NVLAP Lab Code: 200087-0

SUBMITTAL APPLICATION REPORT

FOR GRANT OF CERTIFICATION

FOR

Model: F49

CFR47 90(Y) Broadband Public Safety Equipment Operating in the Band 4940-4990 MHz

FCC ID: VKV-F49

FOR

DBii Networks Limited

201 OAK AVE, #D
Carlsbad, CA 92008

Report Number 080918B

Authorized Signatory: Scot D Rogers
Scot D. Rogers

NVLAP Lab Code: 200087-0

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Submittal Application Test Report For Grant of Certification

For

DBii Networks Limited

201 OAK AVE, #D
Carlsbad, CA 92008

MODEL: F49

Public Safety Band Operation in the 4940-4990 MHz Frequency Band
Frequency Band of Operation: 4942.5 – 4987.5 MHz

FCC ID: VKV-F49

Test Date: November 10, 2008

Certifying Engineer: Scot D Rogers

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Executive Summary

The following information is submitted for consideration in obtaining Grant of Certification per CFR47 Paragraph 90 (Y), broadband Public Safety Equipment operating in the frequency band of 4940-4990 MHz.

Opinion / Interpretation of Results

Applicable Standards: CFR47 Paragraph 90, Subpart Y			
Standard	Test	Remark	Result
90.210(i)	Radiated Emission	Complies with Requirement	Complies
-	Emissions Bandwidth	Reporting purposes	N/A
90.210(i)	Spurious Emissions and Mask	Complies with Requirement	Complies
90.213	Frequency Stability	Reporting purposes	N/A
90.1215(a)	Maximum Output Power	Complies with Requirement	
-	Average Power	Reporting purposes	N/A
90.1215(a)	Power Spectral Density	Complies with Requirement	Complies

Environmental Conditions

Ambient Temperature	23.3 ° C
Relative Humidity	44%
Atmospheric Pressure	30.10 in Hg

Applicable Standards and Test Procedures

In accordance with the Federal Communications Code of Federal Regulations (CFR47), dated October 1, 2007, Part 2 Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057; 90.201 through 90.217, and subpart Y 90.1201 through 90.1217 the following information is submitted. Test procedures used were the established Methods of Measurement of Radio-Noise Emissions as described in ANSI 63.4-2003 and TIA/EIA 603. The unit has also been tested and found to comply with other applicable technical standards with relevant data recorded in appropriate reports.

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 annex 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 - 100 GHz)		
RBW	AVG. BW	Detector Function
1 MHz	1 MHz	Peak/Average
Antenna Conducted Emissions		
RBW	AVG. BW	Detector Function
100 kHz	300 kHz	Peak

Test Site Locations

Conducted EMI — The AC power line conducted emissions testing performed in a shielded screen room located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS

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

Site Registration — Refer to Annex for Site Registration Letters (FCC 90910 and IC: 3041A-1)

NVLAP — Lab code 200087-0

2.1033(c) Application for Certification

1. Manufacturer: DBii Networks Limited
   201 OAK AVE, #D
   Carlsbad, CA 92008

2. Identification: Model: F49 FCC I.D.: VKV-F49

3. A copy of the installation and operating instructions furnished to the end user. Refer to the instruction manual furnished with this application for details.

4. Emission Types: Multiple channels, Data Modulated in angel/pulse, Data transmission

Frequency Range	Channel Width	Emission Designator
4942.5-4987.5 MHz	5	4M27W7D
4945.0-4985.0 MHz	10	8M43W7D
4950.0-4980.0 MHz	20	16M6W7D

5. Frequency Range as show above per channel spacing 4942.5 – 4987.5 MHz

6. Range of operating power values or specific operating power levels, and description of any means provided for variation of operating power. The design offers 1 watt maximum output power operation in this and other services. Power restrictions for operation under CFR47 90(Y) are accounted for in factory defined firmware. Output power may be reduced in 0.5 dB steps through software control.

7. Maximum power rating as defined in the applicable part(s) of the rules. As stated in CFR47, 90.1215 the maximum permissible output power allowed is 33 dBm (2 watts).

8. The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range. The EUT final amplification stage runs at 3.3 volts with 2.0 Amperes current for a power consumed of 6.6 watts.

9. Provide the tune-up procedure over the power range, or at specific operating power levels. Refer to the tune-up procedure furnished with this application for details.

10. A schematic diagram and a description of all circuitry and devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation, and for limiting power. Refer to the schematics furnished with this application for details.

11. A photograph or drawing of the equipment identification plate, or label showing the information to be placed thereon shall be provided. Refer to the identification label exhibit furnished with this application for details.

12. Photographs (8" x 10") of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, if any, and labels for controls and meters and sufficient views of the internal construction to define component placement and chassis assembly. Insofar as these requirements are met by photographs or drawings contained in instruction manuals supplied with the certification request, additional photographs are necessary only to complete the required showing. Refer to the exhibits of this report and or additional information furnished with the application for details.

13. For equipment employing digital modulation techniques, a detailed description of the modulation system to be used, including the response characteristics (frequency, phase, and amplitude) of any filters provided, and a description of the modulating wave train, shall be submitted for the maximum rated conditions under which the equipment will be operated.

14. The data required by CFR47 paragraphs 2.1046 through 2.1057, measured in accordance with the procedures set out in Section 2.1041.

15. The application for certification of an external radio frequency power amplifier under Part 97 of this chapter need not be accompanied by the data required by Paragraph (b)(14) of this section. In lieu thereof, measurements shall be submitted to show compliance with the technical specifications in Subpart C of Part 97 of this chapter and such information as required by Section 2.1060 of this part. This paragraph does not apply to this equipment.

16. An application for certification of an AM broadcast stereophonic exciter generator intended for interfacing with existing certified, or formerly type accepted or notified transmitters must include measurements made on a complete stereophonic transmitter. The instruction book must include complete specifications and circuit requirements for interconnecting with existing transmitters. The instruction book must also provide a full description of the equipment and measurement procedures to monitor modulation and to verify that the combination of stereo exciter generator and transmitter meets the emission limitations of section 73.44. This paragraph does not apply to this equipment.

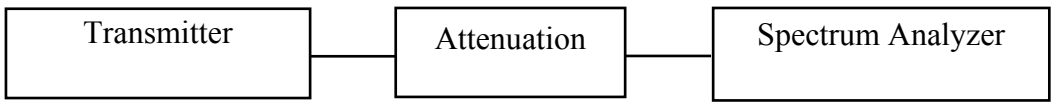
17. A single application may be filed for a composite system that incorporates devices subject to certification under multiple rule parts; however, the appropriate fee must be included for each device. Separate applications must be filed if different FCC Identifiers will be used for each device.

2.1046 RF Power Output

Measurements Required

As required by CFR47 2.1046, radio frequency power output shall be made at the Radio Frequency output terminals. Measurements shall be made to establish the radio frequency power delivered by the transmitter into the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted below: If the power output is adjustable, measurements shall be made for the highest and lowest power levels.

Test Arrangement



The radio frequency power output was measured at the antenna terminal by placing 50 ohm attenuation in the antenna line and observing the emission with the spectrum analyzer. The spectrum analyzer had an impedance of 50 ohms to match the impedance of the standard antenna. A

HP 8562 Spectrum Analyzer was used to measure the radio frequency power at the antenna port. The data was taken in dBm and converted to watts as shown in the following Table. Figure 1 demonstrates maximum output power in band. Figures 2 through 10 demonstrate compliance to peak power spectral density requirements for the transmitter. The EUT output does not exceed 21 dBm/MHz peak power spectral densities at the carrier frequency. Data was taken per Paragraph 2.1046(a) and applicable parts of Part 90.1215(a). The specifications of CFR47 Paragraphs 2.1046, 90.1215 are met. There are no deviations to the specifications.

Results Peak Radio Frequency Output Power

Channel Width (MHz)	Peak Power (dBm)	Peak Power (Watts)
5 MHz	27.0	0.5
10 MHz	26.8	0.5
20 MHz	26.6	0.5

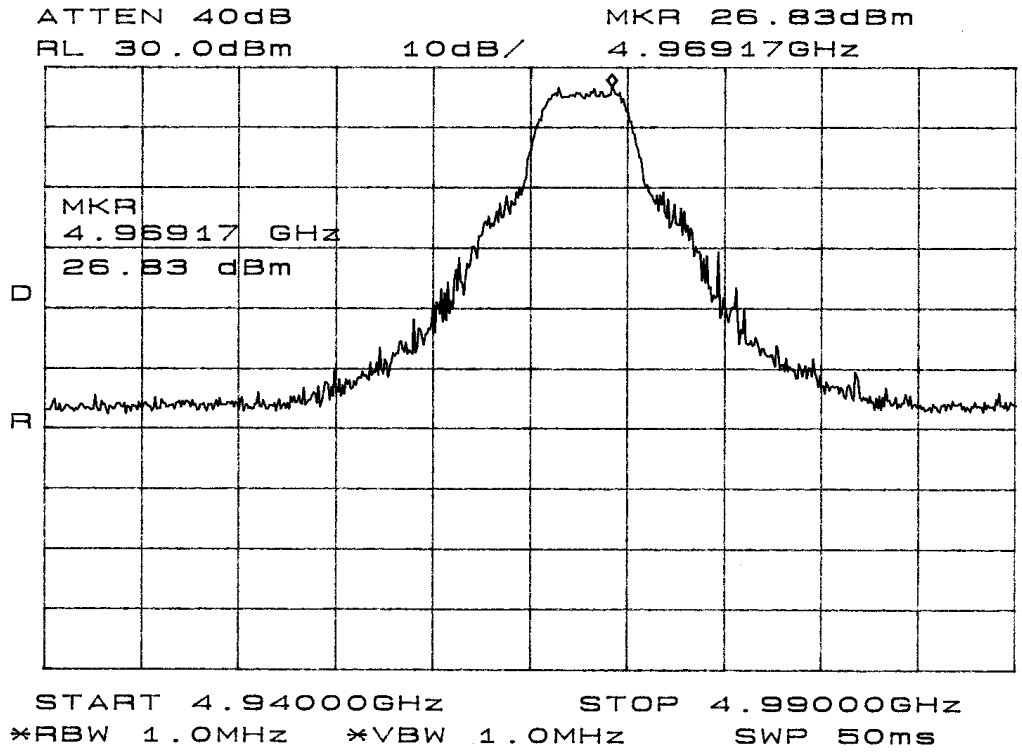


Figure 1 Peak Output in Operational Band Plot

Results Peak Power Spectral Density

Figure Number	Frequency (MHz)	Channel Width (MHz)	Measured PPSD (dBm)	Limit (dBm)
2	4942.5	5 MHz	16.67	21
3	4967.5		19.83	21
4	4987.5		20.67	21
5	4945.0	10 MHz	19.83	21
6	4967.5		20.00	21
7	4985.0		20.33	21
8	4950.0	20 MHz	18.00	21
9	4965.0		18.83	21
10	4980.0		18.33	21

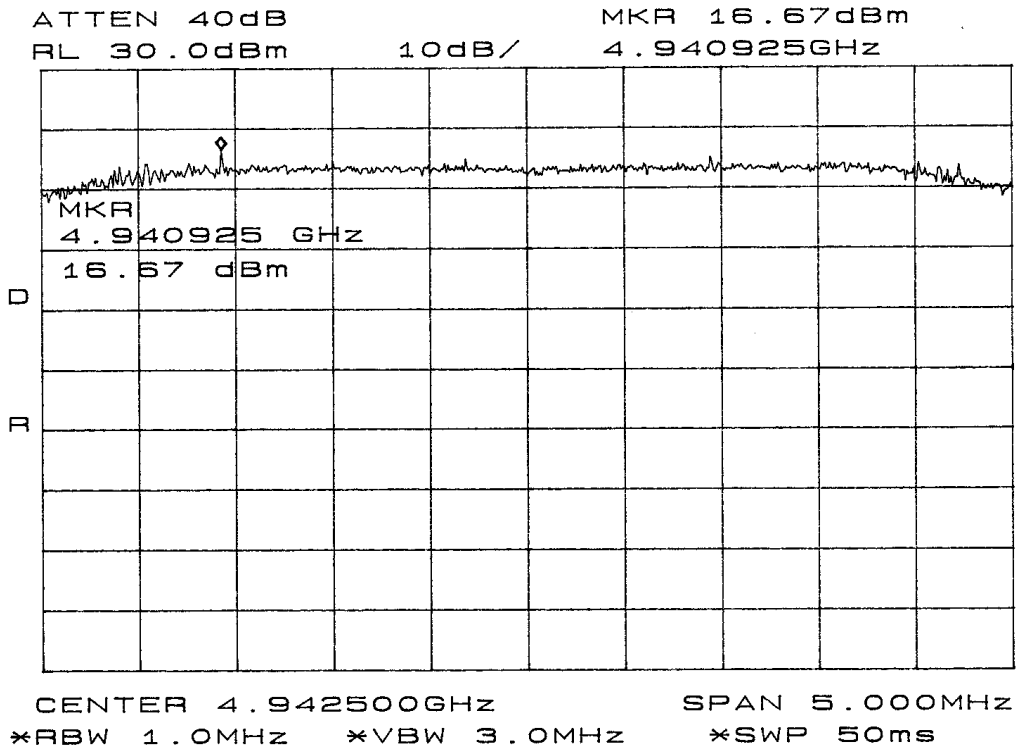


Figure 2 Peak Power Spectral Density Plot 5MHz Channel Spacing Low Channel

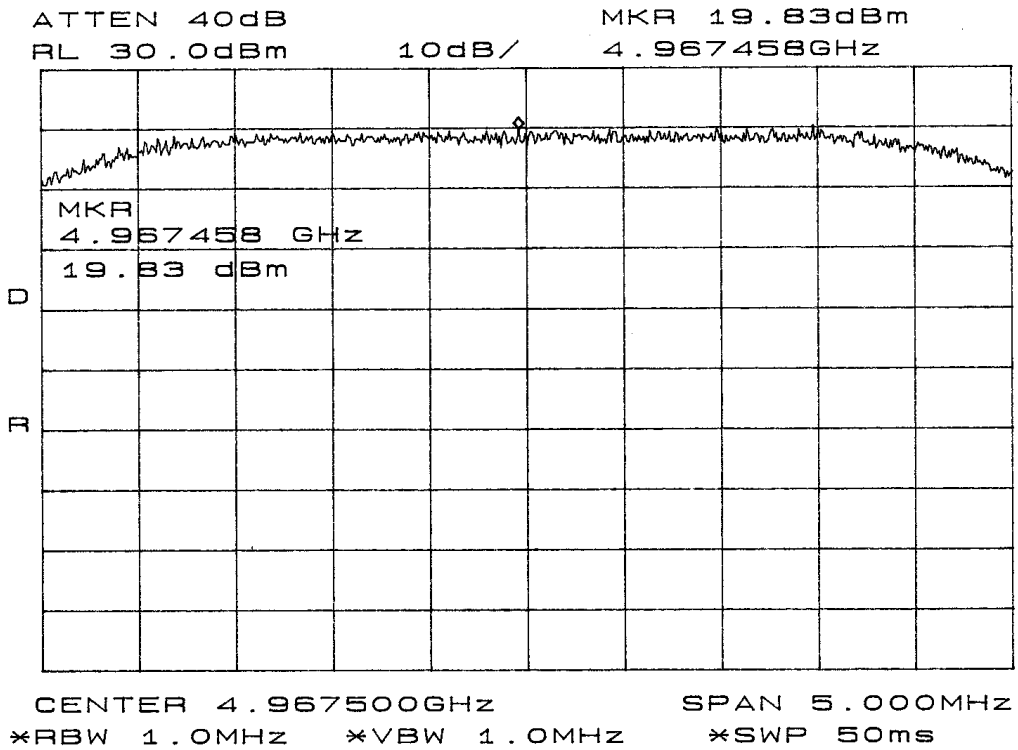


Figure 3 Peak Power Spectral Density Plot 5MHz Channel Spacing Middle Channel

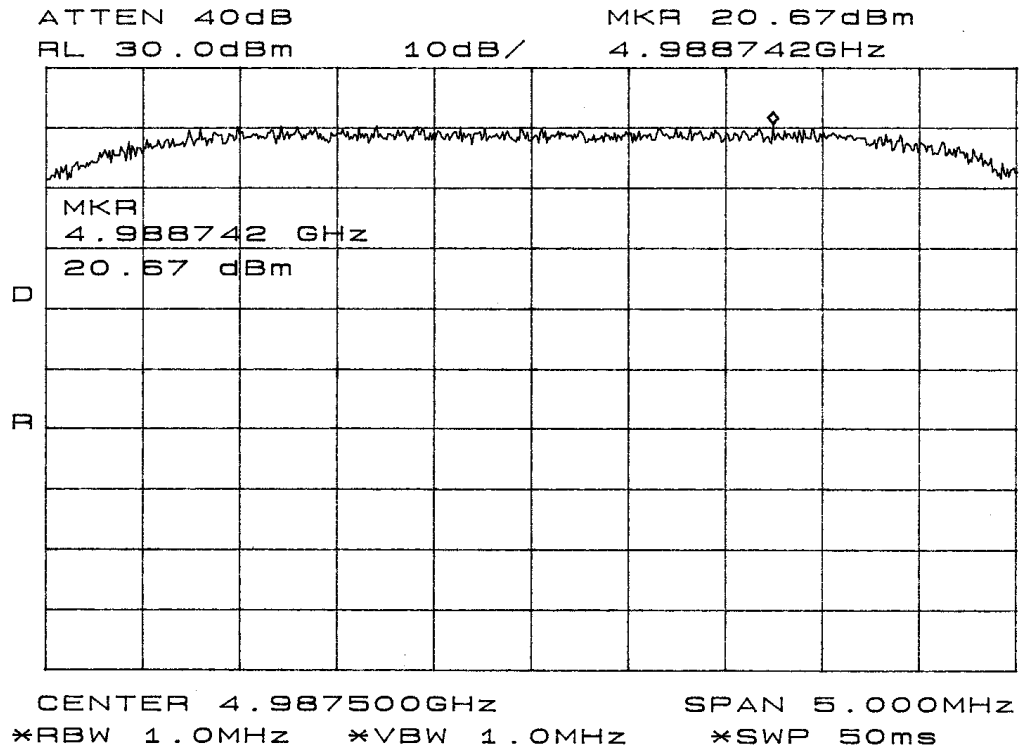


Figure 4 Peak Power Spectral Density Plot 5MHz Channel Spacing High Channel

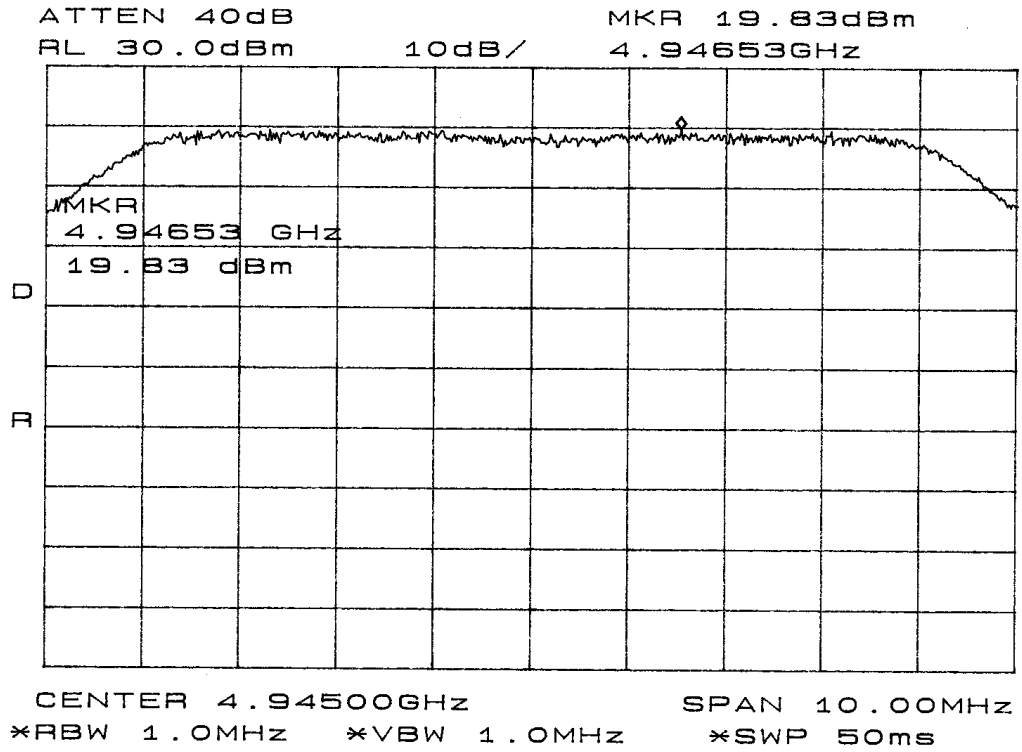


Figure 5 Peak Power Spectral Density Plot 10 MHz Channel Spacing Low Channel

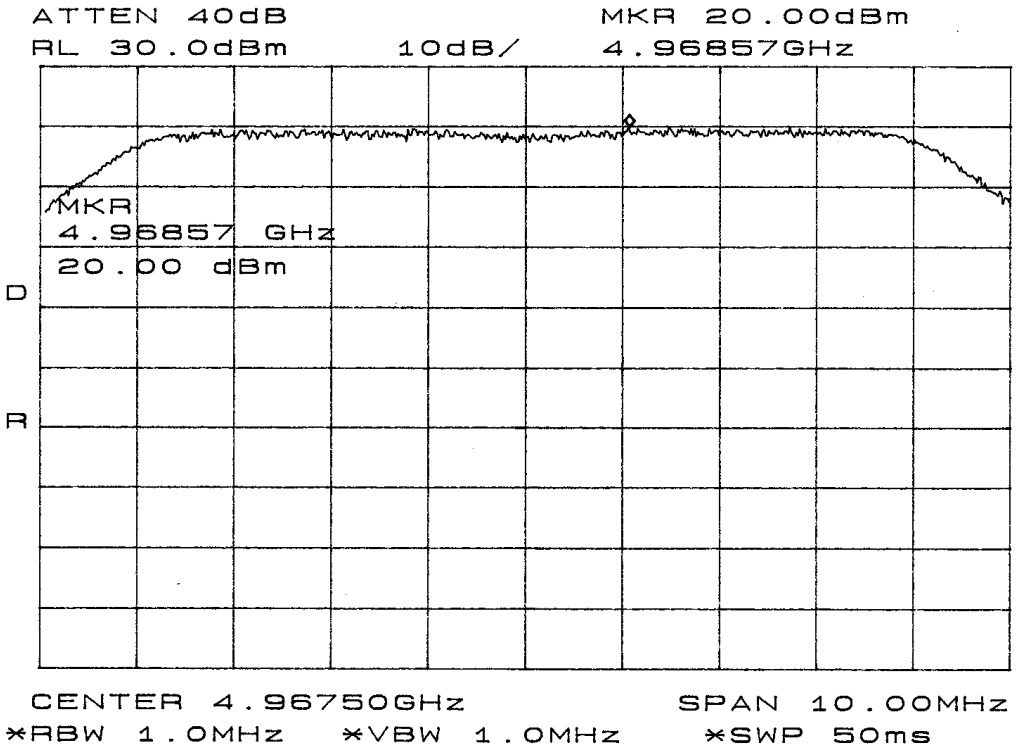


Figure 6 Peak Power Spectral Density Plot 10 MHz Channel Spacing Middle Channel

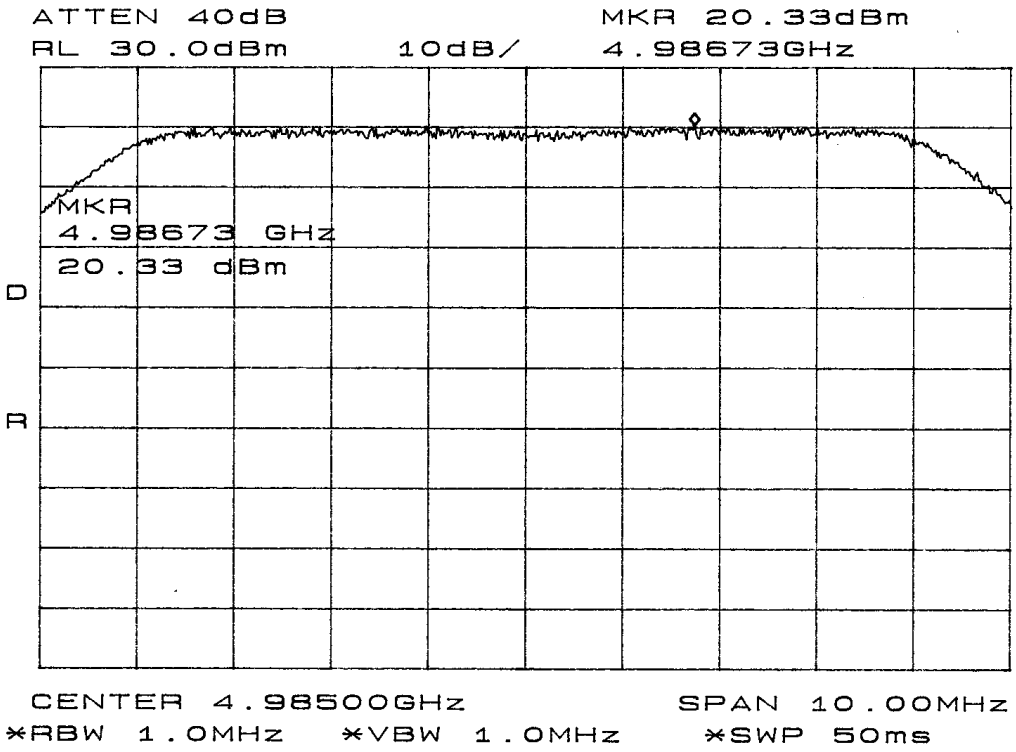


Figure 7 Peak Power Spectral Density Plot 10 MHz Channel Spacing High Channel

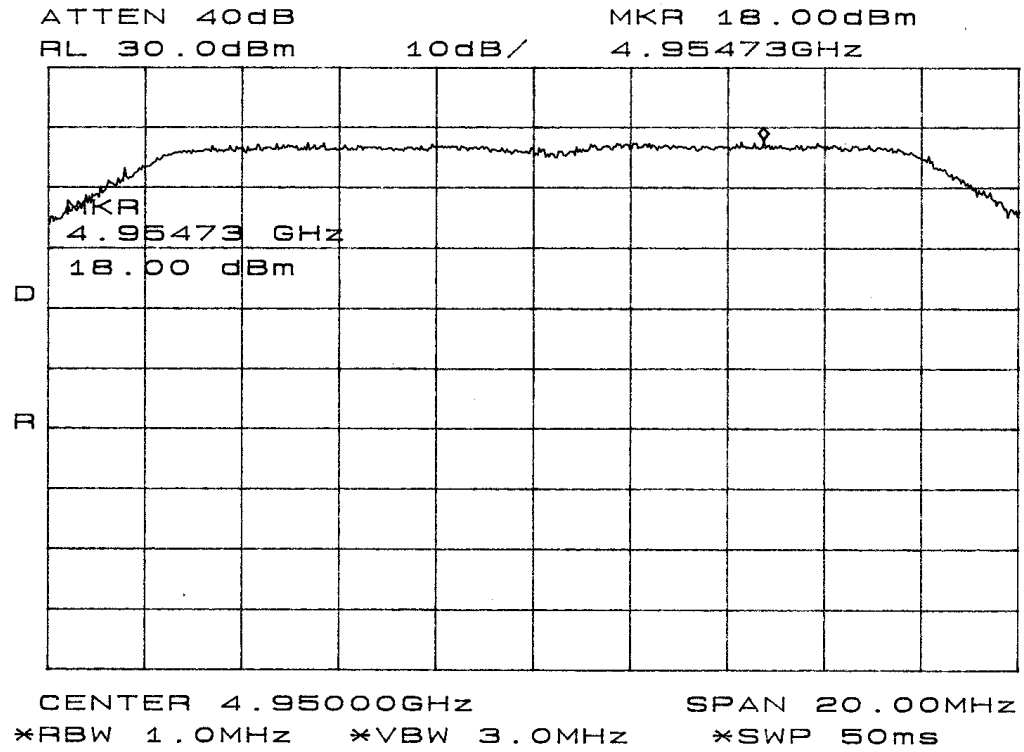


Figure 8 Peak Power Spectral Density Plot 20 MHz Channel Spacing Low Channel

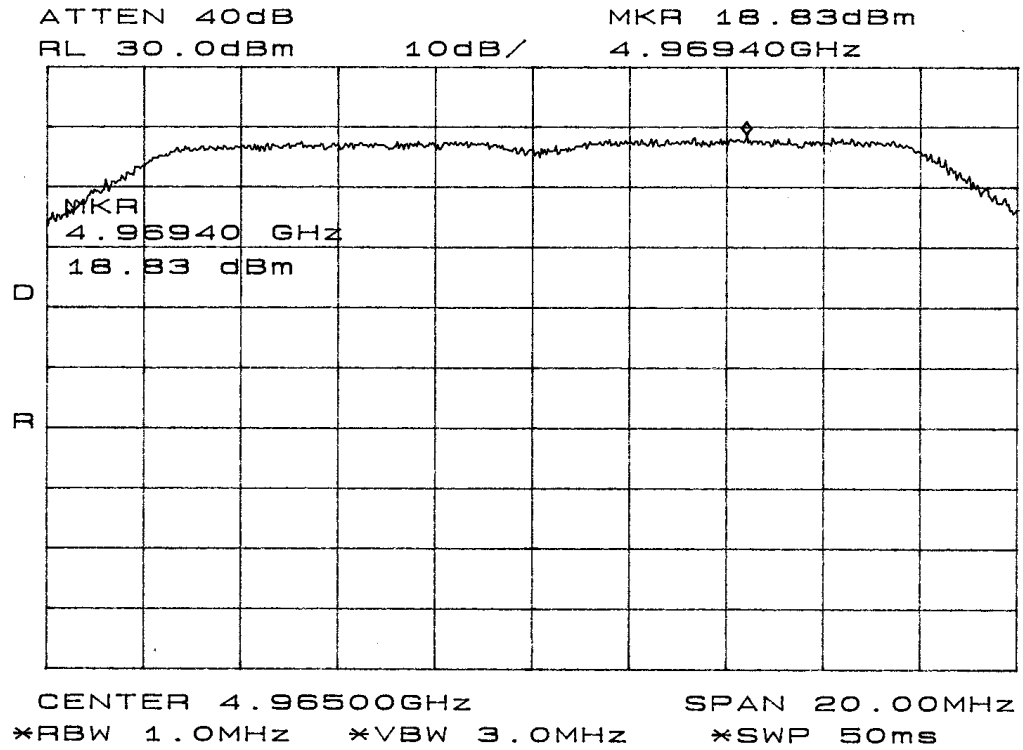


Figure 9 Peak Power Spectral Density Plot 20 MHz Channel Spacing Middle Channel

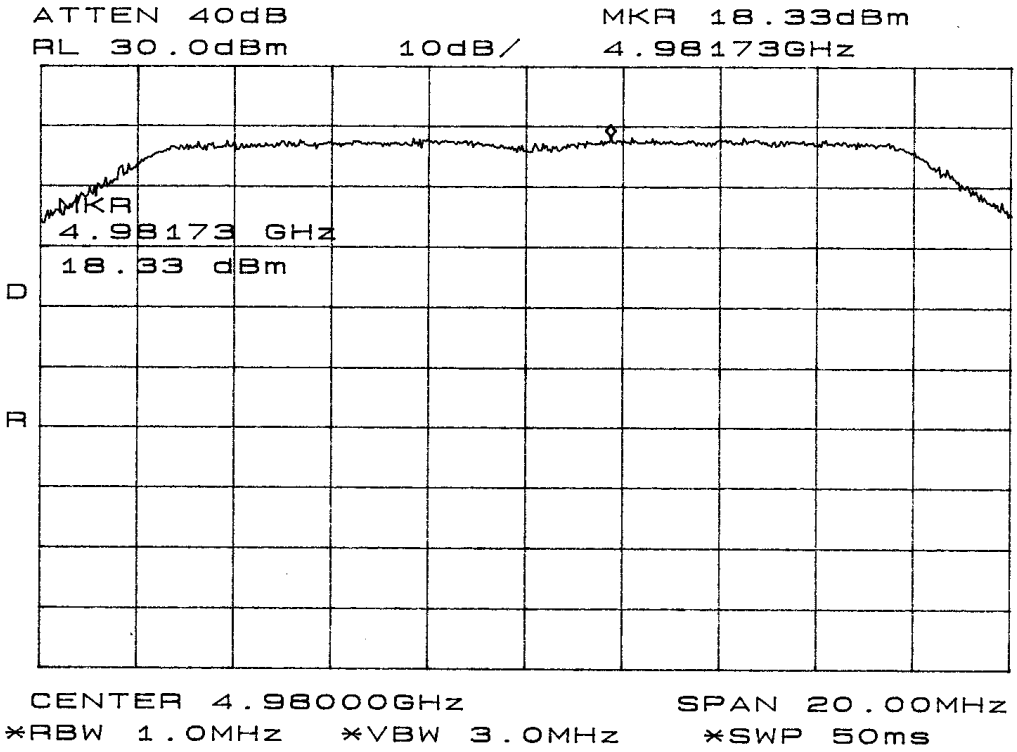


Figure 10 Peak Power Spectral Density Plot 20 MHz Channel Spacing High Channel

2.1047 Modulation Characteristics

Measurements Required

A curve or equivalent data that shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed shall be submitted.

Results Modulation Characteristics

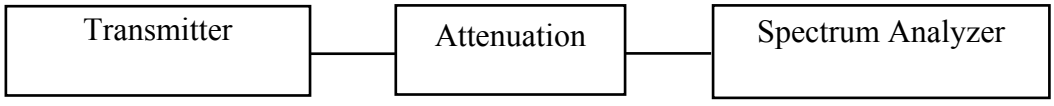
The transmitter operates to transmit data using signals modulated either simultaneously or in pre-established sequence, in a combination of two or more of the following modes: amplitude, angle, pulse, with two or more channels containing quantized or digital information for data, telemetry and/or telecommand. Refer to exhibits for additional modulation information. Specifications of CFR47 Paragraphs 2.1047 and applicable paragraphs of part 90 are met. There are no deviations to the specifications.

2.1049 Occupied Bandwidth, 90.210(m) Emissions Mask

Measurements Required

As required by CFR47 2.1049, occupied bandwidth measurements shall be made at the Radio Frequency output terminals. The radio frequency output was coupled to a HP 8562A Spectrum Analyzer through 50 ohm attenuator and cable. The spectrum analyzer was used to observe the radio frequency spectrum with the transmitter operating through all normal modes with maximum output power. Data was taken per CFR47 paragraphs 2.1049 and applicable paragraphs of part 90. Refer to figures below showing plots of compliance to the emissions mask and occupied bandwidth measurements.

Test Arrangement



Results of Emissions Mask

Figure Number	Frequency (MHz)	Channel Width (MHz)	Results
11	4942.5	5 MHz	Complies
12	4967.5		Complies
13	4987.5		Complies
14	4945.0	10 MHz	Complies
15	4967.5		Complies
16	4985.0		Complies
17	4950.0	20 MHz	Complies
18	4965.0		Complies
19	4980.0		Complies

Requirements of CFR47 Paragraphs 2.1049, 90.210(m) are met. There are no deviations to the specifications.

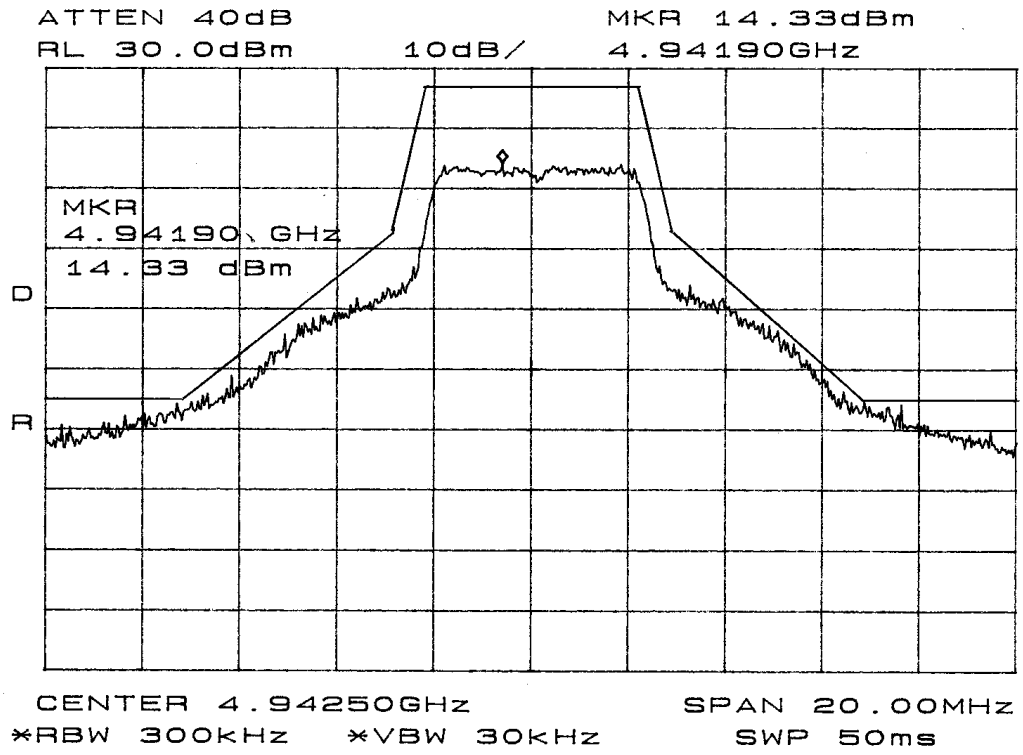


Figure 11 Emissions Mask Plot 5 MHz Channel Spacing Low Channel

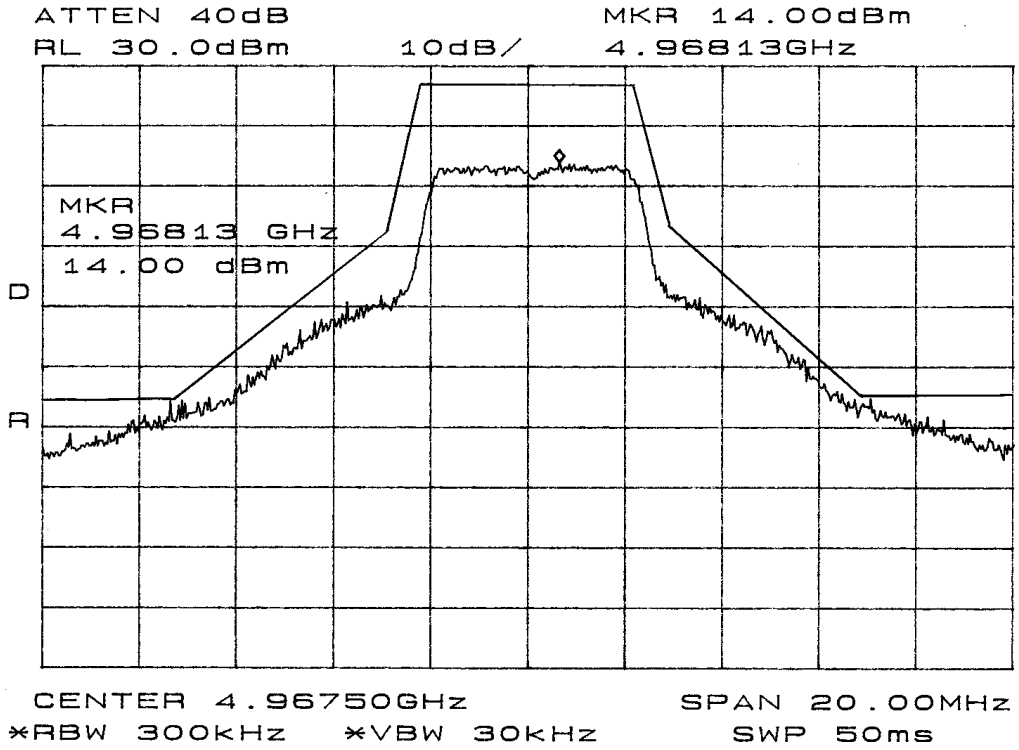


Figure 12 Emissions Mask Plot 5 MHz Channel Spacing Middle Channel

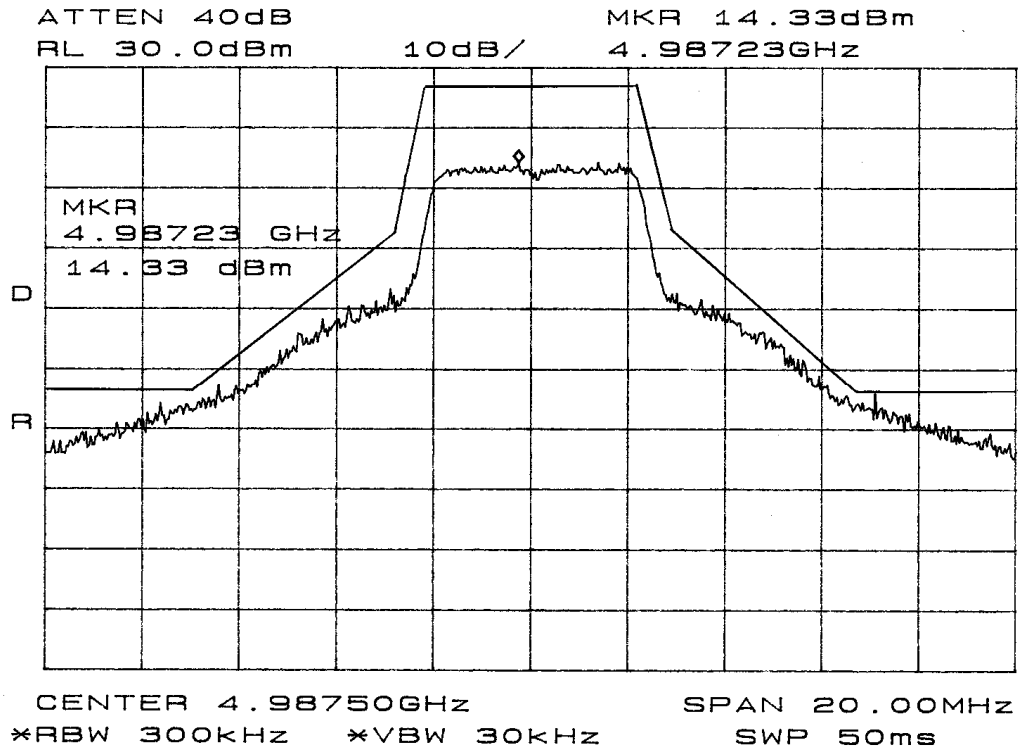


Figure 13 Emissions Mask Plot 5 MHz Channel Spacing High Channel

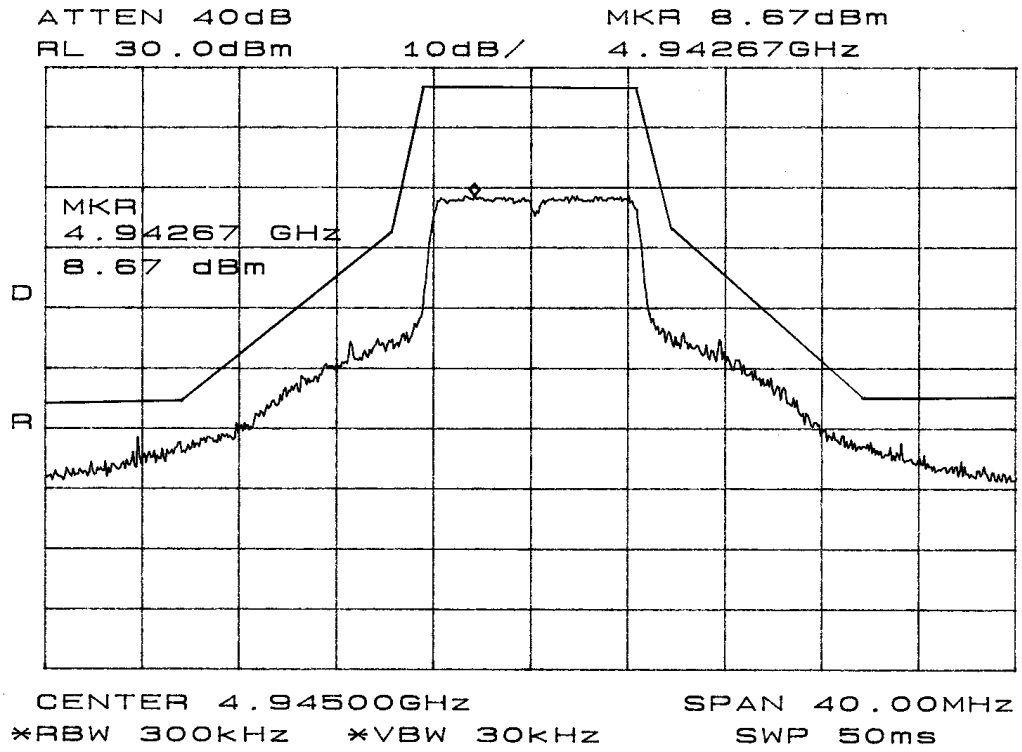


Figure 14 Emissions Mask Plot 10 MHz Channel Spacing Low Channel

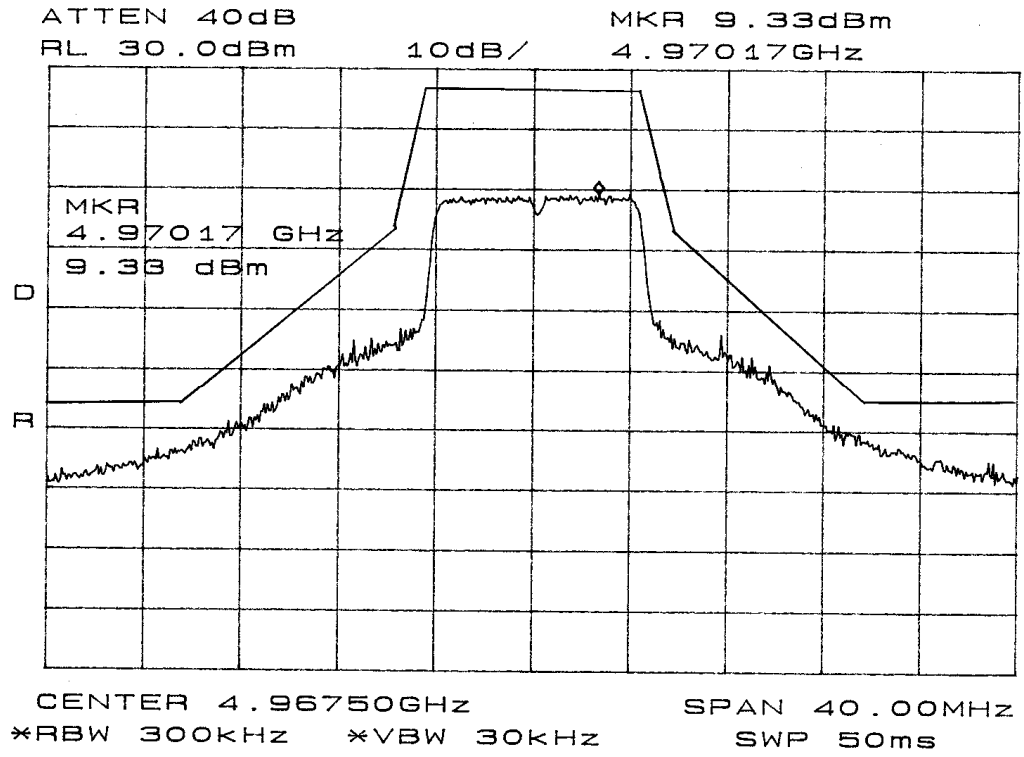


Figure 15 Emissions Mask Plot 10 MHz Channel Spacing Middle Channel

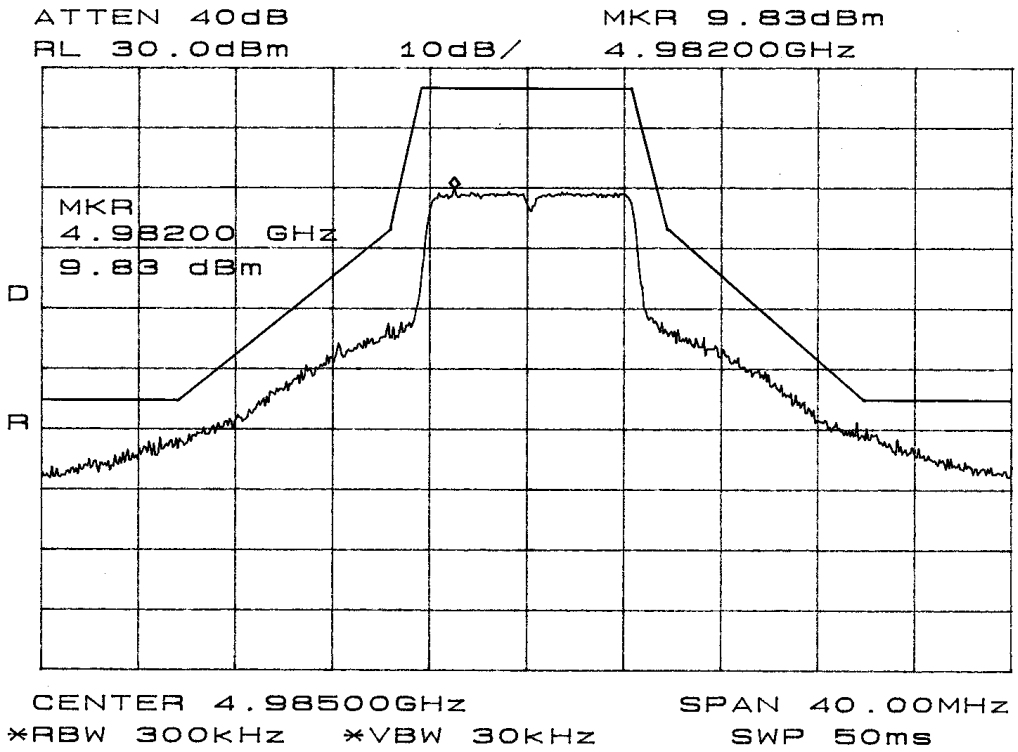


Figure 16 Emissions Mask Plot 10 MHz Channel Spacing High Channel

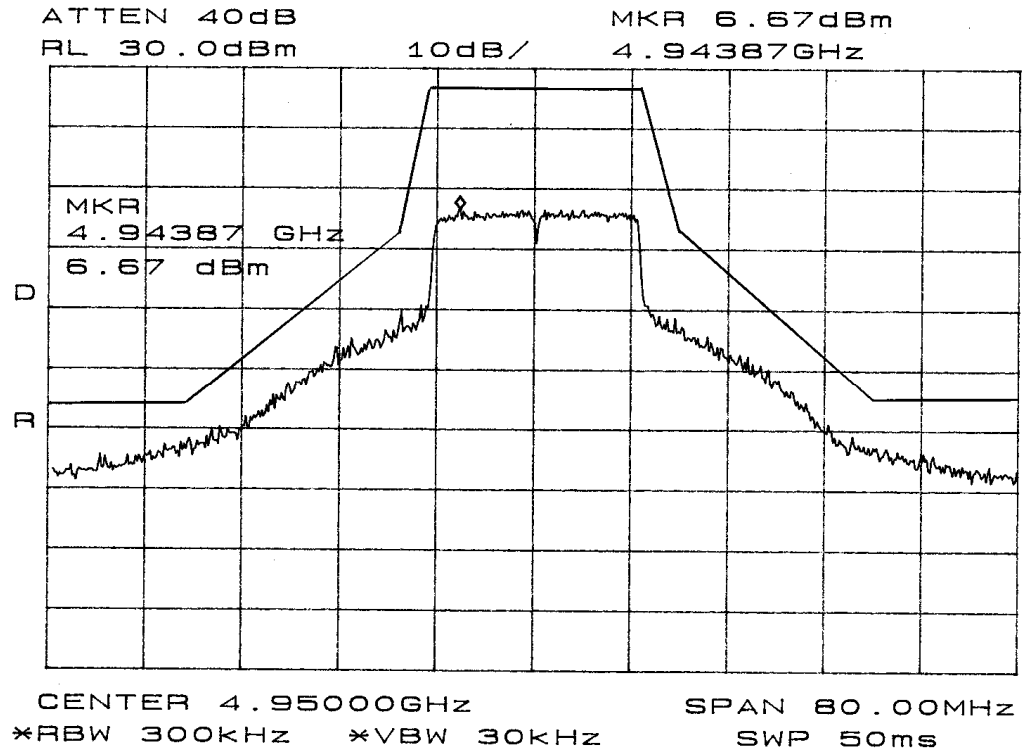


Figure 17 Emissions Mask Plot 20 MHz Channel Spacing Low Channel

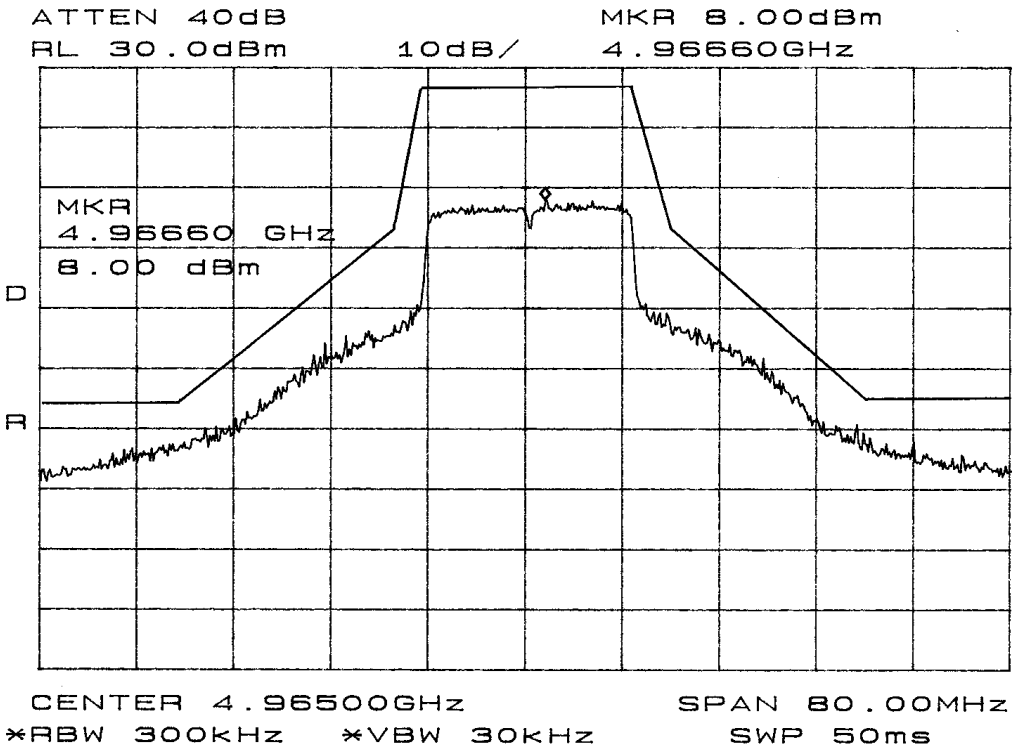


Figure 18 Emissions Mask Plot 20 MHz Channel Spacing Middle Channel

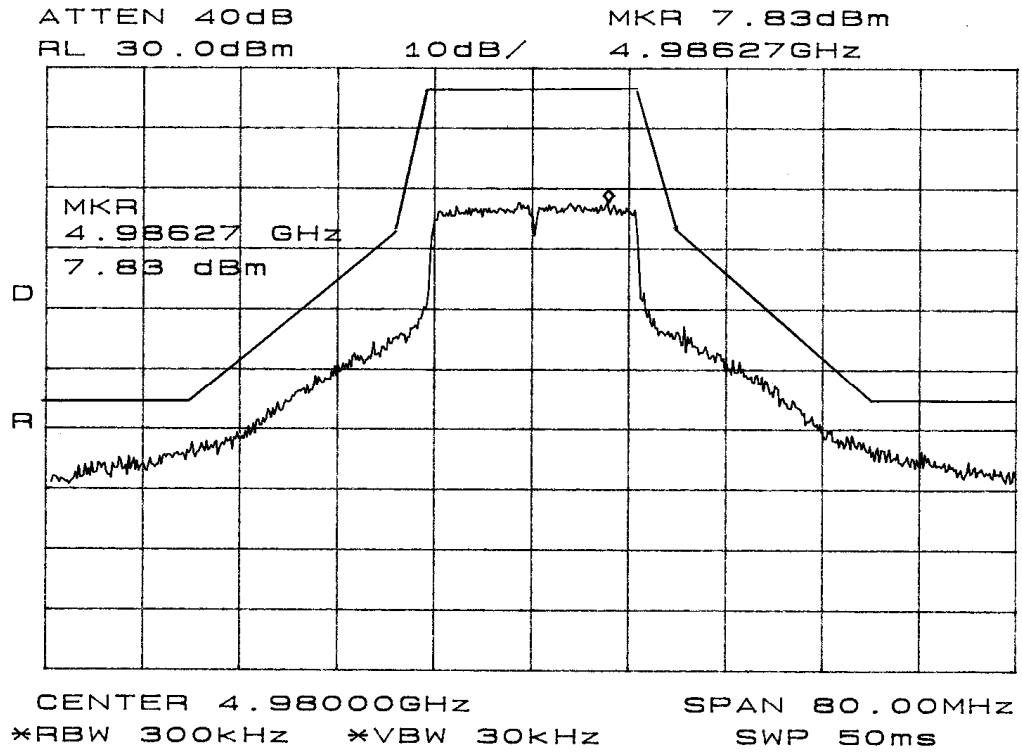


Figure 19 Emissions Mask Plot 20 MHz Channel Spacing High Channel

Results of Occupied Band Width

Figure Number	Frequency (MHz)	Channel Width (MHz)	Occupied Bandwidth (MHz)	Results
20	4942.5	5 MHz	4.27	Complies
21	4967.5		4.22	Complies
22	4987.5		4.22	Complies
23	4945.0	10 MHz	8.43	Complies
24	4967.5		8.43	Complies
25	4985.0		8.40	Complies
26	4950.0	20 MHz	16.6	Complies
27	4965.0		16.6	Complies
28	4980.0		16.6	Complies

Requirements of CFR47 Paragraphs 2.1049, 90.210(m) are met. There are no deviations to the specifications.

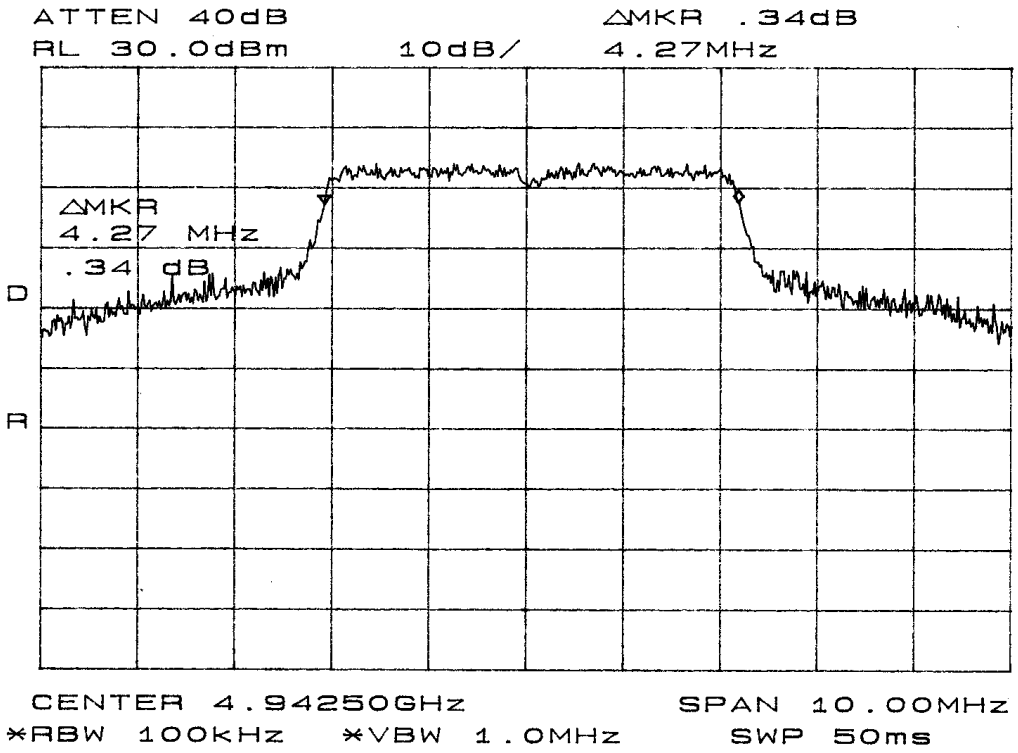


Figure 20 Occupied Bandwidth Plot 5 MHz Channel Spacing Low Channel

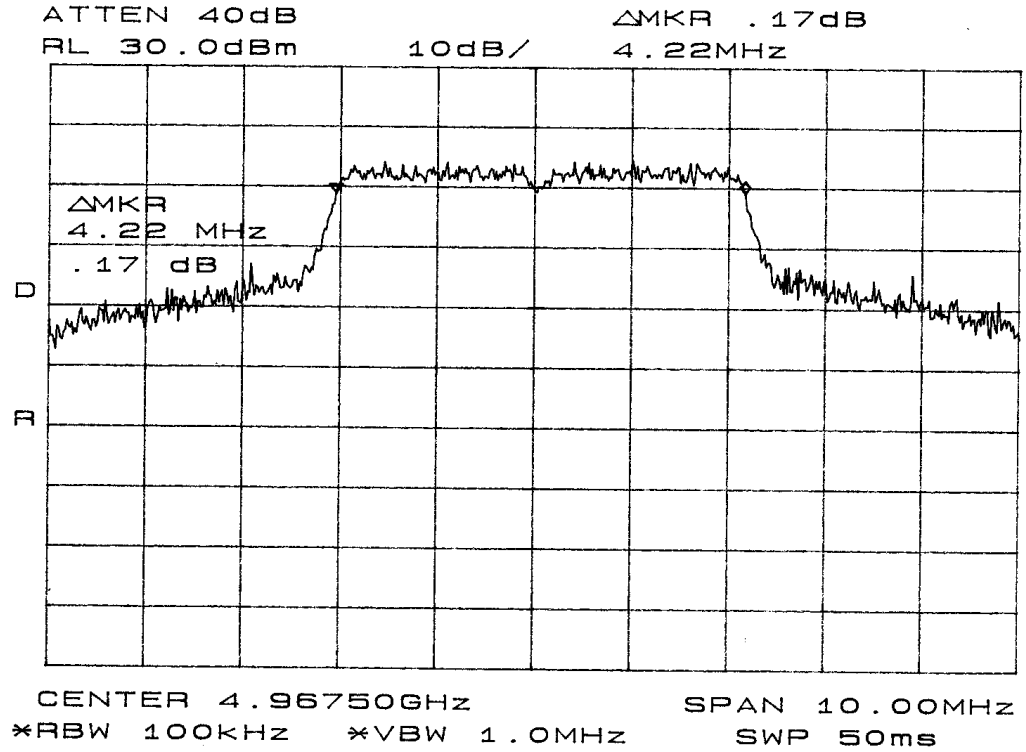


Figure 21 Occupied Bandwidth Plot 5 MHz Channel Spacing Middle Channel

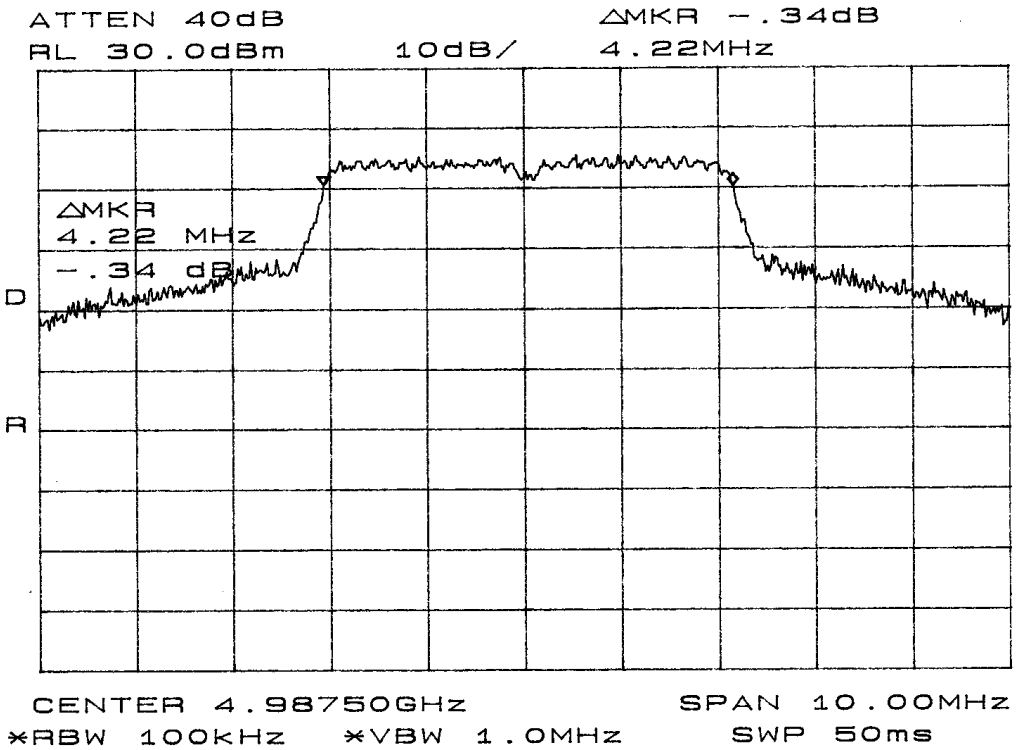


Figure 22 Occupied Bandwidth Plot 5 MHz Channel Spacing High Channel

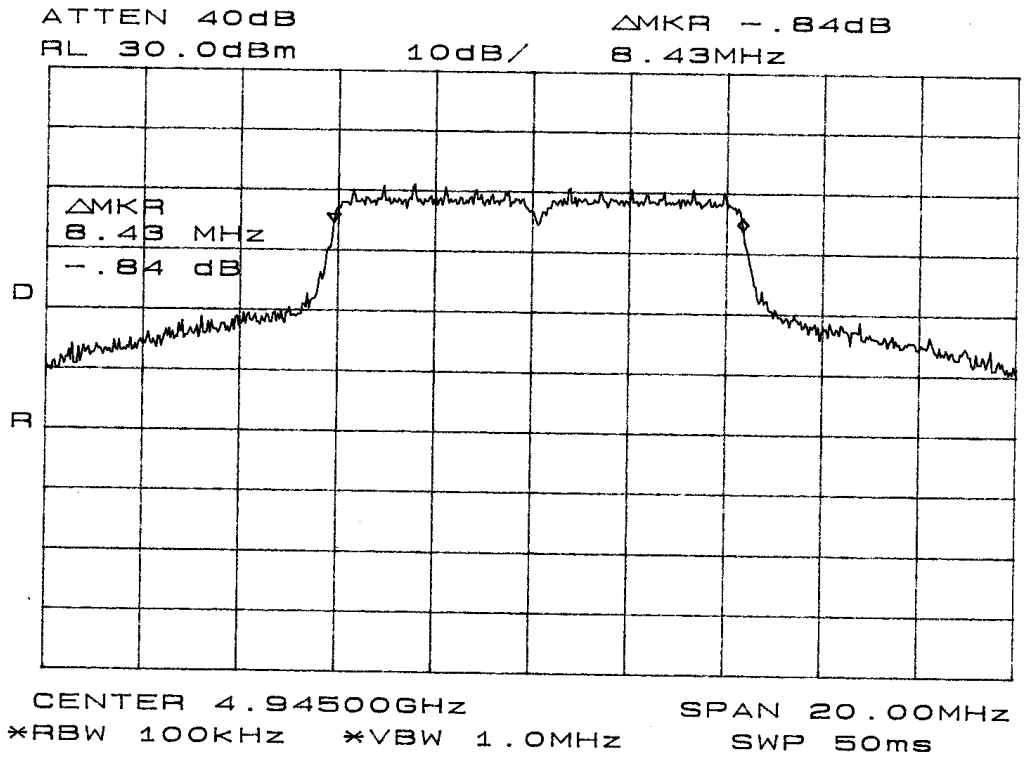


Figure 23 Occupied Bandwidth Plot 10 MHz Channel Spacing Low Channel

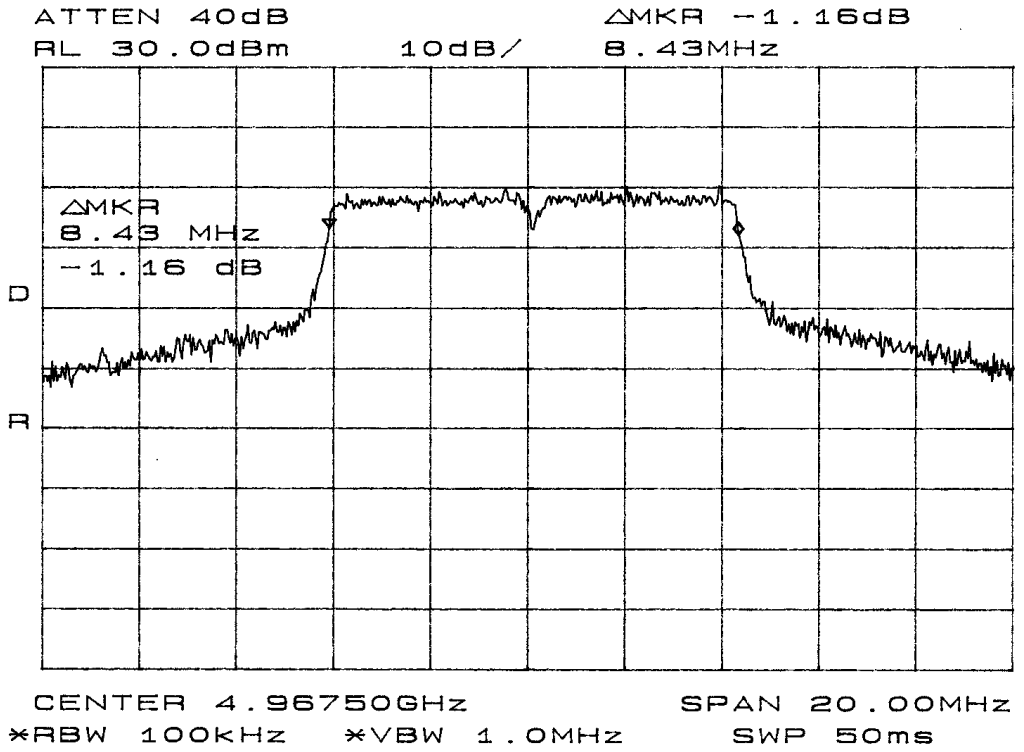


Figure 24 Occupied Bandwidth Plot 10 MHz Channel Spacing Middle Channel

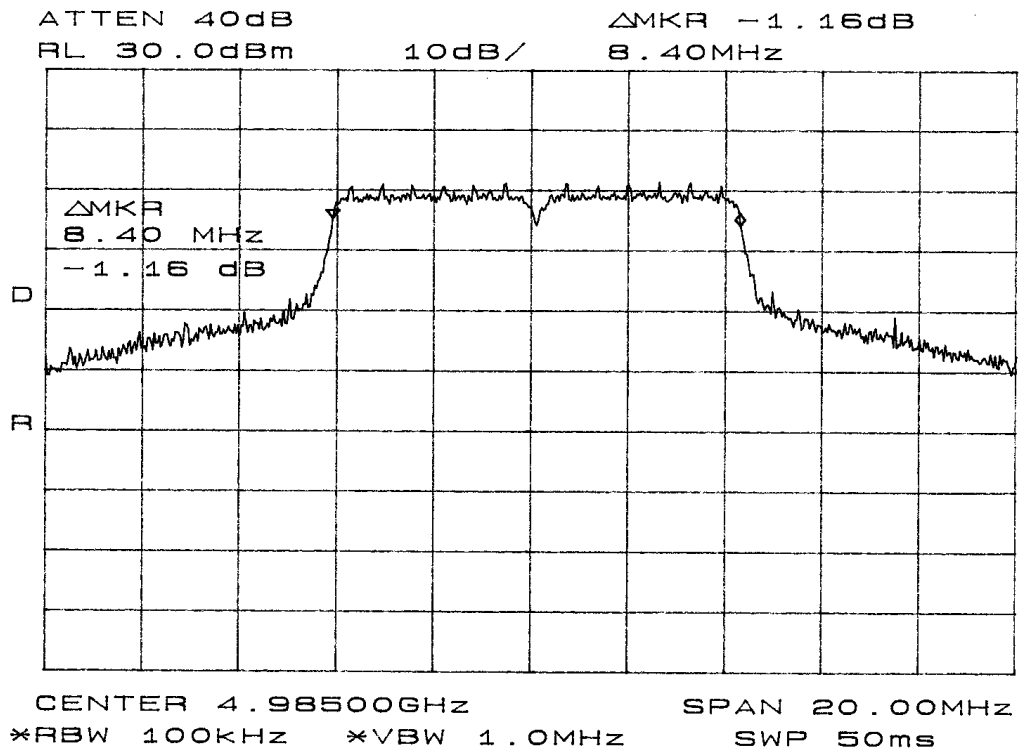


Figure 25 Occupied Bandwidth Plot 10 MHz Channel Spacing High Channel

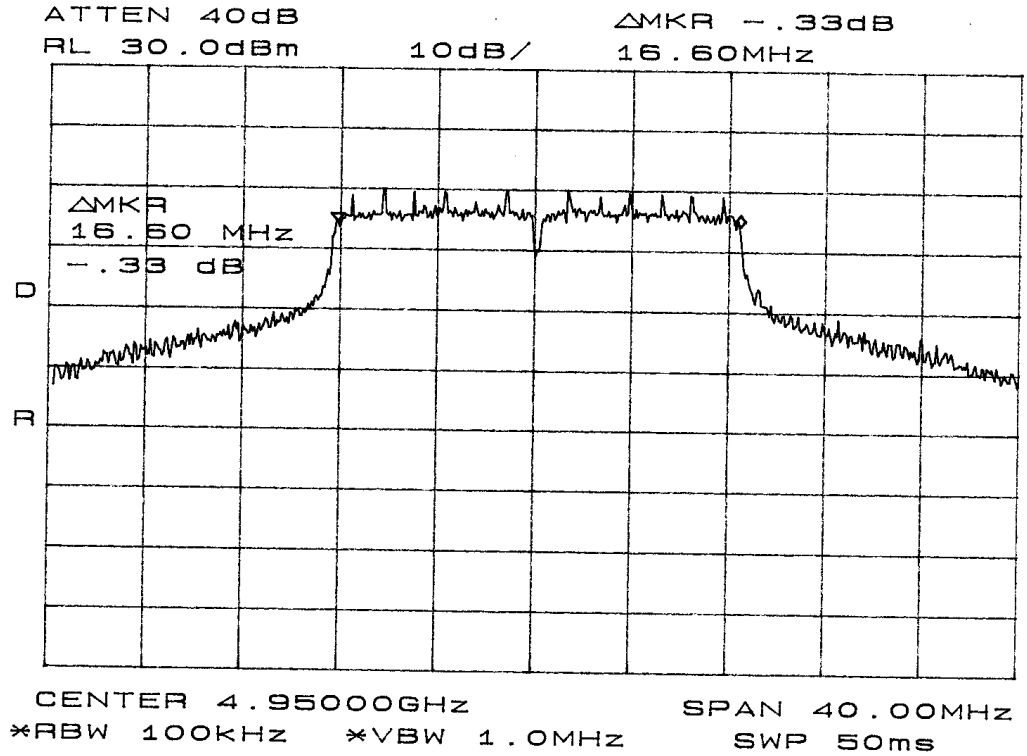


Figure 26 Occupied Bandwidth Plot 20 MHz Channel Spacing Low Channel

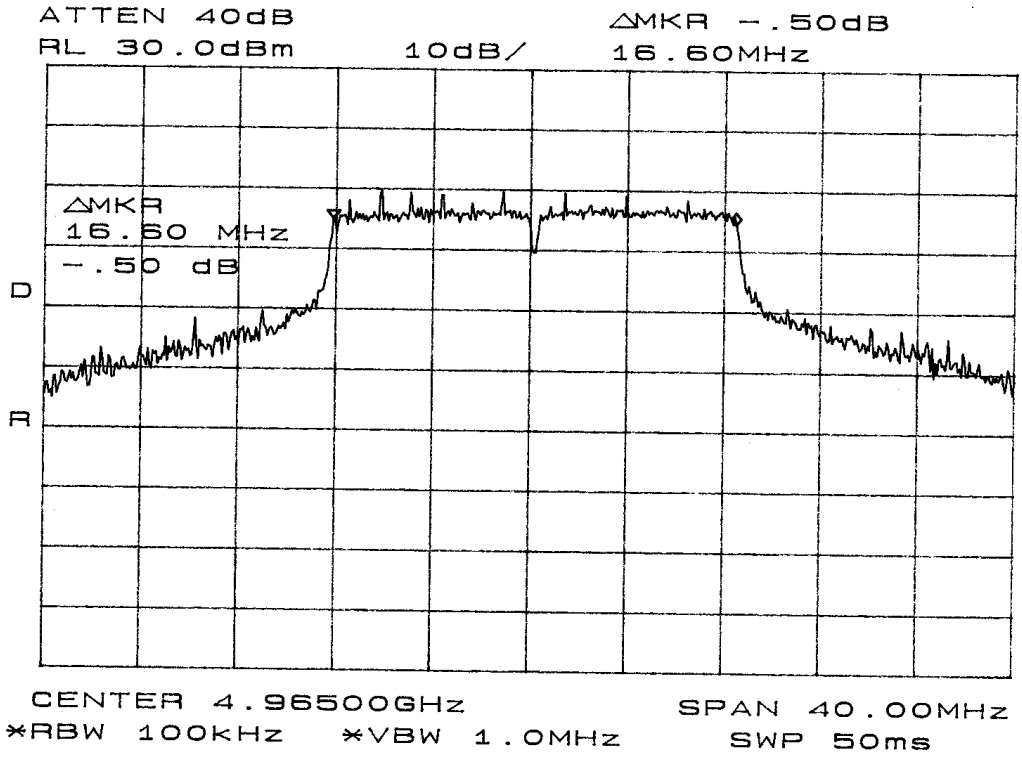


Figure 27 Occupied Bandwidth Plot 20 MHz Channel Spacing Middle Channel

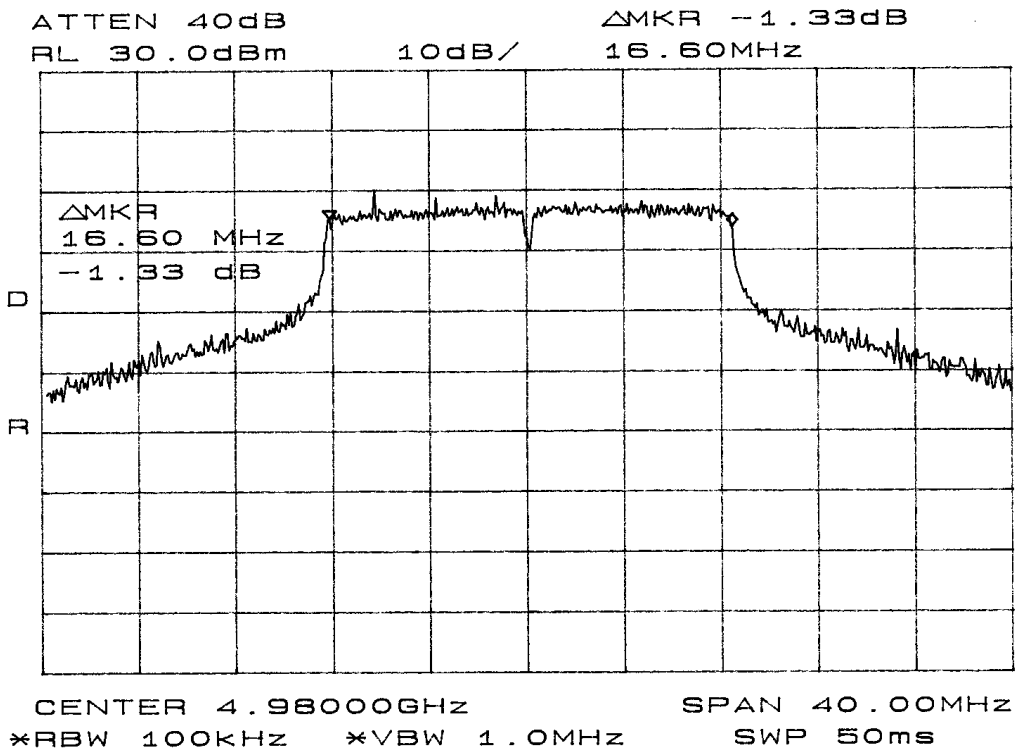


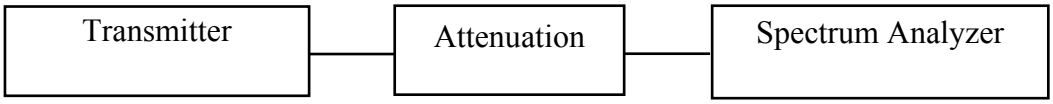
Figure 28 Occupied Bandwidth Plot 20 MHz Channel Spacing High Channel

2.1051 Spurious Emissions at Antenna Terminals

Measurements Required

As required by CFR47 paragraph 2.1051 spurious emissions at antenna terminal measurements were made at the radio frequency output terminals. The radio frequency output was coupled to a HP 8562A Spectrum Analyzer through 50 ohm attenuator and cable. The spectrum analyzer was used to observe the radio frequency spectrum with the transmitter operating through all normal modes with maximum output power. Data was taken per CFR47 paragraphs 2.1051 and applicable paragraphs of part 90. Refer to figures below showing plots demonstrating compliance to the spurious emissions at the antenna terminal measurements.

Test Arrangement



Requirements of CFR47 90.210 (m) (Emission Mask M) specify spurious emissions attenuated below the peak output power to a maximum 52 dBc.

Results of spurious emissions at Antenna Terminal

Figure Number	Frequency (MHz)	Channel Width (MHz)	Results
29	4967.5	5 MHz	Complies
30	4967.5	5 MHz	Complies
31	4967.5	10 MHz	Complies
32	4965.0	20 MHz	Complies

Data was taken per 2.1051 and applicable parts of Part 90. Specifications of Paragraphs 2.1051 and 90.210(m) are met. There are no deviations to the specifications.

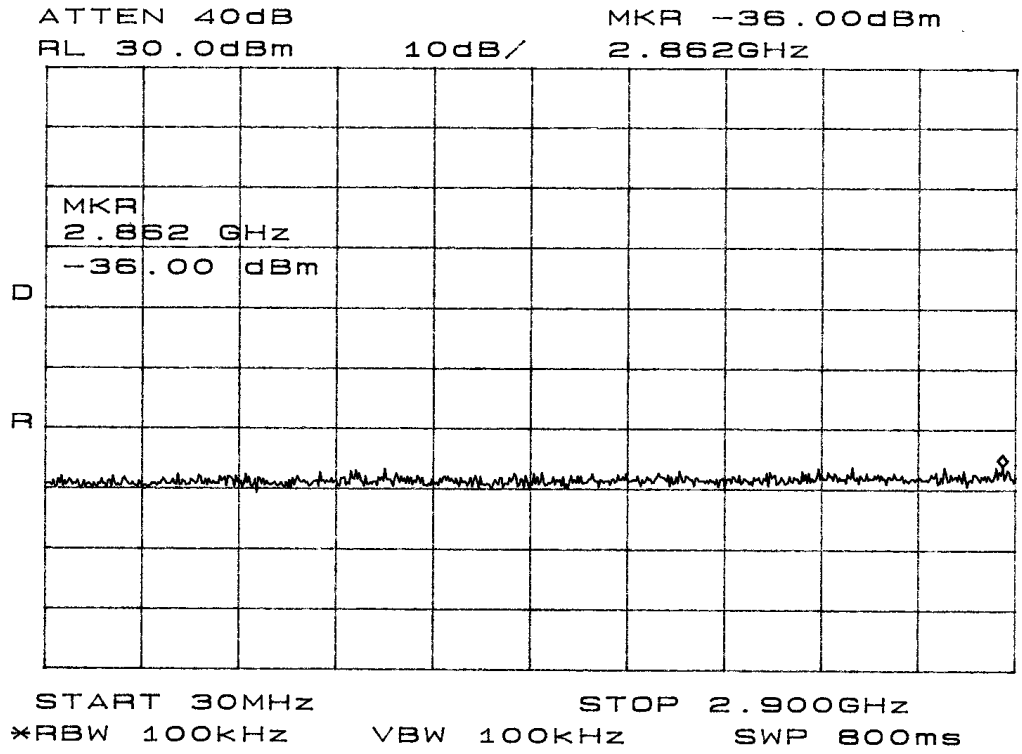


Figure 29 Spurious Emissions at Antenna Terminal Plot 5 MHz Channel Spacing

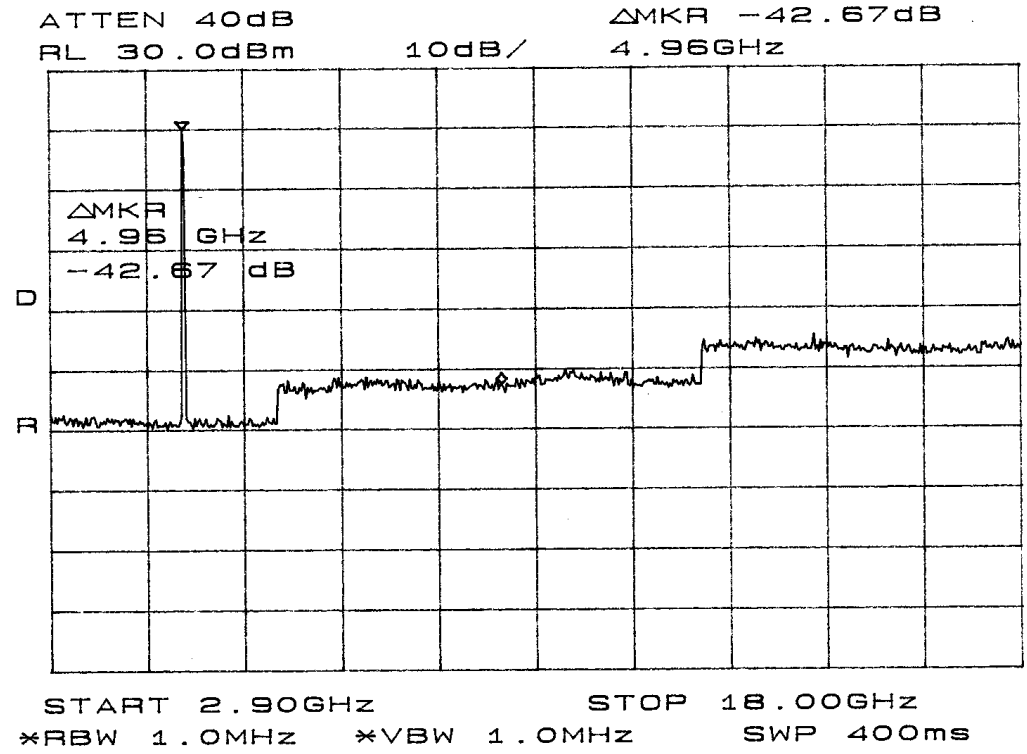


Figure 30 Spurious Emissions at Antenna Terminal Plot 5 MHz Channel Spacing

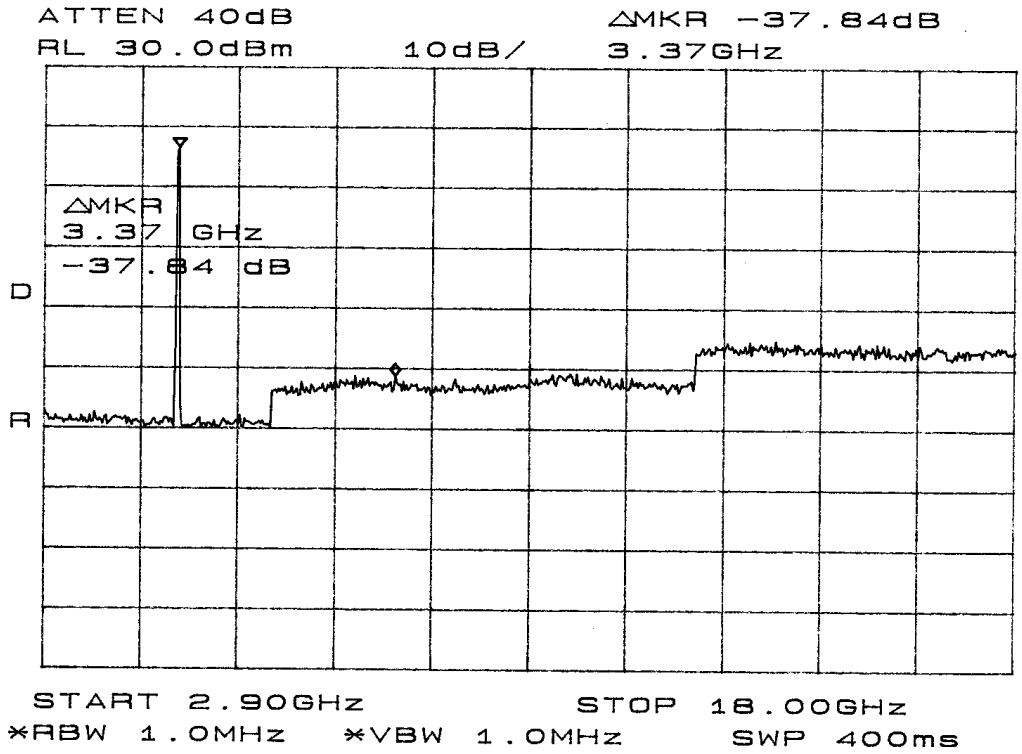


Figure 31 Spurious Emissions at Antenna Terminal Plot 10 MHz Channel Spacing

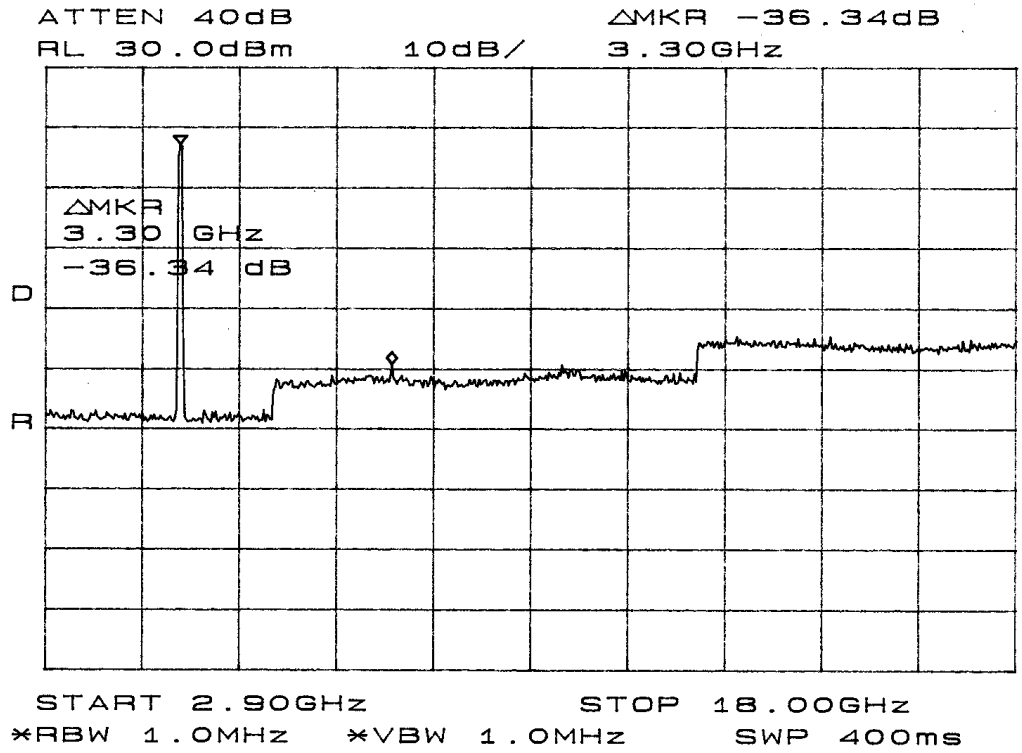


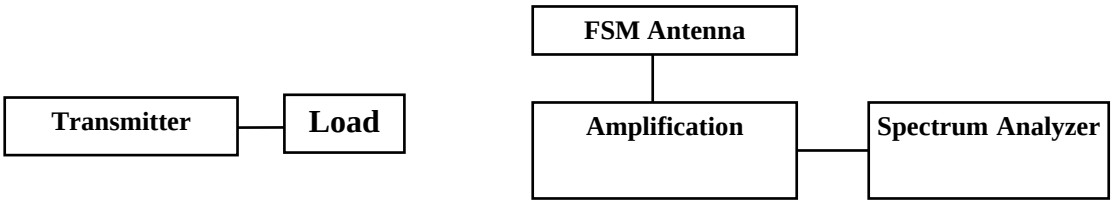
Figure 32 Spurious Emissions at Antenna Terminal Plot 20 MHz Channel Spacing

2.1053 Field Strength of Spurious Radiation

Measurements Required

As required by CFR47 paragraph 2.1053 field strength of radiated spurious emissions were made in accordance with procedures of TIA/EIA-603. Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation.

Test Arrangement



The antenna port of the equipment was connected to a resistive 50 ohm load and transmitting maximum output power during testing. The radio frequency energy was passively coupled to a HP 8562A Spectrum Analyzer through the field strength measurement (FSM) antenna and amplifier. The spectrum analyzer was used to observe the radio frequency spectrum with the transmitter operating through all normal modes. The frequency spectrum from 30 MHz to 60 GHz was observed and worst-case data recorded. The transmitter spurious emissions were measured at the 3 meter Open Area Test Site (OATS). The EUT was placed on a wooden turntable 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. The turntable was rotated though 360 degrees to locate the position registering the highest amplitude emission. The frequency spectrum was then searched for spurious emissions generated from the transmitter. Raising and lowering the FSM antenna and rotating the turntable to maximize the emission. Data was measured and recorded for the maximum amplitude of each spurious emission. A Biconilog antenna was used to measure radiated emissions for frequencies of 30 MHz to 1000 MHz, and/or a log periodic antenna for frequencies of 200 MHz to 5 GHz, and pyramidal horn antennas and or mixers for frequencies of 5 GHz to 60 GHz. The substitution method was used to measure harmonic spurious emissions. Emission levels from the EUT were measured and amplitude levels were recorded. The EUT transmitter was then removed and replaced with a substitution antenna, which was powered from a signal generator.

The output signal from the generator was then adjusted such that the amplitude received was the same as that previously recorded for each frequency. This step was repeated for both horizontal and vertical polarizations. The power in dBm required to produce the desired signal level was then recorded from the signal generator. The power in dBm was then calculated by reducing the previous readings by the gain in the substitution antenna. The testing procedures used conform to the procedures stated in the TIA/EIA-603 document. The limit requires the Amplitude of the spurious emission be attenuated by the calculated amount below the level of the fundamental. On any frequency removed from the assigned frequency outside the assigned band edges: at least 55 + 10 Log (P_o) dB or 50 dB whichever is lesser. The radiated spurious emission below the carrier in dB is calculated from the following equation:

Decibels below carrier = dBc
dBc = 10 Log_{10}[Tx power(W)/0.001] – signal level required to reproduce measured spurious emission.

Example dBc = 10 Log_{10}[0.5/0.001]-(-68.33) = 95.3 dBc

Results Field Strength of Spurious Radiation

5 MHz channel Spacing (Data taken at low, middle, and high channels of operation)							
Frequency of Emission	Amplitude of EUT Spurious emission observed		Signal level to substitution antenna required to reproduce		Emission level below carrier		Limit per 90.210
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	
(MHz)	dBµV	dBµV	dBm	dBm	dBc	dBc	dBc
9885.0	18.5	18.5	-68.3	-68.3	95.3	95.3	50
14827.5	26.0	24.8	-58.5	-59.7	85.5	86.7	50
9935.0	16.5	17.8	-70.3	-69.0	97.3	96.0	50
14902.5	25.1	23.8	-59.4	-60.7	86.4	87.7	50
9975.0	18.3	19.6	-68.5	-67.2	95.5	94.2	50
14962.5	24.3	23.7	-60.2	-60.8	87.2	87.8	50

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

10 MHz channel Spacing (Data taken at low, middle, and high channels of operation)							
Frequency of Emission	Amplitude of EUT Spurious emission observed		Signal level to substitution antenna required to reproduce		Emission level below carrier		Limit per 90.210
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	
(MHz)	dBµV	dBµV	dBm	dBm	dBc	dBc	dBc
9890.0	19.5	20.1	-67.3	-66.7	94.3	93.7	50
14835.0	24.5	24.8	-68.0	-59.7	87.0	86.7	50
9935.0	18.1	18.5	-68.7	-68.3	95.7	95.3	50
14902.5	24.6	23.8	-59.9	-60.7	86.9	87.7	50
9970.0	18.5	19.0	-68.3	-67.8	95.3	94.8	50
14955.0	24.7	24.2	-59.8	-60.3	86.8	87.3	50

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

20 MHz channel Spacing (Data taken at low, middle, and high channels of operation)							
Frequency of Emission	Amplitude of EUT Spurious emission observed		Signal level to substitution antenna required to reproduce		Emission level below carrier		Limit per 90.210
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	
(MHz)	dBµV	dBµV	dBm	dBm	dBc	dBc	dBc
9900.0	18.5	18.8	-68.3	-68.0	94.9	94.6	50
14850.0	25.5	25.0	-59.0	-59.5	85.6	86.1	50
9930.0	20.6	18.6	-66.2	-68.2	92.8	94.8	50
14895.0	24.8	23.8	-59.7	-60.7	86.3	87.3	50
9960.0	19.5	18.5	-67.3	-68.3	93.9	94.9	50
14940.0	24.3	25.0	-60.2	-59.5	86.8	86.1	50

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

Data was taken per 2.1053 and applicable parts of Part 90. Specifications of Paragraphs 2.1053, 2.1057 and 90.210(m) are met. There are no deviations to the specifications.

2.1055 Frequency Stability

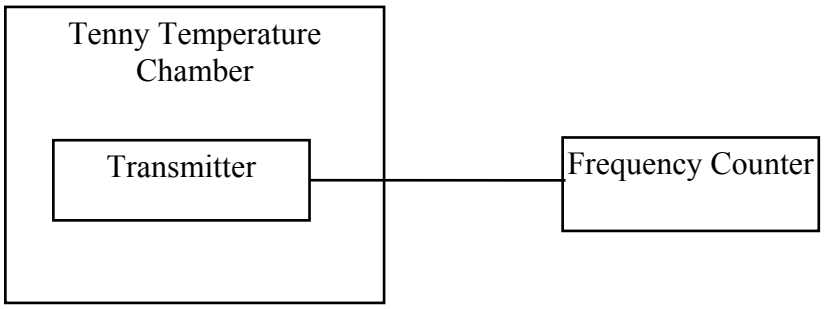
As required by CFR47 2.1055 frequency stability measurements were made at the radio frequency output terminals. The frequency stability shall be measured with variations of ambient temperature from -30° to +50° centigrade. Measurements shall be made at the extremes of the temperature range and at intervals of not more than 10° centigrade through the range. A period sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. In addition to temperature stability, the frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal.

(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, -30°C to +50°C in 10-degree increments.

The frequency stability was measured with variations in the power supply voltage from 85 to 115 percent of the nominal value. A DC power supply was used to vary the DC input voltage for the power input from 2.80 Vdc to 3.79 Vdc. The frequency was measured and the variation in parts per million was calculated. Data was taken per CFR47 Paragraphs 2.1055 and applicable paragraphs of part 90.213.

Frequency Stability Data

Frequency 4967.5 (MHz)	Frequency Stability Vs Temperature In Parts Per Million (PPM)								
Temperature °C	-30	-20	-10	0	10	20	30	40	50
Change (Hz)	-38800.0	-15500.0	-14200.0	-13700.0	-1500.0	0.0	5000.0	4700.0	5100.0
PPM	-7.81	-3.12	-2.86	-2.76	-0.30	0.00	1.01	0.95	1.03

Note: Limit per 90.213 frequencies above 2450 MHz, no specification listed. Data reported per requirement.

Frequency 4967.5MHz	Frequency Stability Vs Voltage Variation 3.3 DC volts nominal; Results In PPM		
Input Voltage	2.80	3.30	3.79
Change (HZ)	0.0	0.0	0.0

Specifications of CFR47 Paragraphs 2.1055 and applicable paragraphs of part 90.213 are met.

There are no deviations or exceptions to the specifications.

Annex

- Annex A Measurement Uncertainty Calculations
- Annex B Test Equipment List
- Annex C Rogers Qualifications
- Annex D FCC Site Registration Letter
- Annex E Industry Canada Site Registration Letter

Annex A Measurement Uncertainty Calculations

Radiated Emissions Measurement Uncertainty Calculation

Measurement of vertically polarized radiated field strength over the frequency range 30 MHz to 1 GHz on an open area test site at 3m and 10m includes following uncertainty:

Contribution	Probability Distribution	Uncertainty (dB)
Antenna factor calibration	normal (k = 2)	±0.58
Cable loss calibration	normal (k = 2)	±0.2
Receiver specification	rectangular	±1.0
Antenna directivity	rectangular	±0.1
Antenna factor variation with height	rectangular	±2.0
Antenna factor frequency interpolation	rectangular	±0.1
Measurement distance variation	rectangular	±0.2
Site Imperfections	rectangular	±1.5

Combined standard uncertainty $u_c(y)$ is

$$U_c(y) = \pm \sqrt{\left[\frac{1.0}{2}\right]^2 + \left[\frac{0.2}{2}\right]^2 + \left[\frac{1.0^2 + 0.1^2 + 2.0^2 + 0.1^2 + 0.2^2 + 1.5^2}{3}\right]}$$

$U_c(y) = \pm 1.6$ dB

It is probable that $u_c(y) / s(q_k) > 3$, where $s(q_k)$ is estimated standard deviation from a sample of n readings unless the repeatability of the EUT is particularly poor, and a coverage factor of k = 2 will ensure that the level of confidence will be approximately 95%, therefore:

$$s(q_k) = \sqrt{\frac{1}{(n-1)} \sum_{k-1}^{n} (q_k - \bar{q})^2}$$

$U = 2\ U_c(y) = 2 \times \pm 1.6$ dB $= \pm 3.2$ dB

Notes:

1.1 Uncertainties for the antenna and cable were estimated, based on a normal probability distribution with k = 2.

1.2 The receiver uncertainty was obtained from the manufacturer's specification for which a rectangular distribution was assumed.

1.3 The antenna factor uncertainty does not take account of antenna directivity.

1.4 The antenna factor varies with height and since the height was not always the same in use as when the antenna was calibrated an additional uncertainty is added.

1.5 The uncertainty in the measurement distance is relatively small but has some effect on the received signal strength. The increase in measurement distance as the antenna height is increased is an inevitable consequence of the test method and is therefore not considered a contribution to uncertainty.

1.6 Site imperfections are difficult to quantify but may include the following contributions:
-Unwanted reflections from adjacent objects.
-Ground plane imperfections: reflection coefficient, flatness, and edge effects.
-Losses or reflections from "transparent" cabins for the EUT or site coverings.
-Earth currents in antenna cable (mainly effect biconical antennas).

The specified limits for the difference between measured site attenuation and the theoretical value (± 4 dB) were not included in total since the measurement of site attenuation includes uncertainty contributions already allowed for in this budget, such as antenna factor.

Conducted Measurements Uncertainty Calculation

Measurement of conducted emissions over the frequency range 9 kHz to 30 MHz includes following uncertainty:

Contribution	Probability Distribution	Uncertainty (dB)
Receiver specification	rectangular	±1.5
LISN coupling specification	rectangular	±1.5
Cable and input attenuator calibration	normal (k=2)	±0.5

Combined standard uncertainty $u_c(y)$ is

$$U_c(y) = \pm \sqrt{\left[\frac{0.5}{2}\right]^2 + \frac{1.5^2 + 1.5^2}{3}}$$

$U_c(y) = \pm 1.2$ dB

As with radiated field strength uncertainty, it is probable that $u_c(y) / s(q_k) > 3$ and a coverage factor of k = 2 will suffice, therefore:

$U = 2\ U_c(y) = 2 \times \pm 1.2$ dB $= \pm 2.4$ dB

Annex B 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.

List of Test Equipment	Calibration Date
Oscilloscope Scope: Tektronix 2230	2/08
Wattmeter: Bird 43 with Load Bird 8085	2/08
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140	2/08
H/V Power Supply: Fluke Model: 408B (SN: 573)	2/08
R.F. Generator: HP 606A	2/08
R.F. Generator: HP 8614A	2/08
R.F. Generator: HP 8640B	2/08
Spectrum Analyzer: HP 8562A, Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W HP Adapters: 11518, 11519, 11520	5/08
Spectrum Analyzer: HP 8591EM	5/08
Frequency Counter: Leader LDC825	2/08
Antenna: EMCO Biconilog Model: 3143	5/08
Antenna: EMCO Log Periodic Model: 3147	10/08
Antenna: Antenna Research Biconical Model: BCD 235	10/08
Antenna: EMCO Dipole Set 3121C	2/08
Antenna: C.D. B-101	2/08
Antenna: Solar 9229-1 & 9230-1	2/08
Antenna: EMCO 6509	2/08
Audio Oscillator: H.P. 201CD	2/08
R.F. Power Amp 65W Model: 470-A-1010	2/08
R.F. Power Amp 50W M185- 10-501	2/08
R.F. PreAmp CPPA-102	2/08
LISN 50 µHy/50 ohm/0.1 µf	10/08
LISN Compliance Eng. 240/20	2/08
LISN Fischer Custom Communications FCC-LISN-50-16-2-08	2/08
Peavey Power Amp Model: IPS 801	2/08
Power Amp A.R. Model: 10W 1010M7	2/08
Power Amp EIN Model: A301	2/08
ELGAR Model: 1751	2/08
ELGAR Model: TG 704A-3D	2/08
ESD Test Set 2010i	2/08
Fast Transient Burst Generator Model: EFT/B-101	2/08
Current Probe: Singer CP-105	2/08
Current Probe: Solar 9108-1N	2/08
Field Intensity Meter: EFM-018	2/08
KEYTEK Ecat Surge Generator	2/08
Shielded Room 5 M x 3 M x 3.0 M	

Annex C Qualifications

Scot D. Rogers, Engineer

Rogers Labs, Inc.

Mr. Rogers has approximately 17 years experience in the field of electronics. Working experiences include six years in the automated controls industry and the remaining 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

NVLAP Lab Code: 200087-0

Annex D FCC Site Registration Letter

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

June 18, 2008

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: June 18, 2008

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
Industry Analyst

NVLAP Lab Code: 200087-0

Annex E Industry Canada Site Registration Letter

Industry Canada Industrie Canada

July 29th, 2008

OUR FILE: 46405-3041
Submission No: 127059

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

Attention: Scot D. Rogers

Dear Sir/Madame:

The Bureau has received your application for the registration / renewal of a 3/10m OATS. Be advised that the information received was satisfactory to Industry Canada. The following number(s) is now associated to the site(s) for which registration / renewal was sought **(3040A-1).** Please reference the appropriate site number in the body of test reports containing measurements performed on the site. In addition, please be informed that the Bureau is now utilizing a **new site numbering scheme** in order to simplify the electronic filing process. Our goal is to reduce the number of secondary codes associated to one particular company. The following changes have been made to your records.

Your primary code is: **3041**
The company number associated to the site(s) located at the above address is: **3041A**
The table below is a summary of the changes made to the unique site registration number(s):

New Site Number	Obsolete Site Number	Description of Site	Expiry Date (YYYY-MM-DD)
3041A-1	3041-1	3 / 10m OATS	2010-07-29

Furthermore, to obtain or renew a unique site number, the applicant shall demonstrate that the site has been accredited to ANSI C63.4-2003 or later. A scope of accreditation indicating the accreditation by a recognized accreditation body to ANSI C63.4-2003 shall be accepted. Please indicate in a letter the previous assigned site number if applicable and the type of site (example: 3 meter OATS or 3 meter chamber). If the test facility is not accredited to ANSI C63.4-2003 or later, the test facility shall submit test data demonstrating full compliance with the ANSI standard. The Bureau 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. There is no fee or form associated with an OATS filing. OATS submissions are encouraged to be submitted electronically to the Bureau using the following URL;

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

Yours sincerely,

S. Proulx Wireless Laboratory
Manager Certification and
Engineering Bureau Industry Canada
3701 Carling Ave., Building 94
Ottawa, Ontario K2H 8S2
Canada

Canada