Testing Tomorrow's Technology

Application
For

Title 47 USC, Part 2, Subpart J, Paragraph 2.902, Equipment Authorization of Verification for an Unintentional Radiator per Part 15, Subpart B, Paragraphs 15.107 and 15.109

And

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

For the

Cirronet Corporation
Model: DNT24

FCC ID: HSW-DNT24

UST Project: 11-0197
Issue Date: September 29, 2011

Total Pages: 64

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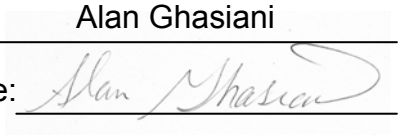
I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date September 29, 2011

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Cirronet Corporation

MODEL: DNT24

FCC ID: HSW-DNT24
IC ID: 4492A-DNT24

DATE: September 29, 2011

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

Equipment type: 2.4 GHz Transmitter 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
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1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 247.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on September 9, 2011 in good operating condition.

1.3 Product Description

The Equipment Under Test (EUT) is the Cirronet Corporation Model DNT24, which is a 2.4 GHZ Transmitter Module. The EUT is a wireless transceiver designed for use in industrial monitoring and control applications and comes in 4 variants. The only difference between them is that a model is either pinned or castellated and has either a permanent antenna or connector installed. The test was performed using both the DNT24P and DNT24PA as worst case representative samples.

Model Number:	Variant
DNT24P	Pinned with connector
DNT24PA	Pinned with antenna
DNT24C	Castellated with connector
DNT24CA	Castellated with antenna

The EUT is plugged into an evaluation board which requires an external 9V power supply and provides a regulated source of 5 VDC to the module. A laptop PC with Cirronet proprietary software is needed to communicate with the device in its test mode state.

The module provides general purpose analog and digital I/O for use by the applications board (see module schematic). The module firmware implements Cirronet proprietary protocols.

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 KDB Publication number 558074 for Digital Transmission Systems Operating Under section 15.247. Also, FCC, KDB Publication No. 558074 was used as a test procedure guide.

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.

1.6 Related Submittal(s)/Grant(s)

The EUT will be used to wirelessly send/receive data. The transceiver presented in this report will be used with other like transceivers:

The EUT is subject to the following FCC Equipment Authorizations:

a) Certification of the transmitter (with modular approval), see test data presented herein.
b) Verification as a class B digital device.

The manufacturer desires to seek a modular approval on this device.

Table 1 - EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
2.4 GHz radio Cirronet Corp. (EUT)	DNT24	Engineering Sample	Pending: HSW-DNT24	6' U - P
Antenna, Please see Antenna description	--	--	None	N/A
DC Power Supply GlobTek	GT-21088-0909-W2	003276 17/04	None	6' U-P
Laptop Computer IBM	Various	--	--	6' U -P
Power Supply IBM	Various	--	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 herein.

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 Extended 90 days
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 Extended 90 days
CALCULATION PROGRAM	N/A	N/A	Ver. 6.0	N/A

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

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 2.4 GHz to 2.4835 GHz, 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 10^{th} 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:

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.5.3 Pulsed Transmitter Averaging

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may also be expressed logarithmically in dB. Please section 2.8 herein for details.

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. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4 - Allowed Antenna(s)

MANUFACTURER	TYPE OF ANTENNA	MODEL	REPORT REFERENCE	GAIN dB_i	TYPE OF CONNECTOR
Fractus Antenna	Chip antenna	FR05-S1-N-0-104	FRACTUS	1.7	Permanently attached
RFM/Cirronet	Patch	PA2412	PATCH	12	MMCX
Mobile Mark	Omni	OD12-2400	Omni	12	Reverse N or reverse TNC
Mobile Mark	Corner	SCR14-2400CT	Corner	14	Reverse N or reverse TNC

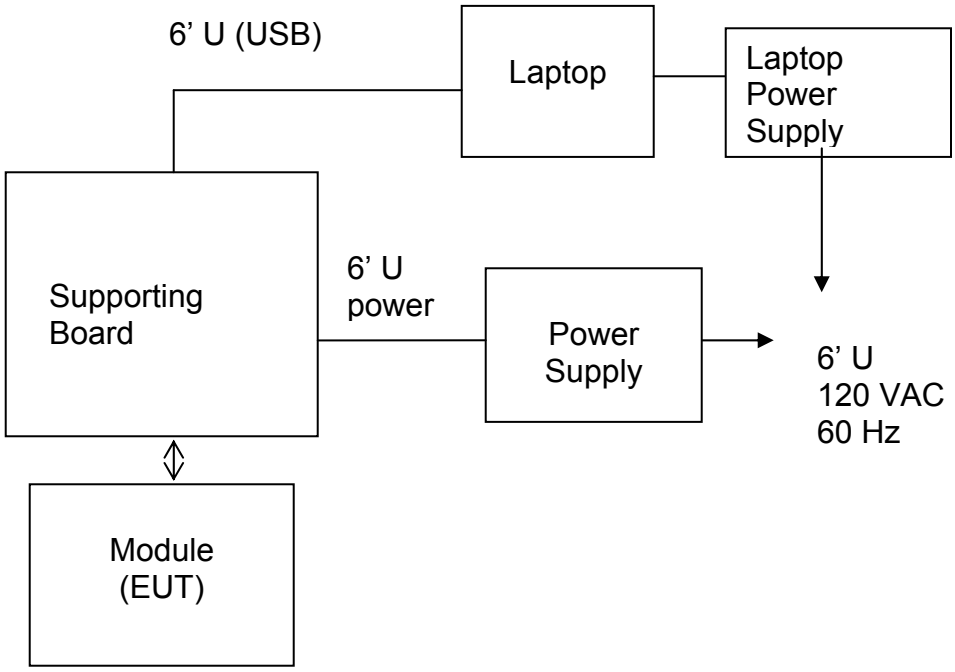


Figure 1- Test Configuration

2.7 Restricted Bands of Operation (Part 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.10.

2.8 Transmitter Duty Cycle (CFR 35 (c))

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 worst-case scenario in any 100 ms timeslot, along with all transmission lengths, will be as follows:

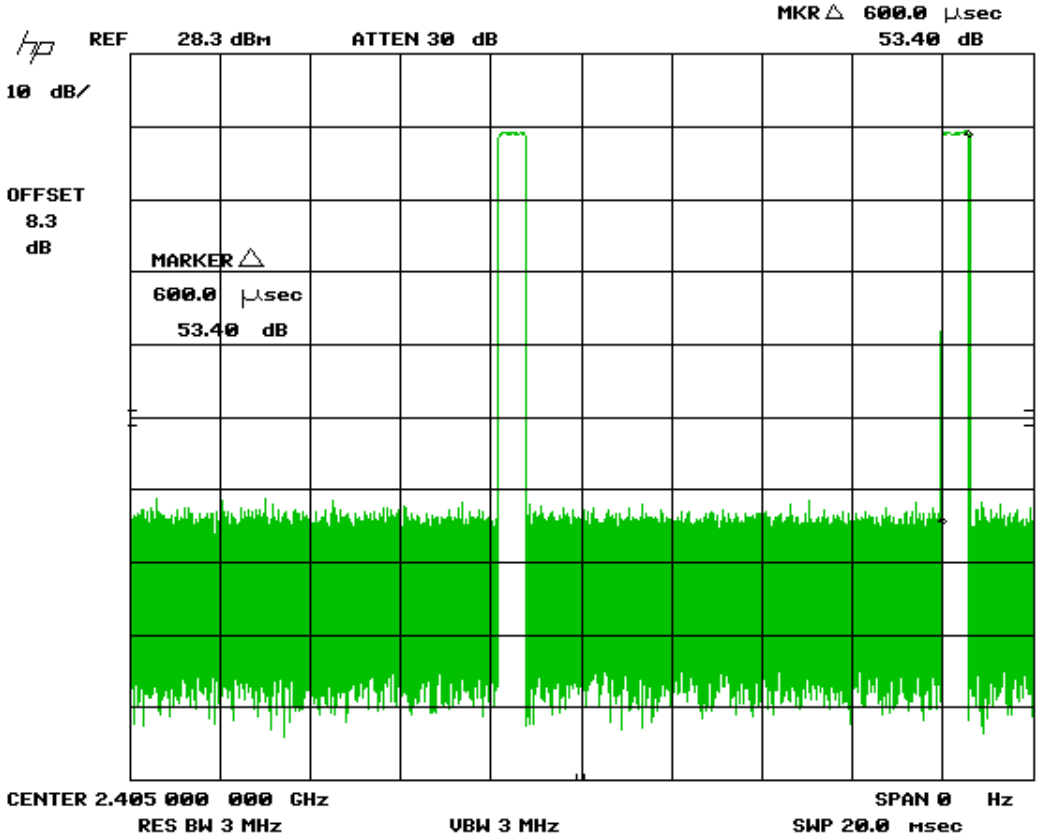


Figure 2 - Duty Cycle Single Pulse

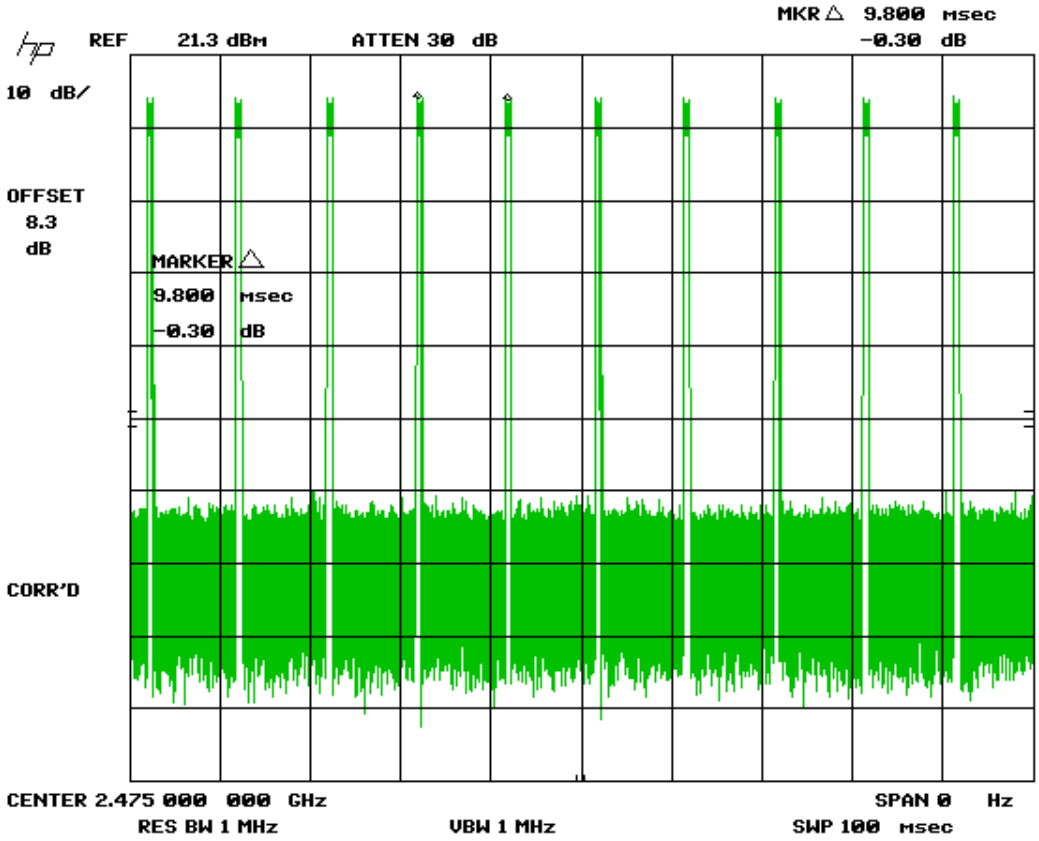


Figure 3 - Duty Cycle 100 msec

The duty cycle is computed as follows (in any 100 ms period): 600usec per pulse

Duty Cycle = (0.6 msec/ 9.8 msec) = 0.06= 6%

Correction Factor = $20\log_{10}(0.06)$ = **-24.43 dB**

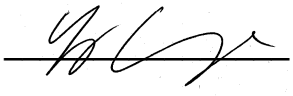
2.9 Intentional Radiator, Power Lines Conducted Emissions (CFR 15.207)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.207, per ANSI C63.4, Paragraph 7, with a spectrum analyzer connected to an LISN and the EUT placed into a continuous mode of transmission.

The worst-case results for conducted emissions were determined to be produced when the EUT was operating under continuous transmission on the low channel. There were no signals within 10.4 dB of the Average limits. Those results are given in Table 5 below.

Table 5 – Transmitter Power Line Conducted Emissions Test Data

CONDUCTED EMISSIONS 150 kHz to 30 MHz						
Tested By: GY	**Specification Requirement: FCC Part 15.207 Class B**		**Project No.: 11-0197**	**Manufacturer/Model: Cirronet Corporation Model DNT24**		
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL-PA (dB)**	**Corrected Results (dBuV)**	**Avg Limits (dBuV)**	**Margin (dB)**	**Detector**
120 VAC, 60 Hz, Phase Line						
0.4939	34.25	0.15	34.40	46.1	11.7	**PK**
0.5900	29.43	0.14	29.57	46.0	16.4	**PK**
2.0700	35.23	0.36	35.59	46.0	10.4	**PK**
5.4000	35.16	0.33	35.49	50.0	14.5	**PK**
10.1000	22.93	0.55	23.48	50.0	26.5	**PK**
25.8000	33.41	1.17	34.58	50.0	15.4	**PK**
120 VAC, 60 Hz, Neutral Line						
0.4948	34.94	0.25	35.19	46.1	34.94	**PK**
0.5438	28.81	0.24	29.05	46.0	28.81	**PK**
1.9800	34.66	0.36	35.02	46.0	34.66	**PK**
5.9130	35.16	0.33	35.49	50.0	35.16	**PK**
14.2000	21.96	0.80	22.76	50.0	21.96	**PK**
25.3500	29.27	1.17	30.44	50.0	29.27	**PK**

SAMPLE CALCULATIONS: At 493.9 kHz, = 34.25 + (0.15) = 34.40 dBuV
Test Date: September 29, 2011
Tested By
Signature:  Name: George Yang

2.10 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 KDB Publication 558074 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 3 through 8 below. The limit for antenna conducted power is 1 Watt (30 dBm) per 15.247 (b)(3).

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 6 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.

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

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, Y, 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.

The test data is detailed below in for this section. Several radiated emissions above 1 GHz were measured at a distance of 1 meter. The measured value at 1 meter was then extrapolated to the resultant at 3 meters using an inverse distance extrapolation factor of -20 dB/decade. There were no test failures.

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

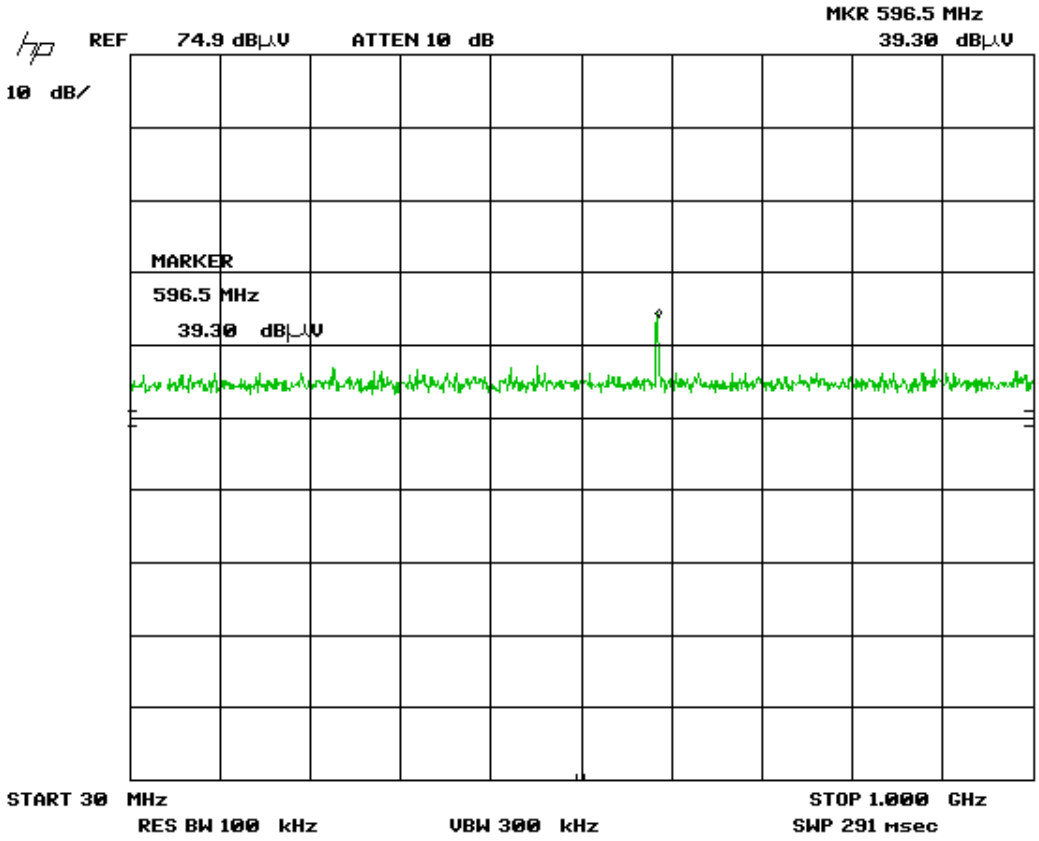


Figure 4 - Antenna Conducted Spurious Emissions - Low Channel, Part 1

2.10 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

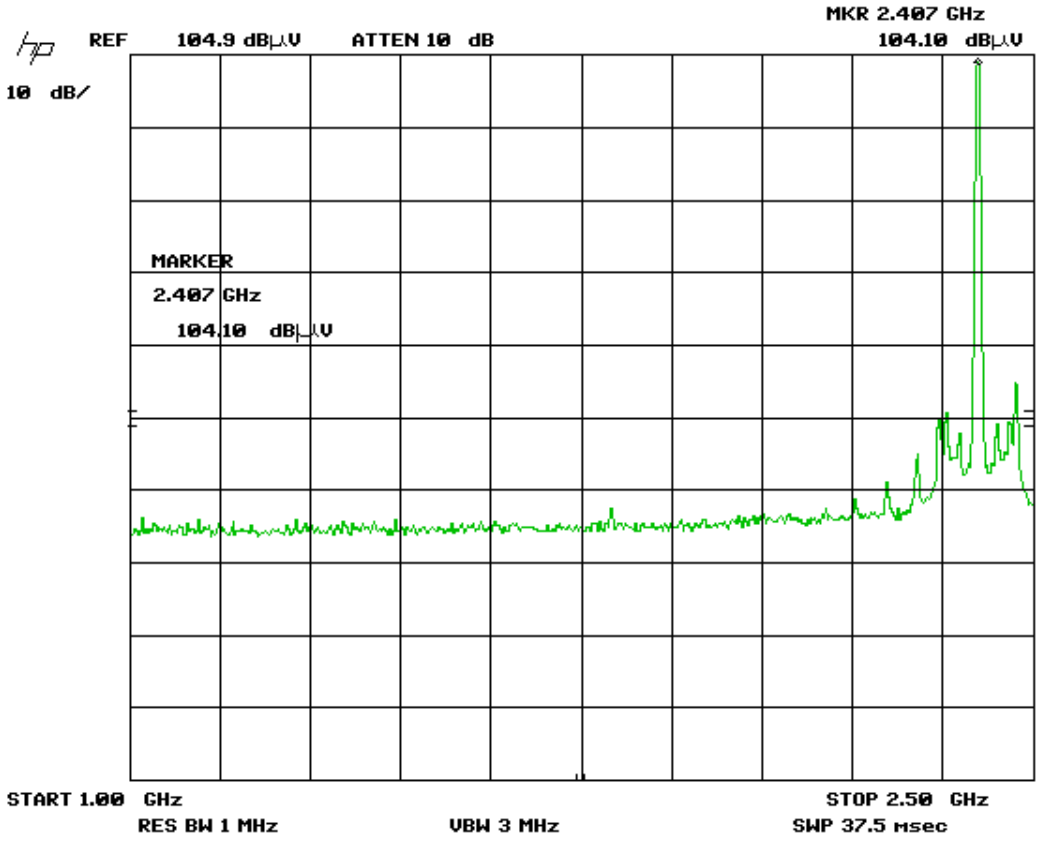


Figure 5 - Antenna Conducted Spurious Emissions - Low Channel, Part 2

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

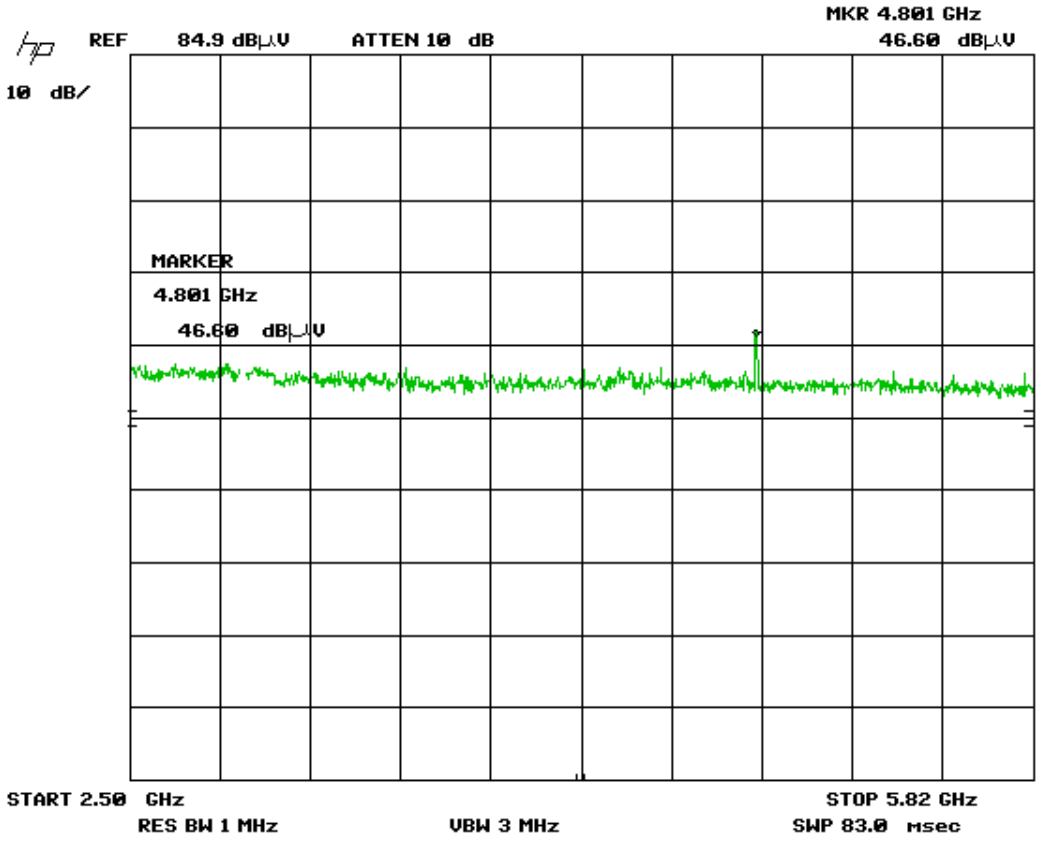


Figure 6 - Antenna Conducted Spurious Emissions - Low Channel, Part 3

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

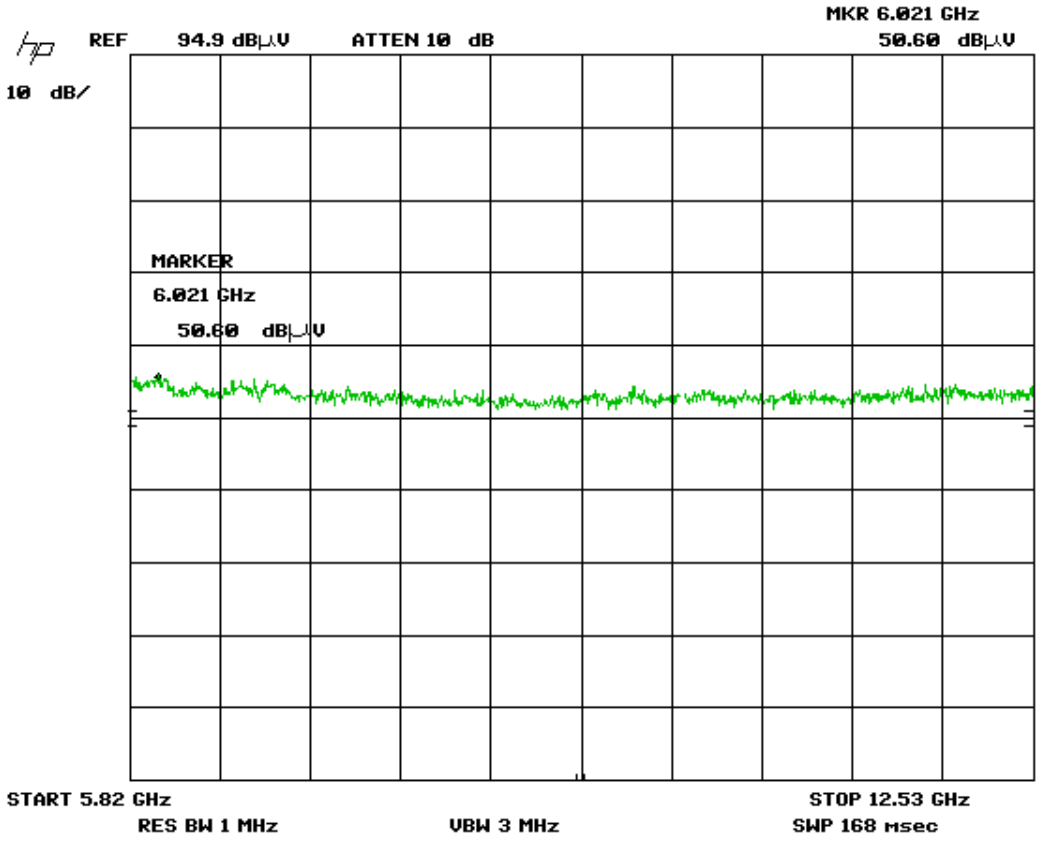


Figure 7 - Antenna Conducted Spurious Emissions - Low Channel, Part 4

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

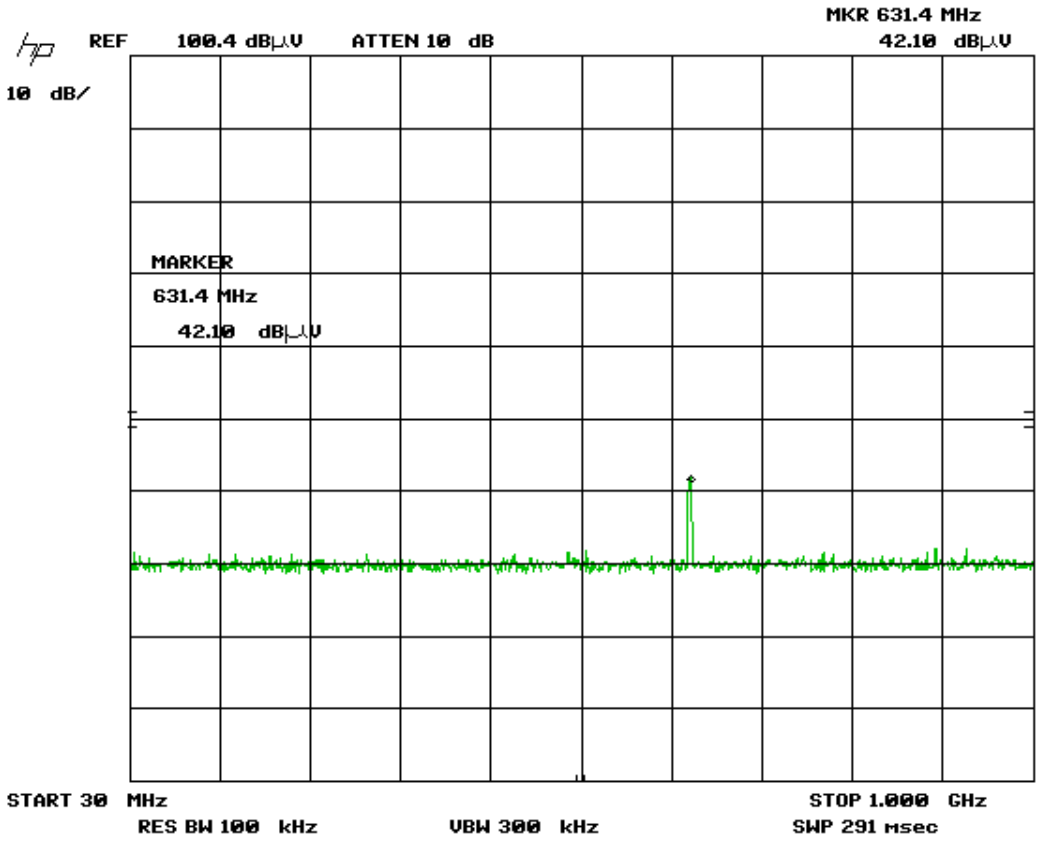


Figure 8 - Antenna Conducted Spurious Emissions - Mid Channel, Part 1

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

Note: Signal shown represents Fundamental Frequency

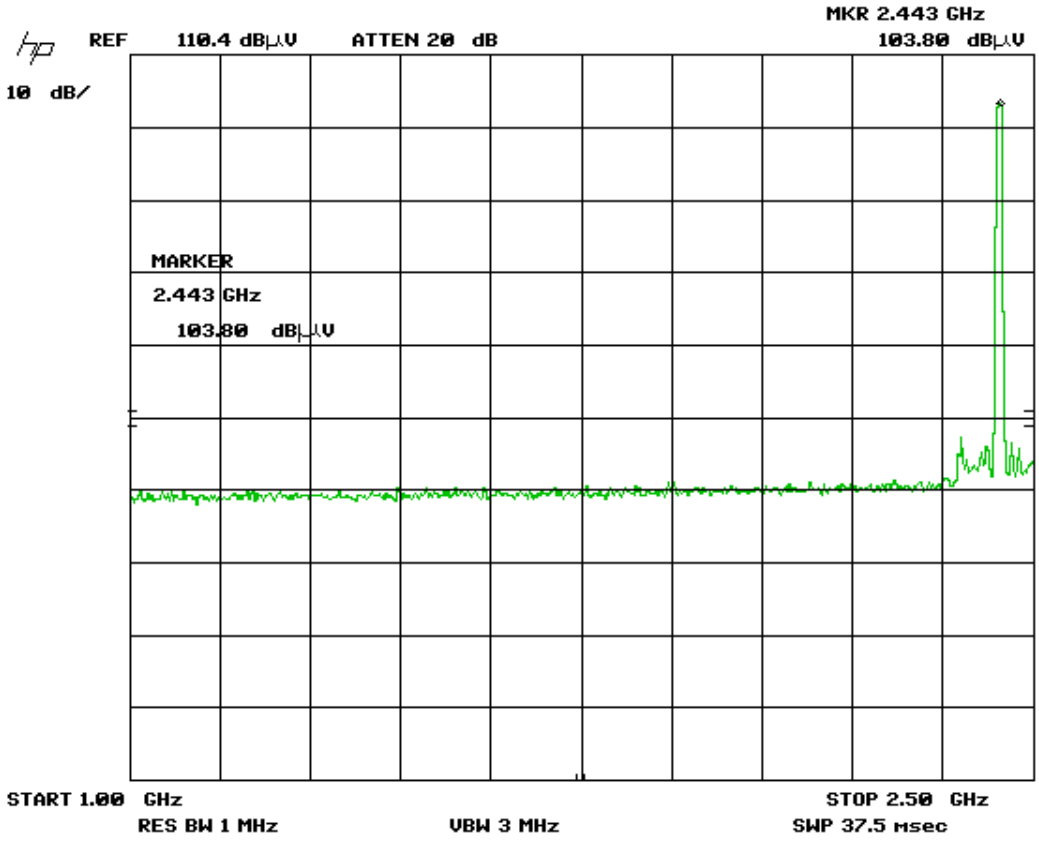


Figure 9 - Antenna Conducted Spurious Emissions - Mid Channel, Part 2

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

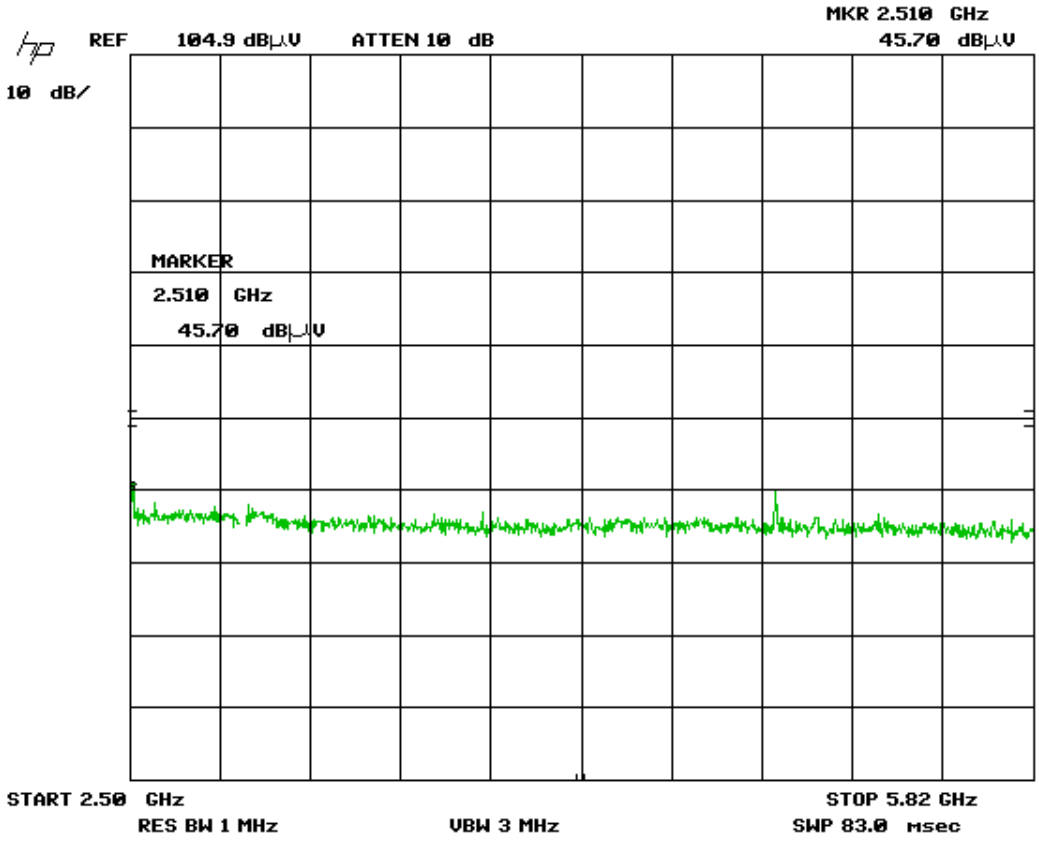


Figure 10 - Antenna Conducted Spurious Emissions - Mid Channel, Part 3

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

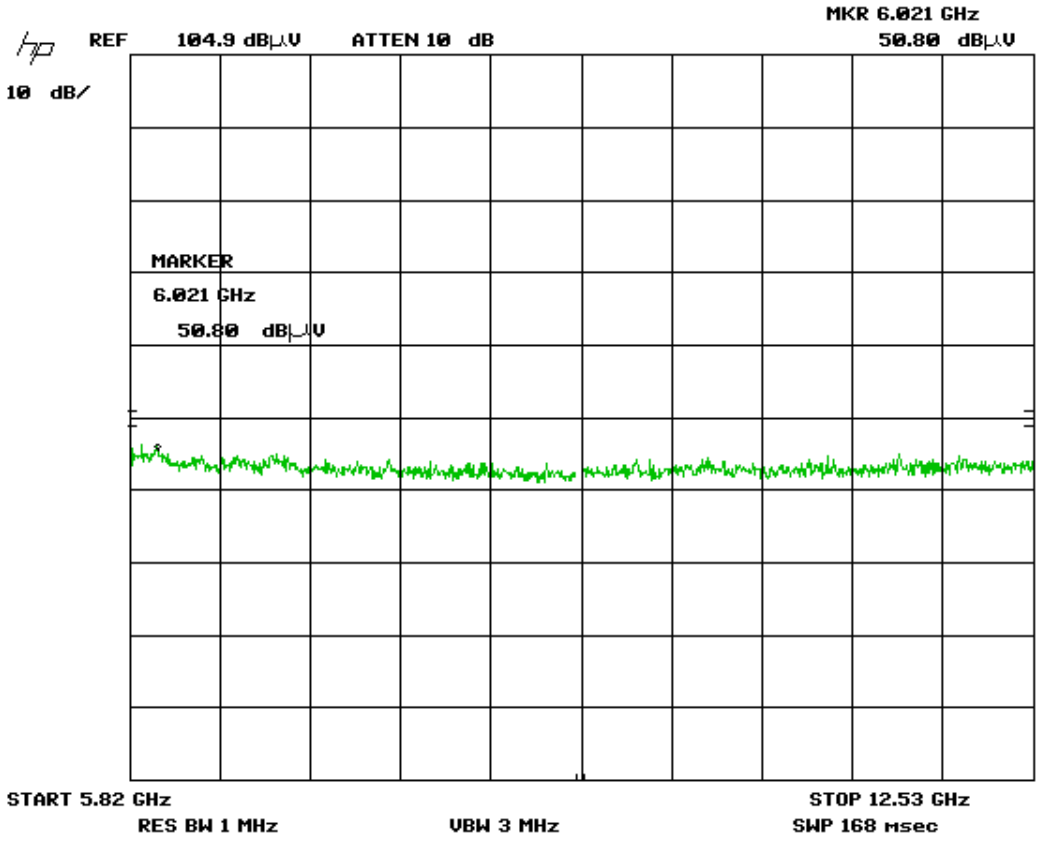


Figure 11 - Antenna Conducted Spurious Emissions - Mid Channel, Part 4

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

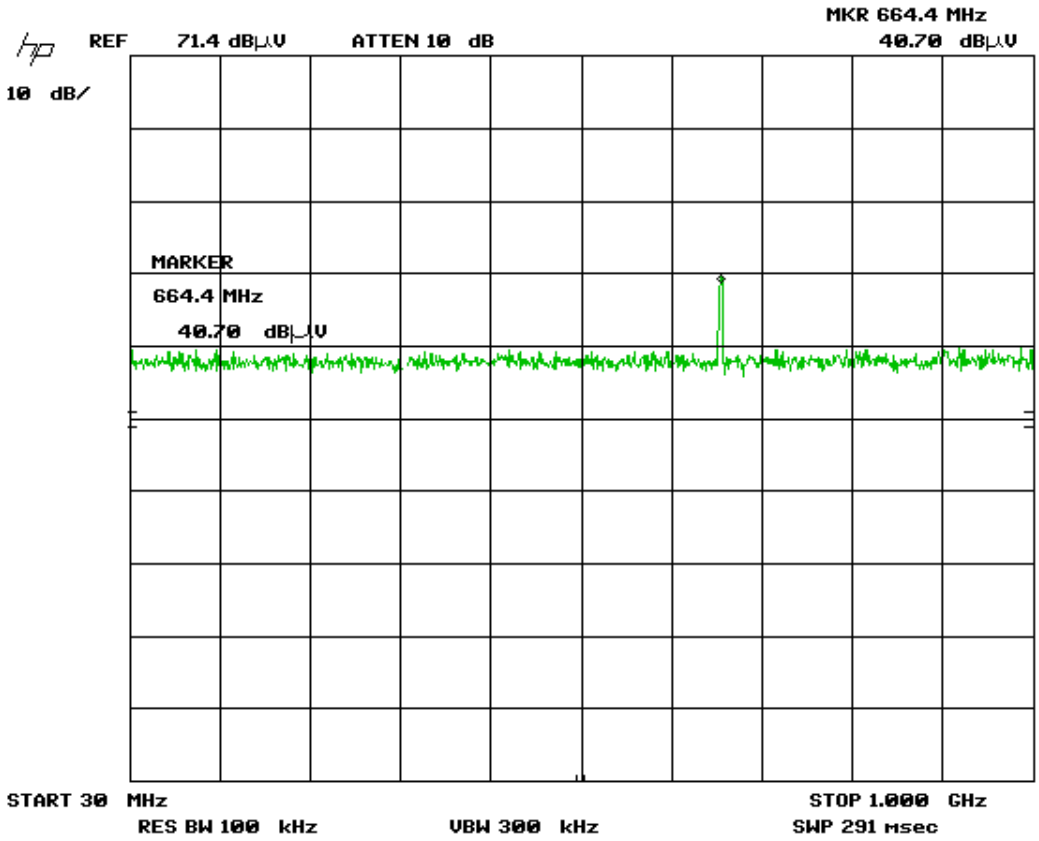


Figure 12 - Antenna Conducted Spurious Emissions - High Channel, Part 1

2.10 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

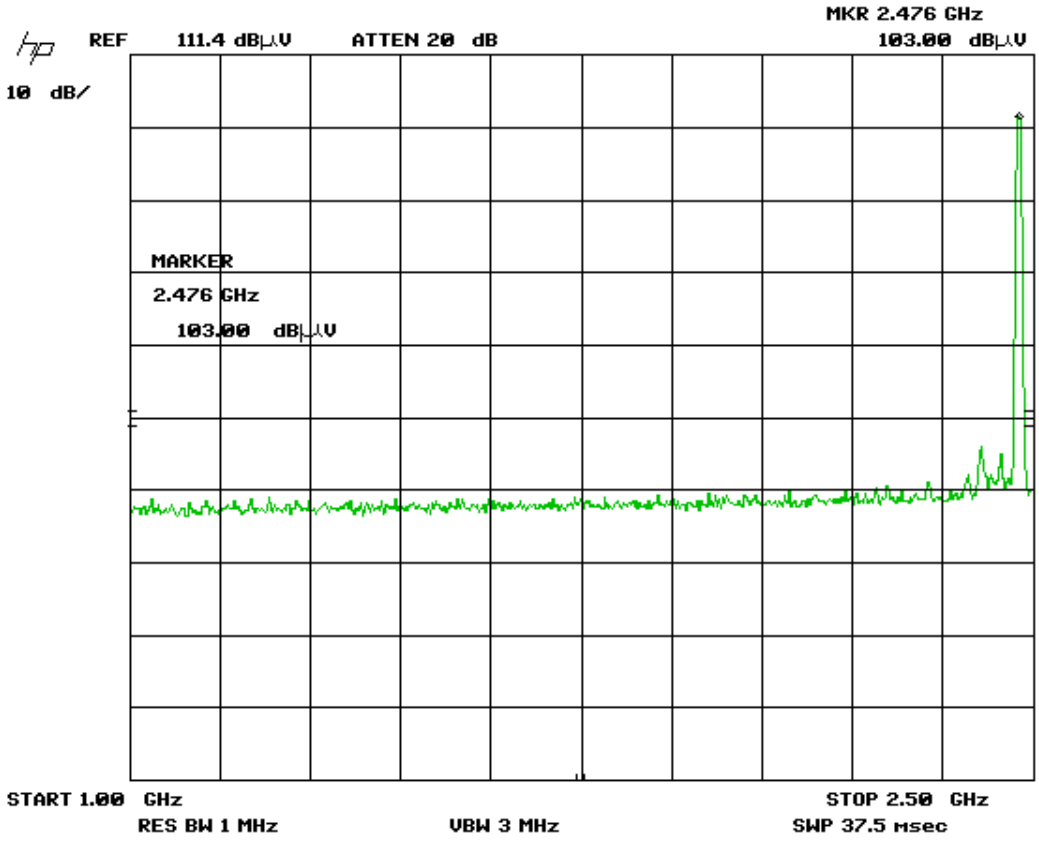


Figure 13 - Antenna Conducted Spurious Emissions - High Channel, Part 2

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

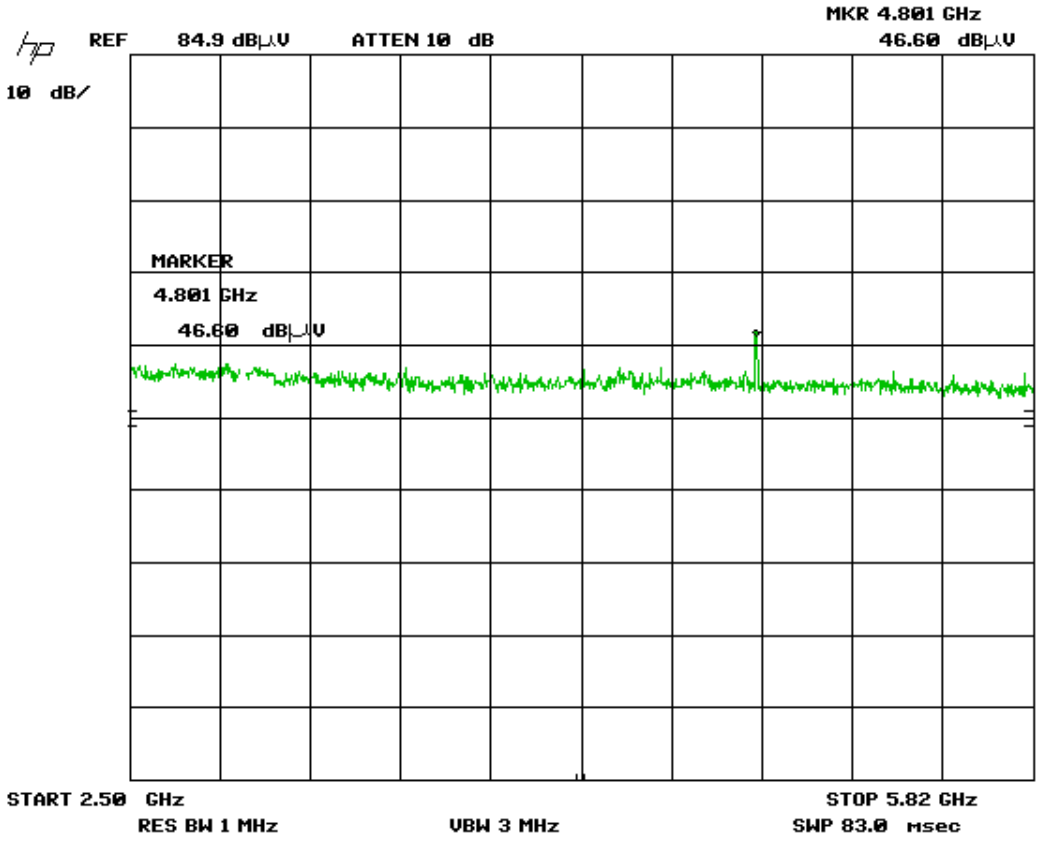


Figure 14 - Antenna Conducted Spurious Emissions - High Channel, Part 3

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

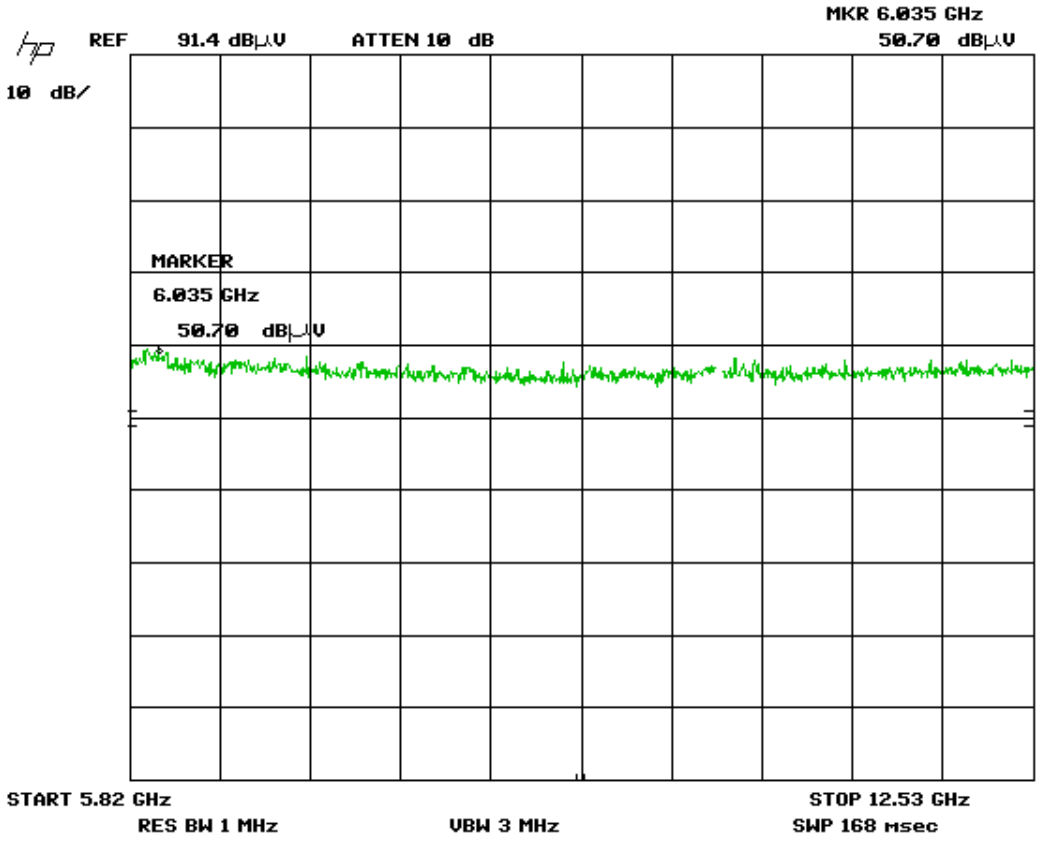


Figure 15 - Antenna Conducted Spurious Emissions - High Channel, Part 4

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

Table 6 – Corner Antenna- Peak Radiated Harmonic & Spurious Emissions

Radiated Harmonic and Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: KM	Test: FCC Part 15, Para 15.247(d)			Client: Cirronet Corporation			
	Project: 11-0197			Model: DNT24			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Pass Margin (dB)	Detector PK / AVG
LOW BAND - PEAK							
2406.28	90.43	31.84	122.27		3.0m./		PK
4810.70	66.11	3.23	70.34	74.0	3.0m./	3.7	PK
7219.30	51.39	9.63	52.48	74.0	1.0m./	21.5	PK
9625.20	49.13	12.40	52.99	74.0	1.0m./	21.0	PK
12031.95	49.04	16.04	56.54	74.0	1.0m./	17.5	PK
MID BAND- PEAK							
2442.85	88.62	31.84	120.46		3.0m./		PK
4882.65	65.41	3.24	69.65	74.0	3.0m./	4.4	PK
7324.20	51.36	10.17	52.99	74.0	1.0m./	21.0	PK
9765.47	46.95	12.20	50.61	74.0	1.0m./	23.4	PK
HIGH BAND- PEAK							
2474.30	88.69	31.87	120.56		3.0m./		PK
4948.78	55.99	3.11	60.10	74.0	3.0m./	13.9	PK
7426.08	48.45	10.00	49.91	74.0	1.0m./	24.1	PK
9901.45	47.31	12.26	51.03	74.0	1.0m./	23.0	PK
12376.50	48.58	16.39	56.43	74.0	1.0m./	17.6	PK

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
2. ND = No other signals detected within 20 dB of specification limit.
SAMPLE CALCULATION:
3. Measurements taken at 1 meter distance were extrapolated to 3 meter using a factor of (-9.5 dB).
4. 1 dB loss factor is added for all measurement using the high pass filter.
RESULTS: At 4810.70 MHz: = 66.11 dBuV+ (1 dB high pass filter loss) + 3.23 dB/m = 70.34 dBuV/m @ 3m
Margin = (74.0 – 70.34) = 3.7 dB

Test Date: September 9, 2011
Tested By
Signature: Keyvan Muvahhid Name: Keyvan Muvahhid

Table 7 – Omni Antenna- Peak Radiated Harmonic & Spurious Emissions

Radiated Harmonic and Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	**Test: FCC Part 15, Para 15.247(d)**			**Client: Cirronet Corporation**			
	Project: 11-0197			**Model: DNT24**			
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Pass Margin (dB)**	**Detector PK / AVG**
LOW BAND - PEAK							
2406.35	87.36	31.84	119.20		3.0m./		**PK**
4810.73	60.59	3.23	64.82	74.0	3.0m./	9.2	**PK**
7219.30	51.33	9.63	52.42	74.0	1.0m./	21.6	**PK**
9621.35	47.33	12.40	51.19	74.0	1.0m./	22.8	**PK**
MID BAND- PEAK							
2442.00	84.93	31.84	116.77		3.0m./		**PK**
4882.60	53.91	3.24	58.15	74.0	3.0m./	15.9	**PK**
7324.20	51.97	10.17	53.60	74.0	1.0m./	20.4	**PK**
HIGH BAND- PEAK							
2475.35	83.98	31.87	115.85		3.0m./		**PK**
4986.50	51.07	3.48	55.55	74.0	3.0m./	18.5	**PK**
7426.08	48.06	10.00	49.52	74.0	1.0m./	24.5	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
2. ND = No other signals detected within 20 dB of specification limit.
SAMPLE CALCULATION:
3. Measurements taken at 1 meter distance were extrapolated to 3 meter using a factor of (-9.5 dB).
4. 1 dB loss factor is added for all measurement using the high pass filter.
RESULTS: At 4810.73 MHz: = 60.59 dBuV+ (1 dB high pass filter loss) + 3.23 dB/m = 64.82 dBuV/m @ 3m
Margin = (74.0 – 64.82) = 9.2 dB

Test Date: September 9, 2011
Tested By
Signature: Keyvan Muvahhid Name: Keyvan Muvahhid

Table 8 – Patch Antenna- Peak Radiated Harmonic & Spurious Emissions

Radiated Harmonic and Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Cirronet Corporation			
	Project: 11-0197			Model: DNT24			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Pass Margin (dB)	Detector PK / AVG
LOW BAND - PEAK							
2406.35	87.43	31.84	119.27		3.0m./		**PK**
4810.55	51.97	3.15	56.12	74.0	3.0m./	17.9	**PK**
7216.15	52.46	9.63	53.55	74.0	1.0m./	20.5	**PK**
9621.17	49.02	12.40	52.88	74.0	1.0m./	21.1	**PK**
MID BAND- PEAK							
2442.23	86.07	31.84	117.91		3.0m./		**PK**
4884.63	52.81	3.24	57.05	74.0	3.0m./	17.0	**PK**
7323.98	51.81	10.17	53.44	74.0	1.0m./	20.6	**PK**
9768.80	45.33	12.20	48.99	74.0	1.0m./	25.0	**PK**
HIGH BAND- PEAK							
2475.30	83.78	31.87	115.65		3.0m./		**PK**
4948.60	56.03	3.78	51.27	74.0	1.0m./	22.7	**PK**
7426.03	53.64	10.00	55.10	74.0	1.0m./	18.9	**PK**
9898.05	46.58	12.39	50.43	74.0	1.0m./	23.6	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
2. ND = No other signals detected within 20 dB of specification limit.
SAMPLE CALCULATION:
3. Measurements taken at 1 meter distance were extrapolated to 3 meter using a factor of (-9.5 dB).
4. 1 dB loss factor is added for all measurement using the high pass filter.
RESULTS: At 4810.55 MHz: = 51.97 dBuV+ (1 dB high pass filter loss) + 3.15 dB/m = 56.12 dBuV/m @ 3m
Margin = (74.0 – 56.12) = 17.9 dB

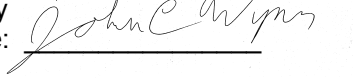
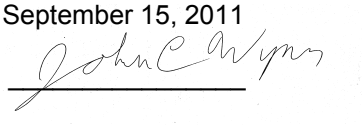
Test Date: September 14, 2011
Tested By
Signature:  Name: John Wynn

Table 9 – Fractus Antenna- Peak Radiated Harmonic & Spurious Emissions

Radiated Harmonic and Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	**Test: FCC Part 15, Para 15.247(d)**			**Client: Cirronet Corporation**			
	Project: 11-0197			**Model: DNT24**			
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Pass Margin (dB)**	**Detector PK / AVG**
LOW BAND - PEAK							
2406.38	78.30	32.63	110.93		3.0m./		**PK**
4810.77	57.25	4.96	53.67	74.0	1.0m./	20.3	**PK**
7216.02	54.68	10.72	56.86	74.0	1.0m./	17.1	**PK**
MID BAND- PEAK							
2442.20	78.10	31.84	109.94		3.0m./		**PK**
4882.80	53.26	3.80	48.52	74.0	1.0m./	25.5	**PK**
7327.05	47.66	10.17	49.29	74.0	1.0m./	24.7	**PK**
HIGH BAND- PEAK							
2474.39	78.10	31.89	109.99		3.0m./		**PK**
4948.78	49.52	3.78	44.76	74.0	1.0m./	29.2	**PK**
7426.08	49.52	10.00	50.98	74.0	1.0m./	23.0	**PK**

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
2. ND = No other signals detected within 20 dB of specification limit.
SAMPLE CALCULATION:
3. Measurements taken at 1 meter distance were extrapolated to 3 meter using a factor of (-9.5 dB).
4. 1 dB loss factor is added for all measurement using the high pass filter.
5. The Fractus antenna was positioned in 3 orthogonal axis (x, y, z) to find the maximum emission the position with the maximum emission is shown herein.

RESULTS: At 4810.77 MHz: = 57.25 dBuV+ (1 dB high pass filter loss)-9.54 + 4.96 dB/m = 53.67 dBuV/m @ 1m
Margin = (74.0 – 53.67) = 20.3 dB

Test Date: September 15, 2011
Tested By
Signature:  Name: John Wynn

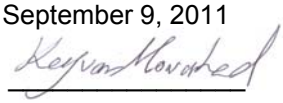
2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d)) (IC RSS 210, A2.9 (a)) (Cont'd).

Table 10 – Corner Antenna- Average Radiated Spurious

Radiated Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Cirronet Corporation			
	Project: 11-0197			Model: DNT24			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA+DC (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Pass Margin (dB)	Detector PK / AVG
LOW BAND - PEAK							
2406.28	90.43	11.84	102.27		3.0m./		**PK**
4810.70	66.11	-16.77	50.34	54.0	3.0m./	3.7	**PK**
7216.15	51.39	-10.37	32.48	54.0	1.0m./	21.5	**PK**
9625.20	49.13	-7.60	32.99	54.0	1.0m./	21.0	**PK**
12031.95	49.04	-3.96	36.54	54.0	1.0m./	17.5	**PK**
MID BAND- PEAK							
2442.85	88.62	11.84	100.46		3.0m./		**PK**
4882.65	65.41	-16.76	49.65	54.0	3.0m./	4.4	**PK**
7324.25	51.36	-9.83	32.99	54.0	1.0m./	21.0	**PK**
9765.47	46.95	-7.80	30.61	54.0	1.0m./	23.4	**PK**
HIGH BAND- PEAK							
2474.30	88.69	11.87	100.56		3.0m./		**PK**
4948.78	55.99	-16.89	40.10	54.0	3.0m./	13.9	**PK**
7425.93	48.45	-10.00	29.91	54.0	1.0m./	24.1	**PK**
9901.45	47.31	-7.74	31.03	54.0	1.0m./	23.0	**PK**
12376.50	48.58	-3.61	36.43	54.0	1.0m./	17.6	**PK**

1. (*) Falls within the restricted bands of CFR 15.205.
2. ND = No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.
3. Test data values measured at 1 meter include a factor of -9.54 dB for distance extrapolation from a test distance of 1 meter to 3 meters.
4. Additional factors include a Duty Cycle, DC = -20.0 dB and filter factor of +1.0 dB.

SAMPLE CALCULATION:
Note: 1 dB loss factor is added for all measurement using the high pass filter.
RESULTS: At 4810.70 MHz: = (66.11+ (1 dB high pass filter loss)) + (-16.77) = 50.34 dBuV/m @ 3m
Margin = (54.0 – 50.34) = 3.7 dB

Test Date: September 9, 2011
Tested By
Signature: 

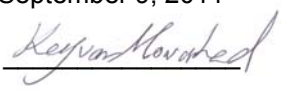
Name: Keyvan Muvahhid

Table 11 – Omni Antenna- Average Radiated Spurious

Radiated Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Cirronet Corporation			
	Project: 11-0197			Model: DNT24			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA+DC (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Pass Margin (dB)	Detector PK / AVG
LOW BAND - PEAK							
2406.35	87.36	11.84	99.20		3.0m./		**PK**
4810.73	60.59	-16.77	44.82	54.0	3.0m./	9.2	**PK**
7219.30	51.33	-10.37	32.42	54.0	1.0m./	21.6	**PK**
9621.35	47.33	-7.60	31.19	54.0	1.0m./	22.8	**PK**
MID BAND- PEAK							
2442.00	84.93	11.84	96.77		3.0m./		**PK**
4882.60	53.91	-16.76	38.15	54.0	3.0m./	15.9	**PK**
7324.20	51.97	-9.83	33.60	54.0	1.0m./	20.4	**PK**
HIGH BAND- PEAK							
2475.35	83.98	11.87	95.85		3.0m./		**PK**
4986.50	51.07	-16.52	35.55	54.0	3.0m./	18.5	**PK**
7426.08	48.06	-10.00	29.52	54.0	1.0m./	24.5	**PK**

1. (*) Falls within the restricted bands of CFR 15.205.
2. ND = No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.
3. Test data values measured at 1 meter include a factor of -9.54 dB for distance extrapolation from a test distance of 1 meter to 3 meters.
4. Additional factors include a Duty Cycle, DC = -20.0 dB and filter factor of +1.0 dB.

SAMPLE CALCULATION:
Note: 1 dB loss factor is added for all measurement using the high pass filter.
RESULTS: At 4810.73 MHz: = (60.59+ (1 dB high pass filter loss)-9.54) + (-16.77) = 44.82 dBuV/m @ 1m
Margin = (54.0 – 44.82) = 9.2 dB

Test Date: September 9, 2011
Tested By
Signature: 

Name: Keyvan Muvahhid

Table 12 – Patch Antenna- Average Radiated Spurious

Radiated Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Cirronet Corporation			
	Project: 11-0197			Model: DNT24			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA+DC (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Pass Margin (dB)	Detector PK / AVG
LOW BAND - PEAK							
2406.35	87.43	11.84	99.27		3.0m./		**PK**
4810.55	51.97	-16.85	36.12	54.0	3.0m./	17.9	**PK**
7216.15	52.46	-10.37	33.55	54.0	1.0m./	20.5	**PK**
9621.17	49.02	-7.60	32.88	54.0	1.0m./	21.1	**PK**
MID BAND- PEAK							
2442.23	86.07	11.84	97.91		3.0m./		**PK**
4884.63	52.81	-16.76	37.05	54.0	3.0m./	17.0	**PK**
7323.98	51.81	-9.83	33.44	54.0	1.0m./	20.6	**PK**
9768.80	45.33	-7.80	28.99	54.0	1.0m./	25.0	**PK**
HIGH BAND- PEAK							
2475.30	83.78	11.87	95.65		3.0m./		**PK**
4948.60	56.03	-16.22	31.27	54.0	1.0m./	22.7	**PK**
7426.03	53.64	-10.00	35.10	54.0	1.0m./	18.9	**PK**
9898.05	46.58	-7.61	30.43	54.0	1.0m./	23.6	**PK**

1. (*) Falls within the restricted bands of CFR 15.205.
2. ND = No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.
3. Test data values measured at 1 meter include a factor of -9.54 dB for distance extrapolation from a test distance of 1 meter to 3 meters.
4. Additional factors include a Duty Cycle, DC = -20.0 dB and filter factor of +1.0 dB.

SAMPLE CALCULATION:
Note: 1 dB loss factor is added for all measurement using the high pass filter.
RESULTS: At 4810.55 MHz: = (51.97+ (1 dB high pass filter loss)) + (-16.85) = 36.12 dBuV/m @ 3m
Margin = (54.0 – 36.12) = 17.9 dB

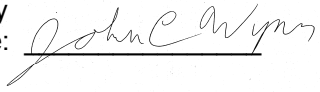
Test Date: September 14, 2011
Tested By
Signature: John C Wynn Name: John Wynn

Table 13 – Fractus Antenna- Average Radiated Spurious

Radiated Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Cirronet Corporation			
	Project: 11-0197			Model: DNT24			
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA+DC (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Pass Margin (dB)	Detector PK / AVG
LOW BAND - PEAK							
2406.38	78.30	12.63	90.93		3.0m./		**PK**
4810.77	57.25	-15.04	33.67	54.0	1.0m./	20.3	**PK**
7216.02	54.68	-9.28	36.86	54.0	1.0m./	17.1	**PK**
MID BAND- PEAK							
2442.20	78.10	11.84	89.94		3.0m./		**PK**
4882.80	53.26	-16.20	28.52	54.0	1.0m./	25.5	**PK**
7327.05	47.66	-9.83	29.29	54.0	1.0m./	24.7	**PK**
HIGH BAND- PEAK							
2442.20	78.10	11.63	89.73		3.0m./		**PK**
4948.78	49.52	-16.22	24.76	54.0	1.0m./	29.2	**PK**
7426.08	49.52	-10.00	30.98	54.0	1.0m./	23.0	**PK**

1. (*) Falls within the restricted bands of CFR 15.205.
2. ND = No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.
3. Test data values measured at 1 meter include a factor of -9.54 dB for distance extrapolation from a test distance of 1 meter to 3 meters.
4. Additional factors include a Duty Cycle, DC = -20.0 dB and filter factor of +1.0 dB.
5. The Fractus antenna was positioned in 3 orthogonal axis (x, y, z) to find the maximum emission the position with the maximum emission is shown herein.

SAMPLE CALCULATION:
Note: 1 dB loss factor is added for all measurement using the high pass filter.
RESULTS: At 4810.77 MHz: = (57.25+ (1 dB high pass filter loss) -9.54) + (-15.04) = 33.67 dBuV/m @ 1m
Margin = (54.0 – 33.67) = 20.3 dB

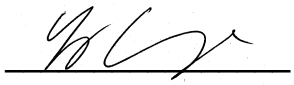
Test Date: September 15, 2011
Tested By
Signature:  Name: John Wynn

2.11 6 dB Bandwidth per CFR 15.247(a)(2), (IC RSS 210, A8.2(a))

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, KDB Publication No. 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 14 and Figures 15 through 17.

Table 14 – 6 dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)
2406	1.67	0.5
2442	1.64	0.5
2475	1.59	0.5

Test Date: September 22, 2011
Tested By
Signature:  Name: George Yang

2.11 6 dB Bandwidth per CFR 15.247(a)(2), (IC RSS 210, A8.2(a))

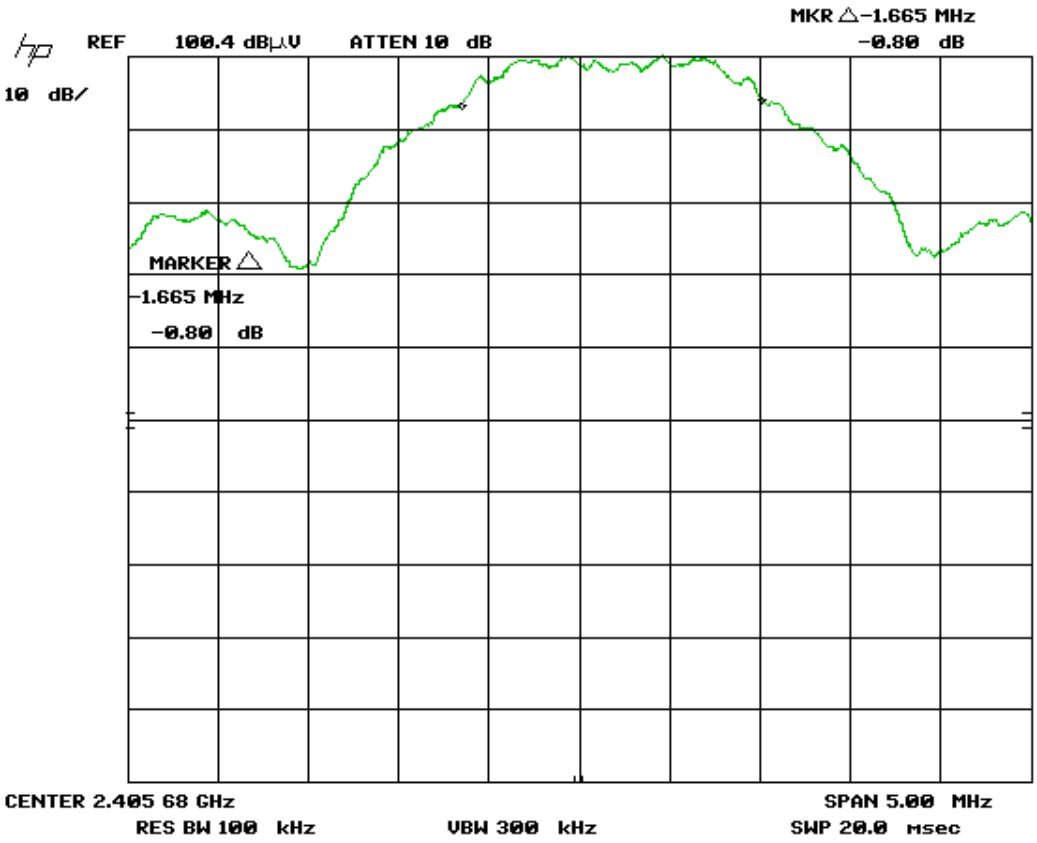


Figure 16 - 6 dB Bandwidth - 15.247 (a) (2) - Low Channel

2.11 6 dB Bandwidth per CFR 15.247(a)(2), (IC RSS 210, A8.2(a))

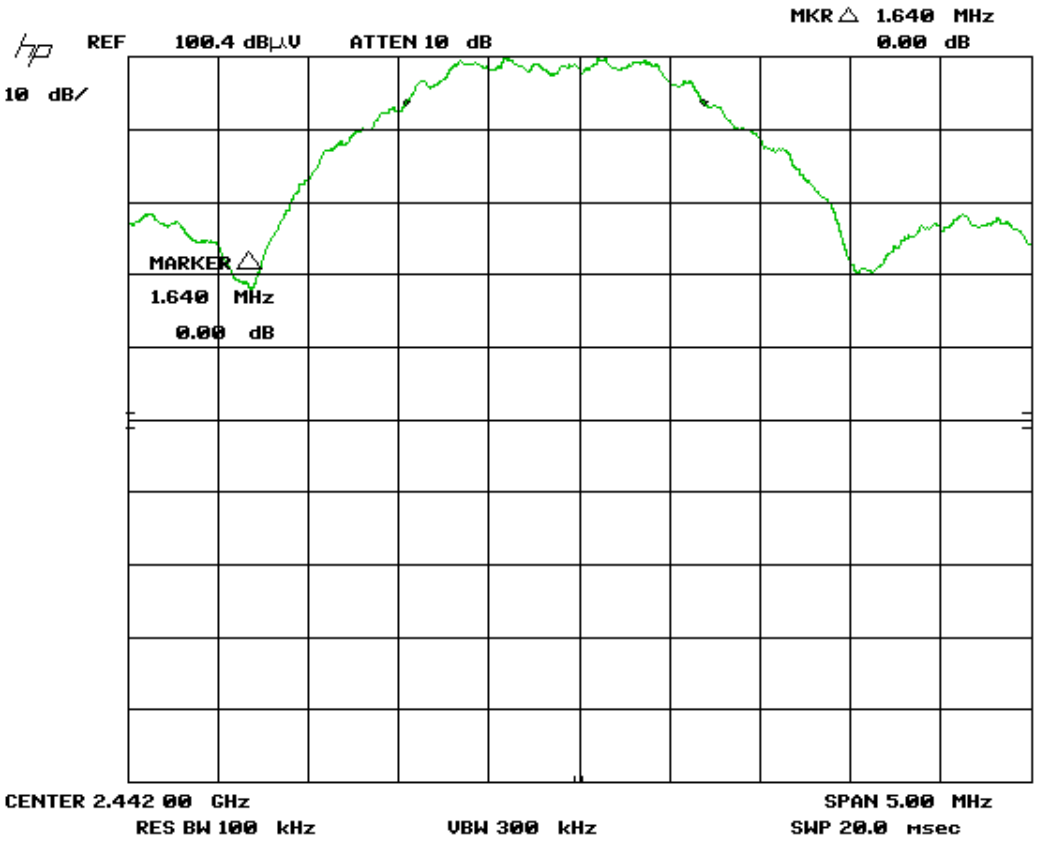


Figure 17 – 6 dB Bandwidth - 15.247 (a) (2) - Mid Channel

2.11 6 dB Bandwidth per CFR 15.247(a)(2), (IC RSS 210, A8.2(a))

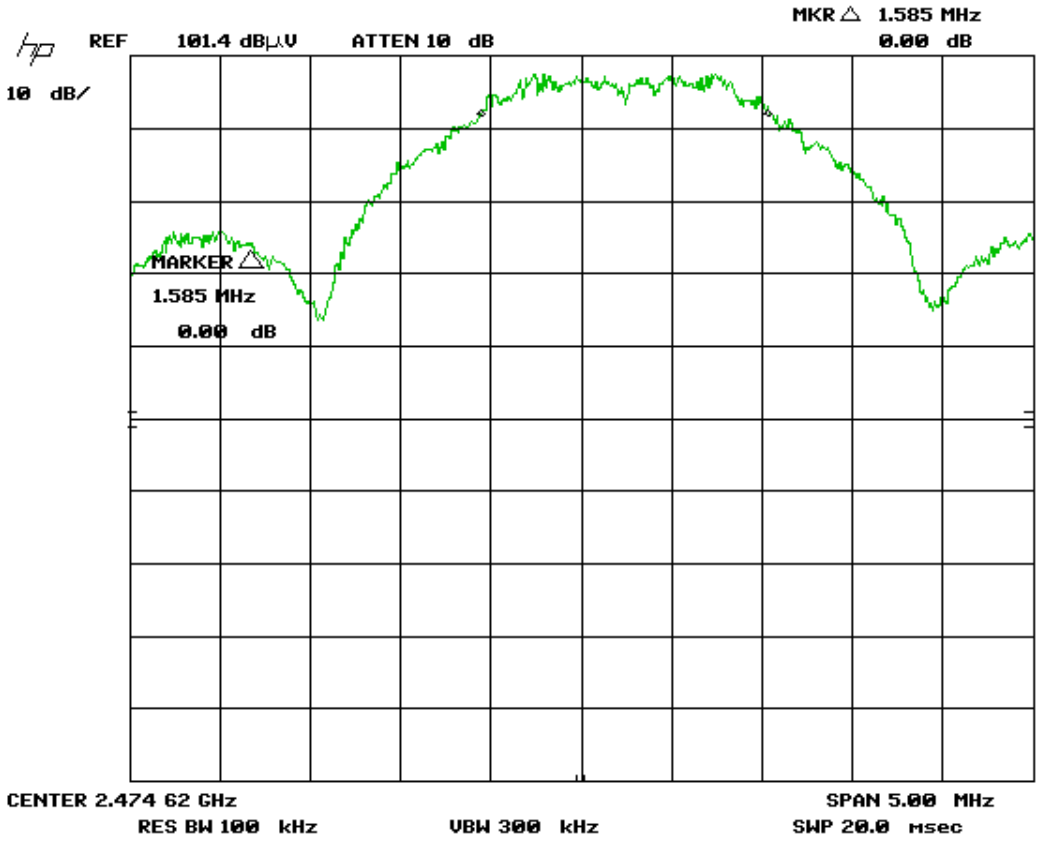


Figure 18 - 6 dB Bandwidth - 15.247 (a) (2) - High Channel

2.12 Maximum Peak Conducted Output Power (CFR 15.247 (b) (3))

For the DNT24 module, the transmitter was programmed to operate at a maximum of +18 dBm across the bandwidth.

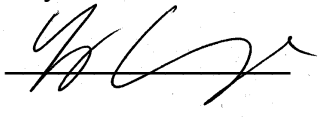
Peak power within the band 2400 MHz to 2483.5 MHz was measured per FCC KDB Publication 558074 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, to the antenna output terminals on the EUT. The spectrum analyzer was set for an impedance 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 0.3 dB, and addition of an attenuator, 8.0 dB and the final corrected measurements were determined by adding 8.3 dB to the raw data measured values of Figures 18 to 20. Peak antenna conducted output power is tabulated in Table 15 below.

Antenna Conducted Output Power was measured at Low Channel, Mid Channel and High Channel frequencies. See Figures 18 to 20 above. The 0.3 dB loss for the RF wire is taken into consideration here (Corrected Measurement column).

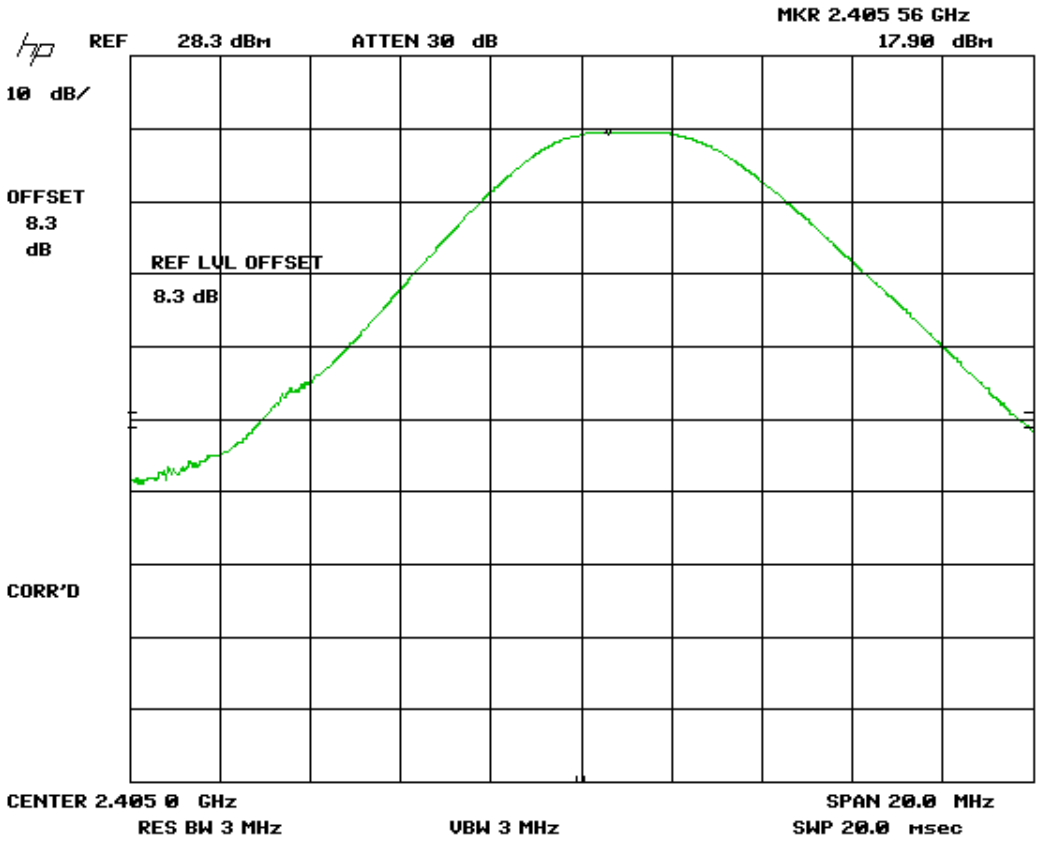
Table 15 - Peak Antenna Conducted Output Power per Part (Same as EIRP)

Frequency of Fundamental (MHz)	Raw Test Data dBm	Corrected Measurement (dBm)	(mW)	FCC Limit (mW Maximum)
Low Band (ch00) 2406	17.9	17.9	61.66	1000
Mid Band (ch07) 2442	17.3	17.3	53.70	1000
High Band (ch14) 2475	16.6	16.6	45.71	1000

Note: reference adjusted for correction factor, 8.3 dB for attenuator and cable loss.

Test Date: May 26, 2010
Tested By
Signature:  Name: George Yang

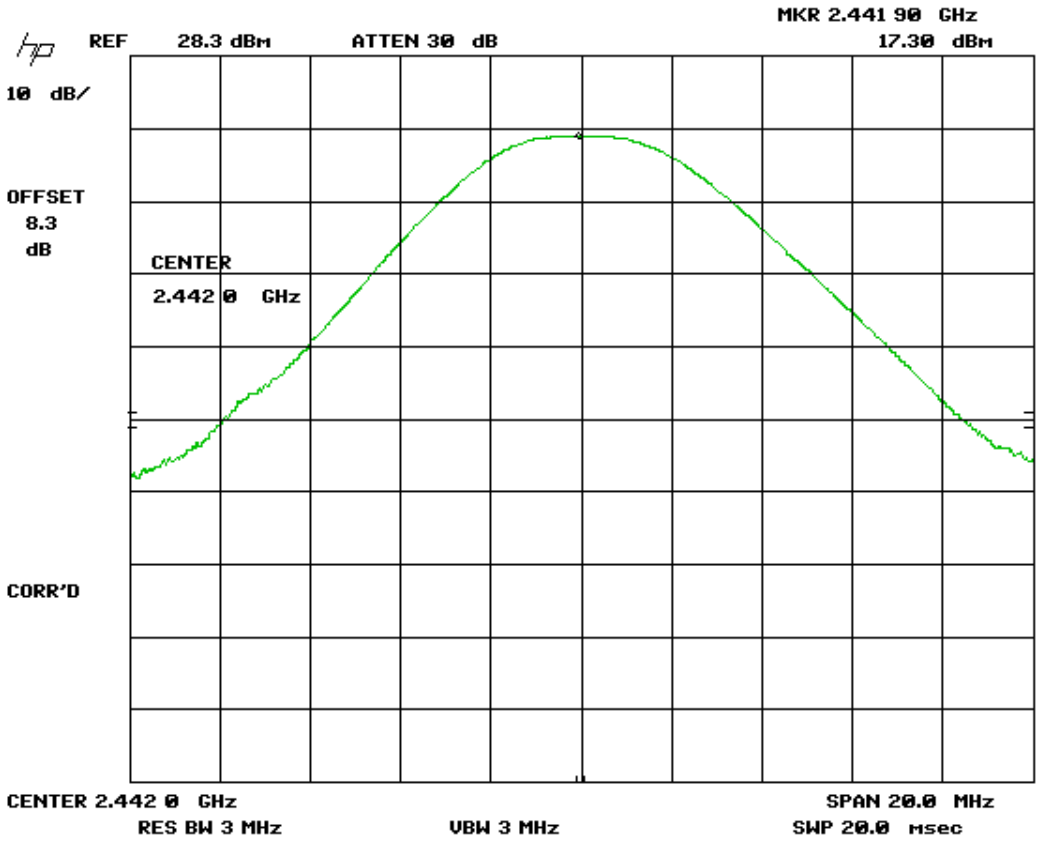
2.12 Peak Power Output (CFR 15.247 (b)(3))



Note: reference adjusted for correction factor.

Figure 19 - Peak Antenna Conducted Output Power - Low Channel

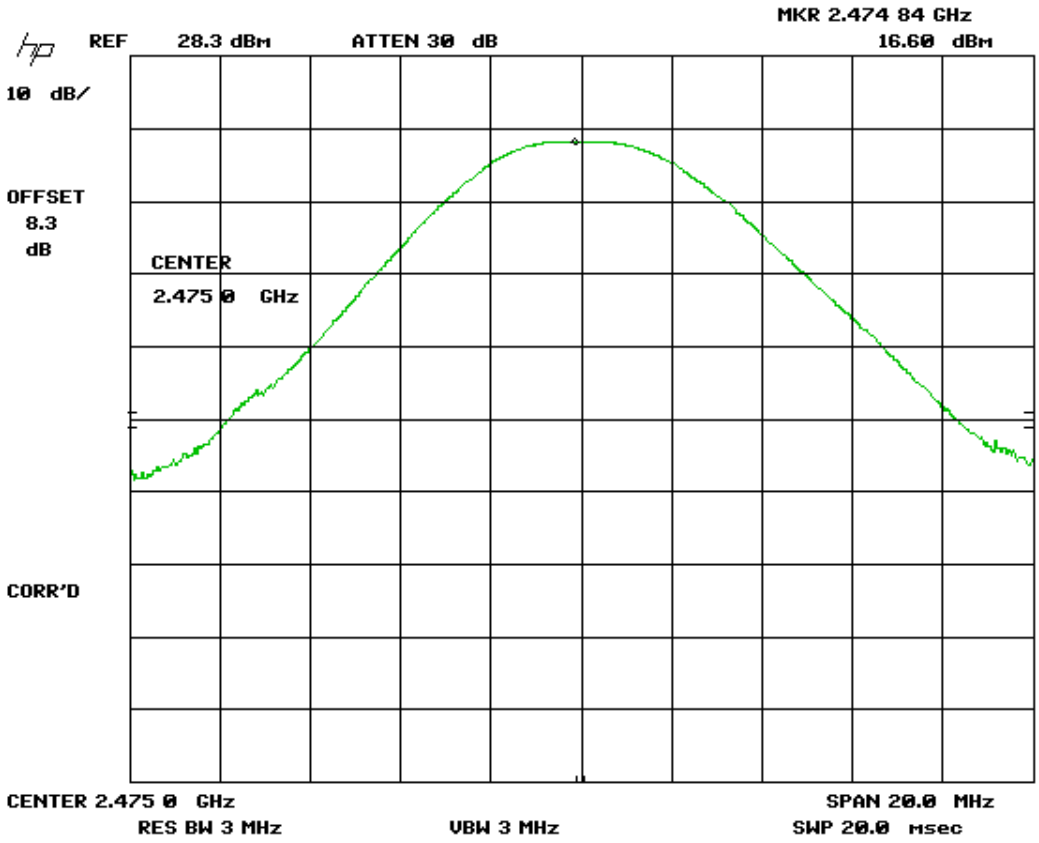
2.12 Peak Power Output (CFR 15.247 (b)(3))



Note: reference adjusted for correction factor.

Figure 20 - Peak Antenna Conducted Output Power - Mid Channel

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



Note: reference adjusted for correction factor.

Figure 21 - Peak Antenna Conducted Output Power - High Channel

2.13 Power Spectral Density (CFR 15.247(e)) (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).

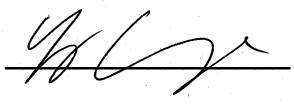
In accordance with 15.247 (e), the power spectral density shall be no greater than +8 dBm per any 3 kHz band.

Results are shown in table 16 and Figures 21 through 23 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 16 - Power Spectral Density for Low, Mid and High Bands

Frequency (MHz)	Test Data (dBm/3 KHz)	Results (dBm/3 kHz)	FCC Limit (dBm/3 kHz)
Low-2405	2.10	2.10	+8.0
Mid-2440	2.10	2.10	+8.0
High- 2475	2.10	2.10	+8.0

Note: reference adjusted for correction factor, 8.3 dB for attenuator and cable loss.

Test Date: September 22, 2011
Tested By
Signature:  Name: George Yang

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

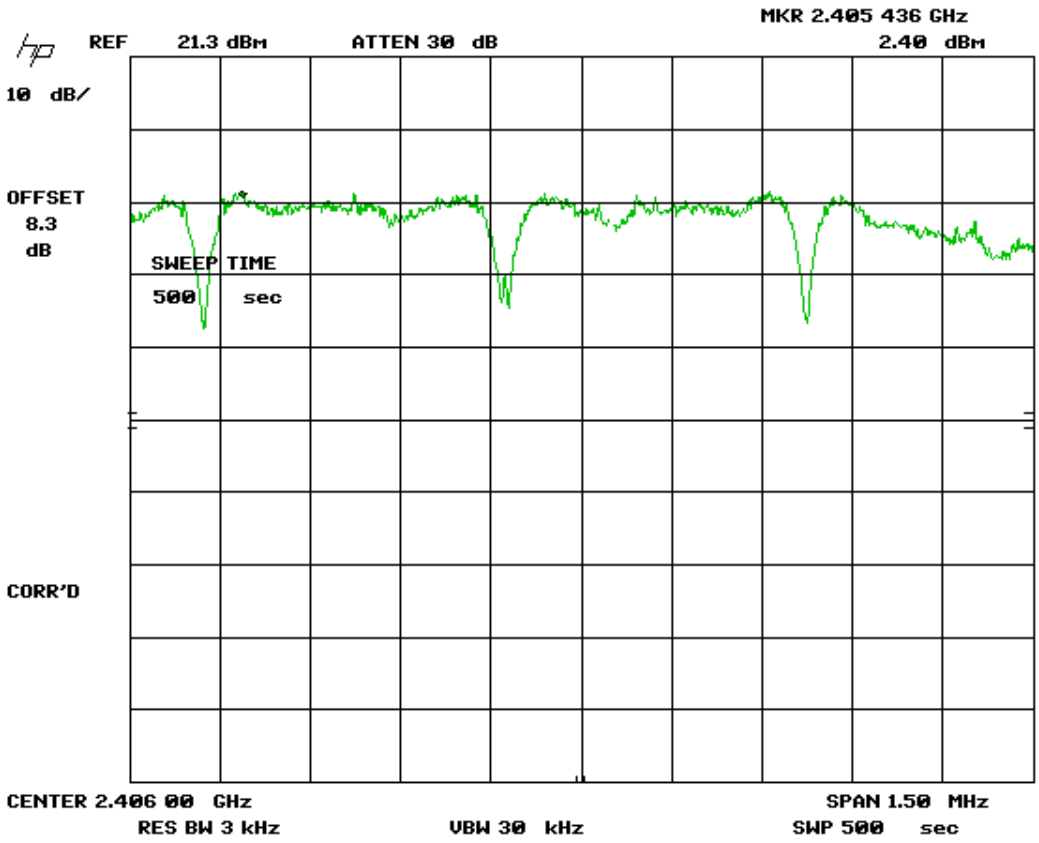


Figure 22 - Peak Power Spectral Density - Part 15.247 (e) - Low Channel

Note: reference adjusted for correction factor, 8.3 dB for attenuator and cable loss.

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

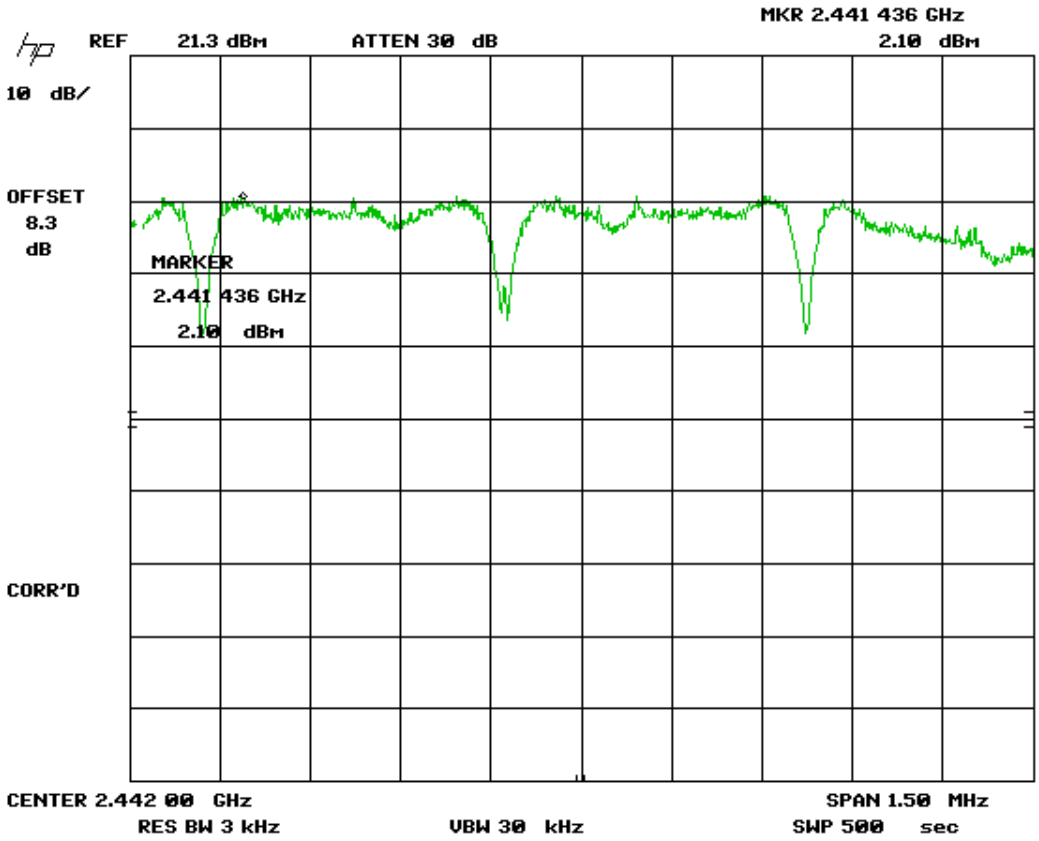


Figure 23 - Power Spectral Density - Part 15.247 (e) - Mid Channel

Note: reference adjusted for correction factor, 8.3 dB for attenuator and cable loss.

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

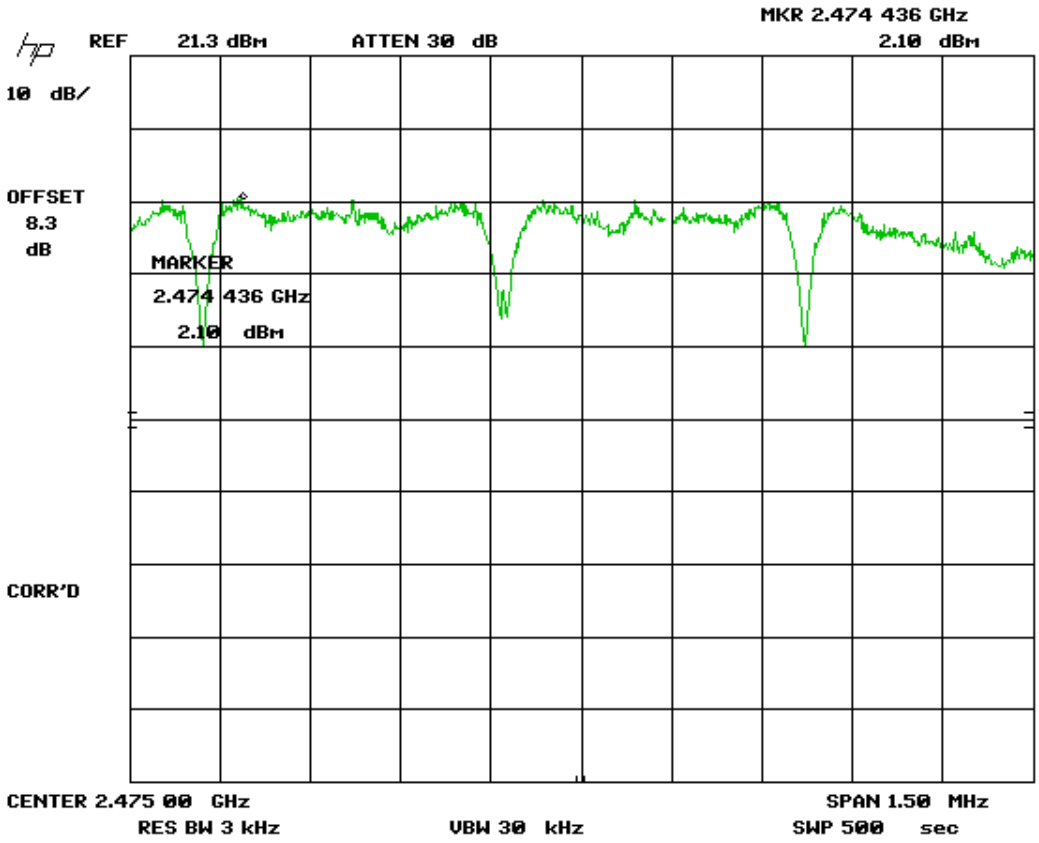


Figure 24 - Peak Power Spectral Density - Part 15.247 (e) - High Channel

Note: reference adjusted for correction factor, 8.3 dB for attenuator and cable loss.

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

Band Edge measurements are made following the guidelines in FCC KDB Publication No. 558074 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.

To capture the band edge 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. See figure 24 and 24 below.

2.14 Band Edge (Cont'd)

Table 17 - Upper Band Edge - Radiated Emissions

Peak Radiated Higher Band Edge Measurements								
Test By: GY	**Test: FCC Part 15.247**				**Client: Cirronet Corporation**			
	Project: 11-0197		**Class:**		**Model: DNT24**			
Frequency (MHz)	**AF table**	**Test data**	**Additional Factors:**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarity**	**Margin (dB)**	**Detector PK / AVG**
Internal Antenna								
Fund. 2475.45	1HN3mV	88.96	19.87 cable loss	108.56	--	3m./	--	**PK**
Band Edge 2483.5	--	(120.56-53.7)	--	66.86	74.0	3m./	7.14	**PK**
Band Edge 2483.5	--	(120.56-53.7)	(-20.0) duty cycle	46.86	54.0	3m./	See calculation below	**AVG**

The limit for the average value of radiated emissions in a Restricted Band is 54 dBuV/m. To compute the average values of the band edge emissions, the duty cycle correction factor of -20.0 dB is applied to the values in the Corrected Results column. After this correction the EUT is found to have met the restrictions placed on average radiated emissions in Restricted Bands. The worst-case measurement is computed below.

CALCULATION OF WORST-CASE AVERAGE UPPER BAND EDGE MEASUREMENT:
Results = Peak Corrected Results + Duty Cycle Correction Factor
Results = 66.86 + (-20.0) = 46.86 dBuV/m
Margin = Limit – Results = 54 – 46.86 = 7.14 dB

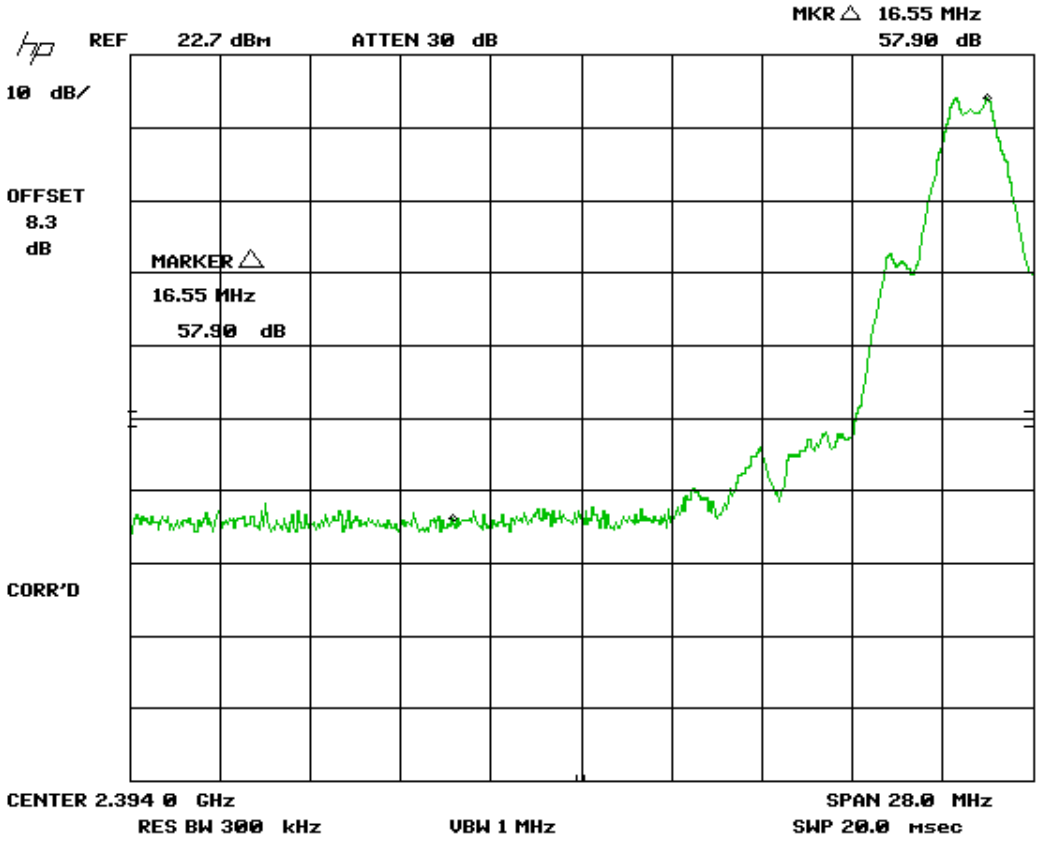


Figure 25 - Band Edge Compliance – Low Channel Delta - Peak
Note: conducted emission shown here as this is the worst case.

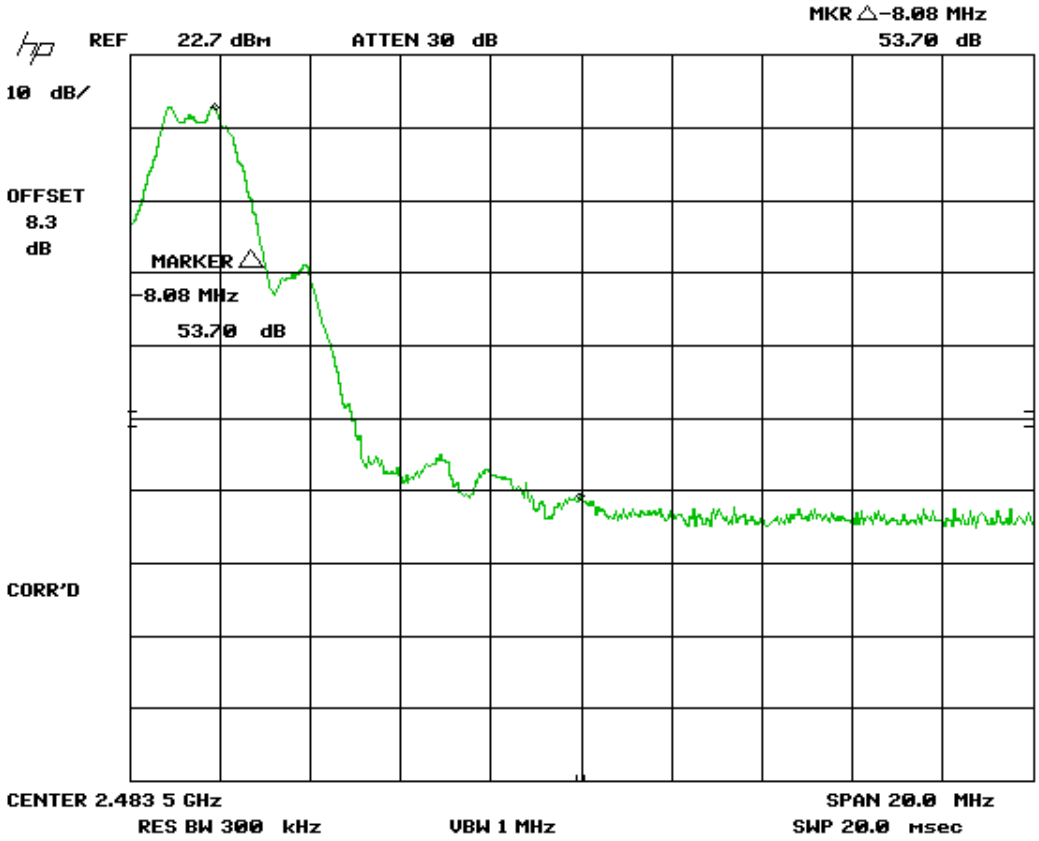


Figure 26 - Band Edge Compliance – High Channel Delta - Peak
Note: conducted emission shown here as this is the worst case.

2.15 20 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, KDB Publication No. 558074 for a bandwidth of 20 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 18 and Figures 26 through 28.

Table 18 - 20 dB Bandwidth and 99% Occupied Bandwidth

Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2406.0	3.04	3.04
2442.0	2.97	2.97
2475.0	2.98	2.98

Test Date: September 22, 2011

Tested By
Signature: _____ Name: George Yang

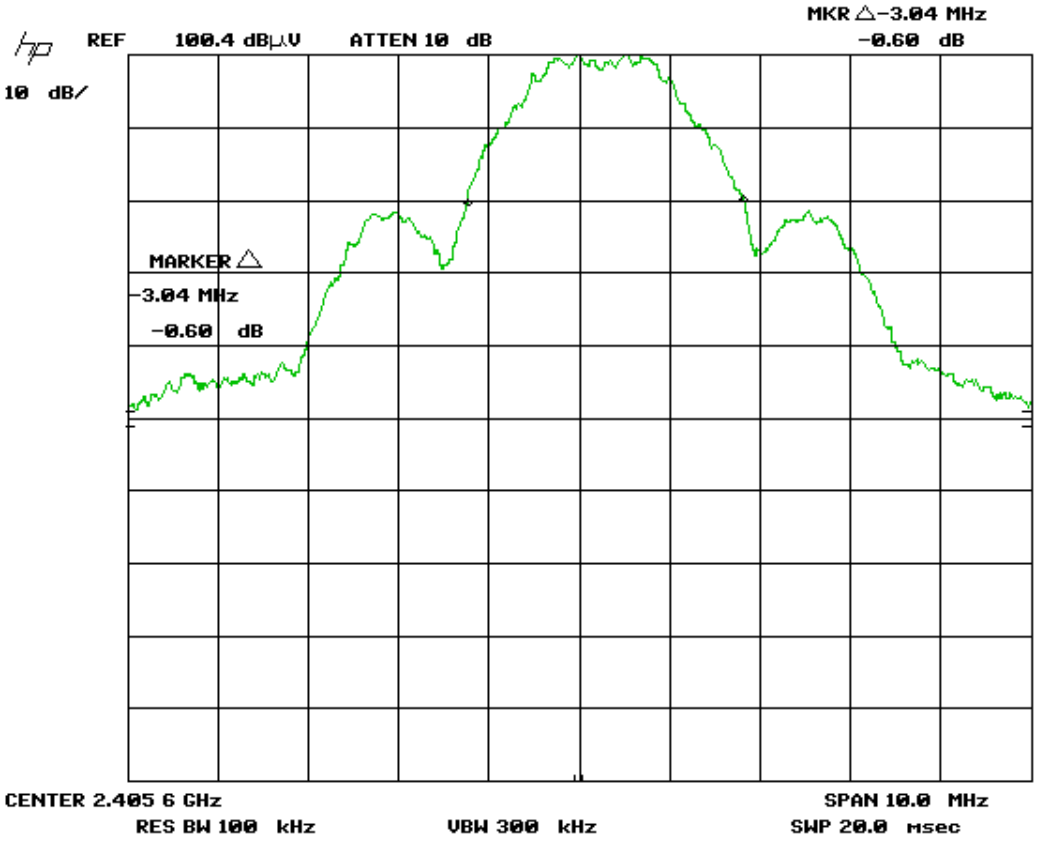


Figure 27 - Low Channel 99% Bandwidth

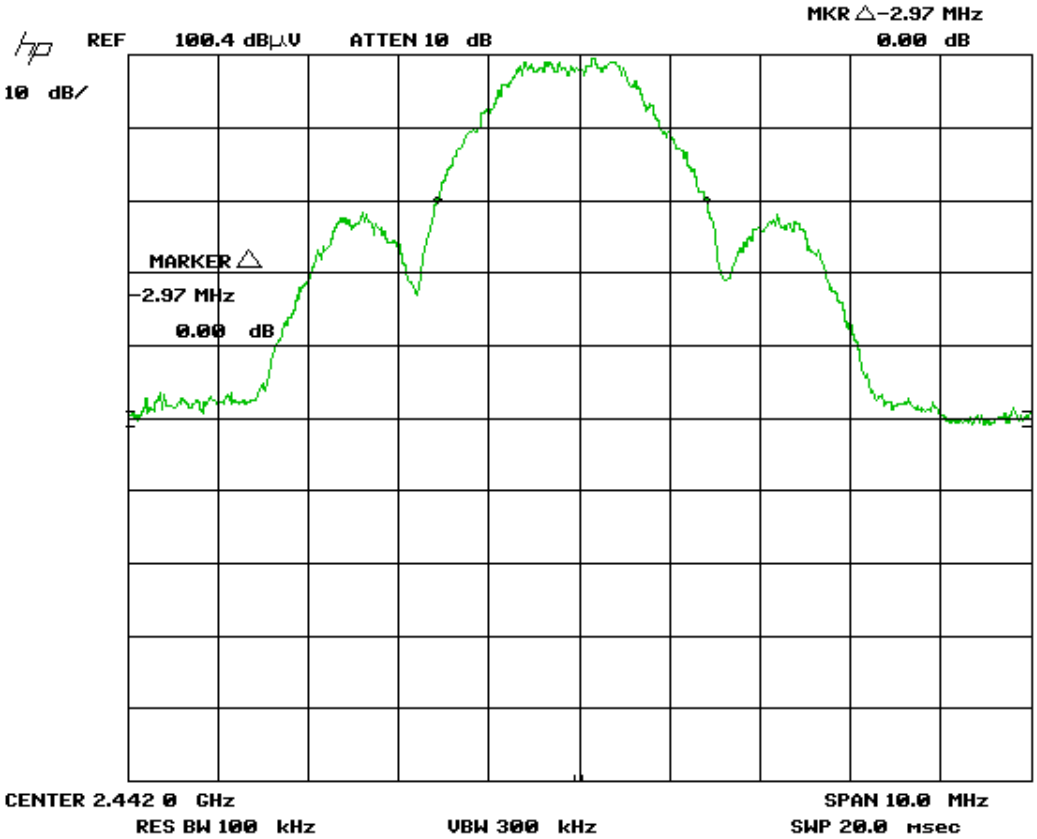


Figure 28 - Mid Channel 99% Bandwidth

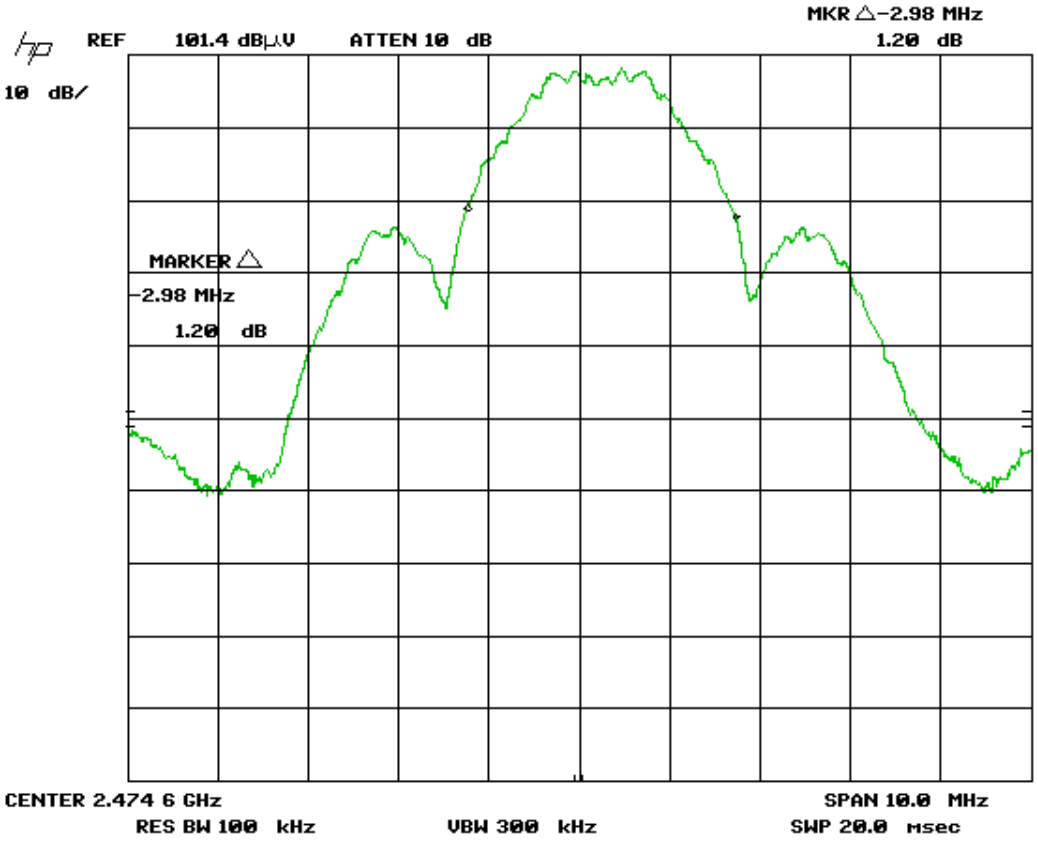


Figure 29 - High Channel 99% Bandwidth

2.16 Unintentional Radiator Power Line 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 19 below.

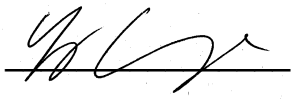
2.16 Unintentional Radiator Power Lines Conducted Emissions (Cont'd)

Table 19 - Power Line Conducted Emissions Data Peak Msmt. vs. Avg. Limits

CONDUCTED EMISSIONS						
Tested By: GY	**Specification Requirement: FCC Part 15, Para 15.107 Class A**		**Project No.: 11-0197**	**Manufacturer/Model: Cirronet Corporation Model DNT24**		
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL-PA (dB)**	**Corrected Results (dBuV)**	**Avg Limits (dBuV)**	**Margin (dB)**	**Detector**
120 VAC, 60 Hz, Supply Line						
0.4939	34.25	0.15	34.40	46.1	11.7	PK
0.5900	29.43	0.14	29.57	46.0	16.4	PK
2.0700	35.23	0.36	35.59	46.0	10.4	PK
5.4000	35.16	0.33	35.49	50.0	14.5	PK
10.1000	22.93	0.55	23.48	50.0	26.5	PK
25.8000	33.41	1.17	34.58	50.0	15.4	PK
120 VAC, 60 Hz, Neutral Line						
0.4948	34.94	0.25	35.19	46.1	34.94	PK
0.5438	28.81	0.24	29.05	46.0	28.81	PK
1.9800	34.66	0.36	35.02	46.0	34.66	PK
5.9130	35.16	0.33	35.49	50.0	35.16	PK
14.2000	21.96	0.80	22.76	50.0	21.96	PK
25.3500	29.27	1.17	30.44	50.0	29.27	PK

Tested from 150 kHz to 30 MHz
SAMPLE CALCULATIONS: At 493.9 kHz, = 34.25 + (0.15) = 34.40 dBuV

Test Date: September 29, 2011
Tested By

Signature:  Name: George Yang

2.17 Unintentional Radiator, Radiated Emissions (CFR 15.109, 15.209)

These test data are provided herein to support the Verification requirement for digital devices. Radiated emissions coming from the EUT in a non-transmit state per 15.109 were evaluated from 30 MHz to 12.5 GHz as well as radiated emission coming for the EUT in a transmitting state per 15.209 and were tested as detailed in ANSI C63.4, Paragraph 8. The worst case is presented herein.

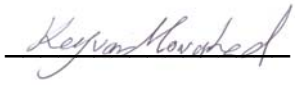
Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth; 1 MHz RBW and 3 MHz VBW. The test data were maximized for magnitude by rotating 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 4.4 dB below the specification limit. The results are shown in Table 20 below.

Table 20 - Unintentional Radiator, Radiated Emissions

Unintentional Radiator, Radiated Emissions							
Test By: GY	**Test: FCC Part 15.109, 15.209**			**Client: Cirronet Corporation**			
	Project: 11-0197 Class: A			**Model: DNT24**			
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							
81.2900	48.60	-16.41	32.19	40.0	3m/H	7.8	**PK**
62.2500	44.30	-16.43	27.87	40.0	3m/H	12.1	**PK**
166.9300	45.10	-11.71	33.39	43.5	3m/H	10.1	**PK**
200.2300	45.80	-12.09	33.71	43.5	3m/H	9.8	**PK**
248.8550	50.40	-11.25	39.16	46.0	3m/H	6.8	**QP**
373.3090	49.20	-8.23	40.97	46.0	3m/H	5.0	**QP**
390.8850	45.10	-7.45	37.66	46.0	3m/H	8.3	**QP**
455.9900	47.10	-6.68	40.42	46.0	3m/H	5.6	**PK**
248.9120	50.40	-11.15	39.26	46.0	3m/V	6.7	**PK**
373.3090	49.20	-8.33	40.87	46.0	3m/V	5.1	**QP**
456.2780	48.20	-6.58	41.62	46.0	3m/V	4.4	**QP**
1092.1300	44.87	-9.50	35.37	54.0	3m/V	18.6	**AVG**
1244.6000	46.16	-8.48	37.68	54.0	3m/V	16.3	**AVG**
1499.2300	43.10	-7.44	35.66	54.0	3m/V	18.3	**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: At 81.29 MHz: = 48.60 + (-16.41) = 32.19 dBuV/m @ 3m
Margin = (40.0 - 32.19) = 7.8 dB

Test Date: September 19, 2011

Tested By Signature:  Name: Keyvan Muvahhid