

APPLICATION
For
GRANT OF
CERTIFICATION

FOR

MODEL:
Nūvi 6xx, 011-01410-xx
Low Power Transmitter

FCC ID: IPH-01060
IC: 1792A-01060

FOR

GARMIN INTERNATIONAL, INC.
1200 East 151st Street
Olathe, KS 66062

Test Report number 060726



ROGERS LABS, INC.

4405 West 259th Terrace
Louisburg, KS 66053
Phone / Fax (913) 837-3214

TEST REPORT

For

APPLICATION of CERTIFICATION

For

GARMIN INTERNATIONAL, INC.

1200 East 151st Street
Olathe, KS 66062
Phone: (913) 397-8200

Mr. Van Ruggles
Director of Quality Assurance

MODEL: Nūvi 6xx
GPN 011-01410-xx

Low Power Transmitter
Frequency Ranges: 88-107, 2,400-2,483.5 MHz

FCC ID: IPH-01060
IC: 1792A-01060

Test Report Number: 060726

Test Date: July 26, 2006

Certifying Engineer: *Scot D. Rogers*
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FORWARD

The following information is submitted for consideration in obtaining a Grant of Certification for low power intentional radiator per CFR Paragraphs 15.239 and 15.249 operation in the 88-108 MHz and Blue Tooth operation in 2400 - 2483.5 MHz band and Industry Canada RSS-210 Low Power Transmitter.

Name of Applicant: Garmin International, Inc.
1200 East 151st Street
Olathe, KS 66062

Model: Nüvi 6xx, GPN 011-01410-xx

FCC ID: IPH-01060

Industry Canada ID: 1792A-01060

Frequency Range: 88-108 MHz and 2400-2483.5 MHz.

Operating Power: Less than 250 Microvolts per meter (88-108 MHz) and 1 mW (as design specification, measured 91.7 dBµV/m @ 3 meters) (2400-2483.5 MHz).

Applicable Standards & Test Procedures

a) In accordance with the Federal Communications Commission, Code of Federal Regulations CFR47, dated October 1, 2005, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, applicable parts of paragraph 15, Part 15C paragraph 15.239 and 15.249, and Industry Canada RSS-210, the following information is submitted.

b) Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI 63.4-2003 Document.

Equipment Tested

<u>Equipment</u>	<u>Serial Number</u>	<u>FCC I.D.#</u>
Nuvi 6xx	P00	IPH-01060
AC Power Adapter(Jet)	17.4K ID	N/A
AC Power Adapter(Delta)	1	N/A
AC Power Adapter(Jet (USB))	P53601985A1	N/A
GA 25 MCX	E1	N/A
GA 27C	E1	N/A
GTM 20	ENG 1	N/A
Dell Computer	2574199639	DoC
Printer	B94C2121X	N/A

List of Test Equipment

A Hewlett Packard 8591EM and or 8562A Spectrum Analyzer was used as the measuring device for the emissions testing. The analyzer settings used are described in the following table. Refer to the Appendix for a complete list of Test Equipment.

HP 8591EM SPECTRUM ANALYZER SETTINGS		
CONDUCTED EMISSIONS		
RBW	AVG. BW	DETECTOR FUNCTION
9 kHz	30 kHz	Peak/Quasi Peak
RADIATED EMISSIONS (30 - 1000 MHz)		
RBW	AVG. BW	DETECTOR FUNCTION
120 kHz	300 kHz	Peak/Quasi Peak
HP 8562A SPECTRUM ANALYZER SETTINGS		
RADIATED EMISSIONS (1 - 40 GHz)		
RBW	AVG. BW	DETECTOR FUNCTION
1 MHz	1 MHz	Peak/Average
ANTENNA CONDUCTED EMISSIONS		
RBW	AVG. BW	DETECTOR FUNCTION
120 kHz	300 kHz	Peak

<u>EQUIPMENT</u>	<u>MFG.</u>	<u>MODEL</u>	<u>CAL. DATE</u>	<u>DUE.</u>
LISN	Comp. Design	FCC-LISN-2-MOD.CD	10/05	10/06
LISN	Comp. Design	1762	2/06	2/07
Antenna	ARA	BCD-235-B	10/05	10/06
Antenna	EMCO	3147	10/05	10/06
Antenna	EMCO	3143	5/06	5/07
Analyzer	HP	8591EM	5/06	5/07
Analyzer	HP	8562A	2/06	2/07

2.1033(b) Application for Certification

- (1) Manufacturer: GARMIN INTERNATIONAL, INC.
1200 East 151st Street
Olathe, KS 66062
Telephone: (913) 397-8200
- (2) FCC Identification: FCC I.D.: IPH-01060
- (3) Copy of the installation and operating manual: Refer to exhibit for Draft Instruction Manual.
- (4) Description of Circuit Functions, Device Operation: The Nūvi 6xx, GPN 011-01410-xx, is a low power Transmitter. This device features operation in the FM frequency band of 88-108 MHz and Blue Tooth communications in the 2400-2483.5 MHz frequency band.
- (5) Block Diagram with Frequencies: Refer to exhibit for the Block Diagram
- (6) Report of measurements showing compliance with the pertinent FCC/IC technical requires are provided in this report.
- (7) Photographs of equipment are provided in application exhibits.
- (8) Peripheral equipment or accessories for the equipment. Optional equipment available for the EUT includes, AC and DC power adapters, external GPS antenna, GTM 20, external microphone, and USB cable for computer interface. The available configuration options were investigated for this report with worst-case data presented.
- (9) Transition Provisions of 15.37 are not being requested.
- (10) The equipment is not a scanning receiver.
- (11) The equipment is not a transmitter operating in the 59-64 GHz frequency range.

Equipment and Cable Configuration

Test Setup

The Nüvi 6xx, GPN 011-01410-xx, is a GPS receiver used for location and navigation and incorporates low power transmitters operating under the Blue Tooth design specification allowing short-range communications in the 2400-2483.5 MHz band and in the FM radio band of 88-108 MHz. The GPS receiver is used to receive and display location and navigation information for the user. The unit was designed to be mounted in an automotive application and the transmitter section allows for short-range communications to other Blue Tooth devices or the FM stereo receiver mounted in the automobile. The EUT was arranged in typical user equipment configurations for testing purposes. The transmitter offers no other interface connections than those in the configuration options shown below. The EUT is powered from internal battery, and/or external A/C or D/C power adapter options. As requested by the manufacturer and required by the CFR, the unit was tested for emissions compliance using the available configurations with the worst-case data presented. Test results in this report relate only to the products described in this report.

Equipment Function and Testing Procedures

The EUT is a low power transmitter operating in the 88-108 MHz band (15.239) and 2400-2483.5 MHz frequency band (15.249). The unit allows communications to other Blue Tooth enabled devices and/or a FM receiver.

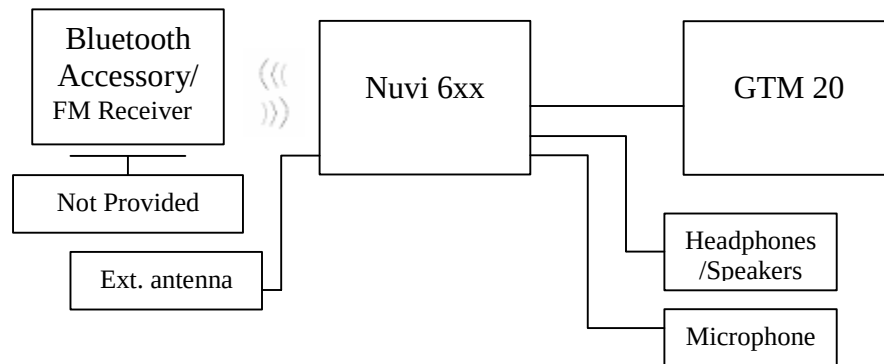
Configuration options for the EUT**Configurations for the Nuvi 6xx (GPN: 011-01410-XX)**

Representing units GPN: 011-01404-xx

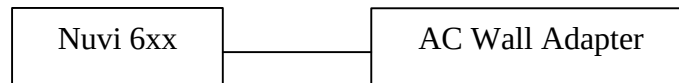
1. Nuvi 6xx connected to USB cable (GPN: 325-00128-02) and PC.



2. Nuvi 6xx connected to GTM 20 TMC FM traffic receiver (GPN: 011-01407-XX). 2.5mm and 3.5mm jacks available for audio input/output. Can be used with external antenna (GPN: 013-00202-00). Can be connected to a Bluetooth wireless accessory e.g. Bluetooth cellular phone (not sold by Garmin) and communicate to a FM receiver.



3. Nuvi 6xx connected to AC wall adapter (GPN: 362-00028-03 or 362-00043-04)

**Notes:**

1. Input voltage of the AC Wall adapter (GPN: 362-00028-03 or 362-00043-04) is 100-240 VAC, 47-63 Hz.
2. Output voltage of the AC Wall adapter (GPN: 362-00028-03 or 362-00043-04) is 5VDC.
3. Internal clock oscillator frequencies of the Nuvi 6xx are 32.768 KHz, 12.0 MHz, 16.367673 MHz, 26 MHz.
4. Bluetooth transmits in the 2.45 GHz band (FHSS).
5. FM transmitter operates in the 88-108 MHz band (FM).

AC Line Conducted Emission Test Procedure

The test setup, including the EUT, was arranged in a test equipment configuration and placed on a 1 x 1.5-meter wooden bench, 0.8 meters high located in a screen room. The power lines of the system were isolated from the power source using a standard LISN with a 50- μ Hy choke. EMI was coupled to the spectrum analyzer through a 0.1 μ F capacitor internal to the LISN. The LISN was positioned on the floor beneath the wooden bench supporting the EUT. The power lines and cables were draped over the back edge of the table.

Radiated Emission Test Procedure

The EUT was placed on a rotating 1 x 1.5-meter wooden platform 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before final data was taken using a spectrum analyzer. Refer to photographs in exhibits for EUT placement used during testing.

Units of Measurements

Conducted EMI: Data is in dB μ V; dB referenced to one microvolt.

Radiated EMI: Data is in dB μ V/m; dB/m referenced to one microvolt per meter.

Test Site Locations

Conducted EMI ROGERS LABS, INC. located at 4405 W. 259th
Terrace, Louisburg, KS.

Radiated EMI The radiated emissions tests were performed at
Rogers Labs, Inc. 3 meters Open Area Test Site
(OATS) located at 4405 W. 259th Terrace,
Louisburg, KS.

Site Approval Refer to Appendix for FCC Site Approval Letter,
Reference 90910, And Dated May 16, 2006, and
Industry Canada reference IC 3041 dated May 23,
2006.

Subpart C - Intentional Radiators

As per CFR Part 15, Subpart C the following information is
submitted for consideration in obtaining a grant of certification
for unlicensed intentional radiators.

15.203 Antenna Requirements

The unit is produced with a permanently attached antenna inside
the sealed plastic case. No provisions for modification or
alterations of the antenna configuration are available to the end
user. For testing purposes, a test unit was modified to allow
for antenna-conducted emissions testing of the Blue Tooth
transmitter for this and other compliance standards. The
requirements of 15.203 are met there are no deviations or
exceptions to the specification.

15.205 Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were investigated at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. Peak and average amplitudes of frequencies above 1000 MHz were compared to the required limits with worst-case data presented below. No other significant emission was observed which fell into the restricted bands of operation. Computed emission values take into account the received radiated field strength, receive antenna correction factor, amplifier gain stage, and test system cable losses.

Sample Calculations:

$$\begin{aligned}\text{Computed Peak (dB}\mu\text{V/m @ 3m)} &= \text{FSM (dB}\mu\text{V)} + \text{A.F. (dB)} - \text{Gain (dB)} \\ &= 50.5 + 8.0 - 30 \\ &= 28.5\end{aligned}$$

Radiated Emissions in Restricted Bands Data per 15.205

Emission Frequency (MHz)	FSM Horz. (dB μ V)	FSM Vert. (dB μ V)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dB μ V/m)	RFS Vert. @ 3m (dB μ V/m)	Limit @ 3m (dB μ V/m)
133.0	50.5	43.0	8.0	30	28.5	21.0	43.5
240.0	47.8	40.3	11.7	30	29.5	22.0	46.0
264.3	25.6	25.9	12.7	30	8.3	8.6	46.0
323.1	26.0	27.0	15.2	30	11.2	12.2	46.0
4804.0	16.5	16.0	32.5	30	19.0	18.5	54.0
4882.0	15.3	18.6	32.5	30	17.8	21.1	54.0
4960.0	16.0	16.0	32.9	30	18.9	18.9	54.0
7323.0	20.3	18.7	36.3	30	26.6	25.0	54.0
7440.0	18.7	17.8	36.7	30	25.4	24.5	54.0
12010.0	16.3	19.6	40.0	30	26.3	29.6	54.0
12205.0	16.3	18.1	40.2	30	26.5	28.3	54.0
12400.0	17.8	18.1	40.6	30	28.4	28.7	54.0

No other emissions found in the restricted bands.

Summary of Results for Radiated Emissions in Restricted Bands 15.205

The radiated emissions for the EUT meet the requirements for FCC CFR 47 Part 15.205 restricted bands of operation. The EUT had a 15.0 dB minimum margin below the limits. Other emissions were present with amplitudes at least 20 dB below the required limits.

15.207 Conducted emissions limits; general requirements**AC Line Conducted EMI 15.207**

The EUT was arranged in a typical equipment configuration (configurations 1 and 3). Testing was performed with the EUT placed on a 1 x 1.5-meter wooden bench 80 cm above the conducting ground plane, floor of a screen room. The bench was positioned 40 cm away from the wall of the screen room. The LISN was positioned on the floor of the screen room 80-cm from the rear of the EUT. Testing for the line-conducted emissions was as follows. The ac adapter for the EUT was connected to the LISN for line-conducted emissions testing (configuration #3) or computer (configuration #1). A second LISN was positioned on the floor of the screen room 80-cm from the rear of the supporting equipment of the EUT. All power cords except the EUT were then powered from the second LISN. EMI was coupled to the spectrum analyzer through a 0.1 μ F capacitor, internal to the LISN. Power line conducted emissions testing was carried out individually for each current carrying conductor of the EUT. The excess length of lead between the system and the LISN receptacle was folded back and forth to form a bundle not exceeding 40 cm in length. The screen room, conducting ground plane, analyzer, and

LISN were bonded together to the protective earth ground.

Preliminary testing was performed to identify the frequencies of each of the emissions, which had the highest amplitudes. The cables were repositioned to obtain maximum amplitude of measured EMI level.

Once the worst-case configuration was identified, plots were made of the EMI from 0.15 MHz to 30 MHz then data was recorded with maximum conducted emissions levels. Refer to Figures 1 and 2 for plots of the EUT (JET AC adapter) conducted emissions frequency spectrum taken in the screen room. Refer to Figures 3 and 4 for plots of the EUT (Delta AC adapter) conducted emissions frequency spectrum taken in the screen room. Refer to Figures 5 and 6 for plots of the EUT (JET (USB) AC adapter) conducted emissions frequency spectrum taken in the screen room. Refer to Figures 7 and 8 for plots of the CPU conducted emissions frequency spectrum taken in the screen room.

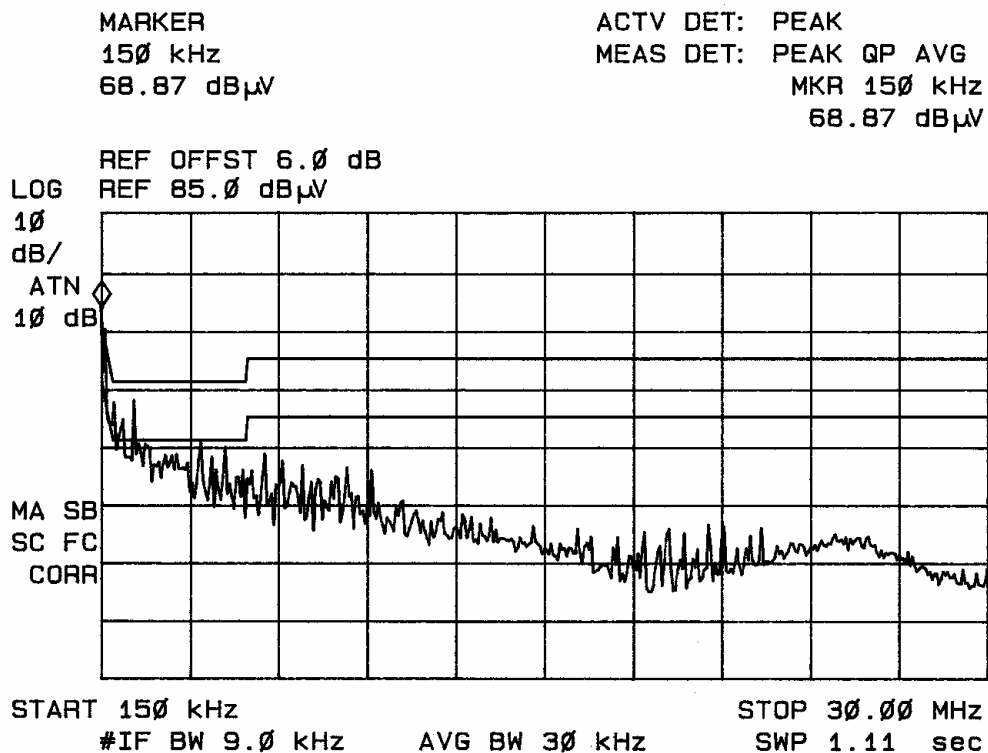


Figure one Conducted emissions of EUT line 1 (Jet)

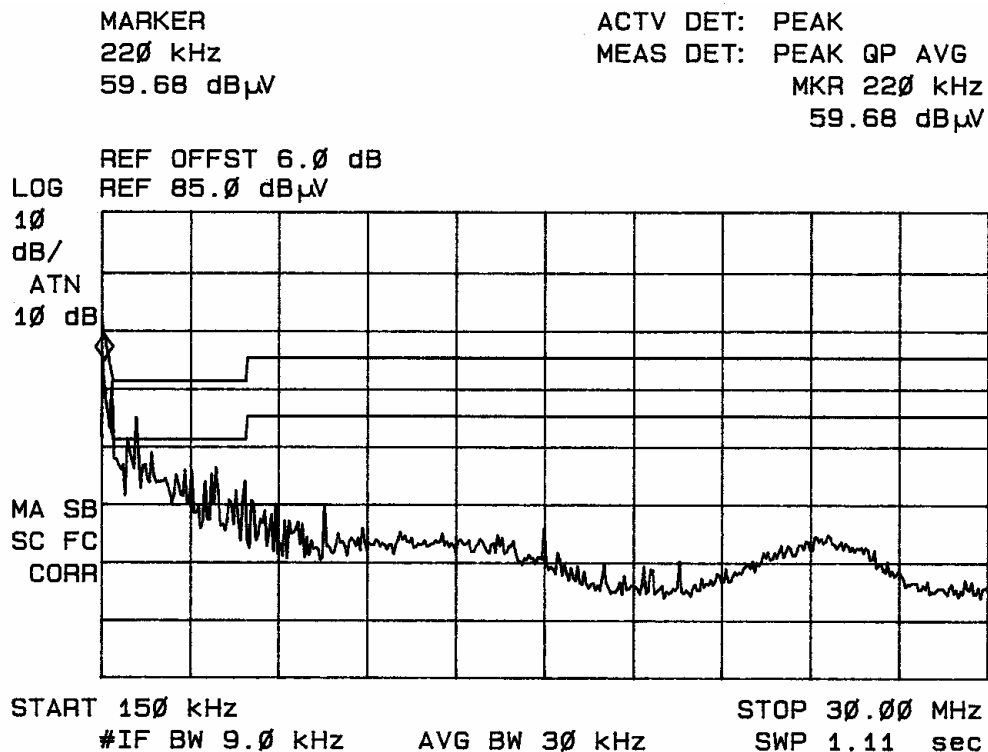


Figure two Conducted emissions of EUT line 2 (Jet)

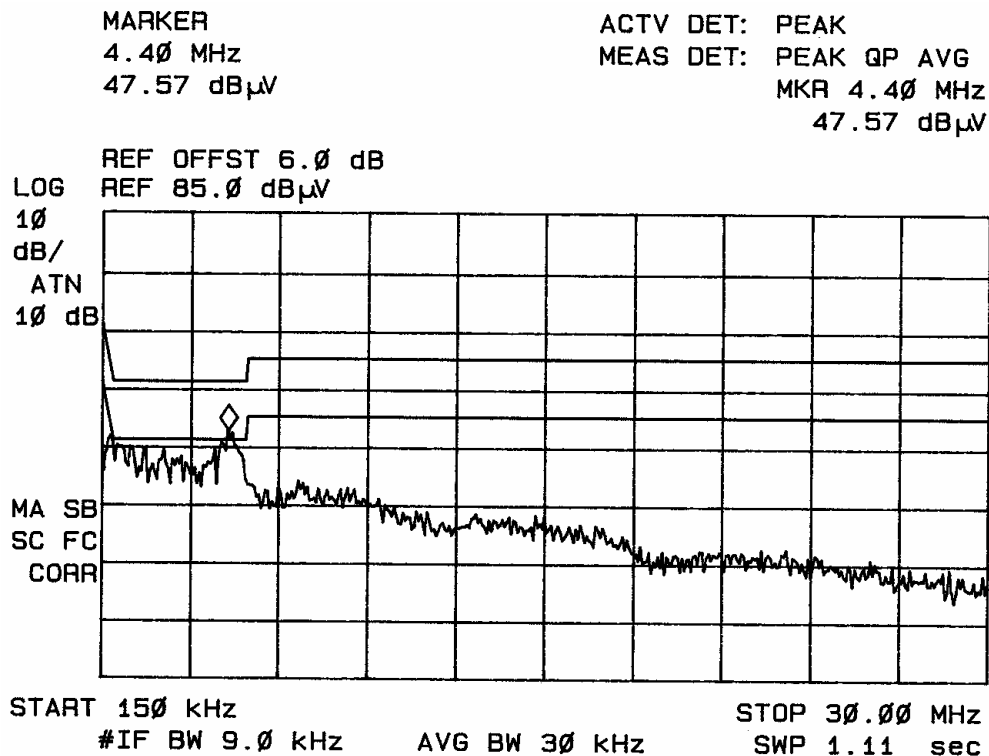


Figure three Conducted emissions of EUT line 1 (Delta)

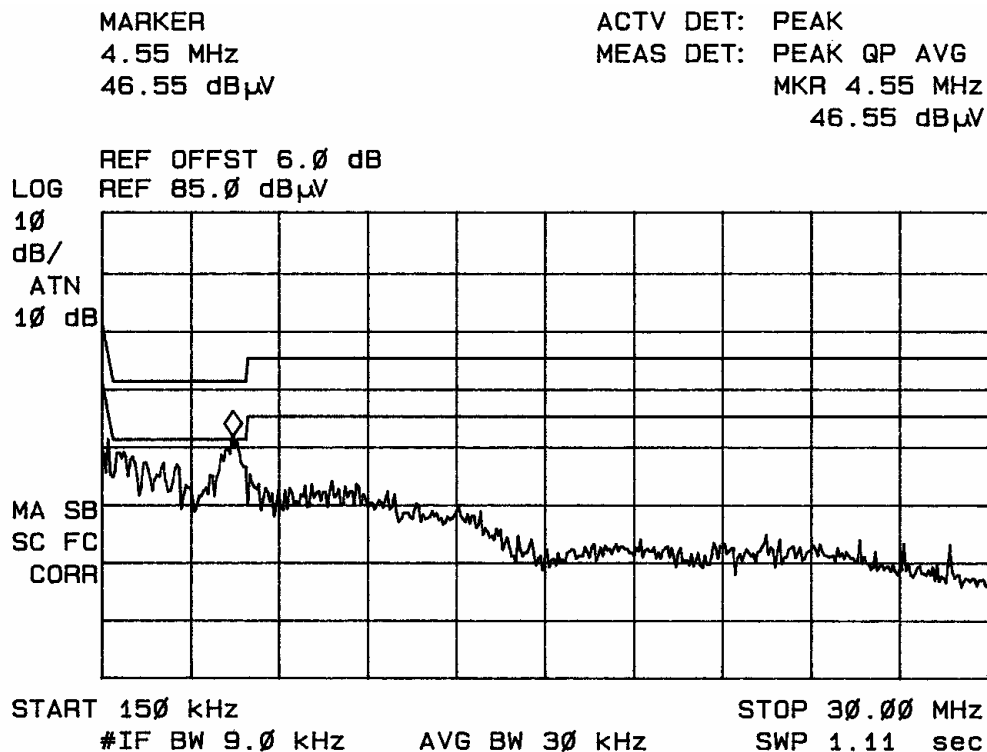


Figure four Conducted emissions of EUT line 2 (Delta)

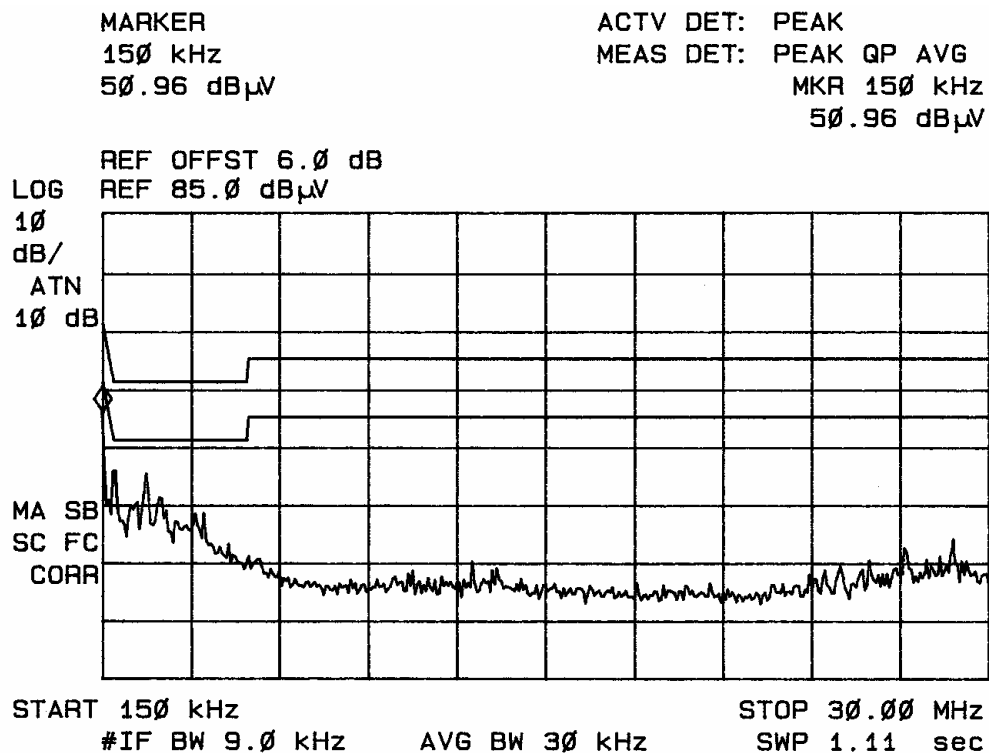


Figure five Conducted emissions of EUT line 1 (Jet (USB))

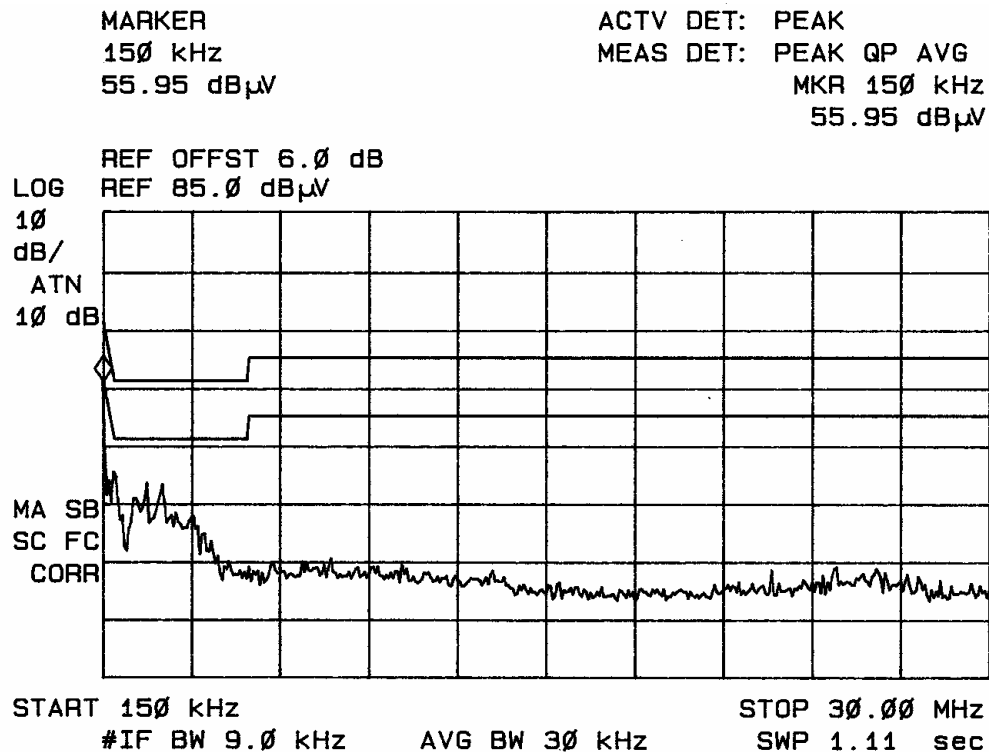


Figure Six Conducted emissions of EUT line 2 (Jet (USB))

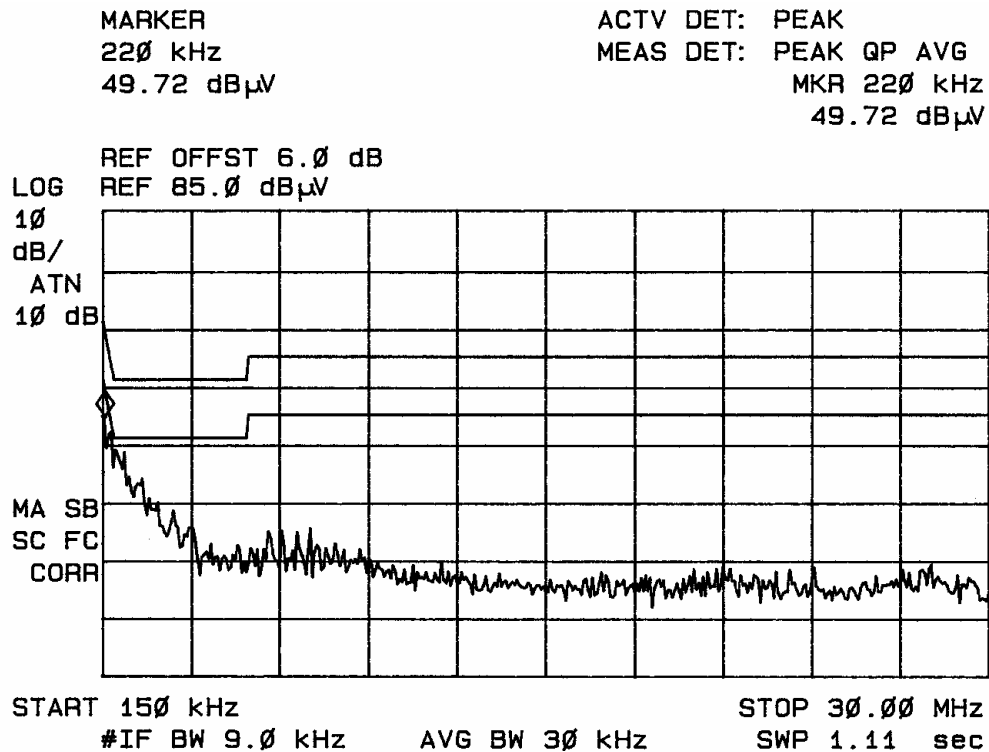


Figure seven Conducted emissions of EUT line 1 (CPU)

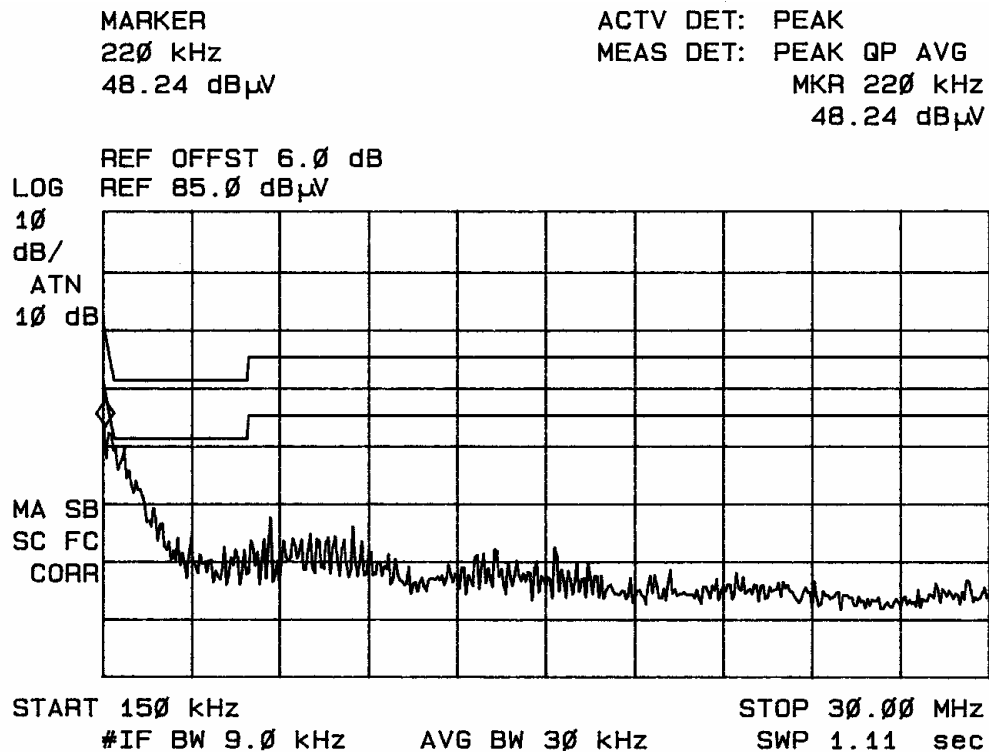


Figure eight Conducted emissions of EUT line 2 (CPU)

Data Conducted Emissions (7 Highest Emissions) (JET)

Frequency band (MHz)	L1 Level (dBµV)			L2 Level (dBµV)			CISPR 22 Limit Q.P. Ave (dBµV)
	Peak	Q.P.	Ave	Peak	Q.P.	Ave	
0.15 - 0.5	68.8	48.7	32.7	59.7	45.3	31.5	66-56 / 56-46
0.5 - 5	47.9	44.9	37.6	48.2	44.4	36.5	56 / 46
5 - 10	32.2	25.9	18.5	27.1	21.3	14.2	60 / 50
10 - 15	29.3	23.4	16.3	29.2	23.5	16.8	60 / 50
15 - 20	26.3	20.9	14.5	23.0	18.3	11.7	60 / 50
20 - 25	29.1	23.4	16.8	28.8	23.7	17.2	60 / 50
25 - 30	28.9	23.8	17.2	28.2	23.6	17.1	60 / 50

Other emissions present had amplitudes at least 20 dB below the limit.

Data Conducted Emissions (7 Highest Emissions) (Delta)

Frequency band (MHz)	L1 Level (dBµV)			L2 Level (dBµV)			CISPR 22 Limit Q.P. Ave (dBµV)
	Peak	Q.P.	Ave	Peak	Q.P.	Ave	
0.15 - 0.5	45.8	42.0	32.7	43.5	39.7	29.4	66-56 / 56-46
0.5 - 5	47.6	41.4	30.7	46.6	40.4	30.1	56 / 46
5 - 10	36.3	29.9	19.1	34.1	29.0	19.1	60 / 50
10 - 15	32.8	27.8	16.8	32.0	24.5	13.5	60 / 50
15 - 20	27.8	22.5	14.0	25.7	20.0	11.2	60 / 50
20 - 25	26.0	19.6	10.6	27.8	22.1	14.1	60 / 50
25 - 30	20.8	15.9	9.3	24.2	17.0	9.9	60 / 50

Other emissions present had amplitudes at least 20 dB below the limit.

Data Conducted Emissions (7 Highest Emissions) (Jet USB)

Frequency band (MHz)	L1 Level (dBµV)			L2 Level (dBµV)			CISPR 22 Limit Q.P. Ave (dBµV)
	Peak	Q.P.	Ave	Peak	Q.P.	Ave	
0.15 - 0.5	50.9	45.2	34.2	55.9	44.8	34.2	66-56 / 56-46
0.5 - 5	44.2	41.8	32.4	42.7	40.3	31.4	56 / 46
5 - 10	24.8	18.4	11.8	22.6	17.2	10.4	60 / 50
10 - 15	23.5	16.3	9.5	21.6	15.5	9.2	60 / 50
15 - 20	21.8	16.9	10.9	19.4	14.8	8.4	60 / 50
20 - 25	20.1	14.8	8.5	24.7	20.4	13.2	60 / 50
25 - 30	29.1	26.3	20.2	25.4	20.8	16.3	60 / 50

Other emissions present had amplitudes at least 20 dB below the limit.

Data Conducted Emissions (7 Highest Emissions) (CPU)

Frequency band (MHz)	L1 Level (dBµV)			L2 Level (dBµV)			CISPR 22 Limit Q.P. Ave (dBµV)
	Peak	Q.P.	Ave	Peak	Q.P.	Ave	
0.15 - 0.5	49.7	46.0	30.1	48.2	46.5	27.7	66-56 / 56-46
0.5 - 5	45.5	42.6	21.9	46.3	43.2	22.0	56 / 46
5 - 10	30.7	22.1	13.2	32.1	27.3	21.5	60 / 50
10 - 15	22.5	17.2	10.4	26.8	19.8	11.7	60 / 50
15 - 20	22.7	17.0	10.0	28.3	19.9	10.9	60 / 50
20 - 25	26.3	17.3	9.9	22.7	16.9	9.9	60 / 50
25 - 30	25.0	18.0	10.6	20.8	16.3	9.5	60 / 50

Other emissions present had amplitudes at least 20 dB below the limit.

Summary of Results for AC Line Conducted General Emissions 15.207

The conducted emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT worst-case had an 11.1 dB minimum margin below the FCC/CISPR quasi peak limit, and an 8.4 dB minimum margin below the FCC/CISPR average limit. Other emissions were present with recorded data representing the worst-case amplitudes.

15.209 Radiated emissions limits; general requirements**General Radiated EMI per 15.209**

The EUT was arranged in all typical equipment configurations and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions investigations were performed to identify the frequencies, which produced the highest emissions. Plots were made of the radiated emission frequency spectrum from 30 MHz to 22,000 MHz for the preliminary testing. Refer to figures nine through thirteen showing the worst-case radiated emission spectrum displayed on the spectrum analyzer taken in a screen room. The

highest radiated emission was then re-maximized at the OATS site before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open field test site at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 25,000 MHz was searched for radiated emissions. Peak and average amplitudes of frequencies above 1000 MHz were compared to the required limits with worst-case data presented below. Measured emission levels were maximized by EUT placement on the table, changing cable location, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Broadband Biconical from 30 MHz to 200 MHz, Log Periodic from 200 MHz to 5 GHz, and/or Biconilog from 30 MHz to 1000 MHz, Pyramidal Horns from 5 GHz to 25 GHz, and amplification stages.

Sample Calculations:

$$\begin{aligned} \text{RFS} &= \text{Radiated Field Strength} \\ \text{dB}\mu\text{V/m @ 3m} &= \text{dB}\mu\text{V} + \text{A.F.} - \text{Amplifier Gain} \\ \text{dB}\mu\text{V/m @ 3m} &= 48.6 + 7.4 - 30 \\ &= 26.0 \end{aligned}$$

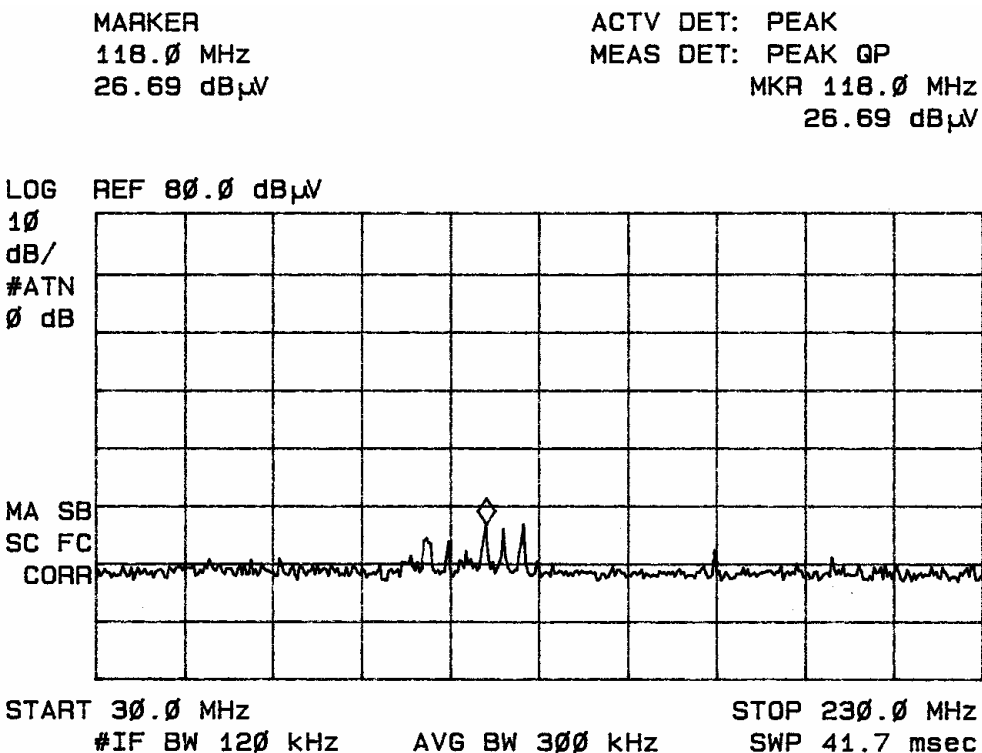


Figure nine Radiated Emissions taken at 1 meter in screen room.

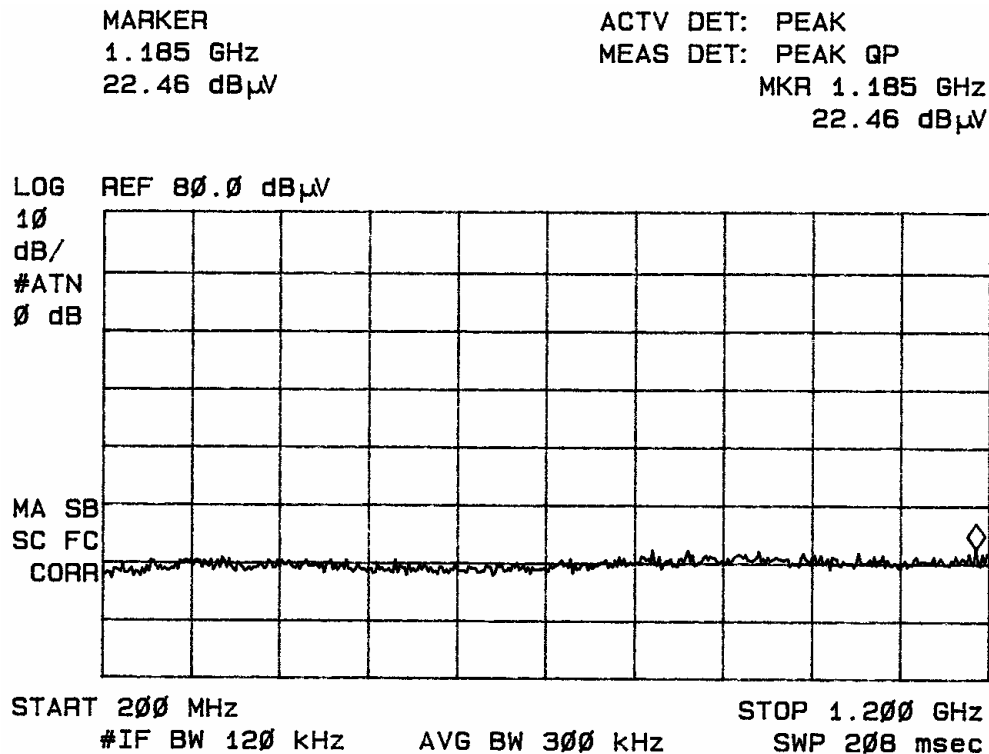


Figure ten Radiated Emissions taken at 1 meter in screen room.

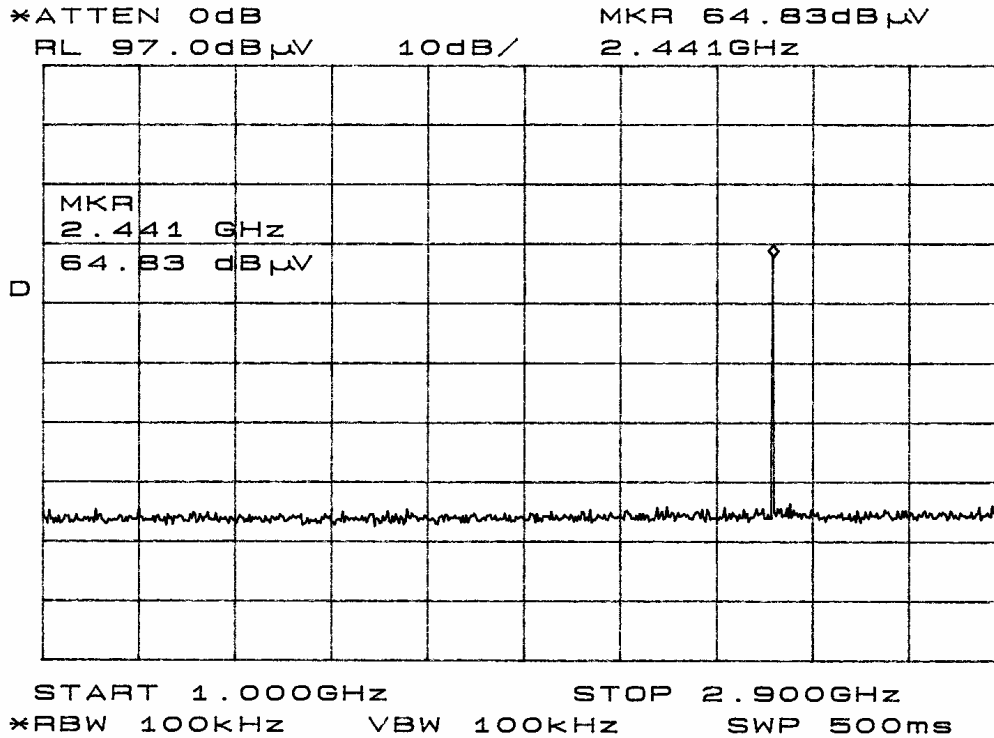


Figure eleven Radiated Emissions taken at 1 meter in screen room.

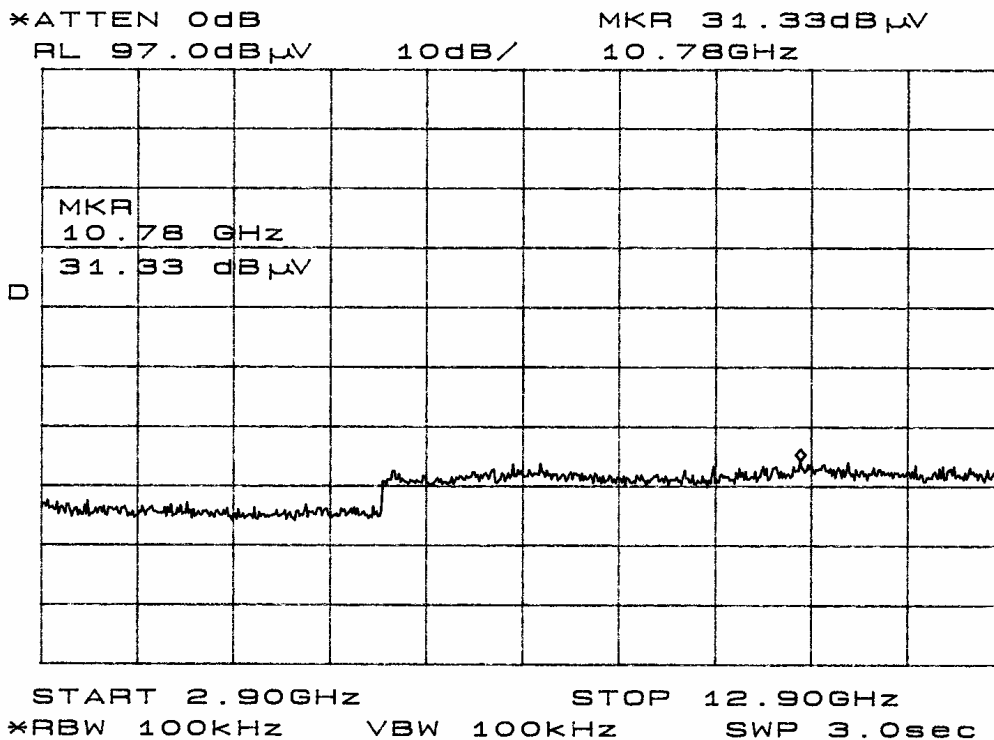


Figure twelve Radiated Emissions taken at 1 meter in screen room.

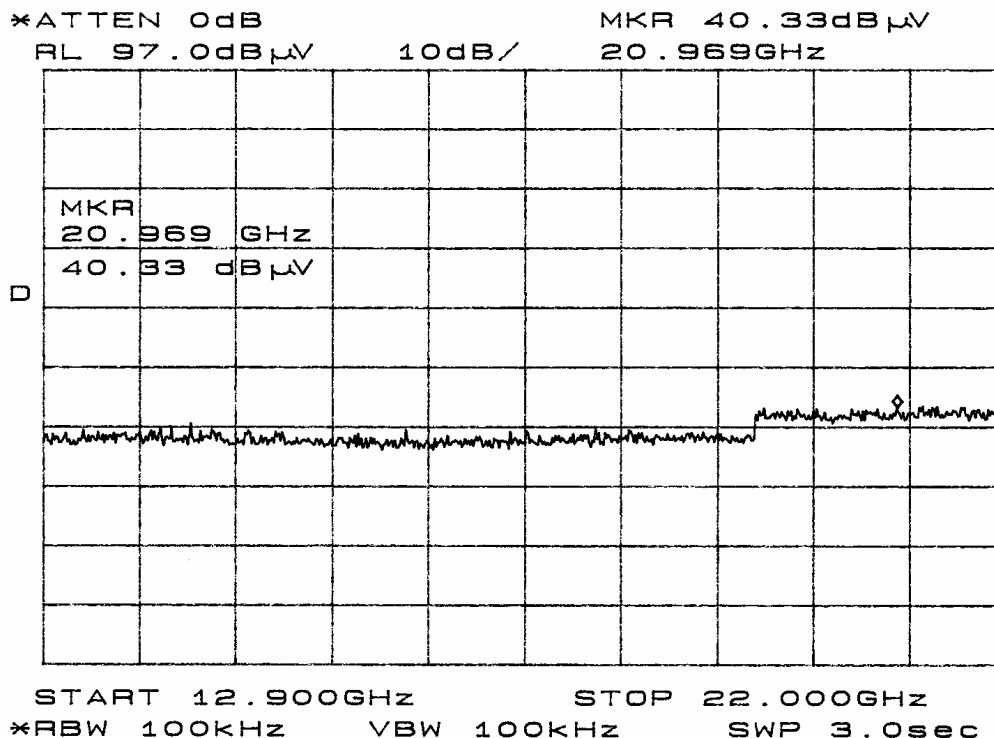


Figure thirteen Radiated Emissions taken at 1 meter in screen room.

General Radiated Emissions Data per 15.209

Emission Freq. (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
96.0	48.6	44.2	7.4	30	26.0	21.6	43.5
133.0	50.5	43.0	8.0	30	28.5	21.0	43.5
144.0	49.6	38.0	12.1	30	31.7	20.1	43.5
178.5	44.6	46.5	9.2	30	23.8	25.7	43.5
192.0	43.5	43.2	10.7	30	24.2	23.9	43.5
195.4	46.4	44.8	10.8	30	27.2	25.6	43.5

Other emissions were present with amplitudes at least 20 dB below limits.

Summary of Results for General Radiated Emissions per 15.209

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had an 11.8 dB minimum margin below the limits. Other emissions were present with amplitudes at least 20 dB below the FCC Limits.

15.239 Operation in the Band 88-108 MHz

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz. The EUT tunes channels in the 88.1-107.9 MHz band and the emissions meet the 200 kHz wide band restriction. Therefore, the requirements are met. There are no deviations or exceptions to the specification. The field strength of any emission within the permitted 200 kHz band shall not exceed 250 micro volts/meter at 3 meters (48 dB μ V/m). The emission limit in this paragraph is based on measuring equipment employing an average detector. Emissions were measured and data recorded for this report. No emission was measured above the limitations of this part for this transmitter. Therefore, the requirements are satisfied. There are no deviations or exceptions to the specifications. The field strength of any emissions radiated on any frequency outside of the 200 kHz band shall not exceed the general radiated emission limits in 15.209. Emissions were measured and data recorded for this report. No emission was measured above the limitations of this part for this transmitter. Therefore, the requirements are satisfied. The requirements of 15.209 are met there are no deviations or exceptions to the specification. Refer to figures fourteen through nineteen demonstrating radiated emissions taken in a screen room at 1-meter distance, demonstrating compliance to the requirements.

Intentional and Spurious Radiated Emissions Data per 15.239

Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
88.1	69.8	64.4	7.5	30	47.3	41.9	48.0
176.2	32.9	28.5	9.1	30	12.0	7.6	43.5
264.3	25.6	25.9	12.7	30	8.3	8.6	46.0
352.4	25.1	25.7	15.4	30	10.5	11.1	46.0
440.5	25.8	26.0	17.0	30	12.8	13.0	46.0
528.6	25.2	25.1	18.6	30	13.8	13.7	46.0
616.7	33.1	34.2	19.5	30	22.6	23.7	46.0
704.8	25.8	25.9	20.8	30	16.6	16.7	46.0
792.9	25.2	25.4	22.2	30	17.4	17.6	46.0
99.3	70.4	62.9	7.4	30	47.8	40.3	48.0
198.6	29.1	30.2	10.6	30	9.7	10.8	43.5
297.9	26.9	27.6	14.3	30	11.2	11.9	46.0
397.2	25.9	26.1	16.5	30	12.4	12.6	46.0
496.5	41.3	34.6	17.7	30	29.0	22.3	46.0
595.8	42.7	31.1	19.2	30	31.9	20.3	46.0
695.1	37.4	38.1	20.9	30	28.3	29.0	46.0
794.4	25.6	25.8	22.2	30	17.8	18.0	46.0
107.7	68.1	60.0	7.1	30	45.2	37.1	48.0
215.4	23.9	30.6	11.0	30	4.9	11.6	43.5
323.1	26.0	27.0	15.2	30	11.2	12.2	46.0
430.8	25.8	25.9	16.5	30	12.3	12.4	46.0
538.6	25.2	25.3	18.9	30	14.1	14.2	46.0
646.3	25.7	25.7	20.4	30	16.1	17.7	46.0
753.9	25.9	25.9	21.8	30	17.7	17.7	46.0
861.6	28.0	29.5	22.9	30	20.9	22.4	46.0
969.3	25.0	25.1	23.5	30	18.5	18.6	54.0

Other emissions were present with amplitudes at least 20 dB below limits.

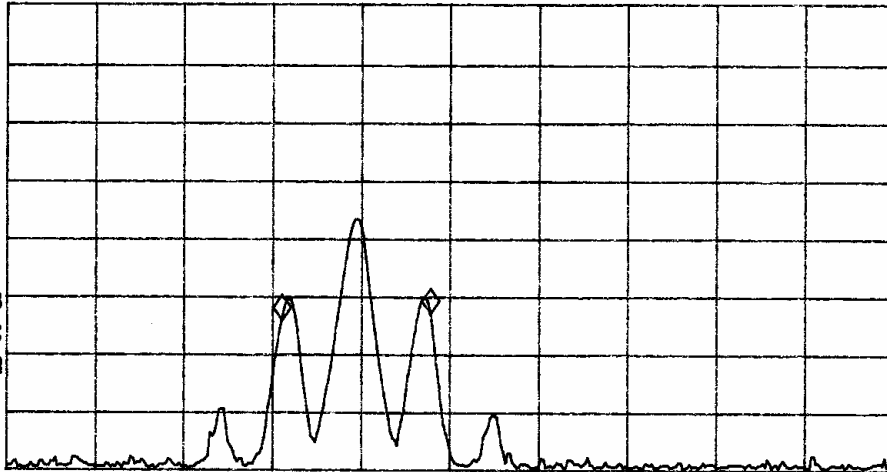
MARKER Δ
41.9 kHz
1.15 dB

ACTV DET: PEAK
MEAS DET: PEAK QP
MKR 41.9 kHz
1.15 dB

LOG REF 80.0 dB μ V

10
dB/
#ATN
0 dB

VA SB
SC FC
CORR



START 88.0000 MHz STOP 88.2500 MHz
#IF BW 3.0 kHz AVG BW 3 kHz SWP 100 msec

Figure fourteen Band Edges of operation (at 88.1 MHz)

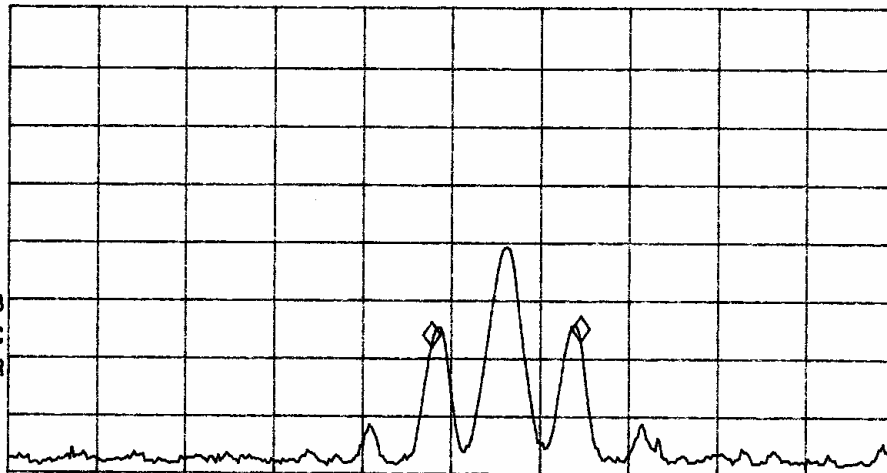
MARKER Δ
41.9 kHz
1.07 dB

ACTV DET: PEAK
MEAS DET: PEAK QP
MKR 41.9 kHz
1.07 dB

LOG REF 80.0 dB μ V

10
dB/
#ATN
0 dB

MA SB
SC FC
CORR



START 107.7500 MHz STOP 108.0000 MHz
#IF BW 3.0 kHz AVG BW 3 kHz SWP 100 msec

Figure fifteen Band Edges of operation (at 107.9 MHz)

MARKER Δ
41.5 kHz
1.36 dB

ACTV DET: PEAK
MEAS DET: PEAK QP
MKR 41.5 kHz
1.36 dB

LOG REF 80.0 dB μ V

10
dB/
#ATN
0 dB

WA SB
SC FC
CORR

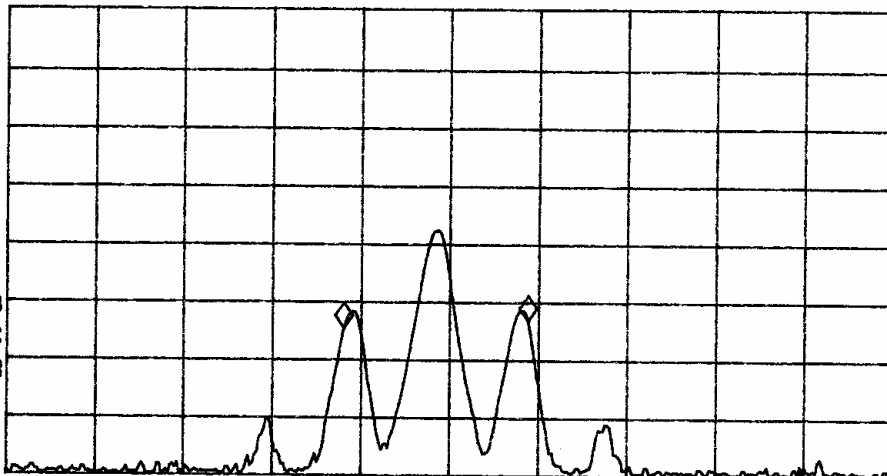


Figure sixteen 200 kHz Occupied Bandwidth requirement

MARKER
88.05 MHz
42.18 dB μ V

ACTV DET: PEAK
MEAS DET: PEAK QP
MKR 88.05 MHz
42.18 dB μ V

LOG REF 80.0 dB μ V

10
dB/
#ATN
0 dB

VA SB
SC FC
CORR



Figure seventeen Output power across the operational band

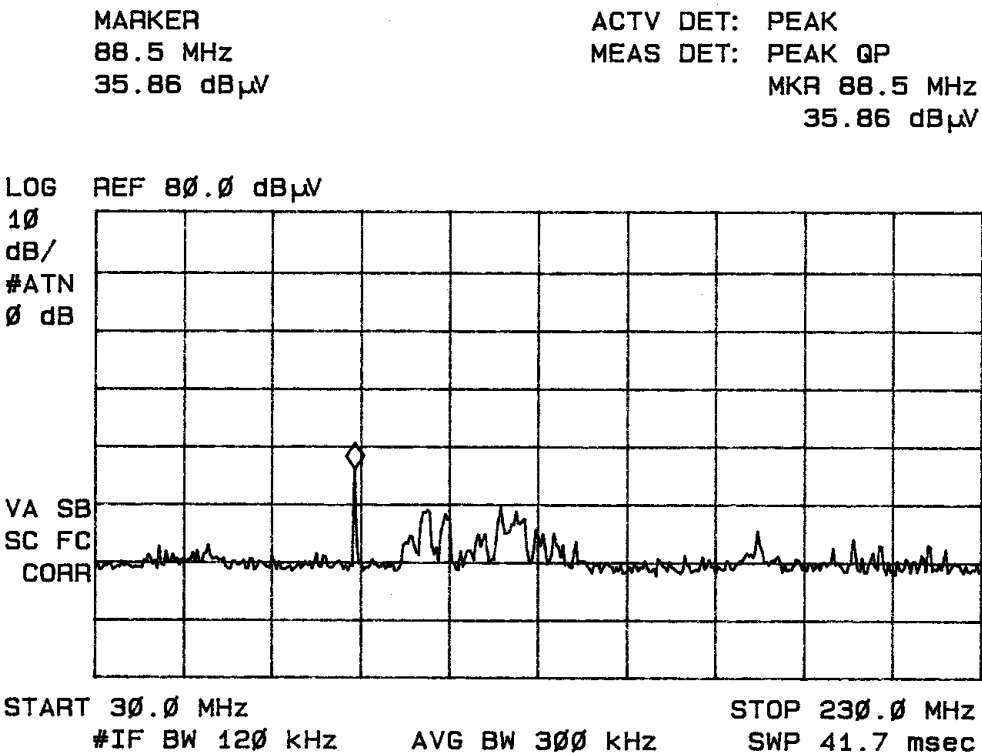


Figure eighteen Radiated Emissions @ 1 Meter in Screen Room

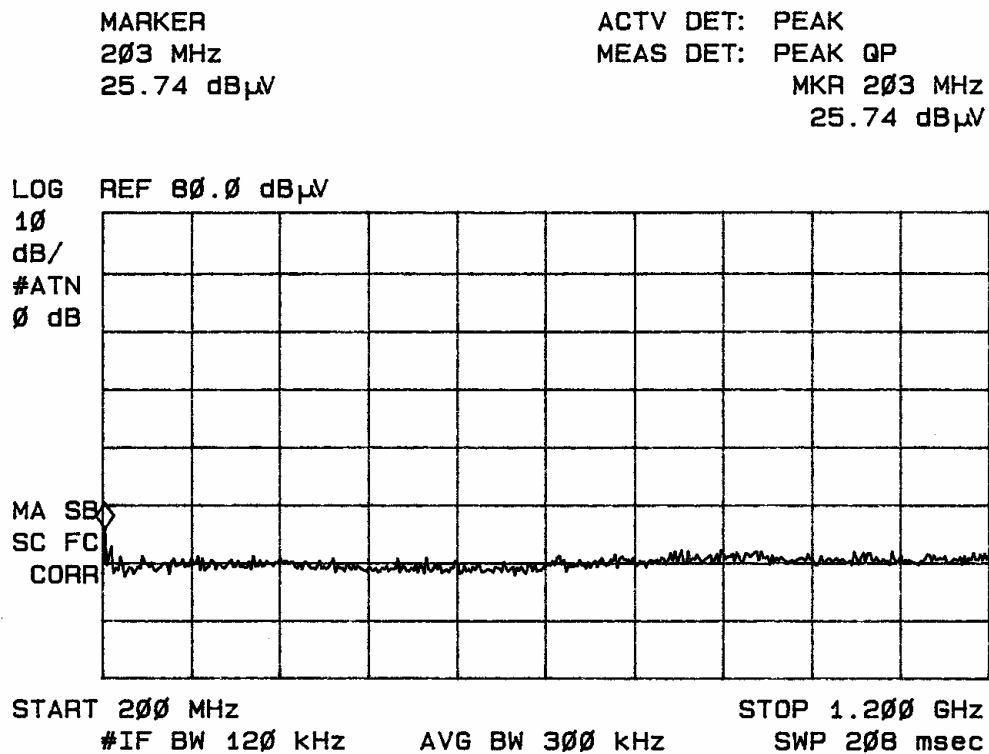


Figure nineteen Radiated Emissions @ 1 Meter in Screen Room

Summary of Results for Radiated Emissions per 15.239

The EUT had a 0.2-dB margin below the limits of 15.239. The radiated emissions for the EUT meet the requirements for FCC CFR 47 Part 15.239 Intentional Radiators. There are no measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the FCC Limits.

15.249 Operation in the Band 2,400-2,483.5 MHz

The power output was measured on an open field test site @ 3 meters. The EUT was placed on a wooden turntable 0.8 meters above the ground plane and at a distance of 3 meters from the FSM antenna. The peak and quasi-peak amplitude of frequencies below 1000 MHz were measured using a spectrum analyzer. The peak and average amplitude of frequencies above 1000 MHz were measured using a spectrum analyzer. The amplitude of the emission was then recorded from the analyzer display.

Emissions radiated outside of the specified bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation. Refer to figures twenty through twenty-six showing the frequency and amplitude of emission displayed on the spectrum analyzer of the temporary test antenna, antenna-conducted emissions taken in a screen room. The amplitudes of each spurious emission were measured both at the OATS at a distance of 3 meters from the FSM antenna and antenna

conducted. The amplitude of each spurious emission was maximized by varying the FSM antenna height, polarization, and by rotating the turntable. A Biconilog Antenna was used for measuring emissions from 30 to 1000 MHz, a Log Periodic Antenna for 200 to 5000 MHz, and Pyramidal Horn Antennas from 4 GHz to 25 GHz. Emissions were measured in dB μ V/m @ 3 meters.

Sample calculation.

$$\begin{aligned} \text{dB}\mu\text{v/m@ 3m} &= \text{FSM} + \text{A.F.} + \text{cable loss} - \text{amplifier Gain} \\ &= 58.0 + 33.2 - 0 \\ &= 91.2 \end{aligned}$$

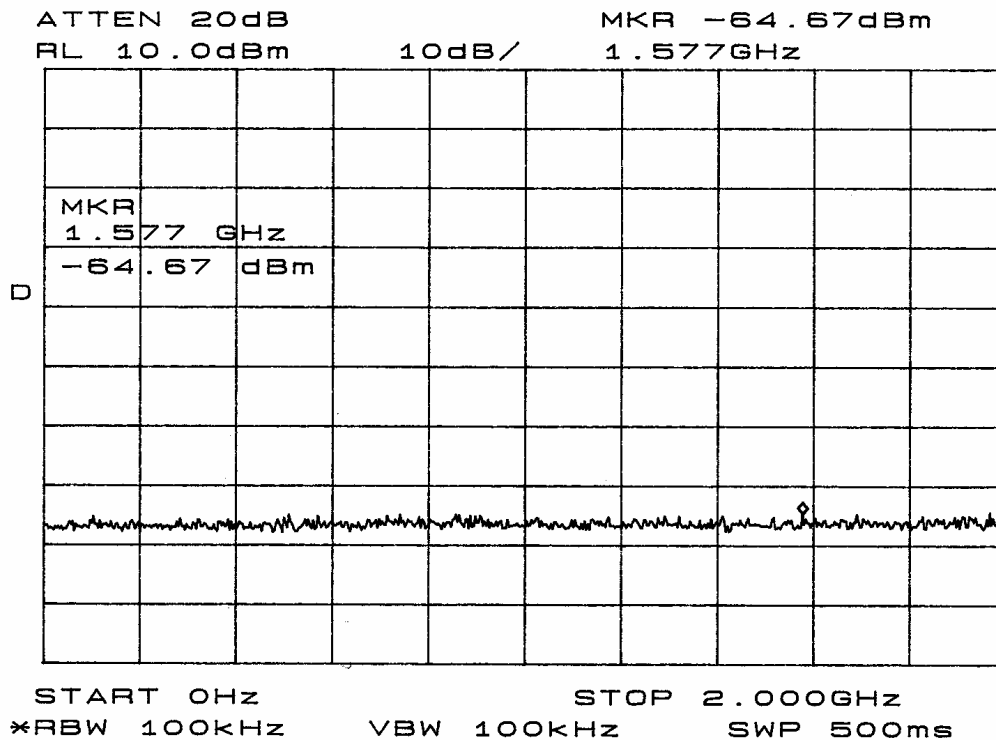


Figure twenty Power output measured at temporary antenna terminal

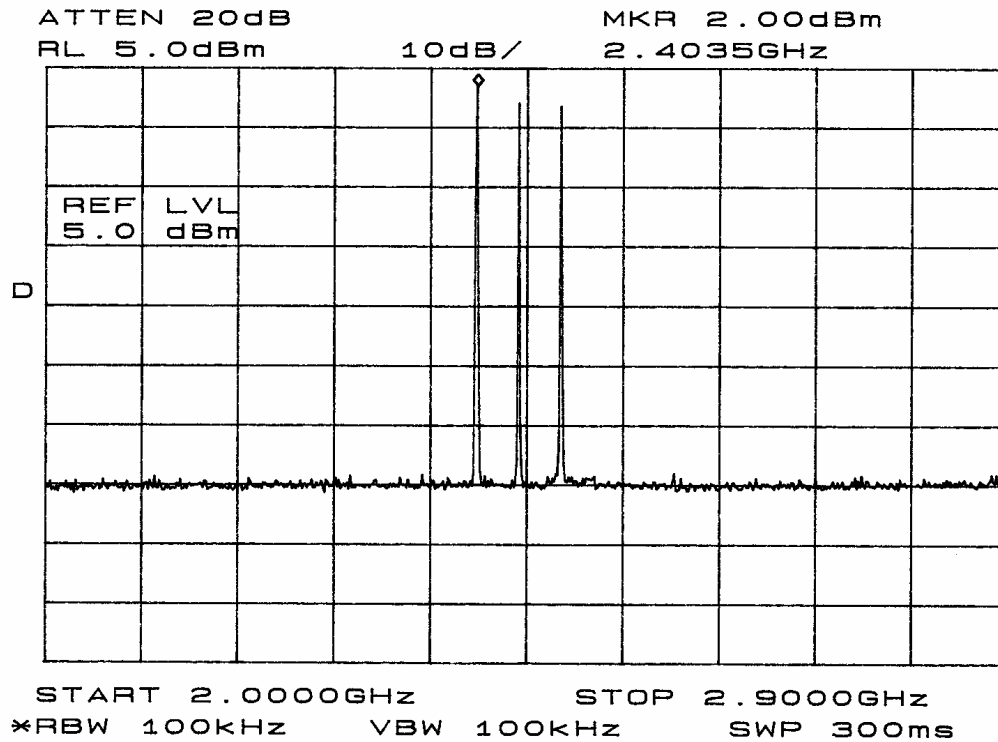


Figure twenty-one Power output measured at temporary antenna terminal

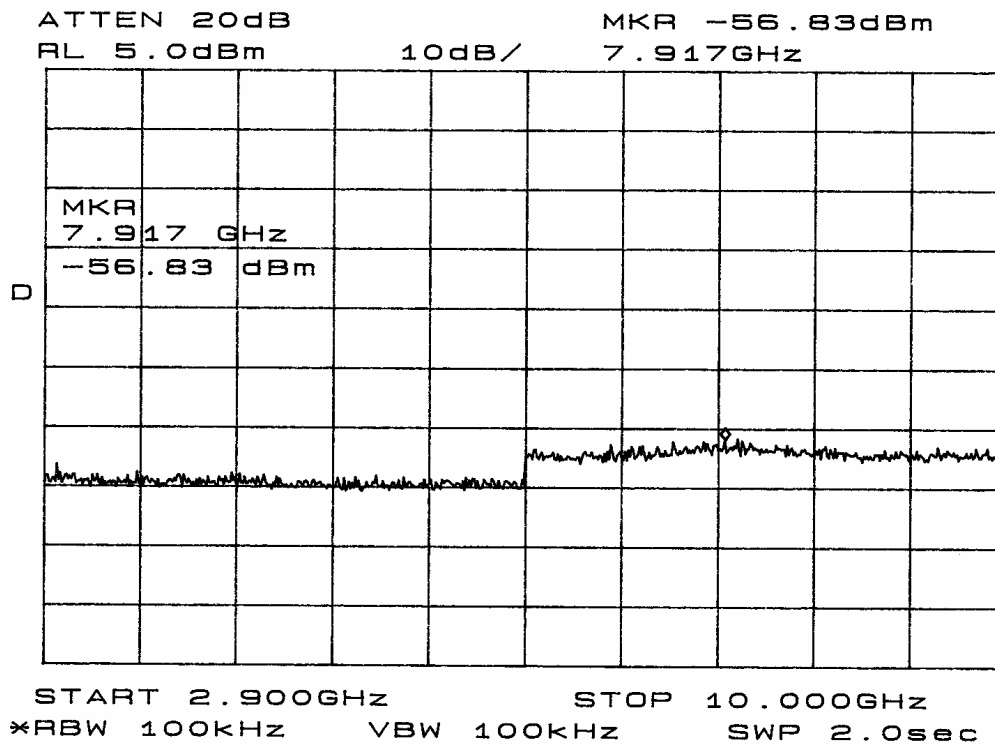


Figure twenty-two Power output measured at temporary antenna terminal

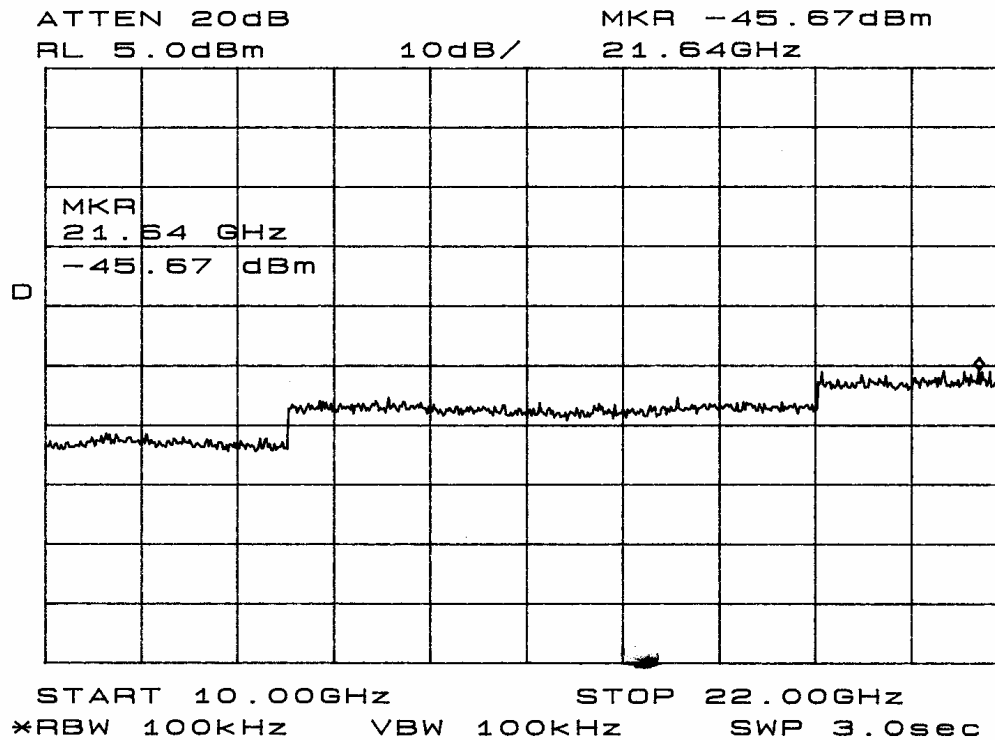


Figure twenty-three Power output measured at temporary antenna terminal

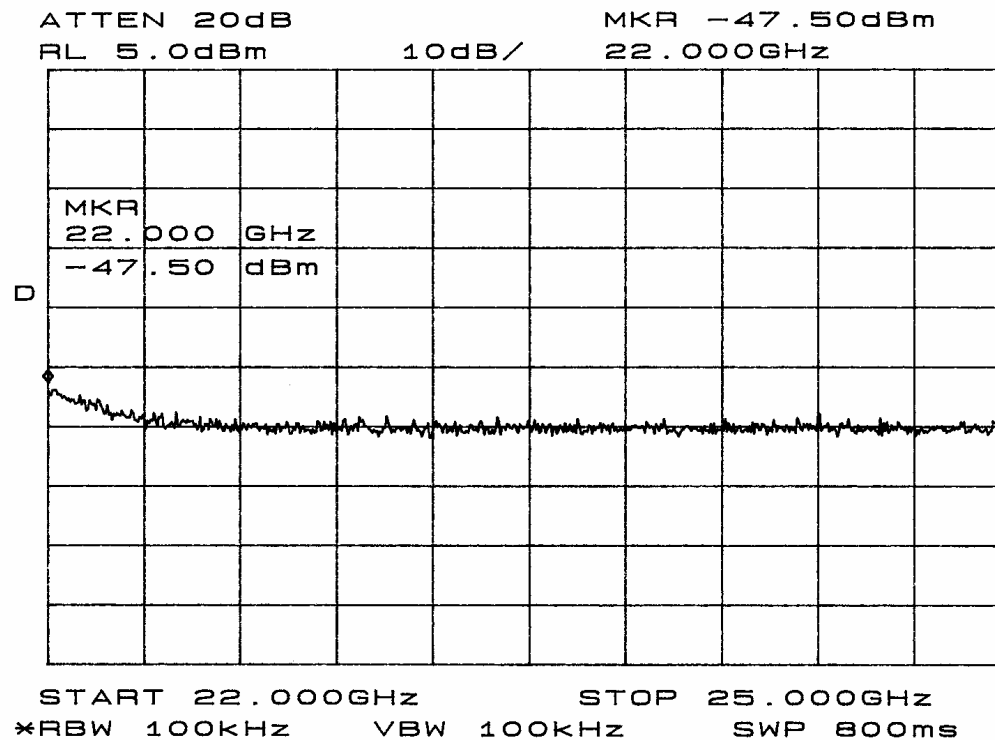


Figure twenty-four Power output measured at temporary antenna terminal

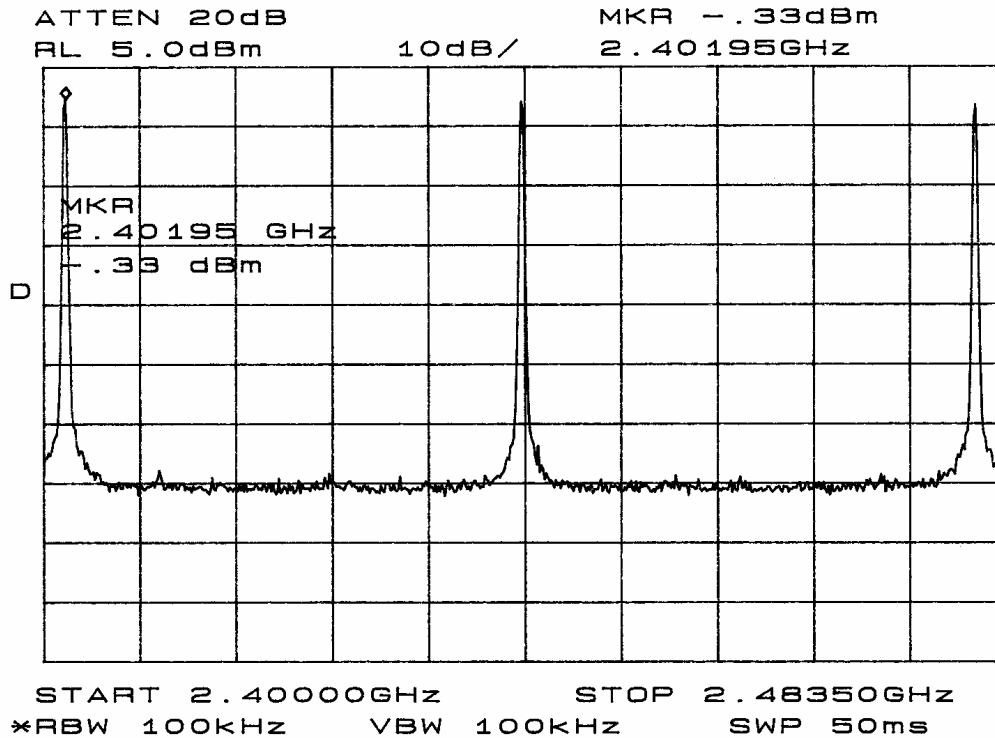


Figure twenty-five Power output measured at temporary antenna terminal

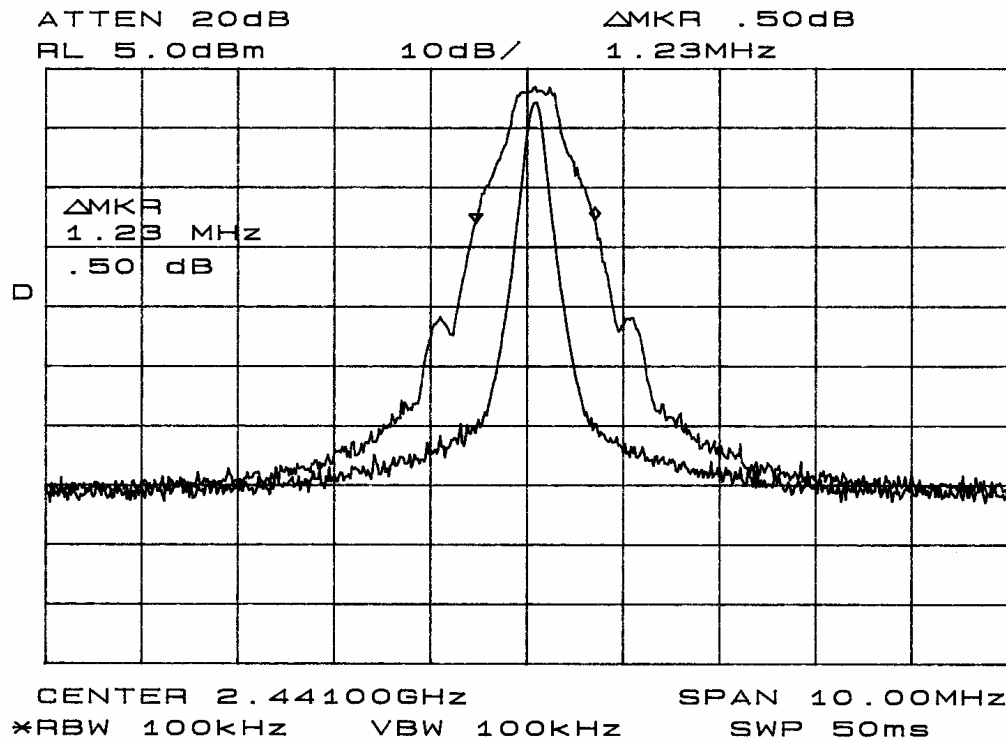


Figure twenty-six Occupied Bandwidth

Transmitter Radiated Emissions Data per 15.249

Emission Frequency (MHz) (polarization)	FSM Peak (dBμV)	FSM Average (dBμV)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Peak @ 3m (dBμV/m)	RFS Average @ 3m (dBμV/m)	Limit @ 3m (ave) (dBμV/m)
2402.0 (H)	58.0	54.5	33.2	0	91.2	87.7	95.2
2402.0 (V)	54.5	48.3	33.2	0	87.7	81.5	95.2
4804.0 (H)	30.6	16.5	32.5	30	33.1	19.0	54.0
4804.0 (V)	25.8	16.0	32.5	30	28.3	18.5	54.0
7206.0 (H)	32.5	18.1	36.0	30	38.5	24.1	54.0
7206.0 (V)	24.1	19.3	36.0	30	30.1	25.3	54.0
9608.0 (H)	25.3	19.8	38.1	30	33.4	27.9	54.0
9608.0 (V)	28.8	18.8	38.1	30	36.9	26.9	54.0
12010.0 (H)	27.6	16.3	40.0	30	37.6	26.3	54.0
12010.0 (V)	28.3	19.6	40.0	30	38.3	29.6	54.0
2441.0 (H)	57.8	53.5	33.9	30	91.7	87.4	95.2
2441.0 (V)	54.4	48.0	33.9	30	88.4	81.9	95.2
4882.0 (H)	26.0	15.3	32.5	30	28.5	17.8	54.0
4882.0 (V)	26.0	18.6	32.5	30	28.5	21.1	54.0
7323.0 (H)	24.8	20.3	36.3	30	31.1	26.6	54.0
7323.0 (V)	25.5	18.7	36.3	30	31.8	25.0	54.0
9764.0 (H)	28.6	17.7	38.2	30	36.8	25.9	54.0
9764.0 (V)	25.3	18.5	38.2	30	33.5	26.7	54.0
12205.0 (H)	27.5	16.3	40.2	30	37.7	26.5	54.0
12205.0 (V)	24.8	18.1	40.2	30	35.0	28.3	54.0
2480.0 (H)	56.3	51.5	33.9	0	90.2	85.4	95.2
2480.0 (V)	53.3	49.0	33.9	0	87.2	82.9	95.2
4960.0 (H)	26.3	16.0	32.9	30	29.2	18.9	54.0
4960.0 (V)	27.1	16.0	32.9	30	30.0	18.9	54.0
7440.0 (H)	26.5	18.7	36.7	30	33.2	25.4	54.0
7440.0 (V)	26.7	17.8	36.7	30	33.4	24.5	54.0
9920.0 (H)	26.1	18.8	38.3	30	34.4	27.1	54.0
9920.0 (V)	27.7	17.3	38.3	30	36.0	25.6	54.0
12400.0 (H)	27.0	17.8	40.6	30	37.6	28.4	54.0
12400.0 (V)	26.5	18.1	40.6	30	37.1	28.7	54.0

Note: Levels measured @ 3-meter OATS site.

Power from Antenna Substitution Method for 15.249

Frequency of Emission (MHz)	Measured Peak Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
	dBμV	dBμV	dBm	dBm
2402.0	58.0	54.5	-4.0	-7.5
2441.0	57.8	54.5	-3.5	-6.8
2480.0	56.3	53.3	-5.0	-8.0

Transmitter Antenna Conducted Emissions Data

Frequency (MHz)	Emission level (dBm)
2402.0	-0.3
4804.0	-71.5
7206.0	-71.5
9608.0	-71.3
12010.0	-70.8
2441.0	-0.8
4882.0	-72.5
7323.0	-71.5
9764.0	-71.6
12205.0	-71.8
2480.0	-1.5
4960.0	-74.0
7440.0	-70.1
9920.0	-70.7
12400.0	-71.8

Summary of Results for Transmitter Radiated Emissions per 15.249

The EUT had a peak amplitude emission of 3.5 dB margin below the average limit of 15.249. The EUT had an Peak amplitude of harmonic emissions of 15.5 dB margin below the average limit of 15.209 and 15.249. The radiated emissions for the EUT meet the requirements for FCC CFR 47 Part 15.249 Intentional Radiators. There are no measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the FCC Limits.

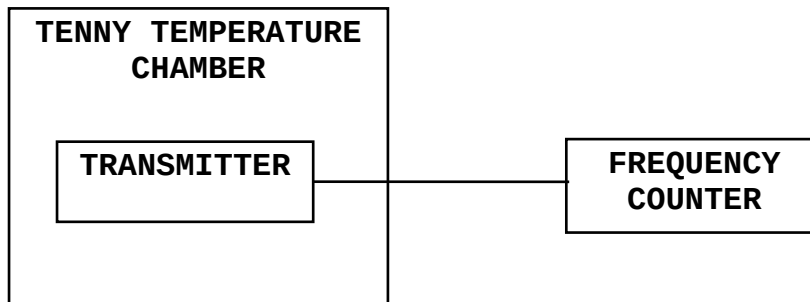
Frequency Stability**Measurements Required**

Temperature stability was measured for the operating temperature range and voltage variations of the unit and recorded.

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

- (2) For hand carried, batteries powered equipment, reduce primary supply voltage to the battery-operating end-point, which shall be specified by the manufacturer.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Test Arrangement



The measurement procedure outlined below shall be followed:

Step 1: The transmitter shall be installed in an environmental test chamber whose temperature is controllable. Provision shall be made to measure the frequency of the transmitter.

Step 2: With the transmitter inoperative (power switched "OFF"), the temperature of the test chamber shall be adjusted to +25°C. After a temperature stabilization period of one hour at +25°C, the transmitter shall be switched "ON" with standard test voltage applied.

Step 3: The carrier shall be keyed "ON", and the transmitter shall be operated unmodulated at full radio frequency power output at the duty cycle for which it is rated, for duration of at least 5 minutes. The radio frequency carrier frequency shall be monitored and measurements shall be recorded.

Step 4: The test procedures outlined in Steps 2 and 3, shall be repeated after stabilizing the transmitter at the environmental temperatures specified.

The frequency stability was measured with variations in the power supply voltage from 85 to 115 percent of the nominal value. A Sorenson DC Power Source was used to vary the dc voltage for the power input from 11.7 Vdc to 15.8 Vdc. The frequency was measured and the variation in parts per million was calculated.

Frequency Stability Data

Nominal frequency 2,441.00 MHz	FREQUENCY STABILITY VS TEMPERATURE IN PARTS PER MILLION (PPM) and percent								
	Temperature in °C								
	-30	-20	-10	0	+10	+20	+30	+40	+50
Change (Hz)	5330.0	5130.0	5660.0	5660.0	5760.0	6060.0	5900.0	6161.0	6000.0
PPM	2.1	2.1	2.3	2.3	2.4	2.4	2.4	2.5	2.5
%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

FREQUENCY IN MHz	STABILITY VS VOLTAGE VARIATION $\pm 15\%$ IN PPM		
	INPUT VOLTAGE		
	11.7 V _{dc}	13.8 V _{dc}	15.8 V _{dc}
2441.000	0	0	0

Specifications of Paragraphs 15.249 are met. There are no deviations to the specifications.

Summary of Results for Frequency Stability

The EUT fulfills the requirements for FCC Part 15C Intentional Radiators frequency stability. The EUT had a 0.00025% worst-case stability at 40 degrees centigrade.

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the FCC CFR 47 Parts 15B & 15C, Class B Emissions Standards. There were no deviations to the specifications.

APPENDIX

Model: Nūvi 6xx, GPN 011-01410-xx

1. Test Equipment List.
2. Rogers Qualifications.
3. FCC Site Approval Letter.
4. Industry Canada Approval Letter.

TEST EQUIPMENT LIST FOR ROGERS LABS, INC.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

<u>List of Test Equipment</u>	<u>Calibration Date</u>
Scope: Tektronix 2230	2/06
Wattmeter: Bird 43 with Load Bird 8085	2/06
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140	2/06
H/V Power Supply: Fluke Model: 408B (SN: 573)	2/06
R.F. Generator: HP 606A	2/06
R.F. Generator: HP 8614A	2/06
R.F. Generator: HP 8640B	2/06
Spectrum Analyzer: HP 8562A,	2/06
Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W	
HP Adapters: 11518, 11519, 11520	
Spectrum Analyzer: HP 8591 EM	5/06
Frequency Counter: Leader LDC 825	2/06
Antenna: EMCO Biconilog Model: 3143	5/06
Antenna: EMCO Log Periodic Model: 3147	10/05
Antenna: Antenna Research Biconical Model: BCD 235	10/05
Antenna: EMCO Dipole Set 3121C	2/06
Antenna: C.D. B-101	2/06
Antenna: Solar 9229-1 & 9230-1	2/06
Antenna: EMCO 6509	2/06
Audio Oscillator: H.P. 201CD	2/06
R.F. Power Amp 65W Model: 470-A-1010	2/06
R.F. Power Amp 50W M185- 10-501	2/06
R.F. PreAmp CPPA-102	2/06
LISN 50 μ Hy/50 ohm/0.1 μ f	10/05
LISN Compliance Eng. 240/20	2/06
LISN Fischer Custom Communications FCC-LISN-50-16-2-08	6/05
Peavey Power Amp Model: IPS 801	2/06
Power Amp A.R. Model: 10W 1010M7	2/06
Power Amp EIN Model: A301	2/06
ELGAR Model: 1751	2/06
ELGAR Model: TG 704A-3D	2/06
ESD Test Set 2010i	2/06
Fast Transient Burst Generator Model: EFT/B-101	2/06
Current Probe: Singer CP-105	2/06
Current Probe: Solar 9108-1N	2/06
Field Intensity Meter: EFM-018	2/06
KEYTEK Ecat Surge Generator	2/06
Shielded Room 5 M x 3 M x 3.0 M (101 dB Integrity)	
5/2/2006	

QUALIFICATIONS
Of
SCOT D. ROGERS, ENGINEER
ROGERS LABS, INC.

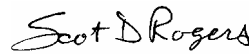
Mr. Rogers has approximately 17 years experience in the field of electronics. Six years working in the automated controls industry and 6 years working with the design, development and testing of radio communications and electronic equipment.

POSITIONS HELD:

Systems Engineer:	A/C Controls Mfg. Co., Inc. 6 Years
Electrical Engineer:	Rogers Consulting Labs, Inc. 5 Years
Electrical Engineer:	Rogers Labs, Inc. Current

EDUCATIONAL BACKGROUND:

- 1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.
- 2) Bachelor of Science Degree in Business Administration Kansas State University.
- 3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.


Scot D. Rogers

July 26, 2006
Date

1/11/03

FEDERAL COMMUNICATIONS COMMISSION

**Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046**

May 16, 2006

Registration Number: 90910

Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053

Attention: Scot Rogers

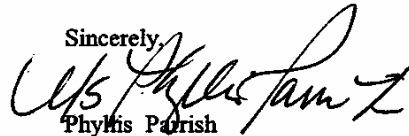
Re: Measurement facility located at Louisburg
3 & 10 meter site
Date of Renewal: May 16, 2006

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,



Phyllis Parrish
Information Technician



May 23rd, 2006

OUR FILE: 46405-3041
Submission No: 115252

Rogers Labs Inc.
4405 West 259th Terrace
Louisburg, KY
USA 66053

Dear Sir/Madame:

The Bureau has received your application for the Alternate Test Site or OATS and the filing is satisfactory to Industry Canada.

Please reference to the file number (3041-1) in the body of all test reports containing measurements performed on the site.

In the future, to obtain or renew a unique registration number, you may demonstrate that the site has been accredited to ANSI C63.4-2003 or later.

If the site is not accredited to ANSI C63.4-2003 or later, the test facility shall submit test data demonstrating conformance with the ANSI standard. The Department will evaluate the filing to determine if recognition shall be granted.

The frequency for re-validation of the test site and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization. However, in all cases, test site re-validation shall occur on an interval not to exceed two years.

If you have any questions, you may contact the Bureau by e-mail at certification.bureau@ic.gc.ca
Please reference our file number above for all correspondence.

Yours sincerely,

A handwritten signature in black ink, appearing to read "R. Corey".

Robert Corey
Manager Certification
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3701 Carling Ave., Building 94
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Canada