APPLICATION

For

GRANT OF CERTIFICATION

FOR

MODEL:

Zūmo, 011-01450-xx
Low Power Transmitter
P/N 011-01450-xx

FCC ID: IPH-01074
IC: 1792A-01074

FOR

GARMIN INTERNATIONAL, INC.

1200 East 151st Street
Olathe, KS 66062

Test Report number 060712

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: Zūmo 011-01450-xx
GPN 011-01450-xx

Low Power Transmitter
FREQUENCY: 2,400-2,483.5 MHz

FCC ID: IPH-01074
IC: 1792A-01074

Test Report Number: 060712

Test Date: July 12, 2006

Certifying Engineer: Scot D Rogers

Scot D. Rogers
ROGERS LABS, INC.
4405 West 259th Terrace
Louisburg, KS 66053
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FAX: (913) 837-3214

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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 Paragraph 15.249 operation in the 2400 – 2483.5 MHz band.

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

Model: Zūmo, GPN 011-01450-xx

FCC ID: IPH-01074

Industry Canada ID: 1792A-01074

Frequency Range: 2400-2483.5 MHz.

Operating Power: Less than 1 mW (as design specification, measured 91.5 dBµV/m @ 3 meters).

Applicable Standards & Test Procedures

a) In accordance with the Federal Communications Code of Federal Regulations, 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 15.249, 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, and FCC documents DA00-1407 and DA00-705.

Equipment Tested

Equipment	Serial Number	FCC I.D.#
011-01450-xx	45	IPH-01074
AC Power Adapter(Tamura)	1	N/A
AC Power Adapter(Delta)	5/26/06	N/A
AC Power Adapter(Phihong)	P53601985A1	N/A
GA 27C	GA27-1	N/A
GXM 30	YHZHEOWL	N/A
GTM 10/12	GTM10-1	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

EQUIPMENT	MFG.	MODEL	CAL. DATE	DUE.
LISN	Comp. Design	FCC-LISN-2-MOD.CD	10/05	10/06
LISN	FCC	FCC-LISN-50-16-2-08	6/06	6/07
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-01074

(3) Copy of the installation and operating manual: Refer to exhibit for Draft Instruction Manual.

(4) Description of Circuit Functions, Device Operation: The 011-01450-xx is a low power Transmitter.

(5) Block Diagram with Frequencies: Refer to exhibit for the Block Diagram

(6) Report of measurements showing compliance with the pertinent FCC 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 include, AC and DC power adapter, external GPS antenna, GXM 30, GTM 10/12, 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

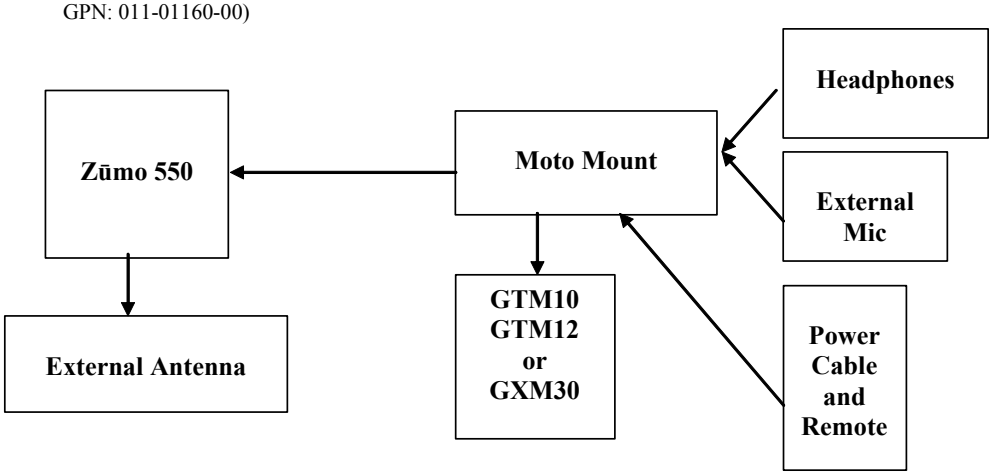
The 011-01450-xx is a GPS receiver used for location and navigation and incorporates a low power transmitter operating under the Blue Tooth design specification allowing short-range communications. The GPS receiver is used to display location and navigation. The unit was designed to be mounted in an automotive application and the transmitter section allows for short-range communications to other Blue Tooth devices. The EUT was arranged in typical user equipment configurations for testing purposes. The transmitter offers no interface connection and powered from internal battery, or external A/C or D/C power adapter. 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

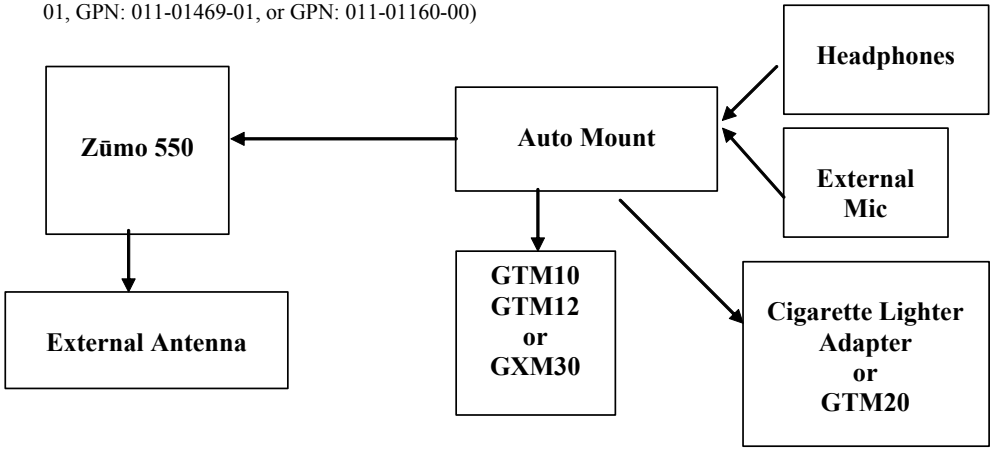
The EUT is a low power transmitter operating in the 2400-2483.5 MHz frequency band. The unit allows communications to other Blue Tooth enabled devices.

Configuration options for the EUT

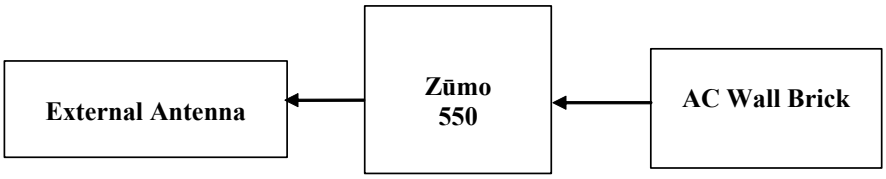
1. Zūmo 550 (GPN: 011-01450-00), connected to motorcycle mount (GPN: 011-01453-00), power cable and remote assembly (GPN: pending), GA 27C external antenna (GPN: 011-00149-05), external mic (GPN: 013-00215-00), headphones, and GTM10/12 or GXM30 (GPN: 011-01150-01, GPN: 011-01469-01, or GPN: 011-01160-00)



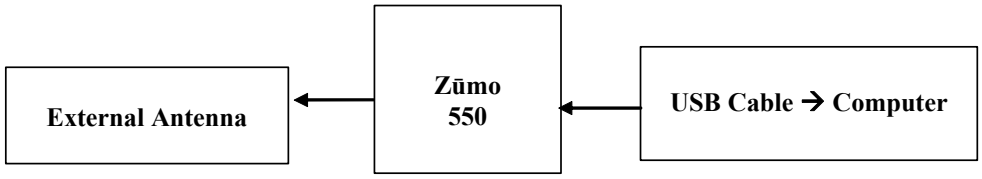
2. Zūmo 550 (GPN: 011-01450-00), connected to automobile mount (GPN: 011-01453-04), power cable assembly or GTM20 (GPN: 320-00314-00 or GPN: 011-01407-01), GA 27C external antenna (GPN: 011-00149-05), external mic (GPN: 013-00215-00), headphones, and GTM10/12 or GXM30 (GPN: 011-01150-01, GPN: 011-01469-01, or GPN: 011-01160-00)



3. Zūmo 550 Li-Ion battery charged by the AC wall brick power supply (GPN: 362-00028-03), external antenna (GPN: 011-00149-05).



4. Zūmo 550 connected to DC power supply and computer through USB cable (GPN: 325-00128-02), external antenna (GPN: 011-00149-05).



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-µHy choke. EMI was coupled to the spectrum analyzer through a 0.1 µF 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 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 dBµV; dB referenced to one microvolt.

Radiated EMI: Data is in dBµV/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, 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 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 checked 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 measured radiated field strength, receive antenna correction factor, amplifier gain stage, and test system cable losses.

Sample Calculations:

Computed Peak (dBµV/m @ 3m) = FSM (dBµV) + A.F. (dB) - Gain (dB)
= 42.0 + 8.2 - 30
= 21.3

Data 15.205

Radiated Emissions in restricted bands

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)
133.1	42.0	47.5	8.4	30	21.3	25.9	43.5
144.0	46.9	40.9	12.1	30	29.0	23.0	43.5
4804.0	15.8	16.3	32.9	30	18.7	19.2	54.0
4882.0	14.7	16.5	32.9	30	17.6	19.4	54.0
4960.0	15.0	16.8	32.9	30	17.9	19.7	54.0
7323.0	17.1	16.8	36.0	30	23.1	22.8	54.0
7440.0	17.3	17.0	36.0	30	23.3	23.0	54.0
12010.0	18.1	18.5	40.0	30	28.1	28.5	54.0
12205.0	18.1	16.5	40.0	30	28.1	26.5	54.0
12400.0	18.3	18.0	40.0	30	28.3	28.0	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 14.5 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 3 and 4). 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 #4). 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 µF 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 (Tamura 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 (Phihong 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.

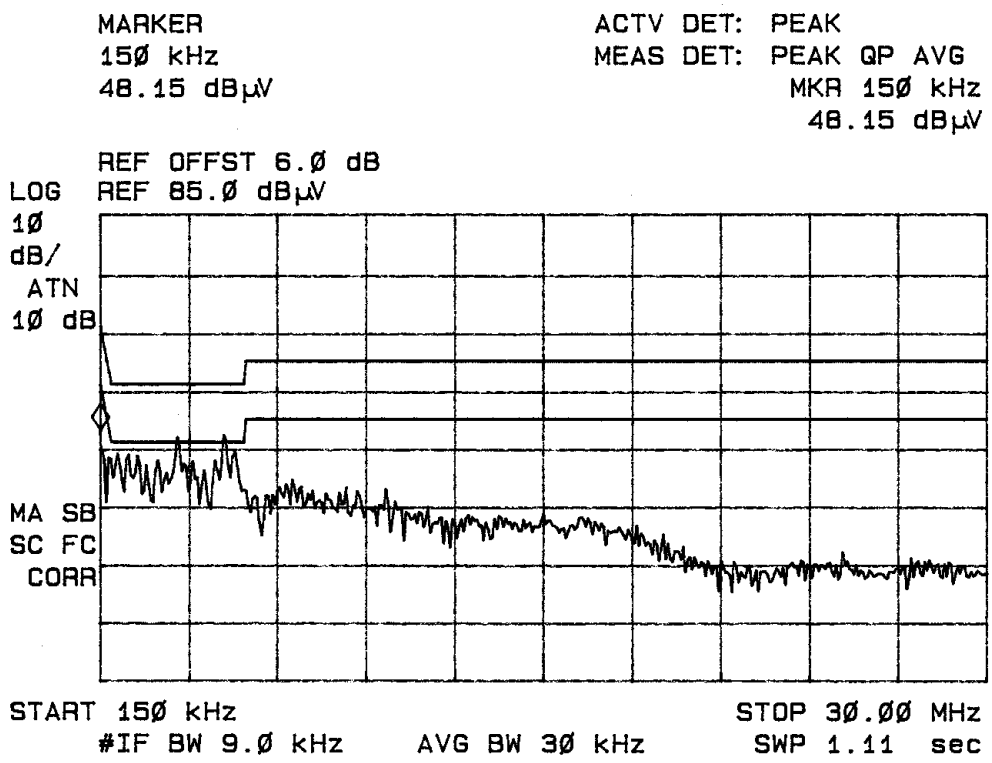


Figure one Conducted emissions of EUT line 1 (Tamura)

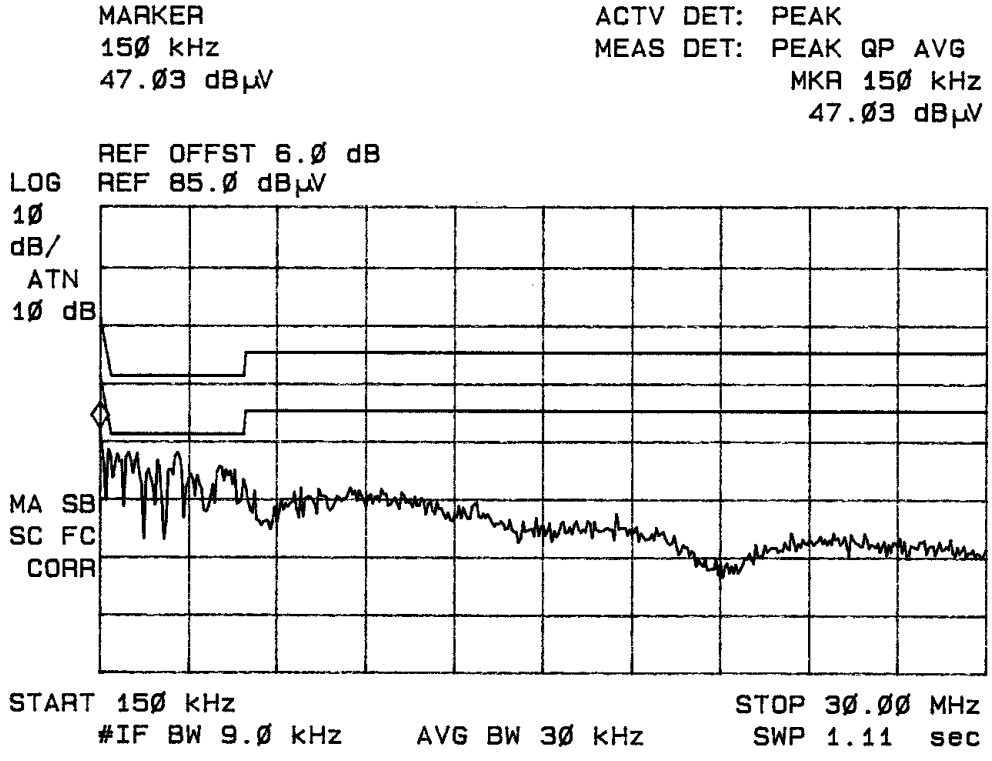


Figure two Conducted emissions of EUT line 2 (Tamura)

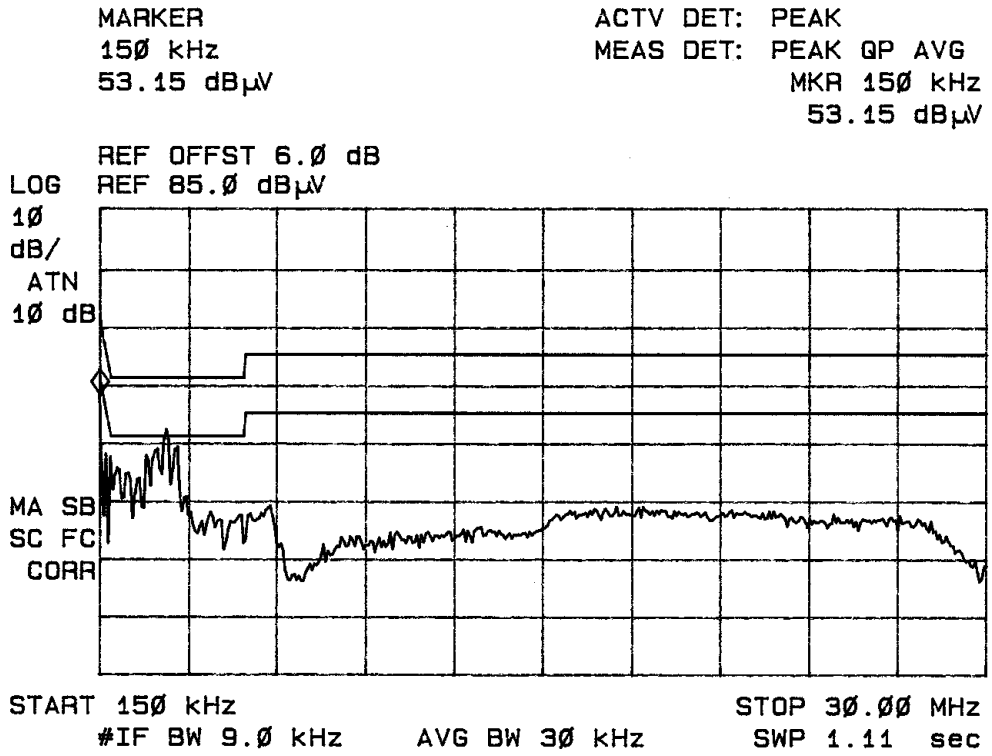


Figure three Conducted emissions of EUT line 1 (Delta)

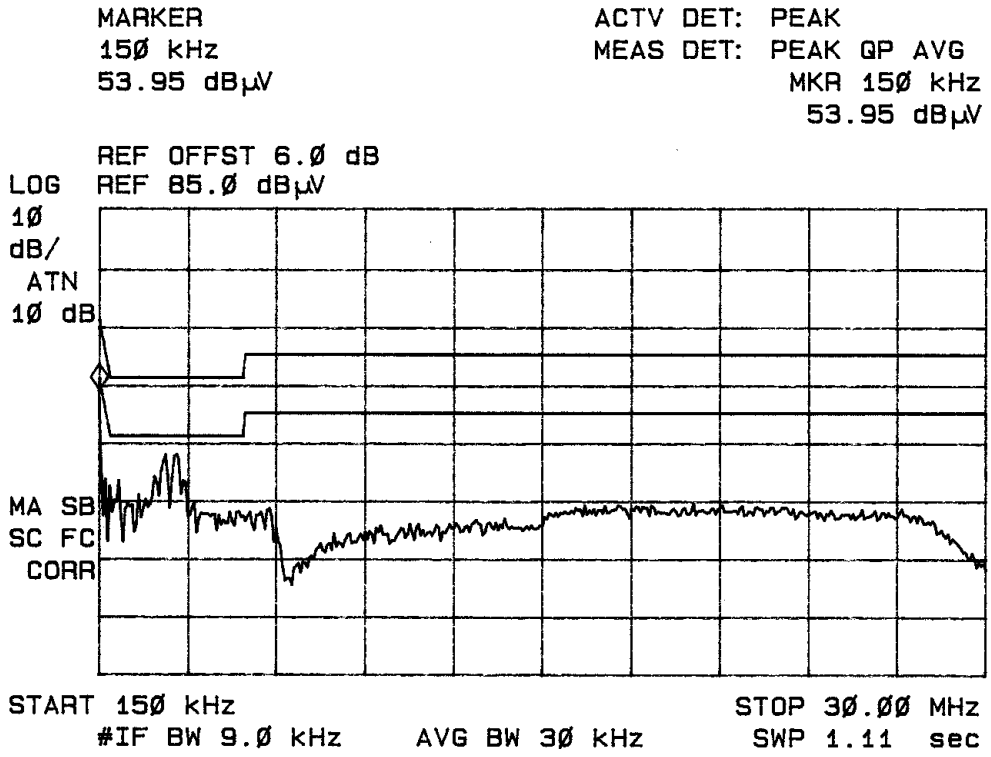


Figure four Conducted emissions of EUT line 2 (Delta)

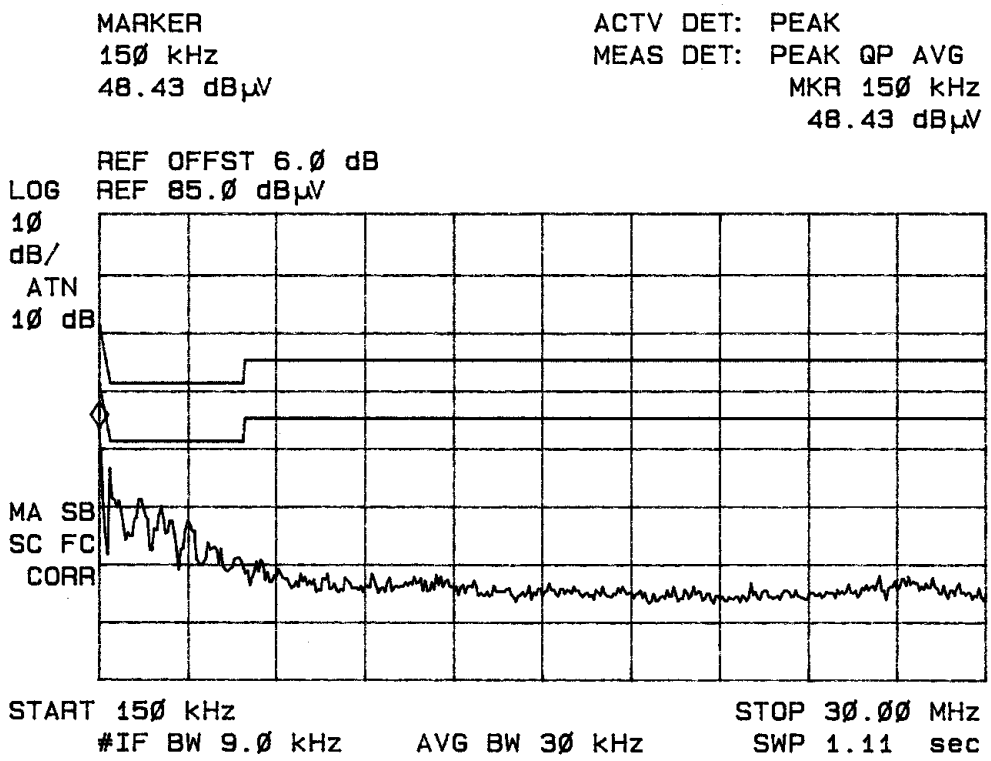


Figure five Conducted emissions of EUT line 1 (Phihong)

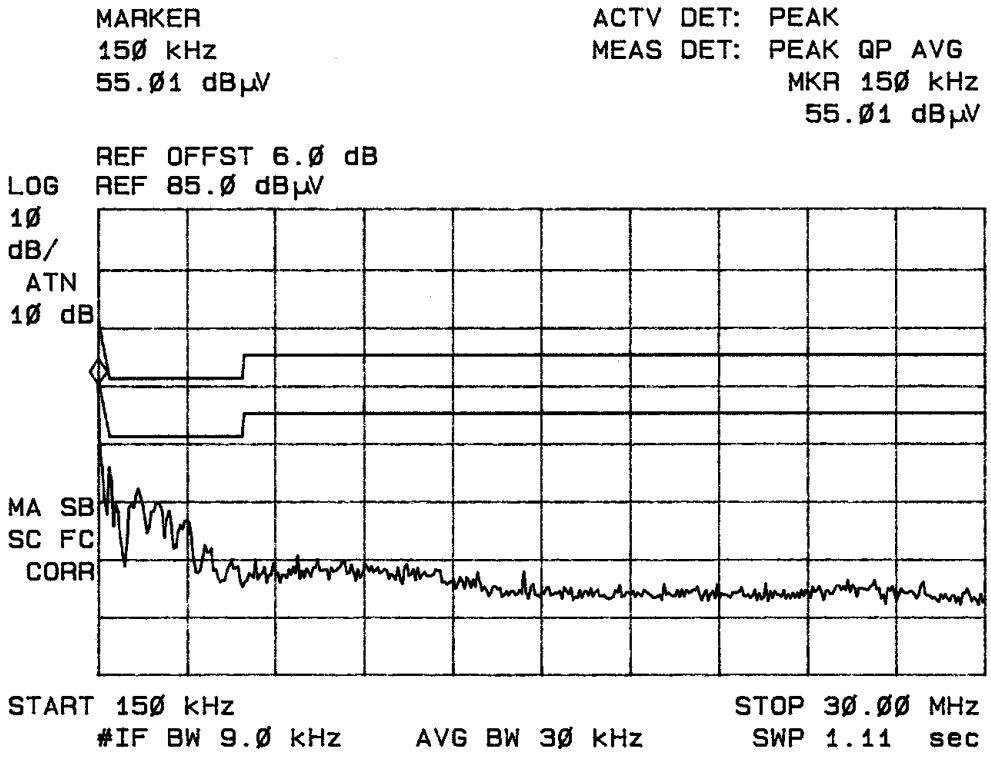


Figure Six Conducted emissions of EUT line 2 (Phihong)

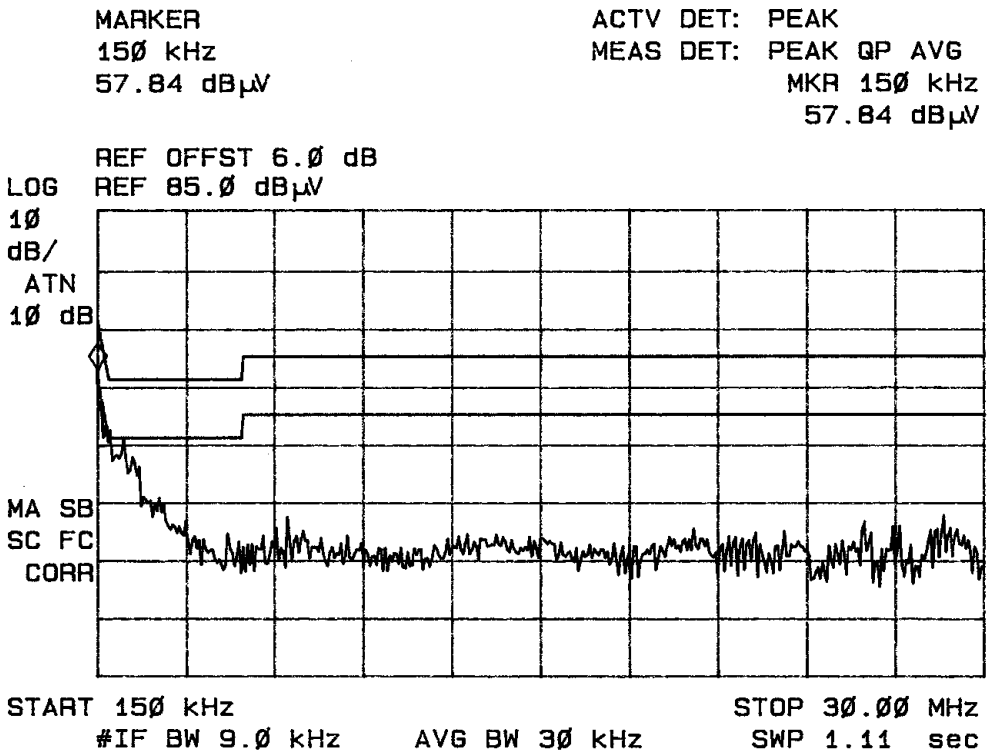


Figure seven Conducted emissions of EUT line 1 (CPU)

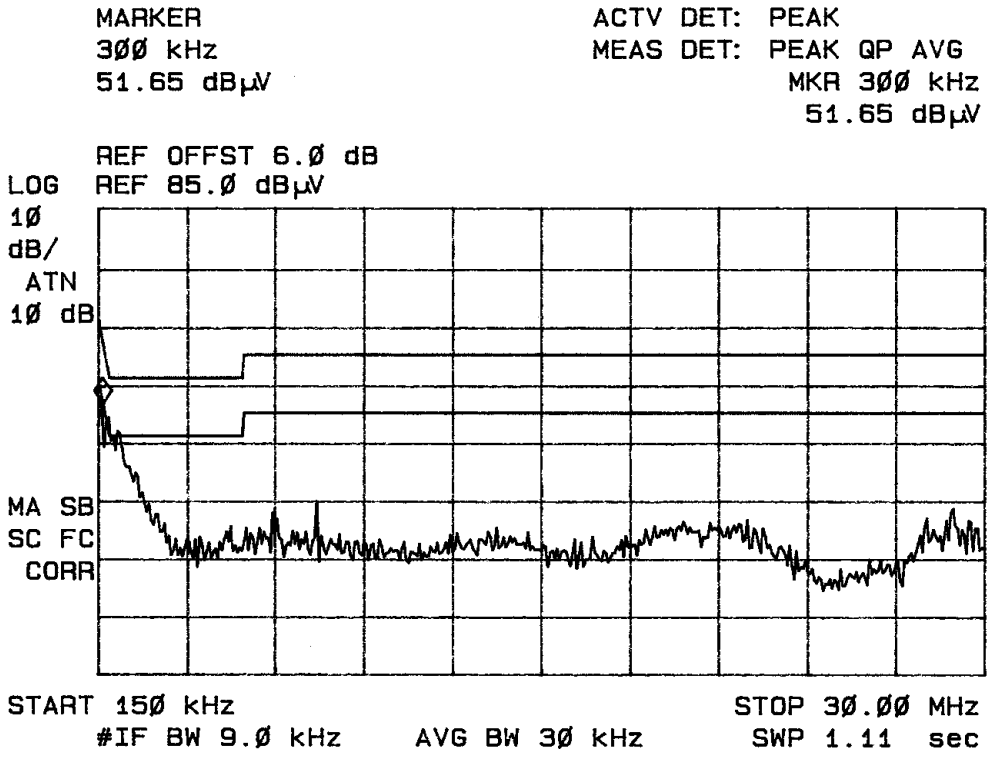


Figure eight Conducted emissions of EUT line 2 (CPU)

Data Conducted Emissions (7 Highest Emissions) (Tamura)

Frequency band (MHz)	L1 Level (dBµV) Peak	Q.P.	AVE	L2 Level (dBµV) Peak	Q.P.	AVE	CISPR 22 Limit Q.P. Ave(dBµV)
0.15 – 0.5	48.1	44.7	37.8	47.0	42.8	34.1	66-56 / 56-46
0.5 – 5	47.9	45.8	37.9	45.3	39.2	28.6	56 / 46
5 – 10	40.8	36.1	24.5	36.1	31.5	20.2	60 / 50
10 – 15	36.6	30.9	19.2	36.1	30.1	19.9	60 / 50
15 – 20	32.6	27.5	19.5	30.5	24.6	14.9	60 / 50
20 – 25	26.6	20.4	11.2	28.0	23.4	15.6	60 / 50
25 – 30	23.9	19.4	11.8	28.3	23.2	15.6	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) Peak	Q.P.	AVE	L2 Level (dBµV) Peak	Q.P.	AVE	CISPR 22 Limit Q.P. Ave(dBµV)
0.15 – 0.5	53.2	48.9	29.6	53.9	47.4	30.2	66-56 / 56-46
0.5 – 5	45.7	43.9	31.2	43.1	42.0	30.7	56 / 46
5 – 10	34.0	32.5	27.3	33.6	31.7	27.2	60 / 50
10 – 15	29.5	27.4	23.4	31.3	29.5	26.4	60 / 50
15 – 20	33.4	31.3	28.3	33.7	32.0	29.7	60 / 50
20 – 25	33.0	31.0	28.6	33.7	31.9	29.0	60 / 50
25 – 30	31.7	29.8	27.6	32.7	30.4	28.0	60 / 50

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

Data Conducted Emissions (7 Highest Emissions) (Phihong)

Frequency band (MHz)	L1 Level (dBµV) Peak	Q.P.	AVE	L2 Level (dBµV) Peak	Q.P.	AVE	CISPR 22 Limit Q.P. Ave(dBµV)
0.15 – 0.5	48.4	44.6	30.5	55.0	46.1	34.2	66-56 / 56-46
0.5 – 5	44.0	42.5	34.6	43.0	41.4	33.3	56 / 46
5 – 10	25.7	20.6	13.4	24.7	19.9	13.2	60 / 50
10 – 15	23.1	17.4	10.9	24.1	18.1	11.5	60 / 50
15 – 20	21.0	15.0	8.9	19.2	14.7	8.5	60 / 50
20 – 25	19.4	14.9	8.6	22.1	16.1	9.7	60 / 50
25 – 30	22.9	16.8	10.6	20.2	15.6	9.2	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) Peak	Q.P.	AVE	L2 Level (dBµV) Peak	Q.P.	AVE	CISPR 22 Limit Q.P. Ave(dBµV)
0.15 – 0.5	57.8	48.0	26.0	51.6	48.9	29.2	66-56 / 56-46
0.5 – 5	43.7	39.0	20.3	48.6	40.6	21.2	56 / 46
5 – 10	30.2	21.1	10.5	28.4	20.0	10.4	60 / 50
10 – 15	26.8	21.1	12.4	27.7	20.9	12.4	60 / 50
15 – 20	24.0	19.5	10.0	27.0	19.1	9.6	60 / 50
20 – 25	27.8	19.7	10.7	29.7	20.7	11.1	60 / 50
25 – 30	27.5	21.3	13.0	29.5	25.4	22.0	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 a 10.2 dB minimum margin below the FCC/CISPR quasi peak limit, and an 11.4 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 15.209

The EUT was arranged in a typical equipment configuration 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 twelve 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:

RFS = Radiated Field Strength
dBµV/m @ 3m = dBµV + A.F. - Amplifier Gain
dBµV/m @ 3m = 45.0 + 7.8 - 30
= 22.8

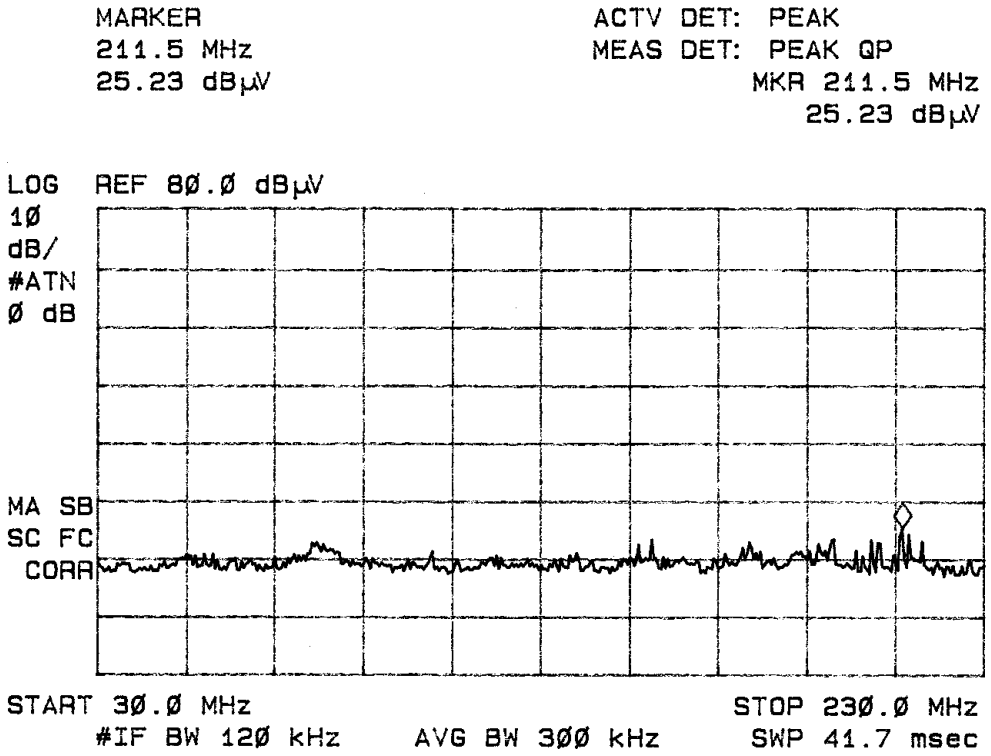


Figure nine Radiated Emissions taken at 1 meter in screen room.

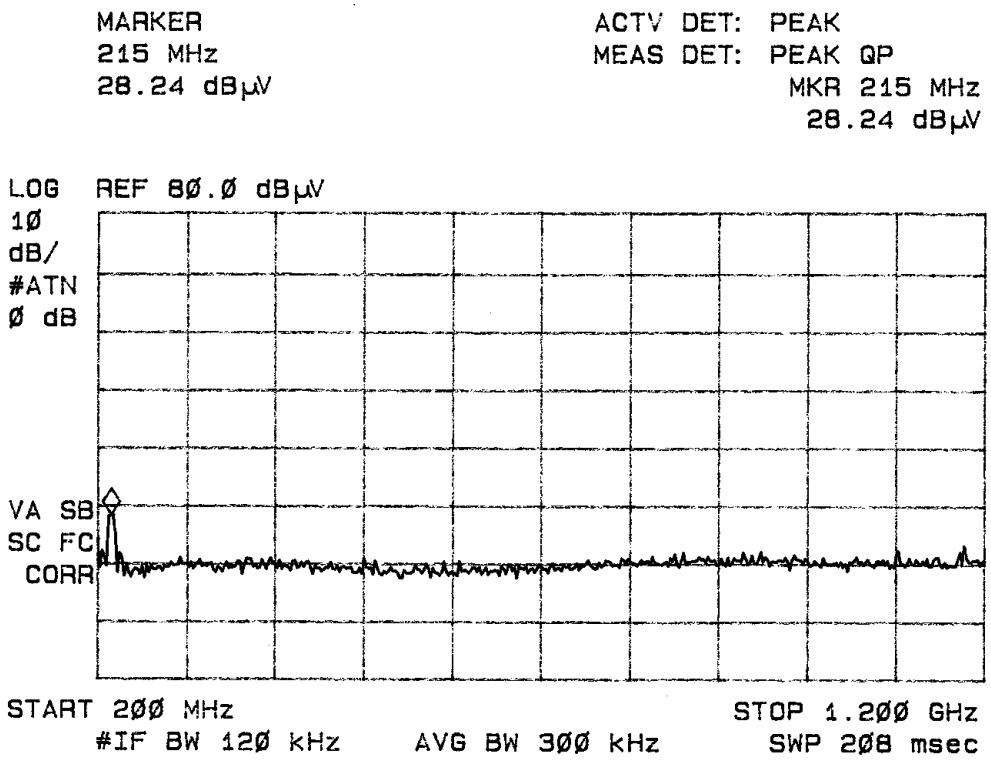


Figure ten Radiated Emissions taken at 1 meter in screen room.

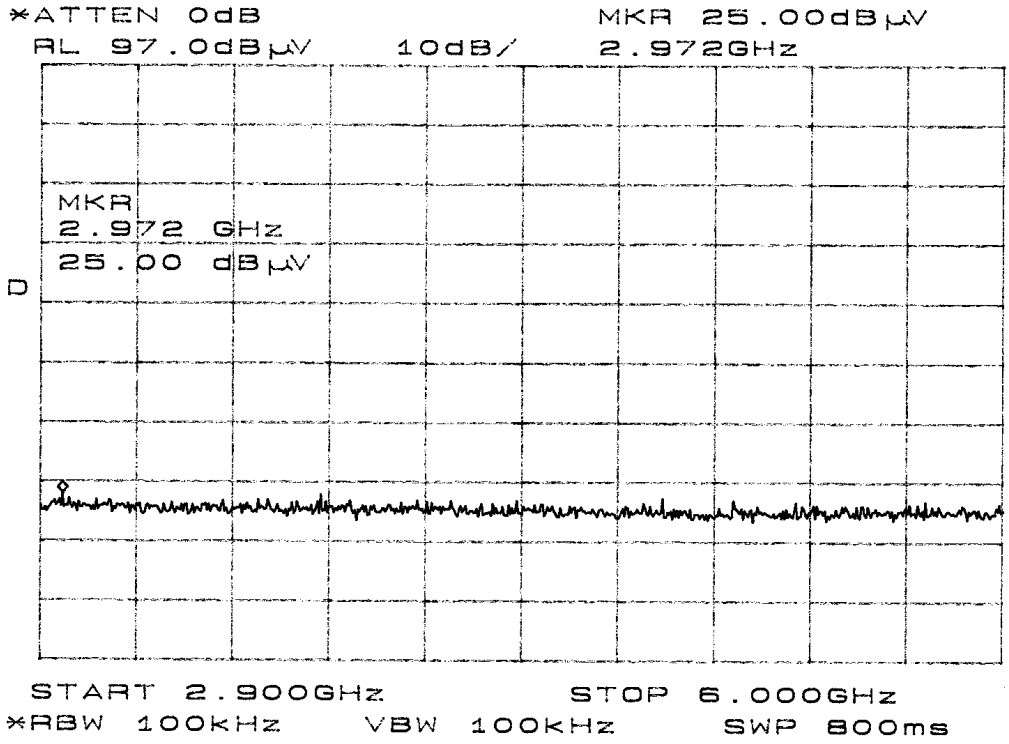


Figure eleven Radiated Emissions taken at 1 meter in screen room.

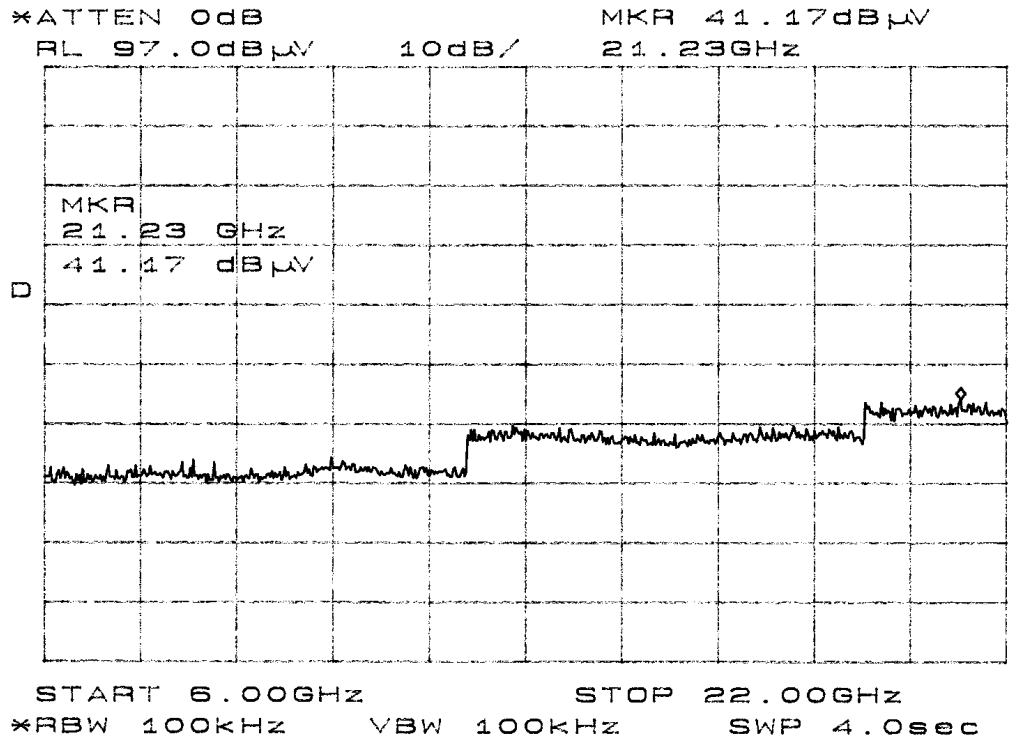


Figure twelve Radiated Emissions taken at 1 meter in screen room.

General Radiated Emissions Data 15.209

Radiated Emissions 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)
85.9	45.0	43.8	7.8	30	22.8	21.6	40.0
96.0	47.0	48.6	7.4	30	24.4	26.0	43.5
133.1	42.9	47.5	8.4	30	21.3	25.9	43.5
144.0	46.9	40.9	12.1	30	29.0	23.0	43.5
237.9	47.8	43.0	11.7	30	29.5	24.7	46.0
250.0	32.5	44.0	12.4	30	14.9	26.4	46.0

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

Summary of Results for General Radiated Emissions 15.209

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had a 14.5 dB minimum margin below the limits. 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.

(a) 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 average amplitude of the carrier frequency was measured using a spectrum analyzer. The peak and average emission amplitude of the emission was then recorded from the analyzer display.

(b) 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 thirteen through twenty showing the frequency and amplitude of emission displayed on the spectrum analyzer of the 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 dBµV/m @ 3 meters.

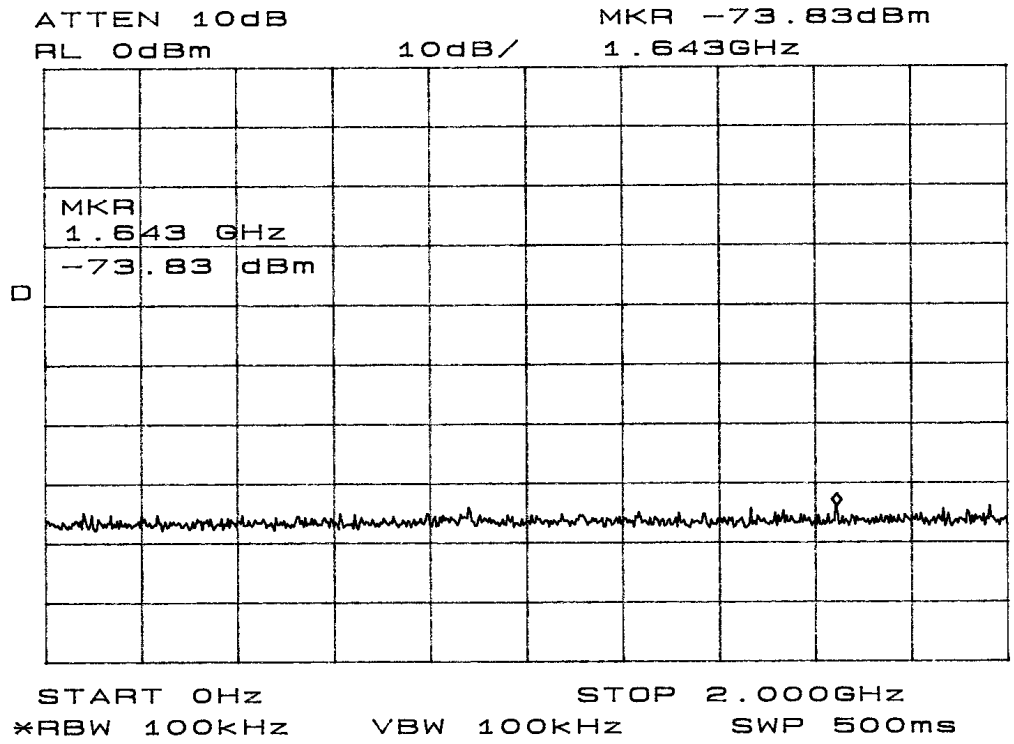


Figure thirteen Power output measured at temporary antenna terminal

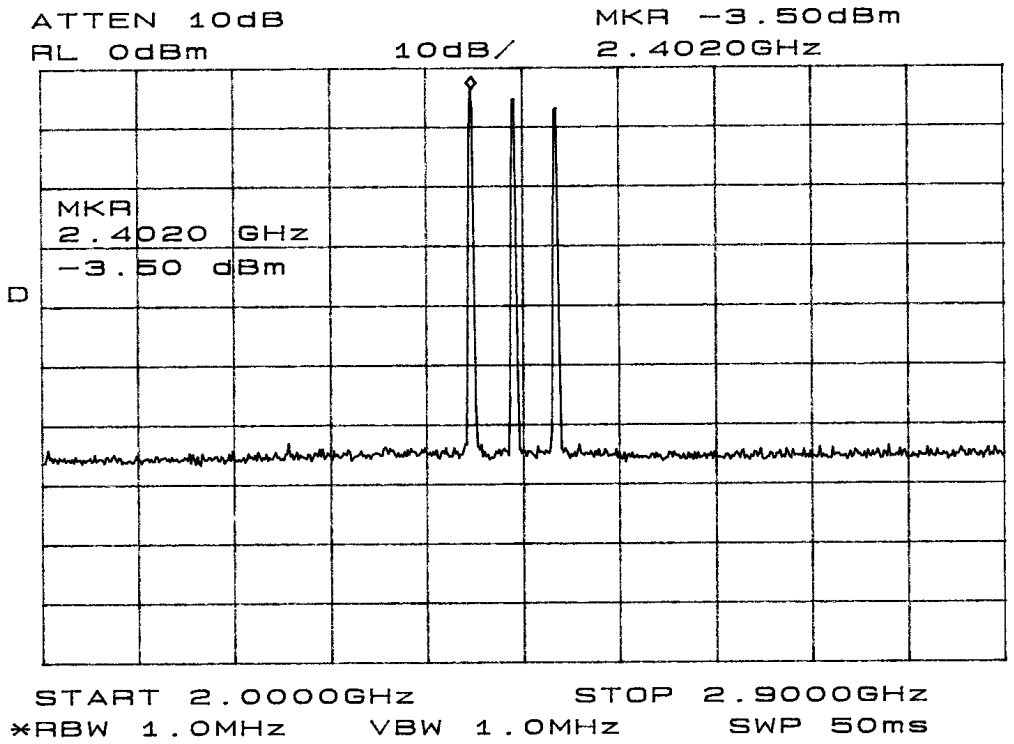


Figure fourteen Power output measured at temporary antenna terminal

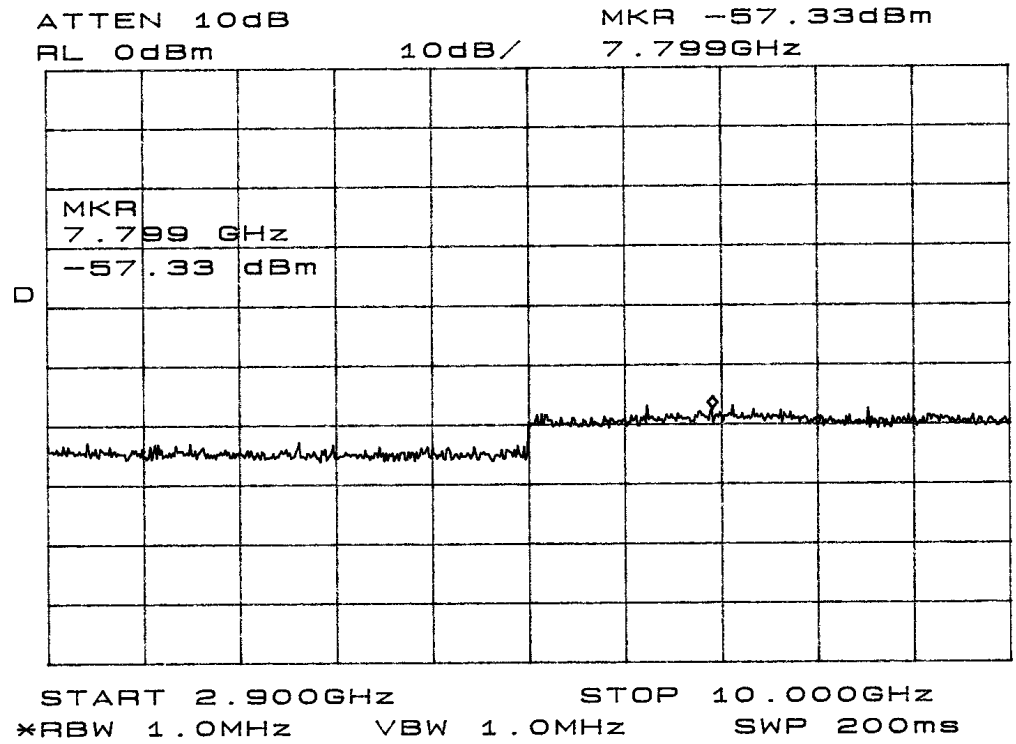


Figure fifteen Power output measured at temporary antenna terminal

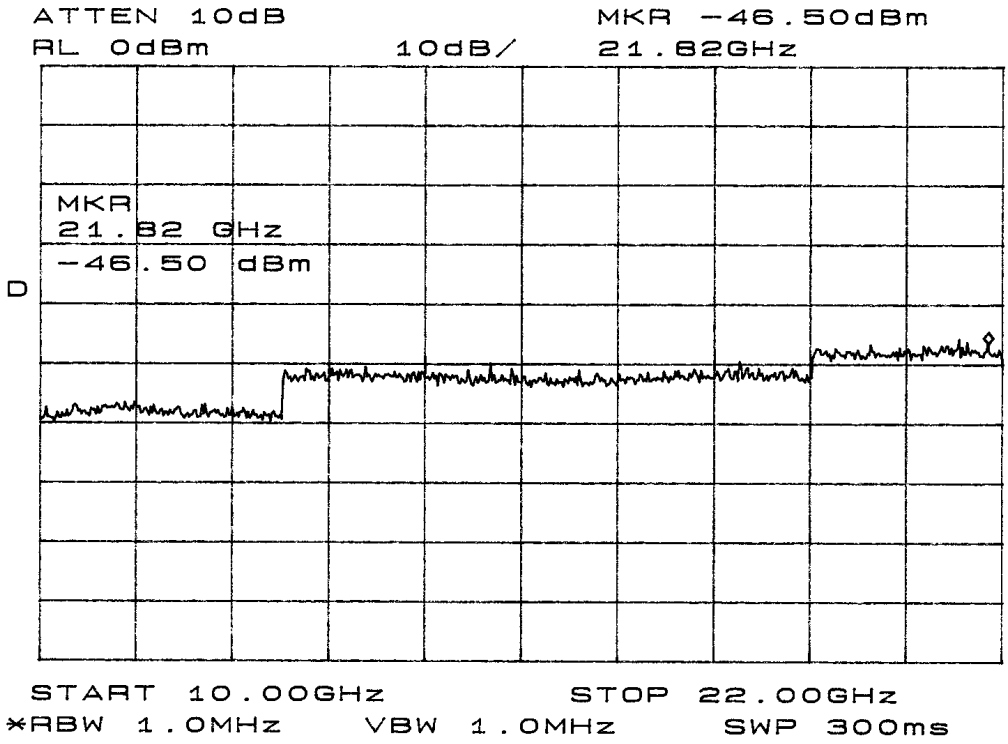


Figure sixteen Power output measured at temporary antenna terminal

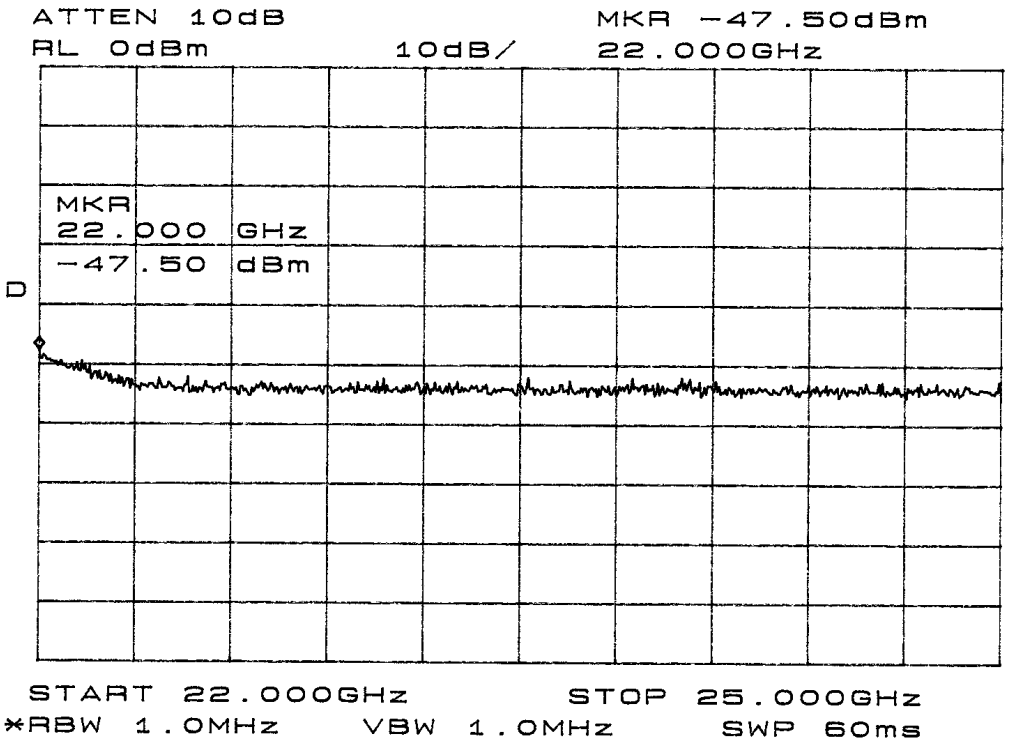


Figure seventeen Power output measured at temporary antenna terminal

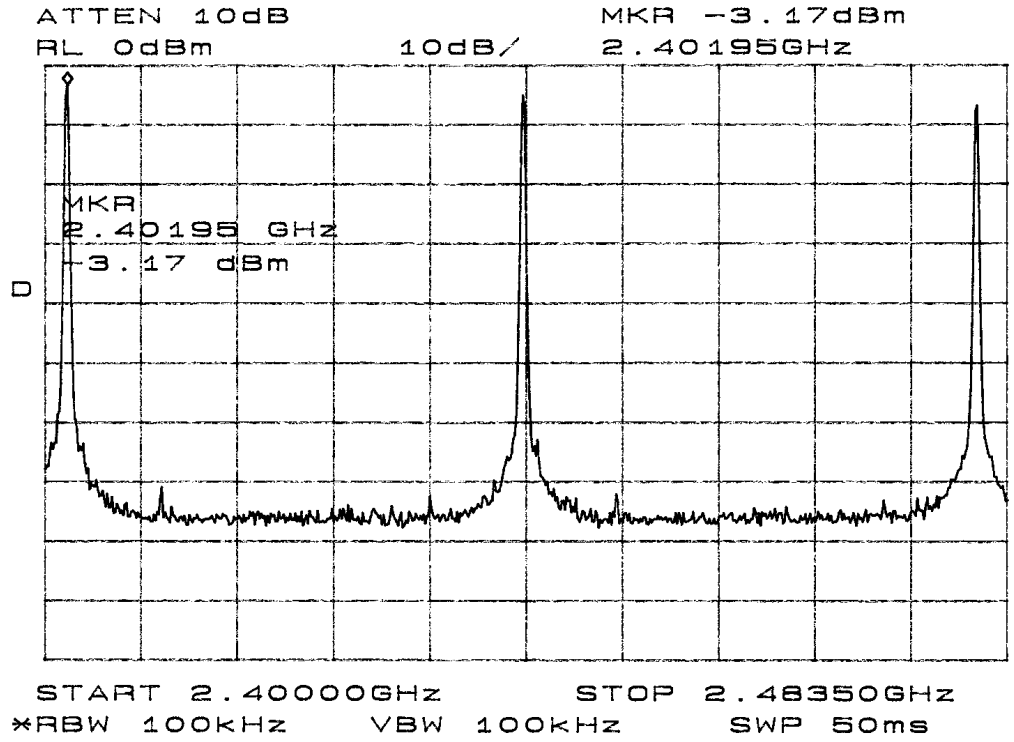


Figure eighteen Power output measured at temporary antenna terminal

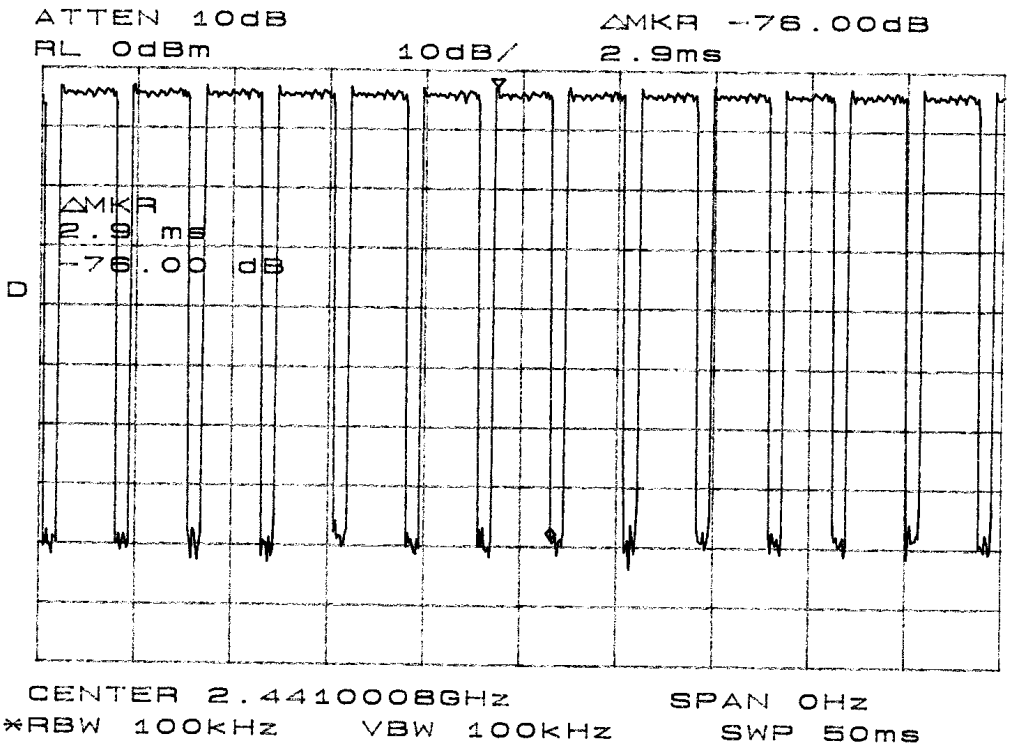


Figure nineteen Dwell Time of Occupancy

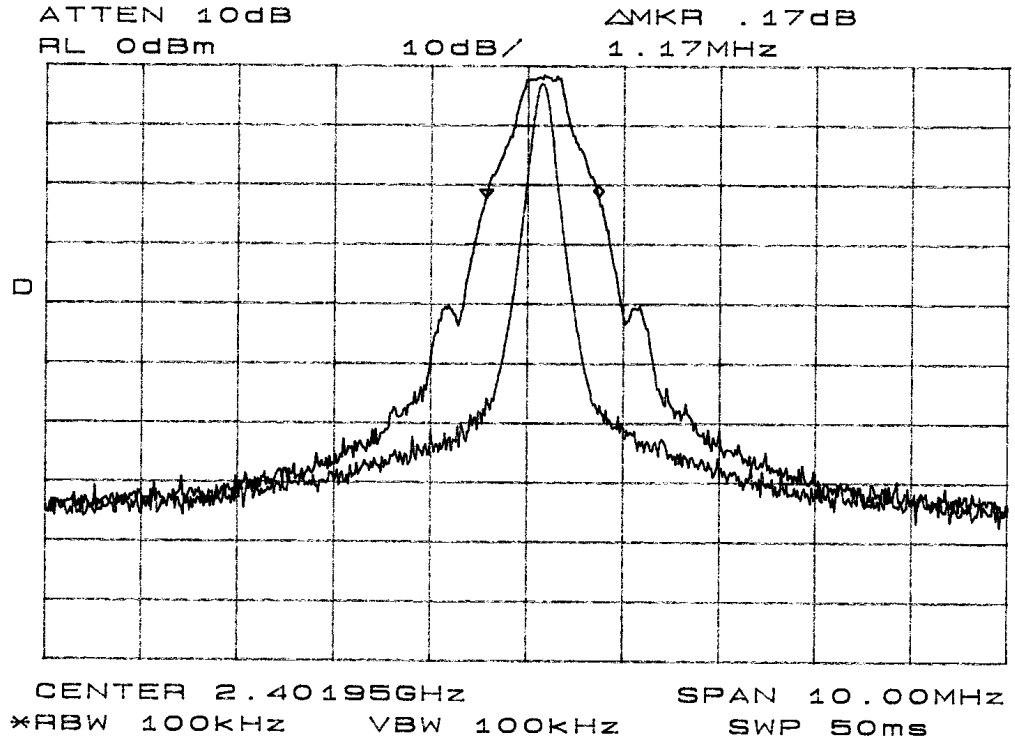


Figure twenty occupied bandwidth

Sample calculation.

dBµv/m@ 3m = FSM + A.F. + cable loss - amplifier Gain
= 58.2 + 33.2 – 0
= 91.4

Transmitter Radiated Emissions

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)	58.2	49.3	33.2	0	91.4	82.5	95.2
2402.0 (V)	54.1	46.9	33.2	0	87.3	80.1	95.2
4804.0 (H)	35.2	15.8	32.9	30	38.1	18.7	54.0
4804.0 (V)	36.1	16.3	32.9	30	39.0	19.2	54.0
7206.0 (H)	34.3	18.0	36.0	30	40.3	24.0	54.0
7206.0 (V)	35.4	17.6	36.0	30	41.4	23.6	54.0
9608.0 (H)	33.4	17.6	38.1	30	41.5	25.7	54.0
9608.0 (V)	34.5	16.5	38.1	30	42.6	24.6	54.0
12010.0 (H)	34.7	18.1	40.0	30	44.7	28.1	54.0
12010.0 (V)	35.2	18.5	40.0	30	45.2	28.5	54.0
2441.0 (H)	57.6	46.0	33.9	0	91.5	79.9	95.2
2441.0 (V)	53.4	46.5	33.9	0	87.3	80.4	95.2
4882.0 (H)	33.8	14.7	32.9	30	36.7	17.6	54.0
4882.0 (V)	35.3	16.5	32.9	30	38.2	19.4	54.0
7323.0 (H)	34.9	17.1	36.0	30	40.9	23.1	54.0
7323.0 (V)	35.5	16.8	36.0	30	41.5	22.8	54.0
9764.0 (H)	34.8	17.8	38.1	30	42.9	25.9	54.0
9764.0 (V)	35.1	16.8	38.1	30	43.2	24.9	54.0
12205.0 (H)	34.3	18.1	40.0	30	44.3	28.1	54.0
12205.0 (V)	35.2	16.5	40.0	30	45.2	26.5	54.0
2480.0 (H)	57.6	45.5	33.9	0	91.5	79.4	95.2
2480.0 (V)	53.2	44.7	33.9	0	87.1	78.6	95.2
4960.0 (H)	33.4	15.0	32.9	30	36.3	17.9	54.0
4960.0 (V)	34.8	16.8	32.9	30	37.7	19.7	54.0
7440.0 (H)	34.5	17.3	36.0	30	40.5	23.3	54.0
7440.0 (V)	35.0	17.0	36.0	30	41.0	23.0	54.0
9920.0 (H)	33.3	18.0	38.1	30	41.4	26.1	54.0
9920.0 (V)	33.8	17.5	38.1	30	41.9	25.6	54.0
12400.0 (H)	34.2	18.3	40.0	30	44.2	28.3	54.0
12400.0 (V)	34.5	18.0	40.0	30	44.5	28.0	54.0

Note: Levels measured @ 3-meter OATS site.

Power from Antenna Substitution Method for 15.249

Frequency of Emission	Measured Peak Amplitude of EUT emission		Signal level to substitution antenna required to reproduce	
	Horizontal	Vertical	Horizontal	Vertical
(MHz)	dBµV	dBµV	dBm	dBm
2402.0	58.2	54.1	-3.3	-6.3
2441.0	57.6	53.4	-3.5	-7.4
2480.0	57.6	53.2	-3.8	-7.6

Transmitter Antenna Conducted Emissions

Frequency (MHz)	Emission level (dBm)
2402.0	-3.5
4804.0	-64.0
7206.0	-76.1
9608.0	-82.3
12010.0	-79.8
2441.0	-4.0
4882.0	-76.0
7323.0	-81.0
9764.0	-80.7
12205.0	-82.0
2480.0	-5.3
4960.0	-68.3
7440.0	-82.6
9920.0	-83.0
12400.0	-77.6

TRANSMITTER EMISSIONS SUMMARY OF RESULTS

Summary of Results for Transmitter Radiated Emissions 15.249

The EUT had a peak amplitude emission of 3.7 dB margin below the average limit of 15.249. The EUT had an average amplitude of harmonic emissions of 8.8 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.

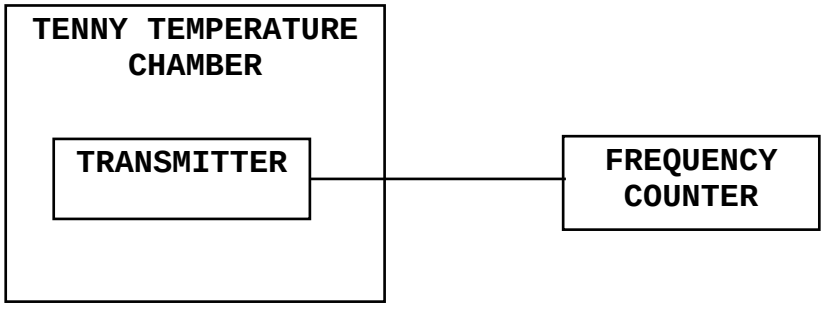
Frequency Stability

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.

Results

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)	1900.0	2000.0	1500.0	1400.0	1000.0	1000.0	1400.0	1400.0	1700.0
PPM	0.778	0.819	0.615	0.574	0.410	0.410	0.574	0.574	0.696
%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FREQUENCY IN MHz	STABILITY VS VOLTAGE VARIATION ±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 0.8-PPM worst-case stability at -20 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: 011-01450-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.

List of Test Equipment	Calibration Date
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, Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W HP Adapters: 11518, 11519, 11520	2/06
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 µHy/50 ohm/0.1 µf	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

Scot D. Rogers

July 12, 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

Industry Canada Industrie Canada

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,

Robert Corey
Manager Certification
Certification and Engineering Bureau
3701 Carling Ave., Building 94
Ottawa, Ontario K2H 8S2

Canada