Exhibit 6: Test Report

TEST REPORT FROM:

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

Type of Report: Certification

TEST OF: Mini Base

FCC ID: MTU-1900-BS-B1

To Part 15 Subpart D
of the FCC Rules and Regulations

Test Report Serial No: 73-6628

Applicant:

CTP Systems Ltd.
16 Bazel Street
P.O. Box 10097
Petach-Tikva 49001
Israel

Date(s) of Test: September 8 - 17, 1998

Issue Date: November 5, 1998

Equipment Receipt Date: September 7, 1998

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: CTP Systems Ltd.
  16 Bazel Street
  P.O. Box 10097
  Petach-Tikva 49001
  Israel

- Manufacturer: CTP Systems Ltd.
  16 Bazel Street
  P.O. Box 10097
  Petach-Tikva 49001
  Israel

- Trade Name: CTPhone 1900

- Model Number: Mini Base

- FCC ID Number: MTU-1900-BS-B1

On this 5th day of November 1998, 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 LABORATORY

_____
Checked by: William S. Hurst, P.E.
Vice President

_____
Tested by: Roger J. Midgley
EMC Manager

SECTION 1 GENERAL INFORMATION

1.1 Product Description

The 1900-BS is the base station portion of a CTPhone system which adds wireless phone service to existing Private Branch Exchange (PBX), Centrex service, or key systems. The CTPhone operates in both single building and campus environments.

The components of the CTPhone consist of multiple base stations, portable handsets and a Base Station Interface Adapter (BSIA). Base stations are installed throughout a facility to relay calls between the portable handsets and the office telephone system. The BSIA connects to an existing telephone system and accommodates one or two base stations and up to 32 CTPhone handset users. Each base station provides up to 31,000 square meters of calling coverage.

The system can be used with four different base stations, the Unified Base, Mini Base (four antenna), Mini Base (five antenna) and the Mini Base (Outdoor unit).

This application is for the Mini Base stations and is identified by FCC ID: MTU-1900-BS-B1. The wireless handset has been previously certified and is identified by FCC ID: MTU-1900-HS-A1.

1.2 Test Specification

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

1.3 Test Methods & Procedures

The Mini Base 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	Complies
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	Complies
15.319 (a)	Frequency of operation	3.2.6	N/A	Complies
15.319 (b)	Modulation technique	3.2.7	6.1.4	Complies
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	Complies
15.319 (f)	Automatic discontinuance of transmission	3.2.11	N/A	Complies
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	Complies
15.323 (b)	Channel packing	3.2.14	8.1.2	Complies

FCC Section	Description	Report Section	ANSI C63.17 Section	Result
15.232 (c)	Time and Spectrum monitoring	3.2.15	Sections 7 and 8	Complies
15.323 (c)(1)	Transmit window monitoring	3.2.16	7.3.2.2 and 7.5	Complies
15.323 (c)(2)	Monitoring threshold	3.2.17	7.3.2.1	Complies
15.323 (c)(3)	Transmission duration	3.2.18	N/A	Complies
15.323 (c)(4)	Acknowledgments	3.2.19	8.2.1	Complies
15.323 (c)(5)	Least interfered channel	3.2.20	7.3.2.1, 7.3.2.2 and 8.2.1	Complies
15.323 (c)(6)	Random waiting interval	3.2.21	8.1.3	Complies
15.323 (c)(7)	Threshold monitoring bandwidth, Threshold monitoring reaction time	3.2.22	7.4 and 7.5	Complies
15.323 (c)(8)	Threshold monitoring antenna	3.2.23	N/A	Complies
15.323 (c)(9)	Monitoring threshold relaxation	3.2.24	N/A	Complies
15.323 (c)(10)	Duplex connections	3.2.25	8.2.3	Complies
15.323 (c)(11)	Alternative monitoring interval	3.2.26	8.2.4	Complies
15.323 (c)(12)	Limitation on use of Section (c)(10) or (c)(11)	3.2.27	N/A	Complies
15.323 (d)	Spurious emissions	3.2.28	6.1.6	Complies

FCC Section	Description	Report Section	ANSI C63.17 Section	Result
15.323 (e)	Frame repetition stability / frame period and jitter	3.2.29	6.2.3 and 6.2.4	Complies
15.323 (f)	Frequency stability	3.2.30	6.2.2	Complies

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.

3.2 Test Results

3.2.1 Coordination with fixed microwave service § 15.307

Measurement Data:

The affidavit from UTAM, Inc. is enclosed in Exhibit 12.

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 Mini Base tunes up to 1930 MHz; therefore, in accordance with § 15.33 (b)(1), the EUT was tested from 30 MHz to 10 GHz.

The Mini Base 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:

The radiated spurious emissions were tested at Hermon Laboratories Ltd. Located in Israel; the test report is enclosed in Appendix C of this report.

3.2.3 Labelling Requirements § 15.311

In addition to the labelling 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:

See label as shown in Exhibit 1.

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:

The conducted emissions were tested at Hermon Laboratories Ltd. Located in Israel; the test report is enclosed in Appendix C of this report.

3.2.5 Antenna Requirement § 15.317

Demonstration of Compliance:

The Mini Base uses an endfeed halfwave antenna that connects to the main board using special connectors. The fifth antenna is a Dipole antenna that connects to the main board via coax cable using special connectors. The same type as specified by the

manufacturer can only replace this antenna.

§ 15.319 General Technical Requirements

3.2.6 Frequency of Operation § 15.319 (a)

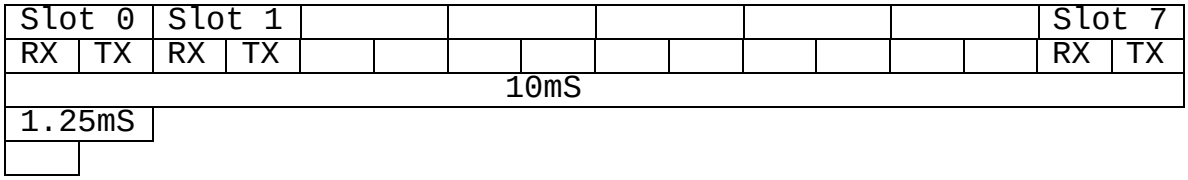
Demonstration of Compliance:

The Mini Base is an Isochronous devise that transmits from 1920 - 1930 MHz. The spectrum has been split into eight 1.25 MHz sub-bands starting with 1920-1921.25 MHz and ending with 1928.75-1930 MHz. The Mini Base operates on the following channels:

Channel Number	Center Frequency (MHz)
0	1920.167
1	1920.485
2	1920.783
3	1921.099
4	1921.408
5	1921.720
6	1922.022
7	1922.339
8	1922.645
9	1922.972
10	1923.279
11	1923.610
12	1923.917
13	1924.213
14	1924.531
15	1924.838
16	1925.143
17	1925.480
18	1925.781
19	1926.087
20	1926.402
21	1926.717
22	1927.032
23	1927.346
24	1927.661
25	1927.957
26	1928.269
27	1928.605
28	1928.905
29	1929.230

Channel Number	Center Frequency (MHz)
30	1929.542
31	1929.840

The 1900-BS uses Time Division Multiple Access (TDMA) technology. Each channel is divided into 10 msec frame periods, this is further divided into eight time-slots of 1.25 msec and each time slot is divided in to receive (RX) and transmit (TX) slots of 625 μsec duration. Shown below is a diagram showing how the 10 msec frame is subdivided:



3.2.7 Digital Modulation Technique § 15.319 (b)

Demonstration of Compliance:

The 1900-BS uses a Differential Pi/4 QPSK digital modulation.

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:

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

BW = Emission Bandwidth in Hz.

The peak transmit power is required to be less than 16.4 dBm. This value is 1 dB lower than the calculated value of 17.4 dBm (as determined by the formula shown below) since the maximum directional gain of the antenna is 4 dBi, as per the requirements of § 15.319 (e).

$$Peak\ Transmit\ Power\ =\ 100\ uW\ x\ \sqrt{307000}\ =\ 55.4\ mW\ =\ 17.4\ dBM$$

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Sections 6.1.2 and 6.1.3.

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.

The Mini Base can be used in two different configurations. The first configuration is with the four internal antennas and the second configuration includes the four internal antennas plus a fifth antenna port to be connected to an external antenna. This external antenna is connected to the base station Coax Cable.

Testing was performed with the base station in both configurations; the data is enclosed below.

Base Station (Internal Antenna Port)

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.167	14.6	301.0
1925.143	15.0	307.0
1929.840	15.1	306.0

Base Station (External Antenna Port)

Frequency (MHz)	Maximum Peak Transmit Power (dBm)	Measured Emission Bandwidth (kHz)
1920.167	9.4	307.0
1925.143	9.6	304.0
1929.840	9.9	306.0

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 Mini Base was tested as per ANSI C63.17-1998 Section 6.1.5.1.

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.

The Mini Base can be used in two different configurations. The first configuration is with the four internal antennas and the second configuration includes the four internal antennas plus a fifth antenna port to be connected to an external antenna. This external antenna is connected to the base station Coax Cable.

Testing was performed with the base station in both configurations; the data is enclosed below.

Base Station (Internal Antenna Port)

Frequency (MHz)	Maximum Power Spectral Density - Peak Detection (dBm)	Maximum Power Spectral Density - Sample Detection (dBm)
1920.167	3.8	3.6
1925.143	4.0	3.8
1929.840	4.0	3.9

Base Station (External Antenna Port)

Frequency (MHz)	Maximum Power Spectral Density - Peak Detection (dBm)	Maximum Power Spectral Density - Sample Detection (dBm)
1920.167	-0.5	-0.7
1925.143	0.6	0.3
1929.840	0.9	0.8

RESULT

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

3.2.10 Directional Gain of Antenna § 15.319 (e)

Requirement:

The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Demonstration of Compliance:

The maximum directional antenna gain for the Mini Base is 4.0 dBi. The typical directional antenna gain for the Mini Base is 3.0 dBi.

The maximum directional antenna gain for the External Antenna is 4.0 dBi. The typical directional antenna gain for the External Antenna is 3.0 dBi.

3.2.11 Automatic Discontinuance of Transmission § 15.319 (f)

Requirement:

The device shall automatically discontinue transmission on case of either absence of information to transmit or operational failure. The provisions in this section are not intended to

preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Measurement Data:

The Mini Base ceased to transmit under the following conditions:

1. Reset BSIA with base station powered from BSIA
2. Reset BSIA with base station powered from external 5 VDC power supply
3. Removed power from BSIA
4. Removed E1 line between BSIA and base station (base station powered from BSIA)
5. Removed E1 line between BSIA and base station (base station powered from external 5 VDC power supply)
6. Removed battery from handset

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 1900-BS is not a hand-held device and the radiating structure is always greater than 2.5 cm from the body of the

user, therefore; the base station is not subject to the requirements of this section.

§ 15.323 Specific Requirements for Isochronous Devices operating in the 1920-1930 MHz sub-band

3.2.13 Channel Allocation § 15.323 (a)

Requirement:

Operation shall be contained within one of eight 1.25 MHz channels starting with 1920-1921.25 MHz and ending with 1928.75-1930 MHz. Further sub-division of a 1.25 MHz channel is permitted with a reduced power level, as specified in § 15. 3 19 (c), but in no event shall the emission bandwidth be less than 50 kHz.

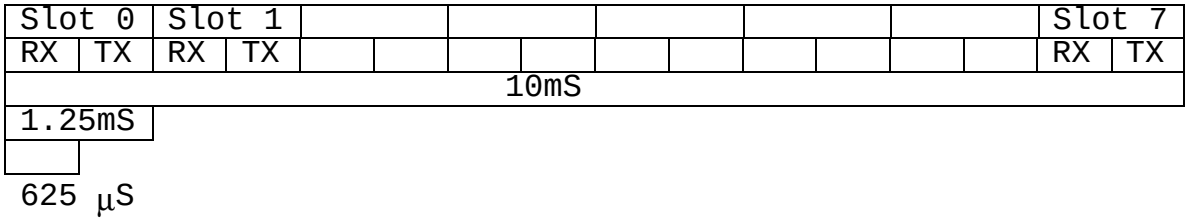
Demonstration of Compliance:

The Mini Base is an Isochronous devise that transmits from 1920 - 1930 MHz. The spectrum has been split into eight 1.25 MHz sub-bands starting with 1920-1921.25 MHz and ending with 1928.75-1930 MHz. The Mini Base operates on the following channels:

Channel Number	Center Frequency (MHz)
0	1920.167
1	1920.485
2	1920.783
3	1921.099
4	1921.408
5	1921.720
6	1922.022
7	1922.339
8	1922.645
9	1922.972
10	1923.279
11	1923.610
12	1923.917
13	1924.213
14	1924.531
15	1924.838
16	1925.143
17	1925.480
18	1925.781
19	1926.087

Channel Number	Center Frequency (MHz)
20	1926.402
21	1926.717
22	1927.032
23	1927.346
24	1927.661
25	1927.957
26	1928.269
27	1928.605
28	1928.905
29	1929.230
30	1929.542
31	1929.840

The 1900-BS uses Time Division Multiple Access (TDMA) technology. Each channel is divided into 10 msec frame periods, this is further divided into eight time-slots of 1.25 msec and each time slot is divided in to receive (RX) and transmit (TX) slots of 625 μsec duration. Shown below is a diagram showing how the 10 msec frame is subdivided:



Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Section 6.1.3.

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.

Base Station (Internal Antenna Port)

Frequency (MHz)	Measured Emission Bandwidth (kHz)
1920.167	301.0
1925.143	307.0
1929.840	306.0

Base Station (External Antenna Port)

Frequency (MHz)	Measured Emission Bandwidth (kHz)
1920.167	307.0
1925.143	304.0
1929.840	306.0

RESULT

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

3.2.14 Time and Spectrum Window § 15.323 (b)

Requirement:

Intentional radiators with an intended emission bandwidth less than 625 kHz shall start searching for an available time and spectrum window within 3 MHz of the sub-band edge at 1920 MHz and search upward from that point. Devices with an intended emission bandwidth greater than 625 kHz shall start searching for an available time and spectrum window within 3 MHz of the sub-band edge at 1930 MHz and search downward from that point.

Demonstration of Compliance:

The base station performs all of the time and spectrum window access monitoring and assigns the frequency channel and

time slot for both the handset and base station. Therefore the monitoring tests and time and spectrum window access procedure tests were performed on the base station only. Shown below are the results of these tests.

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Section 8.1.2.

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, 6, 7, 8, and 9.

Step	Test Condition	Result
1	No Interference	Call Established channel 0 (1920.167 MHz)
2	Interference at lower threshold (-86.8 dBm) 3 MHz from lower edge of sub-band (1920-1923 MHz)	Call Established channel 10 (1923.279 MHz)
3	Interference at lower threshold (-86.8 dBm) 4 MHz from lower edge of sub-band (1920-1924 MHz)	Call Established channel 14 (1924.531 MHz)
4	No Interference	Call Established channel 0 (1920.167 MHz)

RESULT

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

3.2.15 Time and Spectrum Monitoring § 15.323 (c)

Requirement:

Isochronous devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:

Demonstration of Compliance:

The base station performs all of the time and spectrum window access monitoring and assigns the frequency channel and time slot for both the handset and base station. Therefore the monitoring tests and time and spectrum window access procedure tests were performed on the base station only. Sections 3.2.16 through 3.2.27 of this report show compliance to FCC § 15.323 (c)(1) through § 15.323 (c)(12).

3.2.16 Isochronous Reaction Time and Monitoring Interval § 15.323 (c)(1)

Requirement:

Immediately prior to initiating a transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of at least 10 milliseconds for systems designed to use a 10 milliseconds or shorter time frame period or at least 20 milliseconds for systems designed to use a 20 milliseconds frame period.

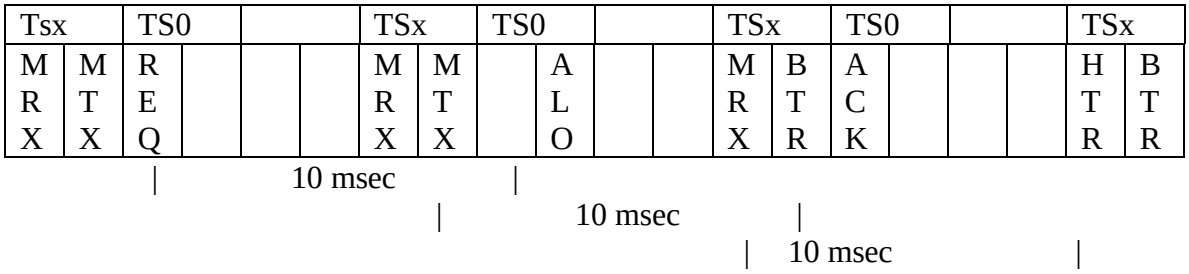
Measurement Data:

To verify that the device was operating as described above the Mini Base was tested as per ANSI C63.17-1998 Sections 7.3.2.2 and 7.5.

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, 6, 7, 8, and 9.

The Base-Station continuously monitors the available time/spectrum windows (time-slots 1-7) using the control channel (time-slot 0). From this information the Base-Station produces an “available time slot table” to facilitate fast selection of a time/spectrum window when access is required, this table is updated every frame period (10 msec). Before the Base-Station assigns a time/spectrum window for a duplex voice channel, it re-monitors the time/spectrum window in the preceding frame period (10 msec). The Base-Station monitors both receive and transmit parts of the time-slot. The Mobile unit will obtain the allocation of the monitored window from the Base-Station through the control time-slot. Shown below is a timing diagram:



X - can get any value between 1-7.
MRX - Monitor of receive part by the Base-Station.
MTX - Monitor of transmit part by the Base-Station.
REQ - A call setup request.
ALO - Time-slot and frequency allocation.
ACK - Acknowledgment for the allocation.
BTR - Base-Station transmit.
HTR - Handset transmit.

ANSI C63.17 Section 7.3.2.2

To test for this section two channels were made interference free; the remaining channels had interference so that they were unavailable. The two channels that were interference free were designated as f1 (channel 14 1924.531 MHz) and f2 (channel 20 1926.402 MHz). The test set-up allowed interference to be placed on f1 and f2 independent of each other.

Step	Test Condition	Result
1	No Interference	Call Established f1 (channel 14 1924.531 MHz)
2	Interference on f1 3 dB above threshold and interference on f2 10 dB above threshold	No Call Established
3	Interference on f2 removed (f2 available)	Call Established f2 (channel 20 1926.402 MHz)
4	Connection terminated	
5	Interference on f2 re-applied, EUT attempted transmission	Call Established f1 (channel 14 1924.531 MHz)

ANSI C63.17 Section 7.5

To test for this section two channels were made interference free; the remaining channels had interference so that they were unavailable. The two channels that were interference free were designated as f1 (channel 14 1924.531 MHz) and f2 (channel 20 1926.402 MHz).

Step	Test Condition	Result
1	No Interference	Call Established on channel 14 1924.531 MHz
2	Interference on Channel 14 at threshold level, pulse modulated with 100.9 μs pulse width	No Call Established on channel 14, call established on channel 20
3	Interference on Channel 1 6 dB above threshold level, pulse modulated with 70.6 μs pulse width	No Call Established on channel 14, call established on channel 20
4	Interference on Channel 1 10 dB above threshold level, pulse modulated with 151.3 μs pulse width	No Call Established on channel 14, call established on channel 20
5	Step 4 was repeated 5 times with the synchronization of the pulsed interference randomly varied with respect to the EUT frame.	No Call Established on channel 14, call established on channel 20
6	No Interference	Call Established on channel 14 1924.531 MHz

SAMPLE CALCULATIONS

$$Pulse\ Width = 35\sqrt{1.25 / B}$$

$$Pulse\ Width = 50\sqrt{1.25 / B}$$

$$Pulse\ Width = 75\sqrt{1.25/B}$$

Where B = Emission Bandwidth in MHz

$$Pulse\ Width = 35\sqrt{1.25/0.307} = 70.6\ u\text{sec}$$

$$Pulse\ Width = 50\sqrt{1.25/0.307} = 100.9\ u\text{sec}$$

$$Pulse\ Width = 75\sqrt{1.25/0.307} = 151.3\ u\text{sec}$$

RESULT

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

3.2.17 Monitoring Threshold § 15.323 (c)(2)

Requirement:

The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device.

Demonstration of Compliance:

The Mini Base operates in the Listen Before Talk (LBT) mode only and does not use the Least Interfered Channel (LIC) mode. Shown below is the calculation for the LBT threshold level:

$$Threshold\ Level\ for\ Isochronous\ (LBT)\ devices = 15\log_{10} B - 184 + 30 - P\ dBm$$

B = Emission Bandwidth (Hz)
P = Measured Transmitter Power Level (dBm)

$$\textit{Threshold Level for Isochronous (LBT) devices} = 15\log_{10} 307000 - 184 + 30 - 15.1 = -86.8\ \textit{dBm}$$

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Section 7.3.2.1.

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, 6, 7, 8, and 9.

ANSI C63.17 Section 7.3.2.1

Since the Mini Base does not use the LIC threshold, the following steps were performed to measure the threshold level and verify that the threshold level did not exceed -86.8 dBm as calculated above.

To test for this section two channels were made interference free; the remaining channels had interference so that they were unavailable. The two channels that were interference free were designated as f1 (channel 14 1924.531 MHz) and f2 (channel 20 1926.402 MHz). The test set-up allowed interference to be placed on f1 and f2 independent of each other.

Step	Test Condition	Result
1	No Interference on f1 or f2 (interference on all other channels)	Call Established f1 (channel 14 1924.531 MHz)
2	Interference on f1 10 dB below manufacturers declared threshold level	Call Established f1 (channel 14 1924.531 MHz)
3	Interference level on f1 increased 1 dB	Call Established f1 (channel 14 1924.531 MHz)

Step	Test Condition	Result
4	Step 3 repeated until the call was established on f2	Call Established f2 (channel 20 1926.402 MHz)
5	Interference level on f1 reduced 1 dB	Call Established f1 (channel 14 1924.531 MHz)
6	Interference level on f1 increased 1 dB	Call Established f2 (channel 20 1926.402 MHz)
7	Steps 5 and 6 repeated 5 times	Same as steps 5 and 6
8	Threshold level measured	Threshold level = -93.7 dBm (measured with 300 kHz RBW)
9	Interference on f1 and f2 at the calculated threshold. The interference on f1 occurred only during the transmit potion of the frame	No Call Established
10	No Interference on f1 or f2 (interference on all other channels)	Call Established f1 (channel 14 1924.531 MHz)

RESULT

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

3.2.18 Transmission Duration § 15.323 (c)(3)

Requirement:

If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

Demonstration of Compliance:

The base station incorporates a software program that does not allow the 1900-BS to transmit longer than 6 hours. A call was placed between the handset and the base station, the time the call was started was noted and the time that the call stopped was

also noted to verify that it transmitted for less than 8 hours.

Measurement Data:

Step	Test Condition	Time
1	Transmission started	10:20 AM
2	Transmission automatically stopped	4:15 PM
3	Transmission length	5 hours 55 minutes

RESULT

In the configuration tested, the EUT transmitted for less than 8 hours; therefore, the EUT complied with the requirements of the specification.

3.2.19 Acknowledgments § 15.323 (c)(4)

Requirement:

Once access to specific combined time and spectrum windows is obtained an acknowledgment from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Section 8.2.1.

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, 6, 7, 8, and 9.

ANSI C63.17 Section 8.2.1

After an available time/spectrum window has been assigned both the base station and handset attempt to transmit on the

specified time/spectrum window. If either device does not receive an acknowledgment, from the other device, within one second the EUT ceases to transmit. After the call is established if there is not an acknowledgment received, every one second, from the other device transmission is ceased. The acknowledgment is based on the receiving of the correct synchronization word of the second device.

On the control channel, the base station stops transmission every 30 seconds and restarts the monitoring process to find an available time and spectrum window.

Step	Test Condition	Result
1	Voice call initiated by the handset, the power to the handset turned off	Base station stopped transmission within 935 msec
2	Voice call initiated by the handset, the power to the base station turned off	Handset stopped transmission after 1.045 sec
3	Voice call initiated, to the handset, by an analog telephone that was connected to the PBX, the analog phone was placed in the on-hook mode	Handset stopped transmission after 1.045 sec
4	Handset activated with base station turned off	Handset did not transmit for more than 1 sec
5	Base station activated with handset turned off	Base station did not transmit for more than 1 sec

RESULT

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

3.2.20 Monitoring Threshold for Systems with a Minimum of 40 Duplex Channels § 15.323 (c)(5)

Requirement:

If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for this comparison must be accurate to within 6 dB. No device or group of cooperating devices located within 1 meter of each other shall occupy more than three 1.25 MHz channels during any frame period. Devices in an operational state that are utilizing the provisions of this section are not required to use the search provisions of paragraph (b) of this section.

Demonstration of Compliance:

The Mini Base does not use the provisions of this section (LIC); it only uses the LBT mode. There are no devices or group of cooperating devices located within 1 meter of each other; this is specified in the installation manual.

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Sections 7.3.2.1, 7.3.2.2 and 8.2.1.

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, 6, 7, 8, and 9.

ANSI C63.17 Section 7.3.2.1

Since the Mini Base does not use the LIC threshold, the following steps were performed to measure the threshold level and verify that the threshold level did not exceed -86.8 dBm as calculated above.

To test for this section two channels were made interference free; the remaining channels had interference so that they were

unavailable. The two channels that were interference free were designated as f1 (channel 14 1924.531 MHz) and f2 (channel 20 1926.402 MHz). The test set-up allowed interference to be placed on f1 and f2 independent of each other.

Step	Test Condition	Result
1	No Interference on f1 or f2 (interference on all other channels)	Call Established f1 (channel 14 1924.531 MHz)
2	Interference on f1 10 dB below manufacturers declared threshold level	Call Established f1 (channel 14 1924.531 MHz)
3	Interference level on f1 increased 1 dB	Call Established f1 (channel 14 1924.531 MHz)
4	Step 3 repeated until the call was established on f2	Call Established f2 (channel 20 1926.402 MHz)
5	Interference level on f1 reduced 1 dB	Call Established f1 (channel 14 1924.531 MHz)
6	Interference level on f1 increased 1 dB	Call Established f2 (channel 20 1926.402 MHz)
7	Steps 5 and 6 repeated 5 times	Same as steps 5 and 6
8	Threshold level measured	Threshold level = -93.7 dBm
9	Interference on f1 and f2 at the calculated threshold. The interference on f1 occurred only during the transmit potion of the frame	No Call Established
10	No Interference on f1 or f2 (interference on all other channels)	Call Established f1 (channel 14 1924.531 MHz)

ANSI C63.17 Section 7.3.2.2

To test for this section two channels were made interference free; the remaining channels had interference so that they were unavailable. The two channels that were interference free were designated as f1 (channel 14 1924.531 MHz) and f2 (channel 20 1926.402 MHz). The test set-up allowed interference to be placed on f1 and f2 independent of each other.

Step	Test Condition	Result
1	No Interference	Call Established f1 (channel 14 1924.531 MHz)
2	Interference on f1 3 dB above threshold and interference on f2 10 dB above threshold	No Call Established
3	Interference on f2 removed (f2 available)	Call Established f2 (channel 20 1926.402 MHz)
4	Connection terminated	
5	Interference on f2 re-applied, EUT attempted transmission	Call Established f1 (channel 14 1924.531 MHz)

ANSI C63.17 Section 8.2.1

After an available time/spectrum window has been assigned both the base station and handset attempt to transmit on the specified time/spectrum window. If either device does not receive an acknowledgment, from the other device, within one second the EUT ceases to transmit. After the call is established if there is not an acknowledgment received, every one second, from the other device transmission is ceased. The acknowledgment is based on the receiving of the correct synchronization word of the second device.

On the control channel, the base station stops transmission every 30 seconds and restarts the monitoring process to find an available time and spectrum window.

Step	Test Condition	Result
1	Voice call initiated by the handset, the power to the handset turned off	Base station stopped transmission within 935 msec
2	Voice call initiated by the handset, the power to the base station turned off	Handset stopped transmission after 1.045 sec
3	Voice call initiated, to the handset, by an analog telephone that was connected to the PBX, the analog phone was placed in the on-hook mode	Handset stopped transmission after 1.045 sec
4	Handset activated with base station turned off	Handset did not transmit for more than 1 sec
5	Base station activated with handset turned off	Base station did not transmit for more than 1 sec

RESULT

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

3.2.21 Isochronous Random Waiting Interval § 15.323 (c)(6)

Requirement:

If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Section 8.1.3.

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, 6, 7, 8, and 9.

ANSI C63.17 Section 8.1.3

Step	Test Condition	Result
1	Interference on all time and frequency channels except channel 0 time slot 1	Control channel transmitting on Channel 0 (1920.167 MHz)
2	Interference on all channels	No control channel transmitting
3	Interference removed, time from end of interference to start of control channel transmission measured	See results below
4	Steps 2 and 3 repeated 5 times	See results below
5	Results of first 5 measurements were greater than 10 msec but less than 150 msec	Proceed to step 6
6	Steps 2 and 3 repeated 95 times	See results below

Attempt	**Time (msec)**
1	112
2	50
3	134
4	40
5	38
6	60
7	174
8	114
9	40
10	58
11	156
12	186
13	176
14	144
15	104
16	188
17	166
18	134

Attempt	Time (msec)
19	82
20	72
21	124
22	52
23	136
24	84
25	136
26	84
27	94
28	126
29	62
30	94
31	156
32	166
33	144
34	104
35	188
36	166
37	146
38	94
39	166
40	166
41	136
42	146
43	94
44	84
45	166
46	144
47	156
48	50
49	72
50	62
51	94
52	166
53	92
54	178
55	156
56	114
57	40
58	62
59	176
60	40
61	62
62	94
63	166

Attempt	Time (msec)
64	136
65	146
66	104
67	166
68	72
69	42
70	50
71	124
72	60
73	168
74	136
75	82
76	42
77	42
78	42
79	104
80	176
81	166
82	144
83	94
84	156
85	124
86	72
87	42
88	42
89	42
90	82
91	146
92	92
93	168
94	146
95	102
96	156
97	42
98	42
99	62
100	94

None of the 100 measurements were less than 10 msec and all-100 measurements varied uniformly between 10 msec and 150 msec or greater; therefore, the EUT meets the requirements of this section.

RESULT

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

3.2.22 Threshold Monitoring Bandwidth § 15.323 (c)(7)

Requirement:

The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than 5OxSQRT (1.25/emission bandwidth in MHz) microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be 35xSQRT (1.25/emission bandwidth in MHz) microseconds but shall not be required to be less than 35 microseconds.

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Sections 7.4 and 7.5.

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, 6, 7, 8, and 9.

Section 7.4

Simple Compliance Test

To test for this section two channels were made interference free; the remaining channels had interference so that they were unavailable. The two channels that were interference free were channel 4 (1921.408 MHz) and channel 16 (1925.143 MHz). The frequency of the interfering signal was determined as shown below:

Center frequency of channel 4 = 1921.408 MHz
Emission bandwidth = 307.0 kHz
40% of emission bandwidth = 122.8 kHz

-40% of emission bandwidth = 1921.285 MHz
+40% of emission bandwidth = 1921.531 MHz
+4 dB level above calculated threshold = -82.8 dBm

Step	Test Condition	Result
1	No Interference	Call Established channel 4
2	Sub-band filled with broadband interference (FM modulated) centered at 1921.285 MHz (-40% of emission bandwidth) 4 dB above threshold level	No Call Established on channel 4, call established on channel 16
3	Sub-band filled with broadband interference (CW signal) centered at 1921.285 MHz (-40% of emission bandwidth) 4 dB above threshold level	No Call Established on channel 4, call established on channel 16
4	Sub-band filled with broadband interference (FM modulated) centered at 1921.531 MHz (+40% of emission bandwidth) 4 dB above threshold level	No Call Established on channel 4, call established on channel 16
5	Sub-band filled with broadband interference (CW signal) centered at 1921.531 MHz (+40% of emission bandwidth) 4 dB above threshold level	No Call Established on channel 4, call established on channel 16
6	No Interference	Call Established channel 4

ANSI C63.17 Section 7.5

To test for this section two channels were made interference free; the remaining channels had interference so that they were unavailable. The two channels that were interference free were designated as f1 (channel 14 1924.531 MHz) and f2 (channel 20 1926.402 MHz).

Step	Test Condition	Result
1	No Interference	Call Established on channel 14 1924.531 MHz

Step	Test Condition	Result
2	Interference on Channel 14 at threshold level, pulse modulated with 100.9 μs pulse width	No Call Established on channel 14, call established on channel 20
3	Interference on Channel 1 6 dB above threshold level, pulse modulated with 70.6 μs pulse width	No Call Established on channel 14, call established on channel 20
4	Interference on Channel 1 10 dB above threshold level, pulse modulated with 151.3 μs pulse width	No Call Established on channel 14, call established on channel 20
5	Step 4 was repeated 5 times with the synchronization of the pulsed interference randomly varied with respect to the EUT frame.	No Call Established on channel 14, call established on channel 20
6	No Interference	Call Established on channel 14 1924.531 MHz

SAMPLE CALCULATIONS

$$Pulse\ Width = 35\sqrt{1.25 / B}$$

$$Pulse\ Width = 50\sqrt{1.25 / B}$$

$$Pulse\ Width = 75\sqrt{1.25 / B}$$

Where B = Emission Bandwidth in MHz

$$Pulse\ Width = 35\sqrt{1.25 / 0.307} = 70.6\ u\,\text{sec}$$

$$Pulse\ Width = 50\sqrt{1.25/0.307} = 100.9\ u\,\text{sec}$$

$$Pulse\ Width = 75\sqrt{1.25/0.307} = 151.3\ u\,\text{sec}$$

RESULT

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

3.2.23 Threshold Monitoring Antenna § 15.323 (c)(8)

Requirement:

The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

Demonstration of Compliance:

The Mini Base uses the same antenna for both monitoring and for transmission; therefore, the Mini Base meets the requirements of this section.

3.2.24 Monitoring Detection Threshold for Devices with less than Maximum Output Power § 15.323 (c)(9)

Requirement:

Devices that have a power output lower than the maximum permitted under the rules may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

Measurement Data:

The Mini Base does not use the provisions of this section; therefore, the Mini Base meets the requirements of this section.

3.2.25 Duplex Connections § 15.323 (c)(10)

Requirement:

An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Section 8.2.3.

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, 6, 7, 8, and 9.

Section 8.2.3

The base station was running a software program that would allow transmission only on a specified frequency and time slot. These slots can be a duplex pair (TX slot 3, RX slot 3) or different slots (TX slot 3, RX slot 4). The system will only transmit on a duplex time slot (TX slot 3, RX slot 3).

The interference was configured to allow two channels interference free, channels 0 (1920.167 MHz) and channel 16 (1925.143 MHz).

Step	Test Condition	Result
1	Interference on all time slots except slot 3 TX and slot 3 RX were interference free	Call Established channel 0

Step	Test Condition	Result
2	Interference on all time slots except slot 3 TX was interference free	No Call Established on channel 0, call established on channel 16
3	Interference on all time slots except slot 3 RX was interference free	No Call Established on channel 0, call established on channel 16
4	Interference on all time slots except slot 2 TX and slot 3 RX were interference free	No Call Established on channel 0, call established on channel 16
5	Interference on all time slots except slot 2 RX and slot 3 TX were interference free	No Call Established on channel 0, call established on channel 16
6	Interference on all time slots except slot 3 TX and slot 3 RX were interference free	Call Established channel 0
7	No Interference	Call Established channel 0

RESULT

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

3.2.26 Alternative Monitoring Interval § 15.323 (c)(11)

Requirement:

An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within the 1.25 MHz frequency channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

Demonstration of Compliance:

The Mini Base will not be co-located closer than 1 meter; therefore, the requirements of this section do not apply. This requirement is specified in the Installation Manual.

3.2.27 Limitation on use of Section (c)(10) or (c)(11) - § 15.323 (c)(12)

Requirement:

The provisions of (c) (10) or (c) (11) of this section shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

Demonstration of Compliance:

The Mini Base does not use the provisions of § 15.323 (c)(10) or (c)(11) to extend the range of spectrum occupied; therefore, the Mini Base meets the requirements of this section.

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 Mini Base 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.

The Mini Base tunes up to 1930 MHz; therefore, in accordance with § 15.33 (b)(1), the EUT was tested from 30 MHz to 19.3 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 Mini Base can be used in two different configurations. The first configuration is with the four internal antennas and the second configuration includes the four internal antennas plus a fifth antenna port to be connected to an external antenna. This external antenna is connected to the base station Coax Cable.

Testing was performed with the base station in both configurations; the data is enclosed below.

Out-of-Channel Emission (Conducted)
(Internal Antenna)

Transmitting on Channel 0 (1920.167 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	109.4	-55.7	-39.5
200 - 500	437.9	-64.8	-39.5
500 - 1000	919.0	-66.3	-39.5
1000 - 1800	1069.5	-54.8	-39.5
1800 - 1900	1886.3	-68.0	-39.5
1900 - 1917.50	1909.4	-58.1	-39.5
1917.50 - 1918.75	1917.7	-66.9	-29.5
1918.75 - 1920	1919.8	-22.1	-9.5
1921.25 – 1922.50	1921.4	-59.7	-9.5
1922.50 – 1923.75	1923.2	-67.1	-29.5
1923.75 - 1930	1925.3	-67.7	-39.5
1930 - 2000	1941.6	-55.9	-39.5
2000 - 4000	3840.3	-67.1	-39.5
4000 – 6000	5760.5	-82.6	-39.5
6000 – 8000	7680.6	-84.7 *	-39.5
8000 – 10,000	9600.7	-85.1 *	-39.5
10,000 – 12,000	11,520.9	-83.4 *	-39.5
12,000 – 14,000	13,441.1	-81.5 *	-39.5
14,000 – 16,000	15,361.3	-76.5 *	-39.5
16,000 – 18,000	17,281.4	-73.5 *	-39.5
18,000 – 20,000	19,201.6	-72.6 *	-39.5
* Noise Floor			

Transmitting on Channel 31 (1929.840 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	119.2	-48.6	-39.5
200 - 500	476.5	-60.1	-39.5
500 - 1000	603.0	-65.9	-39.5
1000 - 1800	1084.1	-52.8	-39.5
1800 - 1900	1898.7	-69.6	-39.5
1900 - 1926.25	1919.2	-66.6	-39.5
1926.25 – 1927.50	1927.1	-67.4	-29.5
1927.50 – 1928.75	1928.7	-66.7	-9.5
1930 – 1931.25	1930.1	-12.9	-9.5
1931.25 – 1932.50	1931.9	-65.4	-29.5
1932.50 - 1940	1934.4	-68.7	-39.5
1940 - 2000	1940.6	-56.5	-39.5
2000 - 4000	3859.7	-69.6	-39.5
4000 – 6000	5789.5	-79.8	-39.5
6000 – 8000	7719.3	-84.6 *	-39.5
8000 – 10,000	9649.2	-85.1 *	-39.5
10,000 – 12,000	11,579.0	-83.4 *	-39.5
12,000 – 14,000	13,508.9	-81.5 *	-39.5
14,000 – 16,000	15,438.8	-76.5 *	-39.5
16,000 – 18,000	17,368.5	-73.5 *	-39.5
18,000 – 20,000	19,298.4	-72.6 *	-39.5
* Noise Floor			

Out-of-Subchannel Emission (Conducted)
(Internal Antenna)

Transmitting on Channel 0 (1920.167 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B 1920.469 - 1920.771	1920.5	-30.7	-13.6
2B to 3B 1920.771 - 1921.073	1920.8	-37.3	-33.6
3B to Channel Edge 1921.073 - 1921.25	1921.2	-55.4	-43.6

Transmitting on Channel 3 (1921.099 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
-1B to -2B 1920.495 - 1920.797	1920.8	-22.7	-13.6
-2B to -3B 1920.193 - 1920.495	1920.4	-44.2	-33.6
-3B to Channel Edge 1920 - 1920.193	1920.1	-61.7	-43.6

Transmitting on Channel 28 (1928.905 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B 1929.207 - 1929.509	1929.2	-28.6	-13.6
2B to 3B 1929.509 - 1929.811	1929.6	-36.8	-33.6
3B to Channel Edge 1929.811 - 1930	1929.8	-55.1	-43.6

Transmitting on Channel 31 (1929.840 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
-1B to -2B 1929.236 - 1929.538	1929.5	-19.2	-13.6
-2B to -3B 1928.935 - 1929.236	1929.1	-43.9	-33.6
-3B to Channel Edge 1928.75 - 1928.935	1928.9	-59.0	-43.6

Out-of-sub-band Emission (Conducted)
(Internal Antenna)

Transmitting on Channel 0 (1920.167 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	109.4	-55.7	-39.5
200 - 500	437.9	-64.8	-39.5
500 - 1000	919.0	-66.3	-39.5
1000 - 1800	1069.5	-54.8	-39.5
1800 - 1900	1886.3	-68.0	-39.5
1900 - 1917.50	1909.4	-58.1	-39.5
1917.50 - 1918.75	1917.7	-66.9	-29.5
1918.75 - 1920	1919.8	-22.1	-9.5
1920.3125 – 1921.5625	1920.4	-15.0	-9.5
1921.5625 – 1922.8125	1922.2	-65.8	-29.5
1922.8125 - 1930	1923.7	-65.8	-39.5
1930 - 2000	1941.6	-55.9	-39.5
2000 - 4000	3840.3	-67.1	-39.5
4000 – 6000	5760.5	-82.6	-39.5
6000 – 8000	7680.6	-84.7 *	-39.5
8000 – 10,000	9600.7	-85.1 *	-39.5
10,000 – 12,000	11,520.9	-83.4 *	-39.5
12,000 – 14,000	13,441.1	-81.5 *	-39.5
14,000 – 16,000	15,361.3	-76.5 *	-39.5
16,000 – 18,000	17,281.4	-73.5 *	-39.5
18,000 – 20,000	19,201.6	-72.6 *	-39.5
* Noise Floor			

Transmitting on Channel 31 (1929.840 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	119.2	-48.6	-39.5
200 - 500	476.5	-60.1	-39.5
500 - 1000	603.0	-65.9	-39.5
1000 - 1800	1084.1	-52.8	-39.5
1800 - 1900	1898.7	-69.6	-39.5
1900 – 1927.1875	1919.2	-60.1	-39.5
1927.1875 – 1928.4375	1927.4	-65.6	-29.5
1928.4375 – 1929.6875	1929.5	-19.1	-9.5
1930 – 1931.25	1930.1	-12.9	-9.5
1931.25 – 1932. 50	1931.9	-65.4	-29.5
1932.50 - 1940	1934.4	-68.7	-39.5
1940 - 2000	1940.6	-56.5	-39.5
2000 - 4000	3859.7	-69.6	-39.5
4000 – 6000	5789.5	-79.8	-39.5
6000 – 8000	7719.3	-84.6 *	-39.5
8000 – 10,000	9649.2	-85.1 *	-39.5
10,000 – 12,000	11,579.0	-83.4 *	-39.5
12,000 – 14,000	13,508.9	-81.5 *	-39.5
14,000 – 16,000	15,438.8	-76.5 *	-39.5
16,000 – 18,000	17,368.5	-73.5 *	-39.5
18,000 – 20,000	19,298.4	-72.6 *	-39.5
* Noise Floor			

Out-of-Channel Emission (Conducted)
(External Antenna)

Transmitting on Channel 0 (1920.167 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	109.5	-66.7	-39.5
200 - 500	437.9	-65.2	-39.5
500 - 1000	785.2	-83.4	-39.5
1000 - 1800	1069.6	-68.5	-39.5
1800 - 1900	1899.0	-64.1	-39.5
1900 - 1917.50	1909.6	-70.6	-39.5
1917.50 - 1918.75	1917.6	-72.4	-29.5
1918.75 - 1920	1919.9	-31.2	-9.5
1921.25 – 1922.50	1921.7	-70.4	-9.5
1922.50 – 1923.75	1922.6	-66.2	-29.5
1923.75 - 1930	1929.6	-71.0	-39.5
1930 - 2000	1941.6	-61.4	-39.5
2000 - 4000	3840.3	-65.2	-39.5
4000 – 6000	5760.5	-67.6	-39.5
6000 – 8000	7680.6	-78.9	-39.5
8000 – 10,000	9601.1	-74.8	-39.5
10,000 – 12,000	11,520.9	-83.4 *	-39.5
12,000 – 14,000	13,441.1	-81.5 *	-39.5
14,000 – 16,000	15,361.3	-76.5 *	-39.5
16,000 – 18,000	17,281.4	-73.5 *	-39.5
18,000 – 20,000	19,201.6	-72.6 *	-39.5
* Noise Floor			

Transmitting on Channel 31 (1929.840 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	119.2	-56.4	-39.5
200 - 500	476.6	-67.9	-39.5
500 - 1000	802.9	-83.1	-39.5
1000 - 1800	1084.1	-68.3	-39.5
1800 - 1900	1898.6	-73.6	-39.5
1900 - 1926.25	1915.6	-72.0	-39.5
1926.25 – 1927.50	1926.6	-71.2	-29.5
1927.50 – 1928.75	1928.6	-70.0	-9.5
1930 – 1931.25	1930.1	-28.3	-9.5
1931.25 – 1932.50	1932.1	-70.7	-29.5
1932.50 - 1940	1934.2	-71.3	-39.5
1940 - 2000	1951.4	-63.7	-39.5
2000 - 4000	3859.7	-65.3	-39.5
4000 – 6000	5789.5	-70.6	-39.5
6000 – 8000	7719.4	-81.8	-39.5
8000 – 10,000	9649.2	-77.8	-39.5
10,000 – 12,000	11,579.0	-83.4 *	-39.5
12,000 – 14,000	13,508.9	-81.5 *	-39.5
14,000 – 16,000	15,438.8	-76.5 *	-39.5
16,000 – 18,000	17,368.5	-73.5 *	-39.5
18,000 – 20,000	19,298.4	-72.6 *	-39.5
* Noise Floor			

Out-of-Subchannel Emission (Conducted)
(External Antenna)

Transmitting on Channel 0 (1920.167 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B 1920.469 - 1920.771	1920.5	-44.0	-13.6
2B to 3B 1920.771 - 1921.073	1920.8	-64.2	-33.6
3B to Channel Edge 1921.073 - 1921.25	1921.1	-69.9	-43.6

Transmitting on Channel 3 (1921.099 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
-1B to -2B 1920.495 - 1920.797	1920.8	-34.6	-13.6
-2B to -3B 1920.193 - 1920.495	1920.4	-63.4	-33.6
-3B to Channel Edge 1920 - 1920.193	1920.1	-69.5	-43.6

Transmitting on Channel 28 (1928.905 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1B to 2B 1929.207 - 1929.509	1929.2	-43.3	-13.6
2B to 3B 1929.509 - 1929.811	1929.6	-60.8	-33.6
3B to Channel Edge 1929.811 - 1930	1929.8	-68.6	-43.6

Transmitting on Channel 31 (1929.840 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
-1B to -2B 1929.236 - 1929.538	1929.5	-34.6	-13.6
-2B to -3B 1928.935 - 1929.236	1929.2	-62.0	-33.6
-3B to Channel Edge 1928.75 - 1928.935	1928.8	-69.6	-43.6

Out-of-sub-band Emission (Conducted)
(External Antenna)

Transmitting on Channel 0 (1920.167 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	109.5	-66.7	-39.5
200 - 500	437.9	-65.2	-39.5
500 - 1000	785.2	-83.4	-39.5
1000 - 1800	1069.6	-68.5	-39.5
1800 - 1900	1899.0	-64.1	-39.5
1900 - 1917.50	1909.6	-70.6	-39.5
1917.50 - 1918.75	1917.6	-72.4	-29.5
1918.75 - 1920	1919.9	-31.2	-9.5
1920.3125 – 1921.5625	1920.3	-25.7	-9.5
1921.5625 – 1922.8125	1922.7	-63.4	-29.5
1922.8125 - 1930	1925.6	-70.3	-39.5
1930 - 2000	1941.6	-61.4	-39.5
2000 - 4000	3840.3	-65.2	-39.5
4000 – 6000	5760.5	-67.6	-39.5
6000 – 8000	7680.6	-78.9	-39.5
8000 – 10,000	9601.1	-74.8	-39.5
10,000 – 12,000	11,520.9	-83.4 *	-39.5
12,000 – 14,000	13,441.1	-81.5 *	-39.5
14,000 – 16,000	15,361.3	-76.5 *	-39.5
16,000 – 18,000	17,281.4	-73.5 *	-39.5
18,000 – 20,000	19,201.6	-72.6 *	-39.5
* Noise Floor			

Transmitting on Channel 31 (1929.840 MHz)			
Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
30 -200	119.2	-56.4	-39.5
200 - 500	476.6	-67.9	-39.5
500 - 1000	802.9	-83.1	-39.5
1000 - 1800	1084.1	-68.3	-39.5
1800 - 1900	1898.6	-73.6	-39.5
1900 – 1927.1875	1925.7	-71.7	-39.5
1927.1875 – 1928.4375	1928.1	-70.6	-29.5
1928.4375 – 1929.6875	1929.7	-28.3	-9.5
1930 – 1931.25	1930.1	-28.3	-9.5
1931.25 – 1932. 50	1932.1	-70.7	-29.5
1932.50 - 1940	1934.2	-71.3	-39.5
1940 - 2000	1951.4	-63.7	-39.5
2000 - 4000	3859.7	-65.3	-39.5
4000 – 6000	5789.5	-70.6	-39.5
6000 – 8000	7719.4	-81.8	-39.5
8000 – 10,000	9649.2	-77.8	-39.5
10,000 – 12,000	11,579.0	-83.4 *	-39.5
12,000 – 14,000	13,508.9	-81.5 *	-39.5
14,000 – 16,000	15,438.8	-76.5 *	-39.5
16,000 – 18,000	17,368.5	-73.5 *	-39.5
18,000 – 20,000	19,298.4	-72.6 *	-39.5
* Noise Floor			

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.

3.2.29 Frame Repetition Stability/Frame Period and Jitter § 15.323 (e)

Requirement:

The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these sub-bands shall be 20 milliseconds or 10 milliseconds/X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per million (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

Measurement Data:

The 1900-BS was tested in accordance with ANSI-C63.17-1998 Sections 6.2.3 and 6.2.4.

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: 10.

Test Performed	Criteria
Frame period	10 msec
Frame repetition stability	10 ppm
Jitter	12.5 μsec

Section 6.2.3

The 1900-BS was configured as specified in section 6.2.3. Both the mean value of the frame repetition rate and the standard deviation were recorded to determine the frame repetition stability. The data is shown below.

Frequency MHz	Standard Deviation Hz	Mean Hz	Frame Repetition Stability ppm
1921.408	0.000008916	100.00009805	2.67

Sample Calculation:

Frame Repetition Stability (ppm) = ((3 * Standard Deviation) / Frame Rate) * 10^6

Frame Rate Hz = 1 / 10 ms = 100 Hz

Section 6.2.4

The 1900-BS was configured as specified in section 6.2.4. The peak to peak, mean and standard deviation values of the frame period distribution were recorded to determine the frame period and jitter.

The mean value shall be the frame period and three times the standard deviation value of the jitter shall not be greater than 12.5 μsec. The data is shown below.

Frequency MHz	Standard Deviation μsec	Mean ms	Jitter μsec
1921.408	0.10150641	9.99998283236	0.30

Sample Calculation:

Jitter μsec = 3 * Standard Deviation

RESULT

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

3.2.30 Frequency Stability § 15.323 (f)

Requirement:

The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ±10 ppm over 1

hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20^0 to $+50^0$ C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20^0 C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

Measurement Data:

The Mini Base was tested as per ANSI C63.17-1998 Section 6.2.2.

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: 10 and 14.

The carrier frequency measurement at 20^0 C (48 VDC) was used as the reference for the measurements at the two extreme temperatures.

The 1900-BS can operate on 48 VDC supplied from the BSIA (E1 lines) or from an external 5 VDC power supply that connects to the AC mains. Therefore testing at the extreme power supply voltages was performed on both the 48 VDC E1 lines and the 120 VAC external power supply.

Temp C^o	Supply Voltage	Frequency of Carrier MHz	Measured Frequency MHz	Deviation ppm
20	102 AC	1929.840	1929.847733	0.45
20	120 AC	1929.840	1929.848864	-0.14
20	138 AC	1929.840	1929.848987	-0.20
20	40.8 DC	1929.840	1929.847865	0.38
20	48.0 DC	1929.840	1929.848592	N/A
20	55.2 DC	1929.840	1929.847964	0.33
-20	Nominal	1929.840	1929.848985	-0.20
50	Nominal	1929.840	1929.848999	-0.21

SAMPLE CALCULATION

$$\text{Deviation ppm} = \frac{FR - FM}{FR} \times 10^6$$

FR = Reference frequency of the carrier at 20^0 C
FM = Measured frequency of the carrier

RESULT

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

Appendix A - Test Procedures

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 = 300 kHz
VBW = 1 MHz

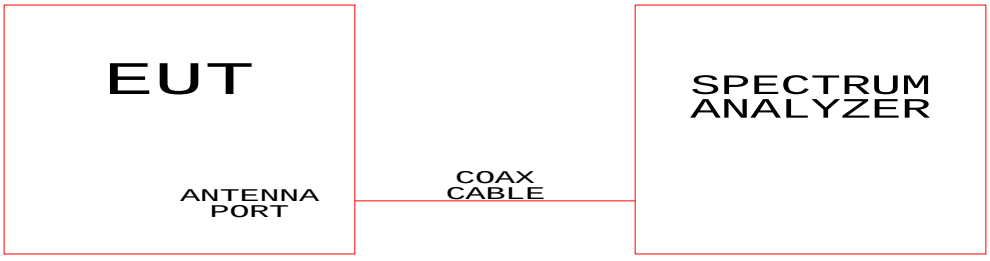
Emission Bandwidth (Section 6.1.3)

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)

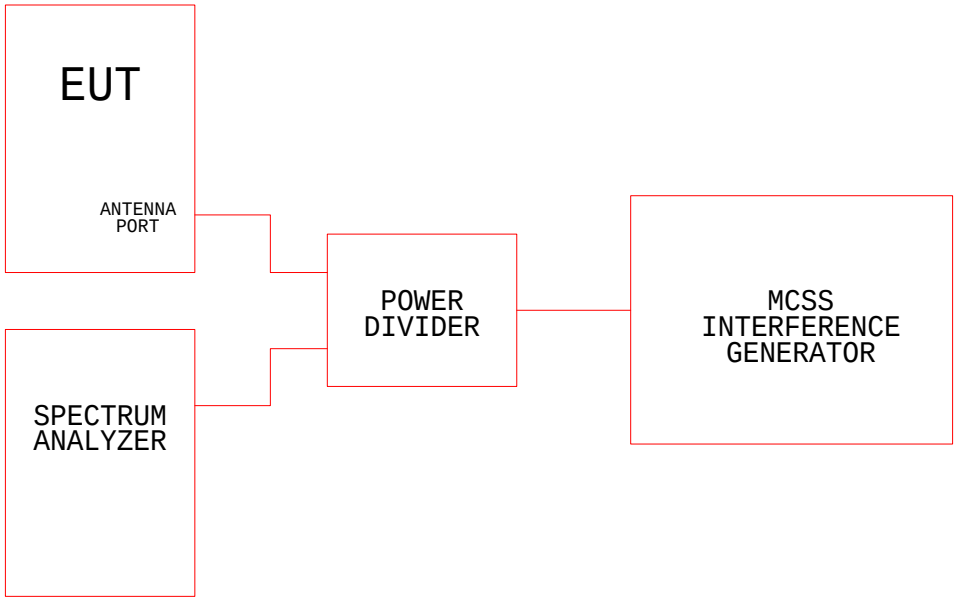


FCC Sections 15.323 (b), 15.323 (c)(1) through 15.323 (c)(12) -

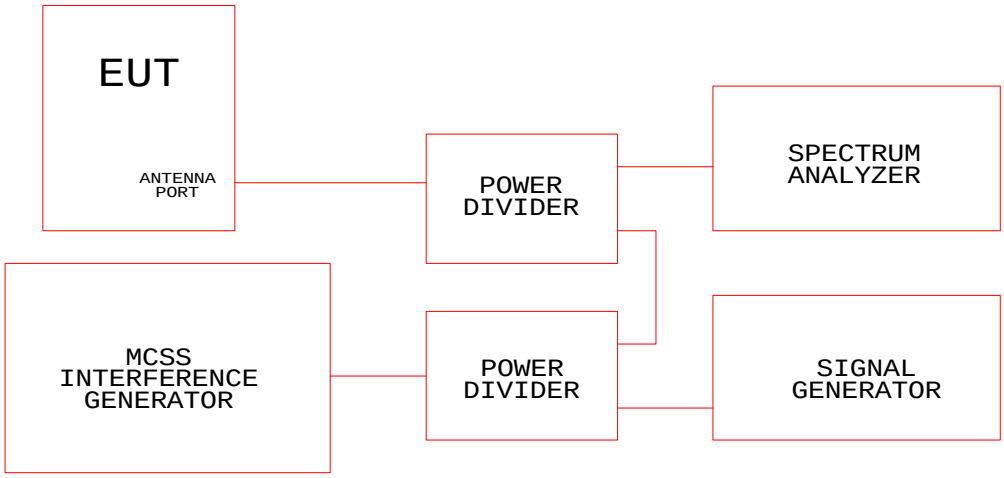
Sections 7 and 8 of ANSI-C63.17-1997

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

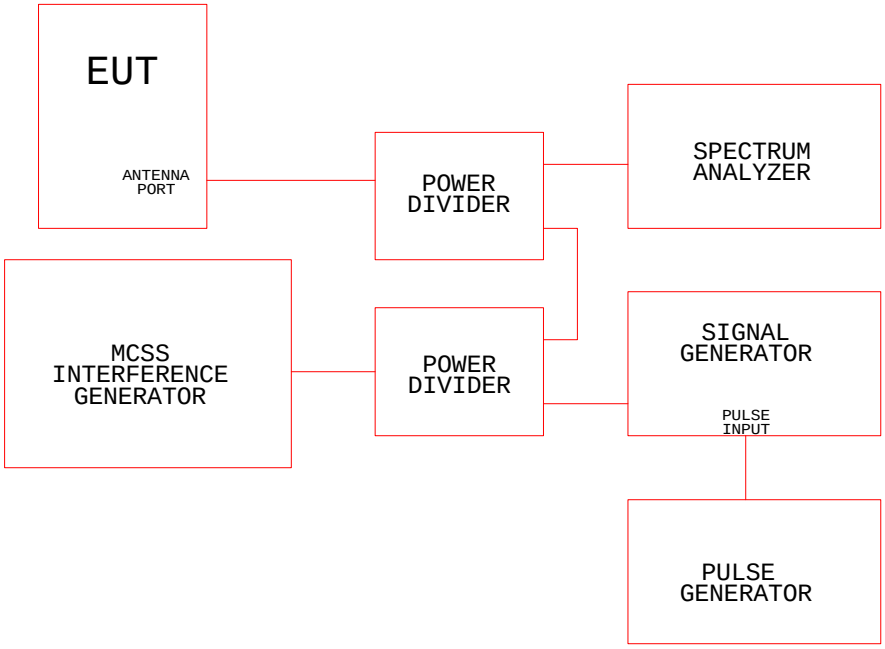
Test Configuration Block Diagram
(Sections 8.1.2, 8.1.3 and 8.2.1)



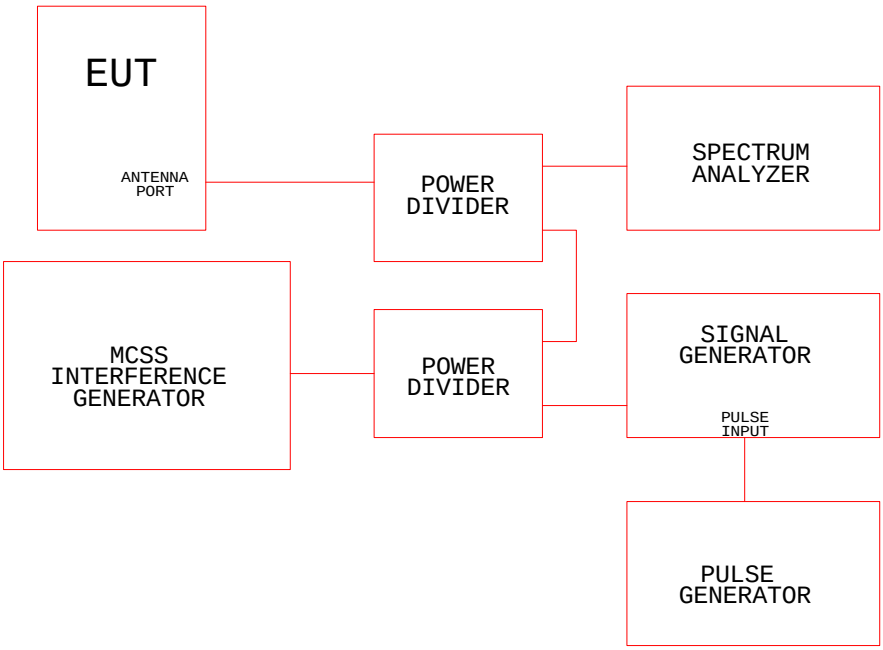
Test Configuration Block Diagram
(Sections 7.3.2.1, 7.3.2.2 and 7.4)



Test Configuration Block Diagram
(Section 7.5)



Test Configuration Block Diagram
(Section 8.2.3)



FCC Section 15.323 (c)(3)
Section 8.2.2 of ANSI-C63.17-1997

The EUT connected as shown in the block diagrams below. The protocal analyzer was placed in line between the PBX and the EUT to monitor the duration of the voice call. The testing was performed as per section 8.2.2 of ANSI C63.17-1998, while the base station and handset had a voice link established

FCC Section 15.323 (d) Spurious Emissions

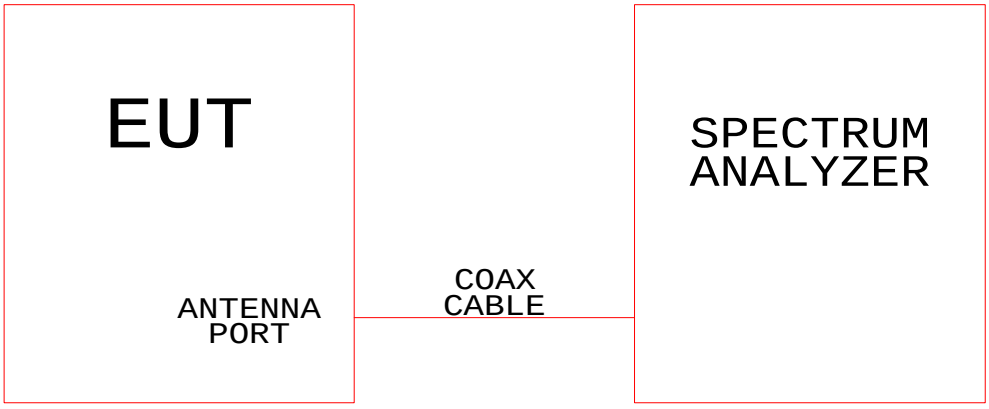
The EUT was directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The base station was connected to a computer that was used to control the base station to permit the base station and handset to transmit on predetermined channels. The spurious emissions 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.

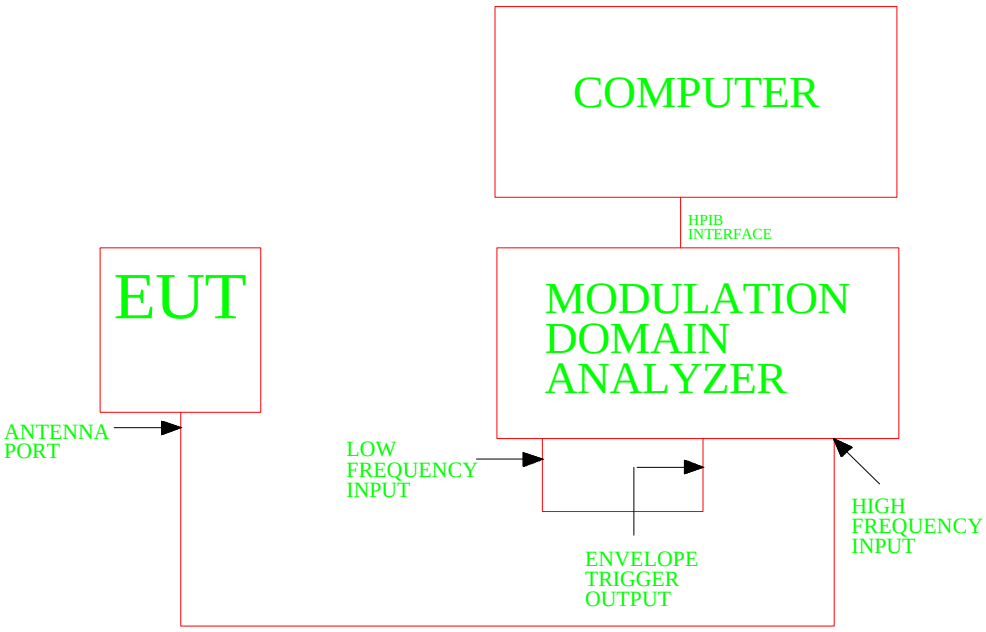
The modulation domain analyzer's settings were set as follows:

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 20^0C 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.

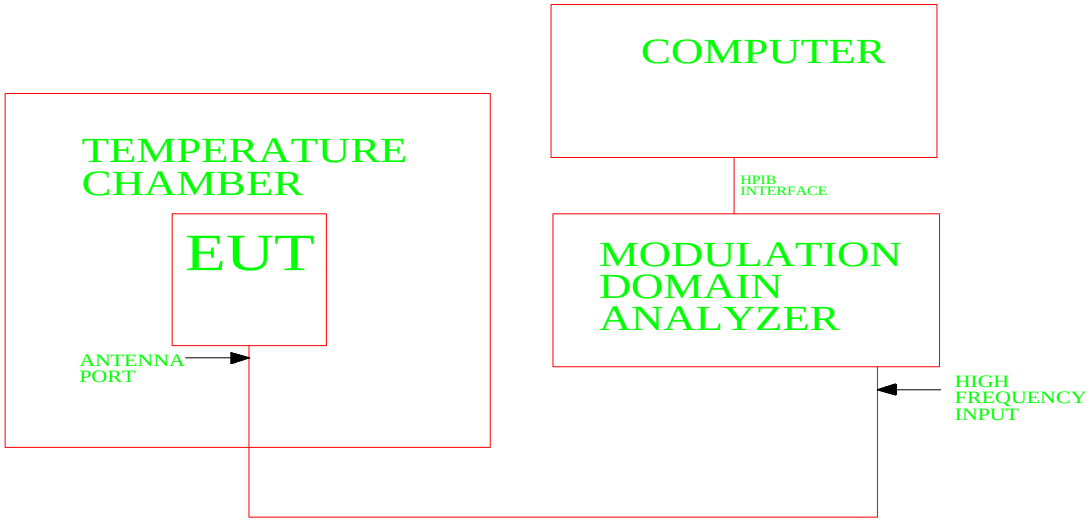
The modulation domain analyzer settings were set as follows:

Carrier Frequency Stability

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

X Axis:	Time
Time Setting:	625 :s
Measurement Interval:	10 :s
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	Signal Generator	Hewlett Packard	8648C
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

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

Appendix C – Hermon Laboratories (EMI Test Report)

The EMI test report was sent as a separate pdf file.