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

Strategic Services Group, Inc. Model: ROAM DCM
Model number: DCM127-NX1

FCC ID: UJX-DCM127-001

UST Project: 10-0125
Issue Date: June 14, 2010

Total Pages: 47

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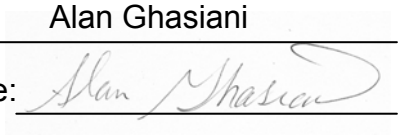
I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date June 14, 2010

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Strategic Services Group, INC.

MODEL: DCM127-NX1

FCC ID: UJX-DCM127-001

DATE: June 14, 2010

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
Alpharetta, GA 30004

Phone Number: (770) 740-0717
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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 May 25, 2010 in good operating condition.

1.3 Product Description

The Equipment under Test (EUT) is the Strategic Services Group, Inc. model ROAM DCM, Model Number DCM127-NX1, which is a 2.4 GHZ Transmitter Module.

The EUT is plugged into a header board which requires an external 6V power supply and provides a regulated source of 3.3 VDC. A laptop PC with Nivis Sense Node software and a 2.4 GHz RF Sniffer is needed to communicate with the device per the instructions in Nivis document *2.4 GHz radio test fixture User Guide*.

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

The power output level was set to “67” on the firmware.

A functional block diagram for the module is shown on Figure 1, herein.

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 Public Notice DA 00-705 was used as a test procedure guide.

1.4 Configuration of Tested System (cont'd)

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 limited modular approval), Paragraphs 2.1 through 2.15 herein.
b) Verification as a class A digital device, Paragraphs 2.16 and 2.17 herein.

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

Table 1 - EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
(EUT) Strategic Services Group, INC	ROAM DCM model number: DCM127-NX1	None	Pending: UJX-DCM127-001	6' U - P
Antenna, Please see Antenna description	--	--	None	N/A
Tek Power DC Power Supply	HY1803D	None	None	6' U-P
Laptop Computer Hewlett Packard	None	None	None	6' U -P
Power Supply Hewlett Packard	HPP181a	00629710	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	8566B	HEWLETT-PACKARD	2332A10055	10/14/09
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	10/07/09
RF PREAMP 100 kHz to 1.3 GHz	8447D	HEWLETT-PACKARD	2944A07436	9/08/09
BICONICAL ANTENNA 25 MHz to 200 MHz	3110B	EMCO	9307-1431	2/02/10
LOG PERIODIC 100 MHz to 1000 MHz	3146	EMCO	3110-3236	9/18/09 2 Year
LISN (x 2) TS24-BNC	9247	Solar Electronics	910495 & 910494	1/19/09
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	9/11/09
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
Nivis	Ferrite	--	Antenna 1	-1	Permanently attached

2 Test and Measurements (Cont'd)

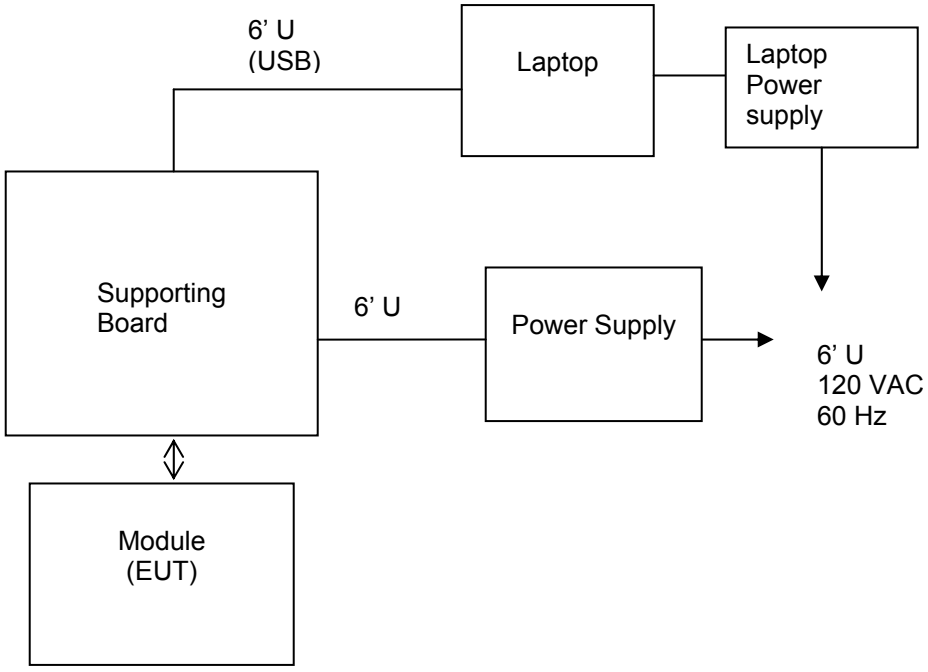


Figure 1- Test Configuration

2 Test and Measurements (Cont'd)

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 transmitter is capable of sending three types of transmissions. They are listed below, along with their pulse-width duration:

	Phy. overhead	Data length	TX len	Tx duration (µs)	Warm up (µs)	Sw delay (µs)	Total TX (µs)
Nack	8	15	23	736	144	20	900
ACK	8	24	32	1024	144	20	1188
Msg	8	125	133	4256	144	20	4420

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 125 ms timeslot, along with all transmission lengths, will be as follows:

Transmitter Activity	Duration (µs)
Rcv message	
Send nack	736
Rcv message	
Send nack	736
Rcv message	
Send nack	736
Rcv message	
Send nack	736
Rcv message	
Send nack	736
Send message	4256
Rcv ACK	
Total:	7936

The duty cycle is computed as follows (in any 100 ms period):

Duty Cycle = (7936/100000) = 0.07936 ≈ 0.08 = 8%

Correction Factor = $20\log_{10}(0.08)$ = -21.9 dB

-21.9 dB

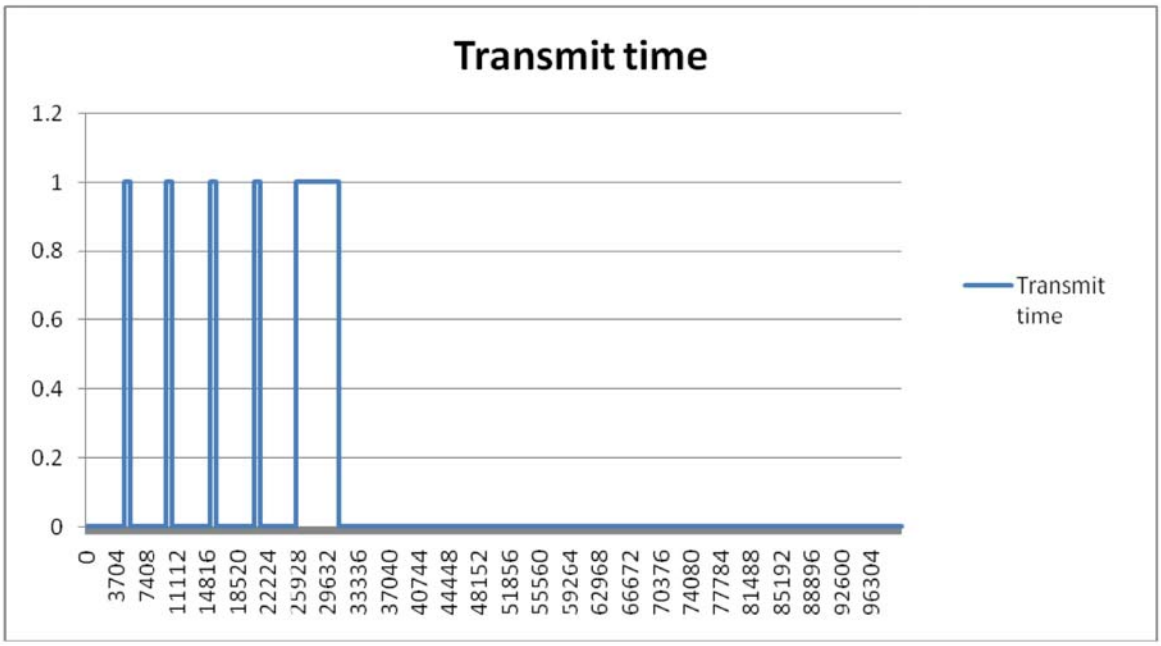


Figure 2 - Duty Cycle

2 Test and Measurements (Cont'd)

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 10.6 dB of the Average limits. Those results are given in Table 5 below.

Table 5 – Transmitter Power Line Conducted Emissions Test Data, Part 15.207

CONDUCTED EMISSIONS						
Tested By: GY	Specification Requirement: FCC Part 15.207 Class A		Project No.: 10-0125	Manufacturer/Model: Strategic Services Group, Inc. model DCM127-NX1		
Frequency (MHz)	Test Data (dBuV)	LISN+CL-PA (dB)	Corrected Results (dBuV)	Avg Limits (dBuV)	Margin (dB)	Detector
120 VAC, 60 Hz, Phase Line						
0.4052	39.60	0.55	40.15	66.0	25.9	PK
0.9597	41.00	0.33	41.33	60.0	18.7	PK
2.1760	48.50	0.29	48.79	60.0	11.2	PK
5.8200	42.00	0.27	42.27	60.0	17.7	PK
10.0700	37.20	0.25	37.45	60.0	22.5	PK
29.8800	44.10	0.30	44.40	60.0	15.6	PK
120 VAC, 60 Hz, Neutral Line						
0.1600	42.80	1.42	44.22	66.0	21.8	PK
0.9960	43.20	0.34	43.54	60.0	16.5	PK
1.8520	49.10	0.29	49.39	60.0	10.6	PK
7.0500	42.50	0.27	42.77	60.0	17.2	PK
10.0600	35.20	0.25	35.45	60.0	24.5	PK
29.9300	41.30	0.25	41.55	60.0	18.4	PK

Tested from 150 kHz to 30 MHz
SAMPLE CALCULATIONS: At 405.2 kHz, = 39.6 + (0.55) = 40.15 dBuV
Test Date: May 26, 2010
Tested By
Signature: _____ Name: George Yang

2 Tests and Measurements (Cont'd)

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.

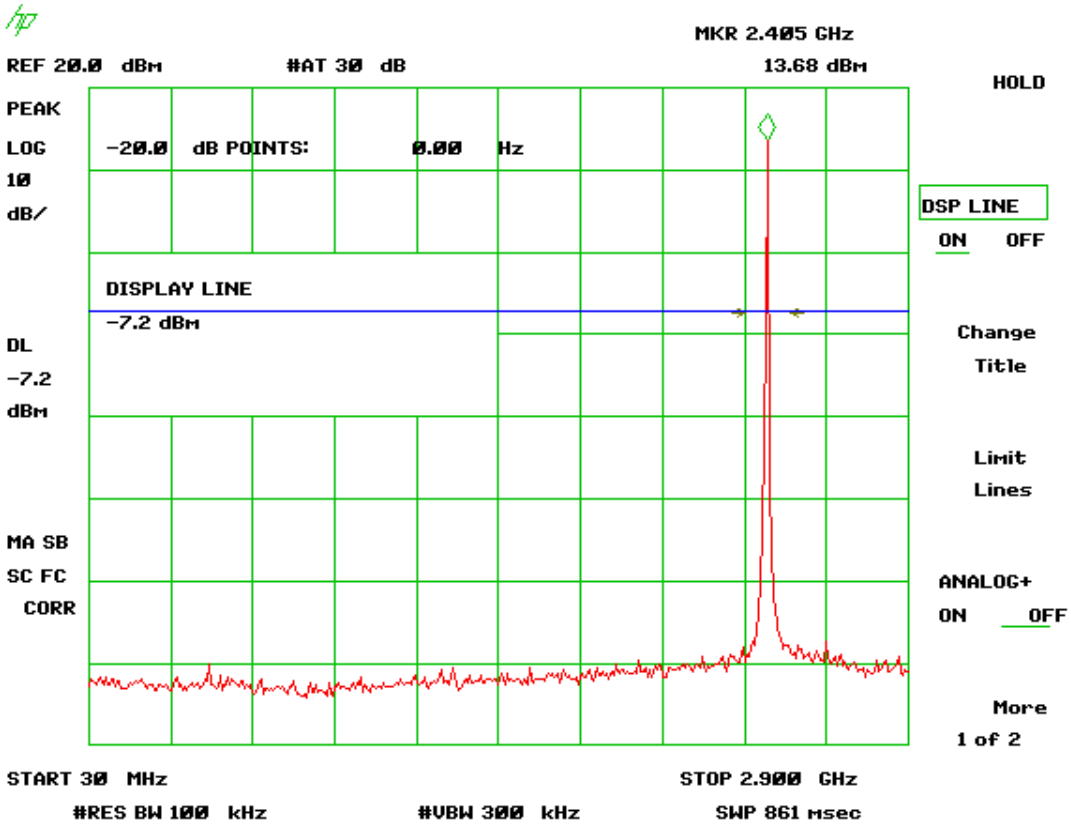
On the OATS, the EUT was mounted on top of a non-conductive table, 80 cm above the floor, by placing it in the X-Z plane along the Z axis with its bottom cover in parallel with the ground. The front of the EUT faced the measurement antenna located 3 meters away. Each signal measured was maximized by 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 6, 7 and 13 herein. 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 Test and Measurements (Cont'd)

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



Note: Signal shown represents Fundamental Frequency

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

2 Test and Measurements (Cont'd)

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

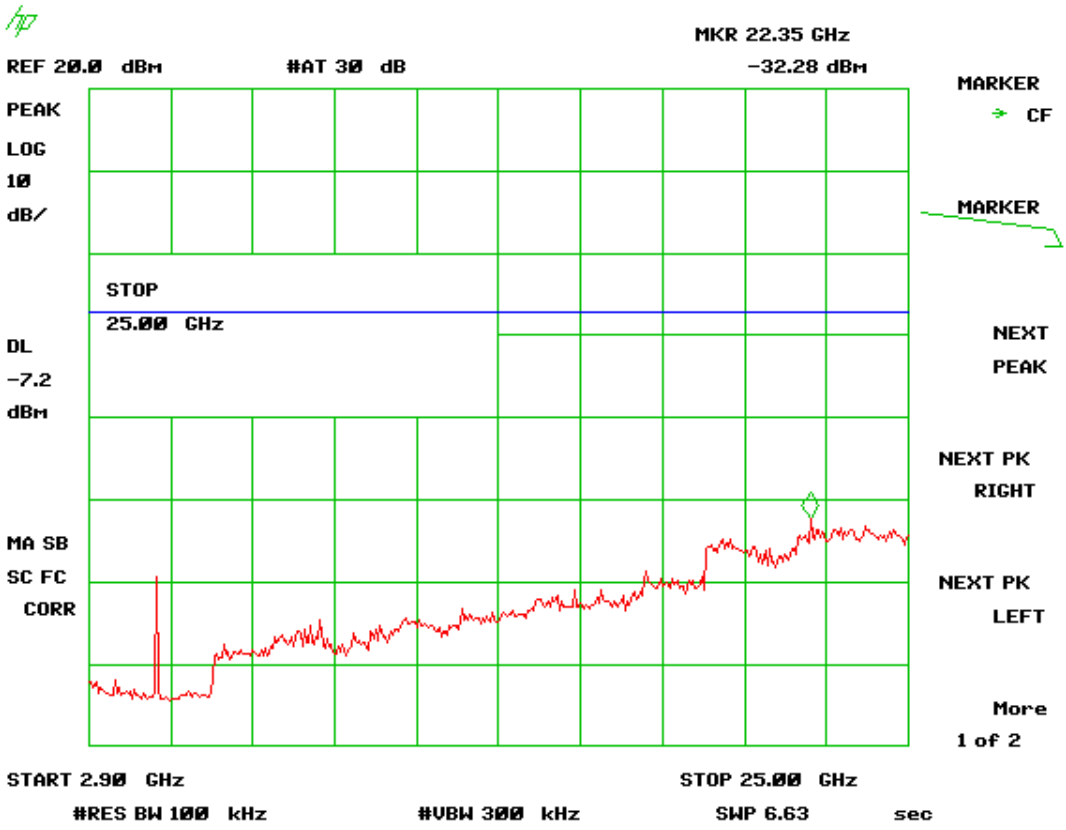


Figure 4 - Antenna Conducted Spurious Emissions – CFR 15.247 (d) - Low Channel, Part 2

2 Test and Measurements (Cont'd)

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

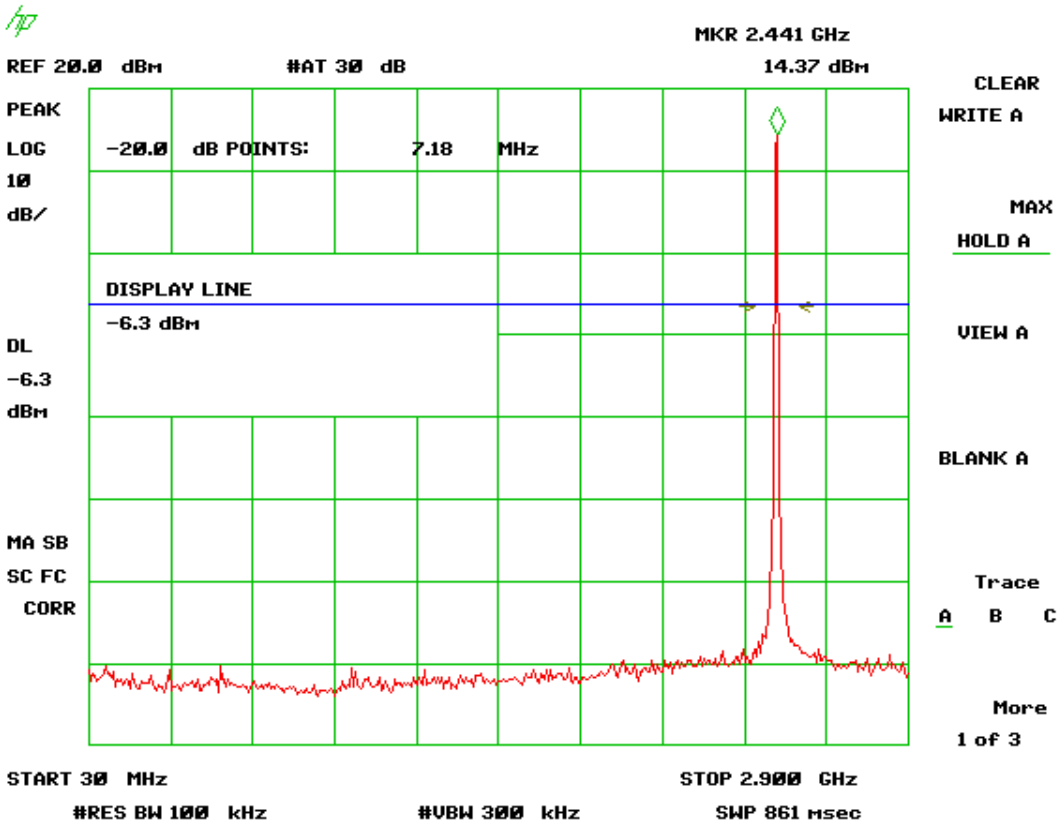


Figure 5 - Antenna Conducted Spurious Emissions – CFR 15.247 (d) - Mid Channel, Part 1

2 Test and Measurements (Cont'd)

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

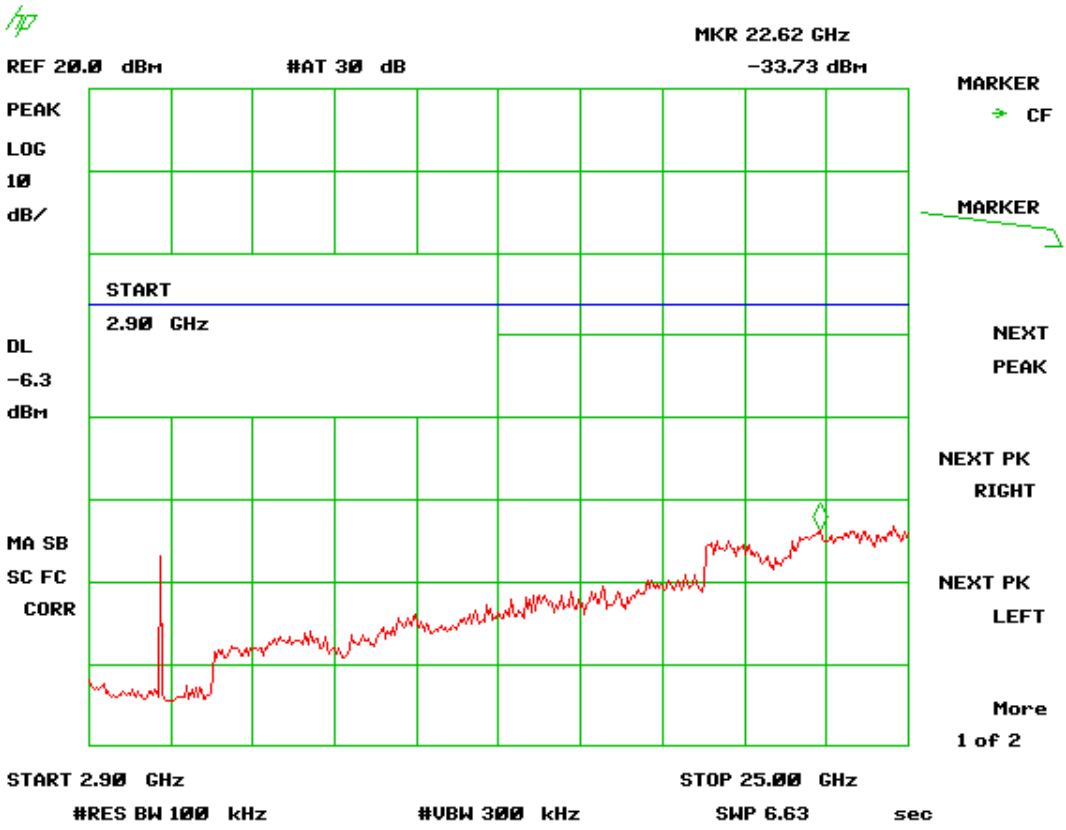


Figure 6 - Antenna Conducted Spurious Emissions – CFR 15.247 (d) - Mid Channel, Part 2

2 Test and Measurements (Cont'd)

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

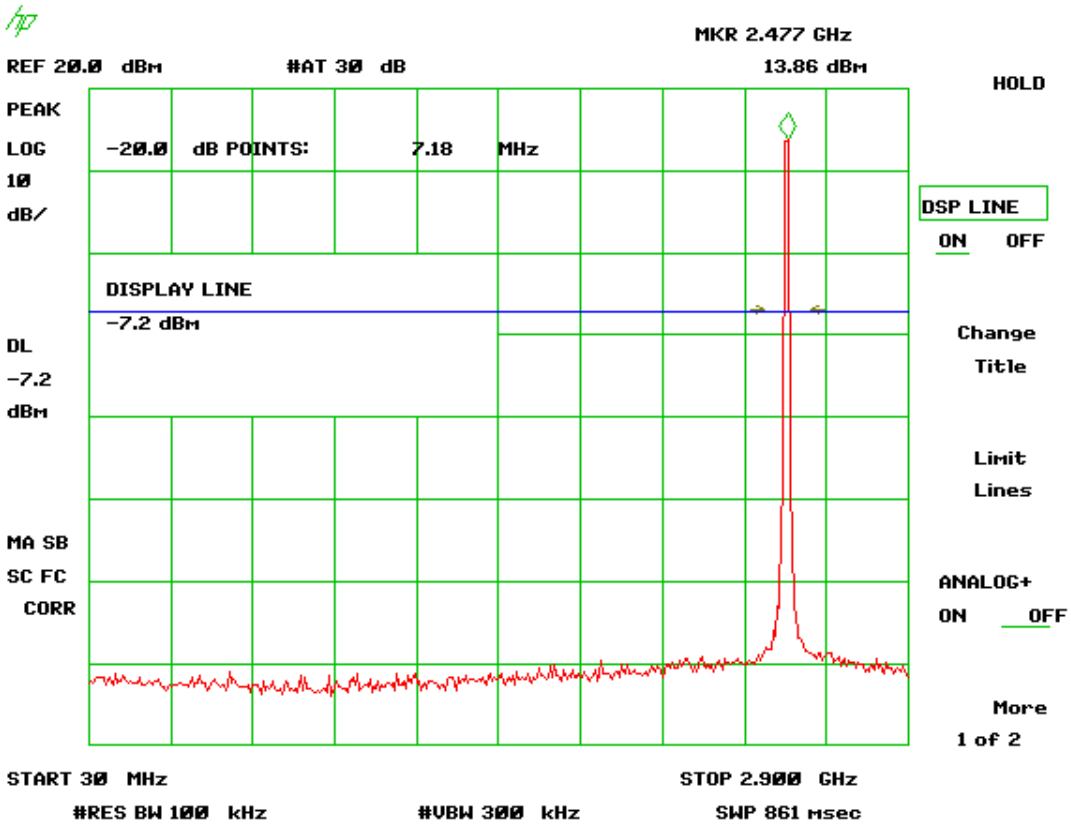


Figure 7 - Antenna Conducted Spurious Emissions – CFR 15.247 (b) - High Channel, Part 1

2 Test and Measurements (Cont'd)

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

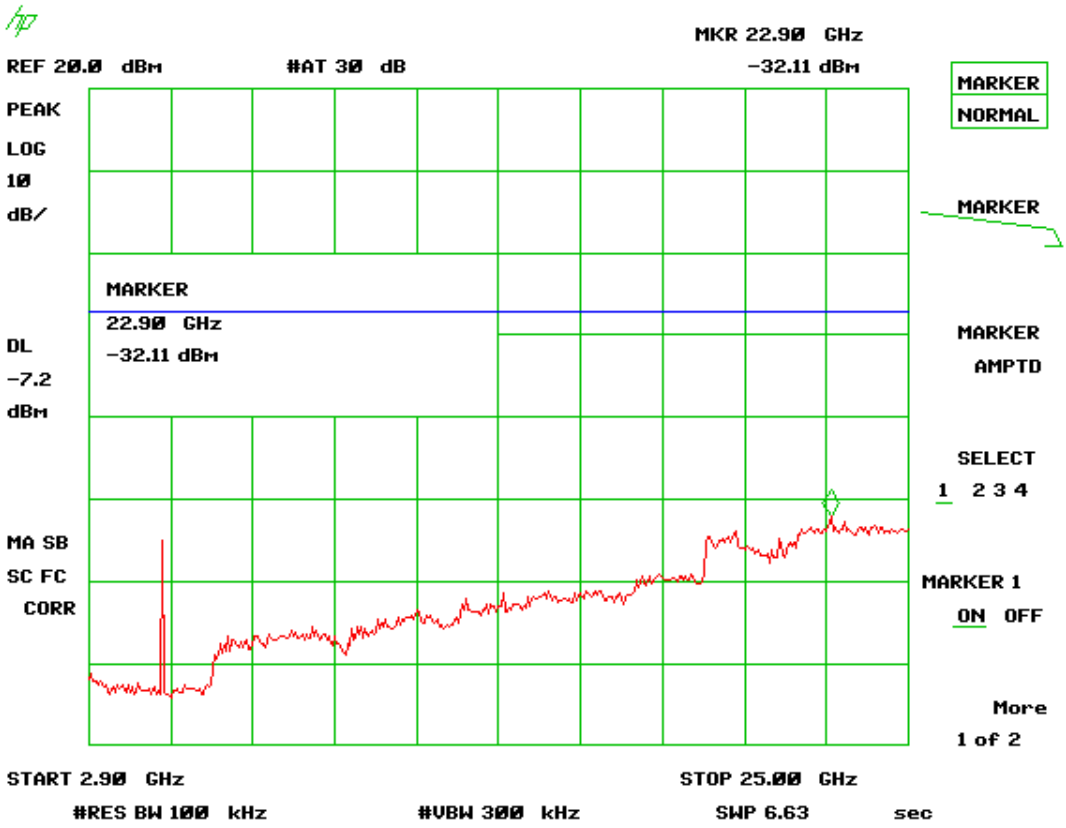


Figure 8 - Antenna Conducted Spurious Emissions - CFR 15.247 (d), High Channel, Part 2

2 Test and Measurements (Cont'd)

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

Table 6 - Peak Radiated Harmonic & Spurious Emissions

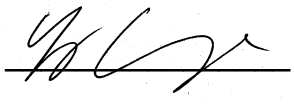
Radiated Harmonic and Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Strategic Services Group, Inc.			
	Project: 10-0125			Model: DCM127-NX1			
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Pass Margin (dB)**	**Detector PK / AVG**
LOW BAND - PEAK							
2405.48	79.49	32.03	111.52	--	3m./VERT	--	**PK**
4809.00*	45.21	3.79	50.00	74.0	3m./VERT	24.0	**PK**
7216.20	47.35	10.20	49.01	89.0	1m./VERT	40.0	**PK**
9618.12	54.86	11.88	58.20	89.0	1m./VERT	30.8	**PK**
12026.38*	48.40	14.92	54.78	74.0	1m./VERT	19.2	**PK**
MID BAND- PEAK							
2440.45	78.26	32.24	110.50	--	3m./VERT	--	**PK**
4880.93*	46.76	4.00	51.76	74.0	3m./VERT	22.2	**PK**
7321.30	51.24	10.44	53.14	88.3	1m./VERT	35.1	**PK**
9762.05	55.25	11.88	58.59	88.3	1m./VERT	29.7	**PK**
12202.75*	54.06	15.13	60.65	74.0	1m./VERT	13.4	**PK**
HIGH BAND- PEAK							
2475.45	79.45	32.45	111.90	--	3m./VERT	--	**PK**
4950.90*	48.79	4.15	53.94	74.0	3m./VERT	20.1	**PK**
7426.30	51.14	9.46	61.60	89.8	1m./VERT	28.2	**PK**
9898.00	52.71	11.92	65.63	89.8	1m./VERT	24.2	**PK**
12377.98*	53.69	15.70	60.85	74.0	1m./VERT	13.1	**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.

2 Test and Measurements (Cont'd)

SAMPLE CALCULATION:
Note: measurements taken at 1 meter distance were extrapolated to 3 meter using a factor of (-9.5 dB).
Note: 1 dB loss factor is added for all measurement using the high pass filter.

RESULTS: At 4809.00 MHz: = 45.21 dBuV+ (1 dB high pass filter loss) + 3.79 dB/m = 50.00 dBuV/m @ 3m
Margin = (74.0 – 50.00) = 24.0 dB
Test Date: May 26, 2010
Tested By
Signature:  Name: George Yang

2 Test and Measurements (Cont'd)

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

Table 7 - Average Radiated Spurious

Radiated Spurious Emissions, Tested from 30 MHz – 24 GHz							
Tested By: GY	Test: FCC Part 15, Para 15.247(d)			Client: Strategic Services Group, Inc.			
	Project: 10-0125			Model: DCM127-NX1			
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							
2405.48	76.99	32.03	109.02	--	3m./VERT	- -	**AVG**
4809.00*	36.92	3.79	41.71	54.0	3m./VERT	12.3	**AVG**
7216.20	37.28	10.20	38.94	89.0	1m./VERT	50.1	**AVG**
9618.12	45.45	11.88	48.79	89.0	1m./VERT	40.2	**AVG**
12026.38*	38.07	14.92	44.45	54.0	1m./VERT	9.6	**AVG**
MID BAND- PEAK							
2440.45	76.04	32.24	108.28	--	3m./VERT	- -	**AVG**
4880.93*	38.09	4.00	43.09	54.0	3m./VERT	10.9	**AVG**
7321.30	40.47	10.44	42.37	88.3	1m./VERT	45.9	**AVG**
9762.05	45.79	11.88	49.13	88.3	1m./VERT	39.1	**AVG**
12202.75*	44.66	15.13	51.25	54.0	1m./VERT	2.8	**AVG**
HIGH BAND- PEAK							
2475.45	77.38	32.45	109.67	--	3m./VERT	- -	**AVG**
4950.90*	39.98	4.15	45.13	54.0	3m./VERT	8.9	**AVG**
7426.30	41.40	9.46	51.86	89.8	3m./VERT	38.0	**AVG**
9898.00	43.52	11.92	56.44	89.8	3m./VERT	33.4	**AVG**
12377.98*	44.02	15.70	51.18	54.0	1m./VERT	2.8	**AVG**

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.

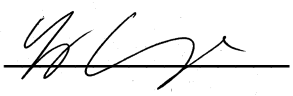
3- Test data values measured at 1 meter include a factor of -9.5 dB for distance extrapolation from a test distance of 1 meter to 3 meters.

4 -Duty Cycle, DC = -21.9 dB

2 Test and Measurements (Cont'd)

SAMPLE CALCULATION:
Note: 1 dB loss factor is added for all measurement using the high pass filter.

RESULTS: At 4809.00 MHz: = (36.92+ (1 dB high pass filter loss)) + (3.79) = 41.71 dBuV/m @ 3m
Margin = (54.0 – 41.71) = 12.29 dB

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

2 Test and Measurements (Cont'd)

2.11 Six (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 DA 00-705 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 8 and Figures 9 through 11.

Table 8 – Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum FCC Bandwidth (MHz)
2405	1.60	0.5
2440	1.60	0.5
2475	1.59	0.5

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

2 Test and Measurements (Cont'd)

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

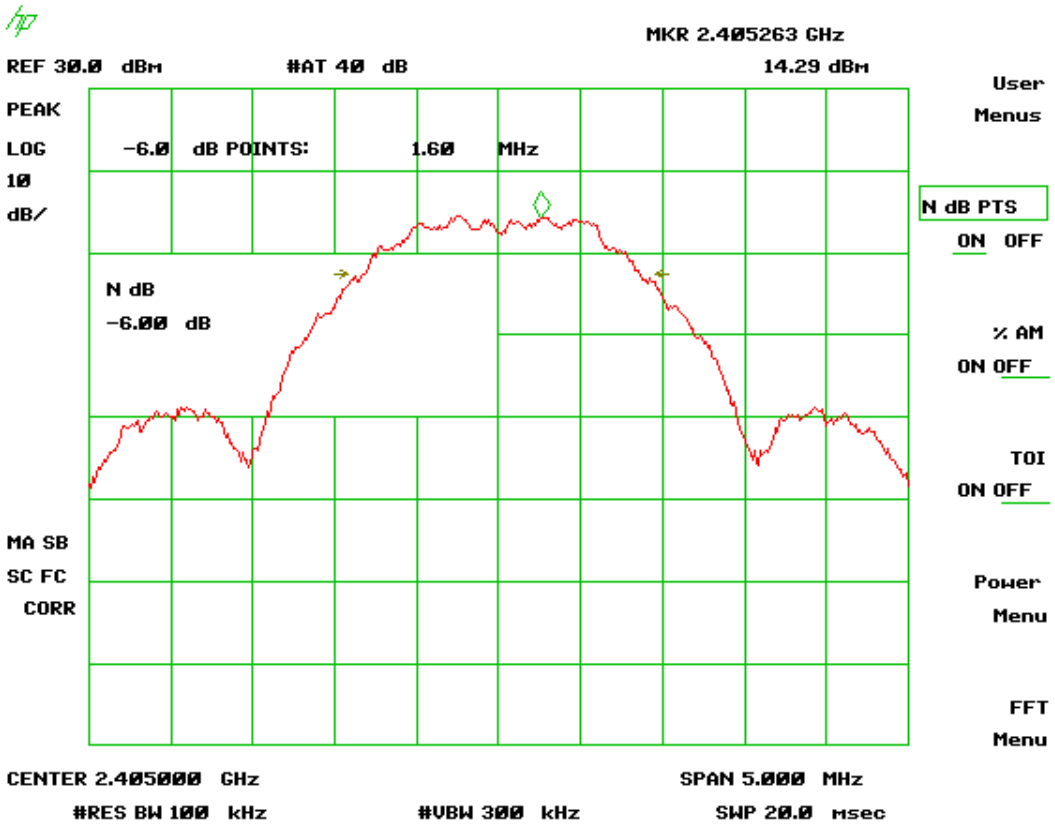


Figure 9 - Six (6) dB Bandwidth - 15.247 (a) (2) - Low Channel

2 Test and Measurements (Cont'd)

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

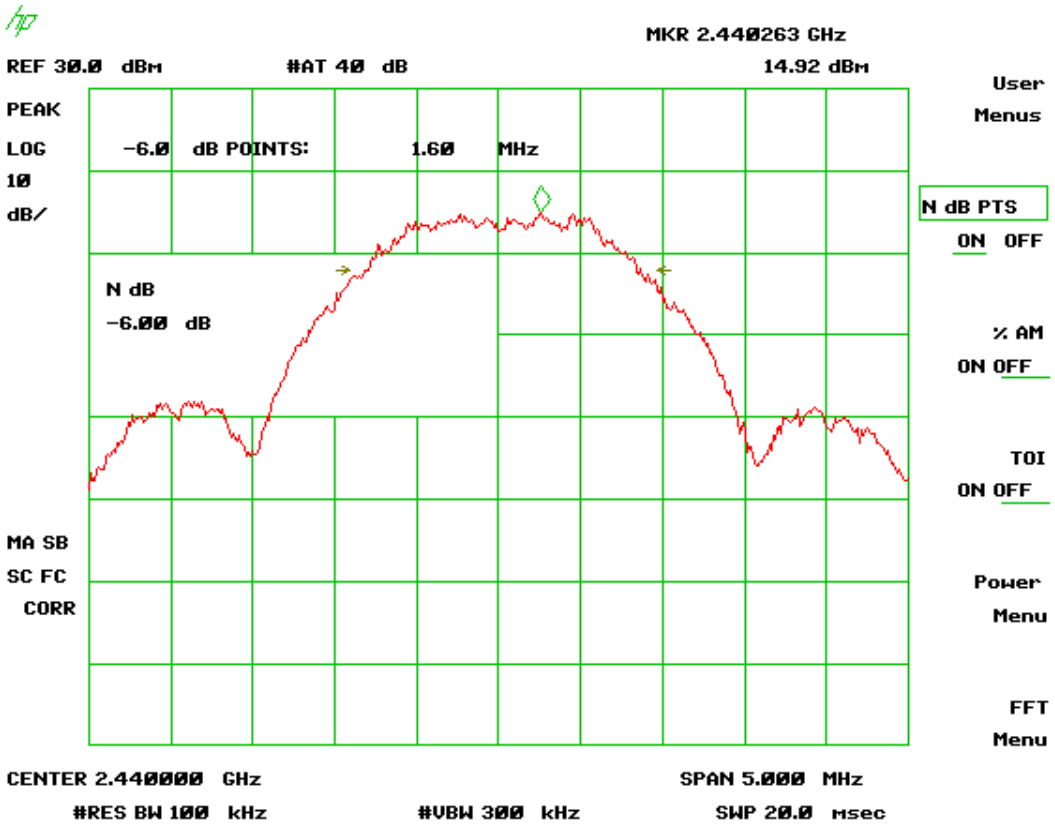


Figure 10 – Six dB Bandwidth - 15.247 (a) (2) - Mid Channel

2 Test and Measurements (Cont'd)

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

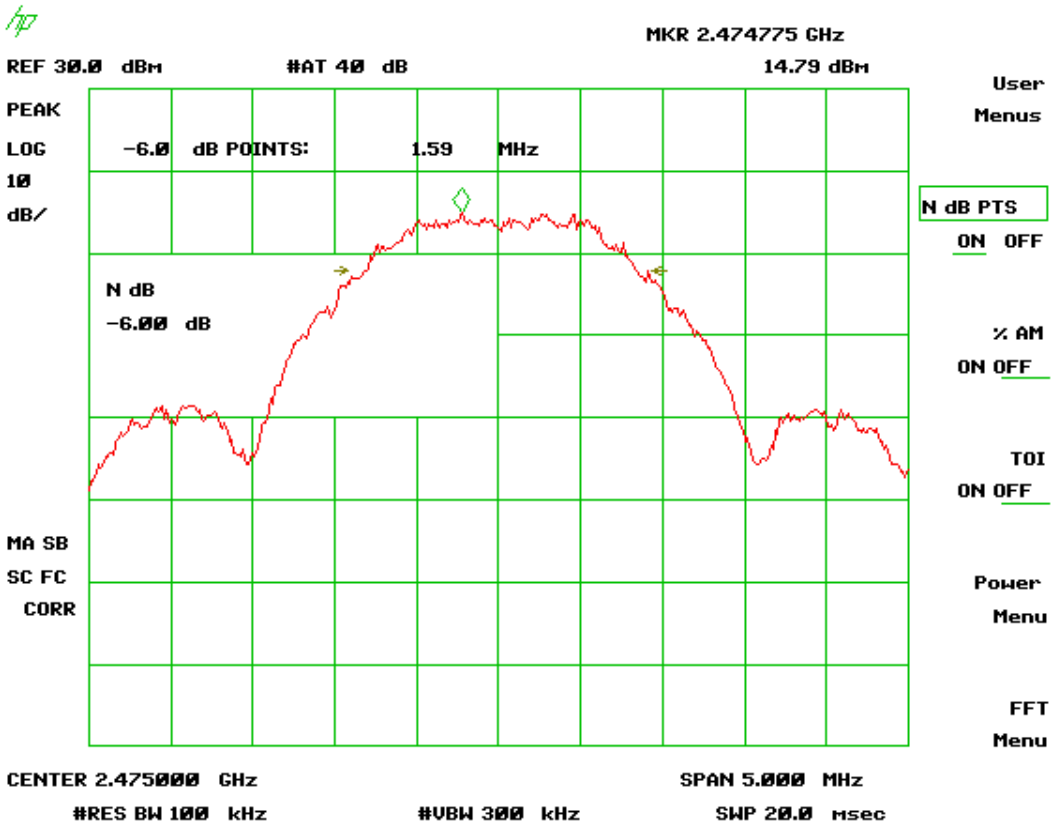


Figure 11 - Six dB Bandwidth - 15.247 (a) (2) - High Channel

2 Test and Measurements (Cont'd)

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

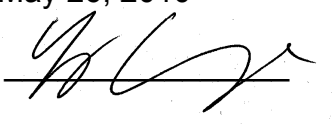
For the DCM127-NX1 module, the transmitter was programmed to operate at a maximum of +12 dBm across the bandwidth.

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 an impedance of 50 Ω with the RBW set greater than the 6 dB bandwidth of the EUT, and the VBW ≥ RBW. The loss of the short cable is 0.5 dB, and the final corrected measurements were determined by adding 0.5 dB to the raw data measured values of Figures 12, 13 & 14. Peak antenna conducted output power is tabulated in Table 9 below.

Antenna Conducted Output Power was measured at Low Channel, Mid Channel and High Channel frequencies. See Figures 3 to 8 above. The 0.5 dB loss for the RF wire is taken into consideration here (Corrected Measurement column).

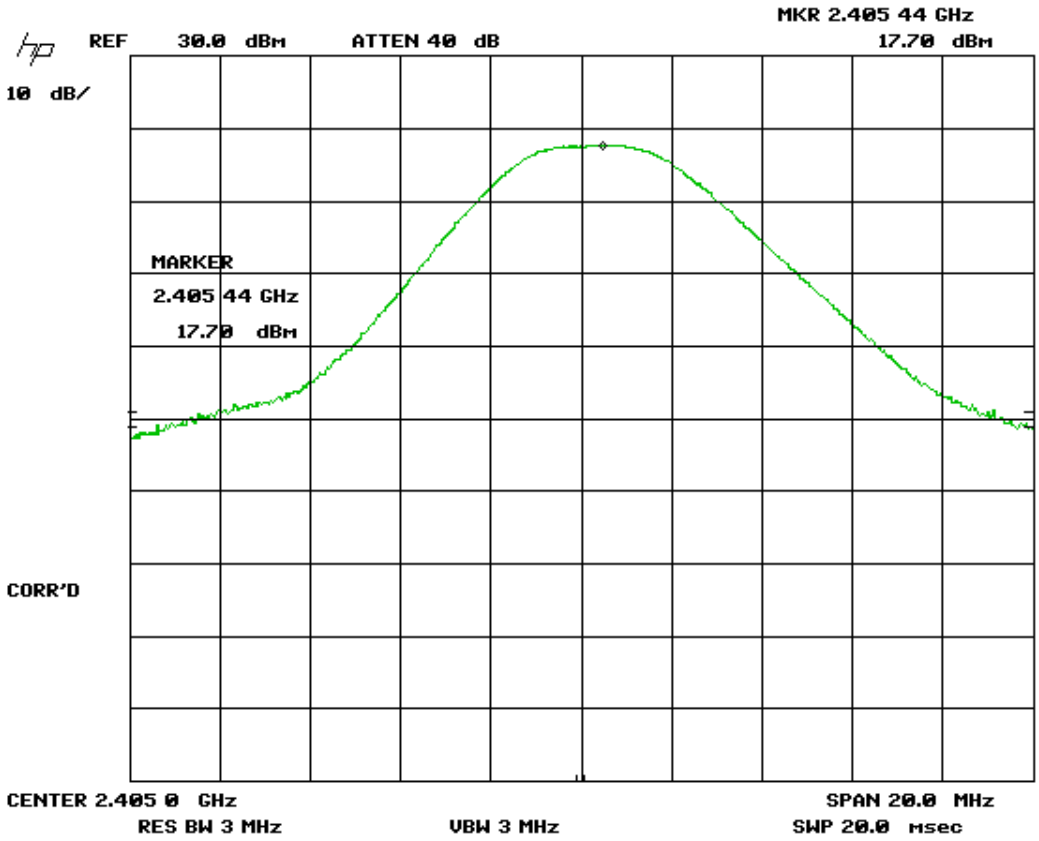
Table 9 - Peak Antenna Conducted Output Power per Part 15.247 (b) (3) (Same as EIRP)

Frequency of Fundamental (MHz)	Raw Test Data dBm	Corrected Measurement (dBm)	(mW)	FCC Limit (mW Maximum)
Low Band (ch00) 2405.03	17.7	18.2	66.07	1000
Mid Band (ch07) 2440.43	18.6	19.1	81.30	1000
High Band (ch14) 2474.45	18.7	19.2	83.18	1000

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

2 Test and Measurements (Cont'd)

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

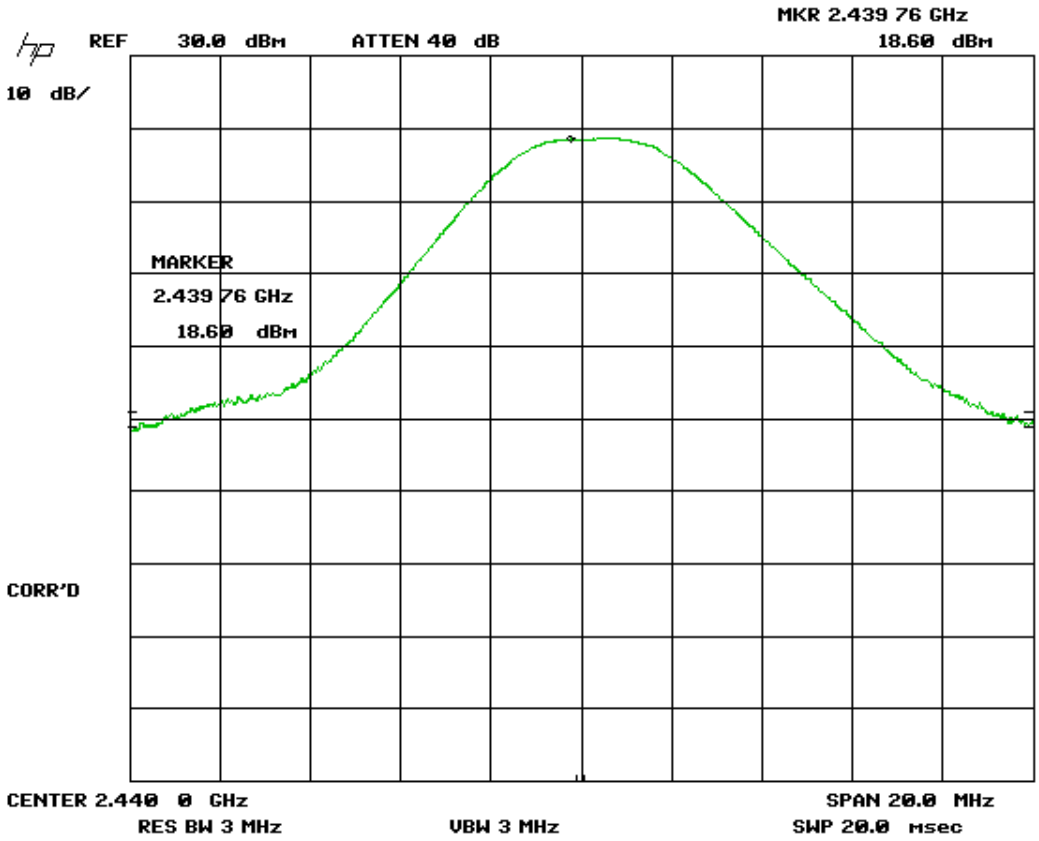


Add 0.5 dB loss for cable attenuation

Figure 12 - Peak Antenna Conducted Output Power, Low Channel

2 Test and Measurements (Cont'd)

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

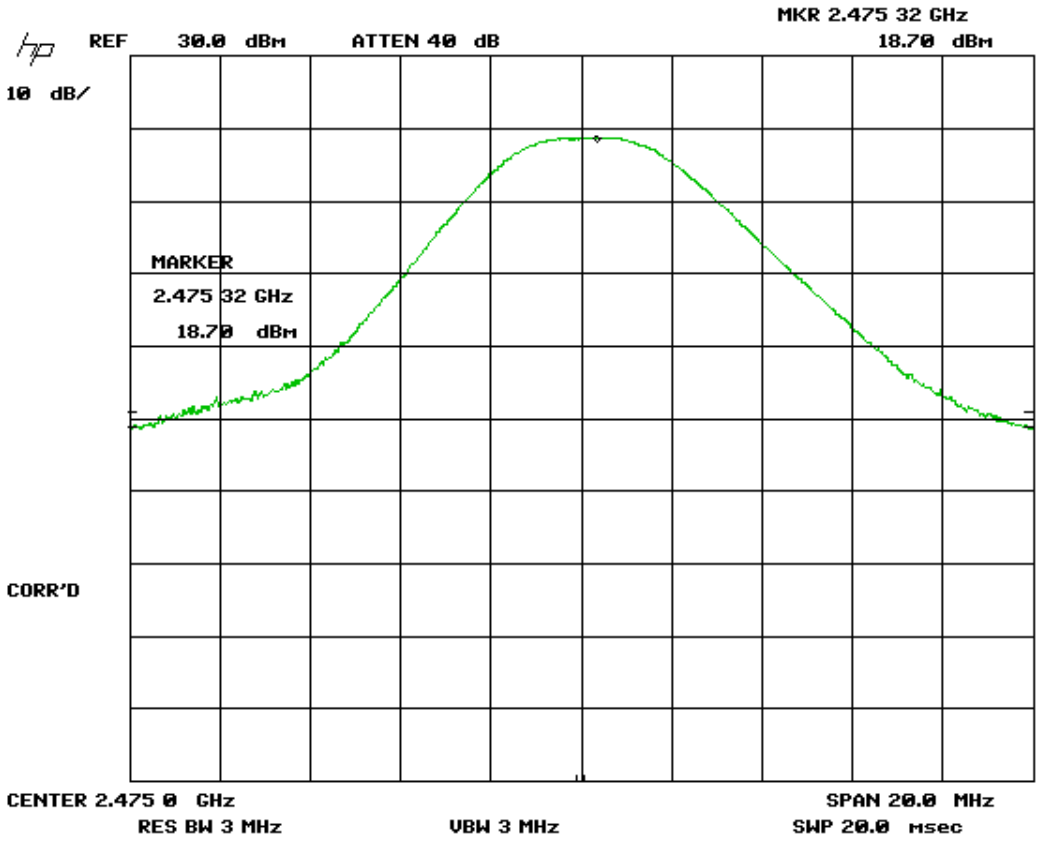


Add 0.5 dB loss for cable assembly

Figure 13 - Peak Antenna Conducted Output Power, Mid Channel

2 Test and Measurements (Cont'd)

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



Add 0.5 dB loss for cable assembly.

Figure 14 - Peak Antenna Conducted Output Power, High Channel

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

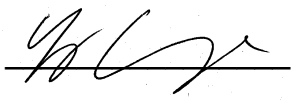
The transmitter was placed into a continuous mode of operation at all applicable frequencies. The measurements were performed per the procedures of FCC KDB Procedure 558074. The RBW was set to 3 kHz and the Video Bandwidth was set to ≥ RBW. The trace capture time was set to (Span/3 kHz).

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 10 and Figures 15 through 17 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 10 - 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	3.50	4.00	+8.0
Mid-2440	4.30	4.70	+8.0
High- 2475	4.30	4.70	+8.0

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

2 Test and Measurements (Cont'd)

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

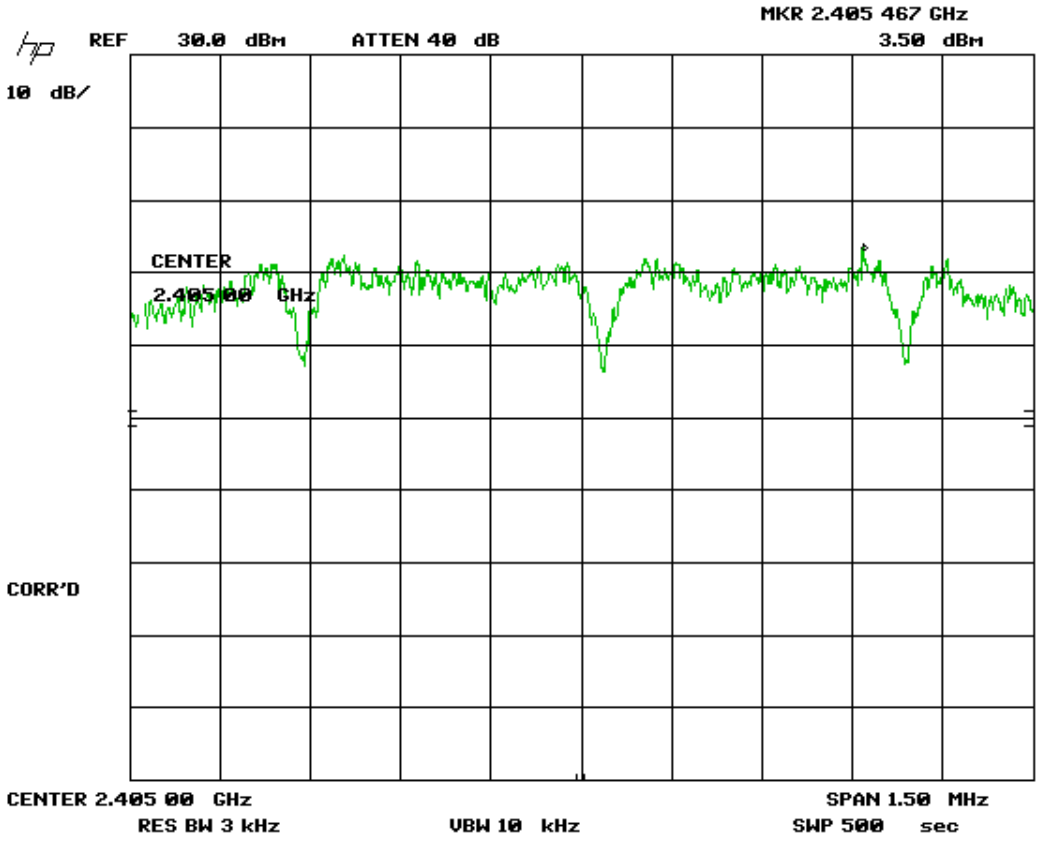


Figure 15 - Peak Power Spectral Density - Part 15.247 (e) - Low Channel

2 Test and Measurements (Cont'd)

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

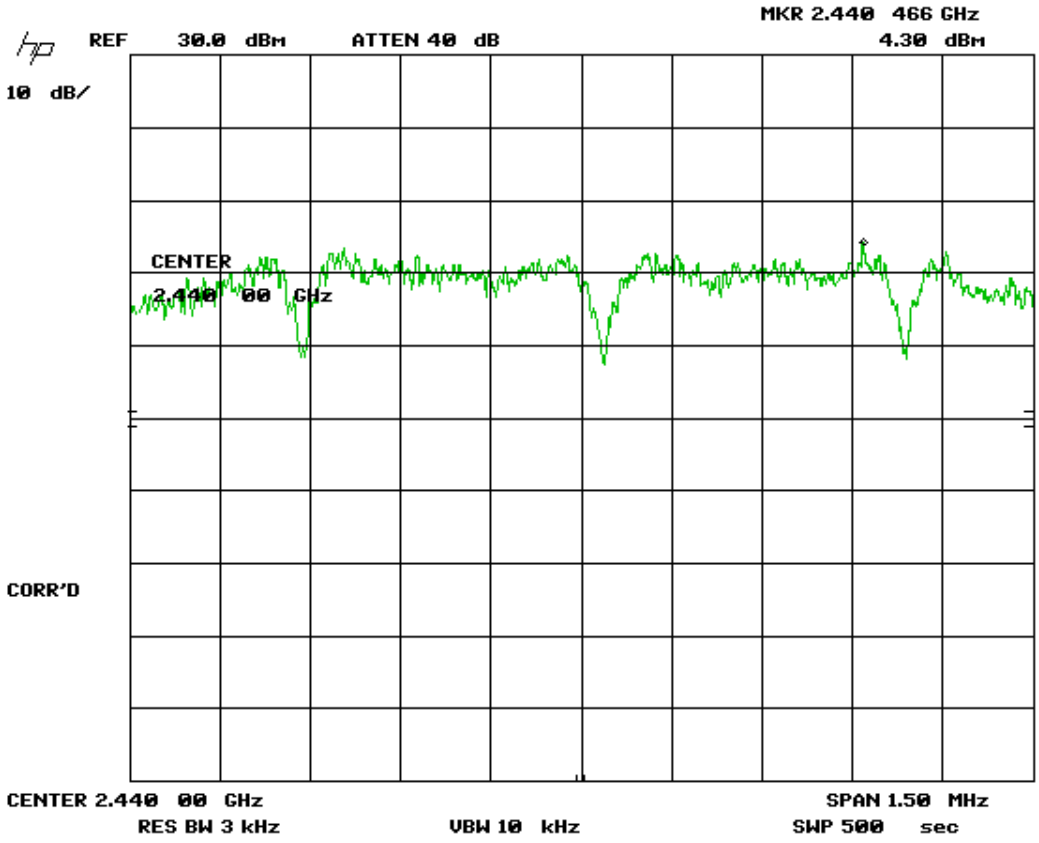


Figure 16 - Power Spectral Density - Part 15.247 (e) - Mid Channel

2 Test and Measurements (Cont'd)

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

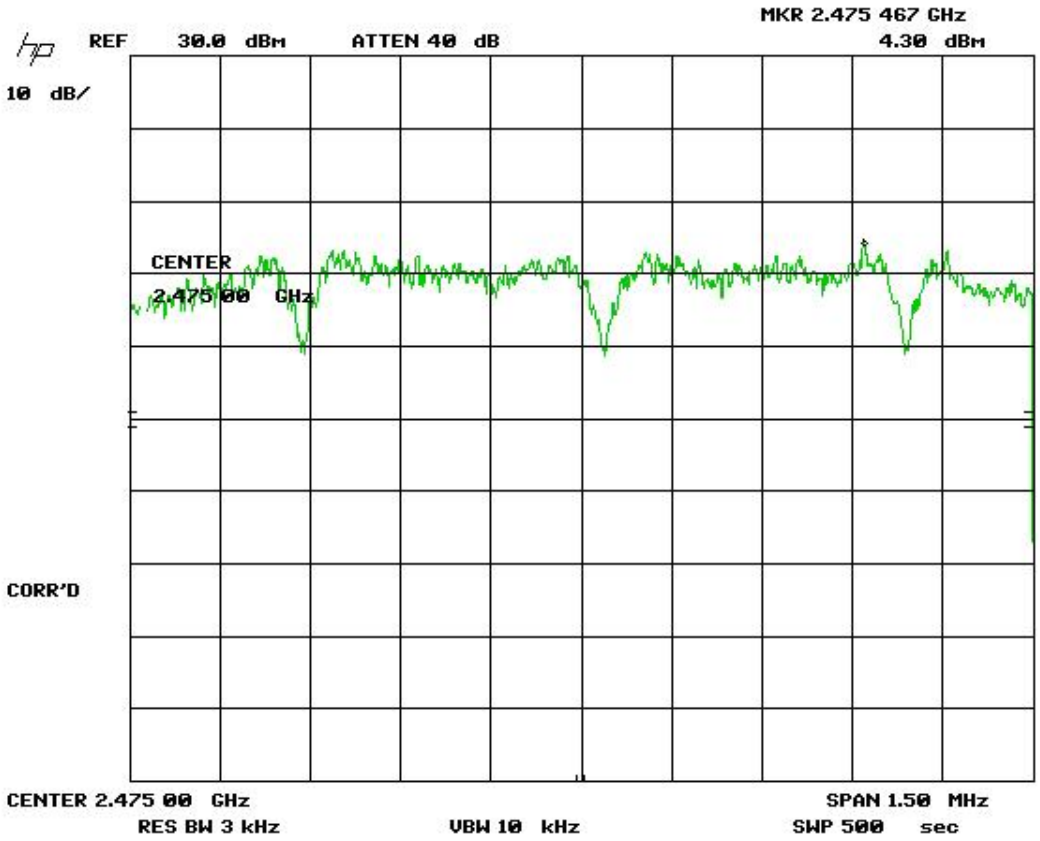


Figure 17 - Peak Power Spectral Density - Part 15.247 (e) - High Channel

2 Test and Measurements (Cont'd)

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

2.14.1 Band Edge and Restricted Bands

Band Edge measurements were made with the EUT operating at the Low Channel and High Channel. Conducted measurements were performed to demonstrate compliance with the requirement of 15.247(d) that all emissions be attenuated by 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 that fall within restricted bands as defined in section 15.205.

The emission of greatest magnitude outside of the band was marked, and then a delta measurement between that emission and the peak fundamental emission was taken. That value was subtracted from the value of the fundamental frequency of the highest operating channel to compute the field strength.

2.14.2 Lower Band Edge

With the transmitter set to 2.405 GHz, Figure 25, the signal level at 2.400 GHz, the lower band edge, is more than 20 dB but less than 50 dB down from the peak. The limit is that it be at least 20 dB down as shown by the "Display Line" on the graph. The conducted measurement, compared to the radiated measurements, was worse case, and so the conducted measurement has been selected for illustration in Figure 18.

2.14.3 Higher Band Edge

Compliance with the conducted band edge measurement is shown in Figure 19. Spurious components outside the band are attenuated by at least 20 dB.

The channel 2480 MHz is reserved for factory tests (see Theory of Operation attachment), therefore for the radiated measurement the transmitter was set to 2.475 GHz, Figure 20, and its fundamental emission was maximized and measured. The marker-delta method was then applied to the largest spurious emission occurring outside the band edge, shown in Figure 20. The largest spurious component outside the band edge was attenuated by at least 20 dB from the fundamental, and met the limits of radiated spurious emissions in Restricted Bands by at least 8.6 dB. The table below summarizes the field strength findings:

2 Test and Measurements (Cont'd)

2.14 Band Edge (Cont'd)

Table 11 - Upper Band Edge - Radiated Emissions

Peak Radiated Higher Band Edge Measurements								
Test By: GY	Test: FCC Part 15.247				Client: Strategic Services Group, Inc.			
	Project: 10-0125		Class:		Model: DCM127-NX1			
Frequency (MHz)	AF table	Test data	AF+CA-AMP+DC dB/m	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarity	Margin (dB)	Detector PK / AVG
Internal Antenna								
Fund. 2475.45	1HN3mV	79.45	32.45	111.90	--	3m./	--	**PK**
Band Edge 2483.5	1HN3mV	34.51	32.79	67.30	74.0	3m./	6.7	**PK**

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 -21.9 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.

SAMPLE CALCULATION OF WORST-CASE AVERAGE RADIATED UPPER BAND EDGE MEASUREMENT:

Results = Peak Corrected Results + Duty Cycle Correction Factor
Results = 67.3 + (-21.9) = 45.4 dBuV/m
Margin = Limit – Results = 54 – 45.4 = 8.60 dB

Plots, in Figures 20 are shown of the radiated upper band edge measurement as this is the worst-case emission.

2 Test and Measurements (Cont'd)

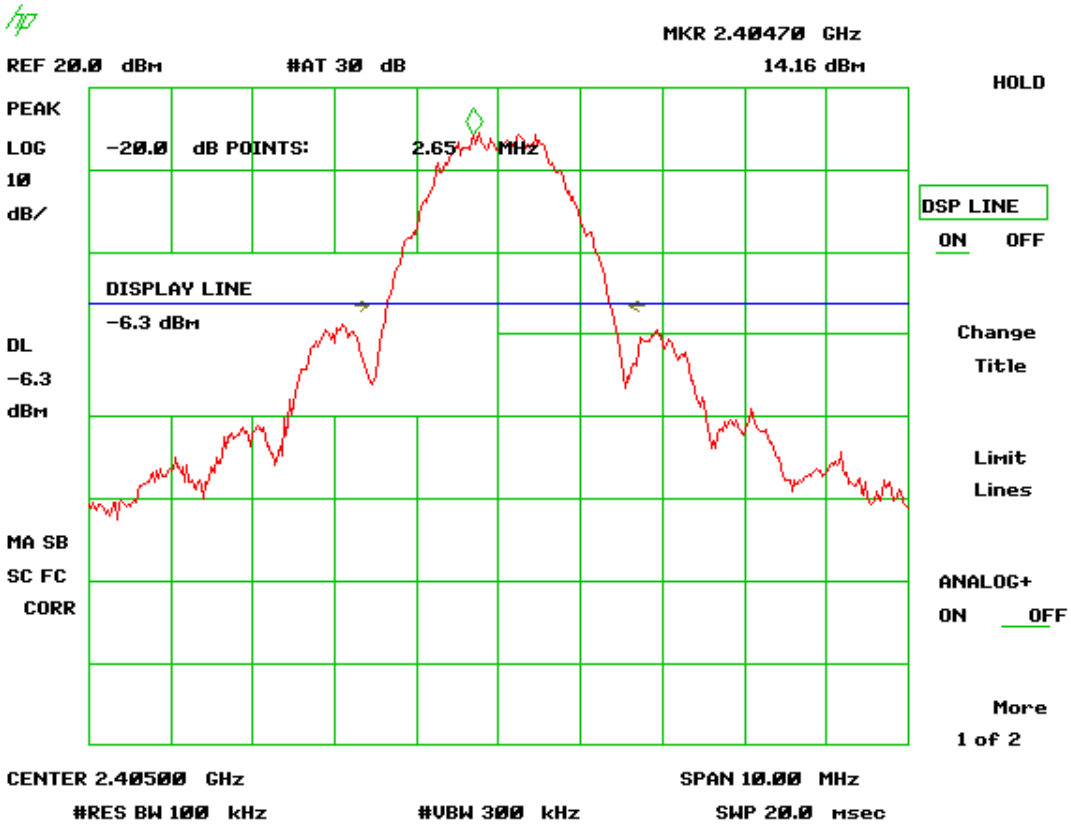


Figure 18 - Conducted Band Edge Compliance – Low Channel Delta - Peak

2 Test and Measurements (Cont'd)

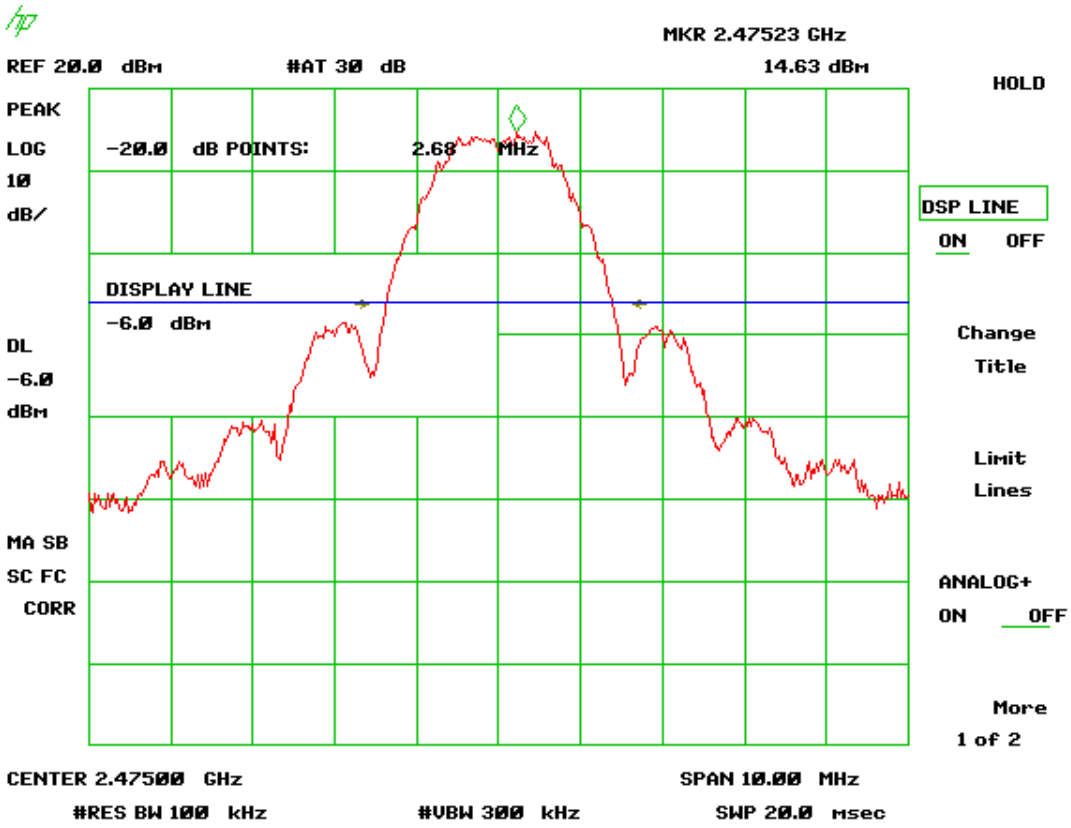


Figure 19 - Conducted Band Edge Compliance – High Channel Delta - Peak

2 Test and Measurements (Cont'd)

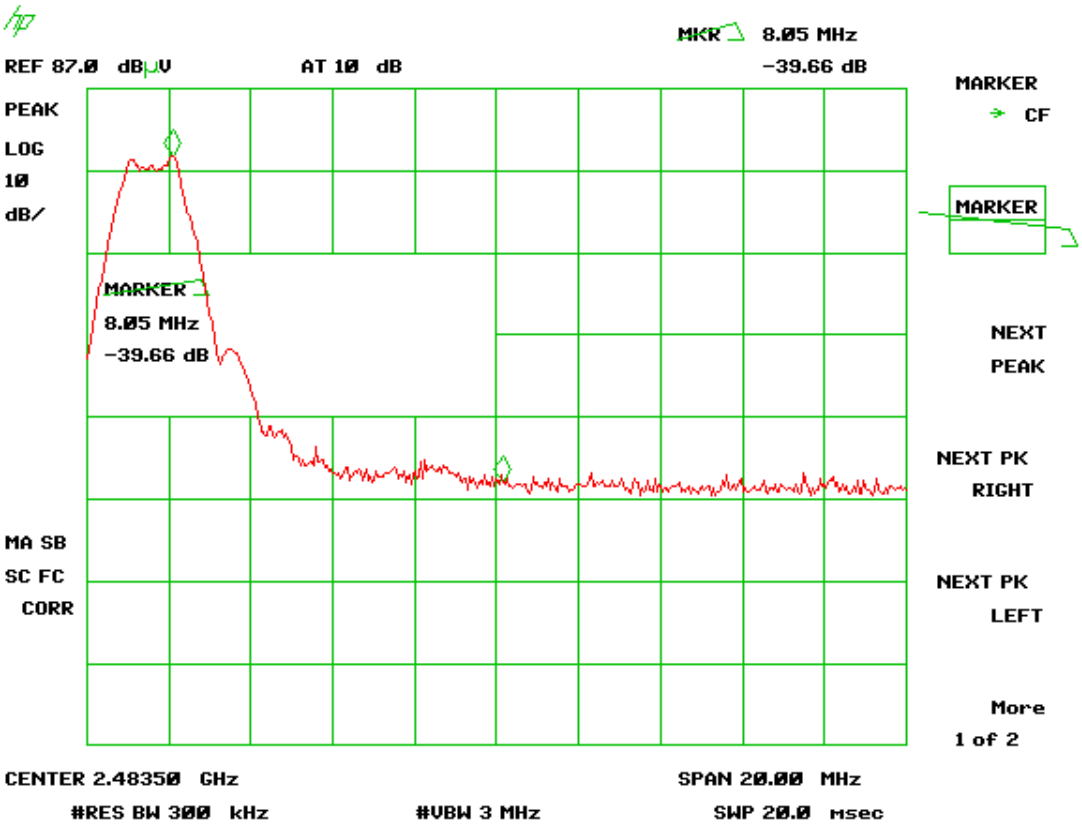


Figure 20 - Radiated Band Edge Compliance – High Channel

2 Test and Measurements (Cont'd)

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

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

Therefore, for:

Peak Power (Watts) = .08318 (from Table 9, herein)
Gain of Transmit Antenna = -1.0 dB$_i$ = 0.794, numeric (from Table 4, herein)
d = Distance = 20 cm = 0.2 m

S = (PG/ $4\pi d^2$) = EIRP/4A = 0.08318(0.794)/4*π*0.2*0.2
=0.066045/0.502 = 0.13156 w/m^2
= (W/m^2) (1m^2/W) (0.1 mW/cm^2)
= 0.013156 mW/cm^2

which is << less than 1 mW/cm^2

2.16 Unintentional Radiator Power Lines Conducted Emissions (CFR 15.107)

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

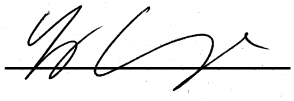
2.16 Unintentional Radiator Power Lines Conducted Emissions (Cont'd)

Table 12 - Power Line Conducted Emissions Data, Class B Part 15.107, Peak Measurement vs. Avg. Limits

CONDUCTED EMISSIONS						
Tested By: GY	Specification Requirement: FCC Part 15, Para 15.107 Class A		Project No.: 10-0125	Manufacturer/Model: Strategic Services Group, Inc. model DCM127-NX1		
Frequency (MHz)	Test Data (dBuV)	LISN+CL-PA (dB)	Corrected Results (dBuV)	Avg Limits (dBuV)	Margin (dB)	Detector
120 VAC, 60 Hz, Supply Line						
0.4052	39.60	0.55	40.15	66.0	25.9	PK
0.9597	41.00	0.33	41.33	60.0	18.7	PK
2.1760	48.50	0.29	48.79	60.0	11.2	PK
5.8200	42.00	0.27	42.27	60.0	17.7	PK
10.0700	37.20	0.25	37.45	60.0	22.5	PK
29.8800	44.10	0.30	44.40	60.0	15.6	PK
120 VAC, 60 Hz, Neutral Line						
0.1600	42.80	1.42	44.22	66.0	21.8	PK
0.9960	43.20	0.34	43.54	60.0	16.5	PK
1.8520	49.10	0.29	49.39	60.0	10.6	PK
7.0500	42.50	0.27	42.77	60.0	17.2	PK
10.0600	35.20	0.25	35.45	60.0	24.5	PK
29.9300	41.30	0.25	41.55	60.0	18.4	PK

Tested from 150 kHz to 30 MHz
SAMPLE CALCULATIONS: At 405.2 kHz, = 39.6 + (0.55) = 40.15 dBuV

Test Date: May 26, 2010
Tested By

Signature:  Name: George Yang

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

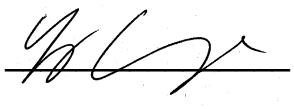
These test data are provided herein to support the Verification requirement for digital devices. Radiated emissions coming from the EUT in a non-transmit state were evaluated from 30 MHz to 12.5 GHz per ANSI C63.4, Paragraph 8.

Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth; 1 MHz RBW and 3 MHz VBW. The test data 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 4.8 dB below the specification limit. The results are shown in Table 13 below.

Table 13 – Unintentional Radiator, Radiated Emissions.

Unintentional Radiator, Radiated Emissions							
Test By: GY	Test: FCC Part 15.109, 15.209			Client: Strategic Services Group, Inc..			
	Project: 10-0125 Class: A			Model: DCM127-NX1			
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							
57.8400	17.30	10.66	27.96	39.0	3m./HORZ	11.0	**PK**
66.6300	17.00	10.56	27.56	39.0	3m./HORZ	11.4	**PK**
82.1900	11.10	10.80	21.90	39.0	3m./HORZ	17.1	**PK**
132.6600	5.90	14.20	20.10	43.5	3m./HORZ	23.4	**PK**
31.7600	15.90	13.04	28.94	39.0	3m./VERT	10.1	**PK**
67.3600	25.00	9.23	34.23	39.0	3m./VERT	4.8	**QP**
1213.3000	34.00	-7.56	26.44	49.5	3m./HORZ	23.1	**PK**
2341.7000	39.15	-3.50	35.65	49.5	3m./HORZ	13.9	**PK**
2108.1700	34.31	-3.69	30.62	49.5	3m./VERT	18.9	**PK**
4618.0000	29.18	3.61	32.79	49.5	3m./VERT	16.7	**PK**

No other emissions detected within 20 dB of the FCC Part 15.109 limits
AF is antenna factor. CL is cable loss. PA is preamplifier gain
SAMPLE CALCULATION:
Note: measurements taken at 3 meter distance were extrapolated to 10 meter using a factor of (-10.5 dB).
RESULTS: At 57.84 MHz: = ((17.3+(-10.5dB extrapolation Factor to 10 m) + 10.66)) = 27.96 dBuV/m @ 3m
Margin = (39.0-27.96) = 11.0 dB
Test Date: May 26, 2010

Tested By Signature:  Name: George Yang