



August 31, 2009

Mr. Ed Castro
Nivis, LLC
1000 Circle 75 Parkway
Atlanta, GA 30339

Dear Mr. Castro:

Enclosed please find Nivis, LLC.'s file copy of the Part 15 Class II Permissive Change Application for Nivis, LLC's module model VN 210.

This Application was requested because Nivis, LLC is adding two additional antennas to be used with this module. The two antennas are of different types and gain. Further information about the antennas can be found in the report.

If you have any questions, please don't hesitate to call. Thank you for your business. Please keep the report in your files as proof that the product has been successfully tested.

Sincerely,

A handwritten signature in cursive script, reading "Alan Ghasiani", is shown within a light gray rectangular box.

Alan Ghasiani
Consulting Engineer, President

3505 Francis Circle Alpharetta, GA 30004
PH: 770-740-0717 Fax: 770-740-1508
www.ustech-lab.com



Testing Tomorrow's Technology

**Application
For**

**US Code Title 47, Modification of Equipment per Part 2, Section 2.932
Class 2 Permissive Change Application**

**US Code Title 47, Certification per Part 2, Subpart J, Section 2.907
And
Part 15, Subpart C, Intentional Radiator Section 15.247 Intentional Radiator
Operating within the Band 2400 MHz to 2483.5 MHz**

For

Nivis, LLC

VN210 Module

FCC ID: SQB-NIVISMOD0003

**UST Project: 09-0128
Issue Date: August 21, 2009**

Total Pages: 53

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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: Chief Compliance Engineer

Date: August 21, 2009

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This report may be copied in part only with the prior
written approval of US Tech. The results contained in
this report are subject to the adequacy and
representative character of the sample provided.

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FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Nivis, LLC
MODEL: VN210
FCC ID: SQB-NIVISMOD0003
DATE: May 13, 2009

This report concerns (check one): Original grant
Class II change ☒

Equipment type: VN210 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
Fax Number: (770) 740-1508

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Maximum Public Exposure to RF (MPE)

1 General Information

1.1 Characterization of Test Sample

The samples used for testing were received by US Tech on August 13 and August 20, 2009 in good operating condition.

1.2 Purpose of the Action (Class II Permissive Change)

The Equipment under Test (EUT) is a Nivis, LLC, Model VN210, 2.4 GHz Direct-Sequence Spread Spectrum transceiver. The EUT is plugged into an application board which provides regulated 3.3 VDC @ 150mA. The module provides general purpose analog and digital I/O for use by the application board (see module schematic). The module firmware implements the Nivis Mesh protocol.

Two new antenna types are being added to this module. The new antennas are 2.4 GHz antennas, of different gain and type than those submitted with the original application. Further details about each antenna can be found in the EUT Antenna Requirement section and Table 4.

1.3 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. Digital RF conducted and radiated 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.

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1.4 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.

1.5 Related Submittal(s)/Grant(s)

The EUT will be used to 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 as a transceiver (with limited modular approval)
- b) Verification as a digital device

The EUT was been previously approved under FCC ID: SQB-NIVISMOD0003 by the FCC on 06/17/2009.

The information contained in this report is presented for the re-certification & verification authorization(s) for the EUT.

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TCB

GRANT OF EQUIPMENT AUTHORIZATION

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

American TCB, Inc.
6731 Whittier Avenue Suite C110
McLean, VA 22101

Date of Grant: 06/17/2009
Application Dated: 06/17/2009

Nivis, LLC
1000 Circle 75 Parkway
Suite 300
Atlanta, GA 30339

Attention: L. Bay, VP - Operations

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: SQB-NIVISMOD0003
Name of Grantee: Nivis, LLC
Equipment Class: Digital Transmission System
Notes: 802.15.4 Modular Transmitter
Modular Type: Limited Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designator
	15C	2405.0 - 2475.0	0.01177		

Limited Modular Approval. This modular transmitter is limited to installation in Nivis products only. Power Output listed is Conducted. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

FEDERAL COMMUNICATIONS COMMISSION

Figure 1. Original FCC Grant

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2 Tests and Measurements

2.1 Test Equipment

Table 1 - EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
(EUT) Nivis, LLC	VN210	None	SQB-NIVISMOD0003	6' U - P
Antenna, see antenna descriptions			None	30 cm Coax
Laptop Computer Hewlett Packard	None	None	None	6' U -P
Power Supply Hewlett Packard	N/A	N/A	N/A	6' U - P 120 VAC/ 60 Hz

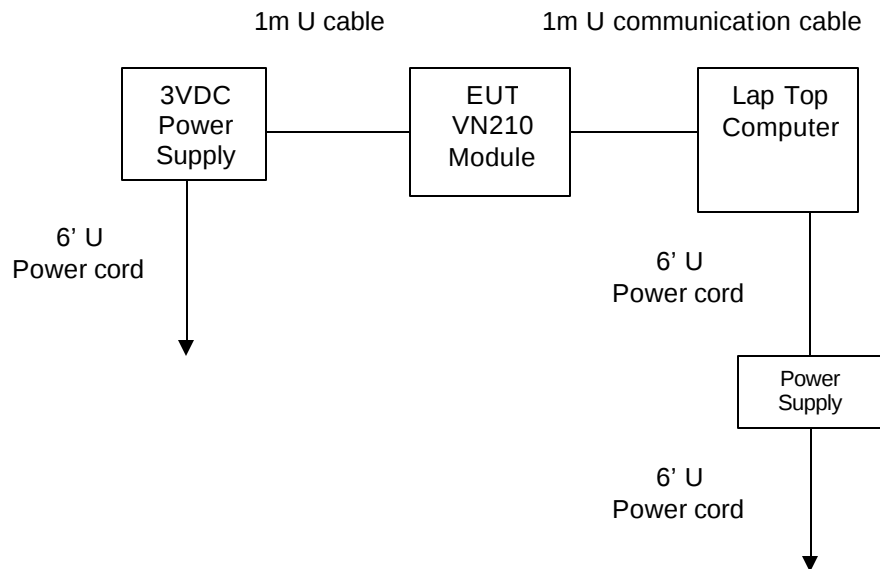


Figure 2. Test System Configuration

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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	8566B	HEWLETT-PACKARD	2410A00109	10/10/08
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	9/9/08
RF PREAMP 100 kHz to 1.3 GHz	8447D	HEWLETT-PACKARD	2944A06291	9/12/08
BICONICAL ANTENNA 25 MHz to 200 MHz	3110B	EMCO	9307-1431	1/22/09
LOG PERIODIC 100 MHz to 1000 MHz	3146	EMCO	9110-3236	11/21/07 2 Year
LISN (x 2) 9247-50-TS-50-N	9247	Solar Electronics	955824 & 955826	1/29/09
HORN ANTENNA 1 GHz to 18 GHz	3115	EMCO	9107-3723	11/4/08 2 Year
PREAMP 1 GHz to 26.5 GHz	8449B	HEWLETT-PACKARD	3008A00480	9/2/08
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

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:

2.5.1 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. 9kHz 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.

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. Nivis, LLC will sell the VN210 RF Module with the following antennas in Table 4.

Table 4 - Allowed Antenna(s)

MANUFACTURER	TYPE OF ANTENNA	MODEL	REPORT REFERENCE	GAIN dB _i	TYPE OF CONNECTOR
Mini-Box.com	Omni Antenna	ANT-N-5	Antenna 1	5.0	N-type
Yokogawa Electric Corp.	Monopole Antenna	F9915KB	Antenna 2	2.0	MMCX-LP

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 operating scenario is as follows:

The transmission duty cycle is calculated as:

Total ON time: 43.52 milliseconds (43.52 mS/100 mS)*100% = 43.5%

In terms of logarithmic voltage (dB); $20 \log (0.4352) = - 7.23 \text{ dB}$

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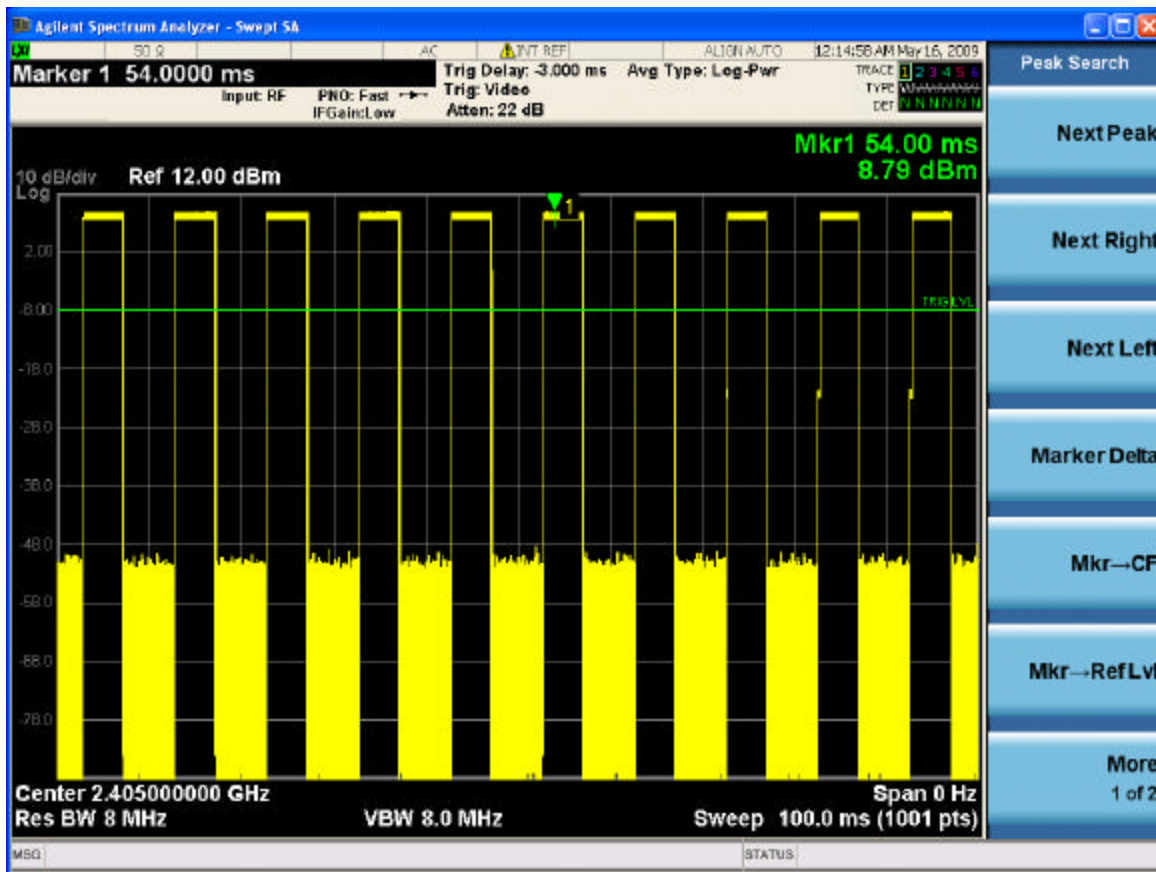


Figure 3. Transmission Duty Cycle

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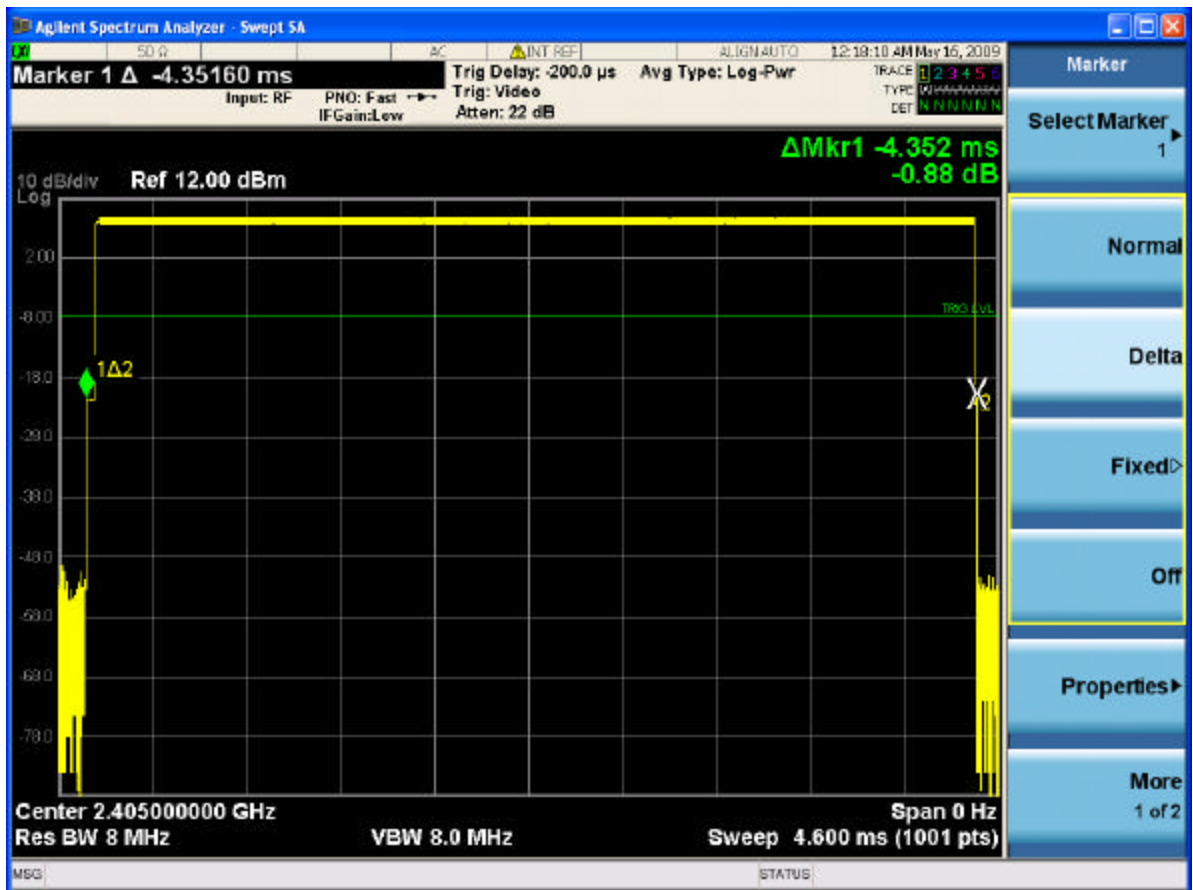


Figure 4. Pulse width

2.9 Unintentional Radiator Power Lines Conducted Emissions (CFR 15.107)

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).

For the permissive change investigation, this test was not performed because the equipment modifications did not affect the originally submitted data.

2.10 Intentional Radiator Power Lines Conducted Emissions (CFR 15.207)

The power line conducted voltage 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.

For the permissive change investigation, this test was not performed because the equipment modifications did not affect the originally submitted data.

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

Radiated emissions were evaluated from 30 MHz to 12.5 GHz per ANSI C63.4, Paragraph 8. Exploratory measurements showed that the EUT, configured with the integral antenna under continuous transmission on the low channel, produced the worst-case radiated emissions.

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 video bandwidth was set to three times the resolution bandwidth. 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.

For the permissive change investigation, this test was not performed because the equipment modifications did not affect the originally submitted data.

2.12 Intentional Radiator Radiated Emissions (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 2 through 8 below. For radiated measurements, the EUT was set into continuous transmission mode. Below 1 GHz, the RBW 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 8 below.

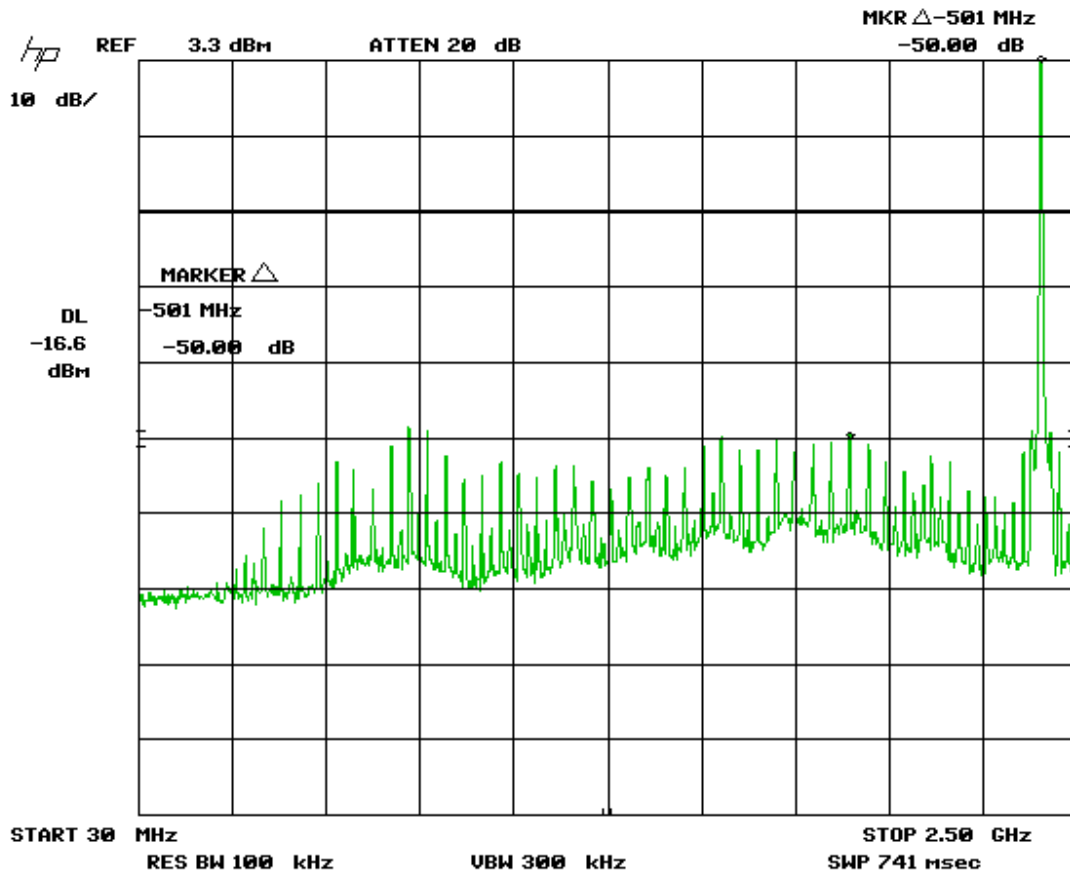
For Average Voltage measurements above 1 GHz, the emissions were measured using RBW = 1 MHz and VBW = 10 Hz. For a pulse-modulated transmitter, the EUT's average emissions are further modified by adding to them the worst-case duty cycle, determined by adding the EUT's pulse widths over a 100 ms period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

For test data, see Tables 5-9. Radiated emissions measured at a distance of 1 meter were extrapolated to the resultant at 3 meters using an inverse distance extrapolation factor of -20 dB/decade. There were no test failures.

2 Test and Measurements (cont'd.)

2.12 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 3 - Antenna Conducted Spurious Emissions – CFR 15.247 (d) - Low Channel, Part 1

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

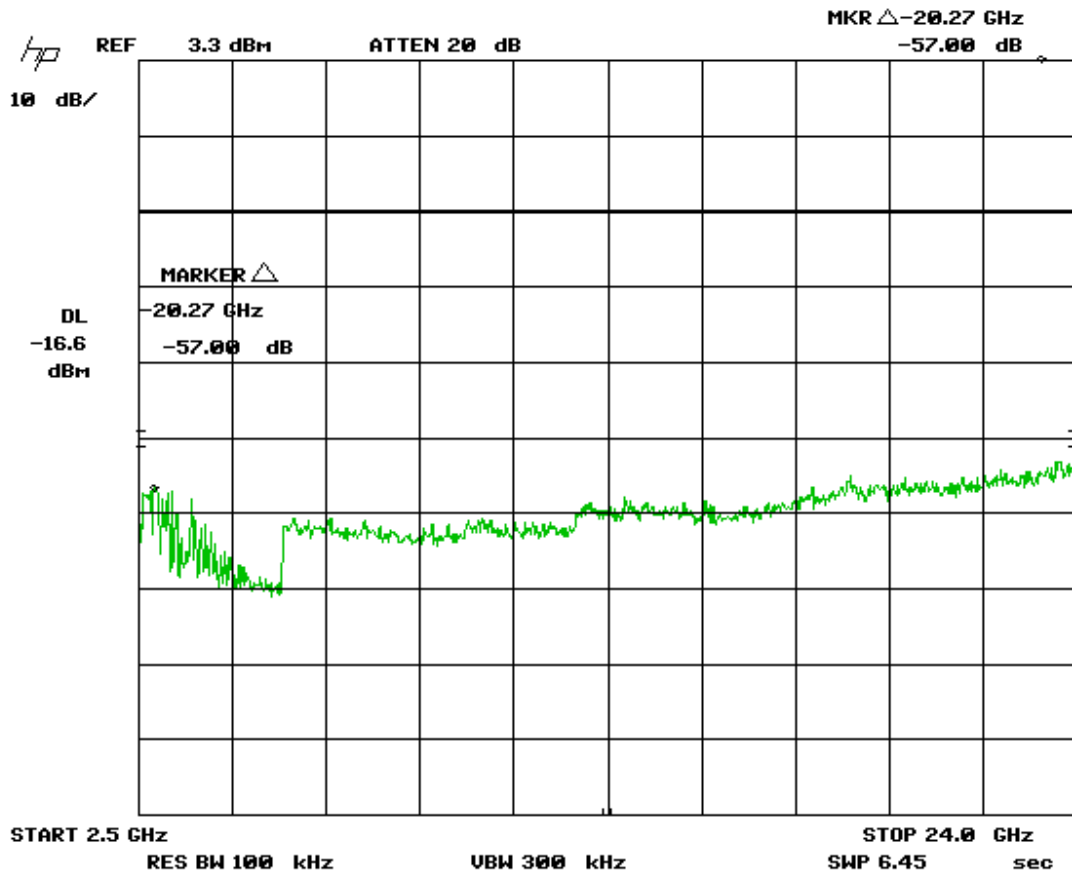


Figure 4 - Antenna Conducted Spurious Emissions – CFR 15.247 (d) - Low Channel, Part 2

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

Note: Signal shown represents Fundamental Frequency

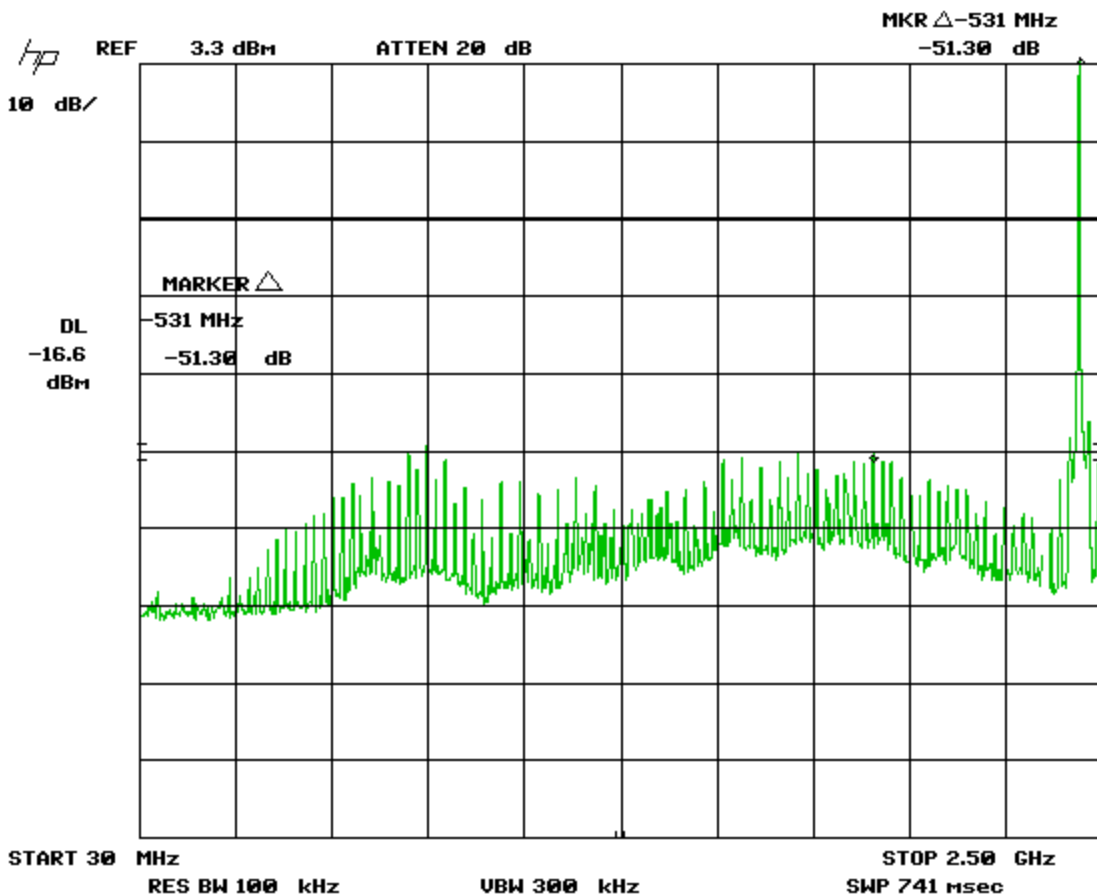


Figure 5 - Antenna Conducted Spurious Emissions – CFR 15.247 (d) - Mid Channel, Part 1

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

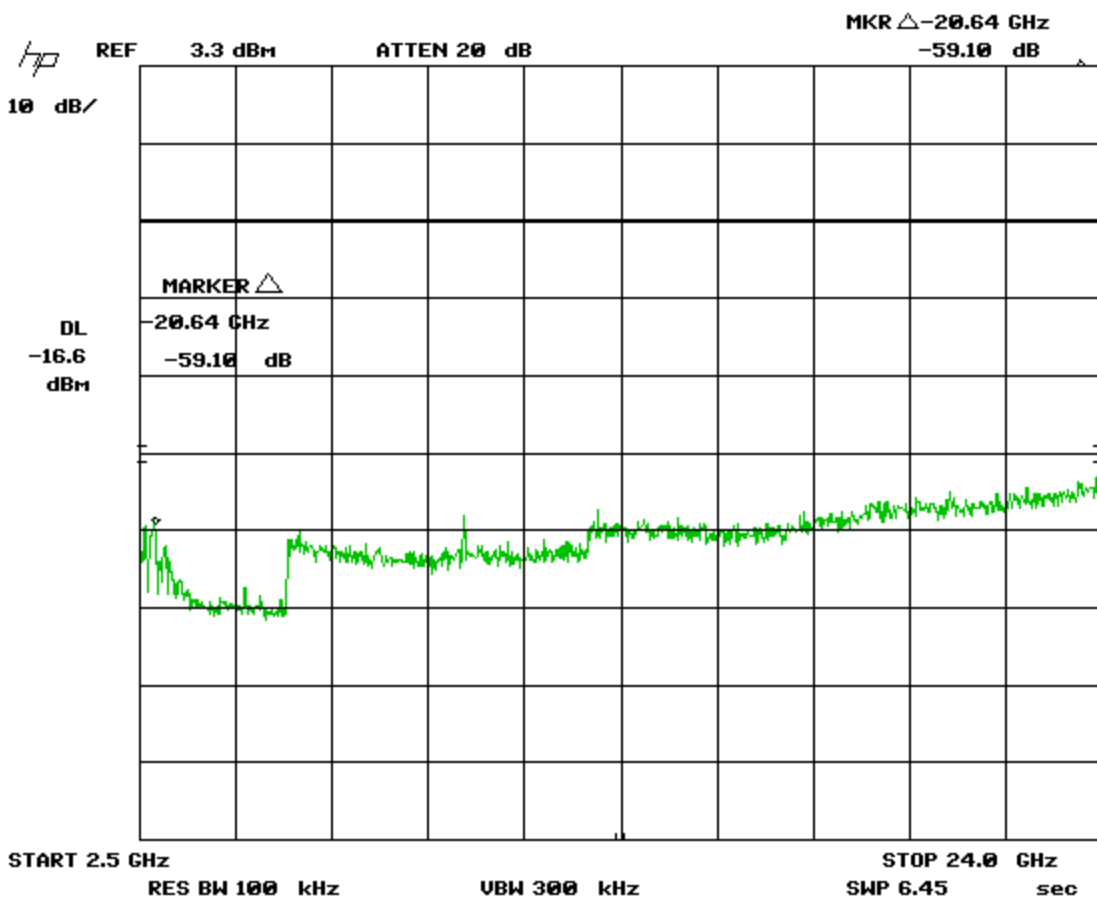


Figure 6 - Antenna Conducted Spurious Emissions – CFR 15.247 (d) - Mid Channel, Part 2

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

2.12 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

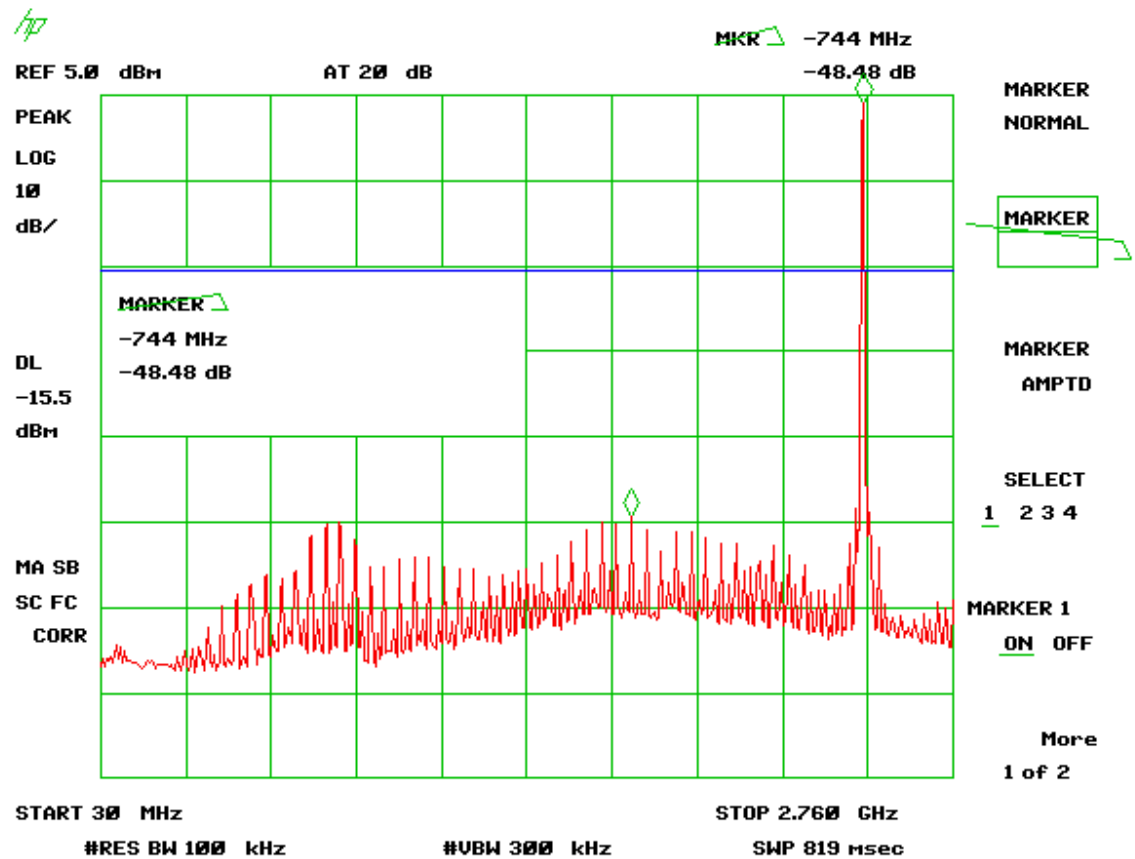


Figure 7 - Antenna Conducted Spurious Emissions – CFR 15.247 (b) - High Channel, Part 1

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

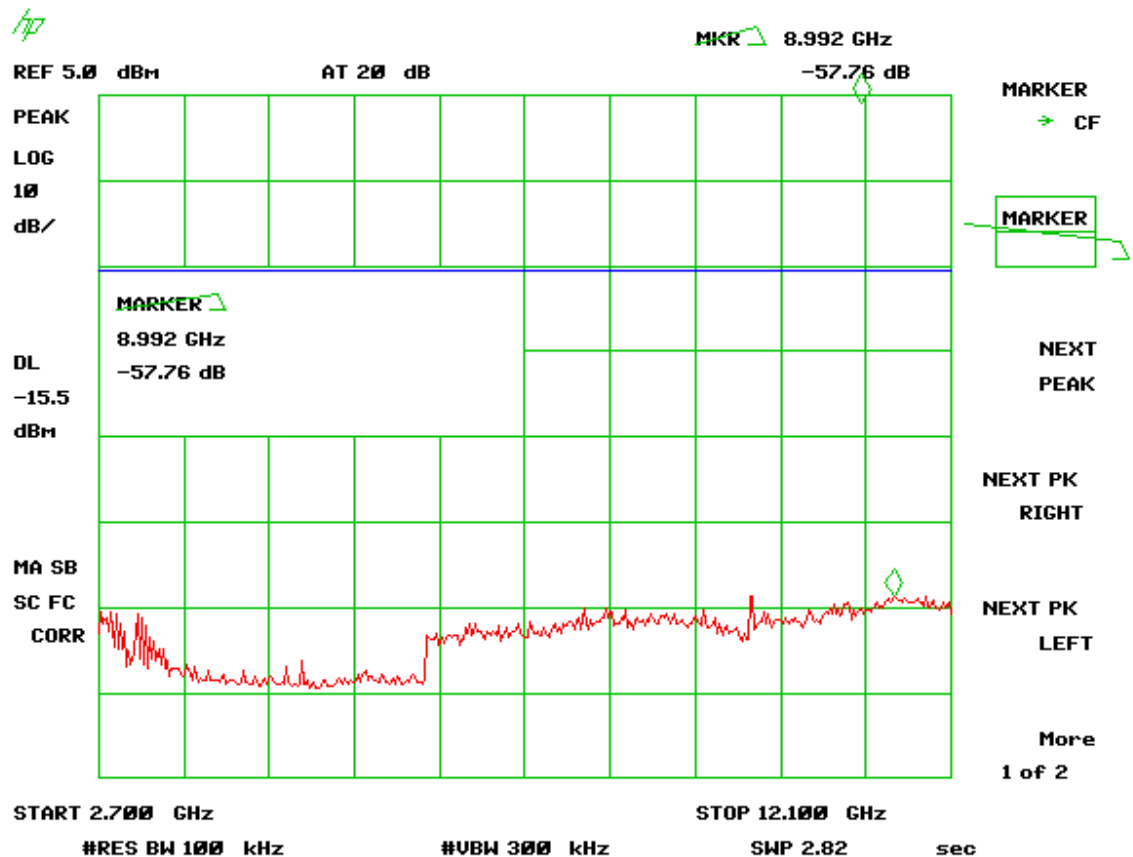


Figure 8 - Antenna Conducted Spurious Emissions - CFR 15.247 (d), High Channel, Part 2

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
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Nivis, LLC
VN210

2 Test and Measurements (Cont'd)

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

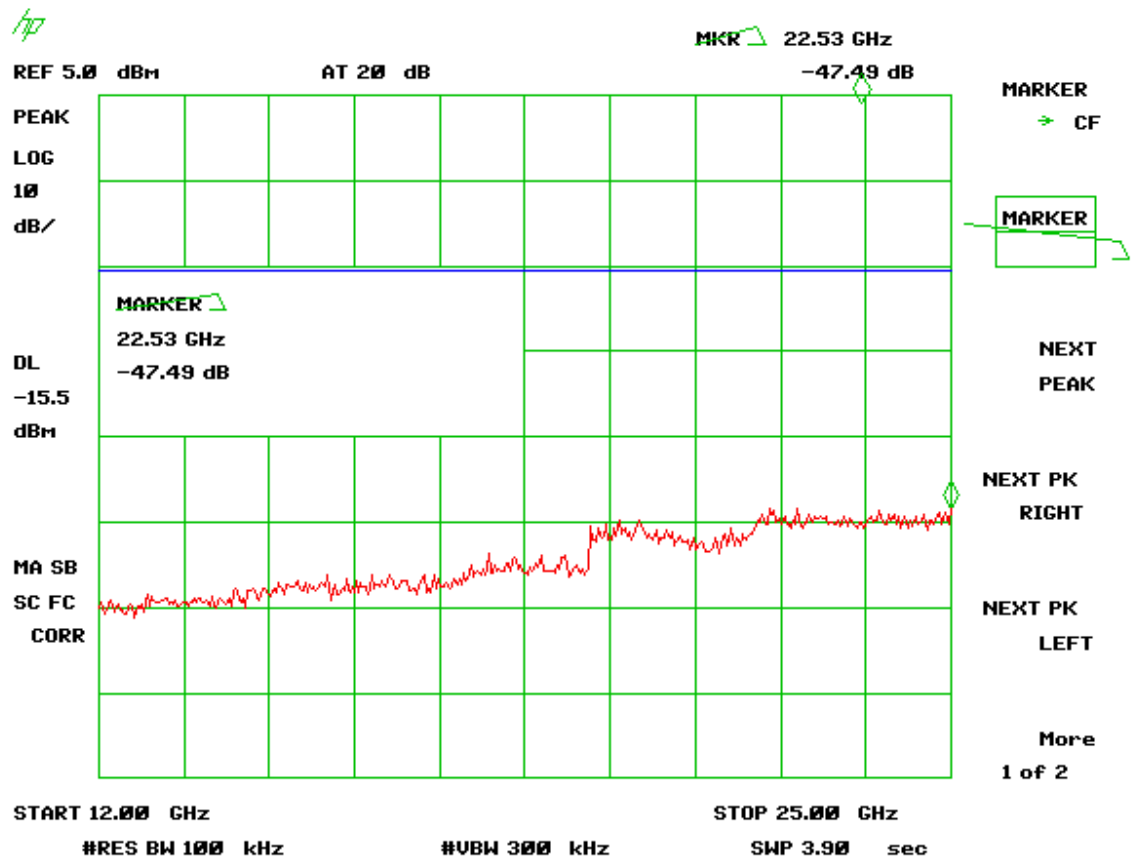


Figure 9 - Antenna Conducted Spurious Emissions - CFR 15.247 (d), High Channel, Part 3

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

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

Table 5 - Peak Radiated Spurious Emissions (Antenna 1)

Radiated Spurious Emissions, Antenna 1, Tested from 1GHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Nivis, LLC			
	Project: 09-0128			Model: VN210			
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							
2405.61	77.16	32.22	109.38	--	3m./VERT	--	PK
4808.98*	57.63	2.34	60.97	74.0	3m./VERT	13.0	PK
7216.28	58.46	8.35	58.27	74.0	1m./VERT	15.7	PK
9617.92	56.55	11.25	59.26	74.0	1m./VERT	14.7	PK
12022.13*	57.56	14.73	63.75	74.0	1m./VERT	10.2	PK
MID BAND- PEAK							
2440.40	78.09	32.36	110.45	--	3m./VERT	--	PK
4880.00*	60.51	2.54	64.05	74.0	3m./VERT	10.0	PK
7318.80*	57.99	8.66	58.11	74.0	1m./VERT	15.9	PK
9758.32	55.24	11.41	58.11	74.0	1m./VERT	15.9	PK
12202.73*	58.82	15.34	65.62	74.0	1m./VERT	8.4	PK
HIGH BAND- PEAK							
2475.43	76.87	32.50	109.37	--	3m./VERT	--	PK
4950.88*	58.04	2.73	61.77	74.0	3m./VERT	12.2	PK
7426.55*	59.04	8.99	59.49	74.0	1m./VERT	14.5	PK
9903.35	56.92	11.58	59.96	74.0	1m./VERT	14.0	PK
12372.83*	58.75	15.91	66.12	74.0	1m./VERT	7.9	PK

*- Falls within the restricted bands of CFR 15.205. ND = No other signals detected within 20 dB of specification limit.

Note: Test data values measured at 1 meter include a factor of -9.5 dB for distance extrapolation from a test distance of 1 meter to 3 meters.

SAMPLE CALCULATION:

RESULTS: At 4808.98 MHz: = (57.63 + (1 dB high pass filter loss) + 2.34)) = 60.97 dBuV/m @ 3m
Margin = (74.0 – 60.97) = 13.0 dB

Test Date: August 13, 2009

Tested By
Signature: 

Name: George Yang

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

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

Table 6 - Average Radiated Spurious (Antenna 1)

Radiated Spurious Emissions, Antenna 1, Tested from 1 GHz – 24 GHz							
Tested By: K.M.	Test: FCC Part 15, Para 15.247(d) Project: 09-0128			Client: Nivis, LLC Model: VN210			
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							
2405.61	74.47	24.99	99.46	--	3m./VERT	--	PK
4808.98*	50.74	-4.89	46.85	54.0	3m./VERT	7.2	AVG
7216.28	50.36	1.12	42.94	54.0	1m./VERT	11.1	AVG
9617.92	46.65	4.02	42.13	54.0	1m./VERT	11.9	AVG
12022.13*	49.19	7.50	48.15	54.0	1m./VERT	5.8	AVG
MID BAND- PEAK							
2440.40	75.15	25.13	100.28	--	3m./VERT	--	PK
4880.98*	53.22	-4.69	49.53	54.0	3m./VERT	4.5	AVG
7318.80*	47.07	1.43	39.96	54.0	1m./VERT	14.0	AVG
9758.32	45.88	4.18	41.52	54.0	1m./VERT	12.5	AVG
12202.73*	49.08	8.11	48.65	54.0	1m./VERT	5.3	AVG
HIGH BAND- PEAK							
2475.43	74.50	25.27	99.77	--	3m./VERT	--	PK
4950.88*	50.96	-4.50	47.46	54.0	3m./VERT	6.5	AVG
7426.55*	49.92	1.76	43.14	54.0	1m./VERT	10.9	AVG
9903.35	47.15	4.35	42.96	54.0	1m./VERT	11.0	AVG
12372.83*	48.82	8.68	48.96	54.0	1m./VERT	5.0	AVG

*- Falls within the restricted bands of CFR 15.205. ND = No other signals detected within 20 dB of specification limit. No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.

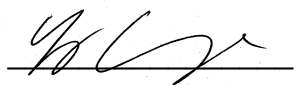
Note: Test data values measured at 1 meter include a factor of -9.5 dB for distance extrapolation from a test distance of 1 meter to 3 meters.

Note: Duty Cycle, DC = -7.23 dB

SAMPLE CALCULATION:

RESULTS: At 4808.98 MHz: = (50.74 + (1 dB high pass filter loss) + (-4.89)) = 46.85 dBuV/m @ 3m
Margin = (54.0 – 46.85) = 7.2 dB

Test Date: August 13, 2009

Tested By
Signature: 

Name: George Yang

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

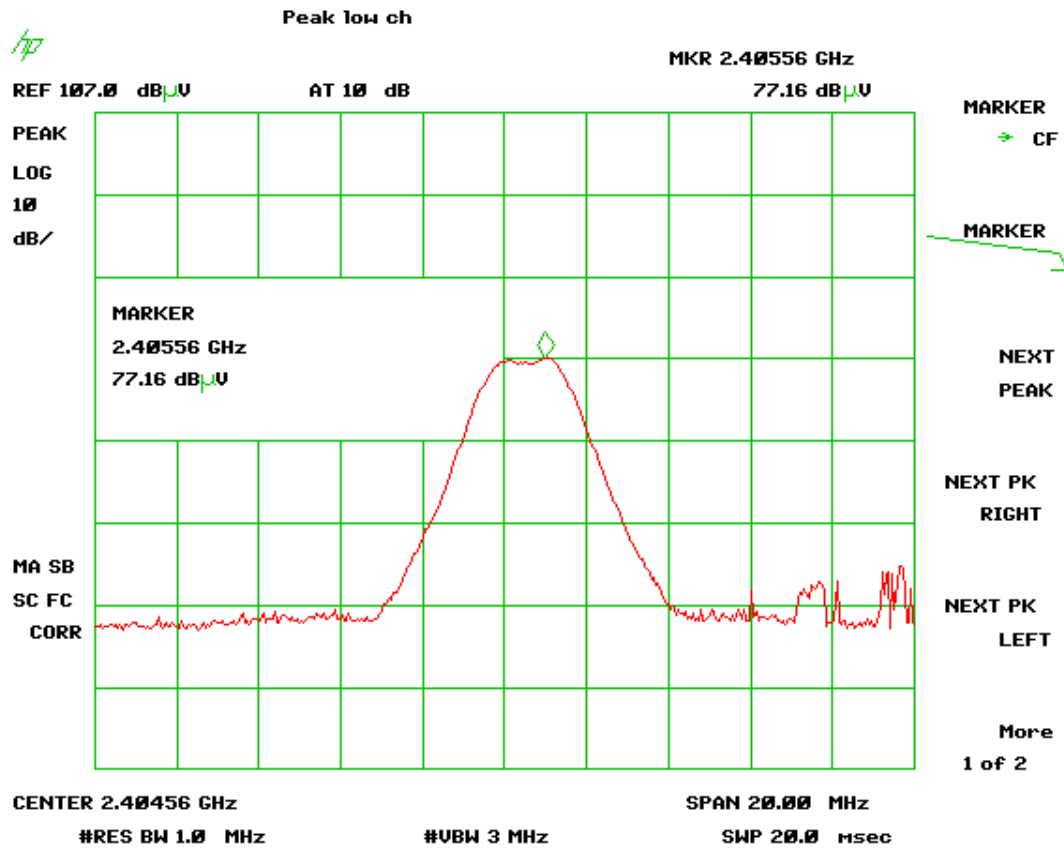


Figure 10 - Peak Radiated Spurious Emission 15.247(d) Antenna 1
Low Channel Fundamental

US Tech
 FCC ID:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15 Class II Permissive Change
 SQB-NIVISMOD0003
 09-0128
 August 21, 2009
 Nivis, LLC
 VN210

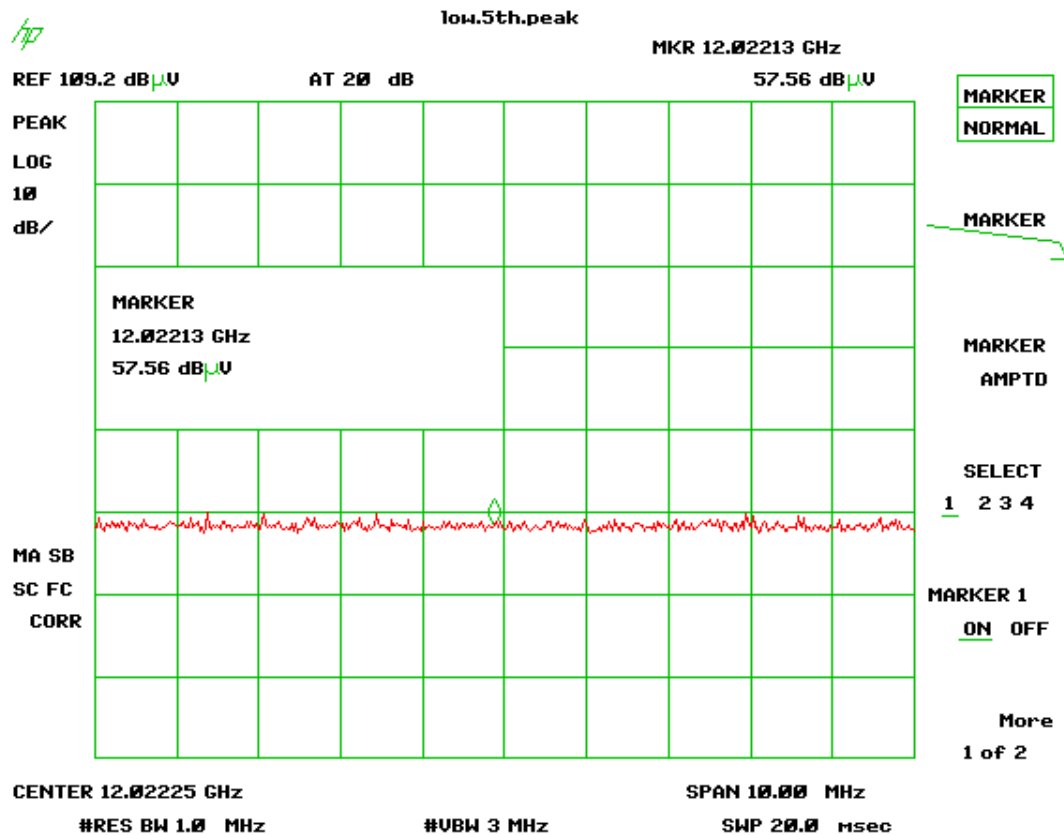


Figure 11 - Peak Radiated Spurious Emission 15.247(d) Antenna 1
 Worse-case Low Channel 5th Harmonic

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

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August 21, 2009
Nivis, LLC
VN210

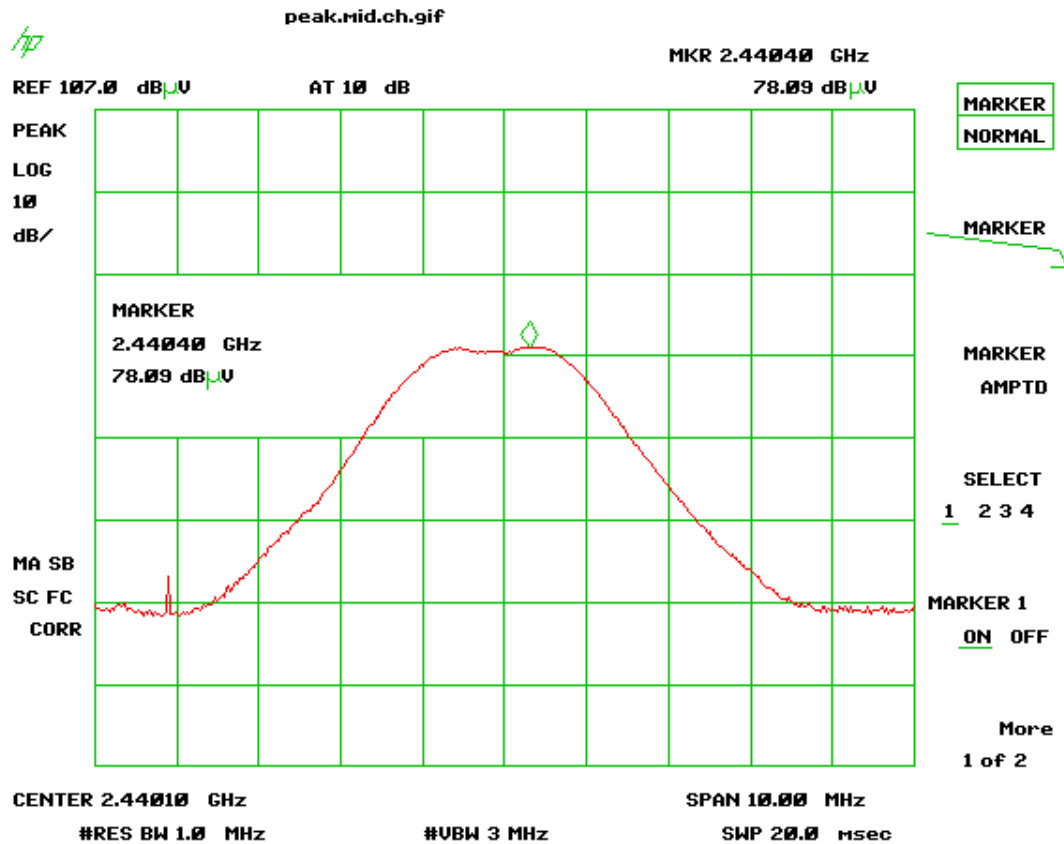


Figure 12 - Peak Radiated Spurious Emission 15.247(d) Antenna 1
Mid Channel Fundamental

US Tech
 FCC ID:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15 Class II Permissive Change
 SQB-NIVISMOD0003
 09-0128
 August 21, 2009
 Nivis, LLC
 VN210

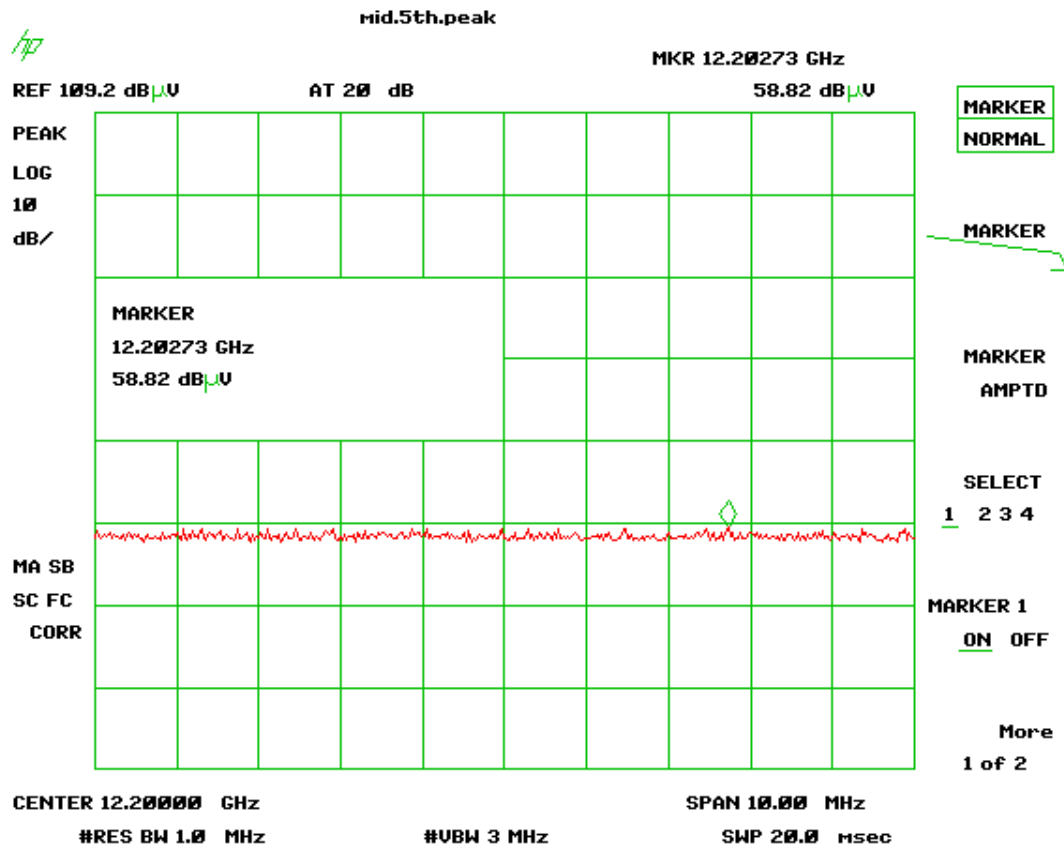


Figure 13 - Peak Radiated Spurious Emission 15.247(d) Antenna 1
 Worse-case Mid Channel 5th Harmonic

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

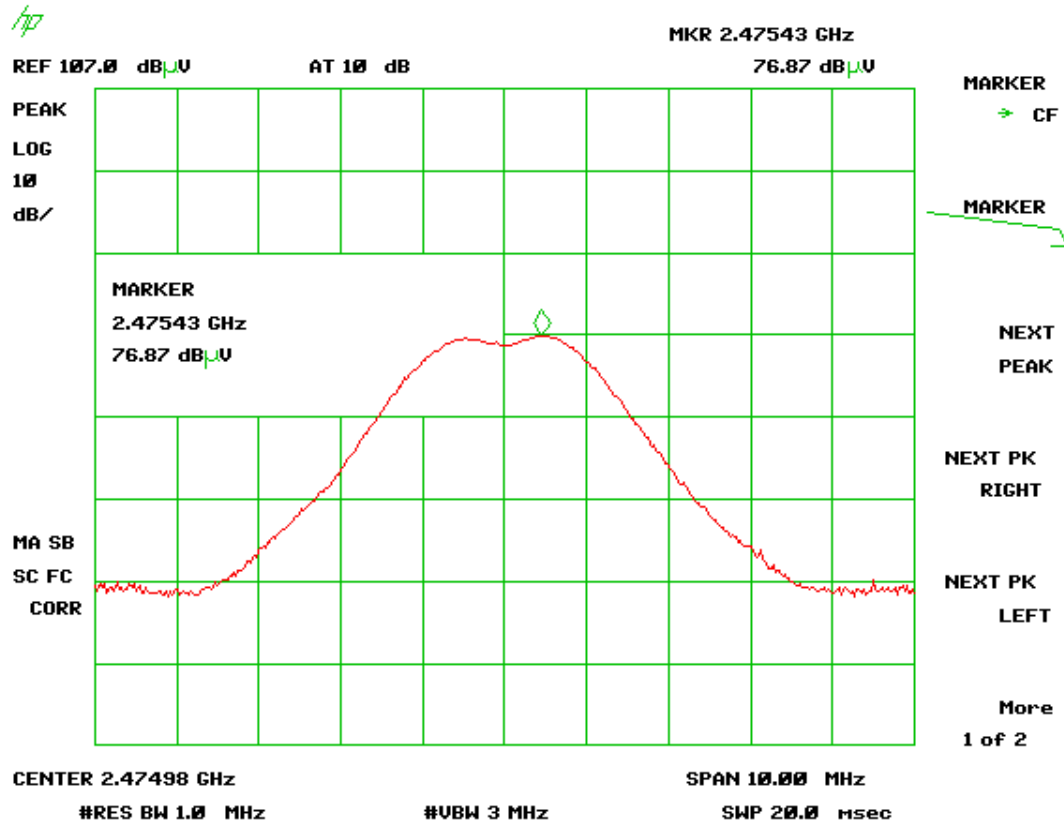


Figure 14 - Peak Radiated Spurious Emission 15.247(d) Antenna 1
High Channel Fundamental

US Tech
 FCC ID:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15 Class II Permissive Change
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 August 21, 2009
 Nivis, LLC
 VN210

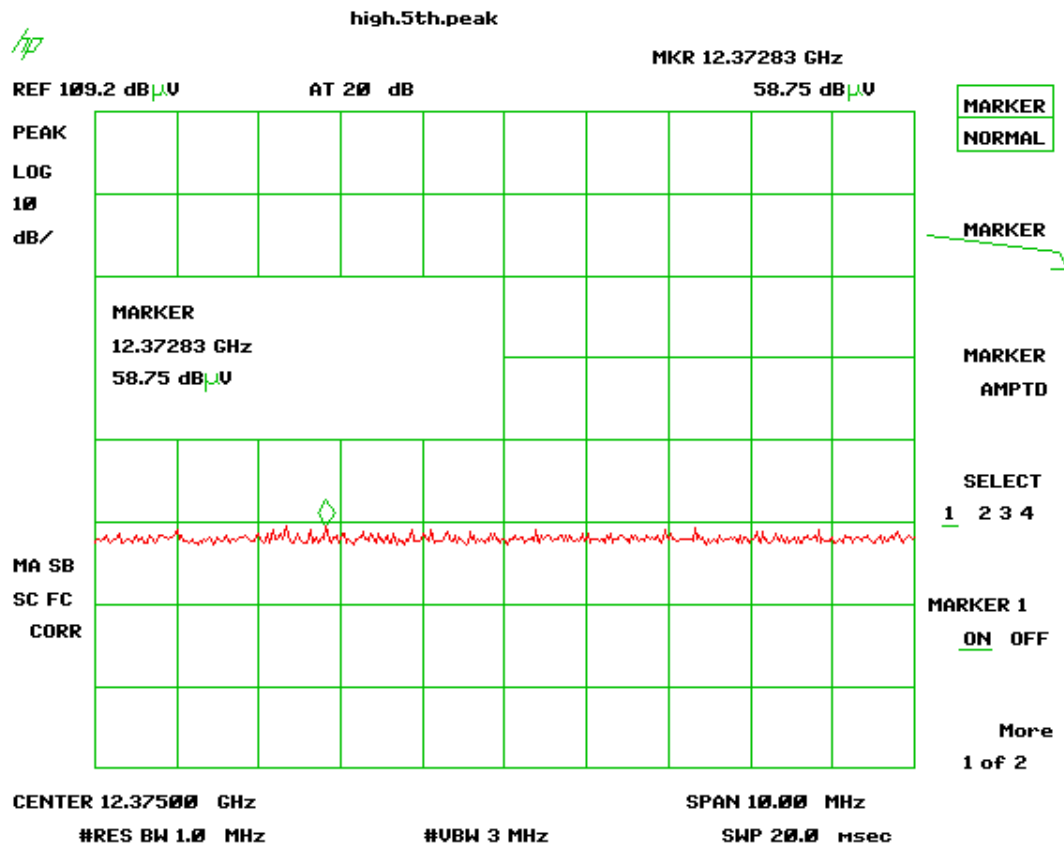


Figure 15 - Peak Radiated Spurious Emission 15.247(d) Antenna 1
 Worse-case High Channel 5th Harmonic

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

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

Table 8 - Peak Radiated Spurious Emissions (Antenna 2)

Radiated Spurious Emissions, Antenna 2, Tested from 1GHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Nivis, LLC			
	Project: 09-0128			Model: VN210			
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							
2405.50	77.39	32.22	109.61	--	3m./VERT	--	PK
4811.10*	57.71	2.34	61.05	74.0	3m./VERT	12.9	PK
7213.50	52.40	7.34	60.74	74.0	3m./VERT	13.3	PK
9621.85	52.28	11.25	55.03	74.0	1m./VERT	19.0	PK
12027.88*	50.21	14.75	56.46	74.0	1m./VERT	17.5	PK
MID BAND- PEAK							
2440.38	76.02	32.36	108.38	--	3m./VERT	--	PK
4880.93*	58.16	2.54	61.70	74.0	3m./VERT	12.3	PK
7321.68*	51.64	7.67	60.31	74.0	3m./VERT	13.7	PK
9761.92	51.29	11.42	54.21	74.0	1m./VERT	19.8	PK
12196.10*	50.66	15.32	57.48	74.0	1m./VERT	16.5	PK
HIGH BAND- PEAK							
2475.45	74.92	32.50	107.42	--	3m./VERT	--	PK
4950.93*	59.20	2.73	62.93	74.0	3m./VERT	11.1	PK
7426.35*	52.76	7.99	61.75	74.0	3m./VERT	12.3	PK
9901.92	54.06	11.58	57.14	74.0	1m./VERT	16.9	PK
12371.93*	49.89	15.91	57.30	74.0	1m./VERT	16.7	PK

* - Falls within the restricted bands of CFR 15.205. ND = No other signals detected within 20 dB of specification limit.

Note: Test data values measured at 1 meter include a factor of -9.5 dB for distance extrapolation from a test distance of 1 meter to 3 meters.

SAMPLE CALCULATION:

RESULTS: At 4811.10 MHz: = (57.71 + (1 dB high pass filter loss) + 2.34)) = 61.05 dBuV/m @ 3m
Margin = (74.0 – 61.05) = 12.9 dB

Test Date: August 20, 2009

Tested By
Signature: 

Name: George Yang

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

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

Table 9 - Average Radiated Spurious (Antenna 2)

Radiated Spurious Emissions, Antenna 2, Tested from 1 GHz – 24 GHz							
Tested By: K.M.	Test: FCC Part 15, Para 15.247(d) Project: 09-0128			Client: Nivis, LLC Model: VN210			
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							
2405.50	74.45	24.99	99.44	--	3m./VERT	--	PK
4811.10*	50.70	-4.89	46.81	54.0	3m./VERT	7.2	AVG
7213.50	44.92	0.11	46.03	54.0	3m./VERT	8.0	AVG
9621.85	43.94	4.02	39.46	54.0	1m./VERT	14.5	AVG
12027.88*	40.81	7.52	39.83	54.0	1m./VERT	14.2	AVG
MID BAND- PEAK							
2440.38	73.30	25.13	98.43	--	3m./VERT	--	PK
4880.93*	51.22	-4.69	47.53	54.0	3m./VERT	6.5	AVG
7321.68*	43.81	0.44	45.25	54.0	3m./VERT	8.7	AVG
9761.92	43.67	4.19	39.36	54.0	1m./VERT	14.6	AVG
12196.10*	40.56	8.09	40.15	54.0	1m./VERT	13.9	AVG
HIGH BAND- PEAK							
2475.45	72.40	25.27	97.67	--	3m./VERT	--	PK
4950.93*	51.93	-4.50	48.43	54.0	3m./VERT	5.6	AVG
7426.35*	45.02	0.76	46.78	54.0	3m./VERT	7.2	AVG
9901.92	46.05	4.35	41.90	54.0	1m./VERT	12.1	AVG
12371.93*	40.16	8.68	40.34	54.0	1m./VERT	13.7	AVG

*- Falls within the restricted bands of CFR 15.205. ND = No other signals detected within 20 dB of specification limit. No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.

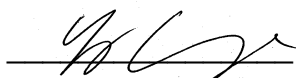
Note: Test data values measured at 1 meter include a factor of -9.5 dB for distance extrapolation from a test distance of 1 meter to 3 meters.

Note: Duty Cycle, DC = -7.23 dB

SAMPLE CALCULATION:

RESULTS: At 4811.10 MHz: = (50.70 + (1 dB high pass filter loss) + (-4.89)) = 46.81 dBuV/m @ 3m
Margin = (54.0 – 46.81) = 7.2 dB

Test Date: August 20, 2009

Tested By
Signature: 

Name: George Yang

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

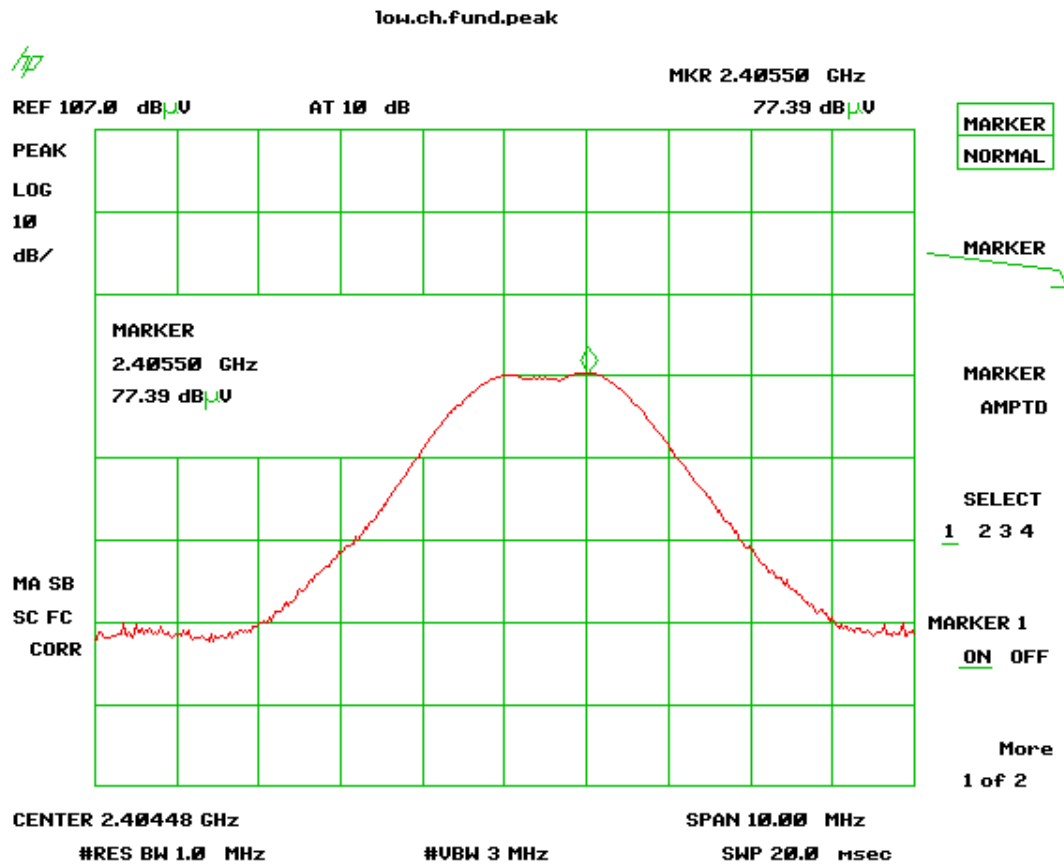


Figure 16 - Peak Radiated Spurious Emission 15.247(d) Antenna 2
Low Channel Fundamental

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
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August 21, 2009
Nivis, LLC
VN210

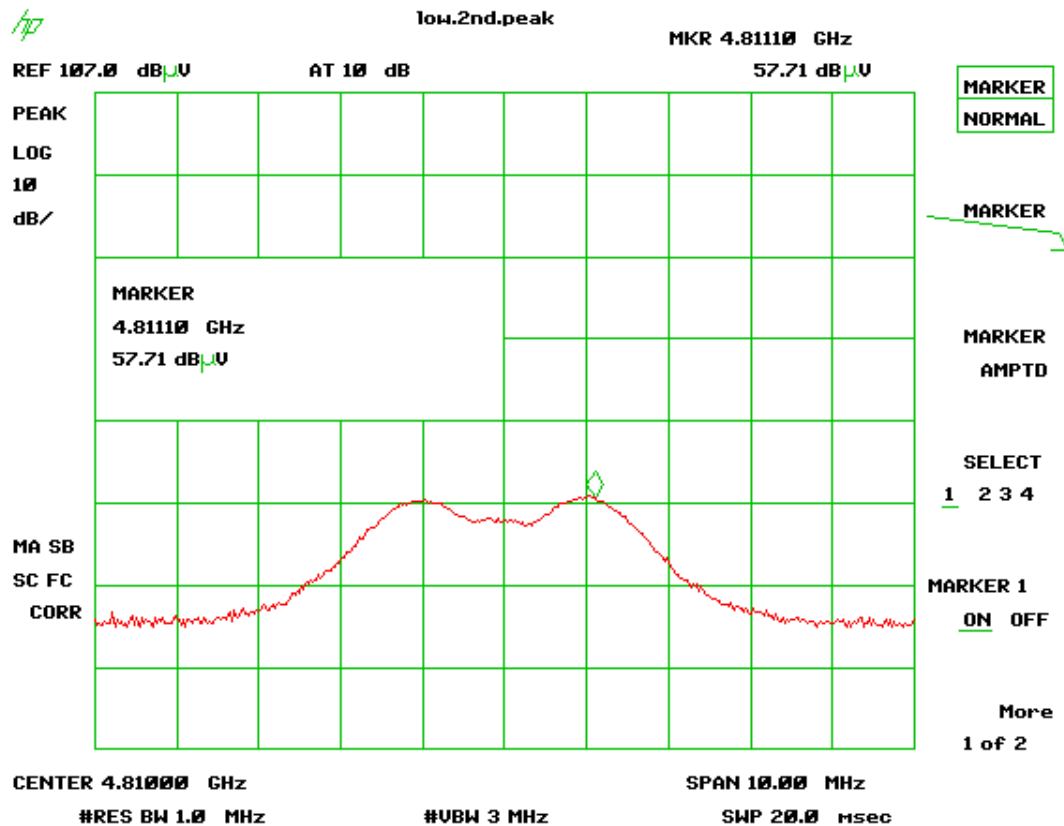


Figure 17 - Peak Radiated Spurious Emission 15.247(d) Antenna 2
Worse-case Low Channel 2nd Harmonic

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

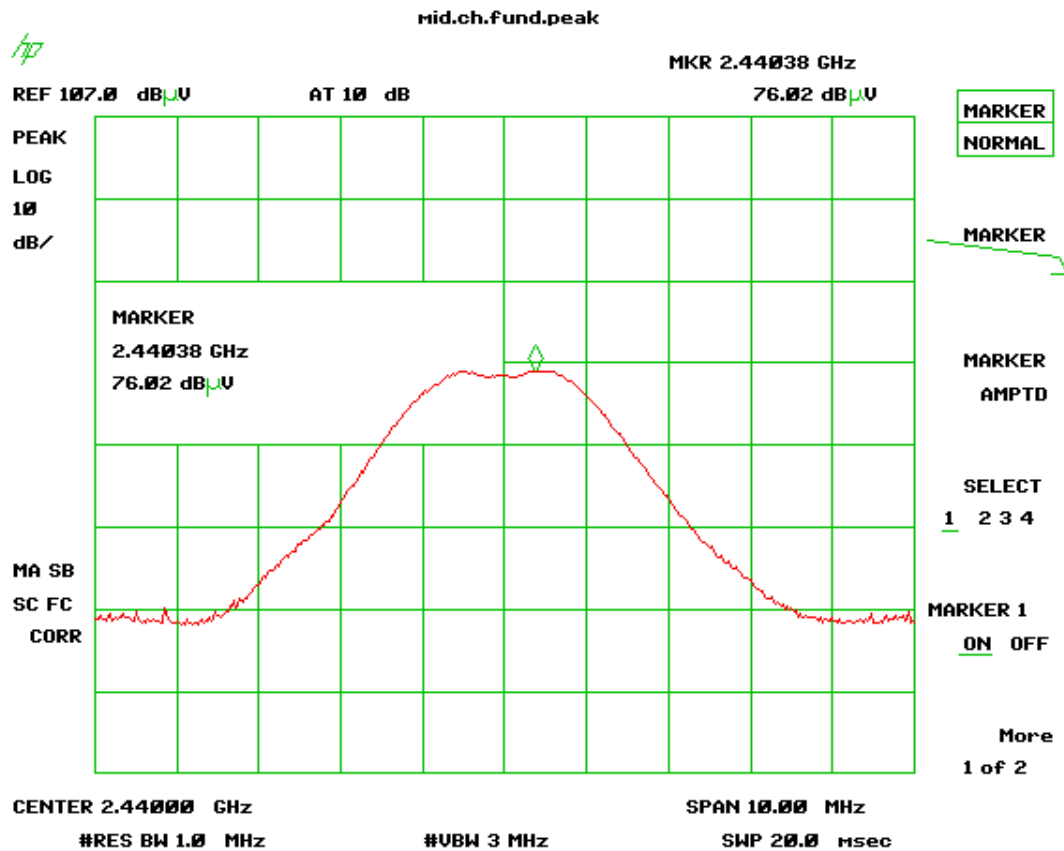


Figure 18 - Peak Radiated Spurious Emission 15.247(d) Antenna 2
Mid Channel Fundamental

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

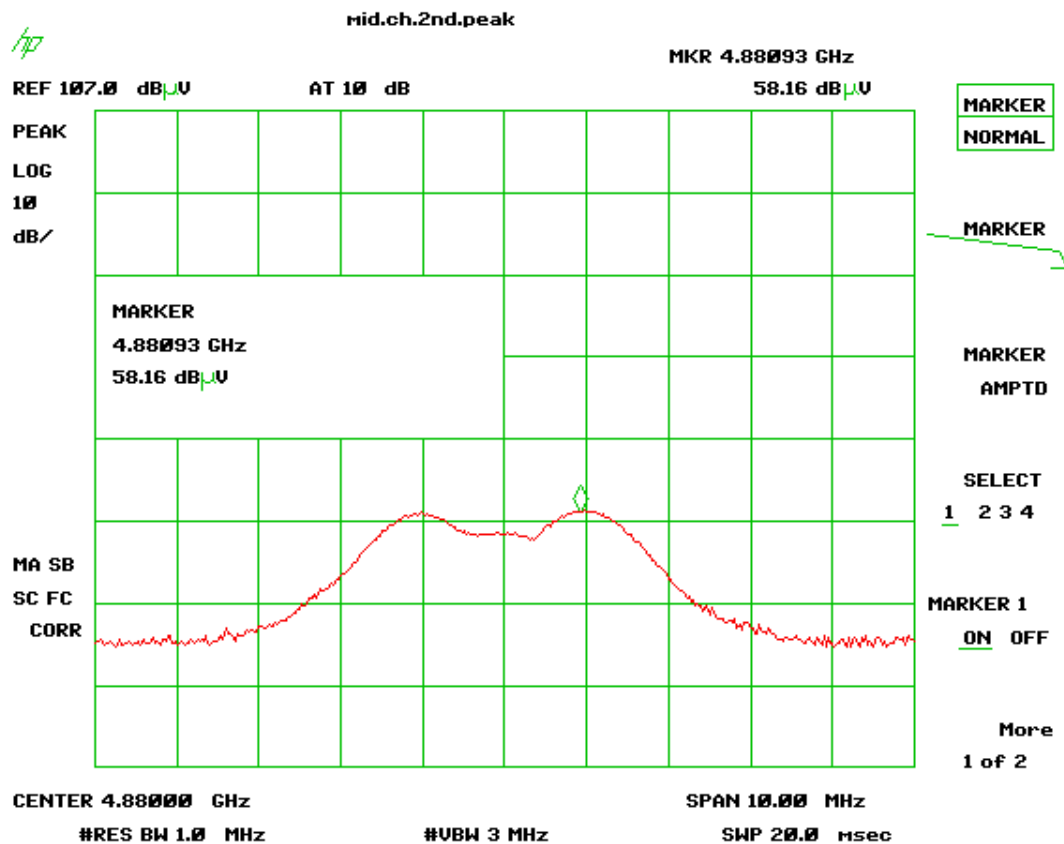


Figure 19 - Peak Radiated Spurious Emission 15.247(d) Antenna 2
Worse-case Mid Channel 2nd Harmonic

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

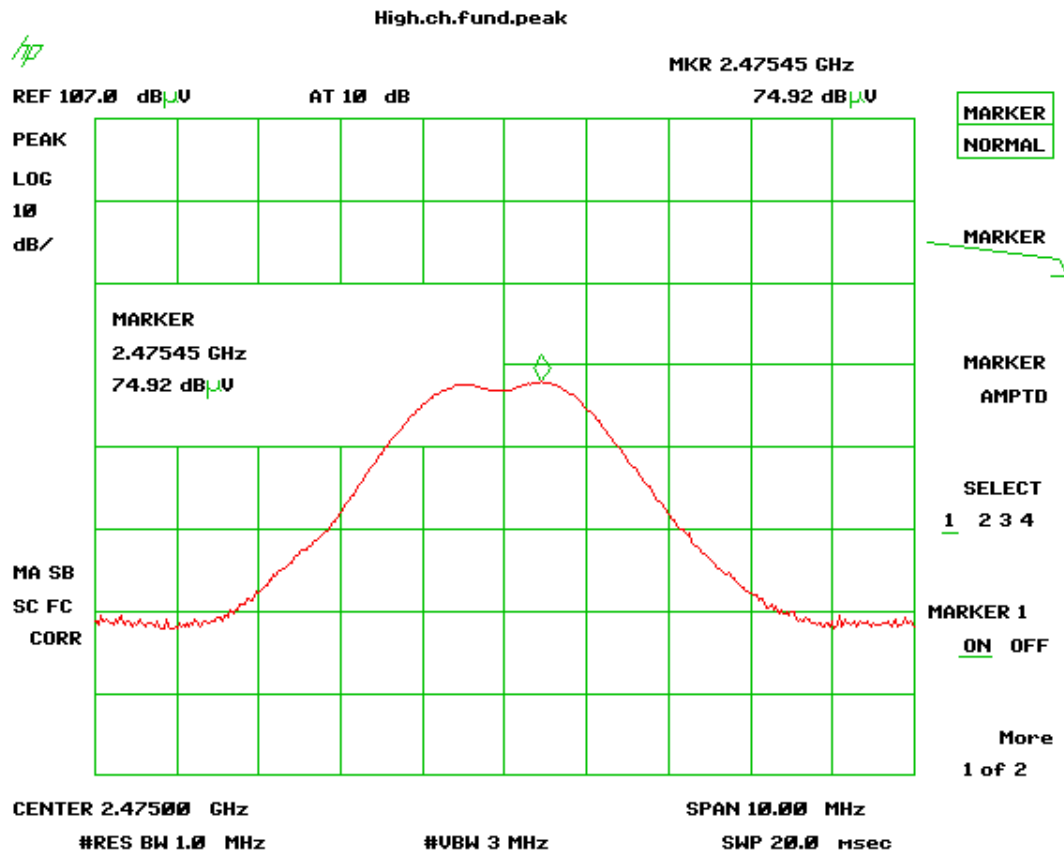


Figure 20 - Peak Radiated Spurious Emission 15.247(d) Antenna 2
High Channel Fundamental

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

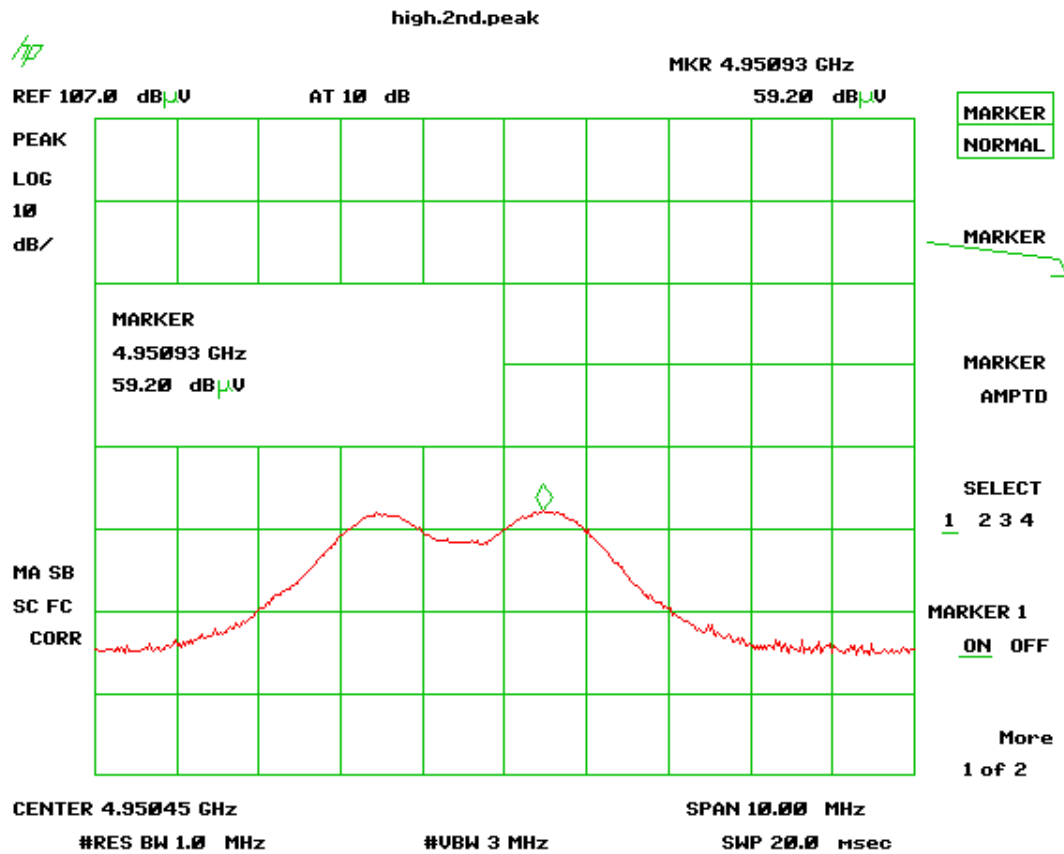


Figure 21 - Peak Radiated Spurious Emission 15.247(d) Antenna 2
Worse-case High Channel 2nd Harmonic

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

2 Test and Measurements (Cont'd)

2.13 Six 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 DA 00-7.5 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 22 through 24.

Table 10 – Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)
2405	1.5	0.5
2440	1.5	0.5
2475	1.5	0.5

Test Date: May 1, 2009

Tested By

Signature:



Name: Keyvan Muvahhid

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

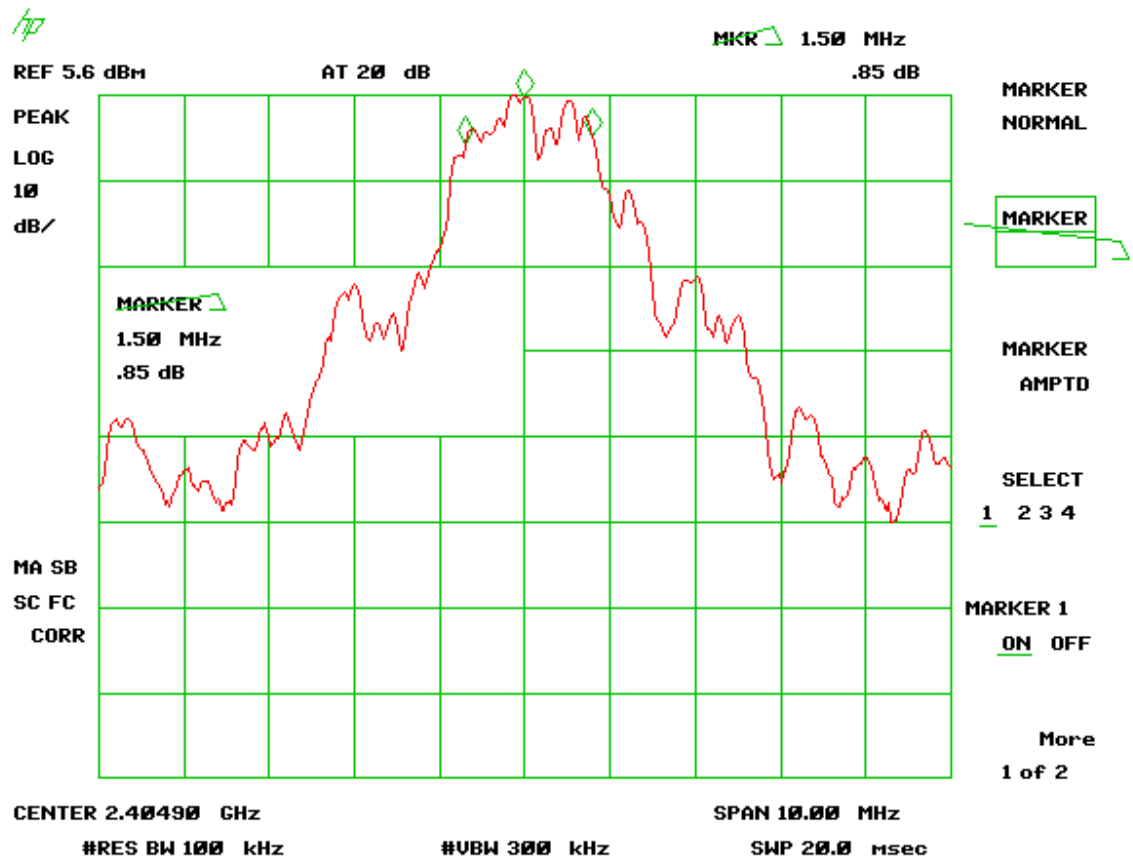


Figure 22 - Six (6) dB Bandwidth - 15.247 (a)(2) - Low Channel

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

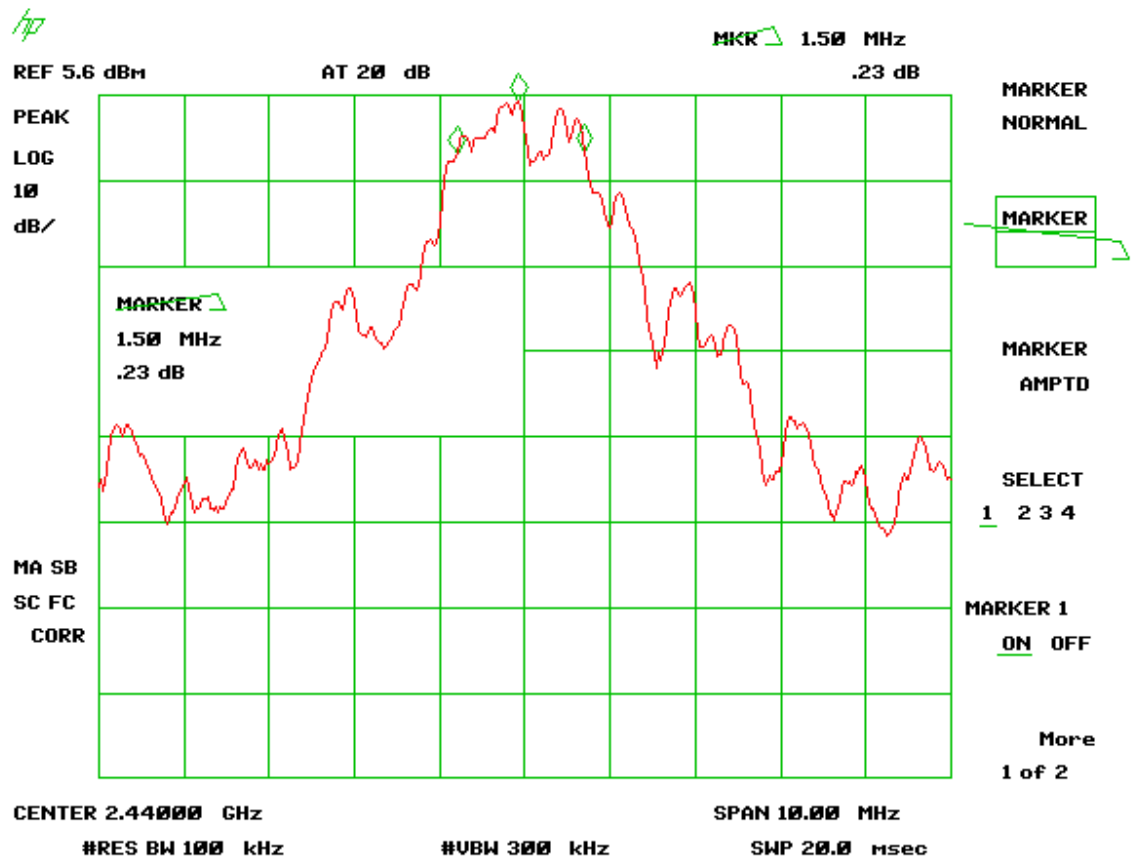


Figure 23 – Six dB Bandwidth - 15.247 (a)(2) - Mid Channel

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

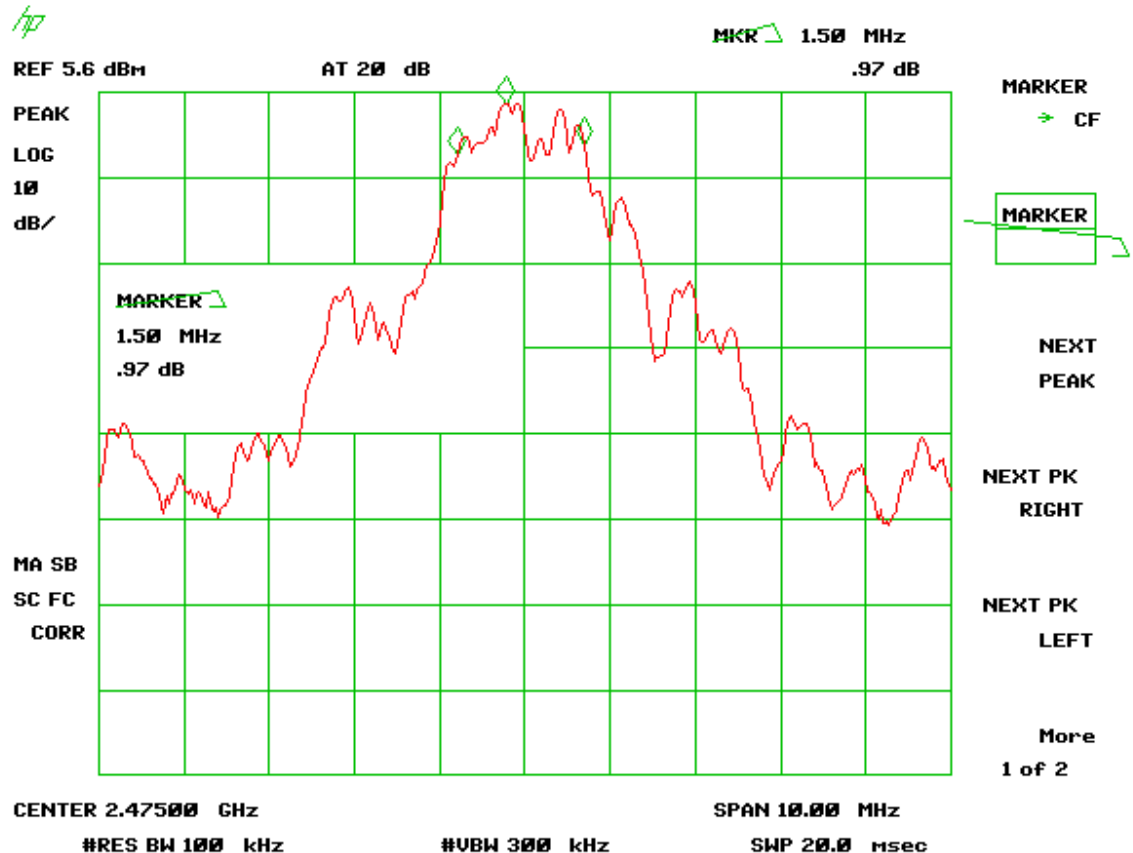


Figure 24 - Six dB Bandwidth - 15.247 (a)(2) - High Channel, Ch. 14

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

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Nivis, LLC
VN210

2 Test and Measurements (Cont'd)

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

For the VN210 model, the transmitter was programmed to operate at a maximum of +12 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 a 50 Ω impedance with the RBW set greater than the 6 dB bandwidth of the EUT, and the VBW = RBW. The loss of the short cable is 0.2 dB, and the final values were determined by adding 0.2 dB to the measured values. Peak antenna conducted output power is tabulated in Table 13 below.

Antenna Conducted Output Power was measured at Low Channel, Mid Channel and High Channel frequencies. See Figures 25 through 27 below.

Table 11 - Peak Antenna Conducted Output Power per Part 15.247 (b) (3)

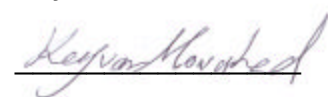
Frequency of Fundamental (MHz)	Measurement		FCC Limit (mW Maximum)
	(dBm)	(mW)	
Low Band (ch00) 2405.03	10.51	11.24	1000
Mid Band (ch07) 2440.43	9.76	9.46	1000
High Band (ch14) 2474.45	9.02	7.97	1000

Measurement values increased by 0.2 dB to correct for cable loss.

Test Date: May 1, 2009

Tested By

Signature:

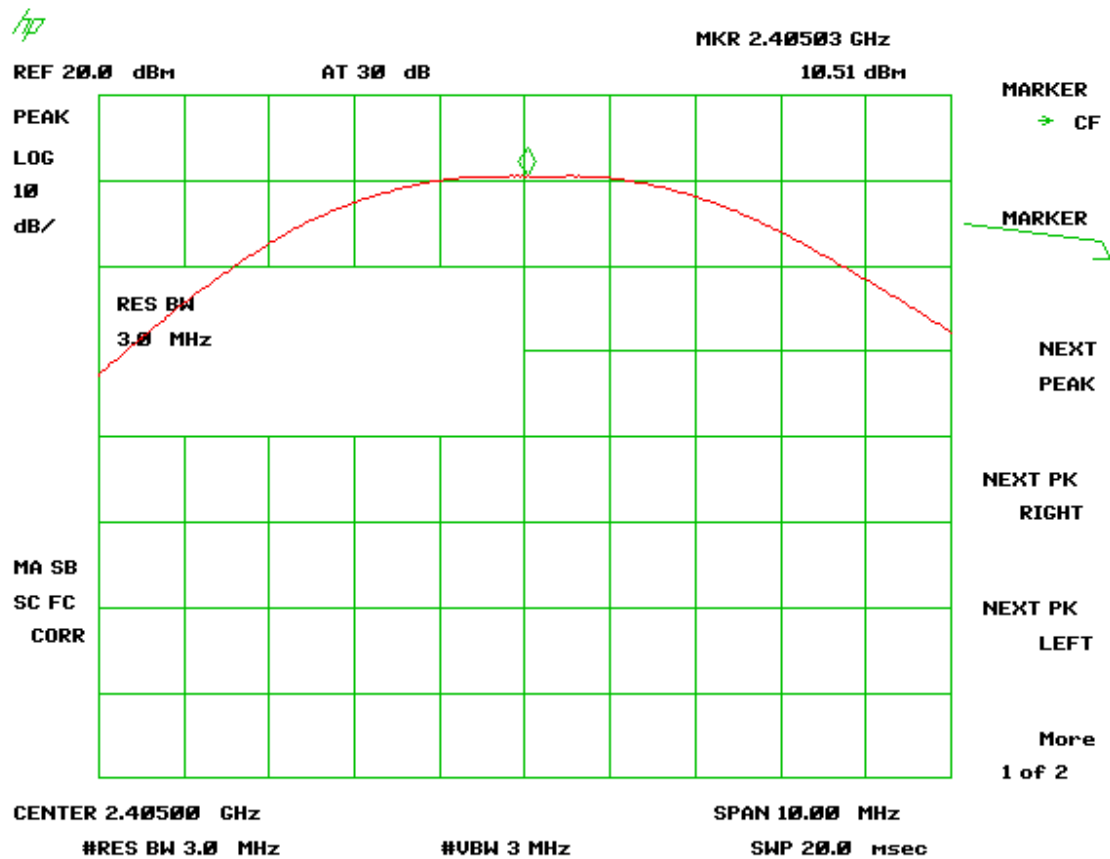


Name: Keyvan Muvahhid

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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



Add 0.2 dB loss for cable attenuation

Figure 25 - Peak Antenna Conducted Output Power, Low Channel

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

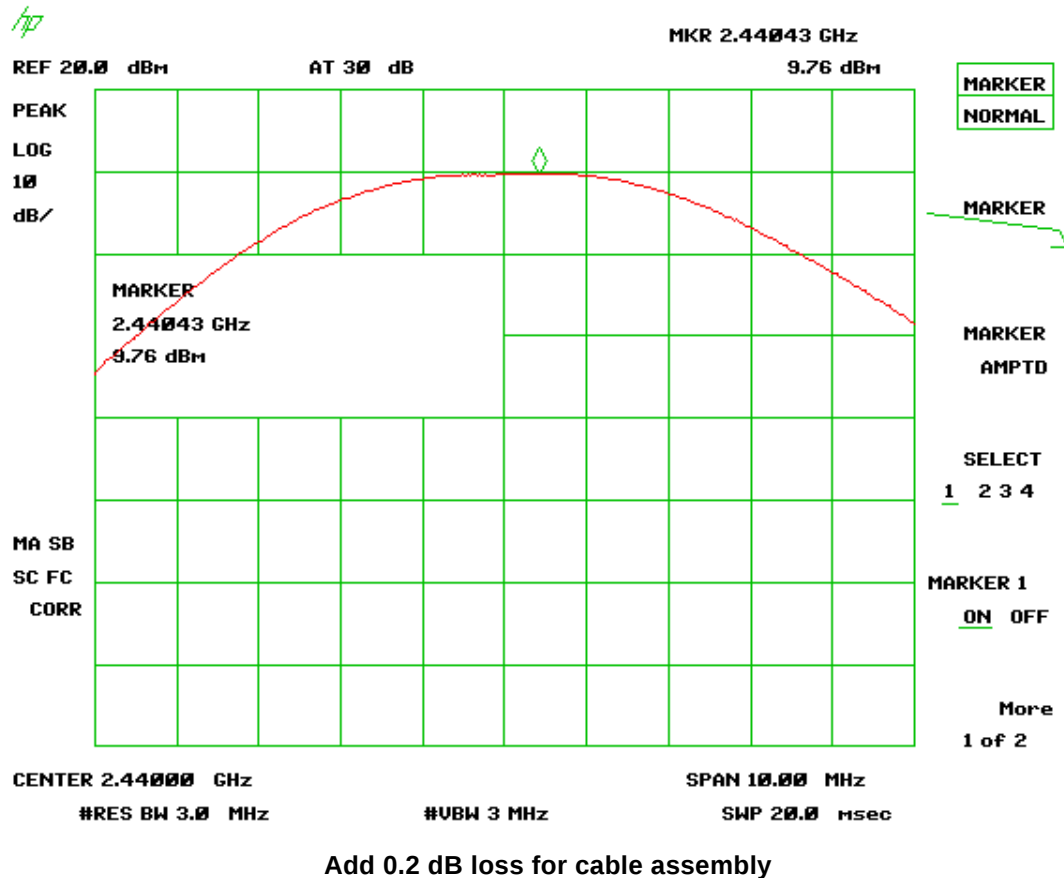
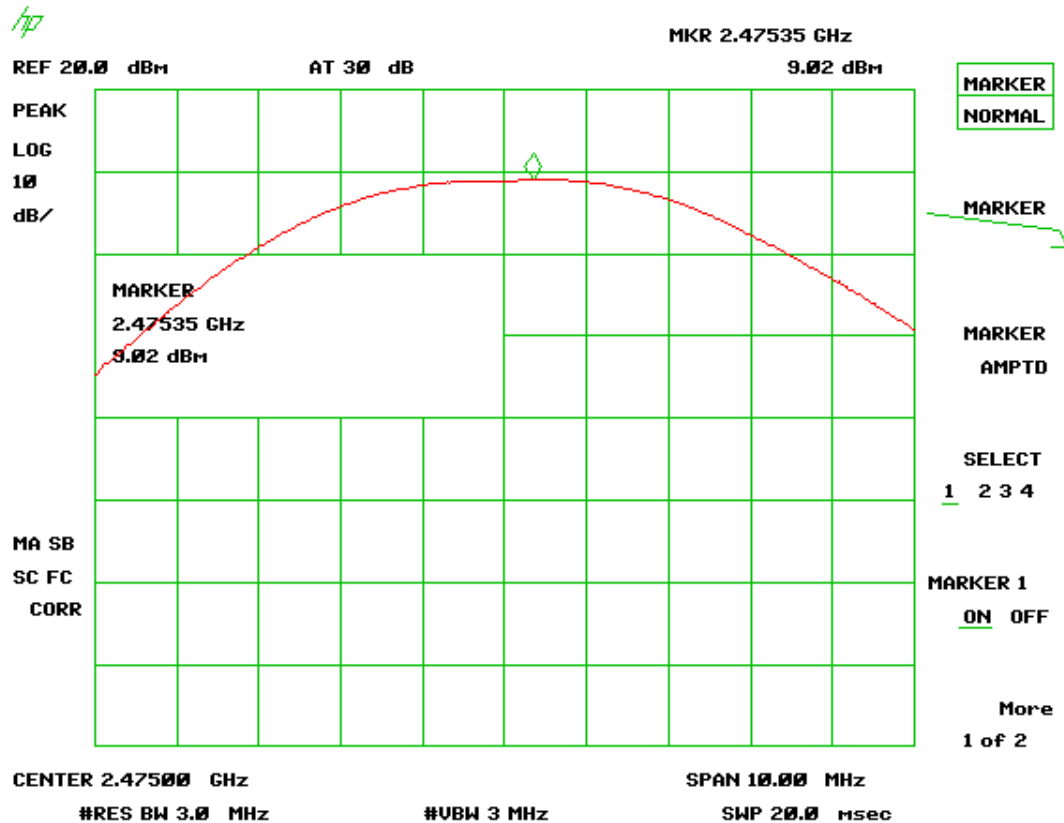


Figure 26 - Peak Antenna Conducted Output Power, Mid Channel

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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



Add 0.2 dB loss for cable assembly.

Figure 27 - Peak Antenna Conducted Output Power, High Channel

Note: For the permissive change investigation, this test was not re-tested because the equipment modifications did not affect the originally submitted data.

2 Test and Measurements (Cont'd)

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

Band Edge measurements were made for the EUT operating first on the Low Channel and then on the High Channel. Conducted measurements were performed to demonstrate compliance with the requirement of 15.247(d) that all emissions be attenuated by at least 20 dB outside the band. Radiated measurements were performed at the upper band edge to demonstrate compliance with the radiated emission limits of 15.209 for signals that fall within the restricted bands as defined in section 15.205. Conducted measurements were performed with RBW = 100 kHz, while radiated measurements were performed with a minimum RBW = 1 MHz. In all cases, the VBW was set = RBW.

Using the “Marker-Delta” method for radiated band edge, the emission of greatest magnitude up to two standard bandwidths (~3 MHz) outside of the band was marked, and then a delta measurement between that emission and the peak of the fundamental emission was taken. That delta value was subtracted from the value of the fundamental frequency of the highest operating channel to compute the field strength.

The EUT passes the average limit requirements for both Low and High Channels. The result from the worst-case antenna, Antenna 1, has been selected for illustration below.

2.15.1 Lower Band Edge

With the transmitter set to its lowest operating channel, the signal level at 2.400 GHz, the lower band edge, is more than 20 dB down from the peak per the requirements of 15.247(d). The actual level of attenuation is measured by the delta marker. This radiated measurement was compared to the originally submitted conducted measurements. The conducted measurements were worse case that data will not be resubmitted here, but the radiated measurement will be shown in Figure 28 below.

US Tech
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15 Class II Permissive Change
SQB-NIVISMOD0003
09-0128
August 21, 2009
Nivis, LLC
VN210

2.15.2 Upper Band Edge

With the transmitter set to its highest operating channel, the signal level at 2.400 GHz, the lower band edge, is more than 20 dB down from the peak per the requirements of 15.247(d). The actual level of attenuation is measured by the delta marker. This radiated measurement was compared to the originally submitted conducted measurements. The conducted measurements were worse case, that data will not be resubmitted here but the radiated measurement will be shown in Figure 29 below.

2.15.2(a) Average Limits

The limit for the average value of radiated emissions in a Restricted Band is 54 dBuV/m. The EUT passes the average limit requirements for both Low and High Channels. The results from the worst-case antenna the Radiated measurement has been selected for illustration in Figures 28 and 29 below.

2 Test and Measurements (Cont'd)

2.15 Band-Edge Measurements (Cont'd)

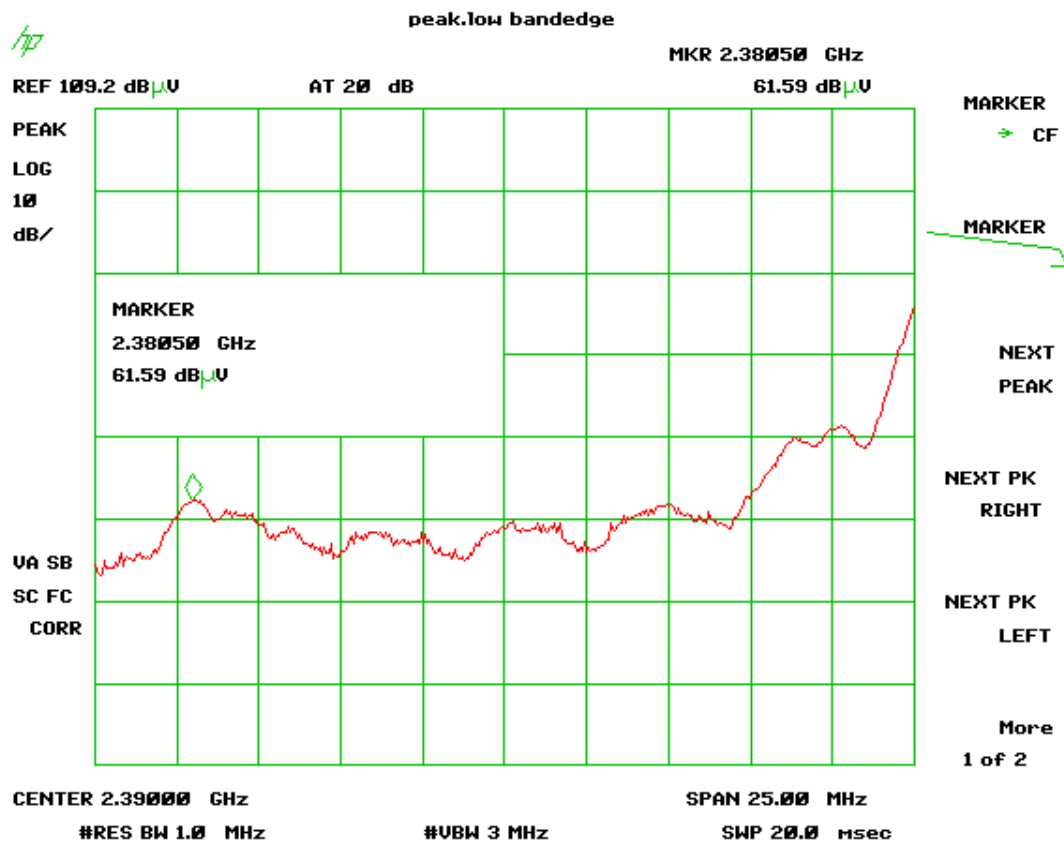


Figure 28 - Radiated Band Edge Compliance – Low Channel-Peak

2 Test and Measurements (Cont'd)

2.15 Band Edge Measurements (Cont'd)

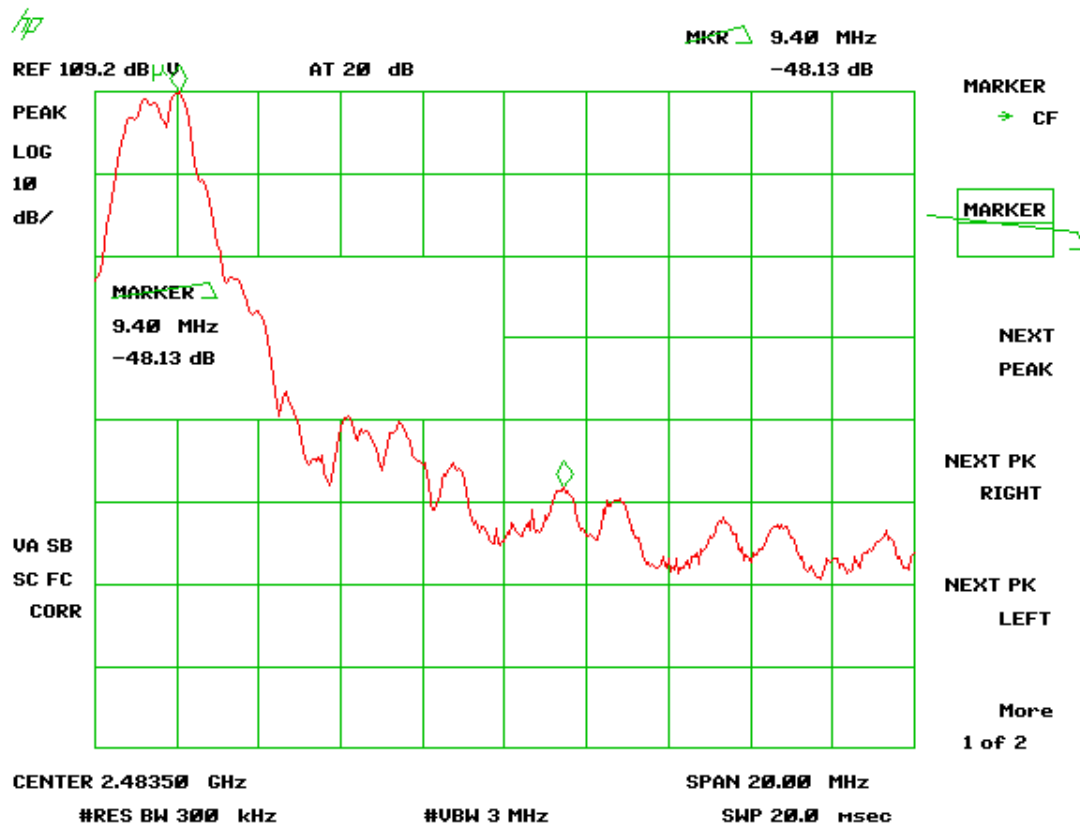


Figure 29 - Radiated Band Edge Compliance – High Channel-Peak