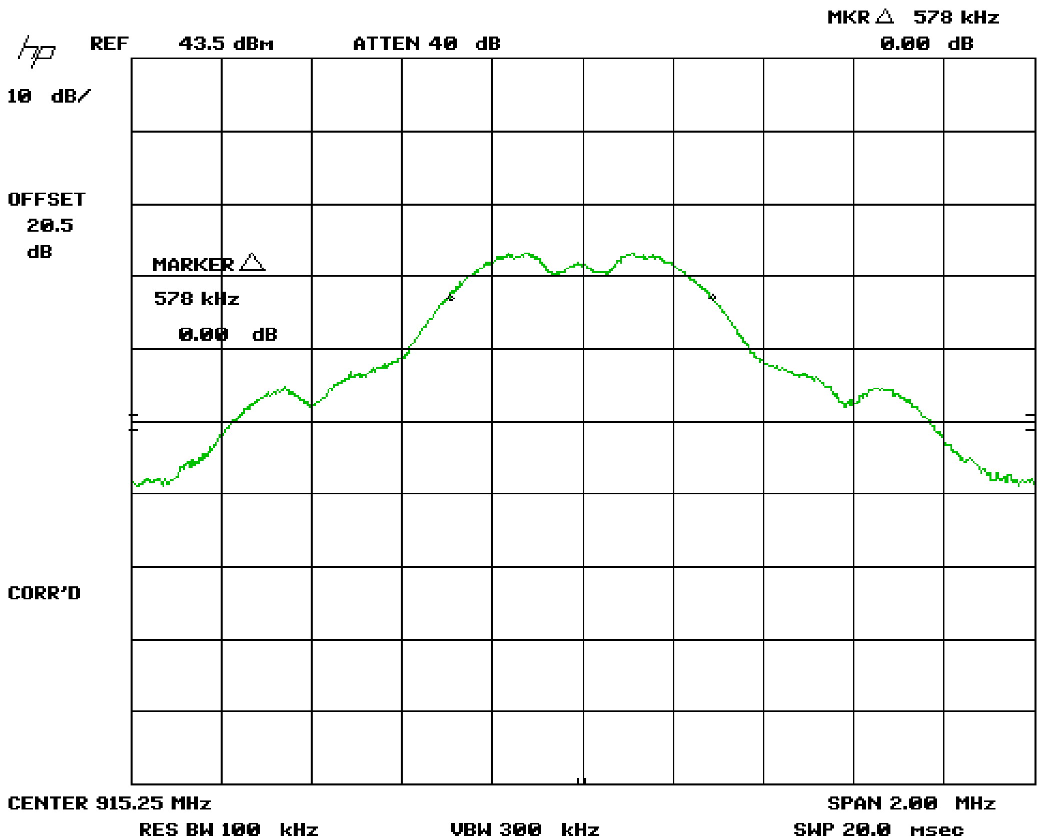

Figure 17 – Mid Channel

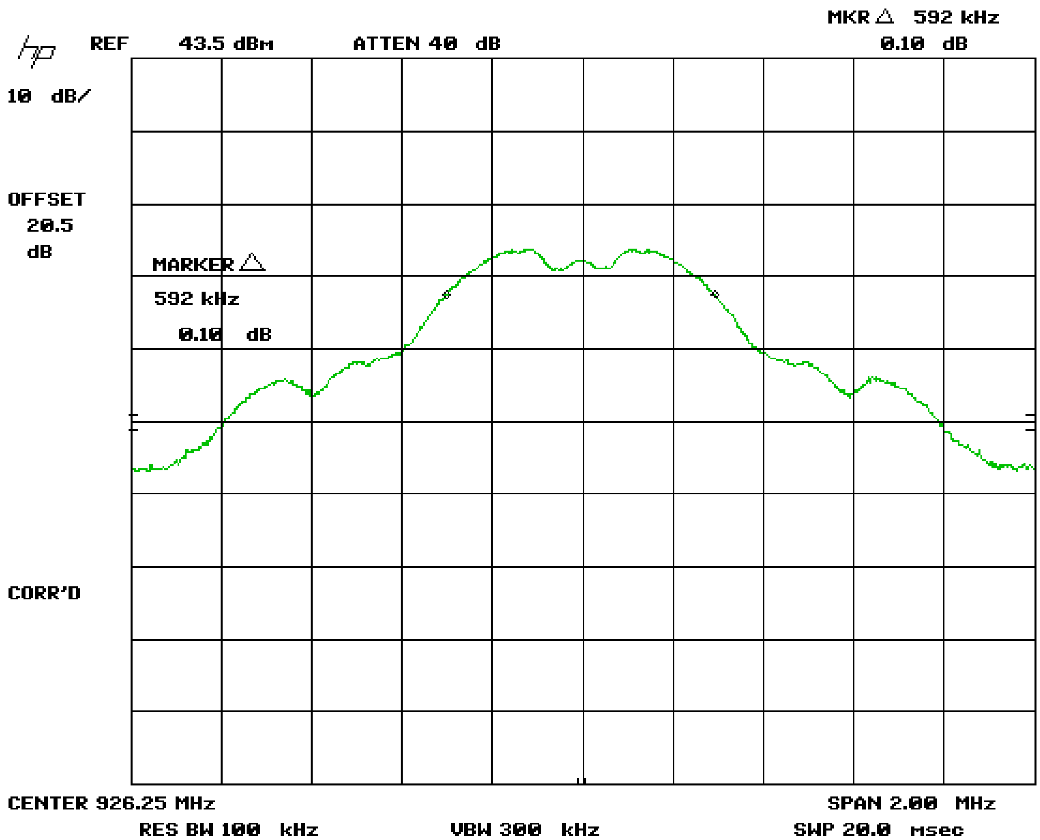

Figure 18 – High Channel

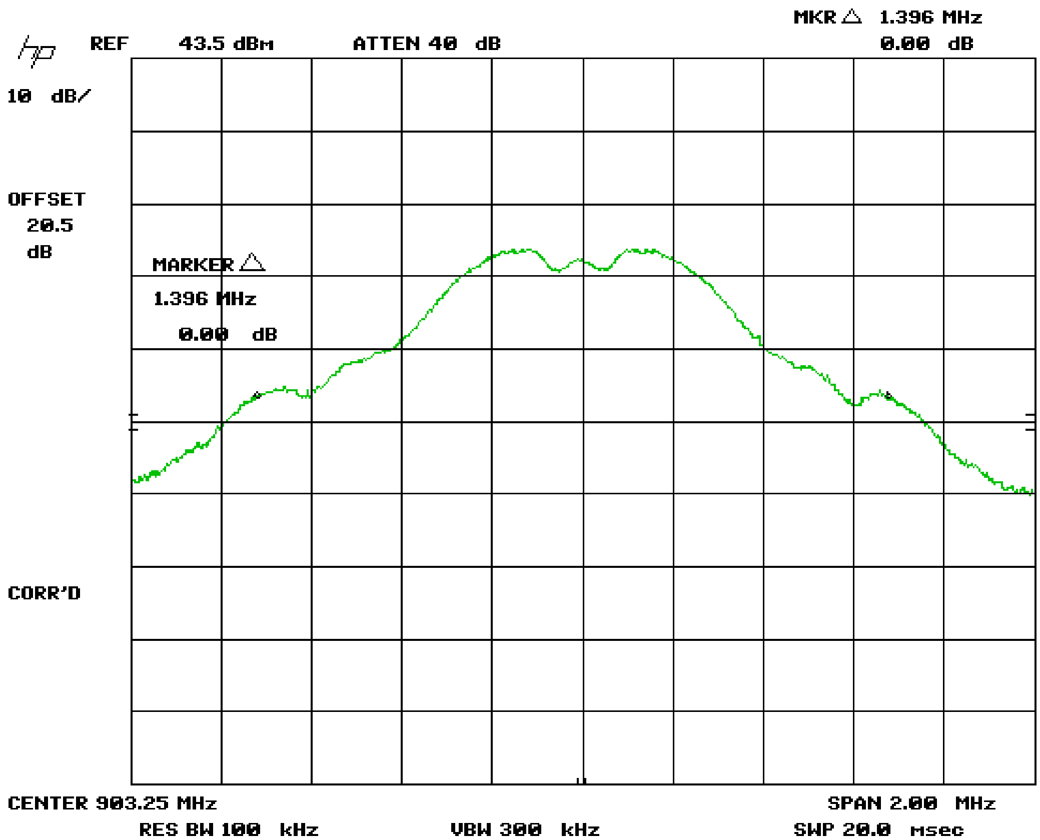

Figure 19 – 99% BW Low Channel

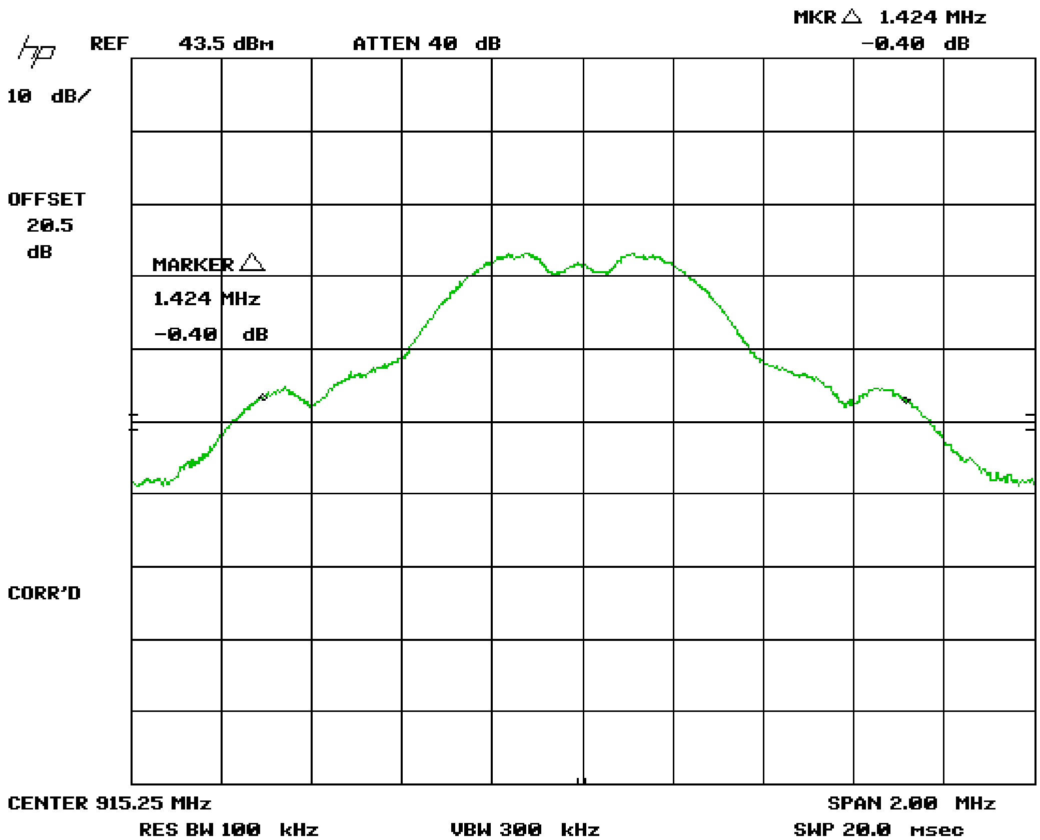

Figure 20 – 99% BW Mid Channel

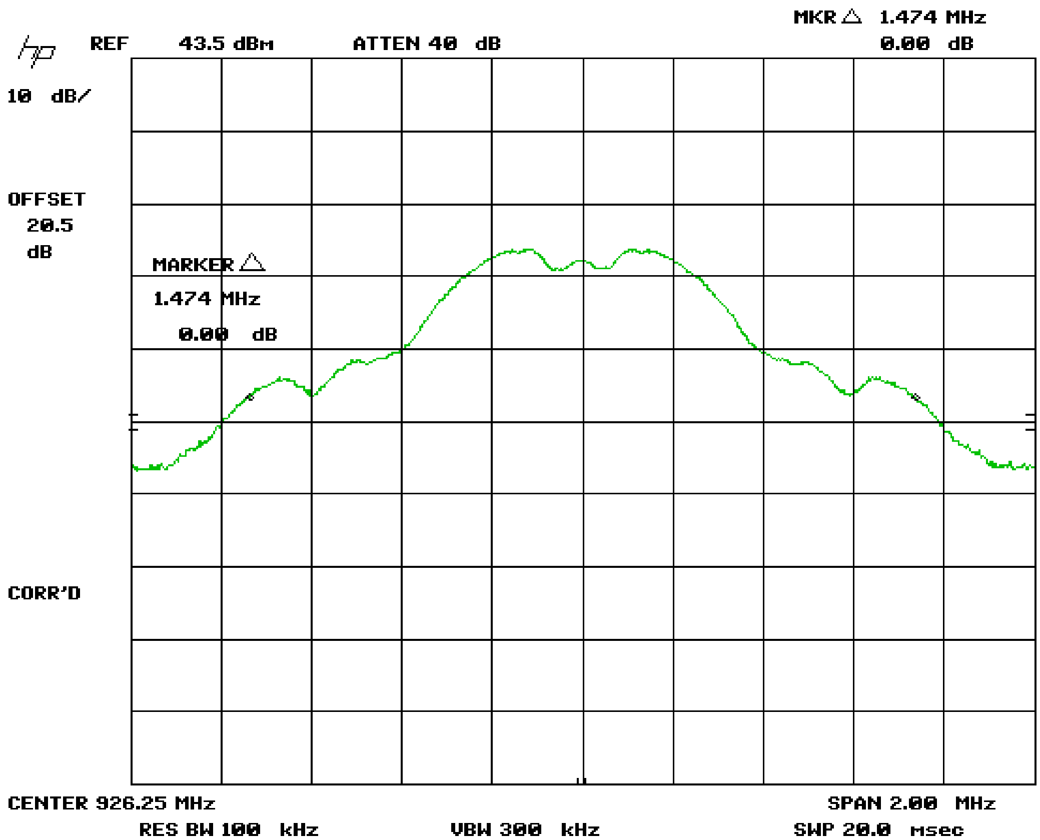

Figure 21 – 99% BW High Channel

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

The transmitter was placed into a continuous mode of operation at all applicable frequencies. 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 ≥ RBW. 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 the table and figures below. Results are corrected by adding 0.5 dB to the measured value to account for the cable loss. All are less than +8 dBm per 3 kHz band.

Table 11 – Power Spectral Density

Frequency (MHz)	Correct Test Data (dBm/3KHz)	FCC limit (dBm/3KHz)
903.25	6.50	8.0
915.25	5.80	8.0
926.25	6.10	8.0

Test Date: March 19, 2011

Tested By
Signature: ______________ Name: George Yang

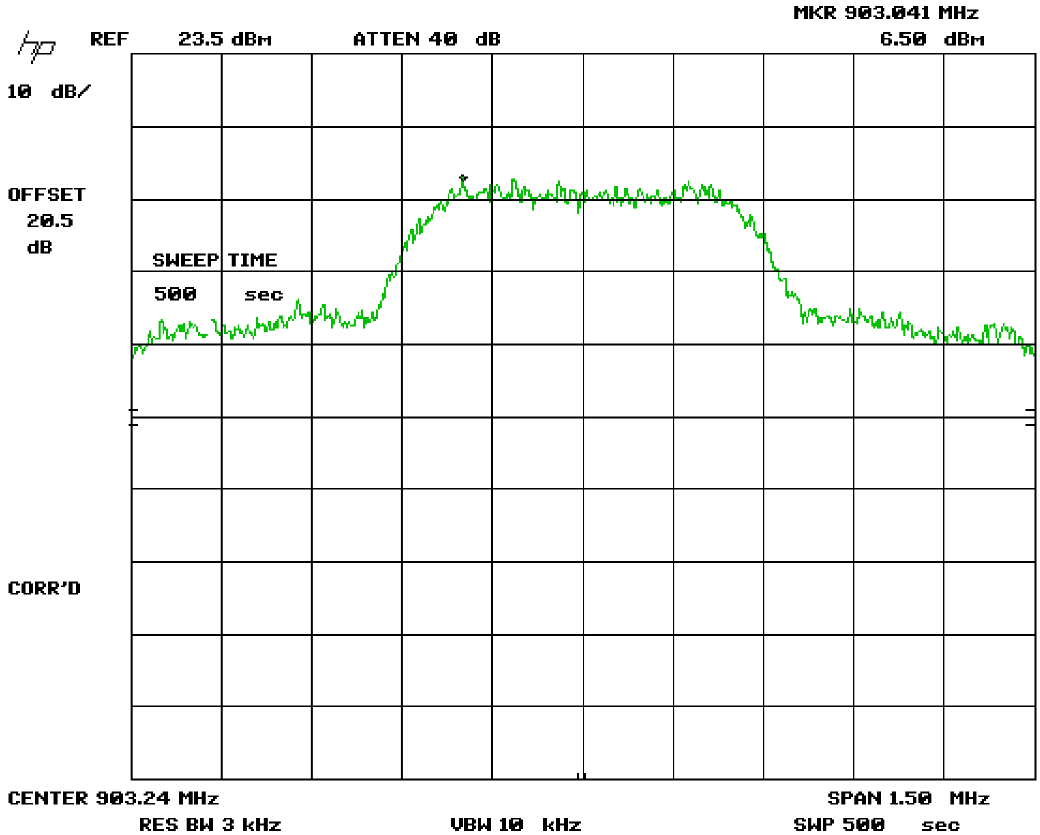

Figure 22 – PSD Low Channel

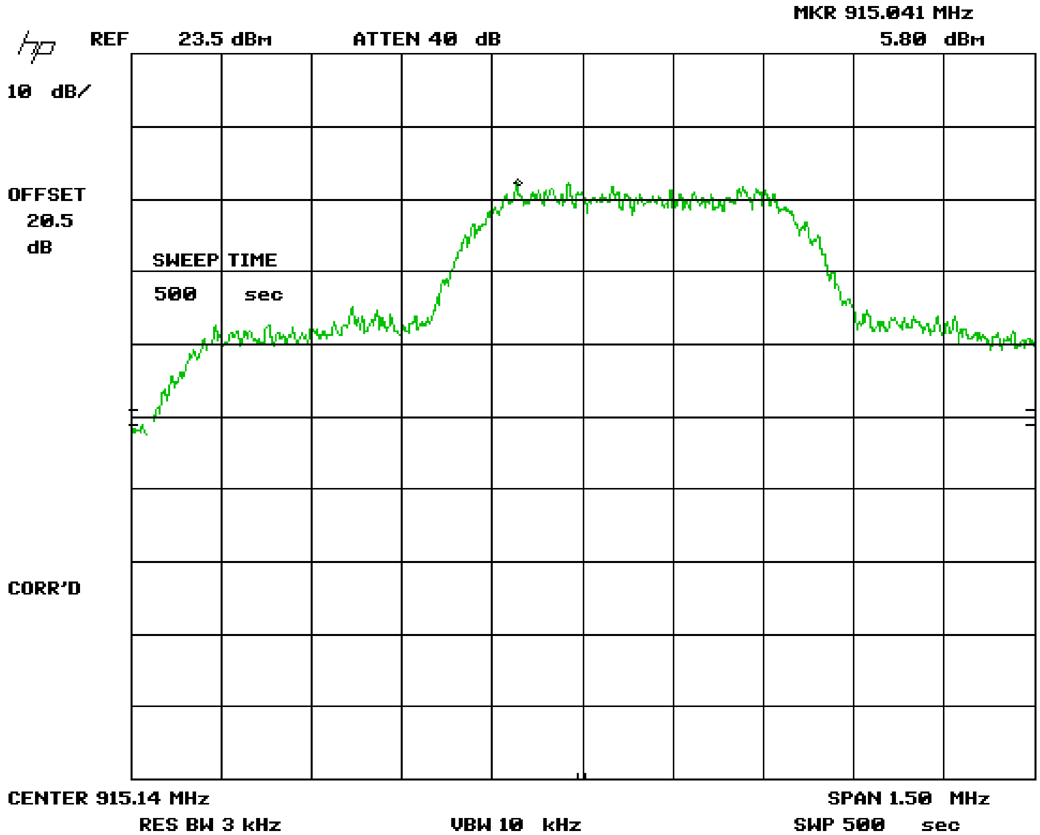

Figure 23 – PSD Mid Channel

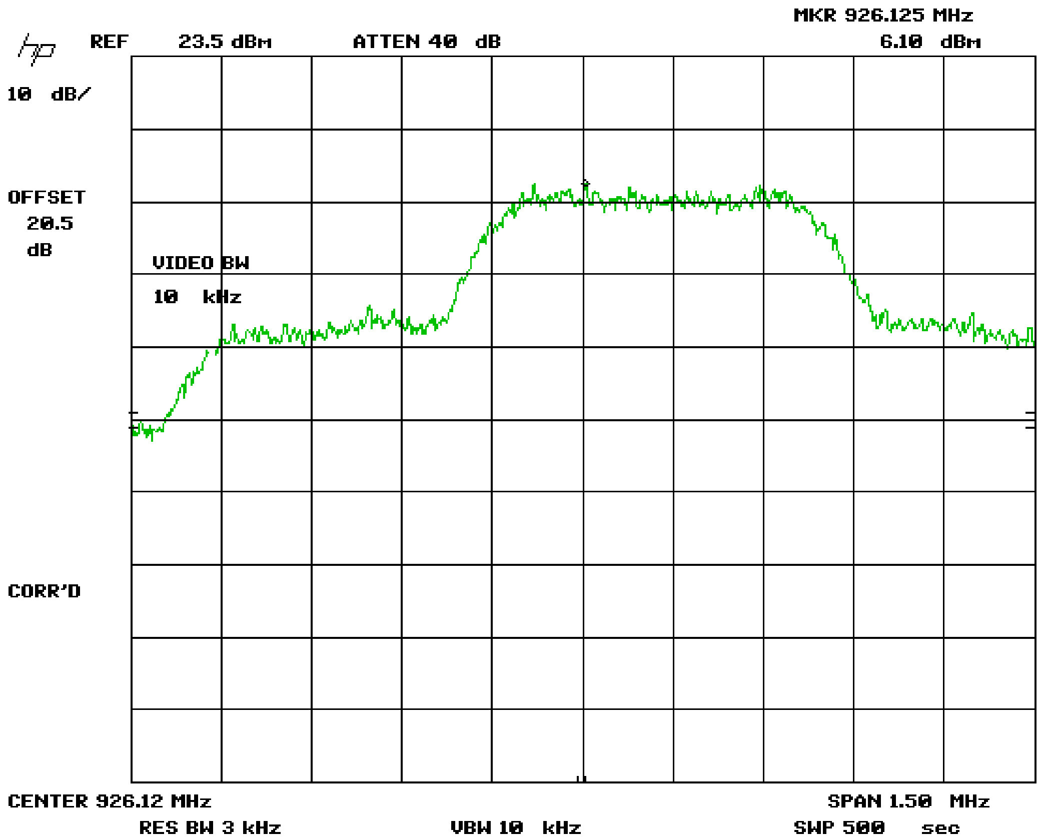

Figure 24 – PSD High Channel

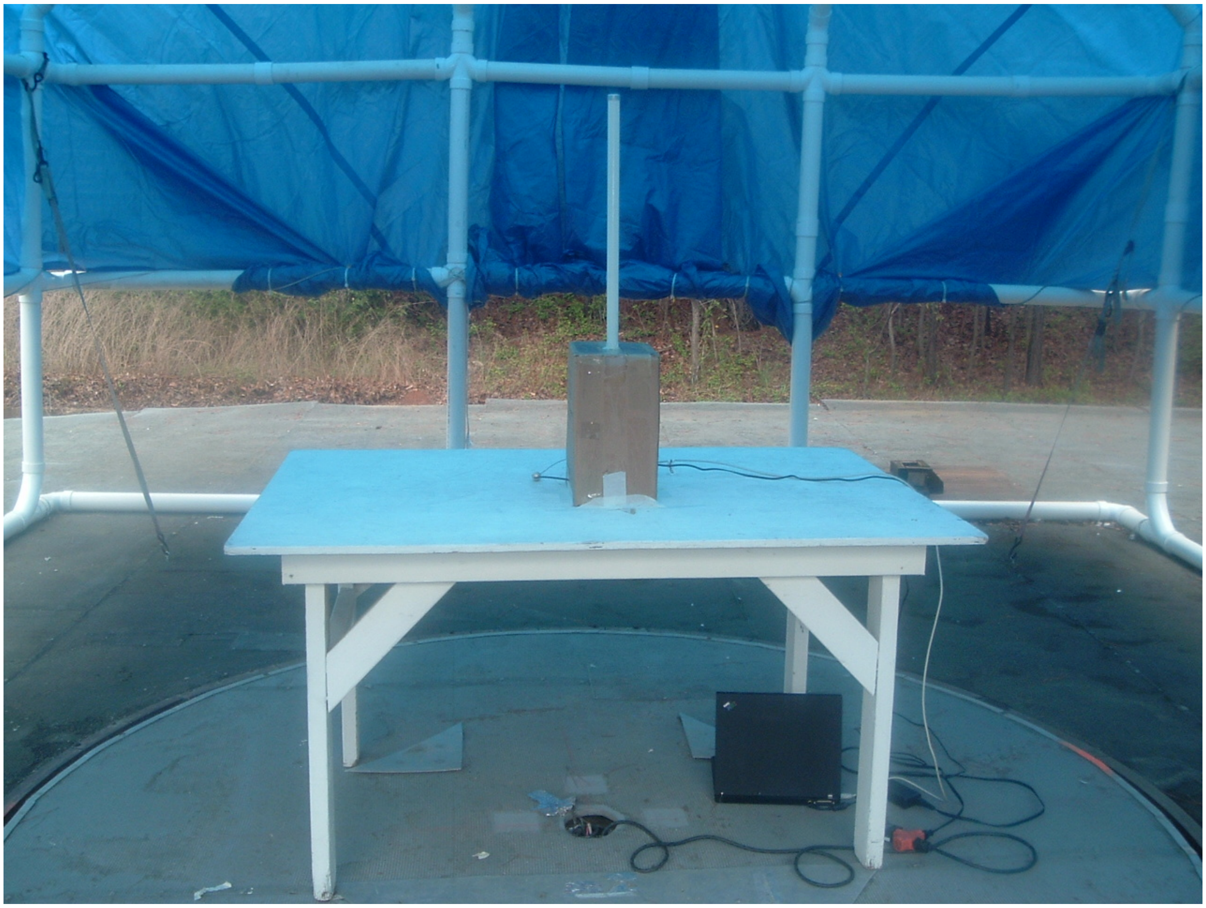

Figure 25- Antenna 1 (Omni) Front View

Figure 26– Antenna 1(Omni) Back View

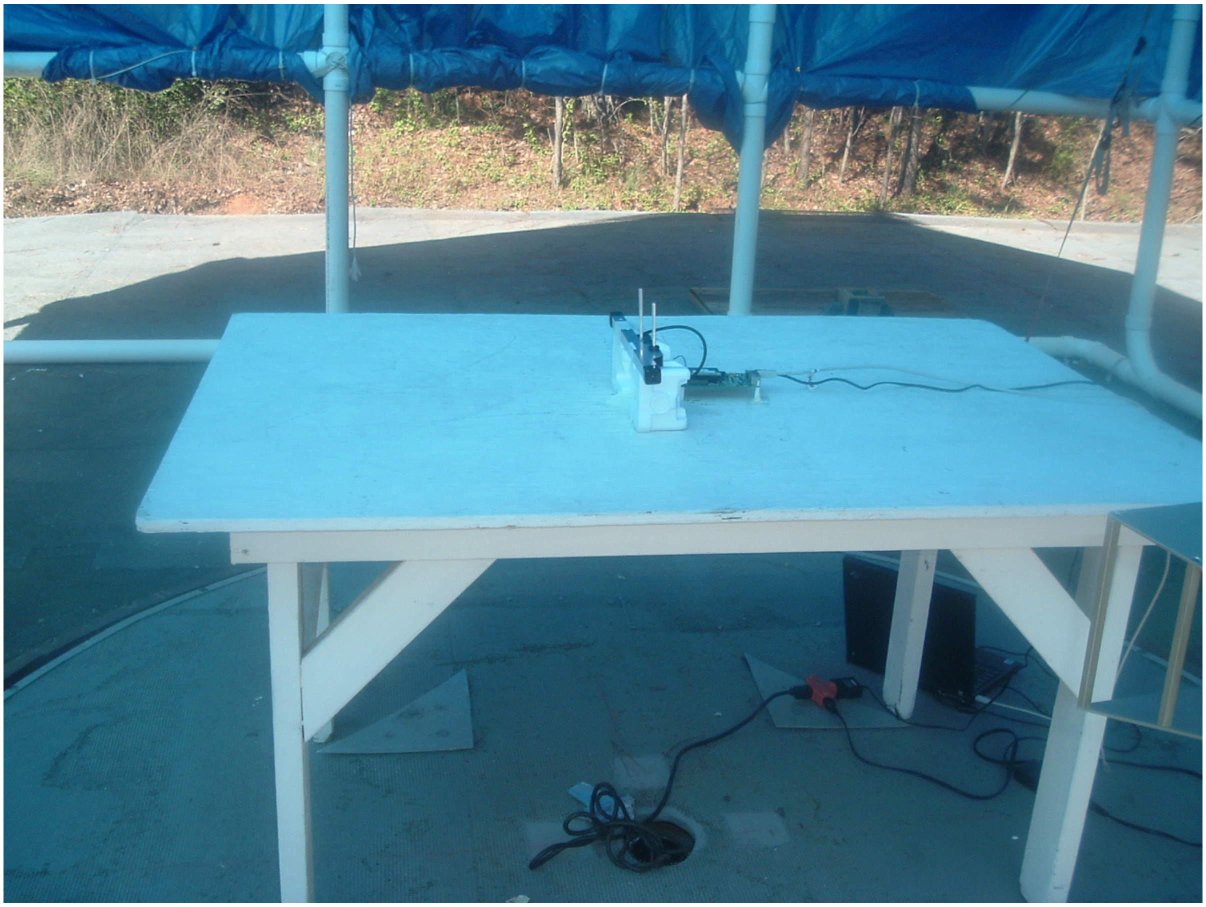

Figure 27– Antenna 2 (Yagi) Front View

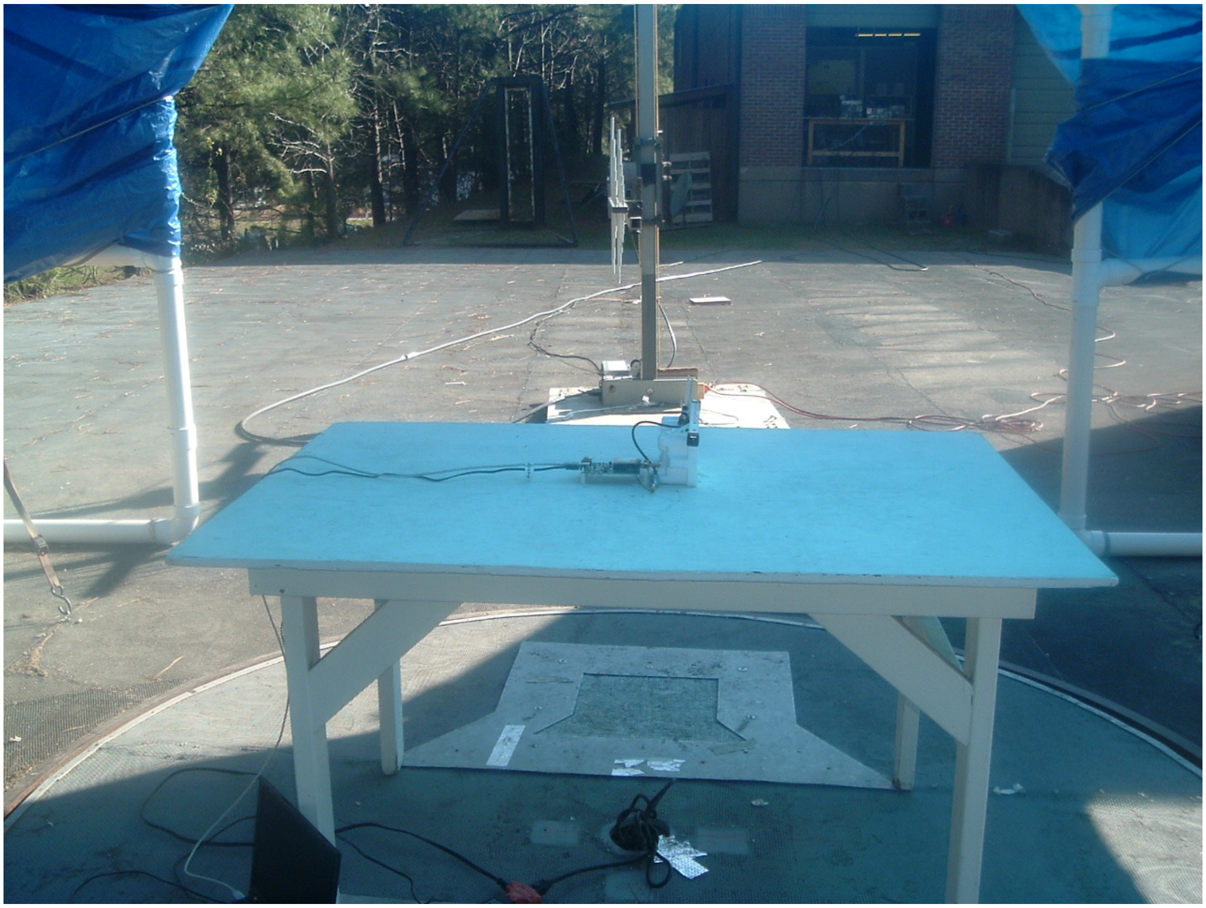

Figure 28– Antenna 2 (Yagi) Back View