



VI. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements

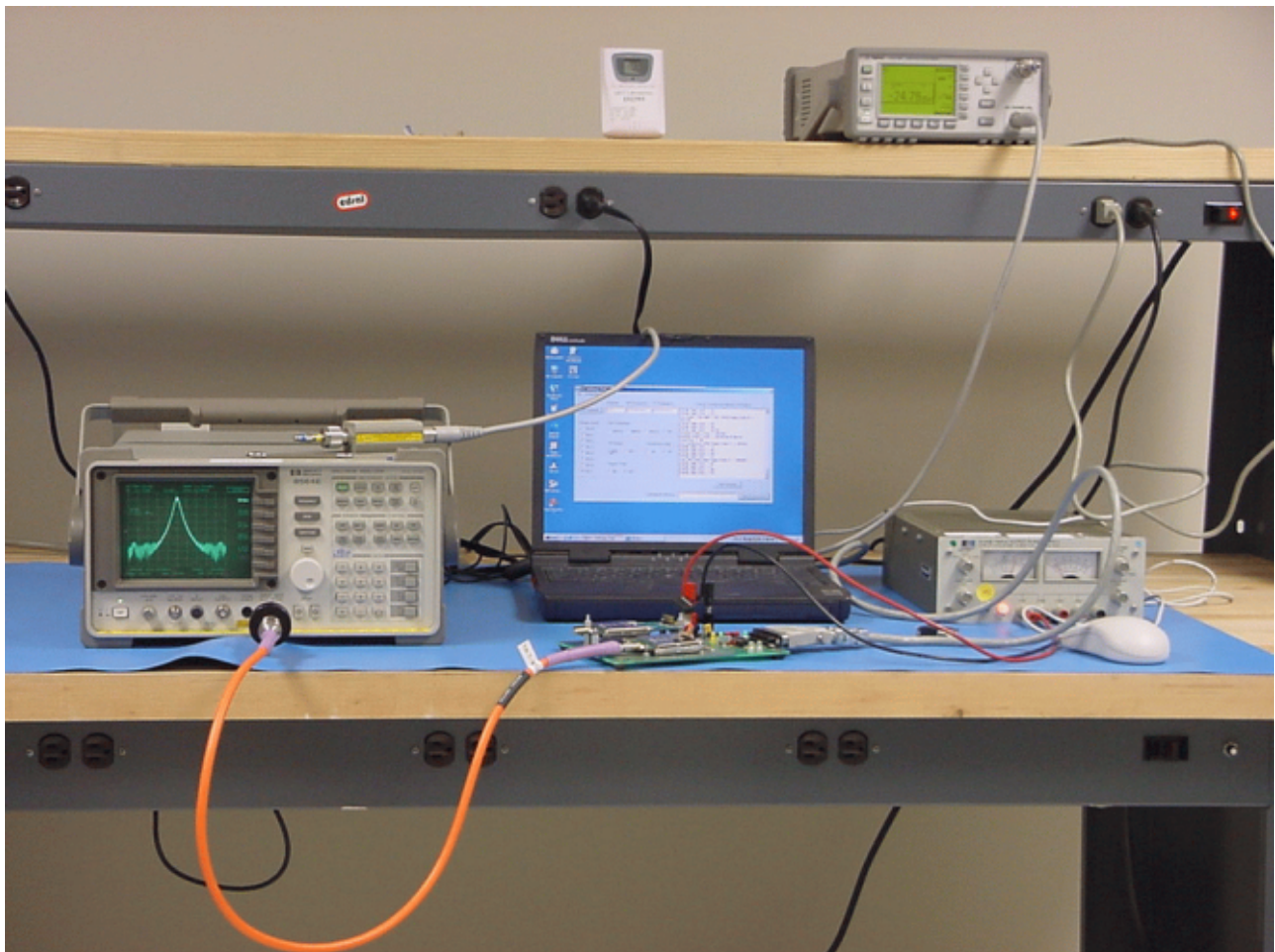
VI. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements

A. Spurious Emissions at Antenna Terminals

Technical Specifications: §2.1051 and §22.917(e)

Test equipment: Test equipment for Spurious Emissions at Antenna Terminals is listed in Section IX of this report.

Photograph:



Photograph 4. Spurious Emissions at Antenna Terminals Test Setup Photo



VI. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements

Measurement

Procedures: As required by 47 CFR 2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a 10 dB attenuator and a Spectrum Analyzer.

Set a 10.5 dB Reference Level Offset and RBW = VBW = 30 kHz to Spectrum Analyzer. The EUT was set to transmit in the middle of the operating frequency range. The EUT was limited to have a burst of 5 second when transmitting at full power. To capture the modulated full power spurious emissions, activated the EUT at the lowest power then set the maximum power level button from HOST, repeated this step until the sweep is complete from 1 MHz to the 10th harmonic of the fundamental. The Display Line was set to -13 dBm as the limit line. Plotted the Spurious Emissions graph. Repeated measurements for both 10 kHz NRZ FSK and 6 kHz FM modulation.

Measured Output Power of EUT: 1.26 Watts

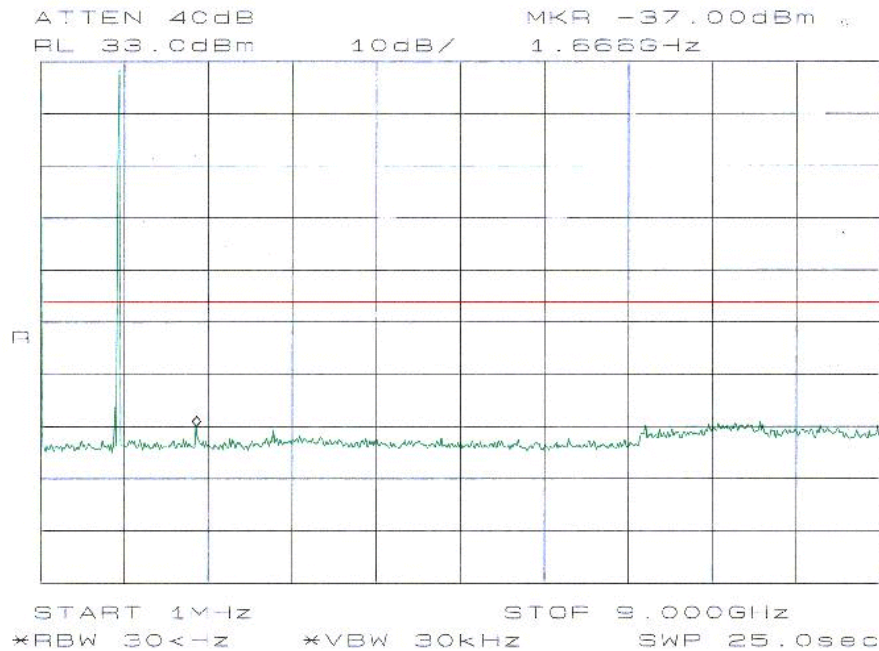
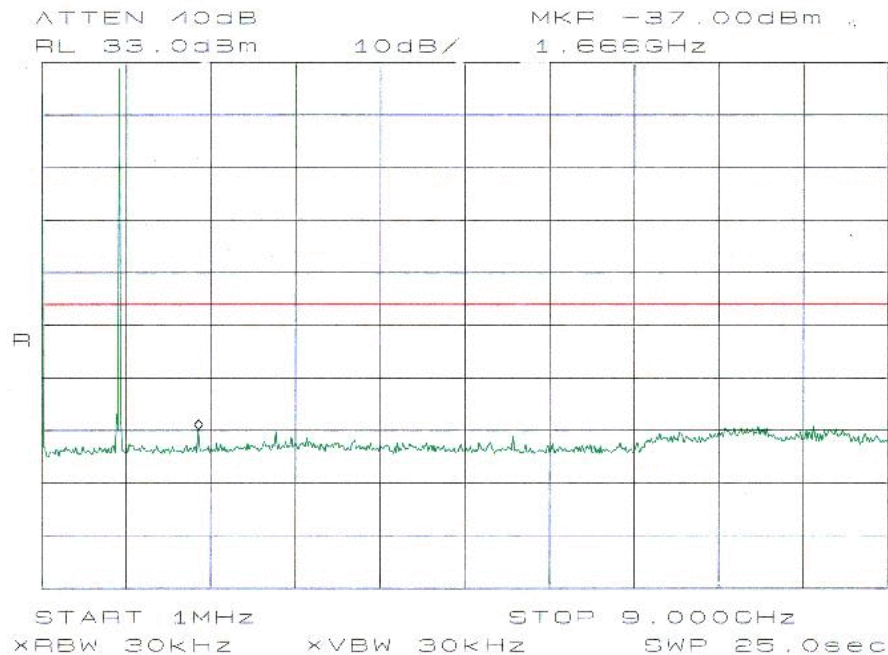
Spur limit = $P_o - (43 + 10\log P_o)$; $P_o = 1.26$ watts or 31 dBm

$$31\text{dBm} - (43 + 10\log 1.26) = 31\text{ dBm} - (44\text{ dB}) = -13\text{ dBm}$$

Results: Equipment complies with Section 2.1051 and 22.917(e). The following pages show measurements of Spurious Emission plots which is recorded below:

10 kHz NRZ FSK Modulation	
Plot #	Comment
7	Middle Channel (834.99 MHz) Spurious Emissions
6 kHz FM Modulation	
Plot #	Comment
8	Middle Channel (834.99 MHz) Spurious Emissions

The following plots are included to illustrate compliance with the required rule parts.

**VI. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements****Plot #7: Middle Channel (834.99 MHz) Out of Band Emissions with -13dBm Display Line****Plot #8: Middle Channel (834.99 MHz) Out of Band Emissions with -13 dBm Display Line**

Test Engineer: Kerwinn Corpuz

Test Date: 01/30/03

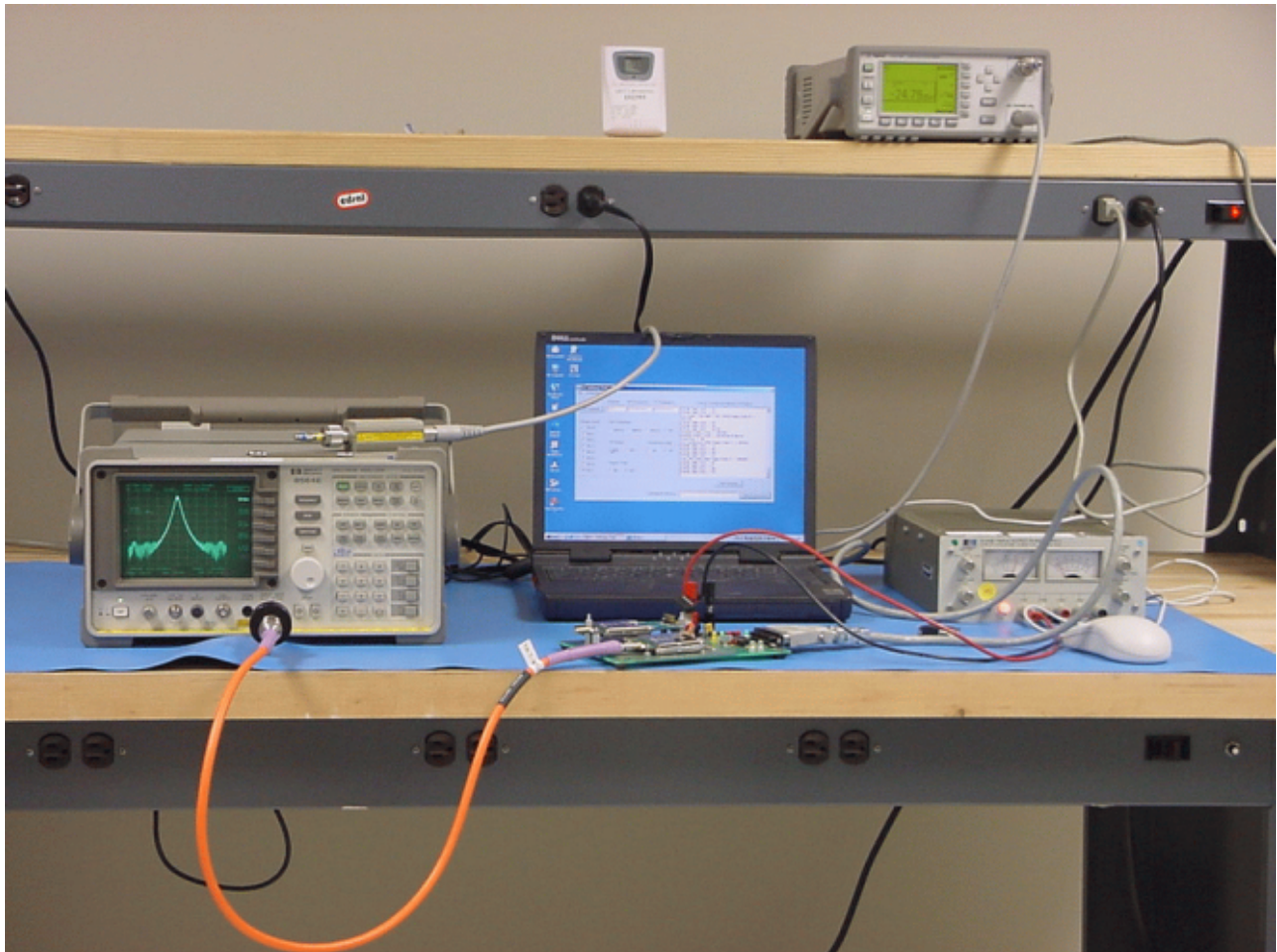
VI. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements

B. Mobile Emissions in Base Frequency Range

Technical Specifications: §22.917(f)

Test equipment: Test equipment for Mobile Emissions in Base Frequency Range at Antenna Terminals is listed in Section IX of this report.

Photograph:



Photograph 5. Mobile Emissions in Base Frequency Range at Antenna Terminals Test Setup Photo



VI. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements

Measurement

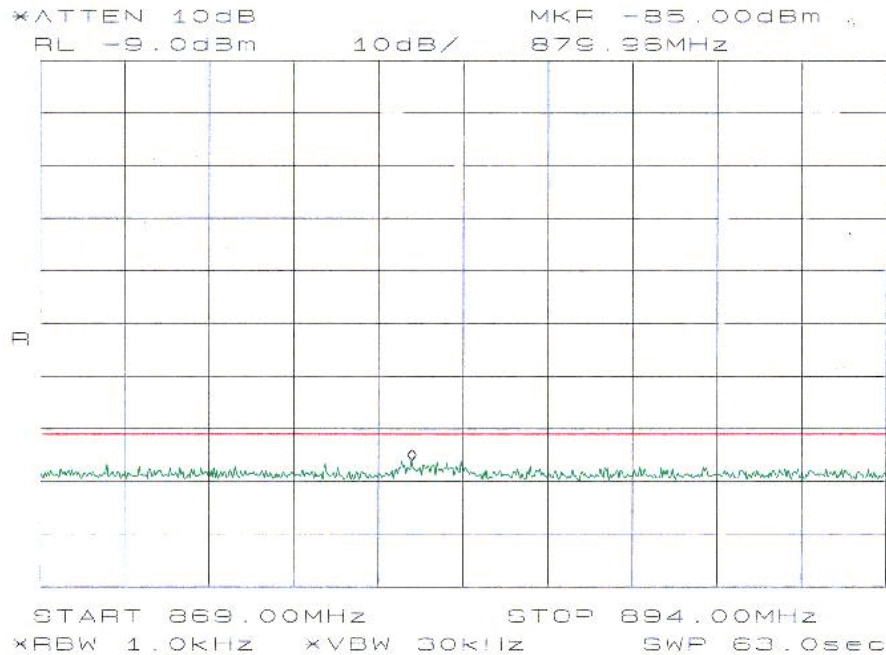
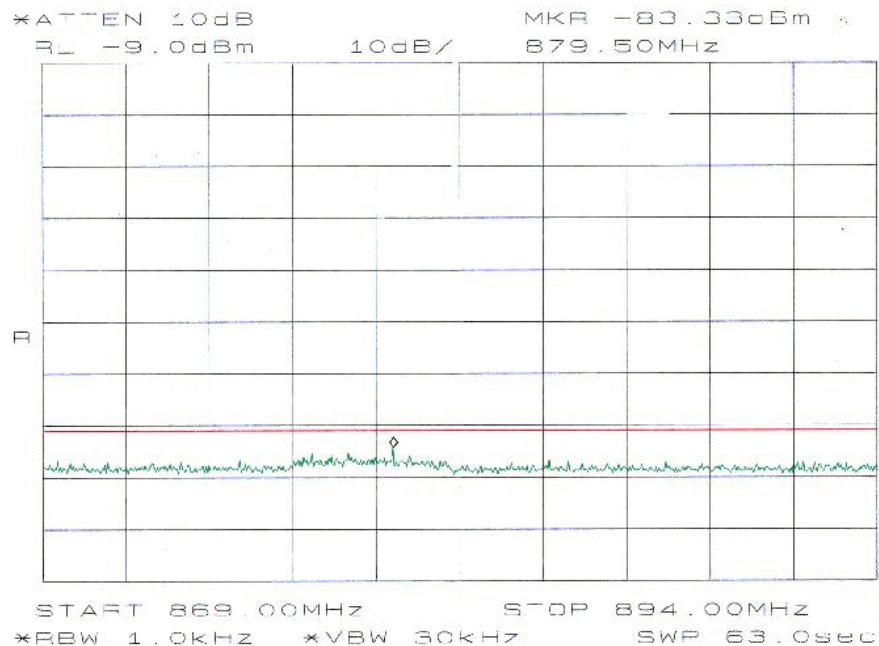
Procedures: As required by 47 CFR 22.917 (f), *mobile emissions in base frequency range at antenna terminal measurements* were made at the RF output terminals using a 10 dB attenuator and a Spectrum Analyzer.

Set a 10.5 dB Reference Level Offset and RBW = 1 kHz, VBW = 30 kHz to Spectrum Analyzer. RBW was set to 1 kHz to improve the Spectrum Analyzer noise floor. The EUT was set to transmit in the middle of the operating frequency range. The EUT was limited to have a burst of 5 second when transmitting at full power. To capture the modulated full power spurious emissions, activated the EUT at the lowest power then set the maximum power level button from HOST, repeated this step until the sweep is complete from 869 MHz to 894 MHz. The Display Line was set to -80 dBm as the limit line. Plotted the emissions graph. Repeated measurements for both 10 kHz NRZ FSK and 6 kHz FM modulation.

Results: Equipment complies with Section 22.917(f). The following pages show measurements of emissions plots which is recorded below:

10 kHz NRZ FSK Modulation	
Plot #	Comment
9	Middle Channel (834.99 MHz) mobile emissions in base frequency range (869 - 894 MHz)
6 kHz FM Modulation	
Plot #	Comment
10	Middle Channel (834.99 MHz) mobile emissions in base frequency range (869 - 894 MHz)

The following plots are included to illustrate compliance with the required rule parts.

**VI. Electromagnetic Compatibility Spurious Emissions at Antenna Terminal Requirements****Plot #8: Middle Channel (834.99 MHz) Mobile Emissions in Base Frequency Range****Plot #10: Middle Channel (834.99 MHz) Mobile Emissions in Base Frequency Range**

Test Engineer: Kerwinn Corpuz

Test Date: 01/30/03



VII. Electromagnetic Compatibility Radiated Emissions Requirements

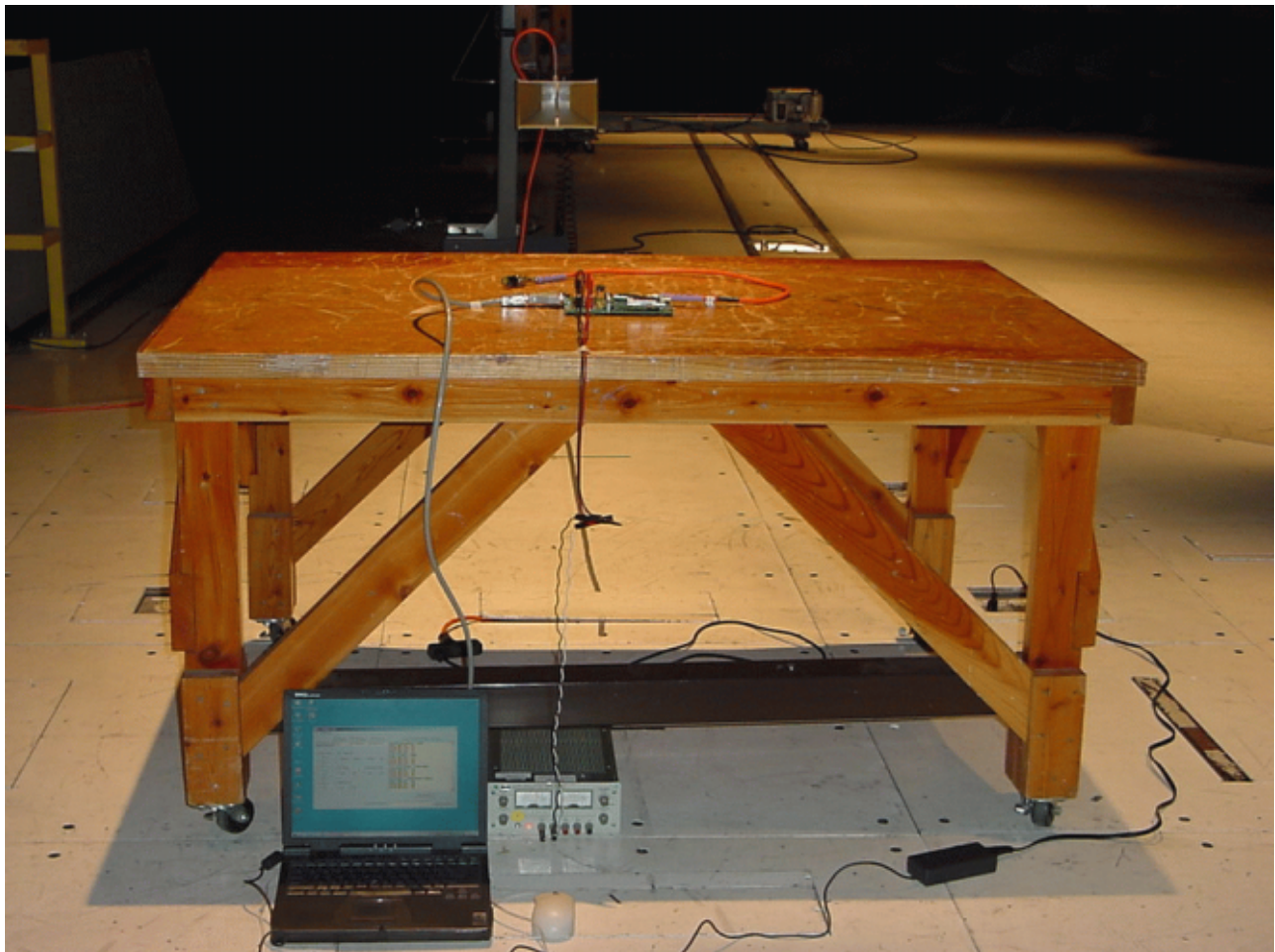
VII. Electromagnetic Compatibility Radiated Emissions Requirements

A. Radiated Emissions (Substitution Method)

Technical Specifications: §2.1053 and §22.917(e)

Test equipment: Test equipment for Radiated Emissions (Substitution Method) is listed in Section IX this report.

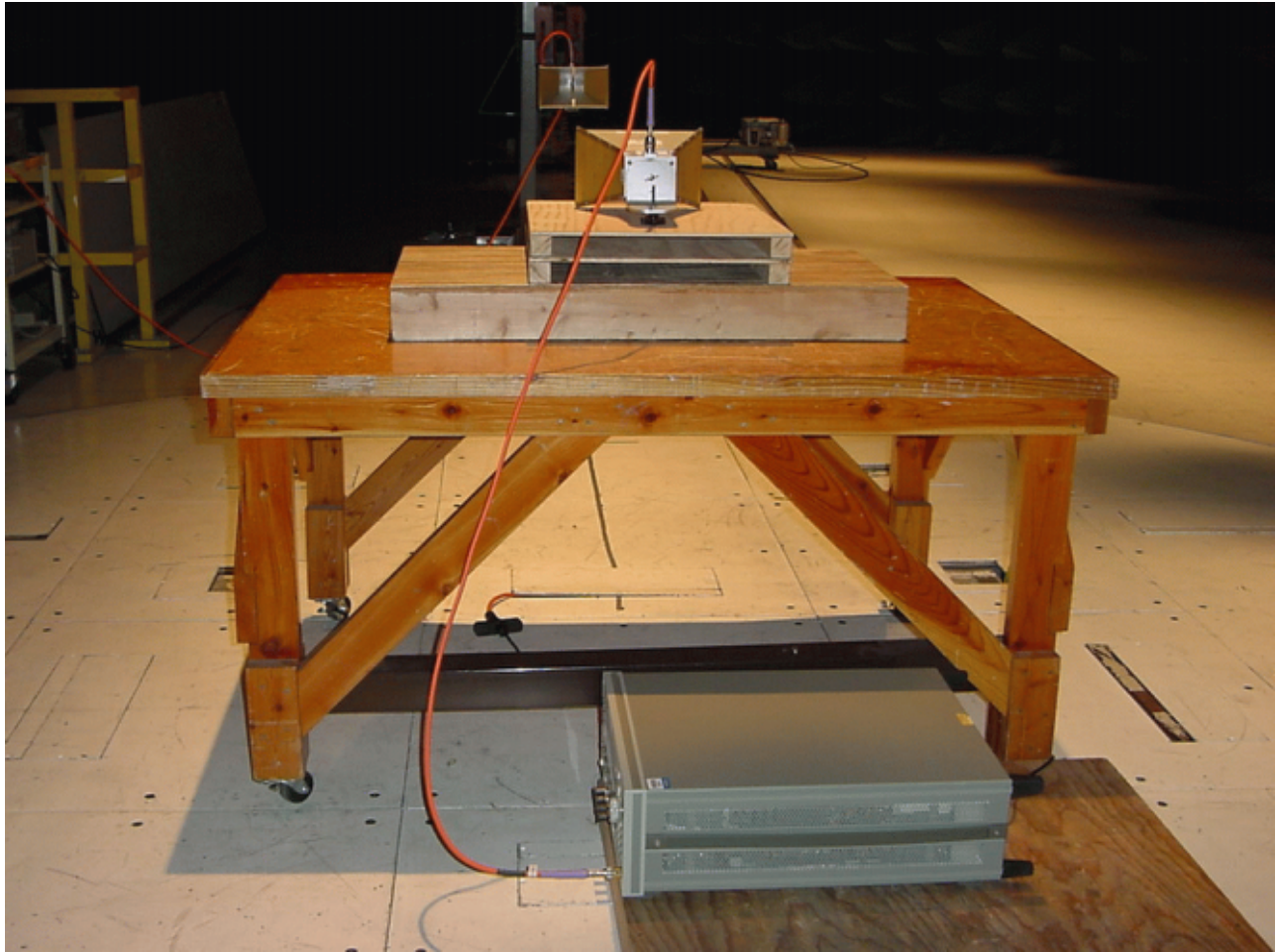
Photograph:



Photograph 6. Radiated Emissions Test Setup Photo (Substitution Method)

VII. Electromagnetic Compatibility Radiated Emissions Requirements

Photograph:



Photograph 7. Radiated Emissions Test Setup Photo (Substitution)



VII. Electromagnetic Compatibility Radiated Emissions Requirements

Measurement

Procedures: As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). The distance between the EUT and the test antenna is 3 meter. The EUT RF port was connected with a 1 meter 2.92 mm(K) cable and terminated to 50 ohm load. Then set to transmit in the lowest of the operating frequency range. The EUT was limited to have a burst of 5 second when transmitting at full power. To capture the full power spurious emissions, activated the EUT at the lowest power and maximized each frequency by rotating the turntable to 360° and varying the test antenna from 1 to 4 meter height. Once the maximized emission is found then set the maximum power level button from HOST. Record reading in a tabular format. These steps were repeated with horizontal polarization, middle, and highest channel.

Once all emissions are collected and recorded, replaced the EUT with a substitution antenna connected to a 1.5 meter 2.92 mm(K) cable and a signal generator. All test setup on the receiving side should be the same as it was when measuring the emissions of the EUT. Repeat all steps above except that the emissions will be compared with the signal generator's amplitude. Record reading in a tabular format.

The Radiated Spurious Emissions *Limit* is obtained by the following:

Measured Output Power of EUT: 1.26 Watts

Spur limit = $P_o - (43 + 10\log P_o)$; $P_o = 1.26$ watts or 31 dBm

$$31\text{dBm} - (43 + 10\log 1.26) = 31\text{ dBm} - (44\text{ dB}) = -13\text{ dBm}$$

Results: Equipment complies with Section 2.1053 and 22.917(e). The following pages show measurements of emissions data sheet which is recorded below:

**VII. Electromagnetic Compatibility Radiated Emissions Requirements****Subject:** Radiated Emissions (Substitution Method) Test Results**Specification:** FCC Part 22 Subpart H, §2.1053 and §22.917(e)

Frequency	Polarization	Spectrum Analyzer	Signal Generator	Cable Loss	Tx Ant. Gain	Gain	ERP	Limit	Margin
(MHz)	V/H	(dBuV)	(dBm)	(dB)	(dBi)	(dBd)	(dBm)	(dBm)	(dBm)
1648.08	H	68.8	-43.7	1	6.42	4.27	-40.43	-13	-27.43
1648.08	V	73.5	-40	1	6.42	4.27	-36.73	-13	-23.73
2472.12	H	68	-41.7	1.23	7.46	5.31	-37.62	-13	-24.62
2472.12	V	78.3	-30.1	1.23	7.46	5.31	-26.02	-13	-13.02
3296.16	H	64.5	-41.8	1.45	7.5	5.35	-37.9	-13	-24.9
3296.16	V	71.7	-32.3	1.45	7.5	5.35	-28.4	-13	-15.4
4120.2	H	69.8	-34.3	1.64	7.62	5.47	-30.47	-13	-17.47
4120.2	V	78.8	-25	1.64	7.62	5.47	-21.17	-13	-8.17
4944.24	H	51.8	-50.5	1.83	8.3	6.15	-46.18	-13	-33.18
4944.24	V	59.2	-42.5	1.83	8.3	6.15	-38.18	-13	-25.18
5768.28	H	49.5	-54.8	2.03	8.36	6.21	-50.62	-13	-37.62
5768.28	V	54.7	-49.6	2.03	8.36	6.21	-45.42	-13	-32.42
6592.32	H	61.8	-40	2.16	9.08	6.93	-35.23	-13	-22.23
6592.32	V	63.5	-37.5	2.16	9.08	6.93	-32.73	-13	-19.73
7416.36	H	71.2	-31.1	2.3	8.75	6.6	-26.8	-13	-13.8
7416.36	V	61.3	-38.5	2.3	8.75	6.6	-34.2	-13	-21.2
8240.4	H	65	-36.6	2.45	9.1	6.95	-32.1	-13	-19.1
8240.4	V	56.7	-43.3	2.45	9.1	6.95	-38.8	-13	-25.8

Table 4. Low Channel Test Results**Test Engineer:** Kerwinn Corpuz**Test Date:** 02/01/03

**VII. Electromagnetic Compatibility Radiated Emissions Requirements****Subject:** Radiated Emissions (Substitution Method) Test Results**Specification:** FCC Part 22 Subpart H, §2.1053 and §22.917(e)

Frequency	Polarization	Spectrum Analyzer	Signal Generator	Cable Loss	Tx Ant. Gain	Gain	ERP	Limit	Margin
(MHz)	V/H	(dBuV)	(dBm)	(dB)	(dBi)	(dBd)	(dBm)	(dBm)	(dBm)
1669.98	H	69.7	-42.7	1.01	6.44	4.29	-39.42	-13	-26.42
1669.98	V	76.5	-37	1.01	6.44	4.29	-33.72	-13	-20.72
2504.97	H	72.8	-37	1.24	7.5	5.35	-32.89	-13	-19.89
2504.97	V	71	-37.4	1.24	7.5	5.35	-33.29	-13	-20.29
3339.96	H	63.2	-43.1	1.46	7.5	5.35	-39.21	-13	-26.21
3339.96	V	69.2	-34.8	1.46	7.5	5.35	-30.91	-13	-17.91
4174.95	H	72.5	-31.6	1.65	7.71	5.56	-27.69	-13	-14.69
4174.95	V	80.5	-23.3	1.65	7.71	5.56	-19.39	-13	-6.39
5009.94	H	55.2	-47.2	1.84	8.3	6.15	-42.89	-13	-29.89
5009.94	V	59.6	-42.2	1.84	8.3	6.15	-37.89	-13	-24.89
5844.93	H	50.3	-54	2.04	8.41	6.26	-49.78	-13	-36.78
5844.93	V	52.3	-52	2.04	8.41	6.26	-47.78	-13	-34.78
6679.92	H	62.7	-39	2.17	9.06	6.91	-34.26	-13	-21.26
6679.92	V	66.5	-34.5	2.17	9.06	6.91	-29.76	-13	-16.76
7514.91	H	68.5	-33.8	2.32	8.71	6.56	-29.56	-13	-16.56
7514.91	V	58.8	-41	2.32	8.71	6.56	-36.76	-13	-23.76
8349.9	H	65	-36.7	2.47	9.14	6.99	-32.18	-13	-19.18
8349.9	V		-43	2.47	9.14	6.99	-38.48	-13	-25.48

Table 5. Middle Channel Test Results**Test Engineer:** Kerwinn Corpuz**Test Date:** 02/01/03

**VII. Electromagnetic Compatibility Radiated Emissions Requirements****Subject:** Radiated Emissions (Substitution Method) Test Results**Specification:** FCC Part 22 Subpart H, §2.1053 and §22.917(e)

Frequency	Polarization	Spectrum Analyzer	Signal Generator	Cable Loss	Tx Ant. Gain	Gain	ERP	Limit	Margin
(MHz)	V/H	(dBuV)	(dBm)	(dB)	(dBi)	(dBd)	(dBm)	(dBm)	(dBm)
1697.94	H	69.2	-43.2	1.02	6.46	4.31	-39.91	-13	-26.91
1697.94	V	73.5	-40	1.02	6.46	4.31	-36.71	-13	-23.71
2546.91	H	70.5	-39.3	1.25	7.5	5.35	-35.2	-13	-22.2
2546.91	V	78.7	-29.7	1.25	7.5	5.35	-25.6	-13	-12.6
3395.88	H	61.8	-44.5	1.47	7.5	5.35	-40.62	-13	-27.62
3395.88	V	69	-35	1.47	7.5	5.35	-31.12	-13	-18.12
4244.85	H	73.3	-30.8	1.67	7.84	5.69	-26.78	-13	-13.78
4244.85	V	83.2	-20.6	1.67	7.84	5.69	-16.58	-13	-3.58
5093.82	H	55.2	-47.2	1.87	8.28	6.13	-42.94	-13	-29.94
5093.82	V	59.8	-42	1.87	8.28	6.13	-37.74	-13	-24.74
5942.79	H	60.2	-44	2.06	8.47	6.32	-39.74	-13	-26.74
5942.79	V	59.3	-45	2.06	8.47	6.32	-40.74	-13	-27.74
6791.76	H	59.8	-42	2.19	9.04	6.89	-37.3	-13	-24.3
6791.76	V	65	-36	2.19	9.04	6.89	-31.3	-13	-18.3
7640.73	H	59.8	-42.5	2.34	8.78	6.63	-38.21	-13	-25.21
7640.73	V	54	-45.8	2.34	8.78	6.63	-41.51	-13	-28.51
8489.7	H	62.3	-39.3	2.5	9.2	7.05	-34.75	-13	-21.75
8489.7	V	57.3	-42.7	2.5	9.2	7.05	-38.15	-13	-25.15

Table 6. High Channel Test Results**Test Engineer:** Kerwinn Corpuz**Test Date:** 02/01/03



VIII. Electromagnetic Compatibility Frequency Stability Requirements

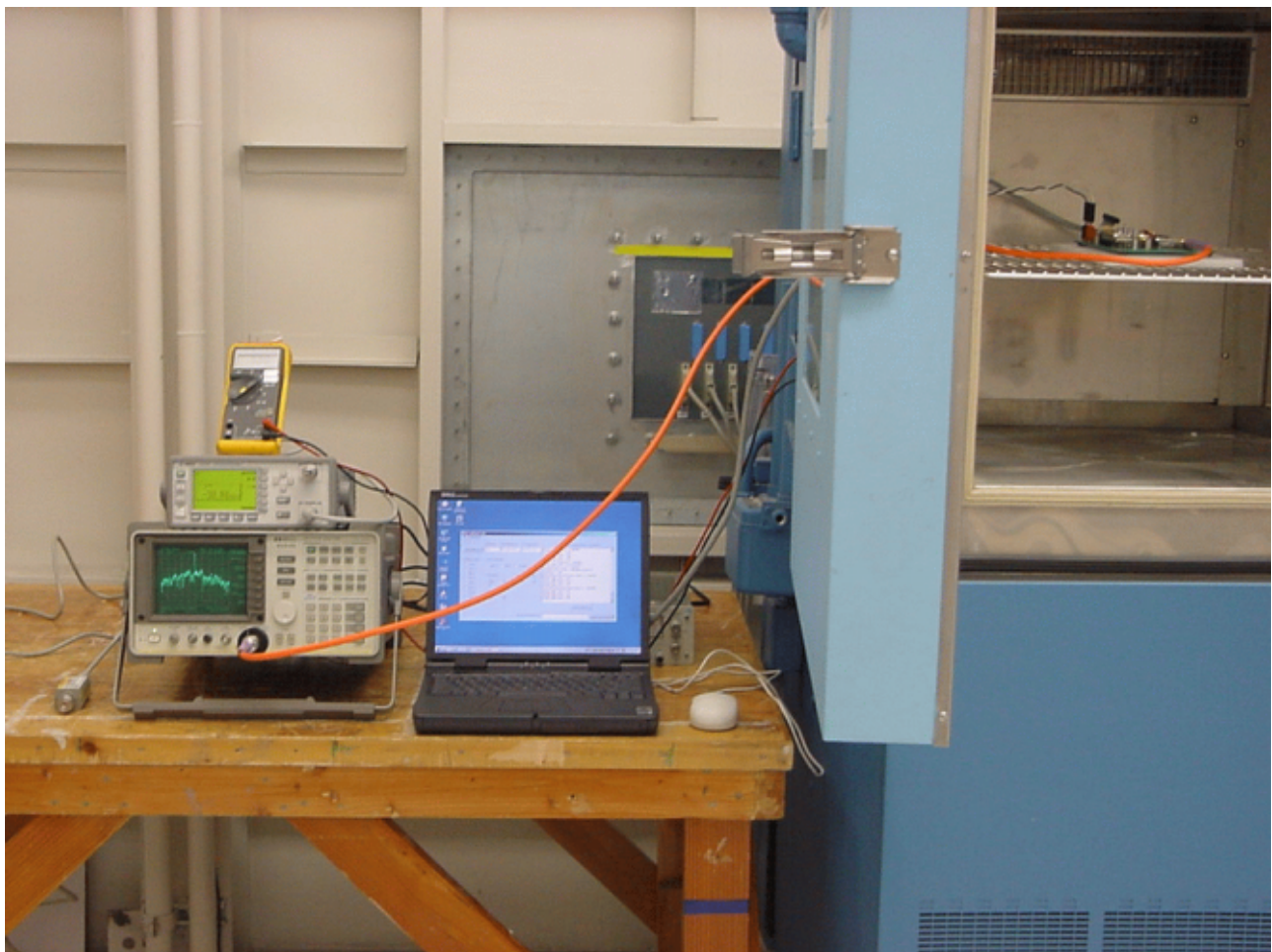
VIII. Electromagnetic Compatibility Frequency Stability Requirements

A. Frequency Stability

Technical Specifications: §2.1055 and §22.355

Test equipment: Test equipment for Frequency Stability is listed in Section IX of this report.

Photograph:



Photograph 8. Frequency Stability Test Setup Photo



VIII. Electromagnetic Compatibility Frequency Stability Requirements

Measurement

Procedures: As required by 47 CFR 2.1055, *frequency stability measurements* were made at the RF output terminals using a 10 dB attenuator connected with 1.5 meter 2.92 mm(K) cable, a Spectrum Analyzer, and a Power Meter.

EUT was placed in the Temperature Chamber and support equipments are outside the chamber on a table. Set a 10.7 dB Reference Level Offset and RBW = VBW = 100 Hz to Spectrum Analyzer. BW was set to 100 Hz to show the frequency values in hertz from the Spectrum Analyzer. Power Meter was use to measure the maximum output power from EUT. The EUT was set to transmit in the middle of the operating frequency range. The EUT was limited to have a burst of 5 second when transmitting at full power. To capture the frequency drift at full power, activated the EUT at the lowest power then set the maximum power level button from HOST. Repeated this step for every 10°C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30° to 50°C.

Voltage supplied to EUT is +5 Vdc.

Reference temperature was done at 20°C with frequency of 834.99 MHz, and power output of 31 dBm. This include Voltage Stability.

Mobile Transmitter Limit = $2.5\text{ppm} * 834.99 \text{ MHz} = 2087.475 \text{ Hz}$

Results:

Equipment complies with Sections 2.1055 and 22.355. The following pages show measurements of emissions data sheet which is recorded below:

EUT battery operating end point was measured 3.2 Vdc, but measured frequency drift and power at 3.25 Vdc.



VIII. Electromagnetic Compatibility Frequency Stability Requirements

Subject: Frequency Stability Test Results

Specification: FCC Part 22 Subpart H, §2.1055 and §22.355

Reference Power: 31 dBm @ 834.99 MHz (Middle Channel) with 20°C

Temperature	Power		Deviation
Celsius	dBm	watts	dBm
-30	31.14	1.30	0.14
-20	31.14	1.30	0.14
-10	31.1	1.29	0.1
0	31	1.26	0
10	31	1.26	0
20	reference		
30	30.89	1.23	0.11
40	30.89	1.23	0.11
50	30.62	1.15	0.38
60	30.63	1.16	0.37

Table 7. Temperature Vs. Frequency Test Results

Reference Frequency: 834.99 MHz (Middle Channel) @ 20°C

Temperature	Measured Freq.	Drift	Drift
(Celsius)	(MHz)	(Hz)	(ppm)
50	834.990933	933	1.12
40	834.990567	567	0.68
30	834.9903	300	0.36
20	Reference		
10	834.990099	99	0.12
0	834.990249	249	0.30
-10	834.990474	474	0.57
-20	834.990391	391	0.47
-30	834.990074	74	0.09

Table 8. DC Voltage End Point Test Results

Reference Vdc = 5 @ 20 °C Frequency: 834.99 MHz, Power = 31 dBm

Measured Voltage	Measured Freq.	Drift	Drift	limit	Measured
(dc)	(MHz)	(Hz)	(ppm)	(ppm)	Power (dBm)
3.25	834.988209	-1791	-2.14	2.5	20.2

Table 9. Temperature Vs. Output Power Test Results

Test Engineer: Kerwinn Corpuz

Test Date: 02/03/03



IX. Test Equipment



IX. Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

Test Name: RF Power Output					Test Date(s): 1/30/03
MET ID #	EQUIPMENT	MANUFACTURER	MODEL #	LAST CAL	CAL DUE
1S2276	POWER METER	HEWLETT PACKARD	E4418B	28-AUG-02	28-AUG-03
1S2275	POWER SENSOR	HEWLETT PACKARD	8485A	26-AUG-02	26-AUG-03
–	10 W ATTENUATOR	JFK	50FH-010-10	SEE NOTE	
Test Name: Conducted measurements at RF port					Test Date(s): 1/30/03
MET ID #	EQUIPMENT	MANUFACTURER	MODEL #	LAST CAL	CAL DUE
1S2293	SPECTRUM ANALYZER 9 kHz-40 GHz	HEWLETT PACKARD	8564E	27-AUG-02	27-AUG-03
1S2001	TRIPLE OUTPUT POWER SUPPLY	HEWLETT PACKARD	6236B	SEE NOTE	
–	10 W ATTENUATOR	JFK	50FH-010-10	SEE NOTE	
Test Name: Radiated Spurious Emissions					Test Date(s): 1/31/03 & 2/1/03
MET ID #	EQUIPMENT	MANUFACTURER	MODEL #	LAST CAL	CAL DUE
1S2293	SPECTRUM ANALYZER 9 kHz-40 GHz	HEWLETT PACKARD	8564E	27-AUG-02	27-AUG-03
1S2001	TRIPLE OUTPUT POWER SUPPLY	HEWLETT PACKARD	6236B	SEE NOTE	
–	50 ohm LOAD	NARDA	375 BNM	SEE NOTE	
1S2278	SWEPT SIGNAL GENERATOR	AGILENT	83650B	27-AUG-02	27-AUG-03
1S2208	HORN ANTENNA	EMCO	3115	SEE NOTE	
1S2198	HORN ANTENNA	EMCO	3115	17-MAY-02	17-MAY-03
1S2121	PRE AMPLIFIER	HEWLETT PACKARD	8449B	16-SEP-02	16-SEP-03
--	HPF	MICRO-TRONICS	HPM13145	SEE NOTE	
Test Name: Frequency Stability					Test Date(s): 2/3/03
MET ID #	EQUIPMENT	MANUFACTURER	MODEL #	LAST CAL	CAL DUE
1S2293	SPECTRUM ANALYZER 9 kHz-40 GHz	HEWLETT PACKARD	8564E	27-AUG-02	27-AUG-03
1S2001	TRIPLE OUTPUT POWER SUPPLY	HEWLETT PACKARD	6236B	SEE NOTE	
1S2276	POWER METER	HEWLETT PACKARD	E4418B	28-AUG-02	28-AUG-03
1S2275	POWER SENSOR	HEWLETT PACKARD	8485A	26-AUG-02	26-AUG-03
1S2229	TEMPERATURE CHAMBER	TENNEY	T63C	13-SEP-02	13-SEP-03
1S2100	SERIES II MULTIMETER	FLUKE	77	18-SEP-02	18-SEP-03

Table 10. Test Equipment

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.



X. Certification Label & User's Manual Information



X. Certification Label & User's Manual Information

A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
 - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
 - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.



X. Certification Label & User's Manual Information

- (e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:
- (i) Compliance testing;
 - (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
 - (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.
- (e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.
- (f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is



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to be operated.¹ In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, or the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant, whichever is applicable.

§ 2.907 Certification.

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

§ 2.948 Description of measurement facilities.

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
 - (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
 - (i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.
 - (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

¹In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart C (of Part 15), which deals with intentional radiators.



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- (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

B. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

- (a) In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:
 - (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.
 - (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.
 - (3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
 - (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.
 - (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.



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§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

- (a) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



END OF REPORT

RF Exposure Requirements

FCC Rules and Regulations 1.1307(b)(2); 1.1310

Specification: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's Guidelines.

EUT meets the requirements of these sections.

MPE CALCULATION

MPE Limit Calculation:

EUT's lowest frequency channel @ 824.04 MHz;
therefore, $f/1500$ = Power Density (mW/cm^2), where f = frequency (MHz)

Limit for Uncontrolled exposure: $0.54936 \text{ mW}/\text{cm}^2$ or $5.4936 \text{ W}/\text{m}^2$

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 = 1.26\text{W} * 2.15\text{dBi} / 4 * 3.14 * (0.2\text{m})^2 = 2.709\text{W} / 0.5026\text{m}^2 = 5.39 \text{ W}/\text{m}^2$$

where, S = Power Density (W/m^2)
 P = Power Input to antenna (1.26 Watts)
 G = Antenna Gain (2.15 dBi)
 R = distance to the center of radiation of the antenna (20 cm or 0.2 m)

The power density @ 20cm = $5.39 \text{ W}/\text{m}^2$, therefore EUT meets the Uncontrolled exposure limit.