

PART 4 - OCCUPIED BANDWIDTH per FCC PART 2, SECTION 47 CFR §2.1049

4.1. Configuration and Procedure

4.1.1 EUT Configuration

The EUT is set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-1992. The measurement instrumentation used was an Hewlett Packard 8566B Spectrum Analyzer with detector and bandwidth parameters as stipulated in C63.4-1992. EUT was 12Vdc powered.

4.1.2 Test Procedure

The Transmitter was placed on the test table. The EUT was configured for maximum response and was set up as described above and configured to transmit continuously. Signal was monitored with an HP 8566B Spectrum Analyzer, using the EMCO Horn Antenna, model # 3115. Unless stated otherwise, the antenna to EUT distance was 1 meter.

4.1.3 Spectrum Analyzer Configuration (During Swept Frequency Scans)

Start Frequency	2,425MHz
Stop Frequency.....	2,430MHz
Sweep Speed	Manual
RES Bandwidth.....	1MHz
Video Bandwidth	1MHz
Quasi Peak Adapter Mode	Bypass
Quasi Peak Adapter Bandwidth	Disabled

4.2. Bandwidth Test per FCC Part 2, Section §2.1049

**20dB Bandwidth Plot Performed at 1 Meter Distance
(Please see initial plot forwarded with application in May)**

PART 5 - FREQUENCY STABILITY TEST per FCC PART 2, SECTION 47 CFR §2.1055

5.1. Configuration and Procedure

5.1.1 EUT Configuration

The EUT is set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-1992. The measurement instrumentation used was an Hewlett Packard 8566B Spectrum Analyzer with detector and bandwidth parameters as stipulated in C63.4-1992. EUT was powered by a dc power supply.

5.1.2 Test Procedure

The Transmitter was placed in the temperature control chamber. The EUT was configured for maximum response and was set up as described above and configured to transmit continuously. The input voltage was varied from 10.2 to 13.8 vdc. Frequency stability was monitored with the HP 8566B Spectrum Analyzer, below and above the center frequencies using an appropriate receiving antenna.

5.1.3 Data Table Legend and Field Strength Calculation

'Margin' indicates the degree of compliance with the applicable limit. For example, a margin of -8 dB means that the emissions is 8 dB below the limit (in compliance); a margin of +4 dB means that the emission is 4 dB over the limit (out of compliance). The margin calculated as follows:

Margin = Corrected Amplitude - Limit; where Corrected Amplitude = Amplitude + Antenna Correction Factor + Cable Loss

A = Average
P = Peak
Q = Quasi Peak

5.1.4 Spectrum Analyzer Configuration (During Swept Frequency Scans)

Start Frequency	2,4370MHz
Stop Frequency.....	2,4374MHz
Sweep Speed	Manual
RES Bandwidth.....	1MHz
Video Bandwidth	1MHz
Quasi Peak Adapter Mode	Bypass

5.2. FREQUENCY STABILITY TEST per FCC PART 2, SECTION 47 CFR §2.1055

5.2.3 Test Results

Temperature	-30 ⁰ C	-30 ⁰ C	-30 ⁰ C	-30 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43733	2.43717	2.43707	2.43707

Temperature	-20 ⁰ C	-20 ⁰ C	-20 ⁰ C	-20 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43732	2.43717	2.43707	2.43707

Temperature	-10 ⁰ C	-10 ⁰ C	-10 ⁰ C	-10 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43732	2.43719	2.43707	2.43707

Temperature	0 ⁰ C	0 ⁰ C	0 ⁰ C	0 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43732	2.43719	2.43707	2.43707

Temperature	10 ⁰ C	10 ⁰ C	10 ⁰ C	10 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43730	2.43720	2.43709	2.43709

Temperature	22 ⁰ C	22 ⁰ C	22 ⁰ C	22 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43730	2.43720	2.43710	2.43709

Temperature	30 ⁰ C	30 ⁰ C	30 ⁰ C	30 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43731	2.43719	2.43710	2.43709

Temperature	40 ⁰ C	40 ⁰ C	40 ⁰ C	40 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43731	2.43719	2.43709	2.43709

Temperature	50 ⁰ C	50 ⁰ C	50 ⁰ C	50 ⁰ C
Time	Start Up	2 minutes	5 minutes	10 minutes
Frequency (GHz)	2.43734	2.43720	2.43709	2.43709

Table 5.2.3 Stability Test for Transmitter, model TX-01H

Conclusion: The EUT meets the requirements of the test reference for Frequency Stability

PART 6 - RF POWER OUTPUT per FCC PART 2, SECTION 47 CFR §2.1046

6.1. CONFIGURATION AND PROCEDURE

6.1.1 EUT Configuration

The EUT is set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-1992. The measurement instrumentation used was an Hewlett Packard 8566B Spectrum Analyzer with detector and bandwidth parameters as stipulated in C63.4-1992. EUT was 12Vdc powered.

6.1.2 Test Procedure

The Transmitter was placed on the test table. The EUT was configured for maximum response and was set up as described above and configured to transmit continuously. Signal was monitored with an HP 8566B Spectrum Analyzer, using the EMCO Horn Antenna, model # 3115. Unless stated otherwise, the antenna to EUT distance was 1 meter. The RF power output = Measured value + antenna correction + cable correction + distance correction, or $-41.5 \text{ dBm} + 27.1 \text{ dB} + 1.6 \text{ dB} + 9.5 \text{ dB} = -3.3 \text{ dBm}$

6.1.3 Spectrum Analyzer Configuration (During Swept Frequency Scans)

Start Frequency 2,424.4MHz
Stop Frequency 2,429.4MHz
Sweep Speed Manual
RES Bandwidth 1MHz
Video Bandwidth 1MHz
Quasi Peak Adapter Mode Bypass
Quasi peak Adapter Bandwidth Disabled

**6.2. RF POWER OUTPUT
per FCC PART 2, SECTION §2.1046**

RF Power Output Plot

(Please see initial plot forwarded with application in May)

**PART 7 - OPEN FIELD ANTENNA TERMINAL SPURIOUS
AND HARMONIC EMISSIONS
per FCC PART 2, SECTION 47 CFR §2.1051**

7.1. CONFIGURATION AND PROCEDURE

7.1.1 EUT Configuration

The EUT is set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-1992. The measurement instrumentation used was an Hewlett Packard 8566B Spectrum Analyzer with detector and bandwidth parameters as stipulated in C63.4-1992. At frequencies above 1GHz, average measurements, if necessary, were made using the video filter method and quasi peak detector and preselector functions were disabled. EUT was powered by a 12Vdc adapter.

7.1.2 Test Procedure

The Transmitter was placed on the test table. The EUT was configured for maximum response and was set up as described above and configured to transmit continuously. Signal strength were monitored at an HP 8566B Spectrum Analyzer, below and above the center frequencies using an appropriate receiving antenna. Maximum emissions was obtained by varying the height of the antennas and then orienting the turntable in 360-degree turns with the analyzer in the manual mode. Unless stated otherwise, the antenna to EUT distance was 3 meters.

Any multiple entries cover the two orientations of the transmitters and cover all three axes due to rotation of the test table and EUT and are the maximum signals resulting from rotation and height search at each frequency. The measurements are quasi-peak measurements below 1000MHz and average measurements above 1000 MHz.

7.1.3 Spectrum Analyzer Configuration (During Swept Frequency Scans)

Start Frequency	30 MHz
Stop Frequency	26,700MHz
Sweep Speed	Auto
RES Bandwidth	100 Khz below 1,000 Mhz
	1 Mhz above 1,000 MHz
Video Bandwidth	100 Khz below 1,000 Mhz
	1 Mhz above 1,000 MHz
Quasi Peak Adapter Mode	Normal
Quasi peak Adapter Bandwidth	Auto

7.2.3 Test Results

The table below shows a summary of the highest amplitudes of the spurious emissions from the equipment under test at various antenna heights, antenna polarizations, and EUT orientations.

Freq. GHz	Ampl. dBuV	Cable Loss dB	Ant. Loss dB	Corr. Ampl. dBuV	Limit dBuV	Margin dBuV	Polarization	Type of Emissions	Measurement
4.8538	-39.33	6.52	34.8	1.99	53.97	-51.98	Vertical	Harmonics	Avg.
7.2807	-47.42	11.50	37.9	1.98	53.97	-51.99	Vertical	Harmonics	Avg.
9.7076	-50.0	28.6	37.9	16.5	53.97	-37.47	Vertical	Harmonics	Avg.
12.1345	-50.0	38.4	39.4	27.8	53.97	-26.17	Vertical	Harmonics	Avg.
14.5614	-50.0	45.1	41.8	36.9	53.97	-17.07	Vertical	Harmonics	Avg.
16.9883	-50.0	50.0	44.4	44.4	53.97	-9.57	Vertical	Harmonics	Avg.

Table 7.2.3 Antenna Terminal Spurious and Harmonic Emissions

Freq. GHz	Ampl. dBuV	Cable Loss dB	Ant. Loss dB	Corr. Ampl. dBuV	Limit dBuV	Margin dBuV	Polarization	Type of Emissions	Measurement
4.8538	-38.44	6.52	34.8	2.88	53.97	-51.09	Horizontal	Harmonics	Avg.
7.2807	-44.21	11.50	37.9	5.19	53.97	-48.78	Horizontal	Harmonics	Avg.
9.7076	-50.0	28.6	37.9	16.5	53.97	-37.47	Horizontal	Harmonics	Avg.
12.1345	-50.0	38.4	39.4	27.8	53.97	-26.17	Horizontal	Harmonics	Avg.
14.5614	-50.0	45.1	41.8	36.9	53.97	-17.07	Horizontal	Harmonics	Avg.
16.9883	-50.0	50.0	44.4	44.4	53.97	-9.57	Horizontal	Harmonics	Avg.

Table 7.2.4 Antenna Terminal Spurious and Harmonic Emissions

No emissions of significant levels were observed between 9KHz and the lowest frequencies shown in the above data. No emissions of significant levels were observed between the highest frequency shown in the above data and 26,700 MHz.

Conclusion: The EUT meets the requirements of the test reference for Antenna Terminal Spurious and Harmonic Emissions.

**PART 8 - OPEN FIELD RADIATED HARMONIC
AND SPURIOUS EMISSIONS
per FCC PART 2, SECTION 47 CFR §2.1053**

8.1. CONFIGURATION AND PROCEDURE

8.1.1 EUT Configuration

The EUT is set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-1992. The measurement instrumentation used was an Hewlett Packard 8566B Spectrum Analyzer with detector and bandwidth parameters as stipulated in C63.4-1992. At frequencies above 1GHz, average measurements, if necessary, were made using the video filter method and quasi peak detector and preselector functions were disabled. EUT was powered by a 12Vdc adapter.

8.1.2 Test Procedure

The Transmitter was placed on the test table. The EUT was configured for maximum response and was set up as described above and configured to transmit continuously. Signal strength were monitored at an HP 8566B Spectrum Analyzer, below and above the center frequencies using an appropriate receiving antenna. Maximum emissions was obtained by varying the height of the antennas and then orienting the turntable in 360-degree turns with the analyzer in the manual mode. Unless stated otherwise, the antenna to EUT distance was 3 meters.

Any multiple entries cover the two orientations of the transmitters and cover all three axes due to rotation of the test table and EUT and are the maximum signals resulting from rotation and height search at each frequency. The measurements are quasi-peak measurements below 1000MHz and average measurements above 1000 MHz.

8.1.3 Spectrum Analyzer Configuration (During Swept Frequency Scans)

Start Frequency	30 MHz
Stop Frequency	26,700MHz
Sweep Speed	Auto
RES Bandwidth	100 Khz below 1,000 Mhz
	1 Mhz above 1,000 MHz
Video Bandwidth	100 Khz below 1,000 Mhz
	1 Mhz above 1,000 MHz
Quasi Peak Adapter Mode	Normal
Quasi peak Adapter Bandwidth	Auto

**PART 8 - OPEN FIELD RADIATED HARMONIC
AND SPURIOUS EMISSIONS
per FCC PART 2, SECTION 47 CFR §2.1053**

8.2.3 Test Results

The table below shows a summary of the highest amplitudes of the radiated emissions from the equipment under test at various antenna heights, antenna polarizations, and EUT orientations.

<i>Freq. GHz</i>	<i>Ampl. dBuV</i>	<i>Cable Loss dB</i>	<i>Ant. Loss dB</i>	<i>Corr. Ampl. dBuV</i>	<i>Limit dBuV</i>	<i>Margin dBuV</i>	<i>Pola- rization</i>	<i>Type of Emissions</i>	<i>Measure- ment</i>
4.8538	-42.50	6.52	34.8	-1.18	53.97	-55.15	Vertical	Harmonics	Avg.
7.2807	-47.97	11.50	37.9	1.43	53.97	-52.54	Vertical	Harmonics	Avg.
9.7076	-50.0	28.6	37.9	16.5	53.97	-37.47	Vertical	Harmonics	Avg.
12.1345	-50.0	38.4	39.4	27.8	53.97	-26.17	Vertical	Harmonics	Avg.
14.5614	-50.0	45.1	41.8	36.9	53.97	-17.07	Vertical	Harmonics	Avg.
16.9883	-50.0	50.0	44.4	44.4	53.97	-9.57	Vertical	Harmonics	Avg.

Table 8.2.3 Open Field Spurious and Harmonic Emissions

<i>Freq. GHz</i>	<i>Ampl. dBuV</i>	<i>Cable Loss dB</i>	<i>Ant. Loss dB</i>	<i>Corr. Ampl. dBuV</i>	<i>Limit dBuV</i>	<i>Margin dBuV</i>	<i>Pola- rization</i>	<i>Type of Emissions</i>	<i>Measure -ment</i>
4.8538	-41.48	6.52	34.8	-.16	53.97	-53.83	Horizontal	Harmonics	Avg.
7.2807	-45.02	11.50	37.9	4.38	53.97	-49.59	Horizontal	Harmonics	Avg.
9.7076	-50.0	28.6	37.9	16.5	53.97	-37.47	Horizontal	Harmonics	Avg.
12.1345	-50.0	38.4	39.4	27.8	53.97	-26.17	Horizontal	Harmonics	Avg.
14.5614	-50.0	45.1	41.8	36.9	53.97	-17.07	Horizontal	Harmonics	Avg.
16.9883	-50.0	50.0	44.4	44.4	53.97	-9.57	Horizontal	Harmonics	Avg.

Table 8.2.4 Open Field Spurious and Harmonic Emissions

No emissions of significant levels were observed between 9KHz and the lowest frequencies shown in the above data. No emissions of significant levels were observed between the highest frequency shown in the above data and 26,700 GHz.

Conclusion: The EUT meets the requirements of the test reference for Radiated Spurious and Harmonic Emissions.

**PART 9 - MODULATION FREQUENCY CHARACTERISTICS
per FCC PART 2, SECTION 47 CFR §2.1047**

The equipment meets the general requirements for modulation frequency characteristics.