TEST REPORT FROM:

COMMUNICATION CERTIFICATION LABORATORY
1940 W. Alexander Street
Salt Lake City, Utah
84119-2039

Type of Report: Class II Permissive Change

TEST OF: AAS19GBG9423AA
AAS19GBG9123AA

FCC ID: ABZ99FT7012

To Part 15 Subpart D
of the FCC Rules and Regulations

Test Report Serial No: 73-7504

Applicant:

Motorola, Inc.
5201 Tollview Drive
Rolling Meadows, IL 60008

Date(s) of Test: June 5, 8, & 11, 2001

Issue Date: July 13, 2001

Equipment Receipt Date: June 5, 2001

CERTIFICATION OF ENGINEERING REPORT

This report has been prepared by Communication Certification Laboratory to evaluate the device described below with the requirements of FCC Part 15, Subpart D. Specific identifying information for the device tested is given below.

- Applicant: Motorola, Inc.
  5201 Tollview Drive
  Rolling Meadows, IL 60008

- Manufacturer: Motorola, Inc.
  1411 East Washington
  Mt. Pleasant, IA 52641

- Trade Name: TELARIO™ TS3000

- Model Number: AAS19GBG9423AA and AAS19GBG9123AA

- FCC ID Number: ABZ99FT7012

On this 13th day of July 2001, I, individually, and for Communication Certification Laboratory, certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

COMMUNICATION CERTIFICATION LABORATOR

Kirk P. Thomas
Tested by: Kirk P. Thomas
Project Engineer

Table of Contents

SECTION 1. GENERAL INFORMATION

1.1 Product Description

The AAS19GBG9423AA is the base station (TS3000) portion of a wireless system. The TS3000 is sold under two different model numbers, the AAS19GBG9123AA model incorporates only one phone line and the other model AAS19GBG9423AA includes an option board for four phone lines. The model AAS19GBG9423AA (four phone line option) was used for testing as representative of both units.

1.2 Changes to Product Description

The original unit contained an internal antenna with the option of connecting a passive remote antenna. The only change to the original unit is that in addition to the passive remote antenna a remote active antenna option is also available. The remote active antenna adds a bi-directional amplifier to the remote antenna. This amplifier has automatic power control to ensure that the antenna radiated power does not exceed the original TS3000 radiated power. To minimize the cost of the low-loss coax the splitter/combiner also contains multiplexing and control signals to control the remote antenna transmit/receive switches and the diversity switches.

1.3 Test Specification

The AAS19GBG9423AA is an Isochronous device that operates in the 1920-1930 MHz sub-band; therefore the AAS19GBG9423AA is subject to the provisions of FCC Part 15, Subpart D. Unlicensed Personal Communications Service Devices.

1.4 Test Methods & Procedures

The AAS19GBG9423AA was tested in accordance with ANSI C63.17-1998.

SECTION 2. SUMMARY OF TEST RESULTS:

2.1 Summary of Tests:

FCC Section	Description	Report Section	ANSI C63.17 Section	Result
15.307	Affidavit from UTAM, Inc. certifying participation in UTAM, Inc.	3.2.1	N/A	Not Effected by Change
15.309	Cross Reference to Subpart B	3.2.2	6.1.6.3	Complies
15.311	Labelling Requirements	3.2.3	N/A	Complies
15.315	AC power line conducted limits	3.2.4	N/A	Complies
15.317	Antenna requirement	3.2.5	N/A	Not Effected by Change
15.319 (a)	Frequency of operation	3.2.6	N/A	Not Effected by Change
15.319 (b)	Modulation technique	3.2.7	6.1.4	Not Effected by Change
15.319 (c)	Peak transmit power and emission bandwidth	3.2.8	6.1.2	Complies
15.319 (d)	Power spectral density	3.2.9	6.1.5	Complies
15.319 (e)	Directional gain of antenna	3.2.10	N/A	Not Effected by Change
15.319 (f)	Automatic discontinuance of transmission	3.2.11	N/A	Not Effected by Change

FCC Section	Description	Report Section	ANSI C63.17 Section	Result
15.319 (i)	IEEE C95.1-1991 and IEEE C95.3-1991	3.2.12	N/A	Complies
15.323 (a)	Channel allocation	3.2.13	N/A	Not Effected by Change
15.323 (b)	Channel packing	3.2.14	8.1.2	Not Effected by Change
15.232 (c)	Time and Spectrum monitoring	3.2.15	Sections 7 and 8	Not Effected by Change
15.323 (c)(1)	Transmit window monitoring	3.2.16	7.3.2.2 and 7.5	Not Effected by Change
15.323 (c)(2)	Monitoring threshold	3.2.17	7.3.2.1	Not Effected by Change
15.323 (c)(3)	Transmission duration	3.2.18	N/A	Not Effected by Change
15.323 (c)(4)	Acknowledgments	3.2.19	8.2.1	Not Effected by Change
15.323 (c)(5)	Least interfered channel	3.2.20	7.3.2.1, 7.3.2.2 and 8.2.1	Not Effected by Change
15.323 (c)(6)	Random waiting interval	3.2.21	8.1.3	Not Effected by Change
15.323 (c)(7)	Threshold monitoring bandwidth, Threshold monitoring reaction time	3.2.22	7.4 and 7.5	Not Effected by Change

FCC Section	Description	Report Section	ANSI C63.17 Section	Result
15.323 (c)(8)	Threshold monitoring antenna	3.2.23	N/A	Not Effected by Change
15.323 (c)(9)	Monitoring threshold relaxation	3.2.24	N/A	Not Effected by Change
15.323 (c)(10)	Duplex connections	3.2.25	8.2.3	Not Effected by Change
15.323 (c)(11)	Alternative monitoring interval	3.2.26	8.2.4	Not Effected by Change
15.323 (c)(12)	Limitation on use of Section (c)(10) or (c)(11)	3.2.27	N/A	Not Effected by Change
15.323 (d)	Spurious emissions	3.2.28	6.1.6	Complies
15.323 (e)	Frame repetition stability / frame period and jitter	3.2.29	6.2.3 and 6.2.4	Not Effected by Change
15.323 (f)	Frequency stability	3.2.30	6.2.2	Not Effected by Change

SECTION 3. MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS:

3.1 General Comments

This section contains the test results only. Details of the test methods used, etc., can be found in Appendix A of this report. Only sections effected by this permissive change were retested. The test results of sections not effected by this permissive change can be found in the original report.

3.2 Test Results

3.2.2 Cross Reference to Subpart B § 15.309

The requirements of Subpart D apply only to the radio transmitter contained in the PCS device. Other aspects of the operation of a PCS device may be subject to requirements contained elsewhere in this Chapter. In particular, a PCS device that includes digital circuitry not directly associated with the radio transmitter also is subject to the requirements for unintentional radiators in Subpart B. The AAS19GBG9423AA tunes up to 1930 MHz; therefore, in accordance with § 15.33 (b)(1), the EUT was tested from 30 MHz to 10 GHz.

The AAS19GBG9423AA complies with the limits shown below for a class A unintentional radiator:

§ 15.109 Radiated Emission Limits Class A

Frequency (MHz)	Field Strength at 10 m(µV/m)	Field Strength at 3 m (dBµV/m)
30 - 88	90	49.1
88 - 216	150	53.5
216 - 960	210	56.4
960 - 10,000	300	59.5

Measurement Data:

A diagram of the test configuration is enclosed in Appendix A and a list of reference codes for test equipment used is enclosed in Appendix B.

Test equipment used: 1, 2, 3, 4, and 5.

Frequency MHz	Polarity H/V	Uncorr Level dBµV	Correction Factor dB	Corrected Level dBµV/m	Criteria dBµV/m
152.6	H	27.1	17.1	44.2	53.5
154.8	H	30.8	17.5	48.3	53.5
174.0	H	26.9	17.9	44.8	53.5
183.9	H	28.8	17.8	46.6	53.5
193.5	H	27.2	18.1	45.3	53.5
200.8	H	23.7	18.3	42.0	53.5
204.0	H	19.3	18.5	37.8	53.5
249.6	H	19.0	20.7	39.7	56.4
403.2	H	14.8	25.6	40.4	56.4
55.7	V	22.5	12.9	35.4	49.1
152.9	V	27.8	17.2	45.0	53.5
154.8	V	32.4	17.5	49.9	53.5
174.2	V	26.2	17.9	44.1	53.5
181.6	V	21.3	17.7	39.0	53.5
201.6	V	17.1	18.4	35.5	53.5
210.4	V	14.6	18.9	33.5	53.5
236.8	V	15.6	20.4	36.0	56.4
384.0	V	10.5	25.1	35.6	56.4
461.6	V	10.8	27.2	38.0	56.4
Note 1: There were no emissions detected above 1000 MHz.					

EUT Configuration

The active antenna portion and the base portion of the AAS19GBG9423AA were each tested as Remotely located Devices per ANSI C63.4-1992 section 6.1.2.1. The AAS19GBG9423AA was also tested in the transmit, receive and idle modes to determine which configuration produced the worst case emissions. The worst case emissions were with the base portion located in the chamber and the active antenna located remotely (outside the chamber), with the AAS19GBG9423AA in transmit mode.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5 dBµV is obtained. The correction factor of -8.9 dB is added to the receiver reading giving field strength of 32 dBµV/m.

The correction factor is obtained by adding the Antenna Factor of 15.7 and a Cable Factor of 2.2 is added and subtracting the Amplifier Gain of 26.8 dB, giving a correction factor of -8.9 dB.

RESULT

In the configuration tested, the EUT complied with the requirements of the specification.

3.2.3 Labeling Requirements § 15.311

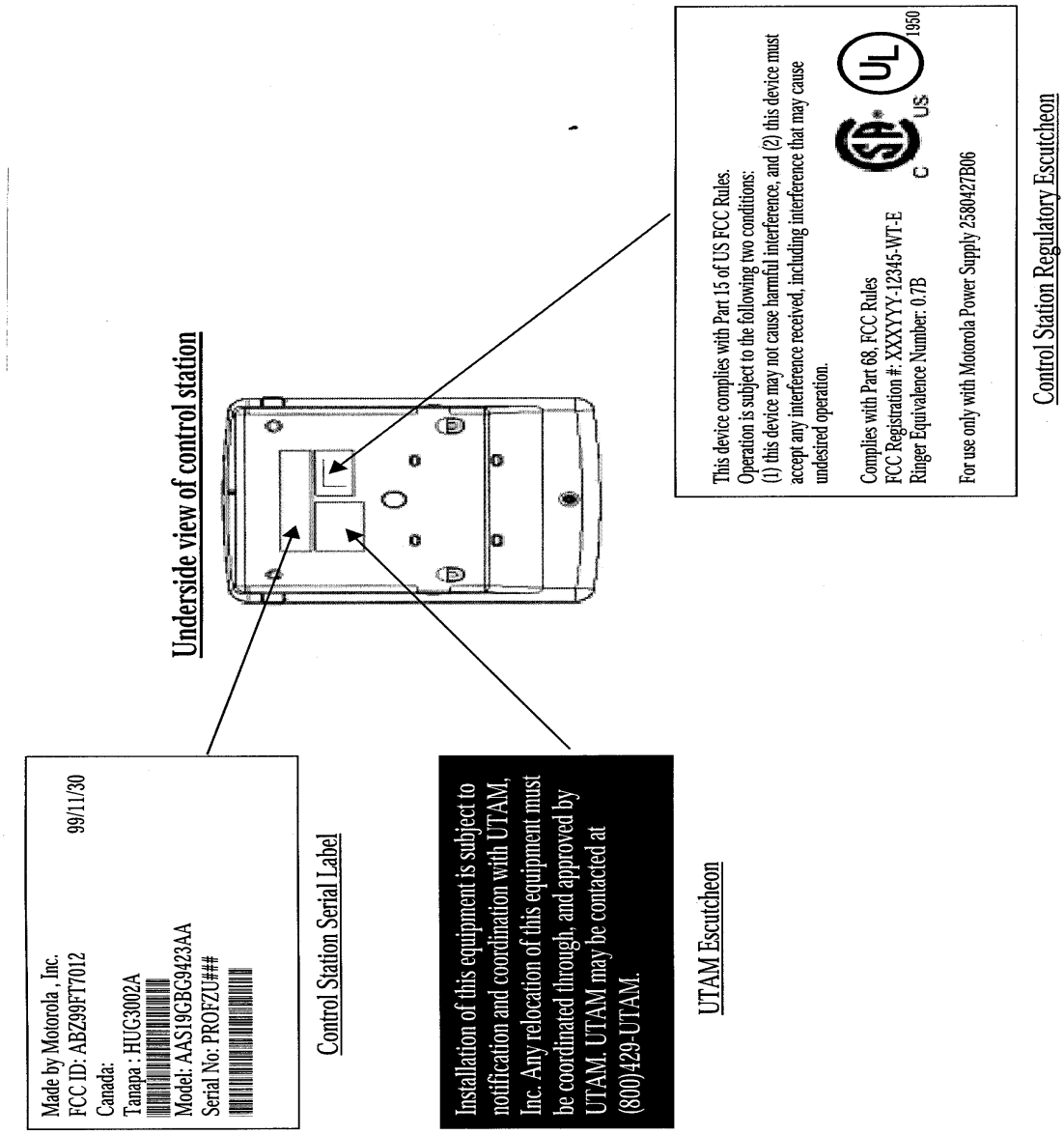
In addition to the labeling requirements of Section 15.19 (a) (3), all devices authorized under this subpart must bear a prominently located label with the following statement:

Installation of this equipment is subject to notification and coordination with UTAM, Inc. Any relocation of this equipment must be coordinated through, and approved by UTAM. UTAM may be contacted at telephone number 1-800-429-8826.

Demonstration of Compliance:

In accordance with the requirements of Sections 15.19 (a)(3), 15.311, 2.925 and 2.926 of the FCC Rules, the following

information will be permanently affixed to the Motorola, Inc. Model AAS19GBG9423AA. Shown below is the label and label placement sketch showing where the label will be placed on the TS3000.



3.2.4 Conducted Emissions § 15.315

An unlicensed PCS device that is designed to be connected to the public utility (AC) power line must meet the limits specified in § 15.207.

§ 15.207 Conducted Emission Limits

Frequency	Conducted Limit (µV)	Conducted Limit (dBµV)
450 kHz to 30 MHz	250	48.0

Measurement Data:

A diagram of the test configuration is enclosed in Appendix A and a list of reference codes for test equipment used is enclosed in Appendix B.

Test equipment used: 1, 12 and 13.

EUT Configuration

The conducted emissions testing was performed with the AAS19GBG9423AA in the following configurations, idle mode, receive mode and transmit mode. The worst case emissions were with the AAS19GBG9423AA in the transmit mode. Shown below are the conducted emissions from the AAS19GBG9423AA in this worst case configuration.

Test Point	Frequency MHz	Detector	Measured Level dBµV	Limit dBµV
Hot Lead	0.48	Peak	44.5	48.0
	0.54	Peak	44.5	48.0
	0.83	Peak	43.0	48.0
	16.26	Peak	36.0	48.0
	16.55	Peak	37.0	48.0
	17.04	Peak	36.0	48.0
	25.08	Peak	33.5	48.0
Neutral	0.45	Peak	44.1	48.0
	0.55	Peak	43.9	48.0
	0.78	Peak	42.7	48.0
	5.22	Peak	35.5	48.0
	16.28	Peak	36.2	48.0
	16.56	Peak	37.4	48.0
	16.86	Peak	37.1	48.0

RESULT

In the configuration tested, the EUT complied with the requirements of the specification.

3.2.5 Antenna Requirement § 15.317

Demonstration of Compliance:

The AAS19GBG9423AA uses a permanently attached antenna. The same type as specified by the manufacturer can only replace this antenna.

3.2.8 Peak Transmit Power and Emission Bandwidth § 15.319 (c)

Demonstration of Compliance:

The peak transmit power is determined by the following formula:

$$Peak\ Transmit\ Power\ =\ 100\ \mu W\ x\ \sqrt{BW}$$

BW = Emission Bandwidth in Hz.

The peak transmit power is required to be less than 17.4 dBm (as determined by the formula shown below).

$$Peak\ Transmit\ Power = 100\ \mu W\ x\ \sqrt{304000} = 55.13\ mW = 17.4\ dBM$$

Measurement Data:

The AAS19GBG9423AA was tested as per ANSI C63.17-1998 Sections 6.1.2 and 6.1.3. The active antenna portion, as well as the base portion of the AAS19GBG9423AA are both equipped with two antenna ports, one for the internal antennas and one for the external antennas; therefore, testing was performed on both ports.

A diagram of the test configuration is enclosed in Appendix A and a list of reference codes for test equipment used is enclosed in Appendix B.

Test equipment used: 1 and 17.

INTERNAL ANTENNA PORT, BASE

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.35	16.4	287.5
1924.85	16.7	288.5
1929.65	16.8	291.0

Internal Antenna Port, Active Antenna (3 Meter Cable)

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.35	13.5	298.0
1924.85	13.4	289.0
1929.65	13.5	291.0

Internal Antenna Port, Active Antenna (350 Foot Cable)

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.35	11.8	295.0
1924.85	11.7	295.0
1929.65	11.7	286.0

External Antenna Port, Base

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.35	15.8	290.5
1924.85	16.0	296.5
1929.65	15.5	292.5

External Antenna Port, Active Antenna (3 Meter Cable)

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.35	14.1	300.0
1924.85	14.1	304.0
1929.65	14.1	304.0

External Antenna Port, Active Antenna (350 Foot Cable)

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.35	11.9	299.0
1924.85	11.6	291.0
1929.65	11.7	298.0

RESULT

In the configuration tested, the EUT complied with the requirements of the specification.

3.2.9 Power Spectral Density § 15.319 (d)

Requirement:

Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

3 mW = 4.7 dBm

Measurement Data:

The AAS19GBG9423AA was tested as per ANSI C63.17-1998 Section 6.1.5. The active antenna portion, as well as the base portion of the AAS19GBG9423AA are both equipped with two antenna ports, one for the internal antennas and one for the external antennas. The Internal Antenna port on the base unit produced the highest levels, therefore; this data is listed below to show compliance.

A diagram of the test configuration is enclosed in Appendix A and a list of reference codes for test equipment used is enclosed in Appendix B.

Test equipment used: 1 and 17.

Internal Antenna Port, Base

Frequency (MHz)	Maximum Power Spectral Density - Peak Detection (dBm)	Maximum Power Spectral Density - Sample Detection (dBm)
1920.335	4.3	4.2
1924.559	3.9	3.9
1929.677	3.5	3.4

RESULT

In the configuration tested, the EUT complied with the requirements of the specification.

3.2.12 IEEE C95.1-1991 § 15.319 (i)

Requirement:

The device must comply with IEEE C.95.1-1991, (ANSI/IEEE C.95.1-1992), "Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz". Measurement methods are specified in IEEE C95.3-1991, "Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields-RF and Microwave".

Measurement Data:

The AAS19GBG9423AA is classified as a mobile device, which is installed so that a minimum separation distance of 20 centimeters is maintained between the transmitter's radiating structure and the body of the user or nearby persons, and the ERP of the AAS19GBG9423AA is less than 3 watts. Therefore, the AAS19GBG9423AA is categorically excluded from routine environmental evaluation for RF exposure as per □2.1091(c).

The installation manual contains the following statement to instruct the installer that the 20 centimeter separation distance must be maintained in order to comply with the RF exposure requirement.

3.2.28 Spurious Emissions § 15.323 (d)

Requirement:

Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the channel edges and 1.25 MHz above or below the channel; 50 dB between 1.25 and 2.5 MHz above or below the channel; And 60 dB at 2.5 MHz or greater above or below the channel. Systems that further sub-divide a 1.25 MHz channel into X sub-channels must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device; in the bands between 2B and 3B measured from the center of the emission bandwidth the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and 1.25 MHz channel edge the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Measurement Data:

The AAS19GBG9423AA was tested as per ANSI C63.17-1998 Section 6.1.6.

A diagram of the test configuration is enclosed in Appendix A and a list of reference codes for test equipment used is enclosed in Appendix B.

Test equipment used: 1 and 17.

The AAS19GBG9423AA tunes up to 1930 MHz; therefore, in accordance with § 15.33 (b)(1), the EUT was tested from 30 MHz to 20 GHz, and in accordance with § 15.31 (m) the EUT was tested with the transmitter tuned near the bottom of the spectrum and tuned near the top of the spectrum. The worst case conducted emissions were with the active antenna connected with a 3 meter cable, therefore; this data is provided below.

Out-of-Channel Emission (Conducted)
(Active External Antenna, 3 Meter Cable)

Transmitting on Channel 1 (1920.35 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	110.6	-50.5	-39.5
200 - 500	277.7	-65.1	-39.5
500 - 1000	673.0	-65.3	-39.5
1000 - 1800	1068.8	-45.5	-39.5
1800 - 1900	1866.2	-53.1	-39.5
1900 - 1917.50	1917.36	-57.2	-39.5
1917.50 -1918.75	1918.7	-55.6	-29.5
1918.75 - 1920	1920.0	-35.2	-9.5
1921.25 - 1922.5	1921.2	-50.3	-9.5
1922.5 - 1923.75	1922.5	-56.6	-29.5
1923.75 - 1930	1923.8	-61.8	-39.5
1930 - 2000	1931.1	-53.7	-39.5
2000 - 4000	2000.0	-62.6	-39.5
4000 - 6000	5828.0	-66.9	-39.5
6000 - 8000	6952.0	-64.8	-39.5
8000 - 19300	18970.0	-58.3	-39.5
* Noise Floor			

Transmitting on Channel 20 (1929.65MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 - 200	119.3	-46.3	-39.5
200 - 500	248.9	-76.1	-39.5
500 - 1000	557.0	-70.2	-39.5
1000 - 1800	1083.2	-50.4	-39.5
1800 - 1900	1865.4	-56.6	-39.5
1900 - 1920	1919.0	-51.4	-39.5
1920 - 1926.25	1926.2	-53.6	-39.5
1926.25 - 1927.5	1927.4	-49.3	-29.5
1927.5 - 1928.75	1928.7	-41.9	-9.5
1930 - 1931.25	1930.0	-37.0	-9.5
1931.25 - 1932.5	1931.3	-55.0	-29.5
1932.5 - 2000	1932.5	-53.0	-39.5
2000 - 4000	3864.0	-50.8	-39.5
4000 - 6000	5884.0	-65.7	-39.5
6000 - 8000	6366.0	-65.8	-39.5
8000 - 19300	18980.0	-57.4	-39.5
* Noise Floor			

Out-of-Subchannel Emission (Conducted)
(Active External Antenna, 3 Meter Cable)

Transmitting on Channel 1 (1920.35 MHz)				
	Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B Above	1920.65 – 1920.95	1920.65	-33.9	-12.7
2B to 3B Above	1920.95 – 1921.25	1921.01	-50.1	-32.7
3B to Channel Edge Above	1921.25 – 1921.275	1921.25	-53.5	-32.7

Transmitting on Channel 3 (1920.95 MHz)				
	Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B Below	1920.65 - 1920.35	1920.64	-33.6	-12.7
2B to 3B Below	1920.35 - 1920.05	1920.30	-49.7	-32.7
3B to Channel Edge Below	1920.05 – 1920.025	1920.03	-53.1	-32.7

Transmitting on Channel 24 (1929.05 MHz)				
	Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B Above	1929.35 – 1929.65	1929.35	-31.3	-12.7
2B to 3B Above	1929.65 – 1929.95	1929.71	-49.6	-32.7
3B to Channel Edge Above	1929.95 – 1929.975	1929.95	-53.1	-32.7

Transmitting on Channel 26 (1929.65 MHz)				
	Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B Below	1929.35 - 1929.05	1929.34	-35.6	-12.7
2B to 3B Below	1929.05 - 1928.75	1929.02	-50.3	-32.7
3B to Channel Edge Below	1928.75 – 1928.725	1928.73	-52.8	-32.7

Out-of-UPCS Band Emissions (Radiated)

See section 3.2.2 of this report for the radiated emissions data.

RESULT

In the configuration tested, the EUT complied with the requirements of the specification.

Appendix A - Test Procedures

FCC Section 15.309 Cross Reference to Subpart B (Radiated Emissions)

The radiated emissions were tested as per ANSI C63.4.

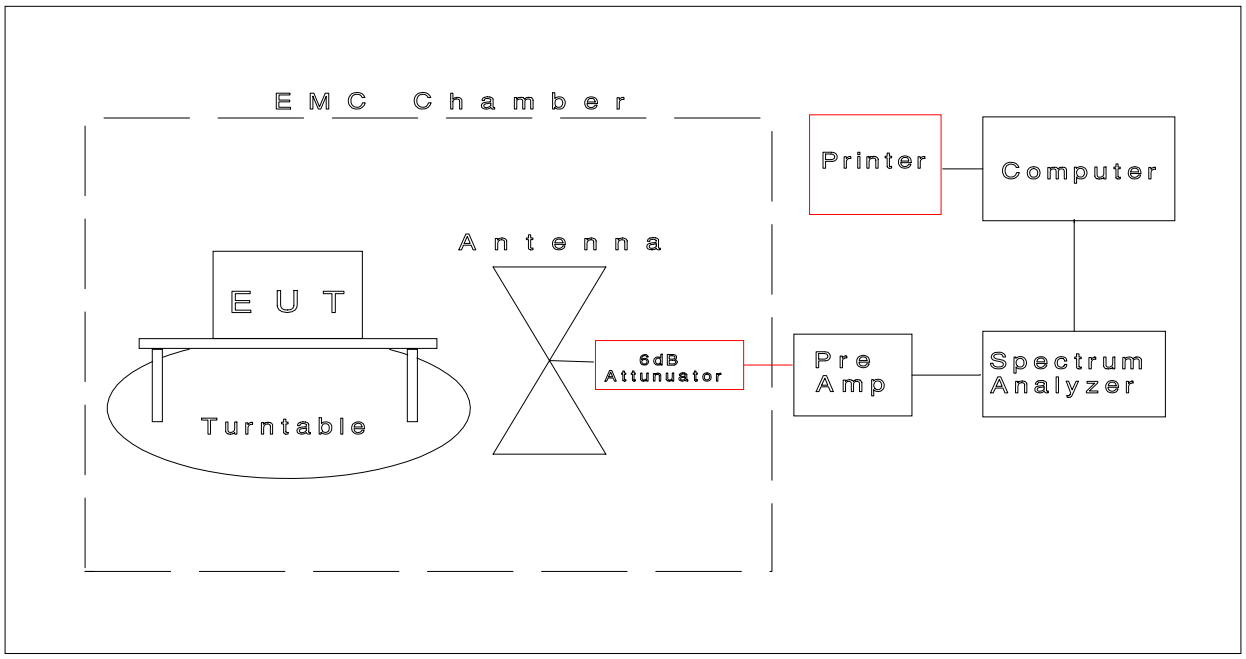
The radiated emissions from the AAS19GBG9423AA were measured using a spectrum analyzer with a quasi-peak adapter for peak and quasi-peak readings. A preamplifier with a fixed gain of 26 dB was used to increase the sensitivity of the measuring instrumentation. The spectrum analyzer's resolution bandwidth was set to 100 kHz and the video bandwidth was set to 300 kHz, for readings in the 30 to 1000 MHz frequency range. Above 1000 MHz the spectrum analyzer's resolution bandwidth was set to 1 MHz and the video bandwidth was set to 3 MHz for peak readings and the resolution bandwidth was set to 1 MHz and the video bandwidth was set to 10 Hz for average readings.

An EMCO Biconical antenna was used to measure the frequency range of 30 to 200 MHz, an EMCO Log Periodic antenna was used to measure the frequency range of 200 to 1000 MHz and a double ridge guide antenna was used to measure the frequency range of 1 to 20 GHz, at a distance of 3 meters from the EUT. The readings obtained by these antennas are correlated to the levels obtained with a tuned dipole antenna by adding the antenna factors.

The configuration of the AAS19GBG9423AA was varied to find the maximum radiated emission. All interconnecting cables were moved to search for the worst case radiated emissions. The computing equipment was rotated 360 degrees, and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

The AAS19GBG9423AA was measured on a non-conducting table 0.8 m above the ground plane. The table is placed on a turntable which is level with the ground plane. The turntable has slip rings, which supply AC power to the computing equipment.

Radiated Emissions Test



FCC Section 15.315 AC Power Line Conducted Emissions

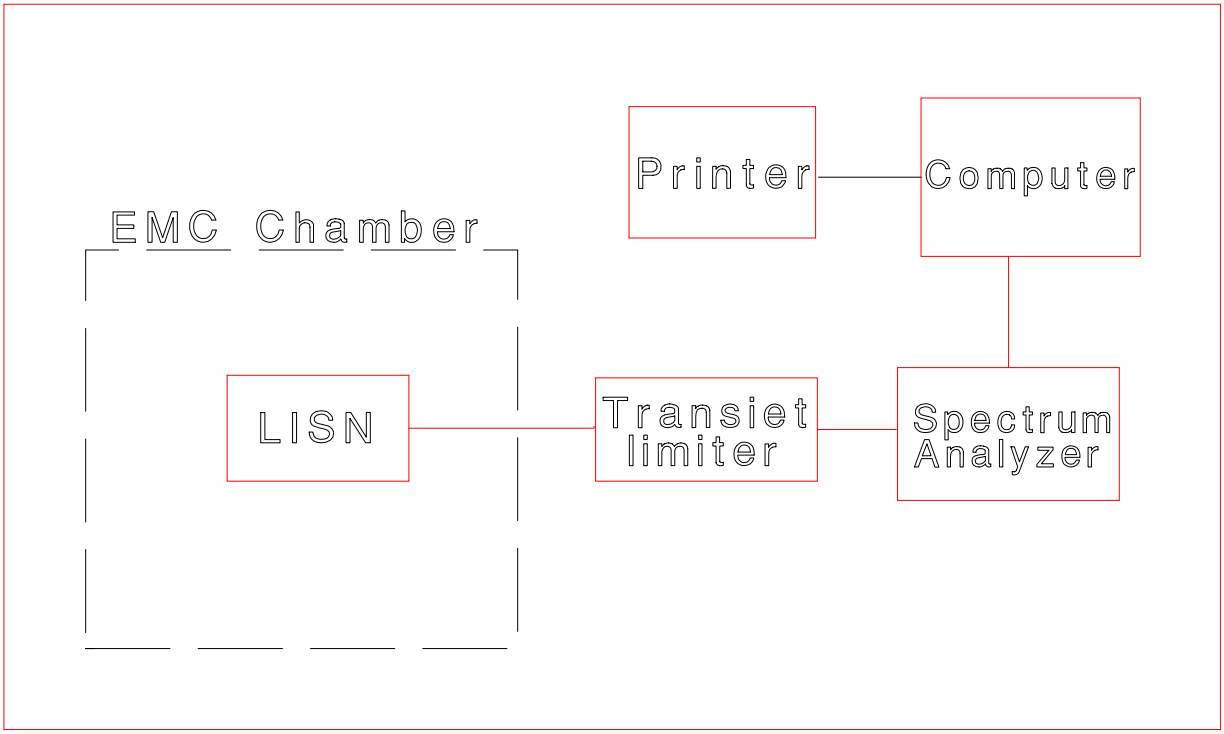
The AC power line conducted emissions were tested as per ANSI C63.4.

The AC power line conducted emissions was measured using a spectrum analyzer with a quasi-peak adapter for quasi-peak readings. The spectrum analyzer's resolution bandwidth was set to 100 kHz, and the video bandwidth was set to 300 kHz for peak readings in the 450 kHz to 30 MHz frequency range.

The line-conducted measurements were made in a screen room using a 50:H Line Impedance Stabilization Network (LISN).

Desktop computing devices are placed on a non-conducting table 80-cm from the metallic floor. The equipment is placed 40 cm from one wall and at least 80 cm from all other walls. Floor standing equipment is placed directly on the earth grounded floor.

Line Conducted Emissions Test



FCC Sections 15.319 (c) Peak Transmit Power, 15.319 (d) Power Spectral Density

The EUT was directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The peak transmit power, emission bandwidth and power spectral density were measured as per sections 6.1.2, 6.1.3 and 6.1.5 of ANSI C63.17-1998, while the base station and handset had a voice link established. The measurements were performed on two channels, as per 47 CFR 15.31(m), one near the bottom of the spectrum and one near the top of the spectrum.

The spectrum analyzer's resolution bandwidth and video bandwidth were set as follows:

Peak Transmit Power (Section 6.1.2)

RBW = 1 MHz
VBW = 3 MHz

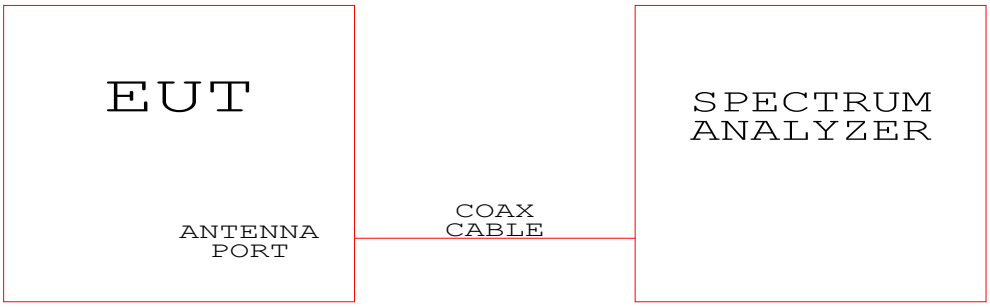
Emission Bandwidth (Section 6.1.3)

RBW = 3 kHz
VBW = 10 kHz

Power Spectral Density (Section 6.1.5)

RBW = 3 kHz
VBW = 10 kHz

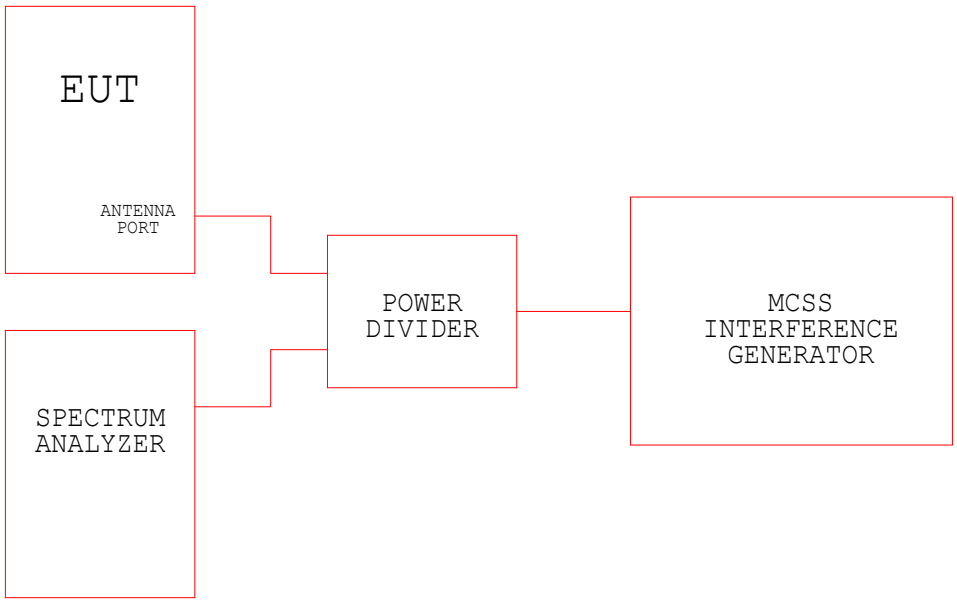
Test Configuration Block Diagram (Sections 6.1.2, 6.1.3 and 6.1.5)



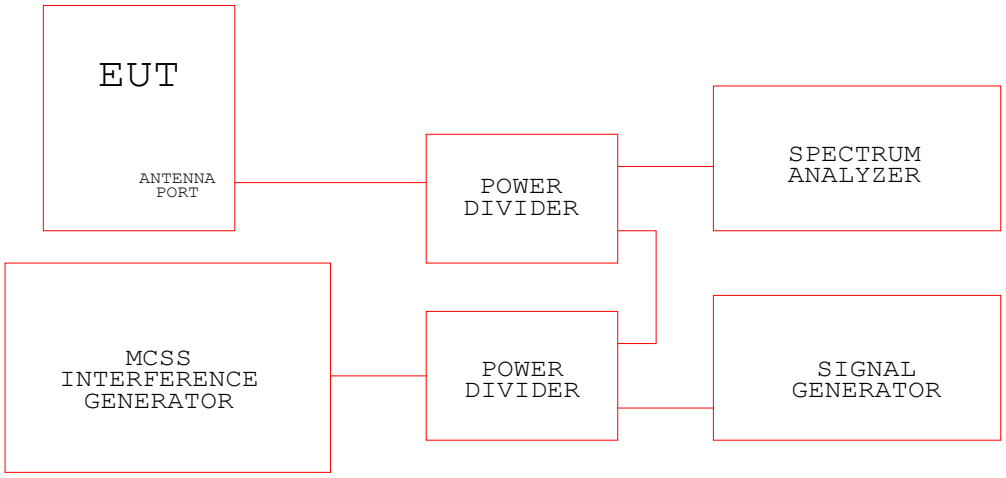
FCC Sections 15.323 (b), 15.323 (c)(1) through 15.323 (c)(12) - Sections 7 and 8 of ANSI C63.17-1998

The EUT connected as shown in the block diagrams below. The MCSS was used to force the EUT to transmit on the desired frequencies and block all the other frequencies. The testing was performed as per sections 7 and 8 of ANSI C63.17-1998, while the base station and handset had a voice link established

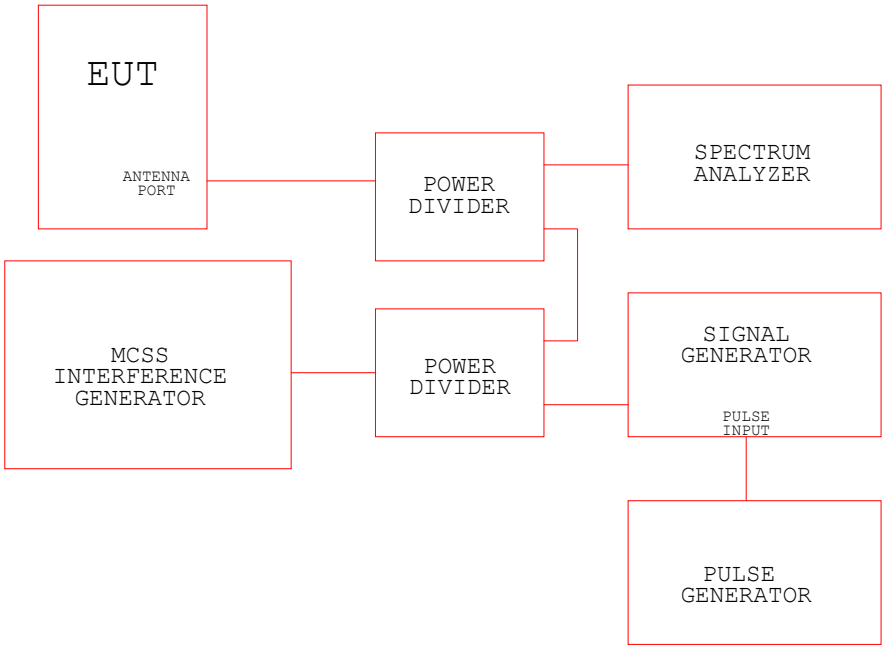
Test Configuration Block Diagram
(Sections 8.1.2, 8.1.3 and 8.2.1)



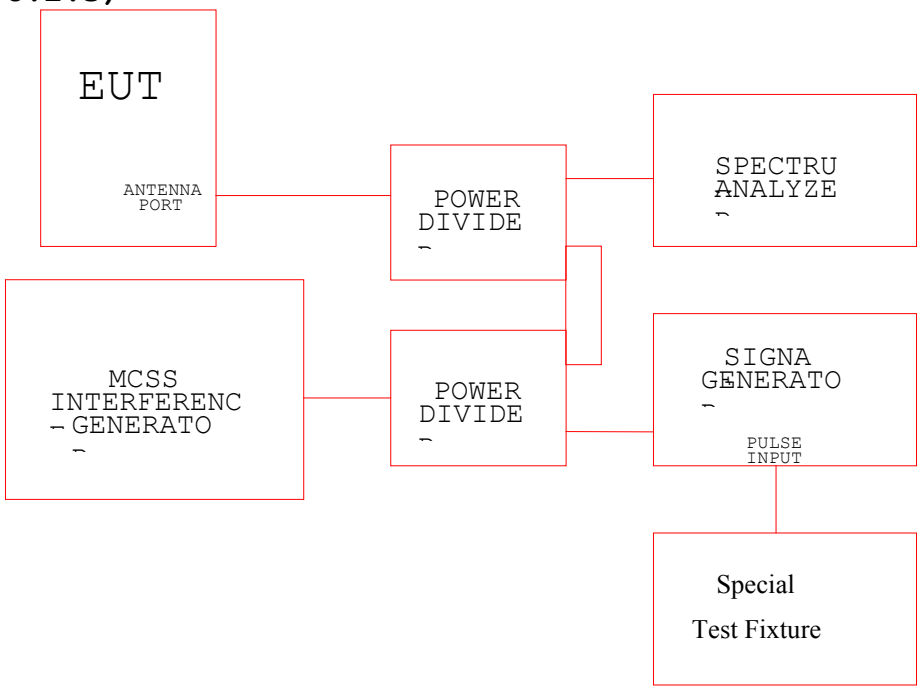
Test Configuration Block Diagram
(Sections 7.3.2.1, 7.3.2.2 and 7.4)



Test Configuration Block Diagram (Section 7.5)



Test Configuration Block Diagram (Section 8.2.3)



FCC Section 15.323 (d) Spurious Emissions

The EUT was directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The base station was connected to a computer that was used to control the base station to permit the base station and handset to transmit on predetermined channels. The spurious emissions were measured as per section 6.1.6 of ANSI C63.17-1998, while the base station and handset had a voice link established. The out-of-channel measurements were performed on two channels, as per 47 CFR 15.31(m), one near the bottom of the spectrum and one near the top of the spectrum. The out-of-subchannel measurements were performed on two sub-channels, one near the bottom of the subchannel and one near the top of the sub-channel.

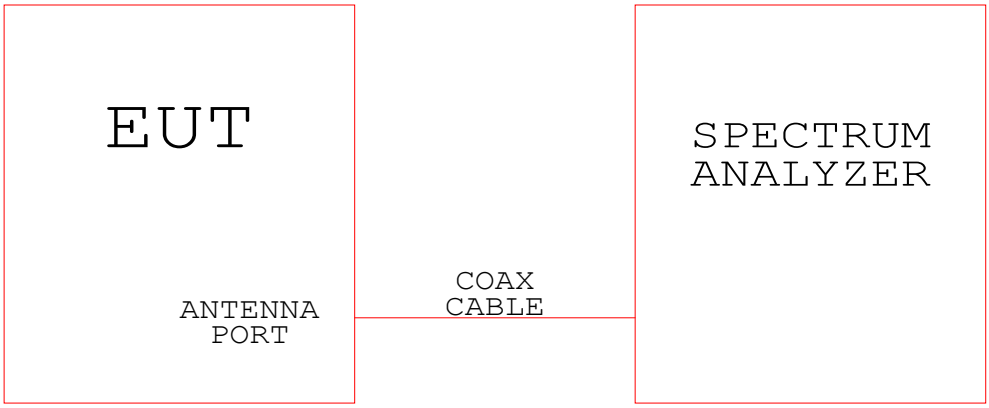
The spectrum analyzer's resolution bandwidth and video bandwidth were set as follows:

Spurious Emissions (Section 6.1.6)

RBW = 3 kHz
VBW = 10 kHz

TEST CONFIGURATION BLOCK DIAGRAM

(Section 6.1.6)



FCC Section 15.323 (e) Frame Period

The EUT was directly connected to the modulation domain analyzer via the antenna output port as shown in the block diagram below. The base station was connected to a computer that was used to control the base station to permit the base station and handset to transmit on predetermined channels. The frame period, frame repetition stability and jitter were measured as per sections 6.2.3 and 6.2.of ANSI C63.17-1998, while the base station and handset had a voice link established. The computer was used to log the results of the measurements.

Frame related measurements were allowed by the utilization of the modulation domain analyzer's "Envelope Trigger Output" port, which generates a TTL compatible signal that represents the envelope of the transmission bursts.

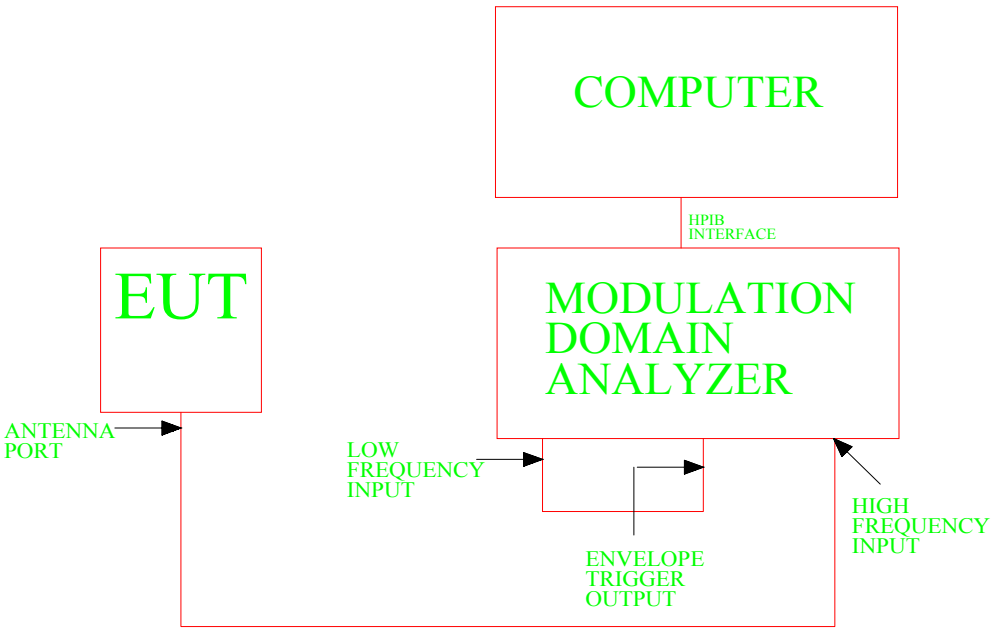
The modulation domain analyzer's settings were set as follows:

Frame Repetition Stability

Mode:	Frequency Measurement
X Axis:	Time
Time Setting:	500 ms
Y Axis:	Frequency
Center Frequency:	200 Hz
Measurement Interval:	5 ms
No. of Measurements:	1000

Frame Period and Jitter

Mode:	Time Measurement
Y Axis:	Time
Center Time:	5 ms
X Axis:	Time
Time Setting:	500 ms
Measurement Interval:	1 ms
No. of Measurements:	1,000,000



FCC Section 15.323 (f) Carrier Frequency Stability

The EUT was placed inside of a temperature chamber and directly connected to the modulation domain analyzer via the antenna output port as shown in the block diagram below. The base station was connected to a computer that was used to control the base station to permit the base station and handset to transmit on predetermined channels. The carrier frequency stability was measured as per section 6.2.2 of ANSI C63.17-1998, while the base station and handset had a voice link established. The computer was used to log the results of the measurements.

The EUT was placed inside of the temperature chamber at 20^{0}C for one hour in order to stabilize the temperature of the chamber and the EUT. This measurement was recorded as a reference for the measurements at the two extreme temperatures and at the two extreme supply voltages using the modulation domain analyzer.

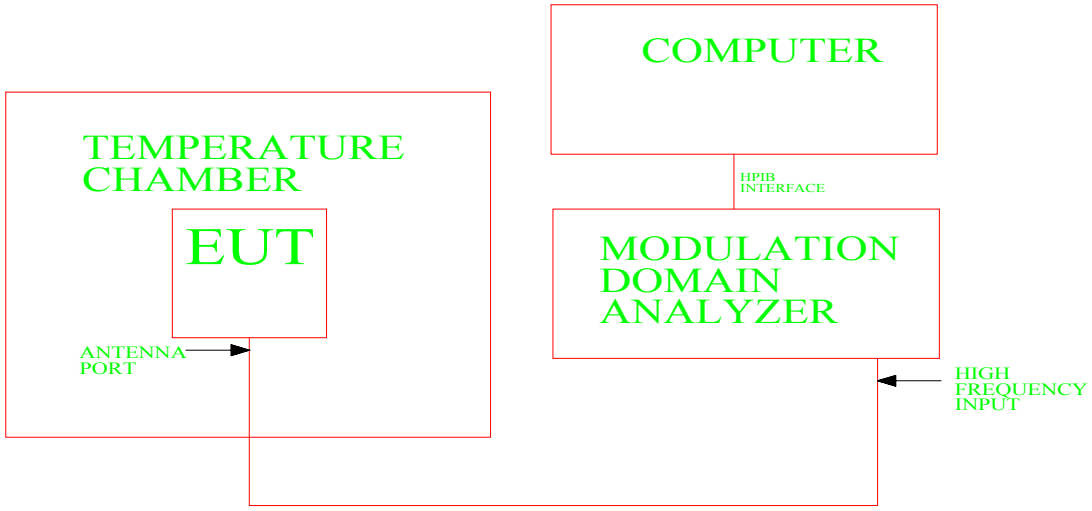
The modulation domain analyzer settings were set as follows:

Carrier Frequency Stability

Mode:	Frequency Measurement
Y Axis:	Frequency
Center Frequency:	1920.35 MHz

X Axis:	Time
Time Setting:	625 us
Measurement Interval:	10 us
No. of Measurements:	5000

Test Configuration Block Diagram
(Section 6.2.2)



Appendix B - List of Test Equipment

Ref. No.	Instrument	Mfgt.	Model
1	Spectrum Analyzer	Hewlett Packard	8566B
2	Pre Amplifier	Hewlett Packard	8447D
3	Pre Amplifier	Hewlett Packard	8449B
4	Biconilog Antenna	EMCO	3142
5	Double Ridge Guide Antenna	EMCO	3115
6	Power Divider/Combiner	Hewlett Packard	11636A
7	Power Divider/Combiner	Hewlett Packard	87303C
8	Signal Generator	Hewlett Packard	8648C
9	MCSS	Hewlett Packard	60
10	Modulation Domain Analyzer	Hewlett Packard	53310A
11	Pulse Generator	Hewlett Packard	8012B
12	LISN	EMCO	3825/2
13	Transient Limiter	Hewlett Packard	11947A
14	Temperature Chamber	Tenney Inc.	Tenney Jr.
15	Oscilloscope	Tektronix	7603
16	Test Fixture	Motorola	N/A
17	Coax Cable	Andrews	N/A

An independent calibration laboratory following outlined calibration procedures calibrates all the equipment listed above every 12 months.

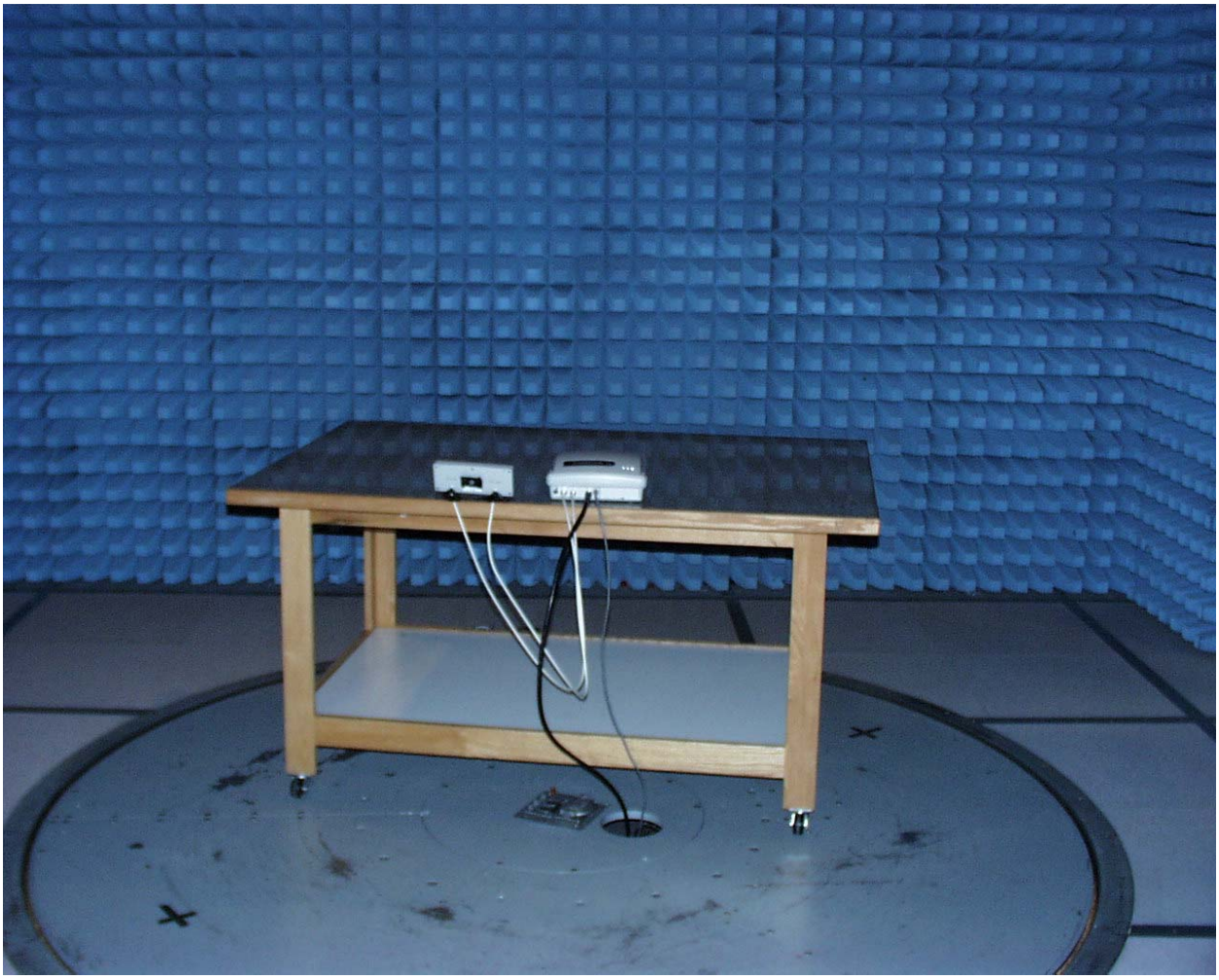
Appendix B – Photographs

Front View of The Test Setup (Base)

Back View of The Test Setup (Base)

Front View of The Test Setup (Active Antenna)

Back View of The Test Setup (Active Antenna)



Front View of the Base

Back View of the Base

Top View of the Base

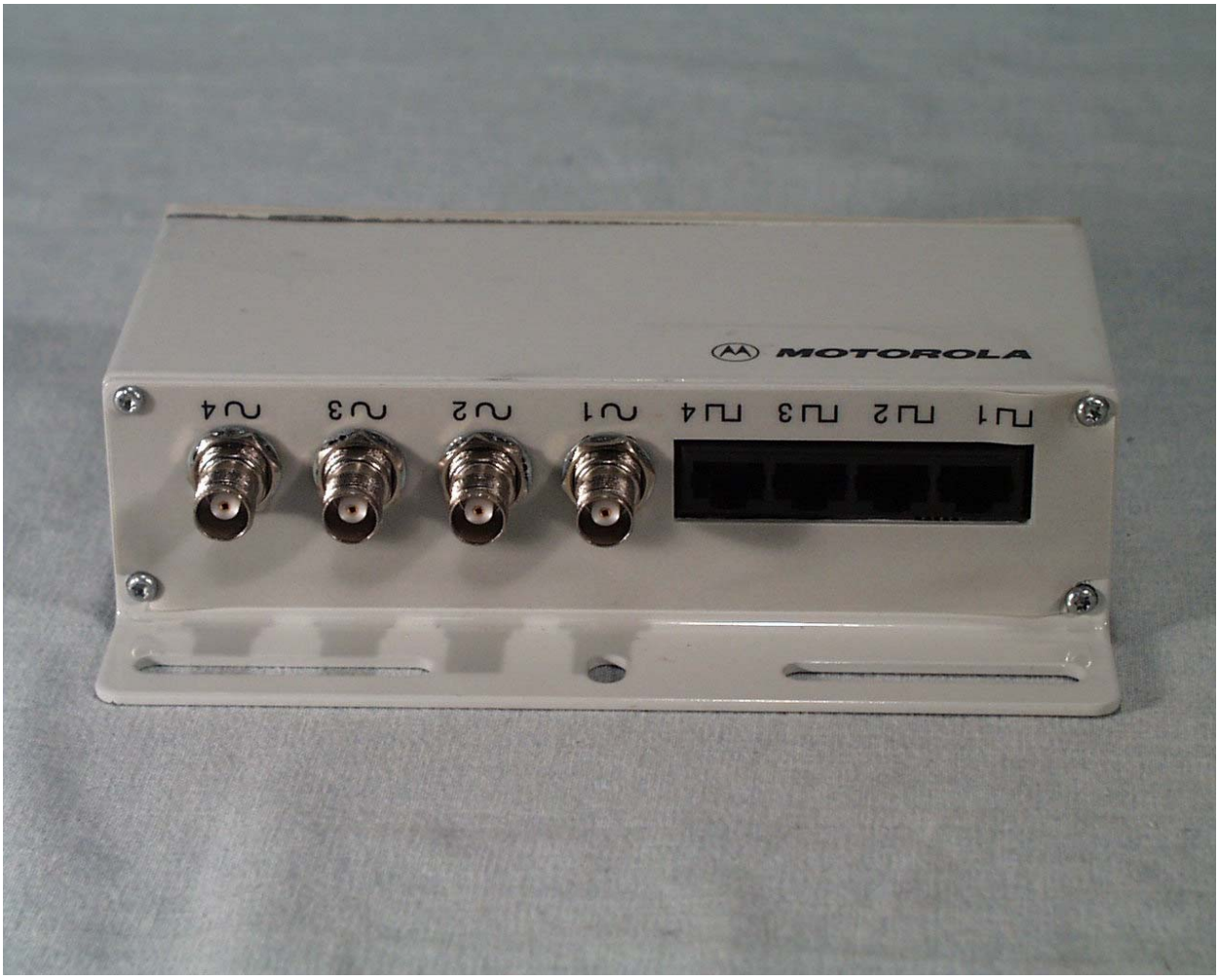
Front View of the Active Antenna

Back View of the Active Antenna

Top View of the Active Antenna

Top View of the Antenna Interface

Back View of the Antenna Interface



Front View of the Antenna Interface

internal photograph pages removed from file to decrease file size. The removed photos are provided in the appropriate exhibit. SBE